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AFWL-TR-
67-131,
VOL IV

AD834728

NUCLEAR EXPLOSION INTERACTION STUDIES

Volume IV

Material Property Codes

J. R. Triplett et al.
Gulf General Atomic Incorporated
San Diego, California 92112
Contract No. F29601-67-C-0014

TECHNICAL REPORT NO. AFWL-TR-67-131, VOL IV

April 1968

AIR FORCE WEAPONS LABORATORY
Air Force Systems Command
Kirtland Air Force Base
New Mexico

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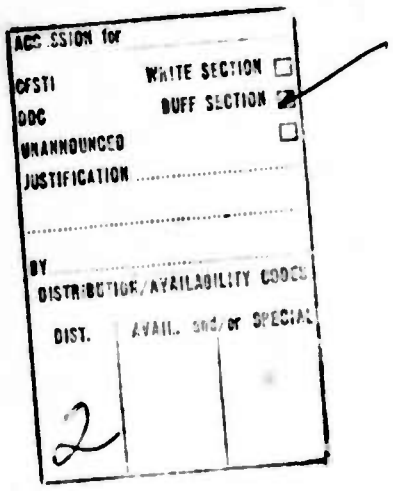

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FOREWORD

This report was prepared by Gulf General Atomic Incorporated, San Diego, California, under Contract F29601-67-C-0014. The research was funded by DASA under Project 5710, Subtask 07.017, Program Element 6.16.46.01H, and by ARPA Order 313, Program Element 6.25.03.01R.

Inclusive dates of research were 29 September 1966 to 27 October 1967. The report was submitted 13 March 1968 by the Air Force Weapons Laboratory Project Officer, Major John Bode (WLRT).

This report is published in four volumes: Volume I, Laser Phenomenology (classified CONFIDENTIAL); Volume II, Two-Dimensional Code Development; Volume III, The OUTPUT Code; and Volume IV, Material Property Codes. The first volume contains a classified report on interaction of laser radiation with solid targets and a brief description of calculations done in conjunction with experiments at the Air Force Weapons Laboratory. The remaining three volumes contain reports of code development efforts in the areas of radiative transfer, hydrodynamics, radiative absorption coefficients, and equations of state.

The projects described in this report are for the most part in an incomplete state of development. This is due in part to the nature of the existing computer programs themselves, which continue in a state of development as long as they are in use, and in part to the time scale involved in bringing new programs to a state of capability for solving real problems.

Gulf General Atomic staff personnel responsible for the direction of the research include J. H. Alexander, R. Brightman, R. S. Englemore, B. E. Freeman, W. B. Lindley, L. Norris, J. T. Palmer, L. M. Schalit, J. R. Triplett, and Mrs. Chris Imes. Contractor's report number is GA-7764, Vol IV.

The cooperation of Dr. P. V. Avizonis, Major J. Bode, Capt C. C. David, Major G. Spillman, and Lt L. Stoessel of AFWL is gratefully acknowledged.

Other documents produced under this contract are: GAMD-7592, " A Numerical Scheme for First-Order Compton Scattering," J. T. Palmer, December 13, 1966; GAMD-7846, "Difference Equations for Heat Flow in Two Dimensions," J. R. Triplett, March 2, 1967; GAMD-7879, "A Modified Characteristic Method for Radiative Transfer," J. R. Triplett, March 17, 1967; GAMD-7889, "R D C D. A FORTRAN Input Routine," J. H. Alexander, March 24, 1967; GAMD-8333, "Hydrodynamic Equations

for Multidimensional Problems," J. R. Triplett, October 24, 1967; GAMD-8379, "A Brief Study of the Thermodynamic Properties of Several Low Z Elements at Low Temperature," L. M. Schalit, November 22, 1967.

This technical report has been reviewed and is approved.

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ABSTRACT

(Distribution Limitation Statement No. 2)

The work covered by this volume falls into three parts: (1) opacity data generated by the DIAPHANOUS code; (2) equation-of-state-data generated by the SPUTTER/HECTIC subroutines AIRMOL and CMOL and the MARIER, HELAS, and HELIKE ionization potential routines; (3) descriptions of codes used to transfer data between LASL, AFWL, Gulf General Atomic, and the DASA Analysis and Information Center (DASIAC).

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NOTATIONS

$A_\alpha, B_\alpha, C_\alpha, D_\alpha, E_\alpha$	Coefficients for least-squares fit of enthalpy for species α
C_α	Concentration of species α in moles/cc; also used as above
E^o_α	Internal energy (cal mole) of species α at temperature T, one atmosphere
E_{sp}	Specific energy of gas mixture, cal/gm or erg/gm
G^o_α	Gibbs free energy (cal mole) of species α at temperature T, one atmosphere
H^o_α	Enthalpy of species α at temperature T, one atmosphere
$H^o_{0,\alpha}$	Heat of formation of species α at 0^oK, one atmosphere; stable molecules N_2, O_2, and A taken as reference state
K_1, K_2, K_3	Equilibrium constants in units of pressure for the reactions $N_2 \rightleftharpoons 2N$, $O_2 \rightleftharpoons 2O$, and $NO \rightleftharpoons N + O$ respectively
k_α	Integration constant needed to relate Gibbs free energy to enthalpy with polynomial expression
M	Mean atomic weight of air, about 14.55 gm/mole
M^o	Mean molecular weight of air at standard temperature and pressure (STP), about 29 gm/mole
$\overline{N}$	Mean number of atoms per molecule for the mixture
P	Total pressure; units will be either atmospheres or dynes/cm^2 to be consistent with context
P_α	Pressure for species α
Q	Classical partition function
R	Gas constant, units vary according to context used

NOTATIONS (continued)

T	Temperature in ^{o}K
V	Volume in cc
X_A^o	Atom fraction of argon in air at STP
X_O^o	Atom fraction of oxygen in air at STP
X_N^o	Atom fraction of nitrogen in air at STP
$(\Delta G_T^o)_j$	Change in Gibbs free energy for the j^{th} reaction at temperature T, one atmosphere
η_α	Number of atoms in molecule α
θ	Temperature in eV
ρ	Density in gm/cc
τ	Specific volume in cc/gm; $\tau = \rho^{-1}$
ϕ	Gas constant in SPUTTER units

SECTION I

INTRODUCTION

The NEIS contract has called for the continued development of the material properties representations used by the SPUTTER, MOTET, HECTIC, and other radiation transport and hydrodynamics codes used in the study of the interactions due to nuclear explosions.

The material properties data and codes that have been developed during this contract are, in large part, connected with the need to improve the opacity formulations used by the above-mentioned codes. The MOTET and HECTIC codes formerly had to use hand-computed fits to the opacities; it is now possible for them to use a data tape containing "grey" opacities. This tape contains data for over 30 different materials.

Techniques for efficient transfer of opacity data have been extensively developed and have been used to transfer such data between Los Alamos Scientific Laboratory, Gulf General Atomic, Air Force Weapons Laboratory, and the Defense Atomic Support Agency Information and Analysis Center (DASIAC). DASIAC has been supplied with a full set of the opacity data generated at Gulf General Atomic.

Descriptions of the numerous codes used to transfer information to DASIAC and other installations have been included in this volume. (The code listings and a discussion of the data formats are included.)

Extensive summaries of the opacity data computed using the DIAPHANOUS code were prepared using codes described in this volume. These summaries are presented in a separate report (Ref. 1).

The EIONX code (used for SPUTTER and HECTIC equation-of-state data) requires ionization potentials for the elements in the material under study. AUGEAS, a DIAPHANOUS input generator, also requires this data.

The MARIER, HELAS, and HELIKE codes were written to help satisfy this need. (This part of the continuing research effort has not yet been concluded.)

In this program Gulf General Atomic has used opacity data generated at Los Alamos Scientific Laboratory. Several codes had to be written before these data could be used by the SPUTTER code. These codes (ANDIMX and COMBO) are described in this volume.

SECTION II

DISCUSSION OF THERMODYNAMIC AND OPACITY PLOTS AND DIAPHANOUS DATA TABULATIONS

The plots and tabulations reported in reference 1 are of the thermodynamic and opacity data calculated by using the DIAPHANOUS code. In most respects the DIAPHANOUS code is similar to the one discussed in references 2 and 3. A few minor modifications and program corrections have been made, which will be discussed in greater detail in a series of follow-on volumes to the report of reference 2. The follow-on reports will also present the absorption coefficient plots as a function of frequency for the thermodynamic properties of materials presented in reference 1.

The data presented are consistent with a model of a monatomic ionizing gas. Other assumptions made are discussed (Ref. 2).

The elements for which data are presented (Ref 1) are:

Material No.	Material
1	Hydrogen
2	Helium
4	Beryllium
6	Carbon
10	Neon
13	Aluminum
18	Argon
26	Iron
29	Copper

(The material number is the atomic number.)

The (composite) multi-element materials are:

Material No.	Material
101	Polyethylene
102	Air
103	Teflon
105	Wet Tuff
106	Refrasil
108	Lithium Hydride
111	H - M - X
119	Grout
124	Playa
129	Average Shale
131	Average Limestone
134	Granite
136	Wet Alluvium
138	Sea Water

These material numbers are the same as those the SPUTTER subroutine EIONX uses in calculating the thermodynamic properties of an ionized gas. The compositions used by both DIAPHANOUS and EIONX are presented in tables I and II.

SPUTTER Material Numbers (as used by EIONX)

Material No.	Material
101	Polyethylene
102	Air
103	Teflon
104	Nylon-Phenolic A
105	Wet Tuff
106	Refrasil
107	Phenolic A
108	Lithium Hydride

Material No.	Material
109	Salt
110	Magnalium
111	H - M - X
112	Refrasil B
113	Phenolic B
114	Refrasil C
115	Carbon-Phenolic (R. Schlaug A)
116	Card Input Material 1
117	Card Input Material 2
118	Card Input Material 3
119	Roy Pauls Grout
120	Playa (R. T. Whittaker - AFWL)
121	Carbon-Phenolic (Mosen-Hays)
122	Refrasil-Phenolic (Mosen-Hays)
123	Lithium Deuteride
124	QPlaya-Calcium
125	DIAPHANOUS Air with Argon (R. T. Walsh)
126	Average Crust
127	Average Wood
128	Average Igneous Rock
129	Average Shale
130	Average Sandstone
131	Average Limestone
132	Average Sediment
133	N. T. Soil (Ref. AFWL-TR-65-171, 1966)
134	Granite (Mem. 97, Am. Geophys. Soc., Table 1. 1)
135	Hi Temp Epoxy-Novalac (Dow Chem. Co.)
136	Wet Alluvium (Ref. DuPont DP-1055)

Material No.	Material
137	Dry Alluvium (Ref. - Hugoniot Data from Sandia, SC-4903 (RR))
138	Sea Water (Handbook of Chemistry and Physics, Chemical Rubber Co., 45th ed. p. F82)
139	Lubri Seal, "HI Vacuum" (Source: A. H. Thomas Co., Philadelphia, Penn.)

TABLE I

DIAPHANOUS COMPOSITIONS FOR SPECIFIED MATERIAL NUMBERS

MATERIAL NO.	MATERIAL NAME	NOLMNT	Z	PART	Z	PART	Z	PART	Z	PART	Z	PART
101	Polyethylene	2	1	0.667	6	0.333						
102	Air	2	7	0.78	8	0.22						
103	Teflon	2	6	0.333	9	0.667						
105	Wet Tuff/Lo	3	1	0.305	8	0.497	14	0.198				
105	Wet Tuff/Hi	5	1	0.305	8	0.497	14	0.180	20	0.014	26	0.004
106	Refrasil	4	1	0.25	6	0.25	8	0.35	14	0.15		
108	Lithium Hydride	2	1	0.5	3	0.5						
111	H - M - X	4	1	0.286	6	0.143	7	0.286	8	0.286		
119	Grout	4	1	0.439	7	0.502	13	0.048	22	0.011		
124	Playa/Lo	4	1	0.221	6	0.049	8	0.536	14	0.197		
124	Playa/Hi	5	1	0.221	6	0.049	8	0.536	14	0.161	20	0.036
129	Shale	4	1	0.1029	8	0.6005	14	0.2562	26	0.0404		
131	Limestone	5	1	0.016	6	0.181	8	0.596	12	0.058	20	0.148
134	Granite/Lo	3	1	0.027	8	0.606	14	0.367				
134	Granite/Hi	5	1	0.027	8	0.606	12	0.106	14	0.206	22	0.055
136	Wet Alluvium	4	1	0.22	8	0.535	14	0.229	26	0.02		
138	Sea Water	5	1	0.6623	8	0.3311	11	0.0032	17	0.0033	20	0.0001

NOLMNT: Number of elements
Z: Atomic number
PART: Number fraction

TABLE II

EIONX COMPOSITIONS FOR SPECIFIED MATERIAL NUMBERS

MATERIAL NUMBER	NOLMNT	Z	PART	Z	PART	Z	PART	Z	PART	Z	PART
101	2.	1.	0.66666667	6.	0.33333333						
102	3.	7.	0.78467	8.	0.21062	18.	0.00471				
103	2.	6.	0.33333333	9.	0.66666667						
104	4.	1.	0.5625	6.	0.34375	7.	0.03125	8.	0.0625		
105	5.	1.	0.31	8.	0.497	13.	0.033	14.	0.1367	19.	0.023
106	4.	1.	0.25	6.	0.25	8.	0.35	14.	0.15		
107	3.	1.	0.45454545	6.	0.45454545	8.	0.09090909				
108	2.	1.	0.5	3.	0.5						
109	2.	11.	0.5	17.	0.5						
110	2.	12.	0.3	13.	0.7						
111	4.	1.	0.28571428	6.	0.14285714	7.	0.28571428	8.	0.28571428		
112	4.	1.	0.19136	6.	0.2392	8.	0.39026	14.	0.17918		
113	3.	1.	0.414	6.	0.517	8.	0.069				
114	5.	1.	0.248	5.	0.007	6.	0.292	8.	0.321	14.	0.132
115	3.	1.	0.179	6.	0.779	8.	0.042				
119	5.	1.	0.4282	6.	0.3264	7.	0.02697	8.	0.1602	14.	0.05626
120	5.	1.	0.22	6.	0.049	8.	0.535	14.	0.164	20.	0.032
121	5.	1.	0.0272	6.	0.8631	7.	0.0078	8.	0.0922	26.	0.0097
122	5.	1.	0.023	6.	0.252	7.	0.003	8.	0.384	14.	0.337
123	2.	1.	0.5	3.	0.5						
124	5.	1.	0.221	6.	0.049	8.	0.536	14.	0.161	20.	0.036
125	3.	7.	0.785	8.	0.21	18.	0.005				
126	5.	8.	0.6255	13.	0.1095	14.	0.2122	20.	0.0336	26.	0.0192
127	3.	1.	0.473	6.	0.317	8.	0.21				
128	5.	1.	0.0266	8.	0.6064	12.	0.1065	14.	0.2059	22.	0.0546
129	4.	1.	0.1029	8.	0.6005	14.	0.2562	26.	0.0404		
130	5.	1.	0.0352	8.	0.6553	12.	0.0266	14.	0.2542	20.	0.0286
131	5.	1.	0.0164	6.	0.18139999	8.	0.5958	12.	0.0578	20.	0.1485
132	5.	1.	0.0687	8.	0.6279	12.	0.0699	14.	0.1865	20.	0.047
133	4.	1.	0.163	8.	0.558	14.	0.226	20.	0.053		
134	5.	8.	0.6399	13.	0.0854	14.	0.2392	19.	0.0251	26.	0.0104
135	3.	1.	0.4615	6.	0.4461	8.	0.0923				
136	4.	1.	0.22	8.	0.535	14.	0.229	26.	0.02		
137	4.	1.	0.083	8.	0.609	14.	0.281	26.	0.026		
138	5.	1.	0.6623	8.	0.3311	11.	0.0032	17.	0.0033	20.	0.0001
139	3.	1.	0.657	6.	0.342	8.	0.001				

Note that the compositions listed are not always identical. However, they are enough alike, in light of other concurrent approximations in the radiation-transport hydrodynamics codes, for the user to consider the opacity data (provided by DIAPHANOUS to SPUTTER) to be for the same material as the thermodynamic data (provided by EIONX to SPUTTER), when the same number is used as (1) the equation-of-state material number, specifier, and (2) the opacity material number specifiers in SPUTTER input.

DIAPHANOUS runs for a given material are usually done in two sets, a low-temperature set and a high-temperature set. It is now standard practice to run the temperatures 1, 1.5, 2.25, 3.4, 5., 7., 10., 15., 22.5, and 34. eV as the low-temperature set. Graphs made from such runs have the material name followed by /LO in their upper titles. Similarly, the standard high-temperature set comprises 50., 70., 100., 225., 340., 500., 700., 1000., and 2250. eV. Occasionally, more temperature values are added (3400., 5000., and 10,000. eV). These graphs have the material name followed by /HI in the upper title. In any case, the graphs plotted at a constant temperature on any given curve have a list of these temperatures (with their respective plotting symbol) just below the upper title. In addition, various dates, tape numbers, and other data are recorded in the plot titles for historical background.

The two independent variables in DIAPHANOUS runs are temperature, θ (in eV), and Γ, a dimensionless "electron degeneracy parameter,"

$$\Gamma \equiv \frac{2(2\pi\, m\, \theta)^{3/2}}{h^3 N_e}$$

where N_e is the number density of free electrons, m is the electron mass, and h is Planck's constant, and

$$(1/N_e) = \frac{(\overline{M^o}/N_a)}{\rho\, \overline{Z}}$$

where ρ is the density in gm/cc, $\overline{Z}$ is the mean ionization (i.e., mean ion charge), $\overline{M^o}$ is the mean atomic weight, and N_a is Avogadro's number of

molecules per mole. Thus $\overline{(M^o/N_a)}$ is the mean mass per molecule.

Then Γ is seen to be inversely proportional to both ρ and $\overline{Z}$:

$$\Gamma = \frac{2(2\pi\, m\, \theta)^{3/2}\overline{(M^o/N_a)}}{h^3\, \rho\, \overline{Z}}$$

$$= c' \left(\frac{\theta^{3/2}}{\rho\, \overline{Z}}\right) \overline{M^o} \cong (0.01\, \theta^{3/2}\overline{M^o})/(\rho \overline{Z})$$

Γ is a natural variable for the DIAPHANOUS code; however, it is an inconvenient variable for intuitive physical reasoning since $\Gamma = \Gamma[\theta, \rho, \overline{Z}(\theta, \rho)]$ for a given material. For this reason, most of the plots have been done for the several dependent variables on curves of constant temperature. For completeness, some plots at constant Γ have been included for each material. The graphs at constant Γ have a list of the Γ values, along with the respective plotting symbol, just below the upper title.

For any given material, the plots are usually in two sets, a /LO set and a /HI set. Within a given set, a group of plots with curves at constant temperature are followed by a group of plots with curves at constant Γ. The y-axis labels are complete and self-explanatory with the exception of the quantity EGAM which is defined as

$$\text{EGAM} \equiv 1 + P/\rho E$$

where P is the pressure in dynes/cm^2, ρ is the density in gm/cc, and E is the specific internal energy in ergs/gm so EGAM is dimensionless. (The quantities ρ and E are the same quantities used in the other graphs and tabular data. P is in units of bars in the other graphs and in the tabular data.)

The plots are arranged in order of increasing material number. Refer to reference 1 for further information on the codes used.

The plots were produced by the following sequence of computer runs:

a. DYPER4 was run to produce plots of the absorption coefficient as a function of frequency and to punch summary cards of thermodynamic and opacity data.

b. GRAPH and TRANS were run using the above summary cards as input. Plot tapes were prepared for the SC-4020 plotter.

The tabulations following the plots were produced by the DLISTR program from the summary cards.

INTRODUCTION TO DISCUSSION OF MATERIAL PROPERTIES SUBROUTINES AND DATA PROCESSING CODES

The following code descriptions are of some of the computer programs developed for and used in the material property calculations performed for this contract.

The codes discussed fall into two overlapping categories:

1. Codes used to generate the tabular or graphical data presented in reference 1. These include:

GOLEM, AIRMOL, DYPER4, GRAPH, TRANS, HELIKE, HELAS, LEVELS, TEDIUS, MARIER, MARIE, DLISTR, GREYS, and EGREY.

2. Codes that have been used in transferring opacity data from one installation to another. These codes have been used to process data from LASL, to supply data to AFWL, and most recently, to create sizeable quantities of stored opacity data at the DASA Information and Analysis Center (DASIAC) in Santa Barbara, California. These include:

DENSER, DASE, DAPHNE, ANDIMX, COMBO, DIANE, DIANTC, DIANCT, DYPDIN, GREYS, EGREY, REDGRE, DLISTR, LEVELS, TEDIUS, EDSILV, DYPER4, GRAPH, and TRANS.

Some applications of the codes discussed in this volume are given in reference 1.

SECTION III

EQUATION-OF-STATE DATA AND CODES

A description of the physics and programming techniques used in the SPUTTER/HECTIC molecular air equation-of-state subroutine AIRMOL, and a description of several codes used to generate needed ionization potentials for the EIONX subroutine is presented in this section.

Several accessory codes (such as GOLEM) are also described.

AIRMOL: A MOLECULAR EQUATION-OF-STATE SUBROUTINE FOR AIR

The computer subroutine AIRMOL develops a molecular equation-of-state for air in thermodynamic equilibrium from room temperature to $25,000^{\circ}K$ over a density range of 10 gm/cc to 10^{-7} gm/cc. Enthalpies and free energies are obtained from analytic fits of tabulated data. The system composition is derived from conservation relations and reaction equations. The thermodynamic variables E, P, $(\partial E/\partial\theta)_{\tau}$, $(\partial E/\partial\tau)_{\theta}$, $(\partial P/\partial\theta)_{\tau}$, and $\overline{N}$ are the final output of the code. These are transferred to the EIONX code, which calculates all translation and ionization quantities. These two subroutines are used in the SPUTTER code, which is a general purpose one-dimensional radiation and fluid mechanics program.

```
      SUBROUTINE AIRMOL(THETA,TAU,FESTER)
C
C
C                GLOSSARY FOR AIRMOL
C
C     ********************************************************************
C     *          DEDTAU     SAME AS   CARBNZ(3)                          *
C     *          DEDTHT     SAME AS   CARBNZ(4)                          *
C     *          DPDTAU     SAME AS   CARBNZ(5)                          *
C     *          DPDTHT     SAME AS   CARBNZ(6)                          *
C     *          EDIS       SAME AS   CARBNZ(1)                          *
C     *          NBAR       SAME AS   ELON(17)                           *
C     ********************************************************************
C
C     A(6)       POLYNOMIAL COEFFICIENT FOR ENTHALPY.
C     AI         XNEPN*RHO. THE TOTAL NUMBER OF N ATOMS (IN MOLE/CC) AT
C                ANY TEMPERATURE AND PRESSURE.
C     AEST       2.*EST
C     B(6)       POLYNOMIAL COEFFICIENT FOR ENTHALPY.
C     BARK(6)    INTEGRATION CONSTANT FOR FREE ENERGY IF ENTHALPY IS
C                POLYNOMIAL
C     BARK2(6)   INTEGRATION CONSTANT FOR FREE ENERGY IF ENTHALPY IS
C                5/2RT
C     C(6)       POLYNOMIAL COEFFICIENT FOR ENTHALPY.
C     CON(6)     CONCENTRATION, MOLES/CC.
C     D(6)       POLYNOMIAL COEFFICIENT FOR ENTHALPY.
C     DI         SQRT(CON(N2))
C     DCDT(6)    D(CON(I))/DT
C     DCDTAU(6)  D(CON(I))/D(AU
C     DEDT(6)    D(ESPEC2(I))/DT
C     DEDTAU     D(EDIS)/DTAU
C     DEDIS      D(EDIS)/DI
C     DEDTHT     D(EDIS)/D(HETA
C     DELH(6)    ENTHALPY AT ONE ATMOSPHERE, ZERO DEGREES KELVIN, 'HEAT
C                OF FORMATION AT REFERENCE STATE', CALORIE/MOLE.
C     DGDT(6)    D(FRENRG(I))/DT.
C     DKP1DT     D(KP1)/DT
C     DKP2DT     D(KP2)/DT
C     DKP3DT     D(KP3)/DT
C     DNDT       D(NBAR)/DT
C     DNUM       DENOMINATOR IN DETERMINANT EQUATS. FOR  D(CON(I))/DT
C                AND  D(CON(I))/DTAU
C     DPDTAU     D(PRESHR)/D(AU = -PRESHR/NBAR*D(NBAR)/DTAU
```

```
C      DPDTHT    -PRESHR * D(NBAR)/DT *(DT/DTHETA)/NBAR . DP/DTHETA
C                WITHOUT  P/THETA TERM
C      E(6)      POLYNOMIAL COEFFICIENT FOR ENTHALPY.
C      E1        2*R2TKEL/RT2
C      EDIS      ENERGY -3/2*PH1*(1/NBAR)*THETA.  TOTAL SPECIFIC ENERGY
C                DUE TO DISSOCIATION.
C      ENERGY    TOTAL SPECIFIC ENERGY, ERG/GM
C      ESPECZ(6) INTERNAL ENERGY AT TKEL, ONE ATMOSPHERE, CAL/MOLE
C      ES1       ESTIMATE AT RATIO CON(NO)/CON(N2) BEFORE ITERATION START
C      EZ        TOTAL DIMENSIONLESS ENERGY. E/RT
C      F1        1 + CON(NO)/KP3*R2TKEL
C      FRENRG(6) (FREE ENERGY AT TKEL)/(R*TKEL), DIMENSIONLESS
C      HSPECZ(6) ENTHALPY AT TKEL, ONE ATMOSPHERE, CAL./MOLE
C      KP1       EQUILIBRIUM CONSTANT IN PRESSURE UNITS FOR N2=2N
C      KP2       EQUILIBRIUM CONSTANT IN PRESSURE UNITS FOR O2=2O
C      KP3       EQUILIBRIUM CONSTANT IN PRESSURE UNITS FOR N+O=NO
C      MARK      CALLING PARAMETER
C                - INCLUDE  ELECTRONIC  EXCITATION FOR ATOMS
C                + NO ELECTRONIC EXCITATION FOR ATOMS
C                0 LIKE +, ALSO PRINTOUT DEBUG QUANTITIES IN AIRMOL
C      MOFRCT(6) MOLE FRACTION
C      NBAR      MEAN NUMBER OF ATOMS PER MOLECULE FOR GAS MIXTURE
C      NITER     ITERATION COUNTER
C      NUNOR1    0 IF ENTHALPY/RT IS CONSTANT FOR ATOMS, 1 IF ENTHALPY/RT
C                IS POLYNOMIAL
C      OLDX(6)   CONCENTRATION OF PREVIOUS ITERATION
C      PH1       9.649E11/WTREF
C      PO        TOTAL PRESSURE, ATMOSPHERES
C      PRESHR    TOTAL PRESSURE, DYNE/CM**2
C      RHO       DENSITY, GM/CC
C      RM1,RM2   RIGHT HAND SIDE OF DETERMINANT EQUATS. FOR D(CON(I))/DTAU
C      RM3-5     RIGHT HAND SIDE OF DETERMINANT EQUATS. FOR D(CON(I))/DT
C      RTKEL     R*TKEL, R=1.98726 CAL/MOLE/DEG
C      R2TKEL    R*TKEL, R=82.054 CC*ATM/MOLE/DEG
C      RT2       R2TKEL**2
C      SCDE      SUM OF D(ESPECZ(I))/DT * CON(I)
C      SCE       SUM OF D(CON(I))/DT * ESPECZ(I)
C      SDT       SUM OF D(CON(I))/DT
C      SDTAU     SUM OF D(CON(I))/DTAU
C      SNC       TOTAL NUMBER OF ATOM PER CC. SUM OF N(I)*CON(I), WHERE
C                N(I) IS ATOM/MOLECULE
C      SNDTAU    SUM OF N(I)*D(CON(I))/DTAU. N(I)=ATOM/MOLECULE
C      SUMCON    SUM OF ALL CON(I), MOLE/CC
C      SUMNRG    TOTAL ENERGY, CAL/CC.  SUM OF CON(I)*ESPECZ(I)
C      TAU       SPECIFIC VOLUME, CC./GM.
C      THETA     TEMPERATURE, EV.
C      TKEL      TEMPERATURE, DEGREES KELVIN
C      TKELN     ALOG(TKEL)   NATURAL  LOG
C      TRM1      KP1/R2TKEL
C      TRM2      A1=CON(NO)
C      VV        XMLFO*RHO. THE TOTAL NUMBER OF O ATOMS (IN MOLE/CC) AT
C                ANY TEMPERATURE
C      V1,V2,V3  CHANGE IN (FREE ENERGY/RT) FOR REACTIONS N2=2N, O2=2O,
C                AND  N+O=NO RESPECTIVELY
C      WTREF     ATOMIC WEIGHT OF AIR AT STP, ABOUT 14.55 GM/MOLE
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C     XREFA      MOLE FRACTION OF A ATOMS/MEAN ATOMIC WEIGHT AT STP
C     XREFO      MOLE FRACTION OF O ATOMS/MEAN ATOMIC WEIGHT AT STP
C     XREFN      MOLE FRACTION OF N ATOMS/MEAN ATOMIC WEIGHT AT STP
C
C
      COMMON/LMS/EION(20)
      EQUIVALENCE (NBAR,EION(17))
      COMMON/LMSG/CARBN2(10)
      DIMENSION AIR(10)
      EQUIVALENCE(AIR(1),CARBN2(1) )
      EQUIVALENCE (AIR(1),EDIS),(AIR(3), DEDTAU) , (AIR(4),DEDTHT),
     * (AIR(5),DPDTAU) , (AIR(6),DPDTHT)
      DIMENSION A(6), B(6), C(6), D(6), E(6), BARK(6), BARK2(6), CON(6) AIRM  50
     *          ,DELH(6),OLDX(6),FRENRG(6),HSPECZ(6),ESPECZ(6),MOFRCT(6)
      DIMENSION                    DCDT(6), DCDTAU(6), DEDT(6), DGDT(6)   AIRM  60
      REAL KP1, KP2, KP3, MOFRCT, NBAR                                    AIRM  70
      DATA XREFN, XREFO, XREFA/5.3929E-2, 1.4476E-2, 3.257E-4/             AIRM  80
      DATA AIREF/14.55/,  AIR (8)/0./,PHI/6.63E10/
      DATA A/3.39032, 3.48754, 3.02986, 2.54395, 2.66918, 2.49716/         AIRM 100
      DATA B/3.26691E-4, 3.33691E-4, 2.39195E-4, - 7.03288E-5, -           AIRM 110
     '6.76606E-5, 2.06980E-6/                                              AIRM 120
      DATA C/-4.43869E-8, - 5.26154E-8, - 2.68348E-8, 2.10493E-8,          AIRM 130
     '1.16238E-8, - 2.90268E-10/                                           AIRM 140
      DATA D/2.84212E-12, 1.78842E-12, 1.46612E-12, - 1.23848E-12, -       AIRM 150
     '6.49696E-13, - 2.16444E-15/                                          AIRM 160
      DATA E/-5.61017E-17, - 3.45129E-17, - 2.68536E-17, 2.27227E-17,      AIRM 170
     '1.25238E-17, 1.16325E-18/                                            AIRM 180
      DATA DELH/0., 0., 21476.5, 112579.5, 58986.5, 0./                    AIRM 190
      DATA BARK/3.47421, 4.63168, 4.44607, 3.99389, 4.12663, 4.37850/      AIRM 200
      DATA BARK2/1., 1., 1., 4.48452, 5.26387, 4.37217/                    AIRM 210
      DATA EREF/2.699E11/
C
C
      MARK=FESTER+.5
C
      TKEL = 11605.4*THETA                                                 AIRM 220
      RHO = 1./TAU                                                         AIRM 230
      RTKEL = 1.98726*TKEL                                                 AIRM 240
      R2TKEL = 82.054*TKEL                                                 AIRM 250
      RT2 = R2TKEL**2                                                      AIRM 260
      TKELN = ALOG(TKEL)                                                   AIRM 270
      DO 3 I = 1,6
      DCDT(I) = 0.
      CON(I) = 0.
    3 DCDTAU(I) = 0.
      PRESHK = 0.
      SUMNRG = 0.
      ENERGY = 0.
      PO = 0.
      EZ = 0.
      DEDTAU = 0.
      DPDTHT = 0.
      DPDTAU = 0.
      DEDTHT = 0.
      KP1 = 0.
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      KP2 = 0.
      KP3 = 0.
      IF (TKEL .LT. 25000.) GO TO 1
      EDIS = 2.899E11 - EREF
      NBAR = 1.
      GO TO 1000
    1 CONTINUE
      IF (RHO .LT. 10.1) GO TO 2
         AIR(8) = 96.0001
      RETURN
    2 CONTINUE
C
C                 COMPUTE ENTHALPY, FREE ENERGY, AND DEDT(I), AND DGD(I,I)
C
      L=5
      IF (MARK .LT. 0) L=6
   10 CONTINUE                                                          AIRM 380
      DO 15 I = 1, L                                                    AIRM 390
      HSPEC2(I) = RTKEL*(A(I) + TKEL*(B(I) + TKEL*(C(I) + TKEL*(D(I) +  AIRM 400
     * TKEL*E(I))))) + DELH(I)                                          AIRM 410
      DED(I) = HSPEC2(I)/TKEL + 1.98726*(-1. + TKEL*(B(I) + TKEL*(2.*C(AIRM 420
     * I) + TKEL*(3.*D(I) + TKEL*(4.*E(I))))))                          AIRM 430
      FRENRG(I) = A(I)*(1. - TKELN) - (BARK(I) + TKEL*(B(I) + TKEL*(C(I)AIRM 440
     * /2. + TKEL*(D(I)/3. + TKEL*E(I)/4.)))) + DELH(I)/RTKEL           AIRM 450
   15 DGDT(I)=-(A(I)/TKEL  +B(I)+TKEL*(C(I)+TKEL*(D(I)+TKEL*E(I)))
     *           +DELH(I)/(RTKEL*TKEL))
      IF (MARK .LT. 0) GO TO 20
      DO 25 I = 4, 6                                                    AIRM 480
      HSPEC2(I)=2.5*RTKEL+DELH(I)
      DEDT(I) = 1.5*1.98726                                             AIRM 500
      FRENRG(I) = 2.5*(1. - TKELN) - BARK2(I) + DELH(I)/RTKEL           AIRM 510
   25 DGDT(I)=- (2.5*DELH(I)/RTKEL)/TKEL
   20 CONTINUE                                                          AIRM 520
C
C                 ARGON CONCENTRATION.
C
      CON(6) = XREFA*RHO                                                AIRM 590
      NITER = 1                                                         AIRM 690
      IF (TKEL - 1200. .GT. -1.E-30) GO TO 60
C
C                 LOW TEMPERATURE APPROXIMATION.
C
      CON(1)=2.6965E-2*RHO
      CON(2)=7.2379E-3*RHO
      DEDTHT = TAU*(DEDT(1)*CON(1) + DEDT(2)*CON(2) + DEDT(6)*CON(6))*
     1     4.184E7*11605.4 - 1.5*PHI/1.99
      GO TO 70                                                          AIRM 660
C
C                 CALCULATE CONCENTRATION BY ITERATIVE METHOD.
C
   60 CONTINUE                                                          AIRM 670
C
C                 EQUILIBRIUM CONSTANTS.
C
      V1 = 2.*FRENRG(4) - FRENRG(1)                                     AIRM 530
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      KP1 = EXP(-V1)                                                    AIRM 540
      V2 = 2.*FRENRG(5) - FRENRG(2)                                     AIRM 550
      KP2 = EXP(-V2)                                                    AIRM 560
      V3 = FRENRG(4) + FRENRG(5) - FRENRG(3)                            AIRM 570
      KP3 = EXP(-V3)                                                    AIRM 580
C
C               CALCULATE  CON(N2) BY ASSUMING CON(NO)/CON(N2) =EST
C
      EST = .01                                                         AIRM 640
      TRM1 = KP1/R2TKEL                                                 AIRM 700
      A1 = XREFN*RHO                                                    AIRM 710
      VV = XREFO*RHO                                                    AIRM 720
      E1 = 2.*R2TKEL/KP2                                                AIRM 730
  300 CONTINUE                                                          AIRM 740
C
C               AFTER FIRST PASS, USE OLD VALUE OF CON(NO) IN EQUATION
C               FOR CON(N2)
C
      IF (NITER .NE. 1)                                                 AIRM 750
     * GO TO 325                                                        AIRM 760
      AEST = 2. + EST                                                   AIRM 770
      D1 = 2.*A1/(SQRT(TRM1) + SQRT(AEST)*SQRT(TRM1/AEST + 4.*A1))      AIRM 780
      GO TO 330                                                         AIRM 790
  325 CONTINUE                                                          AIRM 800
      TRM2 = A1 - CON(3)                                                AIRM 810
      IF (TRM2 .LT. 0.)                                                 AIRM 820
     * TRM2 = 0.                                                        AIRM  30
      D1 = 2.*(A1 - CON(3))/(SQRT(TRM1) + SQRT(TRM1 + 8.*TRM2))         AIRM 840
C
C
  330 CON(1) = D1**2                                                    AIRM 850
C
C               CON(N)
C
      CON(4) = SQRT(KP1)*SQRT(CON(1)/R2TKEL)                            AIRM 860
      F1 = 1. + CON(4)/KP3*R2TKEL                                       AIRM 870
C
C               CON(O)
C
      CON(5) = 2.*VV/(F1 + SQRT(F1**2 + 4.*E1*VV))                      AIRM 880
C
C               CON(O2)
C
      CON(2) = CON(5)**2/KP2*R2TKEL                                     AIRM 890
C
C               CON(NO)
C
      CON(3) = CON(4)*CON(5)*R2TKEL/KP3                                 AIRM 900
   70 CONTINUE                                                          AIRM 910
      SUMCON = 0.                                                       AIRM 920
      DO 30 J = 1, 6                                                    AIRM 930
   30 SUMCON = SUMCON + CON(J)                                          AIRM 940
C
C               MOLE FRACTIONS
C
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      DO 35 J = 1, 6                                                    AIRM 950
   35 MOFRCT(J) = CON(J)/SUMCON                                         AIRM 960
      IF (MARK .NE. 0) GO TO 235
   75 WRITE (6, 210)MOFRCT, NITER                                       AIRM 970
  210 FORMAT (18HMOMOFRCT(I), NITER,1P6E12.5,I5)                        AIRM 980
      WRITE (6, 220)CON                                                 AIRM 990
  220 FORMAT (/H CON(I),10X,1P6E12.5)
      WRITE (6, 230)SUMCON                                              AIRM1010
  230 FORMAT (/H SUMCON,1P6E12.6)                                       AIRM1020
  235 CONTINUE
C
C                 FOR LOW TEMPERATURE, NO ITERATIONS
C
      IF (TKEL .LT. 1200.)                                              AIRM1030
     * GO TO 110                                                        AIRM1040
      IF (NITER .EQ. 1)                                                 AIRM1050
     * GO TO 310                                                        AIRM1060
C
C                 TEST FOR CONVERGENCE
C
      TEST = ABS(OLDX(1) - CON(1))/OLDX(1)*100.                         AIRM1070
      IF (TEST .LT. .1)                                                 AIRM1080
     * GO TO 110                                                        AIRM1090
C
C                 TEST IF ITERATION LIMIT EXCEEDED
C
      IF (NITER .GE. 10)                                                AIRM1100
     * GO TO 120                                                        AIRM1110
  310 DO 314 I = 1, 6                                                   AIRM1120
  314 OLDX(I) = CON(I)                                                  AIRM1130
      NITER = NITER + 1                                                 AIRM1140
C
C                 ITERATE
C
      GO TO 300                                                         AIRM1150
  120    AIR(8) = 96.0120
      RETURN
  110 CONTINUE                                                          AIRM1180
C
C                 THERMO. PROPERTIES OF MIXTURE
C
      SNC = 2.*(CON(1) + CON(2) + CON(3)) + CON(4) + CON(5) + CON(6)    AIRM1190
      PRESMR = 8.314/E7*TKEL*SUMCON                                     AIRM1200
      NBAR = SNC/SUMCON                                                 AIRM1210
      DO 200 I = 1, 6                                                   AIRM1240
      ESPEC2(I) = HSPEC2(I) - RTKEL                                     AIRM1250
      E2 = E2 + MOFRCT(I)*ESPEC2(I)/RTKEL                               AIRM1260
  200 SUMNRG = SUMNRG + CON(I)*ESPEC2(I)                                AIRM1270
      ENERGY = TAU*SUMNRG*4.184E+7
      EDIS = ENERGY - 1.5*PHI*THETA/NBAR-EREF
      PO = R2TKEL*SUMCON                                                AIRM1290
C                                                                       AIRM1300
C           ***DERIVATIVES OF CONCENTRATIONS ***
C                                                                       AIRM1320
      IF (TKEL .LT. 1200.) GO TO 1000
```

```
C                                                                       AIRM1330
C               EQUILIBRIUM CONSTANTS DERIVATIVES
C                                                                       AIRM1350
      DV1DT=  -2.*DGDT(4) + DGDT(1)
      DV2DT = -2.*DGDT(5)+DGDT(2)
      DV3DT= -(DGDT(4)+DGDT(5))+DGDT(3)
      DKP1DT= KP1*DV1DT
      DKP2DT= KP2*DV2DT
      DKP3DT = KP3*DV3DT
C                                                                       AIRM1390
C               RIGHT HAND SIDE OF DET. EQUATS. FOR CONCENTRATION'S
C               DERIVATIVES
C                                                                       AIRM1410
      RH1 = -XREFN*RHO**2                                               AIRM1420
      RH2 = -XREFO*RHO**2                                               AIRM1430
      RH3 = CON(1)*DKP1DT - 82.054*CON(4)**2                            AIRM1440
      RH4 = CON(2)*DKP2DT - 82.054*CON(5)**2                            AIRM1450
      RH5 = CON(3)*DKP3DT - 82.054*CON(4)*CON(5)                        AIRM1460
C
C               CONCENTRATIONS DERIVATIVES
C
      XX = CON(4)*R2IKEL
      YY = CON(5)*R2IKEL
      ZZ = 4.*XX/KP1 + 1.
      DD = YY + KP3*ZZ
      WW = 2./(KP2*ZZ)
      DD1 = RH4 - KP2/KP1*RH3
      EE1 = RH5 + 2.*KP3/KP1*RH3
      DD2 = .5*KP2*(RH2 - RH1)
      EE2 = KP3*RH1
      A55 = XX + (2.*YY + .5*KP2)*DD*WW
      A56 = EE1 + WW*DD1*DD
      B56 = EE2 + WW*DD2*DD
      DCDT(5) = A56/A55
      DCDT(4) = WW*((2.*YY + .5*KP2)*DCDT(5) - DD1)
      DCDT(3) = 2.*RH3/KP1 - ZZ*DCDT(4)
      DCDT(2) = -.5*(DCDT(3) + DCDT(5))
      DCDT(1) = -.5*(DCDT(3) + DCDT(4))
      DCDTAD(5) = B56/A55
      DCDTAD(4) = WW*((2.*YY + .5*KP2)*DCDTAD(5) - DD2)
      DCDTAD(3) = RH1 - ZZ*DCDTAD(4)
      DCDTAD(2) = .5*(RH2 - DCDTAD(3) -DCDTAD(5))
      DCDTAD(1) = .5*( - DCDTAD(3) + (RH1 - DCDTAD(4)))
      DCDT(6) = 0.                                                      AIRM1770
      DCDTAD(6)=-CON(6)*RHO
C
C               THERMO. PROPERTIES DERIVATIVES
C
      SDT = DCDT(1) + DCDT(2) + DCDT(3) + DCDT(4) + DCDT(5) + DCDT(6)   AIRM1790
      SDTAD = DCDTAD(1) + DCDTAD(2) + DCDTAD(3) + DCDTAD(4) + DCDTAD(5)  AIRM180
     *  + DCDTAD(6)                                                     AIRM1810
      SNDT = 2.*(DCDT(1) + DCDT(2) + DCDT(3)) + DCDT(4) + DCDT(5) + DCDTAIRM1820
     * (6)                                                             AIRM1830
      SNDTAD = 2.*(DCDTAD(1) + DCDTAD(2) + DCDTAD(3)) + DCDTAD(4) +     AIRM1840
     * DCDTAD(5) + DCDTAD(6)                                           AIRM1850
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      DNUT = (SNDT - NBAR*SUT)/SUMCON                                    AIRM1860
      DNUTAU = (SNUTAU - NBAR*SUTAUT/SUMCON                              AIRM1870
      IF (NBAR-1. .LT. 1.E-6) DNUTAU = DCDTAU(1) + DCDTAU(2) + DCDTAU(3)
      SCE = 0.                                                           AIRM1910
      SCUE = 0.                                                          AIRM1920
      PROG = 0.
      DO 405 I = 1, 6                                                    AIRM1930
      SCE = SCE + DCUT(I)*ESPEC2(I)                                      AIRM1940
      PROG = PROG + DCUTAU(I)*ESPEC2(I)
  405 SCUE = SCUE + DEUT(I)*CON(I)                                       AIRM1950
      DEUTAU = ENERGY*RHO + TAU*PROG*4.184E7
      DNRGDT = TAU*(SCE +SCUE)*4.184E7
      DEDTHT = DNRGDT*11605.4 - 1.5*PHI/NBAR
      DPDTHT = -PRESHR*DNUT*11605.4/NBAR                                 AIRM1990
      DPDTAU = -PRESHR/NBAR*DNUTAU                                       AIRM2000
C
C                 DEBUG PRINTOUT
C
 1000 CONTINUE
      IF (MARK .NE. 0) RETURN
      CALL DVCHK (KALL)
      WRITE (6,1003) TKEL,RHO,MARK
      WRITE (6,1005) PRESHR,NBAR,SUMNRG,ENERGY,PO ,EZ
      WRITE (6,1006) EDIS,DEDTAU,DEDTHT,DPDTHT,DPDTAU,SUMCON
      WRITE (6,1004) KP1,KP2,KP3
      WRITE (6,1007) HSPEC2
      WRITE (6,1008) FRENRG
      WRITE (6,1021) DGDT
      WRITE (6,1009) ESPEC2
      WRITE (6,1010) MOFRCT
      WRITE (6,1011) CON
      WRITE(6,1017) DKP1DT, DKP2DT, DKP3DT
      WRITE (6,1018) RH1, RH2, RH3, RH4, RH5
      WRITE (6,1019) XX,YY,ZZ,A55,A56,B56
      WRITE (6,1020) DNUT, DNUTAU, DNRGDT, KALL
      WRITE (6,1015) DCUT
      WRITE (6,1016) DCDTAU
 1002 FORMAT (2E12.0,I12)
 1003 FORMAT (16H1TKEL,RHO,MATNUM,2E15.5,I10)
 1004 FORMAT (12HOKP1,KP2,KP3,3E15.5)
 1005 FORMAT (32HOPRESHR,NBAR,SUMNRG,ENERGY,PO,EZ,6E15.5)
 1006 FORMAT (40HODEDIS,DEDTAU,DEDTHT,DPDTHT,DPDTAU,SUMCON,6E15.5)
 1007 FORMAT (7H HSPEC2,6E15.5)
 1008 FORMAT (7H FRENRG,6E15.5)
 1009 FORMAT (7H ESPEC2,6E15.5)
 1010 FORMAT (7H MOFRCT,6E15.5)
 1011 FORMAT (4H CON,6E15.6)
 1015 FORMAT(5HODCDT,6E15.5)
 1016 FORMAT (7HODCDTAU,6E15.6)
 1017 FORMAT (11H DKP1-3/DT,3E15.5)
 1018 FORMAT (07H RH1-5,5E15.5)
 1019 FORMAT (22H XX,YY,ZZ,A55,A56,B56,6E15.5)
 1020 FORMAT (24H DNUT,DNUTAU,DNRGDT,KALL,3E15.6,I5)
 1021 FORMAT (6H DGDT ,6E15.5)
      RETURN

      END
```

System Compositon. The AIRMOL code considers a gas mixture composed of N_2, O_2, NO, N, O, and A in thermodynamic equilibrium. The first step in obtaining the thermodynamic properties of the mixture is to determine the composition as a function of temperature T and density ρ. The argon concentration can be found immediately, because it enters no chemical reactions:

$$C_A = \frac{X_A^o}{M} \rho \tag{1}$$

where X_A^o is the mole fraction of argon in air at STP; M is the mean atomic weight of the mixture, $\simeq 14.55$ gm/mole; C_A is the argon concentration in mole/cc; and ρ is the density in gm/cc.

Conservation Equations. Five concentrations are still unknown. Two equations can be written to express the conservation of nitrogen and oxygen atoms. (AIRMOL does not consider ionization.) For any temperature and density, the total number of moles of nitrogen atoms per cc is $X_N^o \rho/M$, where X_N^o is the mole fraction of nitrogen atoms in air at STP. The conservation equation is then

$$2 C_{N_2} + C_N + C_{NO} = X_N^o \rho/M \tag{2}$$

where C_α is the concentration of species α in moles/cc. A similar equation applies to oxygen:

$$2 C_{O_2} + C_O + C_{NO} = X_O^o \rho/M \tag{3}$$

Equilibrium Constants. The following three reactions are considered:

$$\begin{aligned} N_2 &\rightleftarrows 2N \\ O_2 &\rightleftarrows 2O \\ NO &\rightleftarrows N + O \end{aligned} \tag{4}$$

The equilibrium constants in dimensionless pressure units for these reactions are:

$$\left.\begin{aligned} K_1 &= \frac{P_N^2}{P_{N_2}} \\ K_2 &= \frac{P_O^2}{P_{O_2}} \\ K_3 &= \frac{P_N P_O}{P_{NO}} \end{aligned}\right\} \qquad (5)$$

(The usual conventions referencing the above pressures to the STP values are to be understood.)

Assuming that each species behaves as a perfect gas, the partial pressure for species α can be written

$$P_\alpha = n_\alpha \, RT/V \qquad (6)$$

where P_α is in atmospheres, n_α is the number of moles of species α, V is the volume in cc, and

$$R = 82.054 \text{ (atm-cc)/(mole-}^{\circ}\text{K)}$$

However, (n_α / V) is the concentration C_α. Substituting Eq. (6) into Eq. (5) yields equations that express the equilibrium constants in terms of the dimensionless concentrations:

$$\left.\begin{aligned} K_1 &= C_N^2 \, RT/C_{N_2} \\ K_2 &= C_O^2 \, RT/C_{O_2} \\ K_3 &= C_N \, C_O \, RT/C_{NO} \end{aligned}\right\} \qquad (7)$$

(The usual conventions referencing the above concentrations to the STP values are to be understood.)

Free Energies and Enthalpies. If the equilibrium constants are known as a function of T, then Eq. (7) and the conservation equations are five non-linear equations in the five unknowns (the concentrations). The equilibrium

constants can be written in terms of the change in the Gibbs free energy ΔG_T^o across the reaction:

$$K_j = \exp\left(-\Delta G_T^o / RT\right)_j \tag{8}$$

where the superscript o indicates a standard state of one atmosphere. To solve Eq. (8), one must know the Gibbs free energy, G_α^o, for each species. These are available from analytic fits of tabulated data produced by another code, SALLY. SALLY computes the classical partition function Q from basic molecular and atomic constants, then derives the enthalpy, free energy, etc.* A least-squares technique was used to fit the tabulated enthalpies to a fourth-order polynomial in T. The dimensionless enthalpy for species α is given by

$$\left(\frac{H_T^o - H_0^o}{RT}\right)_\alpha = A_\alpha + B_\alpha T + C_\alpha T^2 + D_\alpha T^3 + E_\alpha T^4 \tag{9}$$

H_T^o is the enthalpy at T °K, and one atmosphere. H_0^o is the enthalpy at 0 °K, one atmosphere. (Stable gas molecules N_2, O_2, and A are taken as reference states.) Thermodynamic consistency requires that the following relations hold:

$$-T\frac{d}{dT}\left(\frac{G_T^o - H_0^o}{RT}\right)_\alpha = \left(\frac{H_T^o - H_0^o}{RT}\right)_\alpha \tag{10}$$

So we must have, from Eqs. (9) and (10)

$$\left(\frac{G_T^o - H_0^o}{RT}\right)_\alpha = A_\alpha(1-\ell nT) - B_\alpha T - C_\alpha T^2/2$$

$$- D_\alpha T^3/3 - E_\alpha T^4/4 + k_\alpha \tag{11}$$

*See any reference on thermodynamics and statistical mechanics, e.g., N. Davidson, Statistical Mechanics, New York, 1962.

The integration constant k_α is determined numerically by comparing the value of the free energy produced by SALLY and the polynomial value, Eq. (11), and finally taking an average k_α over the whole temperature range.

Computer Solution of Composition. With the free energies available, we can calculate the equilibrium constants. We then have five equations with known coefficients in the unknown concentrations; they are listed here as a group:

$$2\,C_{N_2} + C_N + C_{NO} = X_N^o\,\rho/M \tag{12a}$$

$$2\,C_{O_2} + C_O + C_{NO} = X_O^o\,\rho/M \tag{12b}$$

$$RT\,C_N^2 - K_1\,C_{N_2} = 0 \tag{12c}$$

$$RT\,C_O^2 - K_2\,C_{O_2} = 0 \tag{12d}$$

$$RT\,C_N C_O - K_3\,C_{NO} = 0 \tag{12e}$$

Solving Eq. (12c) for C_N and substitution in Eq. (12a) gives an equation in C_{N_2} and C_{NO}:

$$2\,C_{N_2} + (K_1\,C_{N_2}/RT)^{1/2} + C_{NO} = X_N^o\,\rho/M \tag{13}$$

It was observed from published data that over a large temperature and density range the ratio of C_{NO} to C_{N_2} is about 0.01. This fact is the basis of the beginning of an iterative solution for the concentrations. If 0.01 C_{N_2} is substituted for C_{NO} in Eq. (13), one is left with an equation in which only C_{N_2} is unknown:

$$2\,C_{N_2} + (K_1\,C_{N_2}/RT)^{1/2} + 0.01\,C_{N_2} = X_N^o\,\rho/M$$

After solving the above equation for C_{N_2}, we can solve Eq. (12c) for C_N:

$$C_N = (K_1 C_{N_2}/RT)^{1/2}$$

To solve Eq. (12b) for C_O, Eq. (12d) is used to eliminate C_{O_2}, and Eq. (12e) to eliminate C_{NO}. The result is

$$(2RT/K_2) C_O^2 + [1 + (C_N RT/K_3)]C_O = X_O^o \rho/M$$

After this is solved for C_O, Eq. (12d) is solved for C_{O_2}:

$$C_{O_2} = (RT/K_2) C_O^2$$

Iteration. To begin the calculation, it is assumed that $C_{NO} = 0.01\ C_{N_2}$. (C_{NO} has not been explicitly solved.) It is now calculated from Eq. (12e):

$$C_{NO} = RT\ C_N\ C_O/K_3$$

This completes the first iteration. The value just determined for C_{NO} is now used to solve Eq. (12a) again for C_{N_2}. The other concentrations are solved again in the same manner as the first iteration. After a new value for each concentration is obtained, some kind of convergence test must be made.

Convergence of Solution. Several methods were tried to determine the simplest way to test convergence and still ensure that all concentrations had changed less than some relative percent from their previous value. It was noted that C_{N_2} was always the last concentration to converge; hence, the criterion used in that C_{N_2} changed less than 0.1 percent for two successive iterations. Using values less than 0.1 percent did not improve the scheme. A limit of 10 iterations is set, but usually no more than 3 are required.

Thermodynamic Variables

The following variables are of interest.

$$P = RT \sum_{\alpha} C_{\alpha} \tag{14}$$

$$\left(\frac{\partial P}{\partial T}\right)_{\tau} = \frac{P}{T} + RT \sum_{\alpha} \left(\frac{\partial C_{\alpha}}{\partial T}\right)_{\tau} \tag{15}$$

$$\left(\frac{\partial P}{\partial \tau}\right)_{T} = RT \sum_{\alpha} \left(\frac{\partial C_{\alpha}}{\partial \tau}\right)_{T} \tag{16}$$

$$E_{sp} = \tau \sum_{\alpha} E_{\alpha}^{o} C_{\alpha} \tag{17}$$

$$\left(\frac{\partial E_{sp}}{\partial \tau}\right)_{T} = \sum_{\alpha} E_{\alpha}^{o} C_{\alpha} + \tau \left\{ \sum_{\alpha} E_{\alpha}^{o} \left(\frac{\partial C_{\alpha}}{\partial \tau}\right)_{T} \right\} \tag{18}$$

$$\left(\frac{\partial E_{sp}}{\partial T}\right)_{\tau} = \tau \left[\sum_{\alpha} C_{\alpha} \left(\frac{dE_{\alpha}^{o}}{dT}\right)_{\tau} + \sum_{\alpha} E_{\alpha}^{o} \left(\frac{\partial C_{\alpha}}{\partial T}\right)_{\tau} \right] \tag{19}$$

$$\overline{N} = \frac{\sum_{\alpha} \eta_{\alpha} C_{\alpha}}{\sum_{\alpha} C_{\alpha}} \tag{20}$$

η_{α} is the number of atoms in molecule α.

For $y = T$ or $y = \tau$

$$\frac{\partial \bar{N}}{\partial y} = \frac{\sum_\alpha \eta_\alpha \frac{\partial C_\alpha}{\partial y}}{\sum_\alpha C_\alpha} - \frac{\left(\sum_\alpha \eta_\alpha C_\alpha\right)\left(\sum_\alpha \frac{\eta_\alpha C_\alpha}{dy}\right)}{\left(\sum_\alpha C_\alpha\right)^2}$$

E_{sp} is the specific energy in cal/gm. E^o_α is the internal energy of species α for a standard state of one atmosphere. It is a function of T, but not of τ. The dE^o_α/dT derivatives are obtained from the fits for the enthalpy in Eq. (9). For a perfect gas

$$E^o_\alpha = H^o_\alpha - RT$$

$$= (A_\alpha + B_\alpha T + C_\alpha T^2 + D_\alpha T^3 + E_\alpha T^4)\, RT$$

$$+ H^o_{0,\alpha} - RT \qquad (21)$$

$$\frac{dE^o_\alpha}{dT} = R(A_\alpha - 1 + 2B_\alpha T + 3C_\alpha T^2 + 4D_\alpha T^3 + 5E_\alpha T^4) \qquad (22)$$

Internal Energy for Atoms. AIRMOL is a subroutine of EIONX. The latter calculates all electronic excitation and ionization contributions to the energy. To be consistent with EIONX, AIRMOL must not add in these terms. Thus, for atoms, the energy is simply:*

$$E^o_\alpha = 3\, RT/2 + H^o_{0,\alpha} \qquad (23)$$

*An option is available in AIRMOL to include the electronic excitation terms. The third calling parameter would be set negative. This would be done if AIRMOL were coupled with a routine that did not calculate excitation and ionization for molecular species.

$$\frac{dE_\alpha^o}{dT} = 3\ R/2 \tag{24}$$

Concentration Derivatives. The concentration derivatives are obtained by differentiating the five equations, (12a-e), for C_α. If the equations are differentiated with respect to T or τ, the result is five linear equations in $\partial C_\alpha/\partial T$ or $\partial C_\alpha/\partial \tau$. The coefficients involve the C_α, but for a given T and ρ, the C_α have already been calculated. Hence, we have five linear equations in five unknowns with known coefficients:

$$\left.\begin{aligned} 2C'_{N_2} + C'_N + C'_{NO} &= J_1 \\ 2C'_{O_2} + C'_O + C'_{NO} &= J_2 \\ 2C_N\, RT\, C'_N - K_1\, C'_{N_2} &= J_3 \\ 2C_O\, RT\, C'_O - K_2\, C'_{O_2} &= J_4 \\ C_O\, RT\, C'_N + C_N\, RT\, C'_O - K_3\, C'_{NO} &= J_5 \end{aligned}\right\} \tag{25}$$

The derivative C'_α may be with respect to either T or τ. The quantities J_i are known. If C'_α refers to $(\partial C_\alpha/\partial T)_\tau$, J_i is:

$$J_1 = J_2 = 0$$

$$J_3 = C_{N_2} \frac{dK_1}{dT} - C_N^2\, R$$

$$J_4 = C_{O_2} \frac{dK_2}{dT} - C_O^2\, R$$

$$J_5 = C_{NO} \frac{dK_3}{dT} - C_N C_O\, R$$

If C'_α refers to $(\partial C_\alpha/\partial\tau)_T$ then

$$J_3 = J_4 = J_5 = 0$$

$$J_1 = -X_N^o/M\tau^2$$

$$J_2 = -X_O^o/M\tau^2$$

The system given by Eq. (25) is solved by using the Gauss-Jordan method, which reduces the coefficient matrix to a triangular matrix.

Special Cases

If T is less than 1200°K or greater than about 25,000°K, limiting values may be introduced.

Low Temperature. For T less than 1200°K, the system composition is assumed to be the same as at room temperature. This is assumed valid for $\rho \geq 10^{-10}$ gm/cc. The mole fractions of N_2, O_2, and A are constant. The mole fractions of N, O, and NO are zero. $\bar{N}$ is therefore constant; hence, the derivatives of $\bar{N}$ with respect to T or τ are zero. As explained in the next section, the EIONX subroutine calculates the translational contributions to the pressure and energy derivatives. AIRMOL calculates the contributions due to changes in $\bar{N}$. Therefore, in the low-temperature limit the $(\partial P/\partial\tau)_T$, $(\partial P/\partial T)_\tau$, and $(\partial E_{sp}/\partial\tau)_T$ terms passed on from AIRMOL to EIONX are zero. However, the $(\partial E_{sp}/\partial T)_\tau$ term is not zero, because it contains contributions from terms such as $\partial E_\alpha^o/\partial T$. It follows from Eq. (19) that

$$\left(\frac{\partial E_{sp}}{\partial T}\right)_\tau = \tau \sum_\alpha C_\alpha \left(\frac{\partial E_\alpha^o}{\partial T}\right)_\tau \qquad (26)$$

when $T < 1200\,^oK$.

High Temperature. The other extreme is to have T so great, or ρ so small, or both, that no molecules are left. Beyond this point the energy due to dissociation is constant. The nontranslational AIRMOL contributions to the derivatives $(\partial E/\partial T)_\tau$, $(\partial E/\partial \tau)_T$, $(\partial P/\partial T)_\tau$, and $(\partial P/\partial \tau)_T$ are all zero and $\bar{N} \equiv 1$.

Interface with Other Equation-of-State Subroutines

The SPUTTER code uses a general equation-of-state subroutine, EIONX, which interfaces with molecular equations-of-state as follows:

1. All ionization contributions are calculated by EIONX.
2. All translational contributions are calculated by EIONX.

While the equations written in this report have been given in terms of the temperature T in ^{o}K, SPUTTER uses θ in eV for a temperature scale. Also, the reference state for the energy is not the same in AIRMOL and EIONX. The following steps must be taken before any quantities are passed on to EIONX from AIRMOL:

1. All quantities must be converted to a temperature scale of eV, θ.
2. The translational terms must be deleted.
3. A constant ΔE_{ref} must be added to the energy to have consistent reference states. (The value 2.899×10^{11} ergs/gm has been chosen.)

Six quantities are transferred from AIRMOL to EIONX by means of the arrays named CARBNZ and EION, which appear in named common. The quantities, and the cell of the array to which they are made equivalent, are listed here.

EDIS	=	CARBNZ(1)
DEDTAU	=	CARBNZ(3)
DEDTHT	=	CARBNZ(4)
DPDTAU	=	CARBNZ(5)
DPDTHT	=	CARBNZ(6)
NBAR	=	EION(17)

The above quantities are defined as follows:

$$\text{EDIS} = E_{sp}\left(\frac{\text{erg}}{\text{gm}}\right) - \frac{3}{2}\frac{\phi\theta}{\overline{N}} + \Delta E_{ref}$$

$$\text{DEDTAU} = (\partial E_{sp}/\partial\tau)_{\theta}$$

$$\text{DEDTHT} = (\partial E_{sp}/\partial\theta)_{\tau} - \frac{3}{2}\frac{\phi}{\overline{N}}$$

$$\text{DPDTHT} = (\partial P/\partial\theta)_{\tau} - \frac{P}{\theta}$$

$$\text{DPDTAU} = (\partial P/\partial\tau)_{\theta} - \frac{P}{\tau}$$

$$\text{NBAR} = \overline{N} = \frac{\sum_{\alpha} \eta_{\alpha} C_{\alpha}}{\sum_{\alpha} C_{\alpha}}$$

Coefficients for Least-Squares Fits

The dimensionless enthalpy $[(H^{o}_{\alpha} - H^{o}_{0\alpha})/RT]$ for each species was calculated by the SALLY code as a function of T. The data were then fit to a fourth-order polynomial in T by the NOLOUT code, which uses a least-square technique.

$$\left(\frac{H^{o}_{\alpha} - H^{o}_{0\alpha}}{RT}\right) = A_{\alpha} + B_{\alpha}T + C_{\alpha}T^{2} + D_{\alpha}T^{3} + E_{\alpha}T^{4}$$

Table III gives the coefficients in the above equation for the various species. Also listed are the integration constants k_{α} and k'_{α}, needed for the analytic expression, Eq. (11), for the Gibbs free energies. The term k_{α} is used if $(H^{o}_{\alpha} - H^{o}_{0\alpha})/RT = 5/2$ for the atomic species, while k'_{α} is used if the full polynomial expression is used.

TABLE III

COEFFICIENTS FOR VARIOUS SPECIES

	Coefficients						
	A_α	B_α	C_α	D_α	E_α	k_α	k'_α
N_2	3.39032	3.26691-4	-4.43869-8	2.84212-12	-5.61017-17	3.47421	---
O_2	3.48754	3.33691-4	-3.26154-8	1.78842-12	-3.45129-17	4.63168	---
NO	3.62986	2.39195-4	-2.68348-8	1.46612-12	-2.68536-17	4.44607	---
N	2.54395	-7.03288-5	2.10493-8	-1.23848-12	2.27227-17	3.99389	4.48452
O	2.66918	-6.76606-5	1.16238-8	-6.49696-13	1.25238-17	4.12663	5.26387
A	2.49716	2.06980-6	-2.90268-10	-2.16444-18	1.16325-18	4.37850	4.37217

Variables Used in AIRMOL

A(6)	Polynomial coefficients for enthalpy
A1	Total number of N atoms (in mole/cc) at any temperature and pressure
B(6)	Polynomial coefficients for enthalpy
BARK(6)	Integration constants for free energy if enthalpy is polynomial
BARK2(6)	Integration constants for free energy if enthalpy is 5RT/2
C(6)	Polynomial coefficients for enthalpy
CON(6)	Concentrations, moles/cc
D(6)	Polynomial coefficients for enthalpy
DCDT(6)	$(\partial C_\alpha/\partial T)_T$
DEDT(6)	dE^o_α/dT
DEDTAU	$(\partial E_{sp}/\partial \tau)_\theta$
DEDTHT	$(\partial E_{sp}/\partial \theta)_\tau - \rho\phi/N$
DELH(6)	$H^o_{0,\alpha}$, enthalpies at one atmosphere, 0^oK
DGDT(6)	dG^o_α/dT
DKP1DT	dK_1/dT
DKP2DT	dK_2/dT
DKP3DT	dK_3/dT
DNDT	$(\partial \bar{N}/\partial T)_\tau$
DPDTAU	$(\partial P/\partial \tau)_\theta - P/\tau$
DPDTHT	$(\partial P/\partial \theta)_\tau - P/\theta$
E(6)	Polynomial coefficients for enthalpy
EDIS	$E_{sp} - \frac{3}{2}\phi\theta/\bar{N}$, total specific energy due to dissociation
ENERGY	Total specific energy, erg/gm
ESPECZ(6)	Internal energies at T ^oK, one atmosphere, cal/mole
EZ	Total dimensionless energy, E/RT
FRENRG(6)	G^o_α/RT, dimensionless Gibbs free energies
HSPECZ(6)	Enthalpies at T ^oK, one atmosphere, cal/mole

KP1	Equilibrium constant in pressure units for $N_2 \rightleftharpoons 2N$
KP2	Equilibrium constant for $O_2 \rightleftharpoons 2O$
KP3	Equilibrium constant for $NO \rightleftharpoons N + O$
MARK	Third calling parameter for AIRMOL: if negative, include electronic excitation for atoms; if positive, no electronic excitation; if 0, like positive, and also print debug quantities in AIRMOL
MOFRCT(6)	Mole fractions
NBAR	Mean number of atoms per molecule in gas mixture
NITER	Iteration counter
OLDX(6)	Concentrations from preceding iteration
PHI	Gas constant (SPUTTER units), 9.649E11/WTREF
PO	Total pressure, atmospheres
PRESHR	Total pressure, dyne/cm^2
RHO	Density, gm/cc
RH1-RH5	Right-hand side of equations for derivatives of concentrations
RTKEL	RT, with R = 1.98726 cal/mole-$^\circ$K
R2TKEL	R_2T, with R_2 = 82.054 cc-atm/(mole-$^\circ$K)
RT2	$(R_2T)^2$
SCDE	$\sum_\alpha (dE^\circ_\alpha/dT)\, C_\alpha$
SCE	$\sum_\alpha (\partial C_\alpha/\partial T)_\tau$
SDTAU	$\sum_\alpha (\partial C_\alpha/\partial \tau)_T$
SNC	$\sum_\alpha \eta_\alpha C_\alpha$ where η_α is number of atoms per molecule; total number of atoms/cc
SNDTAU	$\sum_\alpha \eta_\alpha\, (\partial C_\alpha/\partial \tau)_T$
SUMCON	$\sum_\alpha C_\alpha$
SUMNRG	Total energy, cal/cc, $\sum_\alpha C_\alpha E^\circ_\alpha$

TAU	Specific volume, cc/gm
THETA	Temperature in eV
TKEL	Temperature in ^{o}K
TKELN	ℓn T, natural log
V1, V2, V3	$\Delta G_T^o / RT$ for the reactions (1) $N_2 \rightleftarrows 2N$; (2) $O_2 \rightleftarrows 2O$, and (3) $NO \rightleftarrows N + O$ respectively
WTREF	Mean atomic weight of air, about 14.55 gm/mole
XREFA	Mole fraction of argon atoms at STP, divided by mean atomic weight of air
XREFN	Mole fraction of nitrogen atoms at STP, divided by mean atomic weight of air
XREFO	Mole fraction of oxygen atoms at STP, divided by mean atomic weight of air

GOLEM: A TOOL TO STUDY EQUATION-OF-STATE AND OPACITY SUBROUTINES

The GOLEM code was developed to study the data computed by the equation-of-state and opacity subroutines (used in SPUTTER, MOTET, and other radiation-transport and hydrodynamic codes) that use temperature θ and density ρ (or specific volume $\tau \equiv 1/\rho$) as independent variables. GOLEM is an edit control code.

The GOLEM code input requirements are extremely simple. The sole input card format required is as follows:

```
      SUBROUTINE GOLEM
C ELT GOLEM/S0905,1.670905, 36292
      SUBROUTINE GOLEM
C **  LOAD KONTRL DECK FOR (MOLECULAR EQUATIONS OF STATE, ETC) PARAMETERS  **
C **  LOAD KONTRL DECK FOR (MOLECULAR EQUATIONS OF STATE, ETC) PARAMETERS  **
C **  LOAD KONTRL DECK FOR (MOLECULAR EQUATIONS OF STATE, ETC) PARAMETERS  **
C **  LOAD KONTRL DECK FOR (MOLECULAR EQUATIONS OF STATE, ETC) PARAMETERS  **
C **  LOAD KONTRL DECK FOR (MOLECULAR EQUATIONS OF STATE, ETC) PARAMETERS  **
C     THIS ROUTINE USABLE FOR TABULATION OF THERMODYNAMIC QUANTITIES
C*********************************************************************
C                                                                      *
C*                    S P O T T E R   C O M M O N                     **
C*                                                                    **
C*                                                                    **
      COMMON   LMDA(37), NK    , NSMLR , IA    , IB    , ICA   , ICB   ,
     1   KMAX  , BLANK1, BLANK2, BLANK3, IAP1  , IBP1  , ICAP1 , ICBP1 ,
     2   II    , IG    , NRAD  , BLANK4, IAM1  , IBM1  , ICAM1 , ICBM1 ,
     3   IIP1  , IGM1  , IALPHA, BLANK5, IH    , IMAX  , BLANK6, DELPR1,
     4   FREQ  , CNTMAX, AR    , ASMLR , POSHA , POSHB , BOILA , BOILB ,
     5   CVA   , CVB   , SLOG  , ALPHA , HVA   , HVB   , HCA   , HCB   ,
     6   EMINA , EMINB , CA    , CB    , GA    , GB    , GL    , GR    ,
     7   RHOL  , RHOR  , EPIO  , EPS1  , R1A   , R1B   , RO1A  , RO1B  ,
     8   RP1A  , RP1B  , RPO1A , RPO1B , IPRINT, TA    , TB    , TC
      COMMON     TD    , TE    , DTH2  , DTH2P , DTH1  , DTRMIN, DTMAX ,
     1   DTMAX1, DTMAX2, DTMAX3, DTR   , SWITCH, C0    , CMIN  , DELTA ,
     2   GAMA  , WCRIT , SIGMA0, AC    , ACOST4, CNVRT , SUMRA , SUMRB ,
     3   RO1A  , RO1AM1, RO1B  , RO1BP1, GMS   , S1    , S2    , S3    ,
     4   S4    , S5    , S6    , S7    , S8    , S9    , S10   , S11   ,
     5   S12   , S13   , S14   , S15   , S16   , S17   , S18   , S19   ,
     6   S20   , E0    , F0    , TAU   , ZERO  , R   (152), DELTAR(152),
     7   ASQ   (152), RD    (152), VD    (152), RDD   (152), SMLR  (152),
     8   DELR  ( 37), P     (152), P1    (152), PB    (152), PB1   (152)
      COMMON           P2    (152), SV    (152), RHO   (152), THETA (152),
     1   W     (152), E     (152), E1    (152), EK    (152), X     (152),
     2   V     (152), G     (152), D     (152), C     (152), X2    (152),
     3   X3    (152), X4    (152), X5    (152), X6    (152), X7    (152),
     4   SMLA  (152), SMLB  (152), SMLC  (152), SMLD  (152), SMLE  (152),
     5   EC    (152), ER    (152), SMLQ  (152), SMLH  (152), RIGA  (152),
     6   BIGB  (152), CV    (152), BC    (152), BR    (152), CMIC  (152),
     7   CRIR  (152), CAPAC (152), CAPAR (152), CRIC  (152), CRIR  (152),
     8   CRIPC (152), GOFR  (152), FEW   (152), CAR   (152), QKLM  ( 37)
      COMMON           IELM  ( 37), ERLM  ( 37), ELM   ( 37), FCLM  ( 37),
     1   FRLM  ( 37), WLM   ( 37), QLM   ( 37), AMASNO( 37), CNRNO ( 37),
     2   ZP1   ( 37), ZP2   ( 37), SOL10 ( 37), ECHCK ( 37), RK    (104),
     3   RL    ( 37), RHOK  (104), RDR   (104), THETAR(104), TEMP  ( 16),
     4   READ  ( 12), MAXL        , MAXLM
C
C*                                                                    **
C*********************************************************************
      COMMON/C1A/GOL001(12240)
      COMMON/LMS/ E1ON(20)
      EQUIVALENCE(ZBAR,E1ON(3))
      EQUIVALENCE (E1ON(5),PHI), (E1ON(16),ZMEAN)
      EQUIVALENCE  (E1ON(15), NSUBE)
      REAL LNGAMA
      REAL NSUBE
```

```
      COMMON/TABLES/EOSPAR(50)
      COMMON/LMSB2/POTENL(5350)
      DIMENSION  M(3)
      EQUIVALENCE (POTENL(1),M(1) )
C                 LOAD ENTIRE POTENTIAL TABLE
      COMMON/LMSC/ M(51)
      DIMENSION Z(51),PART(51)
      EQUIVALENCE(M(1),NOLMNT), (M(2),Z(2)),(M(3),PART(3))
      COMMON/LMSD/          TLMS(30)
      EQUIVALENCE(TLMS(1),BACK1),(TLMS(2),BACK2),(TLMS(7),ZBARLN)
      EQUIVALENCE(DPOTAU,EION(12)),(DPOTHT,EION(13)),(NBAR,EION(17)),
     2    (TLMS(15),DZDTAU),(TLMS(16),DZDTHT)
      COMMON/LMSE/MATREL,ILEMNT,SNAPO,I1,I2,I3,I4,I5,I6,I7,I8,I9,I10,J1,     0800
     2 J2,J3,J4,J5,J6,J7
      EQUIVALENCE (SNAPO,PATH)
      EQUIVALENCE (I10,M2)
      COMMON/LMSESN/ILMSB(15)
      COMMON/LMSG/CARBNZ(10)
      DIMENSION AIR(10)
      EQUIVALENCE (AIR(1),CARBNZ(1))
      COMMON/CNTRL/SCYCLE,JMOLT
      COMMON/EOSIN/EIONIN(30)
      EQUIVALENCE (MARK,EIONIN(28))
      COMMON/GOLEMA/ THATA(250),RHOA(250)
      DIMENSION ROW(1)
      DIMENSION  WORD(8)
      EQUIVALENCE (DELRHO, DELTAU)
      COMMON/LNES//ETA
      COMMON/LMSJ/MATREL(11,37)
      REAL MATREL
      DATA MARKER/1/,IPRNTD/0/,EION(1),SUMPTS,XNPTS,OLDWAY,OKLM(1)/5*0./
      DATA ALEX/1.E-4/
C
C
      WRITE(6,/000)
      WRITE(6,/001)
      WRITE(6,/002)
      WRITE(6,/003)
      WRITE(6,/004)
      WRITE(6,/005)
      WRITE(6,/006)
      WRITE(6,/007)
      WRITE(6,/008)
      WRITE(6,/009)
      WRITE(6,/010)
      WRITE(6,/011)
      WRITE(6,/012)
      WRITE(6,/013)
      MAXPOT = EOSPAR(2)
      WRITE(6,/12)
      WRITE(6,/016) (POTENL(K), K=1,MAXPOT)
      WRITE (6,/65)
      DO //// N=1,37
      N100=         N + 100
      WRITE (6,/64) N100, (MATREL(L,N), L=1,11)
```

```
 //// CONTINUE
C
C
      CALL TICKER ( TIME1)
C
C
C          COLUMNS          FORMAT          DATA
C
C            1-4             F4.0           OKLM(1)
C            5-8             F4.1           TRAIL
C             9              I1             IPRNTO
C                                           IF (IPRNTO .EQ. 0) PRINT
C                                           IF (IPRNTO .EQ. 1) NO PRINT
C                                           IF (IPRNTO .EQ. 2) PRINT GOLOUT
C                                           ARRAY ONLY (NO TITLES)
C                                           IF (IPRNTO .EQ. 3) PRINT GOLOUT
C                                           ARRAY WITH TITLES
C            10              I1             IPNCHO
C                                           IF (IPNCHO .EQ. 0) PUNCH
C                                           IF (IPNCHO .EQ. 1) NO PUNCH
C                                           IF (IPNCHO.EQ.2.OR.IPNCHO.EQ.3)
C                                           .AND.(TRAIL.EQ.11.) PUNCH DIA-
C                                           PHANOUS INPUT IN STANDARD OUT-
C                                           PUT FORMAT
C                                           IF (IPNCHO.EQ.3.OR.IPNCHO.EQ.4)
C                                           .AND.(TRAIL.EQ.11.)PUNCH RELE2,
C                                           REL2HR, RELION, RELPRS, RELENG
C           11-20            F10.0          THETA(I)
C           21-35            E15.8          RHO(I)
C           36-50            E15.8          SV(I)
C           51-54            F4.0           TEST
C           55-66            E12.6          DELTHT
C           67-78            E12.6          DELTAU
C           79-80            I2             J
C
   10 CONTINUE
      OLM(101)=  0.
      READ(5,7061 OKLM(1),TRAIL,IPRNTO,IPNCHO,THETA(1),ROW(1),SV(1),
     2            TEST,DELTHT,DELTAU,J
      SUMPTS = SUMPTS + XNPTS
      MULTI=   0
      IF(OKLM(1).LE.251..OR. OKLM(1).GT.300.) GO TO 101
      MULTI=    1
      MUXIE1=   0
      CALL CONMAT(OKLM(1),MUXIE1)
  101 CONTINUE
      IF (OKLM(1) .EQ. 0.) GO TO 11
         IF(OLDWAT .EQ. 2. .OR. OLDWAT .EQ. 3. .OR. IPNCHO .EQ. 1)
     2      GO TO 1599
         IF (OKLM(1) .LT. 0.) GO TO 1599
         IF (IPRNTO.EQ.2 .OR. IPRNTO.EQ.3) GO TO 1599
      PUNCH 7700
      PUNCH 7701
      PUNCH 7702
      PUNCH 7703
```

```
      IF((IPNCH0.EQ.2.OR.IPNCH0.EQ.3).AND.TRAIL.EQ.11.) PUNCH 7704
      IF((IPNCH0.EQ.3.OR.IPNCH0.EQ.4).AND.TRAIL.EQ.11.) PUNCH 7707
      IF((EOSPAR(37).NE.0.).AND.(IPNCH0.NE.1)) PUNCH 7705
      IF((QREM(1).EQ.0.).OR.(QREM(1).EQ.306.)) PUNCH 7706
      IF(MOTET.EQ.1) PUNCH 7720
 1599 CONTINUE
      ANMIS = 0.
C
        IF(ABS(QREM(1) + .4) .LT. ALEX) GO TO 40
        IF(ABS(QREM(1) + .41) .LT. ALEX) GO TO 41
        IF(ABS(QREM(1) + .43) .LT. ALEX) GO TO 43
        IF(ABS(QREM(1) + .44) .LT. ALEX) GO TO 44
        IF(ABS(QREM(1) + .45) .LT. ALEX) GO TO 45
        IF(ABS(QREM(1) + .48) .LT. ALEX) GO TO 48
      GO TO 42
C    **********************************************************************
C         THE FOLLOWING CARDS ARE ALL
C         READ WITH 10E8.3 FORMATS
C         (INCLUSIVE BOUNDARIES ARE
C         WORD N STARTS AT 8(N-1)+1
C         AND ENDS AT 8N )
   41 CONTINUE
      READ (5,751) (EOSPAR(K), K=1,10)
      GO TO 10
   43 CONTINUE
      READ (5,751) (EOSPAR(K), K=11,20)
      GO TO 10
   44 CONTINUE
      READ (5,751) (EOSPAR(K), K=21,30)
      GO TO 10
   45 CONTINUE
      READ (5,751) (EOSPAR(K), K=31,40)
      GO TO 10
   48 CONTINUE
      READ (5,751) (EOSPAR(K), K=41,50)
      GO TO 10
   42 CONTINUE
      IF(TEST .NE. 0.) GO TO 102
         IF (IPRNT0.NE.2 .AND. IPRNT0.NE.3) WRITE(6,7014) (EOSPAR(K),
     1       K=1,50)
C
      R1A = EOSPAR(1)
      ECHCK(18) = EOSPAR(5)
      DO 46 I=1,11
      EIONIN(I) = EOSPAR(I+5)
   46 CONTINUE
C     EOSPAR(17) CONTROLS TESTER, THE CMOL CALL SEQUENCE PARAMETER.
      EIONIN(28) = EOSPAR(17)
      EIONIN(29) = EOSPAR(18)
      EIONIN(30) = EOSPAR(19)
      M2 = EOSPAR(20)
      RP1A=       EOSPAR(21)
         IF(RP1A .EQ. 0.) WRITE(6,7015)
C     RP1A = 0  IF INCLUDE BLACK-BODY RADIATION CONTRIBUTION
C               IN SUBROUTINE EOS
```

```
      POSMA=      EOSPAR(22)
      MAXLM=      EOSPAR(23)+.5
      LMDA(2)=    EOSPAR(24)+.5
      SOLID(18)=  EOSPAR(25)
      SCYCLE=     EOSPAR(26)
      NK=         EOSPAR(27)+.5
      IAM1=       EOSPAR(28)+.5
      IB=         EOSPAR(29)+.5
      CVA=        EOSPAR(30)
      SOLID(17)=  EOSPAR(31)
      RIB=        EOSPAR(32)
      HVA=        EOSPAR(33)
      HCA=        EOSPAR(34)
      AMASNO(1)=  EOSPAR(35)
      CHRNO(1)=   EOSPAR(36)
      OKLM(18)=   EOSPAR(39)
      CMIN =      EOSPAR(40)
      LMDA(1)   = EOSPAR(41) + .5
      MAXL =      EOSPAR(42) + .5
      S2=         EOSPAR(43)
      MOXIE = OKLM(1)+.5
      IF (MOXIE .EQ. 102) MARK=EOSPAR(44)+.5
C     EOSPAR(44) CONTROLS MARK, THE AIRMOL CALL SEQUENCE PARAMETER.
C
C     SET EOSPAR(37) .NE. 0. TO CALL KAPPA
C     IF KAPPA IS TO BE CALLED, FIRST CALL EIONX TO GET PHI AND ZMEAN
      IF (EOSPAR(37) .EQ. 0.) GO TO 47
      CALL EIONX(1., 1., MOXY, -1.)
      AMASNO(1)=   PHI
      CHRNO(1)=    ZMEAN
C
      ZP1(1)=     CHRNO(1)**(-1.3333333)
      ZP2(1)=     CHRNO(1)**2.3333333
   47 CONTINUE
      WRITE ( 6, 712)
      TIMEA = 0.
      FEW(1)=    0.
      NSUBE=     0.
      EGAM3=     0.
      ZBAR = 0.
      TLMS(10)=  0.
      EION1Z = 0.
      GAMMA=      0.
      LNGAMA = 0.
         IF (IPRNTD.NE.3 .AND. IPRNTD.NE.2) GO TO 4
      ASSIGN 4 TO LRN
      GO TO 5
    4 IPRNTD = IPRNTO
C     SET IPRNTD = IPRNTO TO AVOID IPRNTD WIPE-OUT BY LAST DATA CARD
C
C
      OLDWAY = TRAIL
      LTRAIL = TRAIL + 1.5
      GO TO (13,13,15,15,15,13,13,15,13,13,13,13,13,15,13), LTRAIL
   15 CONTINUE
```

```
      IF(ROW(I).EQ.0.)ROW(I)=1./SV(I)
      IF(SV(I).EQ.0.)SV(I)=1./ROW(I)
   15 CONTINUE
      WRITE(6,705) OKLM(1),TRAIL,IPRNTO,IPNCH0,J,THETA(1),ROW(1),SV(1)
C
C     ******** TRAIL OPTIONS ****************************************
C     TRAIL = 0.   NORMAL GRID OF TEMPERATURE-DENSITY POINTS
C     TRAIL = 1.   SPECIAL ZMEAN PATH
C     TRAIL = 2.   PERFECT GAS AND READ ONE CARD PER POINT
C     TRAIL = 3.   READ ONE CARD PER POINT
C     TRAIL = 4.   COMPUTE (THETA, TAU) RECTANGLE AROUND CENTRAL POINT
C     TRAIL = 5.   NORMAL GRID OF SELECTED TEMPERATURE-DENSITY POINTS
C     TRAIL = 6.   MOLECULAR EQUATION OF STATE CHECKOUT SET
C     TRAIL = 7.   COMPUTE (THETA, RHO) RECTANGLE AROUND CENTRAL POINT
C     TRAIL = 8.   GRID OF TEMPERATURE-LOW DENSITY 1.LE. .1) POINTS
C     TRAIL = 9.   GRID OF TEMPERATURE-HIGH DENSITY 1.GE. .01) POINTS
C     TRAIL = 10.  GRID OF DENSITIES-LOW TEMPERATURE 1.LE. 10 E.V.)
C     TRAIL = 11.  READ DIAPHANOUS DATA CARD
C     TRAIL = 12.  READ GILMORE DATA CARD (SEE TRAIL=11 PATH, COMMENTS)
C     TRAIL = 13.  READ HILSENRATH DATA CARD(SEE TRAIL=11 PATH,COMMENTS)
C     TRAIL = 14.  NORMAL TEMPERATURE SET AT ONE SELECTED DENSITY
C     TRAIL = 15.  NORMAL DENSITY SET AT ONE SELECTED TEMPERATURE
C
C     ***************************************************************
C
C
      IF(TRAIL .EQ. 2.) OKLM(1) = -OKLM(1)
      IF(TRAIL .EQ. 1.) GO TO 12
         IF (MOXIE .NE. 207) GO TO 6601
      READ (5,751) SOLID,OKLM(2)
      WRITE (6,729) SOLID
      WRITE (6,733) OKLM(2)
      PUNCH 7722
      OKLM(1) = OKLM(2)
 6601 CONTINUE
      IF(TRAIL .EQ. 0. .OR. TRAIL .EQ. 8. .OR. TRAIL .EQ. 9. .OR. TRAIL
     2   .EQ. 5. .OR. TRAIL .EQ. 10. .OR. TRAIL .EQ. 14.) GO TO 500
      IF(TRAIL.EQ.15.) GO TO 500
      IF(TRAIL .EQ. 4.) GO TO 200
      IF(TRAIL .EQ. 6.) GO TO 400
      IF(TRAIL .EQ. 7.) GO TO 600
         IF(TRAIL .GE. 11. .AND. TRAIL .LE. 13.) GO TO 100
C
C
C
    1 CONTINUE
      WRITE(6,718)
C     TRAIL = 2.   PERFECT GAS AND READ ONE CARD PER POINT
C     TRAIL = 3.   READ ONE CARD PER POINT
      ASSIGN 14 TO LREIN
      GO TO 6500.
   14 CONTINUE
      GO TO 10
C
   11 CONTINUE
```

```
C       NORMAL EXIT POINT
        IF(OLDWAY.EQ.1..OR.OLDWAY.EQ.2..OR.OLDWAY.EQ.3.) GO TO 17
        TIMEC = TIMEA/XNPTS
        TIMEB=        (TIME3 - TIME1) * 16.666667
        TIMED = TIMEB/SUMPTS
        ASSIGN 2 TO LRN
        IF (IPRNTD.NE.2 .AND. IPRNTD.NE.3) GO TO 2
     5  CONTINUE
        MARKER = 1
        WRITE(6,7014) (EOSPAR(K), K=1,50)
        WRITE (6,7020) MOXIE
          IF (MOXIE.LT.101 .OR. MOXIE.GT.200) GO TO 7776
        ICD1=         MOXIE - 100
        ICD2 =        2 * IFIX(MATREL(1,ICD1) + .5) + 1
        WRITE (6,7023) (MATREL(ICD,ICD1),ICD=2,ICD2)
  7776  CONTINUE
        WRITE (6,7024) ZMEAN, PHI, TLMS(3), ECHCK(18)
        DO 3 J = 1,11628,612
        L = J + 611
        IF (IPRNTD .EQ. 2) GO TO 6
        WRITE (6,7021) (GOLOUT(I),I=J,L)
        GO TO 7
     6  WRITE (6,7022) (GOLOUT(I),I=J,L)
     7  CONTINUE
           IF (GOLOUT(L+1) .EQ. 0.) GO TO 21
     3  CONTINUE
    21  CONTINUE
        WRITE (6,712)
        GO TO LRN,(2,4)
     2  CONTINUE
C
C       TIMEA = (TIME3 - TIME2) * 16.666667,SUM OF TIMES USED DURING CALLS
C         TO EOS.
C       TIMEB = (TIME3 - TIME1) * 16.666667, TOTAL TIME (IN MILLISECONDS)
C         BETWEEN START OF RUN AND LAST CALL TO EOS FOR THE LAST INPUT
C         CARD.
C       TIMEC = TIMEA/XNPTS, WHERE XNPTS IS THE TOTAL NUMBER OF THETA-RHO
C         POINTS FROM THE LAST INPUT CARD.
C       TIMED = TIMEB/SUMPTS, WHERE SUMPTS IS THE TOTAL NUMBER OF POINTS
C         IN THE ENTIRE GOLEM RUN.
C       ALL TIMES PRINTED ARE IN MILLISECONDS
C
        WRITE (6,7025)
        WRITE (6,7026) TIME1, TIMEA, TIME2, TIMEB, TIME3, TIMEC, XNPTS,
       1               TIMED, SUMPTS
C
    17  CONTINUE
        CALL EXIT
        RETURN
C
C
    12  CONTINUE
C       TRAIL = 1.   SPECIAL ZMEAN PATH
        WRITE(6,720)
        IDIOT=    OKLM(1) + .5
```

```
      CALL EIONX (1.,1.,ID10),-1.)
      WRITE(6,701) OKLM(1),ZMEAN,PHI,TLMS(3)
      GO TO 10
C
   16 CONTINUE
      WRITE(6,753)
      CALL EXIT
      RETURN
C
  100 CONTINUE
C
C     TRAIL = 11.  READ DIAPHANOUS DATA CARD
C     DIAPHANOUS DATA IS
C     WORD(1) = THETA OR RHO                WORD(2) = PRESSURE
C     WORD(3) = ENERGY                      WORD(4) = EION
C     EION IS THE DIAPHANOUS NAME FOR EIONIZ
C     WORD(5) = KROS                        WORD(6) = KPLK
C     WORD(7) = ZBAR                        WORD(8) = EGAM
C     TRAIL = 12.  READ GILMORE DATA CARD (SEE TRAIL=11 PATH, COMMENTS)
C     GILMORE DATA HAS WORD(1), AND WORD(3) AS IN DIAPHANOUS, AND
C              WORD(2) = P (DYNES/CM2) AND WORDS(4) THRU (8)
C              ARE NOT USED.
C     TRAIL = 13.  READ HILSENRATH DATA CARD(SEE TRAIL=11 PATH,COMMENTS)
C     HILSENRATH DATA HAS WORD(1) = T (DEG. KELVIN) OR
C        LOG(RHO/REFERENCE-RHO). (WHERE REFERENCE-RHO IS WORD(2)
C        ON CARD WITH T IN WORD(1))
C     WORD(2) = REFERENCE RHO (G/CC) OR P (ATMOSPHERES)
C     WORD(3) = E/RT
C     WORDS (4), (5), AND (6) ARE NOT USED
C     WORD(7) = 1.991 * (1.+ZBAR)
C     WORD(8) IS NOT USED
C
      READ(5,730) (HEAD(I), I=1,12)
      WRITE(6,732) (HEAD(I), I=1,12)
      RELPRS = 0.
      RELENG = 0.
      RELE2  = 0.
      RELZBR = 0.
      RELION = 0.
  102 READ(5,734) (WORD(I), I=1,8)
      IF(WORD(3) .NE. 0.) GO TO 104
C        IF WORD(1) .EQ. -.4, END INPUT AND GO TO NEXT TRAIL CARD.
C     TO END DIAPHANOUS SET, USE CARD PUNCHED WITH -.40 IN COLUMNS 1-4.
C     IF A BLANK CARD FOLLOWS DIAPHANOUS CARD, PROGRAM GOES INTO EXIT
        IF (ABS(WORD(1) + .4) .LT. ALEX) GO TO 103
         IF(WORD(1) .EQ. 0.) GO TO 11
         IF(THETA(1) .NE. WORD(1)) WRITE(6,712)
         IF(TRAIL .LE. 12.) THETA(1) = WORD(1)
         IF(TRAIL .EQ. 13.) THETA(1) = WORD(1)/1.16054E4
         IF(TRAIL .EQ. 13.) REFRHO = WORD(2)
      GO TO 102
  103 TIMEC = TIMEA/XNPTS
      WRITE (6,700) TIMEC, TIMEA, XNPTS
C     TIMEC UNITS ARE MILLISECONDS PER COMPUTATIONAL POINT.
      GO TO 10
```

```
  104 CONTINUE
          IF(TRAIL .LE. 12.) ROW(1) = WORD(1)
          IF(TRAIL .EQ. 13.) ROW(1) = EXP(WORD(1)*2.3025851) * REFRHO
      SV(1)=      1./ROW(1)
      IF((OKLM(1) .EQ. 0. .OR. OKLM(1) .EQ. 306.) .AND. ROW(1) .GT. 10.
     1 .AND. KIA .NE. 0.) GO TO 102
          IF(TRAIL .EQ. 13.) WORD(2) = WORD(2)*1.01325
          IF(TRAIL .NE. 13.) GO TO 108
      WORD(7) = WORD(7)/1.991 - 1.0
      WORD(3) = WORD(3) * THETA(1) * 3.3312097E10
  108 CONTINUE
          IF(TRAIL .NE. 12.) WORD(2) = WORD(2) * 1.E6
          IF(TRAIL .EQ. 11.) WRITE(6,735)
          IF(TRAIL .EQ. 12.) WRITE(6,736)
          IF(TRAIL .EQ. 13.) WRITE(6,737)
      WRITE(6,738) THETA(1), ROW(1), (WORD(I), I=2,8)
      WRITE(6,739)
      ASSIGN 115 TO LBEIN
      GO TO 6500
  115 CONTINUE
          IF(EION12 .NE. 0.) RELION = 1.E2 * (WORD(4)-EION12)/WORD(4)
      RELPRS = (WORD(2)-P1(1))/WORD(2)*1.E2
      RELENG = (WORD(3)-E(1))/WORD(3)*1.E2
      RELE2 = (WORD(3)-E(1)+ECHCK(18))/WORD(3) * 1.E2
          IF(WORD(7).NE.0.)RELZBR = (WORD(7)-FEW(1))/WORD(7)*1.E2
      WRITE(6,740) RELPRS, RELENG, RELZBR,RELE2,RELION
      GAMMA = 0.
      ENGAMA = 0.
      GO TO 102
C
  200 CONTINUE
C     TRAIL = 4.   COMPUTE (THETA, TAU( RECTANGLE AROUND CENTRAL POINT
      WRITE(6,722)
      WRITE(6,716) DELTHT,DELTAU
      SAVTAU = SV(1(
      SAVTHT = THETA(1)
      THETA(1) = SAVTHT - 5.0 * DELTHT
      TIMEA = 0.
      DO 220 N1=1,11
      SV(1( = SAVTAU - 5.0 * DELTAU
          IF (IPRNTO.NE.2 .AND. IPRNTO.NE.3) WRITE(6,712)
      DO 210 N2=1,11
      ROW(1) = 1./SV(1)
      ASSIGN 205 TO LBEIN
      GO TO 6500
  205 CONTINUE
      SV(1( = SV(1) + DELTAU
  210 CONTINUE
      THETA(1( = THETA(1) + DELTHT
  220 CONTINUE
      TIMEC = TIMEA/XNPTS
      WRITE (6,700) TIMEC, TIMEA, XNPTS
      GO TO 10
C
  400 CONTINUE
```

```
C       TRAIL = 6.  MOLECULAR EQUATION OF STATE CHECKOUT SET
        WRITE(6,724)
        TIMEA = 0.
        DO 420 I=1,60
        FI=         I
        THETA(I)=  FI*5.E2/1.16054E4
           IF (IPRNTO.NE.2 .AND. IPRNTO.NE.3) WRITE(6,712)
        DO 420 J=1,12
        JJ=         11-J
        SV(I)=      10.**JJ
        ROW(I)=     1./SV(I)
        ASSIGN 410 TO LREIN
        GO TO 6500
  410 CONTINUE
  420 CONTINUE
        TIMEC = TIMEA/XNPTS
        WRITE (6,700) TIMEC, TIMEA, XNPTS
        GO TO 10
C
  500 CONTINUE
C       TRAIL = 0.    NORMAL GRID OF TEMPERATURE-DENSITY POINTS
C       TRAIL = 5.    NORMAL GRID OF SELECTED TEMPERATURE-DENSITY POINTS
C       TRAIL = 8.    GRID OF TEMPERATURE-LOW DENSITY (.LE. .1) POINTS
C       TRAIL = 9.    GRID OF TEMPERATURE-HIGH DENSITY (.GE. .01) POINTS
C       TRAIL = 10.   GRID OF DENSITIES-LOW TEMPERATURE (.LE. 10 E.V.)
C       TRAIL = 14.   NORMAL TEMPERATURE SET AT ONE SELECTED DENSITY
C       TRAIL = 15.   NORMAL DENSITY SET AT ONE SELECTED TEMPERATURE
        IF(TRAIL .EQ. 0.) WRITE(6,726)
           IF(TRAIL .EQ. 5.) GO TO 502
        IF(TRAIL .EQ. 8.) WRITE(6,708)
        IF(TRAIL .EQ. 9.) WRITE(6,709)
        IF(TRAIL .EQ. 10.) WRITE(6,710)
        IF(TRAIL .EQ. 14.) WRITE(6,719)
        IF(TRAIL.EQ.15.) WRITE(6,725)
        GO TO 504
  502 CONTINUE
        WRITE(6,746) THETA(1),DELTHI,ROW(1),DELTAU
        THETLO = THETA(1)
        THETHI = DELTHI
        RHOLO = ROW(1)
        RHOHI = DELTAU
  504 CONTINUE
        WRITE(6,742) THATA
        WRITE(6,707)
        WRITE(6,744) RHA
        TIMEA = 0.
        WRITE (6,712)
        DO 530 I=1,250
        IF(THATA(I) .EQ. 0.) GO TO 540
           IF(TRAIL .EQ. 5. .AND.(THATA(I) .GT. THETHI .OR. THATA(I) .LT.
     2    THETLO)) GO TO 530
        IF(TRAIL .EQ. 10. .AND. THATA(I) .GT. 10.) GO TO 540
        IF(TRAIL.NE.15.) THETA(I)= THATA(I)
           IF ((TRAIL.NE.14.) .AND. (IPRNTO.NE.3) .AND. (IPRNTO.NE.2))
     1        WRITE (6,712)
```

```
      IF(MOTET.EQ.1)  WRITE(6,760)
      IF(MOTET.EQ.1.AND.RPIA.NE.0.) WRITE(6,765)
      DO 520 J=1,250
      IF(RHA(J) .EQ. 0.0) GO TO 525
         IF(TRAIL .EQ. 5. .AND.(RHA(J) .GT. RHOHI .OR. RHA(J) .LT.
     2   RHOLO)) GO TO 520
      IF(TRAIL .EQ. 8. .AND. RHA(J) .GT. 1.E-1) GO TO 520
      IF(TRAIL .EQ. 9. .AND. RHA(J) .LT. 1.E-2) GO TO 530
      IF(TRAIL .NE. 14.) ROW(1) = RHA(J)
      SV(1) = 1./ROW(1)
      ASSIGN 510 TO LRETN
      GO TO 6500
  510 CONTINUE
      IF(TRAIL.EQ.14.) GO TO  530
  520 CONTINUE
  525 CONTINUE
      IF(TRAIL.EQ.15.) GO TO 540
  530 CONTINUE
  540 CONTINUE
      TIMEC = TIMEA/XNPTS
      WRITE (6,700) TIMEC, TIMEA, XNPTS
      GO TO 10
C
  600 CONTINUE
C     TRAIL = 7    COMPUTE (THETA, RHO) RECTANGLE AROUND CENTRAL POINT
      WRITE(6,722)
      WRITE(6,717) DELTHT,DELRHO
      SAVRHO = ROW(1)
      SAVTHT = THETA(1)
      THETA(1) = SAVTHT - 5.0 * DELTHT
      TIMEA = 0.
      DO 620 N1=1,11
      ROW(1) = SAVRHO/(DELRHO**5)
         IF (IPRNTO.NE.2 .AND. IPRNTO.NE.3) WRITE(6,712)
      DO 610 N2=1,11
      SV(1) = 1./ROW(1)
      ASSIGN 605 TO LRETN
      GO TO 6500
  605 CONTINUE
      ROW(1) = ROW(1) * DELRHO
  610 CONTINUE
      THETA(1) = THETA(1) + DELTHT
  620 CONTINUE
      TIMEC = TIMEA/XNPTS
      WRITE (6,700) TIMEC, TIMEA, XNPTS
      GO TO 10
C
C     *****  WRITE AND PUNCH STATEMENTS  *****
 6500 CONTINUE
 6602 CONTINUE
      IF(MOTET.EQ.1) GO TO 300
      IF((OKLM(1) .EQ. 0. .OR. OKLM(1) .EQ. 306.) .AND. ROW(1) .GT. 10.
     1 .AND. RIA .NE. 0.) GO TO 6550
      GAMMA = 0.
      LNGAMA = 0.
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      EMOLE= 0.
      EIONIZ = 0.
      XNPTS = XNPTS + 1.
C
C     SET EOSPAR(36) .EQ. 0. TO CALL EOS
        IF (EOSPAR(36) .NE. 0.) GO TO 6503
      CALL TICKER(TIME2)
C
      CALL EOS(1)
      CALL TICKER(TIME3)
      TIMEA=        (TIME3 - TIME2) * 16.666667 + TIMEA
      IF (MOXIE.EQ.207) GO TO 6600
      EGAM = 1. + P1(1)*SV(1)/(E(1)-ECHCK(18))
      EGAM2 = 1. + P1(1)*SV(1)/E(1)
      IF(EION(1).NE.0.) EGAM3= 1.+EION(7)*EION(2)/(1.5*TEMS(9)*EION(1))
        IF (IPRNTO.EQ.2 .OR. IPRNTO.EQ.3) GO TO 6503
      WRITE(6,703) THETA(I), ROW(1), SV(1), P1(1), E(1), CV(1), PBI(1),
     1             FEW(1), ASO(1)
 6503 CONTINUE
C        SET EOSPAR(36).EQ.0. TO CALL EOS
C        SET EOSPAR(37).EQ.0. TO AVOID KAPPA
      IF(EOSPAR(37).NE.0.) GO TO 6502
 6501 CONTINUE
      IF(ORLM(1) .GE. 201. .AND. ORLM(1) .LE. 300.) GO TO 6530
        IF(ZBAR .EQ. 0.) GO TO 6515
      EIONIZ = EION(8)-1.5*EION(1)*TEMS(9) +ECHCK(18)
CALCULATION OF TEMS(10) REMOVED BECAUSE EIONX APPROXIMATION IS GOOD. L.N.
      LNGAMA=     TEMS(10)/THETA(1)
      IF(LNGAMA .GT. 88.028) GAMMA = 1.E38
      IF(LNGAMA .LT. (-89.415987)) GAMMA = 1.E-38
      IF(GAMMA .EQ. 0.) GAMMA = EXP(LNGAMA)
        IF((GAMMA.LT.2.7182818) .AND. (IPRNTO.NE.2 .AND. IPRNTO.NE.3))
     1   WRITE (6,715)
      NSUBE=     (6.0247E23/TEMS(3))*ZBAR*ROW(1)
      GO TO 6520
 6515 CONTINUE
        IF (IPRNTO.NE.2 .AND. IPRNTO.NE.3) WRITE (6,728)
 6520 IF(IPRNTO .EQ. 1) GO TO 6530
        IF (IPRNTO.EQ.2 .OR. IPRNTO.EQ.3) GO TO 6504
      THCNST=    EION(10)-EION(1)*EION(13)+EION(7)
      RELCNS=    THCNST/EION(10)
      KK= 10*NOEMNT - 6
      KKK= 10*NOEMNT + 1
      WRITE(6,701)(EION(K),K=1,20),(TEMS(K),K=1,30),SNAFU,GAMMA,LNGAMA,
     2            NSUBE,THCNST,RELCNS
      WRITE(6,701) (Z(K),K=2,KKK)
      IF(MOXIE.EQ.101 ) WRITE(6,701)(TLMSB(K),K=1,15)
      IF (MOXIE .EQ. 6 .OR. MOXIE .EQ. 306 .OR. MOXIE .EQ. 102)
     1  WRITE (6,701) (CARBNZ(K),K=1,10)
      WRITE(6,702)I1,I2,I3,I4,I5,I6,I7,I8,I9,I10,M(1),(M(K),K=4,KK,10),
     2MATERE,IEEMNT,J1,J2,J3,J4,J5,J6,J7
C             EQUIVALENCE(J2,L0)
      IF(NOEMNT.EQ.1) WRITE(6,701) POTENL(I1),POTENL(I3-1),POTENL(I3)
 6530 CONTINUE
        IF (IPRNTO.EQ.2 .OR. IPRNTO.EQ.3) GO TO 6504
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      IF(IPRNTO .EQ. 1) WRITE(6,752) SNAFU,GAMMA,LNGAMA,PHI,TLMS(10)
     1    ,NSUBE, THCNST, RELCNS, DPDTAU, EION(14)
      WRITE(6,7018) EGAM, EGAM2, EGAM3, EIONIZ
         IF (IPNCHO .EQ. 1) GO TO 6540
      IF((IPNCHO.EQ.2.OR.IPNCHO.EQ.3).AND.TRAIL.EQ.11.) PUNCH 721,MOXIE,
     1THETA(1),ROW(1),(WORD(K),K=2,8)
      IF((IPNCHO.EQ.3.OR.IPNCHO.EQ.4).AND.TRAIL.EQ.11.) PUNCH 727,MOXIE,
     1THETA(1),ROW(1),RELPRS,RELENG,RELE2,RELZDR,RELION
      PUNCH 704,  MOXIE ,THETA(1),ROW(1),P1(1),E(1),CV(1),PB1(1),FEW(1),
     2             ASQ(1)
      IF((OKLM(1).GE.201.).AND.(OKLM(1).LE.300.)) GO TO 6509
      PUNCH 711, MOXIE, THETA(1), ROW(1), P1(1), E(1), GAMMA, TLMS(10),
     2           FEW(1), EIONIZ
      PUNCH 715, MOXIE,THETA(1),ROW(1),DPDTAU,DPDTHT,DZDTAU,DZDTHT,NDAR,
     1          NSUBE
6509  CONTINUE
      PUNCH 714, MOXIE, THETA(1), ROW(1), P1(1), E(I), EGAM, EGAM2,
     1           FEW(1), ECHCK(18)
      IF((OKLM(1).EQ.6.).OR.(OKLM(1).EQ.306.).AND.(RIA.NE.0.))
     1             GO TO 6510
6511  CONTINUE
6550  CONTINUE
6540  IF((TRAIL .LE. 10.) .OR. (TRAIL .GE. 14.)) WRITE(6,707)
6541  CONTINUE
      GO TO LRETN,(14,215,510,205,410,605)
6502  CONTINUE
      CALL KAPPA(1,1)
         IF (IPRNTO.EQ.2 .OR. IPRNTO.EQ.3) GO TO 6505
      WRITE(6,7100) THETA(1),ROW(1),SV(1),OKLM(1),CAPAR(1),CAPAC(1),
     2FEW(1)
      IF(IPNCHO .NE. 1) PUNCH 7101, MOXIE, THETA(1), ROW(1), FEW(1),
     2 CAPAR(1), CAPAC(1)
6505  CONTINUE
         IF ((EOSPAR(36).NE.0.) .AND. (IPRNTO.EQ.2 .OR. IPRNTO.EQ.3)) GO
     1      TO 6504
         IF(EOSPAR(36).NE.0.) GO TO 6550
      GO TO 6501
6504  CONTINUE
      GOLOUT(MARKER) = THETA(1)
      GOLOUT(MARKER + 1) = ROW(1)
      GOLOUT(MARKER + 2) = P1(1)
      GOLOUT(MARKER + 3) = E(1)
         IF (EOSPAR(37) .EQ. 0.) GO TO 6512
      GOLOUT(MARKER + 4) = CAPAR(1)
      GOLOUT(MARKER + 5) = CAPAC(1)
6513  CONTINUE
      GOLOUT(MARKER + 6) = FEW(1)
      GOLOUT(MARKER + 7) = CV(1)
      GOLOUT(MARKER + 8) = PB1(1)
      GOLOUT(MARKER + 9) = ASQ(1)
      GOLOUT(MARKER + 10) = EGAM
      GOLOUT(MARKER + 11) = EGAM2
         IF (EGAM .EQ. EGAM2) GOLOUT(MARKER+11) = GAMMA
      MARKER = MARKER+12
      GO TO 6541
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 6512 CONTINUE
      GOLOUT(MARKER+4) = EION12
        IF (EOSPAR(1).NE.0. .AND. EION(17).NE.1.) GOLOUT(MARKER+4) =
     1                                                    EION(17)
C     EION(17) = NBAR
      GOLOUT(MARKER+5) = TLMS(10)
      GO TO 6513
 6510 CONTINUE
      ISAVMX=   MOXIE
      MOXIE= 6
      EMOL=  CARBN2(1) +ECHCK(18)
      PUNCH 723, MOXIE,THETA(1),ROW(1),EMOL,P1(1),(CARBN2(K),K=3,6),
     2   NBAR,ECHCK(18)
      MOXIE=   ISAVMX
      GO TO 6511
 6600 CONTINUE
      CALL ES7
      REL P1 = (EION(7)-P1(1))/EION(7)
      REL P2 = (EION(7)-P1(1))/P1(1)
      WRITE (6,7019) THETA(1),ROW(1),ETA,P1(1),EION(7),REL P1, REL P2
      WRITE (6,701) EION
      WRITE (6,701) E(1),CV(1)
      PUNCH 731, MOXIE,THETA(1),ROW(1),P1(1),EION(7),REL P1,REL P2,E(1),
     1           EION(3)
      GO TO 6541
  300 CONTINUE
      CALL OVCHK(IFAKE)
      CALL TICKER(TIME2)
      THUTA=     THETA(1)*1.E-3
      CALL EOSMOT(MOXIE1,1,SV(1),THUTA    ,ANS)
      P1(1)=     ANS*1.E16
      CALL EOSMOT(MOXIE1,2,SV(1),THUTA    ,ANS)
      E(1)=      ANS*1.E16
      CALL EOSMOT(MOXIE1,3,SV(1),THUTA    ,ANS)
      CV(1)=     ANS*1.E13
      CALL EOSMOT(MOXIE1,4,SV(1),THUTA    ,ANS)
      PB1(1)=    ANS*1.E16
      THUTA=     THUTA**4
      CALL EOSMOT(MOXIE1,5,SV(1),THUTA    ,ANS)
      XLMDA=     ANS
      CAPAR(1)= 1.37*SV(1)/ANS
      CALL TICKER(TIME3)
      SAVEP=     P1(1)
      SAVEE=     E(1)
      SAVECV=    CV(1)
      SAVEPB=    PB1(1)
      TIMEA=        (TIME3 - TIME2) * 16.666667 + TIMEA
      IF(RPIA.EQ.0.) GO TO 105
      THETA4=    THETA(1)**4
      P1(1)=     P1(1) -45.66*THETA4
      PB1(1)=    PB1(1) -137.0*THETA4
      E(1)=      E(1) -137.0*THETA4*SV(1)
      CV(1)=     CV(1) -548.0*THETA4/THETA(1)*SV(1)
  105 CONTINUE
      WRITE(6,761) MOXIE,THETA(1),ROW(1),P1(1),E(1),CV(1),PB1(1),CAPAR(1
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     1),XLMDA
      IF(INPIA.NE.0.) WRITE(6,762) SAVEP,SAVEE,SAVECV,SAVEPB
      IF(IPNCHO.NE.1) PUNCH 721,MOXIE,THETA(1),ROW(1),P1(1),E(1),
     1  CV(1),PU1(1),CAPAR(1),XLMDA
      GO TO LRETN,(14,115,510,205,410,605)
C
C     ********************  F O R M A T S  ************************
C
C
C   ************************  READ FORMATS  ************************
C
  706 FORMAT(F4.0, F4.1, 211, F10.0, 1P2E15.8, 0PF4.0, 1P2E12.6, I2)
  730 FORMAT(12A6)
  734 FORMAT(6E10.4, 2F6.3)
  751 FORMAT(10E8.3)
C
C   ************************ WRITE FORMATS  ************************
C
  700 FORMAT (10H1 TIMEC = ,E13.6, 3X, 13H= TIMEA/XNPTS /10H  TIMEA = ,
     1E13.6,3X, 51H= SUM OF TIMES USED DURING CALLS TO EOS (OR EOSMOT) /
     210H  XNPTS = ,E13.6,3X,60H= TOTAL NUMBER OF THETA-RHO POINTS FROM
     3THE LAST INPUT CARD. /40H0 ALL TIMES PRINTED ARE IN MILLISECONDS.)
  701 FORMAT (1H , 1P10E13.6)
  702 FORMAT (1H , 10(1X,I10) )
  703 FORMAT (1H0  , 3X  1P9E14.7)
  705 FORMAT(10H0OKLM(1) = F6.1, 3X 7HTRAIL = F5.1, 3X 8HIPRNTO = I2, 3X
     2 8HIPNCHO = I2, 3X 3HJ = I2 //1X 10HTHETA(1) = 1PE15.8, 5H E.V. 3X
     3 8HRHO(1) = E15.8, 8H G./C.C. 3X 7HSV(1) = E15.8, 8H C.C./G.)
  707 FORMAT(//)
  708 FORMAT(67H0 GRID OF NORMAL TEMPERATURE-LOW DENSITY POINTS (FROM .1
     2 G/CC DOWN)/)
  709 FORMAT(67H0 GRID OF NORMAL TEMPERATURE-HIGH DENSITY POINTS (FROM .
     201 G/CC UP)/)
  710 FORMAT(58H0 GRID OF NORMAL DENSITIES-LOW TEMPERATURE (BELOW 10 E.V
     2.)/)
  712 FORMAT ( 1H1)
  715 FORMAT(55H0 ***** NOTE THAT GAMMA WAS LESS THAN 2.7182818 *****/)
  716 FORMAT(15H0 DELTA THETA = 1PE12.5, 4H  EV 5X 12H DELTA TAU =E12.5,
     1        6H  CC/G)
  717 FORMAT(15H0 DELTA THETA = 1PE12.5, 4H  EV 5X 12H DELTA RHO =E12.5,
     1        6H  G/CC)
  718 FORMAT(86H0 READ ONE CARD PER TEMPERATURE-DENSITY POINT.  PERFECT
     1GAS IF TRAIL (INPUT) EQUALS 2./)
  719 FORMAT(48H0 NORMAL TEMPERATURE SET AT ONE SELECTED DENSITY /)
  720 FORMAT(20H0 SPECIAL ZMEAN PATH///)
  722 FORMAT(40H0 COMPUTE RECTANGLE AROUND CENTRAL POINT///)
  724 FORMAT(38H0 MOLECULAR EQUATION OF STATE CHECKOUT///)
  725 FORMAT(49H0 NORMAL DENSITY SET AT ONE SELECTED TEMPERATURE /)
  726 FORMAT(43H0 NORMAL GRID OF TEMPERATURE-DENSITY POINTS/)
  728 FORMAT(45H0 PERFECT GAS ANSWER.  GAMMA WAS NOT COMPUTED/)
  729 FORMAT (19H1THE SOLID ARRAY IS /(5X,1P10E12.5))
  732 FORMAT(1H0 12A6)
  733 FORMAT (9H OKLM(2)=,F8.1)
  735 FORMAT(28H0 DIAPHANOUS TYPE CARDS HAVE )
  736 FORMAT(25H0 GILMORE TYPE CARDS HAVE )
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737 FORMAT(28H0 MILSENRATH TYPE CARDS HAVE )
738 FORMAT(                              5X 7HTHETA = 1PE12.5, 5H E.V. 3X
   25HRHO = E12.5, 5H G/CC 3X 3HP = E12.5, 10H DYNES/CM2 3X 3HE =
   3E12.5, 7H ERGS/G /5X 6HEION = E12.5, 7H ERGS/G 3X 6HKPOS = E12.5,
   46H CM2/G 3X 6HKPLK = E12.5, 6H CM2/G 3X 6HZBAR = 0PF7.3, 3X
   56HEGAM = F7.3/)
739 FORMAT(15H0 EOS OUTPUT IS )
740 FORMAT(9H  REL P = 1PE12.5, 3X 7HREL E = E12.5, 3X 9HRELZBAR =
   2E12.5, 3X 15HREL (E-EZERO) = E12.5, 3X 13HREL IONIC E = E12.5//)
742 FORMAT(14H0 THETA SET IS/(1P10E12.5))
744 FORMAT(12H0 RHO SET IS/(1P10E12.5))
746 FORMAT(54H0 NORMAL GRID WITH SELECTED TEMPERATURE-DENSITY POINTS/
   21X,17H MINIMUM THETA = ,F9.3,6H E.V. ,17H MAXIMUM THETA = ,1PE12.5
   3,6H E.V. ,/1X,19H MINIMUM DENSITY = ,1PE10.4,5H G/CC,19H MAXIMUM D
   4ENSITY = ,E12.5,5H G/CC)
752 FORMAT(5X 7HSNAPU = 1PE10.3, 4X 7HGAMMA = E12.5, 4X 8HLNGAMA =
   2 E12.5,4X,5HPHI = E12.5,4A, 23HTLMS(10)=THETA*LNGAMA = E12.5
   3    /5X, 8HNSUBE = ,E12.5,10H THCNST = ,E12.5,10H RELCNS = ,E12.5,
   4    10H DPDTAU = ,E12.5,12H EION(14) = ,E12.5)
753 FORMAT(67H1 J MUST BE SPECIFIED ON TRAIL CARD SINCE RHOR= EOSPAR(J
   2) FOR AIR. 46H USE J=3 TO AVOID ESB WHEN MATERIAL NO. =102. /51H
   3USE J=4 TO AVOID EIONX WHEN MATERIAL NO. IS 208. )
760 FORMAT(1H0,5HOKLM ,5X,6HTHETA ,10X,4HRHO ,7X, 9HPRESSURE ,5X, 7HENE
   2RGY ,7X,7HDEDTHI ,7X,7HDEDTAU ,8X,6HCAPAM ,7X,7HLAMBDA )
761 FORMAT(1H0,14,8(2X,1PE12.5))
762 FORMAT(1H0,40X,4(2X,1PE12.5))
763 FORMAT (75H THE SHORT LINE IS P, E, DEDTHI, DEDTAU, WITH RADIATION
   1 CONTRIBUTIONS.    /)
764 FORMAT (5X,  I4,7X,F3.0,2X,5(F5.0,2X,F9.6))
765 FORMAT (16H1MATREL ARRAY IS //99H MATERIAL NO.  NOLMNT  Z        PA
   1RT     Z       PART     Z       PART     Z       PART     Z       PART
   2 )
7000 FORMAT(1H1  45X 32H**** STANDARD OUTPUT FORMAT **** //15H  OUTPUT
   2LINE 1)
7001 FORMAT(                                                    116H  THETA
   1(EV), RHO (G/CC), SV (CC/G), PI (DYNES/CM SQ), E (ERGS/G), CV (ERG
   2S/G/EV), PBI (ERGS/CC), FEW, ASQ (CM/SEC) /)
7002 FORMAT(21H0 EION ARRAY CONTAINS/ 19H  OUTPUT LINES 2, 3)
7003 FORMAT(                                    126H  THETA (EV), TAU (CC/G), ZHA
   1R, ZBAR1, PHI, ESUM, PRESHR (DYNES/CM SQ), ENERGT (ERGS/G), DEDTHI
   2 (ERGS/GM/EV), DEDTAU (ERGS/CC) / 122H  SNDSPD (CM/SEC), DPDTAU (E
   3RG-G/CC SQ), DPDTHT (DYNES/CM SQ/EV), FAILURE RECORD, NSUBE,  ZMEA
   4N, NBAR, ZSUM1, ZSUM2, ZSUM3/)
7004 FORMAT(31H  EXPLANATION OF SYMBOLS ABOVE )
7005 FORMAT(18H  1)  TAU =        , 22HSPECIFIC VOLUME (CC/G) /18H  2)
   1ZBAR =       , 48HMEAN ION CHARGE (NO. OF ELECTRONS / NO. OF IONS)/
   218H  3)  PHI =         , 52H9.648679E11 / MEAN ATOMIC WEIGHT /
   372H  4)  ALL DERIVATIVES W.R.T. TAU (DEDTAU, DPDTAU) ARE AT CONSTA
   4NT THETA. / 72H  5)  ALL DERIVATIVES W.R.T. THETA (DEDTHT, DPDTHT)
   5 ARE AT CONSTANT TAU. / 18H  6)  SNDSPEED =  , 57H((PARTIAL PRESHR
   6)/(PARTIAL DENSITY)) AT CONSTANT ENTROPY. / 71H  7)  FAILURE RECOR
   7D CONTAINS THE ERROR FLAG AFTER CATASTROPHIC ERRORS. )
7006 FORMAT(18H  9)  NBAR         , 102HMEAN NO. OF ATOMS PER MOLECULE.
   1 IT DIFFERS FROM UNITY IF MOLECULAR EQUATIONS-OF-STATE SO COMPUTE
   211. /)
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 7007 FORMAT(21HO TLMS ARRAY CONTAINS/ 25H  OUTPUT LINES 4, 5, 6, 7 )
 7008 FORMAT(                          126H  BACK1, BACK2, MEAN ATOMIC W
     1EIGHT, 4 VARIES, LN(GAMMA*ZBAR), XBAR(1), ZBARLN, SIGMA, XI, SYNTH
     2ETIC POTENTIAL (1=THETA*LNGAMA) / 107H  ZBAR + BACK2 - 2*BACK1, ZB
     3AR - BACK1, V(1,J) - V(1,J-1), SUMPOT, DZDTAU, DZDTHT, THE NEXT 14
     4 VALUES VARY /41H  SNAPU,GAMMA,LNGAMA,NSUBE,THCNST,RELCNS /)
 7009 FORMAT(31H  EXPLANATION OF SYMBOLS ABOVE )
 7010 FORMAT(36H  1)  BACK1 IS PREVIOUS ZBAR ITERATE / 43H  2)  BACK2 IS
     1 SECOND PREVIOUS ZBAR ITERATE / 39H  3)  XBAR(1) IS RELEVANT MOLE
     2FRACTION / 40H  4)  SIGMA (USED IN EIONM5) IS VARIABLE /10H  5)  X
     3I = 8X 22HPHI * (1./NBAR + ZBAR) / 65H  6)  V(I,J) IS THE JTH IONI
     4ZATION POTENTIAL (1 .LE. J .LE. Z(I)) / 20X 35HFOR THE ITH ELEMENT
     5 OF THE MATERIAL / 79H  7)  SUMPOT (USED IN EIONM5) SUMS THE FIRST
     6 (J-1) POTENTIALS WHERE 1 .LE. V(J) / 14H  8)  DZDTHT = 4X 26HZSUM
     7/1/ZSUM2 (CONSTANT TAU) / 14H  9)  DZDTAU = 4X 28HZSUM3/ZSUM2 (CONS
     8TANT THETA))
 7011 FORMAT(/5H 10)  ALL QUANTITIES INDEXED WITH I ARE SPECIES DEPENDEN
     1T AND CELL CONTAINS / 20X 55HQUANTITY FOR LAST SPECIES IN MATERIAL
     2 (I.E. I = NOLMNT))
 7012 FORMAT(60H 11)  SNAPU CONTAINS  A) 19TH ITERATE OF Z BAR IF IS .EQ
     1. 20 / 12X  2HOR 8X 28HB) Z BAR IF Z BAR .GT. ZMEAN / 85H 12)  GAM
     2MA IS DEFINED AS THE DIMENSIONLESS DEGENERACY PARAMETER IN THE SAH
     3A EQUATION / 46H 13)  LNGAMA IS THE NATURAL LOGARITHM OF GAMMA /
     49OH 14)  NSUBE= (6.0245E23)*ZBAR*RHO/(MEAN ATOMIC WEIGHT), THE NUM
     5BER DENSITY OF ELECTRONS (NO./CC) / 96H 15)  THCNST =    EION(10)
     6- EION(1) * EION(13) * EION(7) ; THERMODYNAMIC CONSISTENCY DEVIATI
     7ON / 81H 16)  RELCNS =    THCNST/EION(10) ; RELATIVE THERMODYNAMIC
     8 CONSISTENCY DEVIATION //)
 7013 FORMAT(10/H  THE NEXT 1 TO 5 LINES (DEPENDING ON THE NUMBER OF ELE
     1MENTS,1 TO 5) ARE Z(2) ONWARD, 10 VALUES PER ELEMENT /123H  IF THE
     2 MATERIAL IS CH2 THE NEXT 2 LINES ARE THE TLMSB ARRAY, IF THE MATE
     3RIAL IS CARBON THE NEXT LINE IS THE CARBNZ ARRAY, /40H  OTHERWISE
     4THESE LINES WILL NOT APPEAR./ 93H  THE NEXT LINES ARE I1 TO I10,M(
     5I),(M(K),K=4,KK,10),MATERL,ILEMNT,J1 TO J7,KK=(10*NOLMNT-6) /30H0
     6EXPLANATION OF SYMBOLS ABOVE /6/H  1)  NOLMNT =    M(1)   IS THE N
     7UMBER OF ELEMENTS IN THE MATERIAL / 44H  2)  MATERL IS THE SPUTTER
     8 MATERIAL NUMBER / 29H0 TWO LINES MAY NEXT APPEAR: /3X,126H IF NOL
     9MNT=1, A LINE PRINTS WITH THE ATOMIC NUMBER, V(J-1), AND V(J)  (WH
     AERE  V(J-1).LT.SYNPOT.LE.V(J)  WAS USED IN THE EIONX /3X,46H SUBRO
     BUTINE UNLESS  (J-1)=0  OR  J=ATOMIC NO.) /3X,111H IF IPRNTO=1, A L
     CLINE PRINTS WITH SNAPU, GAMMA, LNGAMA, PHI, TLMS(10), NSUBE, THCNST
     DM, RELCNS, DPDTAU, EION(14), /
     EN                                                    45H  THE LAST LINE IS
     FEGAM, EGAM2, EGAM3, EION1Z  //6X,29H EGAM= 1.+P1*SV/(E-ECHCK(18))
     GP/6X,18H EGAM2= 1.+P1*SV/E /6X,48H EGAM3= 1.+EION(7)*EION(2)/(1.5*I
     HONS(9)*EION(1)) /6X,42H EION1Z= ENERGY-(1.5*THETA*XI) +ECHCK(18) )
 7014 FORMAT(23H1 EOSPAR ARRAY CONTAINS/(1P10E12.5))
 7015 FORMAT(61HOBLACK-BODY RADIATION CONTRIBUTION INCLUDED BY SUBROUTIN
     1E EOS)
 7016 FORMAT(20H  MARK DECK CONTAINS/(1P10E12.5))
 7017 FORMAT(20HO EGAM (USES E-EO) = 1PE10.3, 5X 16HEGAM2 (USES E) =
     2 E10.3, 5X 23HEGAM3 (USES TRANSL E) = E10.3, 5X 8HEIONIZ = E10.3)
 7019 FORMAT(7HOTHETA=,1PE12.5,5H RHO=,E12.5,15H (RHO/RHOZERO)=,E12.5,10
     1H PRESSURE=,E12.5,
     216H EIONX PRESSURE=,E12.5,/10X,25H ((P1(1)-P EIONX)/P1(1))=,E12.5,
```

```
     326H((P1(1)-P E1ONX)/P E1ONX)=,E12.5 )
 7020 FORMAT (24H1THE MATERIAL NUMBER IS ,I3)
 7021 FORMAT(1H1,5X,5HTHETA,7X,3HRHO,8X,2HP1,9X,1HE,4X,6HCAPAR/,4X,6HCAP
     2AC/,5X,3HFEW,8X,2HCV,7X,3HPB1,7X,3HASQ,6X,4HEGAM,4X,6HEGAM2//44X,6
     3HE1ONIZ,4X,6HSYNPOT,53X,5HGAMMA/(1H ,1P6E10.3,0PF8.5,1P5E10.3))
 7022 FORMAT (1H1 ,(1P6E10.3,0PF8.5,1P5E10.3))
 7023 FORMAT (16HOCOMPOSITION IS ,10X,1HZ,8X,4HPART ,///(24X,F4.0,4X,
     1         F9.8))
 7024 FORMAT (1HO,30X,14H2MEAN       = ,0PF8.3/31X,14HPH1          = ,1PE
     112.5/31X,14HAMEAN       = ,0PF9.3/31X,14HENERGY ZERO = ,1PE12.5)
 7025 FORMAT (85H1 TIMES RECORDED PER GOLEM RUN ARE AS FOLLOWS  (ALL TIM
     AES ARE IN MILLISECONDS), WHERE / 87H  1)  XNPTS = TOTAL NUMBER OF
     BTHETA-RHO COMPUTATIONAL POINTS FROM THE LAST INPUT CARD  / 87H  2)
     C  SUMPTS = TOTAL NUMBER OF THETA-RHO COMPUTATIONAL POINTS IN THE E
     UNTIRE GOLEM RUN. / 22HO QUANTITY    MEANING    // 54H  TIME1       TI
     EME1 IS THE TIME AT THE START OF THE RUN / 70H  TIME2       TIME2 IS
     F THE TIME PRECEDING EACH CALL TO EOS (OR EOSMOT) /72H  TIME3
     GTIME3 IS TIME UPON RETURN FROM EACH CALL TO EOS (OR EOSMOT) // 101
     HH  TIMEA       TIMEA = (TIME3 - TIME2)*16.666667, THE SUM OF TIMES
     IUSED DURING CALLS TO EOS (OR EOSMOT) / 118H  TIMEB       TIMEB = (T
     JIME3 - TIME1)*16.66666/, TOTAL TIME USED BETWEEN START OF RUN AND
     KLAST CALL TO EOS (OR EOSMOT) /13X,24HFOR THE LAST INPUT CARD. /
     L106H  TIMEC       TIMEC = TIMEA/XNPTS, TIME USED PER CALL TO EOS (O
     MR EOSMOT) PER THETA-RHO COMPUTATIONAL POINT. / 112H  TIMED       TI
     NMED = TIMEB/SUMPTS, TIME USED BETWEEN START OF RUN AND LAST CALL T
     OO EOS (OR EOSMOT) PER THETA-RHO / 13X, 20HCOMPUTATIONAL POINT. )
 7026 FORMAT (10HO TIME1 = , F14.6,10X, 8HTIMEA = ,F14.6,/10H  TIME2 = ,
     1F14.6,10X, 8HTIMEB = ,F14.6,/10H  TIME3 = ,F14.6,10X,8HTIMEC = ,
     2F14.6,/10H  XNPTS = ,F14.6,10X,8HTIMED = ,F14.6,/11H  SUMPTS = ,
     3F13.6)
 7100 FORMAT(1HO,3X,7H THETA=,1PE12.5,5H RHO=,E12.5,4H SV=,E12.5,6H OKLM
     2=,0PF6.1,7H CAPAR=,1PE12.5,7H CAPAC=,E12.5,5H FEW=,E12.5)
C
C    ********************** PUNCH FORMATS  **********************
C
  704 FORMAT( 1HA, I4, F9.3, 1P5E10.4, 0PF8.5, 1PE8.2 )
  711 FORMAT( 1HB, I4, F9.3,1PE10.4,E8.2,2E10.4,0PF11.3,1PE9.4,E8.2)
  713 FORMAT(1HC, I4, F9.3, 1P5E10.4, 0PF6.2, 1PE10.4)
  714 FORMAT(1HD, I4, F9.3, 1P5E10.4, 0PF8.5, 1PE8.2)
  721 FORMAT(1HE,I4,F9.3,6E9.3,2F6.3)
  723 FORMAT(1HH,I1,F9.3,1P7E8.2,0PF5.2,E8.2)
  727 FORMAT(1HG,I4,F9.3,1P6E11.3)
  731 FORMAT (1HI,I4,F9.3,1P6E10.3,0PF6.2)
 7101 FORMAT(1HF,I4,F9.3,1P4E10.4)
 7700 FORMAT(1HA 1X 5HMOXIE 2X 5HTHETA 3X 3HRHO 7X 1HP 9X 1HE 9X 2HCV 8X
     .       3HPB1 6X 3HFEW 5X 5HASQ -)
 7701 FORMAT(1HB 1X 5HMOXIE 2X 5HTHETA 3X 3HRHO 7X 1HP 9X 1HE 8X 5HGAMMA
     .       4X 6HSYNPOT 3X 3HFEW 5X 7HEIONIZ-)
 7702 FORMAT(1HC 1X 5HMOXIE 2X 5HTHETA 3X 3HRHO 6X 6HDPDTAU 4X 6HDPDTHT
     .       4X 6HDZDTAU 4X 6HDZDTHT 3X 4HNBAR 4X 6HNSUBE-)
 7703 FORMAT(1HD 1X 5HMOXIE 2X 5HTHETA 3X 3HRHO 7X 1HP 9X 1HE 9X 4HEGAM
     .       5X 5HEGAM2 5X 3HFEW 4X 6HECHCK-)
 7704 FORMAT(1HE,1X,5HMOXIE,6H THETA,3X,4H RHO,6X,2H P,7X,2H E,6X,5H E10
     2N,4X,5H KROS,4X,5H KPLK,1X,5H ZBAR,1X,6H EGAM-)
 7705 FORMAT(1HF,1X,5HMOXIE,6H THETA,4X,4H RHO,6X,4H FEW,5X,6H CAPAR,4X,
     26H CAPAC,26X,1H-)
 7706 FORMAT(1HH,17H MOXIE THETA RHO ,3X,6H EMOL ,3X,3H P ,2X,45H DEDTAU
     2  DEDTHT  DPDTAU  DPDTHT  NBAR ECHCK- )
 7707 FORMAT(1HG,1X,5HMOXIE,6H THETA,3X,4H RHO,8X,6HRELPHS,5X,6HRELENG,
     15X,5HREL2,6X,6HREL2BR,5X,7HRELION- )
 7720 FORMAT(1HM,13H MOXIE THETA ,2X,5H RHO ,5X,3H P ,6X,3H E ,4X,35H DE
     2DTHT   DEDTAU   CAPAR   LAMBDA- )
 7721 FORMAT(1HM,I4,F9.3,1P7E9.3)
 7722 FORMAT(5HMOXIE,2X, 5HTHETA,6X,3HROW,9X,2HP1,9X,2HP2,7X,6HREL P1,5X
     1,6HREL P2,7X,5HE   -)
      END
```

GOLEM INPUT CARD FORMAT (continued)

COLUMNS	FORMAT	DATA
1-4	F4.0	OKLM(1)
5-8	F4.1	TRAIL

9	I1	IPRNT 0
		If (IPRNT0 . EQ. 0), print
		If (IPRNT0 . EQ. 1), no print
		If (IPRNT0 . EQ. 2), print GOLOUT Array only (no titles)
		If (IPRNT0 . EQ. 3), print GOLOUT Array with titles

10	I1	IPNCH0
		If (IPNCH0 . EQ. 0) punch
		If (IPNCH0 . EQ. 1) no punch
		If (IPNCH0 . EQ. 2. OR. IPNCH0. EQ. 3) . AND. TRAIL. EQ. 11.) punch DIAPHANOUS input in standard output format
		If (IPNCH0. EQ. 3. OR. IPNCH0. EQ. 4) . AND. TRAIL. EQ. 11.) punch RELE2, RELZBR, RELICN, RELPRS, RELENG

11-20	F10.0	THETA(1)
21-35	E15.8	RHO(1)
36-50	E15.8	SV(1)
51-54	F4.0	TEST
55-66	E12.6	DELTHT
67-78	E12.6	DELTAU
79-80	I2	J

These quantities are used as follows:

OKLM(1): A material number used to specify the substance under study. A list of the material numbers used by the SPUTTER code is present in the DIAPHANOUS writeup, earlier in this volume.

TRAIL: The specifier of the path (through the temperature-density plane) to be studied

IPRNT0: Controls the type of printout

IPNCH0: Controls the kind of punch output

THETA: Specifies the first input temperature (if one is required)

RHO: Specifies the first input density (if one is required). Either RHO or TAU (see next quantity) may be input

TAU: Specifies the first input specific volume (if one is required). Either RHO or TAU may be input

TEST: This field is used only to distinguish TRAIL cards from other possible GOLEM input cards

DELTHT: Specifies either the increment in temperature or the second input temperature (if either is required)

DELTAU: Specifies either the increment in density or in specific volume or a second input density (if any of these are required)

J: This field is not presently used

The possible trails through the temperature-density plane that can be used are:

TRAIL OPTIONS

TRAIL = 0.	Normal grid of temperature-density points (see next page)
TRAIL = 1.	Special ZMEAN path
TRAIL = 2.	Perfect gas and read one card per point
TRAIL = 3.	Read one card per point
TRAIL = 4.	Compute (THETA, TAU) rectangle around central point
TRAIL = 5.	Normal grid of selected temperature-density points
TRAIL = 6.	Molecular equation-of-state checkout set
TRAIL = 7.	Compute (THETA, RHO) rectangle around central point
TRAIL = 8.	Grid of temperature-low density (. LE. 0.1) points
TRAIL = 9.	Grid of temperature-high density (. GE. 0.01) points
TRAIL = 10.	Grid of densities-low temperature (. LE. 10 eV)
TRAIL = 11.	Read DIAPHANOUS data card
TRAIL = 12.	Read GILMORE data card
TRAIL = 13.	Read HILSENRATH data card
TRAIL = 14.	Normal temperature set at one selected density
TRAIL = 15.	Normal density set at one selected temperature

The normal grid of points takes advantage of a set of temperatures, the THETA array, the RHO array, and densities that are built into the program in the form of data statements. These two data statements and a third, the EOSPAR array, (containing the parameters required by various equation-of-state or opacity subroutines) are gathered together in a block data program (called the KONTRL block data program). The temperature and density arrays so specified can be changed at will. Thus, the normal path is really as variable as desired. In practice, a standard set of temperatures and densities have been used. They are:

```
  Normal THETA array  /0.025, 0.05, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7,
                       0.8, 0.9, 1., 1.5,
1                      2.25, 3.4, 5., 7., 10., 15., 22.5, 34., 50.,
                       70., 100.,
2                      150., 225., 340., 400., 500., 600., 700.,
                       800., 900.,
3                      1.E3, 1.5E3, 2.25E3, 3.4E3, 5.E3, 7.E3,
                       1.E4, 210*0.
  Normal RHO array    /75., 50., 25., 10., 5., 2., 1.5, 1., 0.5, 0.1,
                       1.E-2. 1.E-3,
1                      1.E-4, 1.E-5, 1.E-6, 1.E-7, 1.E-8, 1.E-9,
2                      1.0000001E-10, 1.E-11, 1.E-12, 1.E-13,
                       1.E-14, 227*0.
```

Similarly, the standard set of input parameters in the EOSPAR array (which specifies quantities used by the subroutines) is:

```
  Normal EOSPAR array  /0., 488., -1.E38, 1.E38, 6*0.,
1                       7*0., 1.E-18, 1.E-3, 0.,
2                       1., 0., 1., 2., 2*0., 3., 2*0., 1.5,
3                       8*0., 1., 8.2E11,
4                       1., 2., 8*0.
```

These array elements are used in the following way:

EOSPAR(1) Controls usage of molecular equation-of-state by EIONX to allow ES1LMS, AIRMOL, and CMOL, set EOSPAR(1). NE. 0.

EOSPAR(2) Equals number of entries in MARI deck

EOSPAR(3) Free parameter

EOSPAR(4) Free parameter

EOSPAR(5) Controls ECHCK(18)

EOSPAR(5) Controls energy zero choice - see comment below

EOSPAR(5) = 5.98566E11 ergs/gm for atomization energy of carbon using CMOL

EOSPAR(5) = 9.63E11 ergs/gm for ES1LMS CH2 computations

EOSPAR(5) = 2.899E11 ergs/gm for dissociation energy of air for AIRMOL

EOSPAR(6) Controls EIONIN(1)

EOSPAR(7) Controls EIONIN(2)

EOSPAR(8) Controls EIONIN(3)

EOSPAR(9) Controls EIONIN(4)

EOSPAR(10) Controls EIONIN(5)

EOSPAR(11) Controls EIONIN(6)

EOSPAR(12) Controls EIONIN(7)

EOSPAR(13) Controls EIONIN(8)

EOSPAR(14) Controls EIONIN(9)

EOSPAR(15) Controls EIONIN(10)

EOSPAR(16) Controls EIONIN(11)
These 11 cells can be used to enter a special material composition to EIONX codes. Set EOSPAR(6) = the number of elements in the material. Set EOSPAR(7) through (16) = successive sets of (atomic number, atom number fraction) EOSPAR(6) . LT. 5. 5 is required

EOSPAR(17) Controls EIONIN(28)

EOSPAR(17) For CMOL only
Equivalence (EIONIN(28), FESTER), controls choice of run, full-equilibrium or translation-only
Use EIONIN(28) . EQ. -1. for translation-only treatment
Use EIONIN(28) . EQ. +1. for full-equilibrium treatment at GGA; . EQ. 0. or +1. for full equilibrium treatment at AFWL. for identity of results, use same value of EIONIN(28) at GGA and AFWL.

EOSPAR(18) Controls EIONIN(29)
Equivalence (EIONIN(29), ZBRMIN), controls minimum allowed ZBAR

EOSPAR(19) Controls EIONIN(30)
Equivalence (EIONIN(30), EPSI), controls ZBAR for EIONX iteration test

EOSPAR(20) Controls M2

EOSPAR(21) Controls RPIA
Set EOSPAR(21) . EQ. 0. to include radiation contributions in EOS.
Set EOSPAR(21) . NE. 0. to avoid radiation contributions in EOS

EOSPAR(22) Controls PUSHA

EOSPAR(23) Controls MAXLM

EOSPAR(24) Controls LMDA(2)

EOSPAR(25) Controls SOLID(18)

EOSPAR(26) Controls SCYCLE

EOSPAR(27) Controls NR
Set EOSPAR(27) . GE. 2. for path = 0. in EIONX
Set EOSPAR(27) . LE. 1. for path = -3. in EIONX

EOSPAR(28) Controls LAM1

EOSPAR(29) Controls IB

EOSPAR(30) Controls CVA

EOSPAR(31) Controls SOLID(17)

EOSPAR(32) Controls RIB

EOSPAR(33) Controls HVA

EOSPAR(34) Controls HCA

EOSPAR(35) Controls AMASNO(1)

EOSPAR(36) Controls EOS
Set EOSPAR(36) . NE. 0. to avoid EOS
Set EOSPAR(36) . EQ. 0. to call EOS

EOSPAR(37) Controls KAPPA
Set EOSPAR(37) . NE. 0. to call KAPPA

EOSPAR(38) Controls CHRNO(1)

EOSPAR(39) Controls OKLM(18)

EOSPAR(40) Controls CMIN = 8. 2E11

EOSPAR(41) Controls LMDA(1)

EOSPAR(42) Controls MAXL

EOSPAR(43) Controls S2, normal value = 0

EOSPAR(44) Controls MARK, the AIRMOL control parameter MARK is equivalenced to EIONIN(28).
Set EOSPAR(44) to +2., 0., or -2. to achieve desired results. +2. is standard value

Remaining cells free.

The main print and punch options are:

IPRNT0 = 0 : Normal printout with all debug and intermediate quantities

IPRNT0 = 1 : Limited printout with main thermodynamic variables

IPRNT0 = 2 : Tabular output without captions

IPRNT0 = 3 : Tabular output (with titles) of θ, ρ, P, E, $\overline{Z}$, $(\partial E/\partial\theta)_\tau$, $(\partial E/\partial\tau)_\theta$, the speed of sound, EGAM = 1 + P/ρE, and several other variables

IPNCH0 = 0 : Punches all thermodynamic quantities computed by subroutines

IPNCH0 = 1 : No punch output

No matter which printout format is chosen, a page explaining all quantities is printed. On this page the units used, some relations used, and some definitions for several variables used are discussed.

If the option to punch cards is exercised, the different types of cards are prefaced by title cards and made sortable, together with the title cards, by a distinguishing character punched in column 1 of the card.

The input requirements of the various trails are simple: wherever any temperature-density point is the single or central point of a path to be studied, those values are input to THETA and RHO (or THETA and TAU). If increments are required, the values are input into DELTHT and DELTAU (DELTAU is also used for $\Delta\rho$ if needed). If a trail requires upper and lower temperatures, the upper one is input into DELTHT and the lower one is input to THETA. If upper and lower densities are required, they are

STANDARD OUTPUT FORMAT

```
OUTPUT LINE 1
THETA (EV), RHO (G/CC), SV (CC/G), P1 (DYNES/CM SQ), E (ERGS/G), CV (ERGS/G/EV), P01 (ERGS/CC), PEW, ASO (CM/SEC)

SION ARRAY CONTAINS
OUTPUT LINES 0, 0
THETA (EV), TAU (CC/G), ZBAR, ZBAR2, PHI, CSUM, PRESSR (DYNES/CM SQ), ENERGY (ERGS/G), DEDTHT (ERGS/GM/EV), DEDTAU (ERGS/CC)
DADSPD (CM/SEC), DPDTAU (ERG-G/CC SQ), DPDTHT (DYNES/CM SQ/EV), FAILURE RECORD, NSUBS, ZMEAN, NBAR, ZSUM1, ZSUM2, ZSUM3

EXPLANATION OF SYMBOLS ABOVE
A)  TAU =       SPECIFIC VOLUME (CC/G)
B)  ZBAR =      MEAN ION CHARGE (NO. OF ELECTRONS / NO. OF IONS)
C)  PHI =       =.0486*TAU*I / MEAN ATOMIC WEIGHT
D)  ALL DERIVATIVES ARE A.T. TAU (DE/DTAU, DPDTAU) ARE AT CONSTANT THETA,
E)  ALL DERIVATIVES ARE A.T. THETA (DE/DTHT, DPDTHT) ARE AT CONSTANT TAU,
F)  DADSPEC =   -(PARTIAL PRESSR)/(PARTIAL DENSITY)) AT CONSTANT ENTROPY,
G)  FAILURE RECORD CONTAINS THE ERROR FLAG AFTER CATASTROPHIC ERRORS,
H)  NBAR =      MEAN NO. OF ATOMS PER MOLECULE.  IT DIFFERS FROM UNITY IF MOLECULAR EQUATION-OF-STATE IS COMPUTE IT.

TLNS ARRAY CONTAINS
OUTPUT LINES 0, 1, 2, 3
GBCAC, BACAB, MEAN ATOMIC WEIGHT, N VARIES, LN(GAMMA*ZBAR), ZBAR(I), ZBARLN, SIGMA, AI, SYNTHETIC POTENTIAL (I=THETA/KBAMA)
ZBAR + BACAB - 2*BACA2, ZBAR - BACA1, V(I,J( - V(I,J-1), SUMPOT, DZDTAU, DZDTH., THE HEAT IS VALUES VARY .
SHAPU,GAMMA,LNGAMA,NSUBS,THCNST,RELCNS

EXPLANATION OF SYMBOLS ABOVE
A)  BACA1 IS PREVIOUS ZBAR ITERATE
B)  BACA2 IS SECOND PREVIOUS ZBAR ITERATE
C)  BBAR(I( IS RELEVANT MOLE FRACTION
D)  SIGMA (USED IN EIONMB( IS VARIABLE
E)  AI =        PHI * (I,/<BAR + ZBAR(
F)  V(I,J( IS THE J-TH IONIZATION POTENTIAL (I .LE. J .LE. EI(I(
                FOR THE I-TH ELEMENT OF THE MATERIAL
G)  SUMPOT (USED IN EIONMB) SUMS THE FIRST (J-1( POTENTIALS WHERE I .LE. V(J)
H)  DZDTH1 =    -SUM1/ESUM2 (CONSTANT TAU(
I)  DZDTAU =    -SUM1/ESUM2 (CONSTANT THETA(
COI ALL QUANTITIES INCREASED WITH I ARE SPECIES DEPENDENT AND CELL CONTAINS
                QUANTITY FOR LAST SPECIES IN MATERIAL (I.E. I = NSUBST)
C1) SHAPU CONTAINS   A) 1 WITH ITERATE OF Z BAR IF IS .EQ. 00
                OR      A) Z BAR IF Z BAR .GT. ZMEAN
C2) GAMMA IS DEFINED AS THE DIMENSIONLESS DEGENERACY PARAMETER IN THE SAHA EQUATION
2D) LNGAMA IS THE NATURAL LOGARITHM OF GAMMA
3D( NSUBS (=.00*SZA(I*BBAR*ATMO/(MEAN ATOMIC WEIGHT( THE NUMBER DENSITY OF ELECTRONS (NO./CC(
3D) THCNST =    SION(10) = SION(1) + SION(13) + SION(T) + THERMODYNAMIC CONSISTENCY DEVIATION
3D) RELCNS =    THCNST/SION(10) ) RELATIVE THERMODYNAMIC CONSISTENCY DEVIATION


THE NEXT C TO 8 LINES (DEPENDING ON THE NUMBER OF ELEMENTS,) TO 8) ARE EI(I( PWARD. IS VALUES PER ELEMENT
IF THE MATERIAL IS CH4 THE NEXT 8 LINES ARE THE TLNS8 ARRAY. IF THE MATERIAL IS CARBON THE NEXT LINE IS THE CARBON ARRAY.
OTHERWISE THESE LINES WILL NOT APPEAR.
THE NEXT LINES ARE II TO II(0,4)),)4(8(,4H8.4A),10),MATERL,ELEMNT,J1 TO J7,BAR(I(=NOELMNT=0.

EXPLANATION OF SYMBOLS ABOVE
C)  NOELMNT =   N(1)   IS THE NUMBER OF ELEMENTS IN THE MATERIAL
D)  MATERL IS THE SPUTTER MATERIAL NUMBER

TWO LINES MAY NEXT APPEAR(
  IF NOELMNT=1, A LINE PRINTS WITH THE ATOMIC NUMBER, V(J-1(, AND V(J)  (WHERE  V(J-1(.LT.SYMPOT.LE.V(J)  WAS USED IN THE EION
  SUBROUTINE WHICH IS (J-1(1)0  OR  )OATOMIC NO.(
  IF IPRNTDBG, A LINE PRINTS WITH SHAPU, GAMMA, LNGAMA, PHI, TLNS(10), NSUBS, THCNST, RELCNS, DPDTAU, EION11(),
THE LAST LINE IS EGAM, EGAM2, EGAM3, EIONIZ

    EGAM2 C.*P1*SV/(E-ECMCR(10(1
    EGAM3 C.*P1*SV/E
    EGAM2= 1.+E.DM(7)*EION(0(/(1.5*TLNS(0(*EION)))(
    EIONIZ= CME*RT*(1.5*THETA+AI( *ECMCR(10(
```

input into DELTAU and RHO (or TAU), respectively. If some subset of the normal 0 set is used, then only the needed density need be input, and vice versa. For further guidance consult the code.

Note that although the GOLEM code is lengthy and appears complicated, it has an extremely simple logical structure on any given trail. Each trail generates a member of a set of temperature-density points. The equation-of-state or opacity subroutine is then called to compute the thermodynamic data relevant to this temperature-density point. These data are then either printed, punched (or both), or stored in an array for later printout. The trail next generates the succeeding temperature-density point and the process is repeated. Any number of trail-specifying input cards may be stacked in a given run.

Finally, further development of the GOLEM code will couple it to a plotting routine, GRAPH (which can already couple with the DYPER4 and TRANS codes). Examples of GOLEM output for the AIRMOL subroutine are given in Appendix I. An example is also given for the CMOL subroutine in reference 4.

MARIER: AN ISOELECTRONIC IONIZATION POTENTIAL PREDICTOR

MARIER does 2nd- or 4th-order least-square fits to a given isoelectronic sequence of ionization potentials.

The program contains one read statement:

```
READ (5, 7701) KSTART, KEND, LASTZ, LOWERGO, LOWERZ,
               NEXT, LORDER, LREDUC, LSTEP, MORE
7701 FORMAT (10 (I2, 2X))
```

The meaning of these variables is:

KSTART	is the lowest atomic number used in the first isoelectronic sequence done
KEND	is defined by: (KEND-KSTART+1) isoelectronic sequences are done
LASTZ	is the highest atomic number used in any isoelectronic sequence

```
      PROGRAM MAKIER(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
      COMMON/LMSH/U(1)
      DATA KPREV, KSTART, KEND, LASTZ  /4* 0/  IM/0/  IM2/0/
      DIMENSION X(100),Y(100), COEF(8,100),COE(5),POTENL(100),KATNO(100)
      REAL MARIAN
      DIMENSION MARIAN(100,100)
      DIMENSION MATNO(100)
      DIMENSION XX(3),YY(3),COE2(3)
      DATA  L3/3/ L2/2/
      DATA  DEVEAT/0./  POTENL/100*0./   DEVIAT/0./
C
C
C
C     ASSUME MARI DECK USED HAS ELEMENTS IN MONOTONE INCREASING ORDER
C       FOLLOWED BY ISOTOPIC MIXTURES
C
C     MARI DECK IS ASSUMED TO CONTAIN ONE OR TWO SPECIFICATIONS FOR EACH
C       ELEMENT. (THE SECOND SPECIFICATION WILL ORDINARILY BE USED FOR
C       SPECIAL ISOTOPIC MIXTURES.) THIS PROGRAM WILL USE DATA FROM THE
C       FIRST SPECIFICATION FOR A GIVEN ELEMENT. THE MARI DECK ENDS WITH
C       A ZERO.
C
C
    1 CONTINUE
      READ (5,7701) KSTART, KEND, LASTZ, LOWRGO, LOWRZ, NEXT, LORDER,
     1              LREDUC, LSTEP, MORE
 7701 FORMAT(10(I2,2X))
C
C
C      KSTART IS THE LOWEST ATOMIC NUMBER USABLE IN THE FIRST ISOELEC-
C        TRONIC SEQUENCE DONE
C     KEND IS DEFINED BY:(KEND-KSTART+1) ISOELECTRONIC SEQUENCES ARE
C      DONE
C      LASTZ IS THE HIGHEST ATOMIC NUMBER USED IN ANY ISOELECTRONIC
C        SEQUENCE
C      KPREV IS THE VALUE OF KEND USED ON THE PREVIOUS DATA CARD. IT
C        IS INITIALLY SET TO ZERO.
C      LOWRGO SPECIFIES THE INDEX OF THE FIRST TERM IN THE ISOELECTRO-
C        NIC SEQUENCE WHICH IS ACTUALLY USED IN THE CALCULATION.
C      LOWRZ SPECIFIES THE LOWEST ATOMIC NUMBER WHICH CAN BE USED IN A
C        CALCULATION.
C      NEXT SPECIFIES THE CORE PARAMETER FOR SUBROUTINE DEBUG. IF NEXT
C        EQUALS ZERO, PRINT MESSAGE AND CONTINUE RUN. IF NEXT.NE.0,
C        PRINT MESSAGE AND CALL MERR
C      LORDER SPECIFIES FITTING POLYNOMIAL ORDER
C      IF LREDUC EQUALS 0, LORDER WILL ORDINARILY BE 4. IF LREDUC.NE.0
C        LORDER WILL ORDINARILY BE 3
C     IF LORDER .GT. 4 IS USED, REDIMENSION COEF ARRAY TO COEF(LORDER+4,
C       100) AND COE ARRAY TO COE(LORDER+1)
C      LREDUC .EQ. 0 USES IONIZATION POTENTIALS. LREDUC .NE. 0 USES
C        IONIZATION POTENTIALS DIVIDED BY TERM INDEX
C
C      LSTEP CAN BE USED TO MODIFY THE TERM INDEX VALUE (I.E. WE COULD
C        CALL THE INITIAL TERM INDEX THE (I+LSTEP-1)TH TERM.)
C
      WRITE (6,7702) KSTART,KEND,LASTZ,KPREV,LOWRGO,LOWRZ,NEXT,LORDER,
```

```
     1                LREDUC, LSTEP, MORE
 7702 FORMAT (18H1INPUT AS READ WAS/ 8H KSTART=,I3, 6H KEND=,I3, 7H LAST
     1Z=,I3, 7H KPREV= , I3, 8H LOWRGO= ,I3, 7H LOWRZ= ,I3,6H NEXT= ,I3,
     28H LORDER=,I3, 8H LREDUC=,I3, 7H LSTEP=,I3,6H MORE=,I3)
C
        IF (KSTART.EQ.0) KSTART=1
        IF (LASTZ .EQ.0) LASTZ= 92
      IF(KEND.EQ.0 .OR. KEND .GT. LASTZ ) KEND=LASTZ
      IF(KSTART .GT. KEND) KSTART=KEND
        IF (LOWRGO .EQ.0) LOWRGO=1
        IF (LORDER .EQ. 0) LORDER=4
      IF (KPREV.EQ.KEND.AND.LOWRZ.EQ.1) CALL EXIT
C     TO END RUN, DUPLICATE THE LAST DATA CARD BUT SET LOWRZ=1.  THIS
C      IS THE LAST REQUIRED INPUT CARD AND WILL CALL EXIT.
       WRITE(6,7001)KSTART,KEND,LASTZ,KPREV,LOWRGO,LOWRZ,LORDER,LREDUC
     1,LSTEP,MORE
 7001 FORMAT(24H PARAMETERS AS USED WERE/8H KSTART=,I3,6H KEND=,I3,7H LA
     1STZ=, I3,7H KPREV=,I3, 8H LOWRGO= ,I3  , 7H LOWRZ= ,I3,
     28H LORDER=,I3, 8H LREDUC=,I3, 7H LSTEP=,I3,6H MORE=,I3)
C
      KPREV= KEND
      KCOUNT=KEND-KSTART+1
C
C
C
C
      DO 308 I=1,100
      DO 308 J=1,100
      MATRIX(I,J)=0.
  308 CONTINUE
      DO 90 I=1,6
      DO 90 I2=1,100
      COLP (I,I2)=0.
   90 CONTINUE
  101 CONTINUE
      DO 500 K= KSTART, KEND
C
C     DO ALL SEQUENCES BETWEEN KSTART AND KEND INCLUSIVE.
C
C     THE K=TH SEQUENCE FITS THE (LASTZ-K+1) IONIZATION POTENTIALS
C
C        K       K+1          KK             LASTZ
C      V   ,  V     .... V        .... V
C       1       2           LOWER          LASTZ-K+1
C
C
C     USING J.GRATTEAUS LEAST-SQUARE POLYNOMIAL FIT SUBROUTINE
C     TO A QUADRATIC EQUATION.
C
C
      K2=           K+LOWRGO-1
      LSTORE=       0
  102 CONTINUE
      DO 103 KK= K2, LASTZ
C
```

```
C     THIS ISOELECTRONIC IONIZATION SEQUENCE HAS (LASTZ-K +1) ELEMENTS
C     WHICH STORE INTO THE Y ARRAY. SOME MAY BE ZERO IN THE MARI DECK OR
C     MAY BE MISSING. IF SO, THE SEQUENCE HAS THESE ELEMENTS MISSING IN
C     THE Y ARRAY AND HAS LESS THAN (LASTZ-K+1) TERMS
C
C     LOWER SPECIFIES WHICH IONIZATION POTENTIAL IS USED
C     KK SPECIFIES THE ATOMIC NUMBER OF THE SUCCESSIVE SEQUENCE TERMS
C     LSTORE SPECIFIES THE SEQUENCE INDEX (1,2,3,..LOWER.LE.(LASTZ-K+1))
C
C
      LOWER=        KK-K+1
  104 CONTINUE
      M=1
C     M SUBSCRIPTS ATOMIC NUMBERS IN THE MARI ARRAY
  105 KMARI=U(M)
         IF(KMARI .EQ. KK) GO TO  107
         IF (KMARI .EQ. 0) GO TO 103
C     THE ABOVE OCCURS WHENEVER THE KK-TH ELEMENT IS NOT IN THE MARI
C       DECK
  106 CONTINUE
      M=M+ KMARI+ 2
      GO TO 105
  107 CONTINUE
C     AT THIS POINT THE KK-TH ELEMENT HAS BEEN LOCATED
C     ITS LOWER-TH IONIZATION POTENTIAL WILL BE USED
C
C     TEST LOWER-TH IONIZATION POTENTIAL. IF ZERO, SKIP TO NEXT ELEMENT.
      IF (KMARI.LT.LOWRZ) GO TO 103
C
      INDEX=M+1+ LOWER
         IF(ABS(U(INDEX)).LT. 1.E-8 ) GO TO 103
C     WE NOW HAVE A VALID DATUM AND CAN ENTER IT INTO THE Y ARRAY.
      LSTORE=       LSTORE+1
      X(LSTORE)=    LOWER+LSTEP
      Y(LSTORE)=    U(INDEX)
         IF (IREDUC.NE.0) Y(LSTORE)=Y(LSTORE)/X(LSTORE)
      MATNO(LSTORE)= KK
      MARIAN(KK,LOWER)=U(INDEX)
  103 CONTINUE
C     AT THIS POINT, THE X AND Y ARRAYS HAVE BEEN SET UP.
C     THERE ARE LSTORE ENTRIES IN THESE ARRAYS
      LORDER=LORDER
      ILORDR=LORDER+1
      IF (LSTORE .LT. ILORDR .AND. LORDER .EQ. 4) LORDER=2
C
C
C
      CALL FIT (X, Y, LSTORE, LORDER, DEVEAT, IM, COE)
      IF (IM) 201,202,201
  201 CONTINUE
      WRITE(6,703)LSTORE,LORDER,LOWER,(Y(J),MATNO(J),J=1,LSTORE)
      CALL DEBUG(201,202,NEXT)
      GO TO 500
  202 CONTINUE
      IF (LORDER.NE.LORDER)ILORDR=LORDER+1
```

```
      DO 203 J=1,ILOWUR
      COEF( J, K  ) = COE(J)
  203 CONTINUE
      LAS(=LOWER+8
C
C     EVALUATE SEQUENCE FROM POLYNOMIAL
      DO 204 J=1,LOWER
      XJ=J
      KATNO(J)= K-1+J
      POTENL(J)=COE(1)
      DO 91 I=2,ILOWUR
      POTENL(J)=POTENL(J)+COE(I)*(XJ**(I-1))
   91 CONTINUE
      KKATNO = KATNO(J)
      IF (MARIAN(KKATNO,J) .EQ. 0.) MARIAN(KKATNO,J) = POTENL(J)
  204 CONTINUE
C
      NUXT=LOWER+1
C
      WRITE(6,7703)LSTORE,LURDER,LOWER,(Y(J),MATNO(J), J=1,LSTORE)
 7703 FORMAT(6H1USING,I3,25H IONIZATION POTENTIALS,3X,15HA FIT OF ORDER
     1,I2,8H TO THE ,I3,26H-TH ISOELECTRONIC SEQUENCE/3X,4HWITH,3X,
     212HINPUT VALUE     ,18H AT ATOMIC NUMBER /(10X,1PE10.4,14X,I3))
C
      WRITE(6,7002) (KATNO(J), J, POTENL(J), J=1,LOWER )
 7002 FORMAT(21HOHAS A FIT EVALUATION/3(8H FOR Z =,I3,6H AT J=,I3,11H,A
     1VALUE OF, 0PF9.1,3X))
C
 7704 FORMAT(29H FURTHER EVALUATED VALUES ARE /(3X,4H Z =,I3,3X,4H J =,
     1  I3,1PE15.8))
C
      IF (LURDER .EQ. 4) WRITE(6,7705) (COE(J),J=1,5)
      IF (LURDER .EQ. 2) WRITE(6,7707) (COE(J),J=1,3)
 7705 FORMAT(21H USING THE POLYNOMIAL ,5X,1PE14.8,6H  +J* ,1PE14.8,
     1 /H  +J*J* ,1PE14.8,10H  +J***3 * ,1PE14.8,10H  +J***4 * ,1PE14.8)
C
 7707 FORMAT(21H USING THE POLYNOMIAL ,5X,1PE14.8,6H  +J* ,1PE14.8,
     1 /H  +J*J* ,1PE14.8)
C
      WRITE(6,7005) DEVEAI
 7005 FORMAT(28H THE STANDARD DEVIATION WAS , 1PE12.5 )
C
C
C     MORE=0 FIT Z=93 TO 100 WITH INPUT IF AVAILABLE,OUTPUT IF NOT
C     MORE=1  FIT Z=93 TO 100 WITH INPUT ONLY
C     MORE=2  FIT Z=93 TO 100 WITH OUTPUT ONLY
C     MORE = 3       BYPASS FIT OF Z.GT.92
      IF (MORE.EQ.3) GO TO 500
      IF (MORE .EQ. 1) GO TO 501
C     PATH FOR MORE.EQ.2.OR.MORE.EQ.0
      XX(3)=LOWER
      YY(3)=POTENL(LOWER)
      XX(2)=LOWER-1
      YY(2)=POTENL(LOWER-1)
      XX(1)=LOWER-2
```

```
      YY(1)=POTENL(LOWER-2)
      IF(MORE.NE.0) GO TO 302
      IF (MAINO(LSTORE) .EQ. KAINO(LOWER)) YY(3)=Y(LSTORE)
      IF (MAINO(LSTORE-1) .EQ. KAINO(LOWER-1)) YY(2)=Y(LSTORE-1)
      IF (MAINO(LSTORE-2) .EQ. KAINO(LOWER-2))  YY(1)=Y(LSTORE-2)
  302 CONTINUE
      WRITE (6,7110)
 7110 FORMAT (30HOINPUT TO THE QUADRATIC FIT IS /)
      DO 401 LY=1,3
      LYY=LOWER-3+LY
      LYYY=AA(LY)
      WRITE(6,7109) KAINO(LYY),LYYY,YY(LY)
 7109 FORMAT (5A,18H AT ATOMIC NUMBER ,I3,10H WITH J  = ,I3,
     128H AN IONIZATION POTENTIAL OF ,1PE15.8)
  401 CONTINUE
      GO TO 303
  301 CONTINUE
C     PATH FOR MORE = 1
      AA(1)=X(LSTORE-2)
      AA(2)=X(LSTORE-1)
      AA(3)=X(LSTORE)
      YY(1)=Y(LSTORE-2)
      YY(2)=Y(LSTORE-1)
      YY(3)=Y(LSTORE)
      DO 100 LX=1,3
      LXX=LSTORE-3+LX
      LXXX=AA(LX)
      WRITE (6,7109) MAINO(LXX),LXXX,YY(LX)
  100 CONTINUE
  303 CONTINUE
      CALL FIT (AA,YY,L3,L2,DEVIAT,IM2,COE2)
      IF (IM2) 2001,2002,2001
 2001 CONTINUE
      WRITE (6,7703) L3,L2,(YY(J),MAINO(J),J=1,3)
      CALL DEBUG(2001,2002,NEXT)
      GO TO 500
 2002 CONTINUE
      DO 2003 J=6,8
      COEF(J,K)=COE2(J-5)
 2003 CONTINUE
C
C
      DO 2004 J=NUXT,LAST
      XJ=J
      KAINO(J)=K-1+J
      POTENL(J)=COE2(1)+COE2(2)*XJ+XJ*XJ*COE2(3)
      KKAINO=KAINO(J)
      MARIAN(KKAINO,J)=POTENL(J)
 2004 CONTINUE
      WRITE(6,7704) (KAINO(J), J, POTENL(J), J=NUXT,LAST)
      WRITE (6,7707) COE2
      WRITE (6,7003) DEVIAT
C
C
  500 CONTINUE
```

```
      WRITE (6,7006)
 7006 FORMAT (1H1)
C
C
      DO 600 J=1,100
      IF(J.GT.92 .AND. MORE.EQ.3 ) GO TO 600
      WRITE(6,7007)J
 7007 FORMAT (20HOFOR ELEMENT NUMBER ,I3, 31H, THE IONIZATION POTENTIALS
     1 ARE)
C
C
      DO 601 J2=1,J     ,10
      J4=  MINO(J2+9,J     )
      WRITE (6,7005)      J2,(MARIAN(J,J3), J3=J2,J4)
 7005 FORMAT ( 1X,I3,3X,1P10E12.5)
C
  601 CONTINUE
  600 CONTINUE
C
      JLORDR=ILORDR+3
      IF(MORE.EQ.3) JLORDR=ILORDR
      IF(JLORDR.EQ.8)
     1   WRITE(6,7706) (J,(COEF(JJ,J),JJ=1,JLORDR),J=1,KCOUNT)
 7706 FORMAT (14H1COEF ARRAY I5/(4X,I3,1P5E15.8,3X,1P3E15.8))
      IF(JLORDR.EQ.6)
     1   WRITE(6,7708) (J,(COEF(JJ,J),JJ=1,JLORDR),J=1,KCOUNT)
 7708 FORMAT (14H1COEF ARRAY I5/(4X,I3,1P3E15.8,3X,1P3E15.8))
      IF(JLORDR.EQ.5)
     1   WRITE(6,7710) (J,(COEF(JJ,J),JJ=1,JLORDR),J=1,KCOUNT)
 7710 FORMAT (14H1COEF ARRAY I5/(4X,I3,1P5E15.8))
      IF(JLORDR.EQ.3)
     1   WRITE(6,7709) (J,(COEF(JJ,J),JJ=1,JLORDR),J=1,KCOUNT)
 7709 FORMAT (14H1COEF ARRAY I5/(4X,I3,1P3E15.8))
      GO TO 1
C
      CALL MARIE
      RETURN
      END
```

LOWRGO	specifies the index of the first term in the isoelectronic sequence that is actually used in the calculation
LOWERZ	specifies the lowest atomic number that can be used in a calculation
NEXT	is a debug parameter
LORDER	specifies the order of the polynomial fit
LREDUC	= 0 uses ionization potentials; LREDUC ≠ 0 uses (ionization potentials / term index) in the input to the polynomial fit
MORE	is used to decide on extrapolations for atomic numbers > 92

All sequences between the (KSTART)-th and the (KEND)-th inclusive are done. The kth sequence fits the (LASTZ-k+1) ionization potentials:

$$V_1^k,\ V_2^{k+1},\ \ldots\ V_{LOWER}^{kk},\ \ldots,\ V_{LASTZ-k+1}^{LASTZ}$$

(unless some of the initial members of the sequence are for elements with atomic numbers less than LOWERZ, in which case these terms are not used in the input to the least-squares fit). If the sequence of known ionization potentials contains less than 5 terms, a 2nd-order fit is tried even if LORDER = 4.

MARIER has been used with the block data program MARIF (see separate writeup) to calculate a tentative set of ionization potentials for the first 92 elements. Where present, experimental values have been used. (The sources for these are listed in the MARIE writeup.) Some further work on this task is needed; however, it is felt that further value changes will be within 10 percent of the presently assigned value.

MARIE: A BLOCK DATA PROGRAM OF IONIZATION POTENTIALS

The MARIE program is an intermediate step toward the final completion of the MARI block data program, a table of the ionization potentials of the elements. (See the writeup of program MARIER.)

```
      SUBROUTINE MAKIE
C                LAST COMPILED FEB. 9, 1966 BY GARY LANE
C
C     THIS DECK CONTAINS FOR ALL ELEMENTS PRESENT
C                  A TABLE MADE UP OF THE FOLLOWING QUANTITIES, IN ORDER
C                  ATOMIC NUMBER OF THE ELEMENT
C                  ATOMIC WEIGHT OF THE ELEMENT
C                  IONIZATION POTENTIALS OF THE ELEMENT
C                  EITHER ALL IONIZATION POTENTIALS ARE ENTERED IN
C                * STRICTLY MONOTONIC ORDER OR MISSING ONES ARE ENTERED
C                  AS ZERO
C
C     DATA TAKEN FROM NBS 270-1, NBS 270-2, M.M.GARSTANG I.A.U.SYMP.20
C     (1966)) ALLENS ASTROPHYSICAL TABLES, 3RD ED.) AND BERNE RUNS (USED
C     FOR HE, N, AND O).
C
C                                                                        MAKI
      COMMON/LMSB/H (3)                                                H  1MAKI
      DATA H/1., 1.008, 13.598/                                        H  2MAKI
C
      COMMON/LMSB/HE (4)                                               HE 1MAKI
      DATA HE/2., 4.0026, 24.586, 54.403/                              HE 2MAKI
C
      COMMON/LMSB/LI (5)                                               LI 1MAKI
      REAL LI                                                          LI 2MAKI
      DATA LI/3.,6.939,5.39,75.619,122.419/                            LI 3MAKI
C
      COMMON/LMSB/BE (6)                                               BE 1MAKI
      DATA BE/4., 9.0122, 9.32, 18.206, 153.85, 217.65//               BE 2MAKI
C
      COMMON/LMSB/B  (7)                                               B  1MAKI
      DATA B/5., 10.811, 8.279, 25.155, 37.929, 259.36, 340.21/        B  2MAKI
C
      COMMON/LMSB/C  ( 8)                                              C  1MAKI
      DATA C/6., 12.0112, 11.259, 24.382, 47.870, 64.492, 392.08,      C  2MAKI
     1 489.95/                                                         C  3MAKI
C
      COMMON/LMSB/N  ( 9)                                              N  1MAKI
      REAL N                                                           N  2MAKI
      DATA N/7., 14.0067, 14.532, 29.612, 47.438, 77.469, 97.886,      N  3MAKI
     1 552.06, 666.99/                                                 N  4MAKI
C
      COMMON/LMSB/O  (10)                                              O  1MAKI
      DATA O/8., 15.9999, 13.618, 35.155, 54.947, 77.413, 113.9,       O  2MAKI
     1 138.12, 739.3, 871.34/                                          O  3MAKI
C
      COMMON/LMSB/F  (11)                                              F  1MAKI
      DATA F/9., 18.9984, 17.42, 34.986, 62.66, 87.255, 114.24,        F  2MAKI
     1 157.16, 185.18, 953.8, 1102./                                   F  3MAKI
C
      COMMON/LMSB/NE (12)                                              NE 1MAKI
      REAL NE                                                          NE 2MAKI
      DATA NE/10., 20.183, 21.564, 41.082, 63.76, 97.18, 126.4,        NE 3MAKI
     1 157.91, 207.2, 239.1, 1195.6, 1360.4/                           NE 4MAKI
```

```
C
      COMMON/LMSB/NA (13)                                                    NA 1MAHI
      REAL NA                                                                NA 2MAHI
      DATA NA/11.,  22.9898,  5.138,  47.29,  71.65,  98.88,  138.3/,        NA 3MAHI
     1 172.09,  208.444,  264.155,  299.78,  1464.8,  1646.1/                NA 4MAHI
C
      COMMON/LMSB/MG (14)                                                    MG 1MAHI
      REAL MG                                                                MG 2MAHI
      DATA MG/12.,  24.312,  7.644,  15.031,  80.12,  109.29,  141.23,       MG 3MAHI
     1 186.49,  224.9,  265.95/,  327.9,  367.36,  1761.2,  1959./           MG 4MAHI
C
      COMMON/LMSB/AL (15)                                                    AL 1MAHI
      DATA AL/13.,  26.9815,  5.986,  18.828,  28.448,  119.98,  153.81,     AL 2MAHI
     1 190.47,  241.99,  285.2,  330.22,  398.64,  441.96,  2085.5,          AL 3MAHI
     2 2299./                                                                AL 4MAHI
C
      COMMON/LMSB/SI (16)                                                    SI 1MAHI
      DATA SI/14.,  28.086,  8.1509,  16.343,  33.467,  45.141,  166.76,     SI 2MAHI
     1 205.16,  246.49,  303.93,  351.89,  401.37,  476.17,  523.39,         SI 3MAHI
     2 2436.,  2666./                                                        SI 4MAHI
C
      COMMON/LMSB/P  (17)                                                    P  1MAHI
      DATA P/15.,  30.9738,  10.484,  19.72,  30.156,  51.354,  65.007,      P  2MAHI
     1 220.414,  263.31,  309.26,  371.6,  424.3,  479.4,  560.3,            P  3MAHI
     2 611.4,  2815.,  3001./                                                P  4MAHI
C
      COMMON/LMSB/S  (18)                                                    S  1MAHI
      DATA S/16.,  32.064,  10.4,  23.41,  35.04,  47.292,  72.48,           S  2MAHI
     1 88.03,  281.,  328.82,  378.95,  447.,  505.8,  566.,                 S  3MAHI
     2 651.,  706.,  3220.,  3482./                                          S  4MAHI
C
      COMMON/LMSB/CL (19)                                                    CL 1MAHI
      DATA CL/17.,  35.453,  13.02,  23.804,  39.913,  53.455,  67.815,      CL 2MAHI
     1 96.7,  114.3,  348.4,  400.85,  455.4,  530.9,  593.,                 CL 3MAHI
     2 663.,  749.,  807.,  3654.,  3931./                                   CL 4MAHI
C
      COMMON/LMSB/AR (20)                                                    AR 1MAHI
      DATA AR/18.,  39.948,  15.759,  27.626,  40.891,  59.8,  75.02,        AR 2MAHI
     1 91.32,  124.,  143.49,  422.6,  479.4,  538.9,  621.,                 AR 3MAHI
     2 687.,  755.,  854.,  916.,  4115.,  4407./                            AR 4MAHI
C
      COMMON/LMSB/K  (21)                                                    K  1MAHI
      REAL K                                                                 K  2MAHI
      DATA K/19.,  39.102,  4.339,  31.81,  46.,  60.9,  82.6,               K  3MAHI
     1 99.7,  118.,  155.,  175.94,  503.8,  564.,  629.,                    K  4MAHI
     2 717.,  788.,  870.,  966.,  1031.,  4603.,  4910./                    K  5MAHI
C
      COMMON/LMSB/CA (22)                                                    CA 1MAHI
      DATA CA/20.,40.08,6.111,11.868,51.21,67.,84.39,109.,128.,143.3,        CA 2MAHI
     1188.,211.3,591.8,655.,727.,820.,896.,990.,1084.,1153.,5119.,5471./CA 3MAHI
C
      COMMON/LMSB/SC (23)                                                    SC 1MAHI
      DATA SC/21.,  44.956,  6.54,  12.8,  24.75,  73.9,  92.,               SC 2MAHI
     1 111.,  139.,  159.,  180.,  226.,  250.,  687.,                       SC 3MAHI
     2 758.,  830.,  930.,  1010.,  1115.,  1210.,  1282.,                   SC 4MAHI
```

```
     3 5483.3, 6035.4/                                                  SC 5MAHI
C
      COMMON/LM58/TI (24)                                               TI 1MAHI
      DATA TI/22.,47.9, 6.82, 13.57, 27.47, 43.24, 99.8,                TI 2MAHI
     1       120., 141., 172.,  193.,  217.,  266., 2..,                TI 3MAHI
     2       788., 864., 941., 1046., 1132., 1245., 1341.,              TI 4MAHI
     3       1417.8, 6049.3, 6627.//                                    TI 5MAHI
C
      COMMON/LM56/V (25)                                                V  1MAHI
      DATA V/ 23., 50.942, 6.74, 14.65, 29.4, 48., 65., 129., 151.,     V  2MAHI
     1174., 206., 230.5, 258., 309., 336., 897., 976., 1057., 1170.,    V  3MAHI
     21200., 1380., 1480.5, 1560.3, 6643.8, 7248.4/                     V  4MAHI
C
      COMMON/LM5H/CR (26)                                               CR 1MAHI
      DATA CR/24., 51.996, 6.764, 16.49, 30.95, 50., 73.,               CR 2MAHI
     1 91., 161., 185., 210., 249., 272., 299.,                         CR 3MAHI
     2 355., 384., 1013., 1095., 1182., 1301., 1395.,                   CR 4MAHI
     3 1525.2, 1626.3, 1709.7, 7266.7, 7897.4/                          CR 5MAHI
C
      COMMON/LM5U/MN (27)                                               MN 1MAHI
      REAL MN                                                           MN 2MAHI
      DATA MN/25., 54.938, 7.433, 15.636, 33.69, 53., 76.,              MN 3MAHI
     1 100., 119., 196., 222., 248., 288., 315.,                        MN 4MAHI
     2 350., 404., 435., 1136., 1222., 1313., 1438.,                    MN 5MAHI
     3 1538., 1678., 1779., 1860., 7918., 8575./                        MN 6MAHI
C
      COMMON/LM58/FE (28)                                               FE 1MAHI
      DATA FE/26., 55.847, 7.87, 16.18, 30.643, 57., 79.,               FE 2MAHI
     1 103., 130., 151., 2.5., 262., 290., 330.,                        FE 3MAHI
     2 355., 390., 457., 469., 1206., 1354., 1450.,                     FE 4MAHI
     3 1583., 1687., 1837., 1938., 2029., 8599., 9281./                 FE 5MAHI
C
      COMMON/LM5U/CO (29)                                               CO 1MAHI
      DATA CO/27.,58.9332, 7.86, 17.05, 33.49, 59., 83., 108., 134., 164., 190., CO 2MAHI
     1290., 305., 337., 380., 412., 444., 512., 547., 1403., 1495., 6*0., 9307.7, CO 3MAHI
     2100.6./                                                           CO 4MAHI
C
      COMMON/LM5U/NI (30)                                               NI 1MAHI
      REAL NI                                                           NI 2MAHI
      DATA NI/28., 58.71, 7.633, 18.15, 35.16, 56., 79., 112., 140., 169., 202., NI 3MAHI
     1230., 321., 350., 385., 430., 455., 500., 530., 607., 1541., 7*0., 10046., NI 4MAHI
     2107.0./                                                           NI 5MAHI
C
      COMMON/LM58/CU (31)                                               CU 1MAHI
      DATA CU/29., 63.54, 7.724, 20.29, 36.83, 59., 82., 110., 140., 170., CU 2MAHI
     1206., 241., 265., 370., 400., 440., 480., 520., 560., 630., 671., CU 3MAHI
     21694., 1796., 1905., 2057., 2175., 2360., 2458., 2559., 10815.,  CU 4MAHI
     3115.3./                                                           CU 5MAHI
C
      COMMON/LM58/ZN (32)                                               ZN 1MAHI
      DATA ZN/30., 65.37, 9.391, 17.96, 39.7, 62., 86., 115., 145., 180., 210., ZN 2MAHI
     1250., 0., 311., 420., 450., 490., 540., 580., 620., 700., 9*0., 11610., ZN 3MAHI
     212.95./                                                           ZN 4MAHI
C
      COMMON/LM58/GA (33)                                               GA 1MAHI
```

```
      DATA GA/31.,69.72,6.,20.511,30.684,64.18,90.,                    GA 2MARI
     1 118.,144.,174.,218.,255.,                                       GA 3MARI
     2 1900.,12436.,13246./                                            GA 4MARI
C
      COMMON/LMSB/GL (34)                                              GL 1MARI
      DATA GL/32.,72.59,7.885,15.934,34.223,45.711,93.447,             GL 2MARI
     1 113.,148.,177.,212.,262.,                                       GL 3MARI
     2 2000.,13291.,14127./                                            GL 4MARI
C
      COMMON/LMSB/AS (35)                                              AS 1MARI
      DATA AS/33.,74.9216,9.815,20.209,28.317,50.134,62.626,           AS 2MARI
     1 127.55,150.,182.,218.,253.,                                     AS 3MARI
     2 2100.,14176.,15057./                                            AS 4MARI
C
      COMMON/LMSH/SL (36)                                              SL 1MARI
      DATA SL/34.,78.96,9.75,21.5,32.,43.,68.,82.,155.,167.,223.,260.,  SL 2MARI
     1220.,15092.,15977./                                              SL 3MARI
C
      COMMON/LMSB/HH (37)                                              HH 1MARI
      DATA HH/35.,79.909,11.84,21.6,35.9,47.3,59.7,                    HH 2MARI
     1 88.6,103.,193.,228.,260.,                                       HH 3MARI
     2 2300.,16057.,16947./                                            HH 4MARI
C
      COMMON/LMSB/KK (38)                                              KK 1MARI
      REAL KK                                                          KK 2MARI
      DATA KK/36.,83.8,13.999,24.571,36.951,52.,65.,                   KK 3MARI
     1 79.,110.,126.,234.,270.,                                        KK 4MARI
     2 2400.,17013.,17947./                                            KK 5MARI
C
      COMMON/LMSH/MB (39)                                              MB 1MARI
      DATA MB/37.,85.4,4.176,27.5,40.,52.,71.,                         MB 2MARI
     1 85.,100.,135.,151.,277.,                                        MB 3MARI
     2 2500.,18019.,18978./                                            MB 4MARI
C
      COMMON/LMSB/SK (40)                                              SK 1MARI
      DATA SK/38.,87.62,5.692,11.027,43.,57.,72.,                      SK 2MARI
     1 92.,107.,124.,162.,179.,324.,                                   SK 3MARI
     2 2500.,19055.,20038./                                            SK 4MARI
C
      COMMON/LMSB/T (41)                                               T  1MARI
      DATA T/39.,88.905,6.38,12.23,20.5,62.,77.,                       T  2MARI
     1 93.,116.,131.,148.,191.,206.,                                   T  3MARI
     2 2600.,20123.,21130./                                            T  4MARI
C
      COMMON/LMSB/ZR (42)                                              ZR 1MARI
      DATA ZR/40.,91.22,6.84,13.13,22.98,34.33,82.,99.,117.,141.,157.,  ZR 2MARI
     1170.,222.,2700.,21221.,22252./                                   ZR 3MARI
C
      COMMON/LMSB/NB (43)                                              NB 1MARI
      REAL NB                                                          NB 2MARI
      DATA NB/41.,92.906,6.88,14.32,25.04,38.3,50.,                    NB 3MARI
     1 103.,125.,143.,167.,185.,203.,                                  NB 4MARI
     2 2800.,22951.,23906./                                            NB 5MARI
C
      COMMON/LMSB/MO (44)                                              MO 1MARI
```

```
      REAL MO                                                           MO 2MAKI
      DATA MO/42.,  95.94,  7.1,  16.15,  27.13,  40.4,  61.2,          MO 3MAKI
     1 88.,  120.,  155.,  189.,  197.,  210.,                          MO 4MAKI
     2 2990.,  23513.,  24590./                                         MO 5MAKI
C
      COMMON/LMSB/TC (45)                                               TC 1MAKI
      DATA TC/43.,99.,7.28,15.26,31.,43.,59.,76.,94.,161.,183.,199.,    TC 2MAKI
     1224.,3090.,24706.,25807./                                         TC 3MAKI
C
      COMMON/LMSB/RU (46)                                               RU 1MAKI
      DATA RU/44.,101.07,7.364,16.76,28.46,46.,63.,81.,100.,119.,193.,  RU 2MAKI
     1216.,225.,3190.,25931.,27056./                                    RU 3MAKI
C
      COMMON/LMSB/RH (47)                                               RH 1MAKI
      DATA RH/45.,  102.905,  7.46,  18.07,  31.05,  46.,  67.,         RH 2MAKI
     1 85.,  105.,  126.,  147.,  220.,  250.,                          RH 3MAKI
     2 3290.,  27189.,  28336./                                         RH 4MAKI
C
      COMMON/LMSB/PD (48)                                               PD 1MAKI
      DATA PD/46.,106.4,8.33,19.42,32.92,49.,66.,90.,110.,132.,155.,    PD 2MAKI
     1178.,261.,3390.,28478.,29648./                                    PD 3MAKI
C
      COMMON/LMSB/AG (49)                                               AG 1MAKI
      DATA AG/47.,  107.87,  7.574,  21.48,  34.82,  52.,  70.,         AG 2MAKI
     1 89.,  116.,  139.,  162.,  187.,                                 AG 3MAKI
     2 3590.,  29801.,  30993./                                         AG 4MAKI
C
      COMMON/LMSB/CD (50)                                               CD 1MAKI
      DATA CD/48.,  112.4,  8.991,  16.92,  38.2,  55.,  73.,           CD 2MAKI
     1 94.,  115.,  140.,  170.,  195.,                                 CD 3MAKI
     2 3690.,  31150.,  32371./                                         CD 4MAKI
C
      COMMON/LMSB/IN (51)                                               IN 1MAKI
      REAL IN                                                           IN 2MAKI
      DATA IN/49.,  114.82,  5.786,  18.869,  28.029,  54.41,  77.,     IN 3MAKI
     1 98.,  120.,  144.,  178.,  204.,                                 IN 4MAKI
     2 3790.,  32545.,  33782./                                         IN 5MAKI
C
      COMMON/LMSB/SN (52)                                               SN 1MAKI
      DATA SN/50.,  118.69,  7.344,  14.632,  30.524,  40.735,  72.273, SN 2MAKI
     1 103.,  126.,  150.,  176.,  213.,                                SN 3MAKI
     2 3890.,  33968.,  35227./                                         SN 4MAKI
C
      COMMON/LMSB/SB (53)                                               SB 1MAKI
      DATA SB/51.,  121.75,  8.641,  16.53,  25.32,  44.156,  55.7,     SB 2MAKI
     1 107.6,  132.,  157.,  184.,  211.,                               SB 3MAKI
     2 3990.,  35425.,  36705./                                         SB 4MAKI
C
      COMMON/LMSB/TE (54)                                               TE 1MAKI
      DATA TE/52.,  127.6,  9.01,  18.6,  30.6,  37.81,  60.27,         TE 2MAKI
     1 72.33,  137.2,  164.,  192.,  220.,                              TE 3MAKI
     2 4090.,  36916.,  38217./                                         TE 4MAKI
C
      COMMON/LMSB/I (55)                                                I  1MAKI
      REAL I                                                            I  2MAKI
```

```
      DATA I/53.,  126.9044,  10.456,  19.099,  32.,  42.,  66.,          I  3MAKI
     1 81.,  99.,  170.,  200.,  229.,                                    I  4MAKI
     2 4100.,  38441.,  39764./                                           I  5MAKI
C
      COMMON/LMSB/XE (56)                                                 XE 1MAKI
      DATA XE/54.,  131.3,  12.129,  21.21,  32.12,  38.3,  51.5,         XE 2MAKI
     1 64.2,  91.4,  106.6,  175.2,  196.2,  218.6,  242.3,              XE 3MAKI
     2 267.4,  293.6,  323.6,  352.6,  382.7,  414.,  443.6,             XE 4MAKI
     3 563.8,  599.2,  635.9,  690.8,  730.,  753.,  864.,               XE 5MAKI
     4 1521.,  1582.,  1642.,  1712.,  1782.,  1854.,  1945.,            XE 6MAKI
     5 2025.,  2106.,  2461.,  2471.,  2559.,  2649.,  2742.,            XE 7MAKI
     6 2919.,  3022.,  3224.,  3330.,  7632.,  7822.,  8020.,            XE 8MAKI
     7 8234.,  8821.,  9082.,  9528.,  9802.,  40260.,  41430./          XE 9MAKI
C
      COMMON/LMSB/CS (57)                                                 CS 1MAKI
      DATA CS/55.,  132.905,  3.893,  25.1,  35.,  46.,  62.,             CS 2MAKI
     1 74.,  101.,  120.,  144.,  253.,                                   CS 3MAKI
     2 4300.,  41597.,  42962./                                           CS 4MAKI
C
      COMMON/LMSB/BA (58)                                                 BA 1MAKI
      DATA BA/56.,  137.34,  5.21,  10.001,  36.,  49.,  62.,             BA 2MAKI
     1 80.,  93.,  120.,  143.,  157.,                                    BA 3MAKI
     2 4400.,  43229.,  44613./                                           BA 4MAKI
C
      COMMON/LMSB/LA (59)                                                 LA 1MAKI
      REAL LA                                                             LA 2MAKI
      DATA LA/57.,  138.91,  5.61,  11.43,  19.17,  52.,  66.,            LA 3MAKI
     1 80.,  100.,  114.,  144.,  165.,  204.,                            LA 4MAKI
     2 4400.,  44897.,  46301./                                           LA 5MAKI
C
      COMMON/LMSB/CE (60)                                                 CE 1MAKI
      DATA CE/58.,  140.12,  5.6,  12.3,  20.,  35.,  70.,                CE 2MAKI
     1 85.,  100.,  122.,  137.,  165.,  189.,                            CE 3MAKI
     2 4500.,  46601.,  48025./                                           CE 4MAKI
C
      COMMON/LMSB/PR (61)                                                 PR 1MAKI
      DATA PR/59.,  140.907,  5.48,  0.,  23.2,  200.,                    PR 2MAKI
     1 89.,  106.,  122.,  146.,  182.,  197.,                            PR 3MAKI
     2 4600.,  48342.,  49785./                                           PR 4MAKI
C
      COMMON/LMSB/ND (62)                                                 ND 1MAKI
      REAL ND                                                             ND 2MAKI
      DATA ND/60.,  144.24,  5.5,  400.,                                  ND 3MAKI
     1 190.,  110.,  128.,  147.,  171.,                                  ND 4MAKI
     2 4800.,  50120.,  51582./                                           ND 5MAKI
C
      COMMON/LMSB/PM (63)                                                 PM 1MAKI
      DATA PM/61.,147.,70.,135.,154.,173.,4900.,51930.,53417./            PM 2MAKI
C
      COMMON/LMSB/SM (64)                                                 SM 1MAKI
      DATA SM/62.,  150.35,  5.6,  11.3,                                  SM 2MAKI
     1 580.,  53790.,  55290./                                            SM 3MAKI
C
      COMMON/LMSB/EU (65)                                                 EU 1MAKI
      DATA EU/63.,151.96,5.67,11.2,790.,187.,5190.,55083.,57201./         EU 2MAKI
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C
      COMMON/LMSB/GD (66)                                                    GD 1MAKI
      DATA GD/64.,157.25,6.16,12.,60*0.,57615.,59151./                       GD 2MAKI
C                                                                            GD 3MAKI
      COMMON/LMSB/TB (67)                                                    TB 1MAKI
      DATA TB/65., 158.924, 5.98,                                            TB 2MAKI
     1 62*0., 59587., 61140./                                                TB 3MAKI
C                                                                            TB 4MAKI
      COMMON/LMSB/DT (68)                                                    DT 1MAKI
      DATA DT/66., 162.5, 6.8,  63*0.,  61599., 63169./                      DT 2MAKI
C                                                                            DT 3MAKI
      COMMON/LMSB/HO (69)                                                    HO 1MAKI
      DATA HO/67., 164.93, 6.,                                               HO 2MAKI
     1 64*0., 63652., 65239./                                                HO 3MAKI
C                                                                            HO 4MAKI
      COMMON/LMSB/ER (70)                                                    ER 1MAKI
      DATA ER/68., 167.26, 6.08,                                             ER 2MAKI
     1 65*0., 65746., 67350./                                                ER 3MAKI
C                                                                            ER 4MAKI
      COMMON/LMSB/TM (71)                                                    TM 1MAKI
      DATA TM/69., 168.934, 6.,                                              TM 2MAKI
     1 66*0., 67882., 69502./                                                TM 3MAKI
C                                                                            TM 4MAKI
      COMMON/LMSB/TH (72)                                                    TH 1MAKI
      DATA TH/70.,173.04,6.2,12.1,66*0.,/0062.,/1696./                       TH 2MAKI
C                                                                            TH 3MAKI
      COMMON/LMSB/LU (73)                                                    LU 1MAKI
      REAL LU                                                                LU 2MAKI
      DATA LU/71., 174.97, 6.1, 15., 19.,                                    LU 3MAKI
     1 66*0., /2284., /3933./                                                LU 4MAKI
C                                                                            LU 5MAKI
      COMMON/LMSB/MF (74)                                                    MF 1MAKI
      DATA MF/72., 178.49, 7., 14.9, 23.3, 33.1,                             MF 2MAKI
     1 66*0., /4550., /6214./                                                MF 3MAKI
C                                                                            MF 4MAKI
      COMMON/LMSB/IA (75)                                                    IA 1MAKI
      DATA IA/73., 180.948, 7.88, 16.2, 22., 33., 45.,                       IA 2MAKI
     1 66*0., /6860., /8539./                                                IA 3MAKI
C                                                                            IA 4MAKI
      COMMON/LMSH/W  (76)                                                    W  1MAKI
      DATA W/74.,163.85,7.98,17./,24.,35.,48.,61.,114.3,131.2,149.1,         W  2MAKI
     1168.,200.,222.,270.,300.,309.,338.,369.,401.,434.,468.,504.,541.,      W  3MAKI
     2583.,623.,664.,706.,750.,796.,1045.,1093.,1142.,1192.,1244.,1297.,W    4MAKI
     31367.,1423.,1481.,1539.,1758.,1818.,1880.,1942.,2101.,2168.,2333.,W    5MAKI
     42402.,4032.,4133.,4238.,4346.,4457.,4575.,4767.,4891.,5020.,5459.,W    6MAKI
     55590.,5722.,5857.,5996.,6498.,6651.,6970.,7124.,15545.,15816.,         W  7MAKI
     616109.,16426.,18209.,18597.,.19275.,19680.,79377.,81009./              W  8MAKI
C                                                                            W  9MAKI
      COMMON/LMSB/RE (77)                                                    RE 1MAKI
      DATA RE/75., 186.2, 7.87, 16.6, 26., 38., 51.,                         RE 2MAKI
     1 64., 79.,                                                             RE 3MAKI
     2 66*0., 81618., 83325./                                                RE 4MAKI
C                                                                            RE 5MAKI
      COMMON/LMSB/OS (78)                                                    OS 1MAKI
      DATA OS/76.,190.2,8./,17.,25.,40.,54.,68.,83.,99.,66*0.,84067.,        OS 2MAKI
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      DATA RA/88.,220.05,5.277,10.144,34.,46.,58.,76.,89.,103.,140.,     RA 2MARI
     1156.,1690.,11744Y.,119268./                                        RA 3MARI
C
      COMMON/LMSB/AC (91)                                                AC 1MARI
      DATA AC/89.,227.,6.9,12.1,20.,49.,62.,76.,95.,109.,123.,164.,      AC 2MARI
     1770.,120600.,122442./                                              AC 3MARI
C
      COMMON/LMSB/IH (92)                                                IH 1MARI
      DATA IH/90., 232.038, 6.95, 12., 20., 29.2, 65.,                   IH 2MARI
     1 80., 94., 115., 130., 145.,                                       IH 3MARI
     2 1890., 123809., 125858./                                          IH 4MARI
C
      COMMON/LMSB/PA (93)                                                PA 1MARI
      DATA PA/91., 231., 590., 84., 100., 115., 138., 154.,              PA 2MARI
     1 1990., 127084., 128934./                                          PA 3MARI
C
      COMMON/LMSB/U  (94)                                                U  1MARI
      DATA U/92., 235.04, 6.12, 11.45, 17.92, 31.12, 47.33, 62.83, 92.7,U  2MARI
     1105.7   ,119.1   ,149.   ,182./ ,178.4  ,221.8,241. ,339.3 ,363.4,U  3MARI
     2388.2,414.,440.5,466.,508.,537.5,568.,599.,733.2,766.3,801.,835.,  U  4MARI
     3948.,986.,1091.,1131.,1354.,1404.,1455.,1508.,1562.,1618.,1675.,   U  5MARI
     41733., 1808., 1869., 1932., 1997., 2062.,2130.,2513.,2581., 2651.,U  6MARI
     52721.,2795.,2869.,3003.,3081.,3160.,3242.,3555.,3637.,3720.,3804.,U  7MARI
     64209.,4300.,4536.,4629.,7428.,7562.,7701.,7844.,7991.,8146.,8512.,U  8MARI
     78675.,8843.,9016.,9593.,9764.,9938.,10120.,11370.,11570.,12000.,   U  9MARI
     812220.,25330.,25670.,26040.,26440.,30960.,31460.,32340.,32920.,    U 10MARI
     9130400.,132500./                                                   U 11MARI
C
      COMMON/LMSB/ENDWRD(2)
      DATA ENDWRD/0.,854./
C
      RETURN
      END
```

The way in which the MARI deck is used by the EIONX program and other equation-of-state subroutines requires that, if any given ionization potential is unknown, it and all higher ionization potentials must be replaced by zeros. The MARIE block data program is not held to this restriction and has zeros replacing only the unknown ionization potentials (and not any higher ones that may be known). However, it must have the elements entered in the order of increasing atomic number. The MARI block data program is ordered in the same fashion, but this is merely for reading ease and is not a requirement on the MARI program.

The potentials used in MARIE are taken from HELAS, which follows, and Allen (Ref. 5), Garstang (Ref. 6), Moore (Ref. 7), NBS tables (Ref. 8), Stewart and Rotenberg (Ref. 9), and Lotz (Ref. 10).

MARIE is a FORTRAN IV block data program used by many other programs as a source of the atomic weights and the ionization potentials of the elements. It is organized in the same fashion as the MARI block data program, namely:

1. For each element, in sequence as listed below:
   a. The atomic number
   b. The atomic weight
   c. The ionization potentials

For any given element, those ionization potentials that are not known are entered as zero.

2. The MARIE deck has the elements entered in the order of increasing atomic number.

HELIKE: THE HELIUM ISOELECTRONIC SEQUENCE

HELIKE is one of two programs used to generate the ionization potentials of the helium sequence. (HELAS is the other program; refer to the HELAS writeup.) HELIKE is based on the development of Bethe and Salpeter.

1. $V^{Z}_{Z-1} = J_{NR} + E_j + \Delta E_j$ in Rydbergs

2. $J_{NR} = Z^2 - \frac{5}{4} Z + 0.315311 - 0.01707/Z + 0.00068/Z^2 + 0.00164/Z^3 + 0.00489/Z^4$

3. $E_j = \frac{1}{4} \alpha^2 Z^2 \{Z^2 - 3.606Z + 3.29 + 0.05/Z\}$

4. $\Delta E_j = \frac{-16 Z^4 \alpha^3}{3\pi} \{3.745 - \ell n\, Z - \left(\frac{1}{Z}\right)(5.97 - 1.31\, \ell nZ) + (3.08 - 0.28\, \ell nZ)/Z^2\}$

5. $\alpha \equiv 1./137.037$

where V^{Z}_{Z-1} is the (Z-1)-st ionization potential of the element with atomic number Z.

The helium-sequence ionization potentials generated by the above equation appear to diverge from measured values for Z > 17. For this reason, the technique used in the HELAS program was next coded. A comparison tabulation follows the HELAS writeup.

HELAS: THE HELIUM ISOELECTRONIC SEQUENCE

HELAS is the second program used to generate the ionization potentials of the helium sequence (refer to the HELIKE writeup). HELAS is based on the paper by Brenner and Brown (Ref. 11).

The relativistic Dirac equation for the energy of a one-electron atom can be written:

$$E_{DIRAC} = -2(\beta_Z - 1)\alpha^2 \quad \text{in Rydbergs}$$

where

$$\beta_Z = [1 - (\alpha Z)^2]^{1/2} \quad \text{and } \alpha \equiv (1./137.037)$$

The two-electron-interaction energy can be expressed as

$$\gamma_Z = 2\,[\beta_Z\,(2\beta_Z - 1)]^{-1}\,[-1 + 10\beta_Z - 2(\beta_Z)^2 - 4(\beta_Z)^3]$$

$$- 2\left[\frac{2}{(3)(2\beta_Z + 1)\Gamma(2\beta_Z + 1)}\right]\left[\frac{\Gamma(2\beta_Z + 1)(\quad + 18\beta_Z - 2(\beta_Z)^2 - 12(\beta_Z)^3)}{2\pi^{1/2}\beta_Z}\right]$$

Then, the helium-sequence ionization potential is given by:

$$\phi^Z_{Z-1} = E_{DIRAC} - \gamma_Z \qquad \text{in Rydbergs}$$

It proved necessary to normalize this equation to the value of V_1^{He} by using

$$X^Z_{Z-1} = \phi^Z_{Z-1} - (\phi_1^2 - V_1^2) \qquad \text{in Rydbergs}$$

where V_1^2 is the (measured) first ionization potential of helium and $(\phi_1^2 - V_1^2)$ is thus an additive constant. The set of X^Z_{Z-1}; $2 \le Z \le 92$ form the final program output. These values are tabulated together with the HELIKE values in table IV.

```
      PROGRAM HELIKE(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
C
C     REFERENCE
C               BETHE AND SALPETER
C               QUANTUM MECHANICS OF ONE AND TWO ELECTRON SYSTEMS.
C               EQUATIONS (33.12), (41.11A), AND (41.12A)
C
C
      DIMENSION V CM(100), V EV(100), JNR(100), EJ(100), DEL EJ(100)
      REAL JNR
      DATA PI/3.14159265/, RY CM/109737.31/, RY EV/13.6048/, ALF MI/137.
     1        037/
C
      COMMON/LMSB/A(1)
C
      ALFA= 1./ALF MI
      ALFASQ=  ALFA * ALFA
C
C
C
      DO 1 I=2,100
      Z=I
      ZLN=ALOG(Z)
      ZSQ=Z*Z
      Z4TH= ZSQ*ZSQ
C
C     NON-RELATIVISTIC CONTRIBUTION
      JNR(I)= ZSQ -1.25*Z +.315311 -1.707E-2/Z +6.8E-4/ZSQ +1.64E-3/Z
     1           /ZSQ  + 4.89E-3/Z4TH
C
C     RELATIVISTIC CONTRIBUTION
      EJ(I)= .25 * ALFASQ *ZSQ * (ZSQ-3.606*ZLN +3.29 + .05/Z )
      DEL EJ(I)= -16. * Z4TH *ALFASQ *ALFA/3./PI * (3.747-ZLN-(5.97-1.3
     1             1*ZLN)/Z  +(3.08-.28*ZLN)/ZSQ  )
C
      K=5
C
      RYA CM= RY CM-60.22/A(K)
      RYA EV= RYA CM * 1.23977E-4
      K=K+2+IFIX(A(K-1))
C
      SUM= JNR(I)+EJ(I)+DEL EJ(I)
      V CM(I)= RYA CM * SUM
      V EV(I)= RYA EV * SUM
    1 CONTINUE
C
C
      WRITE(6,2)
    2 FORMAT(1HI)
      WRITE(6,3)
    3 FORMAT(53H THE 2 ELECTRON GROUND STATE IONIZATION POTENTIAL IS )
      WRITE(6,4) ( I,V EV(I),V CM(I), JNR(I),EJ(I),DEL EJ(I),I=2,100)
    4 FORMAT(1X, 7HFOR Z= ,I3, 9H,  N E.V.,1PE13.6,13H (UR,IN /CM, ,E13.

     16, 6H ), = ,E13.6, 7H JNR + ,E13.6, 6H EJ + , E13.6, 7H DEL EJ )
      CALL EXIT
      CALL MAKIE
      RETURN
      END
```

```
      PROGRAM  MELAS(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
C
C     REFERENCE
C
C     S.BRENNER AND G.E. BROWN
C     PROC. ROY. SOC. LONDON, SERIES A, VOL.218, P.422-432
C          (1953)
C
C
C
C
      DIMENSION BETA(100), EDIRAC(100), BRACES(100),E TO E(100),ETOEV(10
     10),ETOT(100),ETOTEV(100),ETOT2(100), EVTOT2(100),EDRCEV(100)
C
      DATA ALF M1/137.037/,RY/13.6048/,SQRTPI/1.7724539   /,ME RY/1.8071
     1       /, ME EV/24.585/
C
      ALFA= 1./ALFM1
      ALFSQ= ALFA*ALFA
C
C
C
      DO 1 I=2,100
      Z=I
      ZSQ= Z*Z
      BETA(1)=SQRT(1.-ALFSQ * ZSQ)
      X=BETA(1)
      EDIRAC(1)=-2.*(X-1.)/ALFSQ
      EDRCEV(1)=EDIRAC(I)*RY
      CALL GAMMA(2.*X+1.,GAM1,S2,S3)
    2 CALL GAMMA(2.*X+.5,GAMHAF,S4,S3)
      GO TO 4
    3 CALL MERR
    4 CONTINUE
      Y= 2.*X-1.
      BRACES(1)=  (-1.+X* (10. - X* (2.+4.*X)))/X/Y/3.
     1  -2./GAM1/3./Y  *   GAMHAF * (-1.+ X*(18.-X* (2.+ 12.*X)))/
     2  SQRTPI/2. /X
      E TO E(1)=  2.* Z *  BRACES(I)
      ETOEV(1)=  E TO E(1)  *RY
      ETOT(I)= EDIRAC(1)-E TO E(I)
      ETOTEV(I)=EDRCEV(1)-ETOEV(I)
      IF (I.GT.2) GO TO 5
      MELOT= ME RY-ETOT(2)
      MELEV= ME EV-ETOTEV(2)
    5 CONTINUE
      ETOT2(1)= ETOT(I) + MELOT
      EVTOT2(1) = ETOTEV(I)+MELEV
    1 CONTINUE
```

```
C
C
C
      WRITE(6,7)
    7 FORMAT(1H1)
      WRITE(6,8) HELOT, HELEV
    8 FORMAT(1X,14HUSING HELOT = ,1PE15.8,2X, 12HAND HELEV = ,1PE15.8,
     112H WE COMPUTE //1X,3H  Z,  5X,7HBETA(Z),4X,9HEDIRAC(Z),3X,9HEDRCE
     2V(Z),3X,9HBRACES(Z),3X,9HE TO E(Z),2X,10HE TO EV(Z),4X,8HE TOT(Z),
     33X,9HETOTEV(Z),3X,9HE TOT2(Z),3X, 9HEVTOT2(Z))
      WRITE(6,9) (I,BETA(I),EDIRAC(I),EDRCEV(I),BRACES(I),ETOE(I),
     1 ETOEV(I),ETOT(I),ETOTEV(I),ETOT2(I),EVTOT2(I), I=2,100)
    9 FORMAT (1X,I3,1PE12.6,1X,9E12.6)
      CALL EXIT
C
      END
         IF(KMARI .EQ. KK) GO TO  107
         IF (KMARI .EQ. 0) GO TO 103
C     THE ABOVE OCCURS WHENEVER THE KK-TH ELEMENT IS NOT IN THE MARI
C       DECK
  106 CONTINUE
      M=M+ KMARI+ 2
      GO TO 105
  107 CONTINUE
C     AT THIS POINT THE KK-TH ELEMENT HAS BEEN LOCATED
C     ITS LOWER-TH IONIZATION POTENTIAL WILL BE USED
C
C     TEST LOWER-TH IONIZATION POTENTIAL. IF ZERO, SKIP TO NEXT ELEMENT.
      IF (KMARI.LT.LOWNZ) GO TO 103
C
      INDEX=M+1+ LOWER
         IF(ABS(U(INDEX)).LT. 1.E-8 ) GO TO 103
C     WE NOW HAVE A VALID DATUM AND CAN ENTER IT INTO THE Y ARRAY.
      LSTORE=      LSTORE+1
      X(LSTORE)=   LOWER+LSTEP
      Y(LSTORE)=   U(INDEX)
         IF (LREDUC.NE.0) Y(LSTORE)=Y(LSTORE)/X(LSTORE)
      MATNO(LSTORE)= KK
  103 CONTINUE
C     AT THIS POINT, THE X AND Y ARRAYS HAVE BEEN SET UP.
C     THERE ARE LSTORE ENTRIES IN THESE ARRAYS
C
C
C
      CALL FIT (X, Y, LSTORE, LORDER, DEVEAT, IM, COE)
      IF (IM) 201,202,201
  201 CONTINUE
      WRITE(6,703)LSTORE,LORDER,LOWER,(Y(J),MATNO(J),J=1,LSTORE)
      CALL DEBUG(201,202,NEXT)
      GO TO 500
  202 CONTINUE
      ILORDR=LORDER+1
      DO 203 J=1,ILORDR
      COEF( J, K   ) = COE(J)
  203 CONTINUE
```

```
      LAST=LOWER+8
C
C     EVALUATE SEQUENCE FROM POLYNOMIAL
      DO 204 J=1,LOWER
      XJ=J
      KATNO(J)= K-1+J
      POTENL(J)=COE(1)
      DO 91 I=2,ILORDR
      POTENL(J)=POTENL(J)+COE(I)*(XJ**(I-1))
   91 CONTINUE
      KKATNO = KATNO(J)
      MANIAN(KKATNO,J) = POTENL(J)
  204 CONTINUE
C
      NUAT=LOWER+1
C
      WRITE(6,7703)LSTORE,LORDER,LOWER,(Y(J),MATNO(J), J=1,LSTORE)
 7703 FORMAT(6H1USING,I3,23H IONIZATION POTENTIALS,3X,15HA FIT OF ORDER
     1,I2,6H TO THE ,I3,26H-IH ISOELECTRONIC SEQUENCE/3X,4HWITH,3X,
     212HINPUT VALUE     ,18H AT ATOMIC NUMBER /(10X,1PE10.4,14X,I3))
C
      WRITE(6,7002) (KATNO(J), J, POTENL(J), J=1,LOWER )
 7002 FORMAT(21HOHAS A FIT EVALUATION/3(8H FOR Z =,I3,6H AT J=,I3,11H,A
     1VALUE OF, 0PF9.1,3X))
C
 7704 FORMAT(29H FURTHER EVALUATED VALUES ARE /(3X,4H Z =,I3,3X,4H J =,
     1  I3,1PE15.8))
C
      WRITE(6,7705)  COE
 7705 FORMAT(21H USING THE POLYNOMIAL ,5X,1PE14.8,6H  +J* ,1PE14.8,
     1 7H  +J*J* ,1PE14.8,1UH  +J**3 * ,1PE14.8,1UH  +J**4 * ,1PE14.8)
C
 7707 FORMAT(21H USING THE POLYNOMIAL ,5X,1PE14.8,6H  +J* ,1PE14.8,
     1 7H  +J*J* ,1PE14.8)
C
      WRITE(6,7003) DEVEAT
 7003 FORMAT(28H THE STANDARD DEVIATION WAS , 1PE12.5 )
C
C
C     MORE=0 FIT Z=93 TO 100 WITH INPUT IF AVAILABLE,OUTPUT IF NOT
C     MORE=1  FIT Z=93 TO 100 WITH INPUT ONLY
C     MORE=2  FIT Z=93 TO 100 WITH OUTPUT ONLY
      IF (MORE .EQ. 1) GO TO 301
C     PATH FOR MORE.EQ.2.OR.MORE.EQ.0
      XX(3)=LOWER
      YY(3)=POTENL(LOWER)
      XX(2)=LOWER-1
      YY(2)=POTENL(LOWER-1)
      XX(1)=LOWER-2
      YY(1)=POTENL(LOWER-2)
      IF(MORE.NE.0) GO TO 302
      IF (MATNO(LSTORE) .EQ. KATNO(LOWER)) YY(3)=Y(LSTORE)
      IF (MATNO(LSTORE-1) .EQ. KATNO(LOWER-1)) YY(2)=Y(LSTORE-1)
      IF (MATNO(LSTORE-2) .EQ. KATNO(LOWER-2))  YY(1)=Y(LSTORE-2)
  302 CONTINUE
```

```
      WRITE (6,7110)
 7110 FORMAT (30HOINPUT TO THE QUADRATIC FIT IS /)
      DO 401 LY=1,3
      LYY=LOWER-3+LY
      LYYY=XX(LY)
      WRITE(6,7109) MATNO(LYY),LYYY,YY(LY)
 7109 FORMAT (5X,18H AT ATOMIC NUMBER ,I3,10H WITH J  = ,I3,
     1 12H AN IONIZATION POTENTIAL OF ,1PE15.8)
  401 CONTINUE
      GO TO 303
  301 CONTINUE
C     PATH FOR MORE = 1
      XX(1)=X(LSTORE-2)
      XX(2)=X(LSTORE-1)
      XX(3)=X(LSTORE)
      YY(1)=Y(LSTORE-2)
      YY(2)=Y(LSTORE-1)
      YY(3)=Y(LSTORE)
      DO 108 LX=1,3
      LXX=LSTORE-3+LX
      LXXX=XX(LX)
      WRITE (6,7109) MATNO(LXX),LXXX,YY(LX)
  108 CONTINUE
  303 CONTINUE
      CALL FIT (XX,YY,L3,L2,DEVIAT,IM2,COE2)
      IF (IM2) 2001,2002,2001
 2001 CONTINUE
      WRITE (6,7703) L3,L2,(YY(J),MATNO(J),J=1,3)
      CALL DEBUG(2001,2002,NEXT)
      GO TO 500
 2002 CONTINUE
      DO 2003 J=6,8
      COEF(J,K)=COE2(J-5)
 2003 CONTINUE
C
C
      DO 2004 J=NUXT,LAST
      XJ=J
      KATNO(J)=K-1+J
      POTENL(J)=COE2(1)+COE2(2)*XJ+XJ*XJ*COE2(3)
      KKATNO=KATNO(J)
      MARIAN(KKATNO,J)=POTENL(J)
 2004 CONTINUE
      WRITE(6,7704) (KATNO(J), J, POTENL(J), J=NUXT,LAST)
      WRITE (6,7707) COE2
      WRITE (6,7003) DEVIAT
C
C
  500 CONTINUE
      WRITE (6,7006)
 7006 FORMAT (1H1)
C
C
      DO 600 J=1,100
      WRITE(6,7007)J
```

```
 7007 FORMAT (20H0FOR ELEMENT NUMBER ,I3, 31H, THE IONIZATION POTENTIALS
     1 ARE)
C
C
      DO 601 J2=1,J     ,10
      J4=  MINU(J2+9,J     )
      WRITE (6,7005)     J2,(MARIAN(J,J3), J3=J2,J4)
 7005 FORMAT ( 1X,I3,3X,1P10E12.5)
C
  601 CONTINUE
  600 CONTINUE
C
      JLOWOR=ILORUR+3
      WRITE(6,7706)    (  J,(COEF(JJ,J),JJ=1,JLOWOR   ),J=1,KCOUNT)
 7706 FORMAT (14H1COEF ARRAY I5/(4X,I3,1P5E15.8,3X,1P3E15.8))
      GO TO 1
C
      CALL MARIE
      RETURN
      END
```

TABLE IV

IONIZATION POTENTIALS FOR THE TWO-ELECTRON ATOM

Z	(Ref. 5)	HELAS	HELIKE	Z	HELAS	HELIKE
2	2.4581+01	2.458500+01	2.459021+01	51	3.574248+04	3.575074+01
3	7.5619+01	7.559767+01	7.564295+01	52	3.723141+04	3.723577+01
4	1.5385+02	1.538334+02	1.539037+02	53	3.875441+04	3.875410+01
5	2.59298+02	2.592956+02	2.593939+02	54	4.031182+04	4.030598+01
6	3.91986+02	3.920030+02	3.921350+02	55	4.190398+04	4.189166+04
7	5.51925+02	5.519665+02	5.521509+02	56	4.353126+04	4.351138+01
8	7.39114+02	7.392276+02	7.394696+02	57	4.519402+04	4.516541+01
9	9.536+02	9.537974+02	9.541228+02	58	4.689264+04	4.685401+04
10	1.1956+03	1.195717+03	1.196147+03	59	4.862751+04	4.857744+04
11	1.4648+03	1.465021+03	1.465582+03	60	5.039905+04	5.033598+04
12	1.7612+03	1.761765+03	1.762473+03	61	5.220768+04	5.212990+04
13	2.0855+03	2.085968+03	2.086870+03	62	5.405386+04	5.395948+04
14	2.436+03	2.437710+03	2.438826+03	63	5.593802+04	5.582502+04
15	2.815+03	2.817031+03	2.818401+03	64	5.786065+04	5.772679+04
16	3.22+03	3.223997+03	3.225656+03	65	5.982224+04	5.966511+04
17	3.654+03	3.658670+03	3.660660+03	66	6.182331+04	6.164026+04
18	4.115+03	4.121115+03	4.123485+03	67	6.386439+04	6.365256+04
19	4.603+03	4.611420+03	4.614207+03	68	6.594602+04	6.570232+04
20	5.119+03	5.129647+03	5.132907+03	69	6.806879+04	6.778985+04
21		5.675899+03	5.679673+03	70	7.023330+04	6.991547+04
22		6.250255+03	6.254594+03	71	7.244014+04	7.207951+04
23		6.852810+03	6.857765+03	72	7.469000+04	7.428230+04
24		7.483672+03	7.489287+03	73	7.698353+04	7.652417+04
25		8.142944+03	8.149263+03	74	7.932141+04	7.880546+04
26		8.830720+03	8.837804+03	75	8.170441+04	8.112653+04
27		9.547140+03	9.555024+03	76	8.413326+04	8.348771+04
28		1.029231+04	1.030104+04	77	8.660876+04	8.588937+04
29		1.106637+04	1.107598+04	78	8.913176+04	8.833187+04
30		1.186944+04	1.187996+04	79	9.170308+04	9.081556+04
31		1.270166+04	1.271312+04	80	9.432365+04	9.334082+04
32		1.356319+04	1.357561+04	81	9.699440+04	9.590803+04
33		1.445417+04	1.446755+04	82	9.971633+04	9.851756+04
34		1.537476+04	1.538910+04	83	1.024905+05	1.011698+05
35		1.632512+04	1.634041+04	84	1.053179+05	1.038651+05
36		1.730543+04	1.732163+04	85	1.081997+05	1.066040+05
37		1.831586+04	1.833293+04	86	1.111371+05	1.093867+05
38		1.935660+04	1.937448+04	87	1.141314+05	1.122137+05
39		2.042784+04	2.044643+04	88	1.171838+05	1.150854+05
40		2.152978+04	2.154898+04	89	1.202957+05	1.180022+05
41		2.266262+04	2.268229+04	90	1.234686+05	1.209646+05
42		2.382660+04	2.384855+04	91	1.267040+05	1.239730+05
43		2.502191+04	2.504196+04	92	1.300036+05	1.270277+05
44		2.624880+04	2.626871+04	93	1.333689+05	1.301293+05
45		2.750751+04	2.752699+04	94	1.368018+05	1.332781+05
46		2.879828+04	2.881702+04	95	1.403042+05	1.364746+05
47		3.012137+04	3.013899+04	96	1.438782+05	1.397193+05
48		3.147706+04	3.149313+04	97	1.475258+05	1.430126+05
49		3.286562+04	3.287965+04	98	1.512492+05	1.463550+05
50		3.428732+04	3.429878+04	99	1.550511+05	1.497469+05
				100	1.589338+05	1.531888+05

SECTION IV
OPACITY AND DATA TRANSFORMATION CODES

All of the valid DIAPHANOUS, DIANE, SYLVIA, ALOUETTE, and ZSAZSA opacity information in use at General Atomic has been transmitted on tape to the DASIAC. Enough information has been presented in the code writeups (which follow) to enable these tapes to be read. For further information refer to:

1. DIAPHANOUS data: see the DENSER, DASE, DAPHNE, DYPER4, GRAPH, and TRANS writeups. The DENSER writeup specifies the DASIAC tape format. The other codes listed are able to use, edit, or modify the data as specified in their writeups.
2. DIANE data: see the DIANCT and DIANE-tape-and-card-format writeups, and the GREYS, EGREY, REDGRE, and DYPDIN writeups. The DIANCT and DIANE-tape-and-card-format write-ups specify the DASIAC tape format.
3. SYLVIA, ZSAZSA, and ALOUETTE data: see the EDSILV writeup for a discussion of the DASIAC tape format.

DYPER4: A PLOT PREPARATION CODE FOR OPACITY AND THERMODYNAMIC DATA

The primary functions of the DYPER4 program are to read data from either a DIAPHANOUS, a DENSER, or an ANDIMX tape and prepare plot tapes for the SC-4020. DYPER4 reads one input data tape and either plots opacity data and punches cards containing thermodynamic data, or sets up a one-dimensional array containing thermodynamic data to be plotted by subroutine GRAPH. DYPER4 requires only one data card, containing the following information:

```
00100     1.   C ELT DYPER6/50824,1,670905, 59099
00100     2.   C EOF 3
00100     3.   C     SUBROUTINE DIAPER
00100     4.   C
00100     5.   C     **** COMPILED SEPTEMBER 28, 1966  SCHALIT/YATES  ****
00100     6.   C
00100     7.   C     VARIABLE NAME  MEANING
00100     8.   C
00100     9.   C     *** AUGEAS ***
00100    10.   C     DELEPJ (2000)  ENERGY CHANGE DURING A TRANSITION (EV)
00100    11.   C     DELEPS (1300)  IONIZATION POTENTIAL OF A STATE (EV)
00100    12.   C     EIN (15)       ENERGY OF GROUND STATE OF AN IONIZATION LEVEL
00100    13.   C     EPSD (1300)    SAME AS EPS IN DIAPHANOUS
00100    14.   C     FPC (3, 3, 3)  FRACTIONAL PERCENTAGE COEFFICIENT FOR TRANSITION BETWEEN
00100    15.   C                    SPLIT CONFIGURATIONS
00100    16.   C     IJJ (2000)     IDENTIFICATION NUMBER OF INITIAL STATE ASSOCIATED WITH A
00100    17.   C                    TRANSITION
00100    18.   C     ISPLIT (15, 40)IDENTIFICATION OF A SPLIT CONFIGURATION
00100    19.   C     MERGED (15, 40)TRUE IF THIS CONFIGURATION IS THE AVERAGE OF SOME OTHER
00100    20.   C                    CONFIGURATIONS IN THE TABLE
00100    21.   C     MJJ (2000)     NUMBER OF ELECTRONS IN LEVEL FROM WHICH ONE IS REMOVED IN
00100    22.   C                    THIS TRANSITION
00100    23.   C     NFD (1300)     SAME AS NF IN DIAPHANOUS
00100    24.   C     NJJ (2000)     PRINCIPAL QUANTUM NUMBER (OR REDUCED QUANTUM NUMBER) OF
00100    25.   C                    ELECTRON REMOVED IN THIS TRANSITION.
00100    26.   C     NQ (6, 15, 40) NUMBER OF ELECTRONS IN AN ELECTRON LEVEL IN A CONFIGURATION
00100    27.   C     NNMAX (15)     NUMBER OF CONFIGURATIONS AT AN IONIZATION LEVEL
00100    28.   C     NRSAVE (1300)  CONFIGURAYION IDENTIFICATION OF A STATE
00100    29.   C     NSAVE (1300)   QUANTUM NUMBER OF OUTER ELECTRON, IF BEYOND TABLE, OF A
00100    30.   C                    STATE
00100    31.   C     QQ (1300)      SAME AS Q IN DIAPHANOUS
00100    32.   C     QNT (15, 40)   DEGENERACY OF A CONFIGURATION
00100    33.   C     W0 (15, 40)    COEFFICIENTS IN QUADRATIC FOR DETERMINING ENERGY OF THIS
00100    34.   C                    CONFIGURATION
00100    35.   C     W1 (15, 40)    COEFFICIENTS IN QUADRATIC FOR DETERMINING ENERGY OF THIS
00100    36.   C                    CONFIGURATION
00100    37.   C     W2 (15, 40)    COEFFICIENTS IN QUADRATIC FOR DETERMINING ENERGY OF THIS
00100    38.   C                    CONFIGURATION
00100    39.   C     *** DIAPH2 ***
00100    40.   C     BE (100)       SAME AS BEJ, INDEXED BY (NF + 1) FOR INITIAL STATE
00100    41.   C     BEJ (1600)     PARAMETER DETERMINING LINE WIDTH FOR A TRANSITION
00100    42.   C     C (10)         CONCENTRATION OF AN ELEMENT (ATOMS/ATOM)
00100    43.   C     COM (12)       COMMENT CARD IN FORMAT 12A6
00100    44.   C     DELE (100)     SUM OF DELI AT PREVIOUS IONIZATION LEVELS (EV)
00100    45.   C     DELEPJ (2200)  ENERGY CHANGE DURING A TRANSITION (EV)
00100    46.   C     DELEPS (1500)  IONIZATION POTENTIAL OF A STATE (EV)
00100    47.   C     DELI (100)     PRESSURE IONIZATION AT AN IONIZATION LEVEL (EV)
00100    48.   C     EPS (1500)     ENERGY OF A STATE, USUALLY REFERRED TO THE ENERGY OF THE
00100    49.   C                    GROUND STATE OF THE NEUTRAL ATOM (EV)
00100    50.   C     EPSPRM (1500)  ENERGY OF A STATE AFTER REDUCTION DUE TO PRESSURE IONIZA-
00100    51.   C                    TION (EV)
00100    52.   C     EA (100)       SAME AS EAJ, INDEXED BY (NF + 1) FOR INITIAL STATE
00100    53.   C     EAJ (1600)     PARAMETER DETERMINING LINE LOCATIONS FOR A TRANSITION
00100    54.   C     GAMBLK (10)    ARRAY OF GAMMA
00100    55.   C     IJ (2200)      IDENTIFICATION NUMBER OF INITIAL STATE ASSOCIATED WITH A
00100    56.   C                    TRANSITION
00100    57.   C     MAKEZ (1500)   IDENTIFICATION OF STATE TO BE ELIMINATED
00100    58.   C     MJ (2200)      NUMBER OF ELECTRONS IN LEVEL FROM WHICH ONE IS REMOVED IN
00100    59.   C                    THIS TRANSITION
00100    60.   C     NEW (2200)     ORIGINAL IDENTIFICATION NUMBER OF A TRANSITION
00100    61.   C     NF (1500)      NUMBER OF FREE ELECTRONS FOR A STATE
00100    62.   C     NJ (2200)      TOTAL QUANTUM NUMBER (OR REDUCED QUANTUM NUMBER) OF ELEC-
00100    63.   C                    TRON REMOVED DURING A TRANSITION
00100    64.   C     NLAST (10)     INDEX NUMBER OF LAST STATE IN TABLE FOR AN ELEMENT
00100    65.   C     PHI (2200)     STRENGTH OF EDGE DUE TO THIS TRANSITION
```

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00100    66.  C     G (1500)        DEGENERACY OF A STATE
00100    67.  C     R (1500)        FIRST PROPORTIONAL TO LOG POPULATION AND THEN TO POPULATION
00100    68.  C                      OF A STATE
00100    69.  C     Rb (10)         FIRST MAXIMUM R, THEN SUM OF R*S, FOR AN ELEMENT
00100    70.  C     SMALLP (1500)   POPULATION OF A STATE
00100    71.  C     TESTJ (2200)    LOWEST VALUE OF MU AT WHICH THE ABSORPTION COEFFICIENT IS
00100    72.  C                      AFFECTED BY THE LINE SERIES FOR THIS TRANSITION
00100    73.  C     TKBLK (10)      ARRAY OF KT
00100    74.  C     U (5)           COEFFICIENTS IN GAUSSIAN INTEGRATION
00100    75.  C     A (5)           COEFFICIENTS IN GAUSSIAN INTEGRATION
00100    76.  C     UOLD (2200)     LOCATION OF EDGE DUE TO THIS TRANSITION (EV/EV)
00100    77.  C     UPHM (2200)     LOWERED EDGE TO APPROXIMATE HIGH LINES (EV/EV)
00100    78.  C     W (10)          ATOMIC WEIGHT OF AN ELEMENT
00100    79.  C     Z (10)          ATOMIC NUMBER OF AN ELEMENT
00100    80.  C     *** DIAPER ***
00100    81.  C     AMU (1000)      ABSORPTION COEFFICIENT AT A PARTICULAR VALUE OF MU(.6 .LE.
00100    82.  C                      MU .LE. 15) (PER CM)
00100    83.  C     BMU (1000)      BOTTOM OF EDGE OCCURING AT A PARTICULAR VALUE OF MU(MU .GT.
00100    84.  C                      15)(PER CM)
00100    85.  C     ID (12)         COMMENT CARD
00100    86.  C     TMU (1000)      TOP OF EDGE OCCURING AT A PARTICULAR VALUE OF U (U>15) (PER
00100    87.  C                      CM)
00100    88.  C     *** SPECTRA ***
00100    89.  C     DEFECT (100, 6)QUANTUM DEFECT INDEXED BY THE IONIZATION LEVEL AND L + 1
00100    90.  C     DELEPJ (3500)   SAME AS DELEPJ IN DIAPHANOUS
00100    91.  C     DELEPS (1750)   SAME AS DELEPS IN DIAPHANOUS
00100    92.  C     EPSD (1750)     SAME AS EPS IN DIAPHANOUS
00100    93.  C     IJJ (3500)      SAME AS IJ IN DIAPHANOUS
00100    94.  C     IONZC (100)     ZCORE FOR AN IONIZATION LEVEL
00100    95.  C     L (19)          L FOR AN ELECTRON LEVEL
00100    96.  C     LIN (10)        LEVEL AT WHICH AN ELECTRON IS BEING ADDED
00100    97.  C     LOUT (10)       LEVEL AT WHICH AN ELECTRON IS BEING REMOVED
00100    98.  C     MJJ (3500)      SAME AS MJ IN DIAPHANOUS
00100    99.  C     N (19)          N FOR AN ELECTRON LEVEL
00100   100.  C     NE (92, 19)     NUMBER OF ELECTRONS PER ELECTRON LEVEL IN THE GROUND STATE
00100   101.  C                      OF AN IONIZATION LEVEL
00100   102.  C     NFD (1750)      SAME AS NF IN DIAPHANOUS
00100   103.  C     NJJ (3500)      SAME AS NJ IN DIAPHANOUS
00100   104.  C     QJ (1750)       SAME AS Q IN DIAPHANOUS
00100   105.  C                                                                          SMAN0040
00101   106.        DIMENSION AMU(3000), BMU(1500), TMU(1500), U1(3000), U2(1500) ,
00101   107.       1A(682), TX(2), TY(2), CHARA(4), CHARB(3), AA(20),
00101   108.       2 CHARC(4), CHARD(3), CHARE(3), CHARG(3), CHARH(3)                    SMAN0070
00101   109.       3 , BCDBLK(40), HUB(14), IHUB(13), HUBB(8), COMP(10), IZ(10)
00103   110.        EQUIVALENCE (AA(1),ZBAR), (AA(2),RHO), (AA(3),BIGP), (AA(4),EPSMAL
00103   111.       1), (AA(5),AKAPPA), (AA(6),WAMBDA), (AA(7),E1PART), (AA(8),BAMNEW)
00104   112.        EQUIVALENCE (BCDBLK, CHARA), (BCDBLK(5), CHARC),                     SMAN0090
00104   113.       1            (BCDBLK(6), CHARB), (BCDBLK(9), CHARD),                 SMAN0100
00104   114.       2            (BCDBLK(12), CHARE), (BCDBLK(15), CHARG),               SMAN0110
00104   115.       3 ( BCDBLK(18), CHARH), (HUBB(2), UIN), (HUBB(3), DUI)
00104   116.  C                                                                          SMAN0130
00105   117.        INTEGER ANDINX,DENSER
00106   118.        INTEGER W
00107   119.        EQUIVALENCE(IUX,UX)
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00107   120.   C
00110   121.          COMMON/PRSA/NFRAME, SAVET, SECRET(6), ANDIMX, IDANDI(12,5)
00110   122.   C
00111   123.          COMMON/CIA/DYPOUT(5000)
00112   124.          DATA DYPOUT/5000*0./
00114   125.          COMMON/DCII/IEND(100), NPTS(100), J1, NAME, ID(12)
00115   126.          DATA J1/1/, MARKER/-9/, EPSILN/1.E-6/, IEND,NPTS/200*0/
00123   127.          DATA IENDED/0/
00125   128.          DATA MIN/10/
00125   129.   C      MIN = 10  COMPRESSED INPUT TAPE UNIT.
00125   130.   C
00125   131.   C      MUB(3) IS TEMPERATURE IN EV
00125   132.   C      MUB(4) IS DENSITY IN GM/CM2
00125   133.   C      MUB(8) IS ZBAR
00125   134.   C      MUB8(5) IS ROSSELAND MEAN CONTINUOUS OPACITY IN CM2/GM
00125   135.   C      MUB8(6) IS ROSSELAND MEAN (TOTAL RADIATION) OPACITY IN CM2/GM
00125   136.   C
00127   137.          DATA NFRAME, SAVET/0.0,0/SECRET/6HSECRET,6H H/D -,6HGROUP ,
00127   138.         16H 1     / ANDIMX/6HANDIMX/,DENSER/6HDENSER/
00127   139.   C                                                                    SMAN0150
00127   140.   C                                                                    SMAN0160
00127   141.   C              FORMAT OF INTERMEDIATE DIAPHANOUS TAPE                SMAN0170
00127   142.   C        SIGNAL                                                      SMAN0180
00127   143.   C          -1.  NEXT RECORD CONTAINS IDENTIFICATION CARD             SMAN0190
00127   144.   C          -2.  BEGINNING OF CASE.  NEXT RECORD CONTAINS TEMPERATURE AND SMAN0200
00127   145.   C               GAMMA.  SUCCEEDING RECORDS CONTAIN COMPUTED ABSORPTION SMAN0210
00127   146.   C               COEFFICIENTS. WITH LINES, FOR U LESS THAN 15.         SMAN0220
00127   147.   C          -6.  TRANSITIONS HAVE BEEN EXHAUSTED BEFORE REACHING U = 15. SMAN0230
00127   148.   C               FOLLOWING RECORDS CONTAIN SOME EXTRAPOLATED VALUES.   SMAN0240
00127   149.   C          -3.  FOLLOWING RECORDS CONTAIN DATA, WITHOUT LINES, FOR U  SMAN0250
00127   150.   C               GREATER THAN 15.                                      SMAN0260
00127   151.   C          -4.  NEXT RECORD CONTAINS SUMMARY OF RESULTS.  END OF CASE. SMAN0270
00127   152.   C          -9.  END OF TAPE.                                         SMAN0280
00127   153.   C
00127   154.   C
00127   155.   C                       FORMAT OF ANDIMX TAPE
00127   156.   C
00127   157.   C                 A) A FIRST RECORD OF: ANDIMX
00127   158.   C                 B) A SECOND RECORD OF: 60 IDENTIFICATION WORDS
00127   159.   C                 C) A SIGNAL RECORD OF: -1. (DATA FOLLOWS FOR A GIVEN
00127   160.   C                       TEMPERATURE-DENSITY POINT
00147   161.   C                 D) A 3R WORD RECORD  (CAYT IS WORD(3), RHO IS WORD(4))
00127   162.   C                 E) A RECORD WITH (NMAX+1) WORDS: NMAX,(MU(J),J=1,NMAX)
00127   163.   C
00127   164.   C                 RECORDS (C,D,AND E) ARE THEN REPEATED. TEMPERATURES
00147   165.   C                 AND DENSITIES ARE MONOTONIC. TEMPERATURES ARE LOWEST
00127   166.   C                 AT THE BEGINNING OF THE TAPE,THE HIGHEST DENSITY FOR
00147   167.   C                 A GIVEN TEMPERATURE IS THE FIRST DENSITY AT THAT
00127   168.   C                 TEMPERATURE.
00127   169.   C
00127   170.   C                 F) A SIGNAL RECORD OF: -9. SIGNIFIES END OF DATA.
00127   171.   C
00136   172.         5 FORMAT  (12A6)                                              SMAN0290
00136   173.         8 FORMAT (1H1,12A6/15HOTEMPERATURE = , F10.3////6X, 5HGAMMA, 6X
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00136   174.        1        11HRHO(GM/CM3), 6X, 7HP(BARS), 5X, 12HENG(ERGS/GM), 3X,    SMAN0310
00136   175.        2        13HEION(ERGS/GM), 3X, 12HKROS(CM2/GM), 2X,                 SMAN0320
00136   176.        3        12HKPLK(CM2/GM), 3X, 4HZBAR, 5X, 4HEGAM)                   SMAN0330
00137   177.      11 FORMAT (6HTHETA=, F12.2, 6HGAMMA=, E12.5, 6HMUZRO=, E12.3,         SMAN0340
00137   178.       1        6HMUONE=, E12.3)                                           SMAN0350
00140   179.      12 FORMAT (48H     0     5    10    15     1    10   100  1000)      SMAN0360
00141   180.      13 FORMAT (52H THERE IS AN ERROR IN THIS RUN.  CONSULT PROGRAMMER     SMAN0370
00141   181.       1        33HBEFORE SENDING TAPE H TO PLOTTER.)                      SMAN0380
00142   182.      14 FORMAT (10H THERE ARE, I4, 33H FRAMES ON TAPE H,   PLEASE NOTE    SMAN0390
00142   183.       1        47HTHIS ON THE SAVE TAPE REQUEST, IF THERE IS ONE.)        SMAN0400
00143   184.      15 FORMAT(1P2E13.3, 3E15.3, E15.2, E13.1, 0PF11.2, F9.2)             SMAN0410
00144   185.      18 FORMAT(1P6E10.4, 0P2F6.3)                                         SMAN0420
00145   186.      19 FORMAT(1PE10.4)                                                   SMAN0430
00146   187.         READ=IND 16
00146   188.   C
00146   189.   C     TKIN  IS THE TEMPERATURE AT WHICH PLOTTING BEGINS
00146   190.   C     TKEND IS THE LAST TEMPERATURE WHICH IS PLOTTED
00146   191.   C     M     IF (M .GT. 0) THE VALUE OF AMIN IS CHANGED TO THE HIGHEST
00146   192.   C           POWER OF 10 WHICH DIVIDES AMIN
00146   193.   C           IF (M .EQ. 0) AMIN IS NOT CHANGED
00146   194.   C     N     IF (N .GT. 0) HUEBNER DATA IS ONLY PLOTTED FOR U FROM U = .3
00146   195.   C           TO U = 15.
00146   196.   C     IPLOT1  DETERMINES WHETHER THE DYPOUT ARRAY IS TO BE FILLED.
00146   197.   C           IF (IPLOT1 .EQ. 1) USE DYPOUT ARRAY
00146   198.   C           IF (IPLOT1 .NE. 1) NORMAL PLOTTING PATH
00146   199.   C
00146   200.   C
00146   201.   C     FOLLOWING ARE THE VARIABLES STORED IN DYPOUT(I) (AND INTEGRAL
00146   202.   C       MULTIPLES OF I)
00146   203.   C
00146   204.   C     I          SADY VARIABLE      HUEBNER VARIABLE
00146   205.   C     1          TK                 TK
00146   206.   C     2          RHO                RHO
00146   207.   C     3          GAMMA
00146   208.   C     4          PRESHR
00146   209.   C     5          ENERGY
00146   210.   C     6          EION
00146   211.   C     7          KPLK               CROPA
00146   212.   C     8          KROS               TROPA (KROS)
00146   213.   C     9          ZBAR               CAPNF (ZBAR)
00146   214.   C     10         EGAM
00146   215.   C
00146   216.   C
00146   217.   C     READ INPUT CARD 1/1
00147   218.         READ (5,101) TKIN, TKEND, SIZ, M, N, IPLOT1, IBCD0
00160   219.     101 FORMAT (3F10.4,4(5X,I5))
00161   220.         WRITE (6,3) TKIN, TKEND, SIZ, M, N, IPLOT1, IBCD0
00172   221.       3 FORMAT (17H INPUT AS READ IS//11H TKIN    = ,E12.4, /11H TKEND   =
00172   222.      1  ,E12.4,/11H SIZ     = ,E12.4,/11H M       =  ,I5,/11H N       =
00172   223.      2 ,I5,/10H IPLOTI  =,I5,/11H IBCD0    = ,I5)
00172   224.   C
00173   225.           IF (TKEND .LT. 1.E-35) TKEND=1.E38
00173   226.   C
00175   227.         WRITE (6,4)  TKIN, TKEND, SIZ, M, N, IPLOT1, IBCD0
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00206   226.       4 FORMAT (17HOINPUT AS USED IS//11H TKIN    = ,E12.4, /11H TKEND   =
00206   229.        1 ,E12.4,/11H SIZ     = ,E12.4,/11H M       = ,I5,/11H N       =
00206   230.        2 ,I5,/10H IPLOT1  =,I5,/11H IBCD0    = ,I5,/1H1)
00206   231.  C
00207   232.          IF (IPLOT1 .EQ. 1) GO TO 400
00207   233.  C     DO PLOTTING OF THERMO OR DO (PLOTS OF MU VS. U AND PUNCH CARDS)
00207   234.  C     BUT NOT BOTH
00207   235.  C
00207   236.  C
00211   237.       CALL SETUP(A,662,16)
00212   238.       CALL BCDCON (BCDBLK)                                          SMAN0050
00213   239.       WRITE (0, 12)                                                 SMAN0060
00213   240.  C     P R O C E S S   I N P U T                                    SMAN0070
00213   241.  C
00215   242.    400 CONTINUE
00216   243.       IF (IBCD0 .EQ. 0) GO TO 9401
00220   244.       READ,IND IS
00221   245.       READ(15)IUX
00224   246.       NAME = IUX
00225   247.       I1UX=UX-.5
00226   248.       IF(I1UX .EQ. (-1)) GO TO 100
00230   249.       IF (IUX .EQ. ANDIMX) GO TO 700
00232   250.       WRITE(6,7999) UX, I1UX, IUX, IUX
00240   251.    7999 FORMAT (26H PROBLEM WITH FIRST RECORD /5X,1PE15.8,2X,I4,2X,A6, 2X0
00240   252.       11H)
00261   253.       GO TO 999
00262   254.    9401 CONTINUE
00263   255.       READ (MIN,7401) IUX, (ID(I),I=1,18), NZ, (COMP(K),IZ(K),K=1,NZ)
00260   256.       NAME=          IUX
00261   257.    7401 FORMAT (13A6, / I2,  (F6.4, I2))
00262   258.       IF (IUX .EQ. DENSER) GO TO 9403
00264   259.    9402 CONTINUE
00265   260.       WRITE (6,7999) UX, IUX, IUX, IUX
00273   261.       GO TO 999
00274   262.    9403 CONTINUE
00275   263.       WRITE (6,7404) JJ, II, ULAST, AKLAST, TK, GAMMA, (AA(K),K=1,26),
00275   264.      1(U1(I),I=6,II), (AMU(I),I=6,II), (U2(I), I=2,JJ), (BMU(I),I=2,JJ),
00275   265.      2(TMU(I),I=2,JJ)
00335   266.    7404 FORMAT (2I4, 13E9.4, /(14E9.4))
00335   267.  C     IF (JJ .GT. 1500) THE A ARRAY HAS BEEN WIPED OUT
00336   268.    9404 CONTINUE
00337   269.       READ (MIN,7404) JJ,II, ULAST, AKLAST, TK, GAMMA, (AA(K),K=1,20),
00337   270.      1(U1(I), I=6,II1, (AMU(I),I=6,II), (U2(I),I=2,JJ), (BMU(I),I=2,JJ),
00337   271.      2(TMU(I),I=2,JJ)
00377   272.       IF (JJ .GT. 0) GO TO 9000
00401   273.       NEND = 2
00402   274.       GO TO 200
00403   275.    9000 CONTINUE
00404   276.       IF ((II .GT. 150) .OR. (JJ .GT. 1500)) GO TO 9405
00406   277.       ITHCH = 10000
00407  *DIAGNOSTIC* THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00407   278.       IF (ULAST .NE. 0.) ITHCH=II
00411   279.       NO=2
00412  *DIAGNOSTIC* THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
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00412   280.          IF (U2(2) .NE. 0.)  NO=1
00414   281.          DO 9406 I=6,II
00417   282.          U1(I-5) = U1(I)
00420   283.          AMU(I-5) = AMU(I)
00421   284.     9406 CONTINUE
00423   285.          DO 9407 I=2,JJ
00426   286.          U2(I-1) = U2(I)
00427   287.          BMU(I-1) = BMU(I)
00430   288.          TMU(I-1) = TMU(I)
00431   289.     9407 CONTINUE
00433   290.          IMAX=          II - 5
00434   291.          JMAX=          JJ - 1
00435   292.          GO TO 9403
00436   293.      100 CONTINUE
00437   294.          NAME = -1
00440   295.          READ(15)(ID(I),I=1,12)
00446   296.     9403 CONTINUE
00447   297.            IF (IPLOT1 .EQ. 1) GO TO 401
00451   298.          PUNCH 5, (ID(I), I = 1, 12)                                    3MAN0510
00457   299.          CALL FRAME(8.0, 1.0, 1.0, 0.0)                                 3MAN0520
00460   300.          CALL TSP(0.2, 0.5, ID, 72)                                     3MAN0530
00461   301.          CALL ADF                                                       3MAN0540
00462   302.          NFRAME=NFRAME+1                                                3MAN0550
00463   303.      401 CONTINUE
00464   304.          IF (IBCDO .EQ. 0)  GO TO 9404
00466   305.          READ(15)UX
00471   306.            IF (ABS(UX+2.) .LT. EPSILN) GO TO 32
00473   307.          WRITE (6,20) UX
00476   308.       20 FORMAT (7HMONO SIGNAL OF -2. FOLLOWS FIRST (ID) RECORD ON THE DIAP
00476   309.         1HANOUS TAPE.  UX = , F10.4)
00477   310.          GO TO 999
00477   311.    C     READ IN MU VERSUS U FOR GIVEN T, GAMMA                         3MAN0580
00500   312.       32 CONTINUE
00501   313.          READ (15) TK, GAMMA
00505   314.          I = 1                                                          3MAN0600
00506   315.          ITWCH = 10000                                                  3MAN0610
00507   316.       34 READ(15)U1(I),AMU(I)
00513   317.            IF (ABS(U1(I) + 3.) .LT. EPSILN) GO TO 60
00515   318.            IF (ABS(U1(I) + 6.) .LT. EPSILN) GO TO 40
00517   319.            IF (ABS(U1(I) + 4.) .LT. EPSILN) GO TO 75
00521   320.          I = I + 1                                                      3MAN0660
00522   321.          GO TO 34                                                       3MAN0670
00523   322.       40 ITWCH = I - 1                                                  3MAN0680
00524   323.          GO TO 34                                                       3MAN0690
00525   324.       60 NO = 1                                                         3MAN0700
00526   325.          J = 1                                                          3MAN0710
00527   326.       65 READ(15)U2(J),BMU(J),TMU(J)
00534   327.            IF (ABS(U2(J1 + 4.) .LT. EPSILN) GO TO 75
00536   328.          J = J + 1                                                      3MAN0740
00537   329.          GO TO 65                                                       3MAN0750
00540   330.       73 NO = 2                                                         3MAN0760
00541   331.       75 CONTINUE
00542   332.          READ (15) ZBAR,RHO,BIGP,EPSMAL,AKAPPA,WAMBDA,EIPART,GAMNEW
00554   333.          IMAX = I - 1                                                   3MAN0780
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00555   334.          JMAX = J - 1                                                    3MAN0790
00585   335.    C
00586   336.     9408 CONTINUE
00587   337.            IF ((TK+EPSILN).LT.YKIN .OR. TK.GT.(TKEND+EPSILN)) GO TO 291
00588   338.            IF (IPLOT1 .EQ. 1) GO TO 410
00591   339.    C
00591   340.    C       START PLOTTING FIRST FRAME                                      3MAN0830
00593   341.       80 CALL FRAME(0.0, 20.0, 20.0, 0.0)                                 3MAN0840
00594   342.          CALL GXA(4, 0.7, 1.0, 8.25)                                     3MAN0850
00595   343.          CALL GYA(4, 1.0, 0.9, 5.0)                                      3MAN0860
00596   344.          CALL TSP(1.5, 19.0, ID, 72)                                     3MAN0870
00597   345.          AMIN = 1.E9                                                     3MAN0880
00570   346.          DO  120  I = 1, IMAX                                            3MAN0890
00573   347.      120 AMIN= AMIN1(AMIN, AMU(I))                                       3MAN0900
00575   348.          IF (M .EQ. 0) GO TO 81
00577   349.          I2 = IFIX(ALOG10(AMIN))
00600   350.          IF (I2 .LE. 0) I2 = I2 - 1
00602   351.          AMIN = 10.**I2
00603   352.       81 CONTINUE
00604   353.          GO TO (83, 84), NO                                              3MAN0910
00605   354.       83 BMIN = 1.E9                                                     3MAN0920
00606   355.          DO  190  J = 1, JMAX                                            3MAN0930
00611   356.      190   IF ((U2(J)-150.) .LT. 1.E-37) BMIN = AMIN1(BMIN, BMU(J))
00614   357.       84 CALL GCDCON (GCDBLK(9))                                        3MAN0950
00615   358.          WRITE (0, 11) TK, GAMMA, AMIN, BMIN                             3MAN0960
00623   359.          CALL TSP(1.3, 2.6, CHARD, 18)                                   3MAN0970
00624   360.          CALL TSP(1.3, 2.3, CHARE(1), 18)                                3MAN0980
00625   361.          DO  90  I = 1, 4                                                3MAN0990
00630   362.          XTYP = 5. * FLOAT(I) - 4.7                                      3MAN1000
00631   363.       85 CALL TSP(XTYP, .6, CHARA(I), 8)                                 3MAN1010
00632   364.          YTYP = 6.25 * FLOAT(I) - 5.25                                   3MAN1020
00633   365.       90 CALL TSP(.1, YTYP, CHARC(I), 8)                                 3MAN1030
00635   366.          CALL TSP(1.3, 2.0, CHARB, 18)                                   3MAN1040
00638   367.    C     PLOT MU VERSUS U                                                3MAN1050
00636   368.          DO  150  I = 1, IMAX                                            3MAN1060
00641   369.          PMU1= 2.7143 * ALOG(AMU(I) / AMIN) + 1.0                        3MAN1070
00642   370.          IF (I .EQ. 1) GO TO 140                                         3MAN1080
00644   371.          TX(1) = TX(2)                                                   3MAN1090
00645   372.          IF (ITWCM .GE. I) GO TO 134                                     3MAN1100
00647   373.          TY(1) = TY(2)                                                   3MAN1110
00650   374.          TX(2) = U1(I) + 1.00                                            3MAN1120
00651   375.      134 TY(2) = AMIN1(PMU1, 20.)                                        3MAN1130
00652   376.          IF (TY(1) .GT. 20.) GO TO 150                                   3MAN1140
00654   377.      138 CALL DVR(1, 0, TX, TY, 1)                                       3MAN1150
00655   378.          IF (ITWCM .LT. I) GO TO 150                                     3MAN1160
00657   379.      140 TX(1) = U1(I) + .95                                             3MAN1170
00660   380.          TY(2) = PMU1                                                    3MAN1180
00661   381.          TX(2) = U1(I) + 1.05                                            3MAN1190
00662   382.          TY(1) = AMIN1(PMU1, 20.)                                        3MAN1200
00663   383.            IF ((PMU1-20.) .LT. 1.E-37) CALL DVR(1, 0, TX, TY, 1)
00665   384.      150 CONTINUE                                                        3MAN1220
00667   385.          CALL ADF                                                        3MAN1230
00670   386.          NFRAME=NFRAME+1                                                 3MAN1240
00671   387.          GO TO (160, 248), NO                                            3MAN1250
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00671   388.   C      START PLOTTING SECOND FRAME                                  SMAN1260
00672   389.     160  CALL GXA(4, 0.7, 1.0, 6.25)                                 SMAN1270
00673   390.          CALL GYA(3, 1.0, 0.9, 6.25)                                 SMAN1280
00674   391.          CALL TSP(1.5, 19.0, ID, 72)                                 SMAN1290
00675   392.          CALL TSP(1.3, 2.6, CHARD, 16)                               SMAN1300
00676   393.          CALL TSP(1.3, 2.3, CHARE, 16)                               SMAN1310
00677   394.          DO  160  I = 1, 4                                           SMAN1320
00702   395.          XTYP = 6.25 + FLOAT(I) - 5.75                               SMAN1330
00703   396.          YTYP = 0.7                                                  SMAN1340
00704   397.     170  CALL TSP(XTYP, YTYP, CHAR6(I), 6)                          SMAN1350
00705   398.          XTYP = 0.1                                                  SMAN1360
00706   399.          TTYP = 6.25 + FLOAT(I) - 5.25                               SMAN1370
00707   400.     180  CALL TSP(XTYP, YTYP, CHARC(I), 6)                          SMAN1380
00711   401.          CALL TSP(1.3, 2.0, CHARM, 16)                               SMAN1390
00711   402.   C      PLOT MU VERSUS U                                            SMAN1400
00712   403.          DO  240  J = 1, JMAX                                        SMAN1410
00715   404.          PU = 2.7183 + ALOG(U2(J) / 10.0) + 1.0                      SMAN1420
00716   405.            IF (PU .GT. 20.) GO TO 9999
00720   406.          PMU1=  1.0+ 2.7183 + ALOG(TMU(J) / GMIN)                    SMAN1430
00721   407.          PMU2=  1.0+ 2.7183 + ALOG(BMU(J) / BMIN)                    SMAN1440
00722   408.     210  TX(2) = PU                                                  SMAN1450
00723   409.          IF (J .EQ. 1) GO TO 230                                     SMAN1460
00725   410.          TY(1) = TY(2)                                               SMAN1470
00726   411.          TY(2) = PMU2                                                SMAN1480
00727   412.            IF ( PMU2 .GT. -1.E-37) GO TO NPMU1, (210, 230)
00731   413.            IF ((U2(J)-150.) .LT. 1.E-37) GO TO 999
00733   414.          GO TO 230                                                   SMAN1510
00734   415.     9999 CONTINUE
00735   416.          WRITE (6,9998) TK, GAMMA, (U2(JJ),GMU(JJ),TMU(JJ),JJBJ,JMAX)
00767   417.     9998 FORMAT (1H0U=PU,8T,20,3X,9H AT TK = ,0PF10.2,13H AND GAMMA = ,
                    1         1PE12.5 / (15X,4HU = ,1PE12.8,6X,8H BMMU = ,1PE12.8,6X,
00767   418.
00767   419.        2         7H TMU = ,1PE12.5) )
00760   420.          GO TO 9997
00761   421.     220  CALL DVR(1.0,TX, TY, 1)                                    SMAN1520
00762   422.     230  TX(1) = PU                                                  SMAN1530
00763   423.          TY(1) = PMU2                                                SMAN1540
00764   424.          TY(2) = PMU1                                                SMAN1550
00765   425.          ASSIGN 210 TO NPMU1                                         SMAN1560
00766   426.            IF (PMU2 .GT. -1.E-37) GO TO 233
00770   427.          TY(1) = 1.                                                  SMAN1580
00771   428.            IF((PMU1-1.) .GT. -1.E-37) GO TO 233
00773   429.          TY(2) = 1.                                                  SMAN1600
00774   430.          GO TO 240                                                   SMAN1610
00776   431.     233    IF ((PMU1-20.) .LT. 1.E-37) GO TO 237
00777   432.          TY(2) = 20.                                                 SMAN1630
01000   433.          ASSIGN 230 TO NPMU1                                         SMAN1640
01001   434.          IF (PMU2 .GT. 20.) GO TO 240                                SMAN1650
00773   435.     237  CALL DVR(1, 0, TX, TY, 1)                                  SMAN1660
00774   436.     240  CONTINUE                                                    SMAN1670
00776   437.     9997 CONTINUE
00777   438.          CALL ADF                                                    SMAN1680
01000   439.          NFRAME=NFRAME+1                                             SMAN1690
01001   440.     242  CONTINUE
01002   441.            IF (IPLOT1 .EQ. 1) GO TO 410
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01004   442.            IF (ABS((TK-SAVET)/TK) .LT. EPSILN) GO TO 250
01006   443.      245 CONTINUE
01007   444.          WRITE (6,2) (ID(I), I=1,12), TK
01016   445.          PUNCH 19, TK
01021   446.          SAVET=        TK
01022   447.          WRITE (6,2) AMIN
01025   448.        2 FORMAT(8H AMIN = , 1PE15.8)
01026   449.      250 CONTINUE
01027   450.          WRITE (6,15) GAMMA,RHO,BIGP,EPSMAL,EIPART,AKAPPA,WAMBDA,ZBAR,
01027   451.         1 GAMNEW
01042   452.          PUNCH 18, RHO, BIGP, EPSMAL, EIPART, AKAPPA, WAMBDA, ZBAR, GAMNEW
01054   453.      251 CONTINUE
01055   454.          NEND=         1
01056   455.          IF (I8CDD .EQ. 0) GO TO 9404
01060   456.          READ (15) UX
01063   457.            IF (ABS(UX+5.) .LT. EPSILN) NEND = 2
01065   458.            IF (ABS(UX+7.) .LT. EPSILN) NEND = 3
01065   459.    C
01067   460.          GO TO ( 32,260, 720 ), NEND
01070   461.      260 CONTINUE
01071   462.            IF (IPLOTI .EQ. 1) GO TO 420
01073   463.          CALL FRAME(0.0, 1.0, 1.0, 0.0)
01074   464.          CALL TSP(.2, .5, ID, 72)                                    SMAN1790
01075   465.          CALL ADF                                                    SMAN1800
01076   466.      270 CALL FINISH
01077   467.          NFRAME=NFRAME+1                                             SMAN1820
01100   468.          PRINT 14,NFRAME                                             SMAN1830
01103   469.          WRITE (6, 14) NFRAME                                        SMAN1840
01106   470.          GO TO 820
01107   471.      760 CONTINUE
01107   472.    C
01107   473.    C     READ START OF ANDIMX TAPE
01107   474.    C
01110   475.          READ (15)(( IDANDI(I,J), I=1,12), J=1,5)
01121   476.            IF (IPLOTI .EQ. 1) GO TO 405
01123   477.          PUNCH 26, (( IDANDI(I,J), I=1,12), J=1,5)
01134   478.       26 FORMAT (12A6)
01135   479.          CALL FRAME( 0.0,1.0,1.0,0.0 )
01136   480.          DO 710 J = 1,5
01141   481.          YTYP = 0.56 - FLOAT(J) * 0.04
01142   482.      710 CALL TSP( 0.2, YTYP, IDANDI(1,J), 72 )
01144   483.          CALL TSP( 0.42, 0.8, SECRET, 20 )
01145   484.          CALL ADF
01146   485.          NFRAME = NFRAME + 1
01147   486.      405 CONTINUE
01150   487.          READ (15) UX
01153   488.      790 CONTINUE
01154   489.          NEND=         1
01155   490.            IF (ABS(UX + 5.) .LT. EPSILN) NEND=2
01157   491.            IF (ABS(UX + 7.) .LT. EPSILN) NEND=3
01161   492.          GO TO (32,999 ,720), NEND
01161   493.    C
01161   494.    C     PROCESS MUEBNER DATA FOR GIVEN THETA, RHO
01161   495.    C
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01162   496.      720 READ (15) HUB, IHUB, HUBB
01200   497.          GAMMA=        0.
01201   498.          BIGP=         0.
01202   499.          EPSMAL=       0.
01203   500.          EIPART=       0.
01204   501.          GAMMEW=       0.
01205   502.          TK=           HUB(3)
01206   503.          RHO=          HUB(4)
01207   504.          ZBAR=         HUB(6)
01210   505.          WAMBDA=       HUBB(5)
01211   506.          AKAPPA=       HUBB(6)
01212   507.          READ(15) MAXU, ( AMU(I), I=1, MAXU )
01221   508.            IF ((TK+EPSILN).LT.TKIN .OR. TK.GT.(TKEND+EPSILN)) GO TO 831
01223   509.            IF (IPLOT1 .EQ. 1) GO TO 410
01225   510.            IF (ABS((TK-SAVET)/TK).LT. EPSILN) GO TO 403
01227   511.          WRITE (6,21) ((IDANDI(I,J), I=1,12), J=1,5), TK
01401   512.       21 FORMAT (1H1,5(1X,12A6/),///15HOTEMPERATURE = ,0PF12.5,1SH ELECTRON
01201   513.         1 VOLTS //1QX,3HRHO,10X,4HZBAR,9X,5HTROPA,9X,5HCROPA )
01242   514.          PUNCH 19, TK
01245   515.          SAVET=        TK
01206   516.      403 CONTINUE
01247   517.          WRITE (6,22)      RHO, ZBAR, AKAPPA, WAMBDA
01255   518.       22 FORMAT (3X,1P6E14.5)
01256   519.          PUNCH 16, RHO, ZBAR, AKAPPA, WAMBDA
01256   520.   C
01256   521.   C      START PLOTTING FIRST FRAME OF HUEBNER DATA
01256   522.   C
01264   523.          CALL FRAME( 0.0,40.0,40.0,0.0,0.0 )
01265   524.          CALL GXA( 4, 1.4, 2.0, 12.50 )
01266   525.          CALL GYA( 7, 2.0, 1.8, 5.0 )
01267   526.          DO 740 J = 1,5
01272   527.          YTYP = 36.2 - FLOAT(J) * 0.6
01273   528.      740 CALL TSP( 3.0, YTYP, IDANDI(1,J), 72 )
01275   529.          CALL TSP( 3.0, 39.0, SECRET, 20 )
01276   530.          CALL WCDCON( BCDBLK(21) )
01277   531.          WRITE ( 0, 750 )
01301   532.      750 FORMAT(66H      0     5    10    15    20    25    30     1    10
01301   533.         1 100  1000)
01302   534.          DO 755 I = 1,7
01305   535.          XTYP = 5.0* FLOAT(I) - 4.7
01306   536.          J = 20 + I
01307   537.      755 CALL TSP( XTYP,1.2,BCDBLK(J),6 )
01311   538.          DO 756 I = 1,4
01314   539.          J = 27 + I
01315   540.          TTTP = 12.5 * FLOAT(I) - 10.5
01316   541.      756 CALL TSP( 0.2, TTTP, BCDBLK(J), 6 )
01320   542.          AMIN = 1.E9
01321   543.          DO 760 I = 1,MAXU, 5
01324   544.      760 AMIN = AMIN1( AMIN, AMU(I) )
01326   545.          IF (M .EQ. 0) GO TO 757
01330   546.          I2 = IFIX(ALOG10(AMIN))
01331   547.          IF (I2 .LE. 0) I2 = I2 - 1
01333   548.          AMIN = 10.**I2
01334   549.      757 CONTINUE
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01335   550.          CALL BCDCON( BCDBLK(32) )
01336   551.          WRITE( 0, 840 ) TK, RHO, AMIN
01343   552.      840 FORMAT( 6HTHETA=, F12.2, 6HRHO = , E12.5, 6HMU2RO=, E12.3 )
01344   553.          CALL TSP( 2.6, 5.2, BCDBLK(32), 18 )
01345   554.          CALL TSP( 2.6, 4.6, BCDBLK(35), 18 )
01346   555.          CALL TSP( 2.6, 4.0, BCDBLK(38), 18 )
01347   556.          DO 770 I = 1, MAXU, 5
01352   557.          UI(I) = UIN + FLOAT( I - 1 ) * DUI
01353   558.          PMU1 = 5.4286 * ALOG( AMU(1)/AMIN ) + 2.0
01354   559.          IF( I .EQ. 1 )   GO TO 780
01356   560.          TX(1) = TX(2)
01357   561.          TY(2) = AMIN1( PMU1, 39.5 )
01360   562.          IF( TY(1) .GT. 40.0 )  GO TO   770
01362   563.          CALL DVR( 1, 0, TX, TY, 1 )
01363   564.      780 TX(1) = UI(I) + 1.985
01364   565.          TY(2) = PMU1
01365   566.          TX(2) = UI(I) + 2.015
01366   567.          TY(1) = AMIN1( PMU1, 39.5 )
01367   568.            IF ((PMU1-39.5) .LT. 1.E-37) CALL DVR(1, 0, TX, TY, 1)
01371   569.      770 CONTINUE
01373   570.          CALL ADF
01374   571.          NFRAME = NFRAME + 1
01374   572.  C
01375   573.      801 CONTINUE
01376   574.          READ (15) UX
01401   575.          NEND = 1
01402   576.            IF (ABS(UX + 5.) .LT. EPSILN) NEND = 2
01404   577.            IF (ABS(UX + 7.) .LT. EPSILN) NEND = 3
01406   578.          GO TO ( 32, 800, 720 ), NEND
01406   579.  C
01407   580.      800 CONTINUE
01410   581.            IF (IPLOT1 .EQ. 1) GO TO 420
01412   582.          CALL FRAME (0.0, 1.0, 1.0, 0.0)
01413   583.          DO 810 I = 1,5
01416   584.          YTYP = 0.56 - FLOAT(I) * 0.04
01417   585.      810 CALL TSP( 0.2, YTYP, IDANDI(I,1), 72 )
01421   586.          CALL ADF
01422   587.          CALL FINISH
01423   588.          NFRAME = NFRAME + 1
01424   589.          PRINT 14, NFRAME
01427   590.      820 CONTINUE
01430   591.          IF (IBCDO  .NE. 0) REWIND 15
01432  *DIAGNOSTIC*  THE RETURN STATEMENT IS ILLEGAL IN A MAIN PROGRAM. IT WAS CHANGED TO STOP.
01432   592.          RETURN                                                          3MAN1050
01433   593.      999 PRINT 13                                                        3MAN1060
01435   594.          WRITE (6, 13)                                                   3MAN1070
01437   595.          CALL DUMP
01440   596.          GO TO 270                                                       3MAN1090
01440   597.  C
01440   598.  C
01440   599.  C     SECTION FOR FILLING DYPOUT ARRAY. IPLOT1 .EQ. 1
01440   600.  C
01441   601.      410 CONTINUE
01441   602.  C
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01442   603.            IF (ABS((TK-SAVET)/TK) .LT. EPSILN) GO TO 411
01442   604.    C     IF ABOVE TRUE THEN PRESENT TEMPERATURE IS SAME AS LAST PREVIOUS
01442   605.    C     TEMPERATURE
01444   606.            IF (NAME .EQ. ANDIMX) GO TO 421
01444   607.    C
01444   608.    C     NEW TEMPERATURE, DIAPHANOUS INPUT TAPE
01446   609.          WRITE (6,8) (ID(I), I=1,12), TK
01455   610.          GO TO 420
01455   611.    C
01456   612.      421 CONTINUE
01456   613.    C     NEW TEMPERATURE, ANDIMX INPUT TAPE
01456   614.    C
01457   615.          WRITE (6,21) ((IDANDI(I,J), I=1,12), J=1,5), TK
01457   616.    C
01457   617.    C
01471   618.      420 CONTINUE
01472   619.            IF (SAVET .LT. 1.E-37 .AND. NEND.NE.2) GO TO 412
01474   620.          IEND(J1)=     MARKER + 9
01475   621.          NPTS(J1)=     (IEND(J1)-IENDED)/10
01476   622.          IENDED=       IEND(J1)
01477   623.            IF (NEND .EQ. 2) GO TO 430
01501   624.          J1=           J1 + 1
01502   625.      412 CONTINUE
01503   626.          SAVET=        TK
01504   627.      411 CONTINUE
01505   628.            IF (NAME .EQ. ANDIMX) GO TO 422
01507   629.          WRITE (6,15) GAMMA, RHO, BIGP, EPSMAL, EIPART, AKAPPA, WAMBDA,
01507   630.         1      ZBAR, GAMNEW
01522   631.          GO TO 423
01522   632.    C
01523   633.      422 CONTINUE
01524   634.          WRITE (6,22) RHO, ZBAR, AKAPPA, WAMBDA
01524   635.    C
01532   636.      423 CONTINUE
01532   637.    C
01533   638.          MARKER=       MARKER + 10
01534   639.          DYPOUT(MARKER)=     TK
01535   640.          DYPOUT(MARKER+1)=   GAMMA
01536   641.          DYPOUT(MARKER+2)=    RHO
01537   642.          DYPOUT(MARKER+3)=   BIGP
01540   643.          DYPOUT(MARKER+4)=   EPSMAL
01541   644.          DYPOUT(MARKER+5)=   EIPART
01542   645.          DYPOUT(MARKER+6)=   AKAPPA
01543   646.          DYPOUT(MARKER+7)=   WAMBDA
01544   647.          DYPOUT(MARKER+8)=   ZBAR
01545   648.          DYPOUT(MARKER+9)=   GAMNEW
01545   649.    C
01546   650.          GO TO 251
01546   651.    C
01547   652.      430 CONTINUE
01550   653.          J3=           IEND(J1)
01551   654.          WRITE (6,23) J1, (L, NPTS(L), IEND(L), L=1,J1)
01562   655.       23 FORMAT (1HI,I5,37H SET(S) OF OUTPUT PARAMETERS HAVE BEEN STORED AS
01562   656.         1 FOLLOWS //10X,1HI,13X,7HNPTS(I),13X,7HIEND(I)/(6X,I5,19X,I5,19X,
01562   657.         2 I5))
01563   658.          WRITE (6,24) (DYPOUT(LL), LL=1,J3)
01571   659.       24 FORMAT (16H1DYPOUT ARRAY IS  /(1P10E12.5))
01572   660.          WRITE (6,25)
01576   661.       25 FORMAT (35H0DYPER6 RUN COMPLETED SUCCESSFULLY. )
01576   662.          CALL GRAPH
01576   663.          GO TO 820
01577   664.          END

      END OF LISTING.     3 *DIAGNOSTIC* MESSAGE(S).
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COLUMNS	FORMAT	INPUT VARIABLE	MEANING
1-10	F10.4	TKIN	Temperature at which plotting of opacity data and punching (of thermodynamic quantities) begin, or temperature at which array (of thermodynamic quantities) starts to be filled
11-20	F10.4	TKEND	Last temperature for which opacity data are plotted and thermodynamic quantities are punched on cards, or last temperature for which data are stored for plots of thermodynamic quantities
21-30	F10.4	SIZ	Not used
36-40	I5	M	If (M.GT.0), the value of AMIN is changed to the highest power of 10 which divides AMIN If (M.EQ.0), AMIN is not changed
46-50	I5	N	If (N.GT.0), ANDIMX (Huebner) opacity data are plotted only for u = 0.3 to u = 15. If (N.EQ.0), all ANDIMX (Huebner) opacity data are plotted
56-60	I5	IPLOT1	If (IPLOT1 .EQ.0), DYPER4 does opacity plots and punches cards containing thermodynamic data If (IPLOT1.EQ.1), DYPER4 fills an array of thermodynamic quantities to be plotted by subroutine GRAPH
66-70	I5	IBCD0	If (IBCD0.EQ.0), the input data tape is a DENSER BCD data tape If (IBCD0.NE.0), the input data tape is a binary DIAPHANOUS or ANDIMX data tape

To use the DYPER4 program, the following tapes must be mounted:

1. One input data tape
   a. DENSER data tape - mount on unit 10
   b. DIAPHANOUS or ANDIMX data tape - mount on unit 15

2. The output (plot) tape, which must be written at a tape density of 556 BPI - mount on unit 16.

The plots in this volume were prepared by the DYPER4 program. Plots of the absorption coefficients as a function of frequency (at a given temperature - density point for these materials) are being prepared.

GRAPH: A PLOTTING PROGRAM

The GRAPH subprogram is used in conjunction with either the DYPER4, TRANS, or GOLEM programs. Given a one-dimensional array of variables set up in regularly spaced repeating groups, GRAPH produces SC-4020 plot tapes of user-specified quantities. It is written in FORTRAN IV language. The plots produced have, on each curve, the dependent variable plotted versus one of the (assumed) two independent variables, while one independent variable is held constant. Five cards per plot are required as GRAPH input. They are:

1. Two cards containing the following information:
   a. Card 1/2 in format (4(I2, 1X), 6X, 15(I2, 1X)) specifying all data necessary to plot values. (Values are read into (IN(J), J=1, 4) and (OPN(JJ), JJ=1, 15))
      1. If (IN(1). EQ. O) all plotting is done
      2. If (IN(1). EQ. -2) code returns to the calling program to allow a new VARB array to be set up so that more frames may be added to same plot tape
   b. Card 2/2 in format (7E10.4, 4X, A6) that specifies 7 real constants to be used in setting up the x- and y-array variables (read into the XIN array), and ICURVE; ICURVE is a six-letter word specifying the independent variable held constant when the curve(s) are being plotted. Normally this is the temperature.

```
00101     1.          SUBROUTINE GRAPH
00101     2.    C
00101     3.    C     SUBROUTINE TO PLOT DIAPHANOUS,ANDIMX,DENSER,OR GOLEM-CALCULATED
00101     4.    C     VALUES
00101     5.    C
00101     6.    C
00103     7.          INTEGER OPN, TEMP, CHAR, HCHAR
00104     8.          INTEGER GOLEM, DENSER, ANDIMX
00105     9.          INTEGER GLAB
00105    10.    C
00106    11.          COMMON/CIA/VAHB(1)
00107    12.          COMMON/DCI1/IEND(100), NPTS(100), J2, NAME, GLAB(12), AA(12240)
00110    13.          COMMON/DCI2/IN1, IN2, IN3, IN4, C1, C2, C3, C4, C5, C6, C7, C8,
00110    14.         1          IDUMMY, JDUMMY, NGRID, NCHAR, ICON, NNTM
00111    15.          COMMON/DCI3/NNGRID,KDUMM,IFLAG
00112    16.          COMMON/PHSA/NFRAME, TESTT, SECRET(4), ANDIMX,IDANDI(12,9)
00112    17.    C
00113    18.          DIMENSION IN(4), OPN(15)
00114    19.          DIMENSION  X(26,100), Y(26,100)
00115    20.          DIMENSION XX(100), YY(100), NCHX(100), LABSAV(12)
00116    21.          DIMENSION XLAB(12), YLAB(12), XIN(7), LABEL(54), CCURVE(26)
00117    22.          DIMENSION CHAR(26), HCHAR(26), LCHAR(9)
00120    23.          DIMENSION JCURVE(2), JABEL(26)
00121    24.          DIMENSION C(8), VALS(100), ISCALE(2)
00121    25.    C
00121    26.    C
00121    27.    C*    ITAPE IS THE PLOT OUTPUT TAPE, NORMALLY ON UNIT 16
00122    28.          DATA ITAPE/16/
00124    29.          DATA XDUM,NDUM/0.,682/
00127    30.          DATA JCURVE/2*6H          /, LIN/3HLIN/, LOG/3HLOG/
00133    31.          DATA YY1/1.0443638322/
00135    32.          DATA X1/0.026787715/, DELTYI/0.013392857/
00140    33.          DATA EPSILN/1.E-5/
00142    34.          DATA JBLANK/6H       /, IYPLTD/-1/
00145    35.          DATA DENSER / 6HDENSER /, GOLEM / 6H GOLEM /, ANDIMX / 6HANDIMX /
00151    36.          DATA ITEMP/6H TEMP /
00153    37.          DATA CHAR/17,18,19,20,21,22,23,24,25,33,34,35,36,37,38,39,40,41,
00153    38.         1          50,51,52,53,54,55,56,57/
00155    39.          DATA HCHAR/1HA, 1HB, 1HC, 1HD, 1HE, 1HF, 1HG, 1HH, 1HI, 1HJ, 1HK,
00155    40.         1           1HL, 1HM, 1HN, 1HO, 1HP, 1HQ, 1HR, 1HS, 1HT, 1HU, 1HV,
00155    41.         2           1HW, 1HX, 1HY, 1HZ/
00157    42.          DATA LCHAR/    1H1,1H2,1H3,1H4,1H5,1H6,1H7,1H8,1H9/
00157    43.    C
00161    44.          EQUIVALENCE (GLAB(1), ID(1))
00162    45.          EQUIVALENCE (IN(1),IN1), (OPN(1),IDUMMY), (C(1),C1), (NCURVE,NNTM)
00163    46.          EQUIVALENCE (XIN(5),CONSTX), (XIN(6),CONSTY) , (OPN(12), IPLOTT)
00164    47.          EQUIVALENCE (XIN(7), CONST)
00164    48.    C
00164    49.    C*    SUBROUTINE ASSUMES THE FOLLOWING (ALL COMMENTS CONCERNING DIAPHA-
00164    50.    C*      NOUS ARE APPLICABLE TO DENSER)
00164    51.    C*        1.  VALUES ARE STORED IN ORDER OF DECREASING OR INCREASING VALUE
00164    52.    C*            (IF POINTS ARE TO BE CONNECTED).
00164    53.    C*        2.  DIAPHANOUS VALUES ARE STORED IN 10-WORD GROUPS, AS TEMPERA-
00164    54.    C*            TURE VECTORS, IN ORDER OF DECREASING DENSITIES PER TEMPERA-
00164    55.    C*            TURE.
00164    56.    C*        3.  ANDIMX VALUES ARE STORED IN 10-WORD GROUPS, IN THE SAME
00164    57.    C*            MANNER AS DIAPHANOUS
00164    58.    C*        4.  GOLEM VALUES ARE STORED AS 12-WORD GROUPS, IN ANY MANNER
00164    59.    C*            THE USER DESIRES, AS LONG AS ALL VALUES STORED CAN BE PLOT-
00164    60.    C*            TED IN ORDER OF INCREASING OR DECREASING X OR Y VALUE (IF
00164    61.    C*            POINTS ARE TO BE CONNECTED).
00164    62.    C*        5.  THE FOLLOWING QUANTITIES ARE KNOWN
00164    63.    C*            A)  IEND ARRAY, AN ARRAY CONTAINING THE LOCATIONS OF THE
00164    64.    C*                LAST CELL USED TO STORE VALUES FOR A GIVEN CURVE
00164    65.    C*                (E.G., THE LAST CELL USED AT A CONSTANT THETA, FOR
00164    66.    C*                DIAPHANOUS).
00164    67.    C*            B)  NPTS ARRAY, AN ARRAY CONTAINING THE NUMBER OF X-Y POINTS
00164    68.    C*                TO BE PLOTTED, PER GIVEN CONSTANT (COMPUTED AS NPTS(I)=
00164    69.    C*                NPTS(I)/10 FOR DIAPHANOUS AND ANDIMX OUTPUT, AND NPTS(I)
00164    70.    C*                = NPTS(I)/12 FOR GOLEM OUTPUT)
00164    71.    C*            C)  J2, THE NUMBER OF TEMPERATURE SETS STORED FOR PLOTTING
00164    72.    C*            D)  NAME, AN INTEGER VALUE IDENTIFYING THE SOURCE OF THE
00164    73.    C*                DATA TO BE PLOTTED
00164    74.    C*                1)  NAME = -1, DIAPHANOUS OUTPUT
00164    75.    C*                2)  NAME = DENSER, CONDENSED DIAPHANOUS OUTPUT
00164    76.    C*                3)  NAME = ANDIMX, ANDIMX OUTPUT
00164    77.    C*                4)  NAME = GOLEM, GOLEM OUTPUT
00164    78.    C             E)  TRANS OR DYPER RUNS - AN IDENTIFYING TITLE TO BE PRINTED
00164    79.    C*                AT THE TOP OF EACH GRAPH.
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C
C*   INPUT IS AS FOLLOWS
C*     1) TWO CARDS CONTAINING THE FOLLOWING INFORMATION
C*        A) CARD 1/2 IN FORMAT (6(I2,1X), 6X, 15(I2,1X)) SPECIFYING
C*           ALL DATA NECESSARY TO PLOT VALUES.  (VALUES ARE READ INTO
C*           (IN(J), J=1,6) AND (OPN(JJ), JJ=1,15))
C*           1) IF (IN(1).EQ.0) ALL PLOTTING IS DONE.
C*           2) IF (IN(1).EQ.-2) CODE RETURNS TO THE CALLING PROGRAM
C*              TO ALLOW A NEW VARB ARRAY TO BE SET UP SO THAT MORE
C*              FRAMES MAY BE ADDED TO THE SAME PLOT TAPE.
C*        B) CARD 2/2 IN FORMAT (7E10.0,6X,A6) THAT SPECIFIES 7 REAL
C*           CONSTANTS TO BE USED IN SETTING UP THE X- AND Y-ARRAY
C*           VARIABLES (READ INTO THE XIN ARRAY), AND ICURVE.
C*           ICURVE IS A 6-LETTER WORD SPECIFYING THE INDEPENDENT
C*           VARIABLE OF WHICH THE CURVE(S) ARE BEING PLOTTED. NORMALLY
C*           THIS IS THE TEMPERATURE.
C*     3) A CARD IN FORMAT (12A6), CONTAINING TITLE INFORMATION USED
C*        AS A HEADING FOR EACH FRAME.  (MAY BE A BLANK CARD)
C*     4) TWO CARDS, EACH IN FORMAT 12A6, THAT SPECIFY THE APPROPRIATE
C*        LABELS FOR THE X- AND Y-AXES, RESPECTIVELY  (EITHER ONE
C*        OR BOTH CARDS MAY BE BLANK)
C
C***** D E S C R I P T I O N   O F   I N P U T                    *****
C*   THE IN ARRAY CONTROLS WHICH VARIABLES IN THE VARB ARRAY ARE TO
C*     BE USED FOR PLOTTING
C*     A) IN(1) AND IN(2) SPECIFY VARIABLES TO BE USED IN THE X-ARRAY,
C*        THE ARRAY CONTAINING THE ABSCISSAS OF POINTS TO BE PLOTTED.
C*     B) IN(3) AND IN(4) SPECIFY VARIABLES TO BE USED IN THE Y-ARRAY,
C*        THE ARRAY CONTAINING THE ORDINATES OF POINTS TO BE PLOTTED.
C
C*   IN(I)     SAUT VARIABLE      HUEBNER VARIABLE     GOLEM VARIABLE
C*   1         TK                 TK                   THETA(TK)
C*   2         GAMMA                                   RHO
C*   3         RHO                RHO                  P1 (PRESSURE)
C*   4         PRESHR                                  E (ENERGT)
C*   5         ENERGT                                  NBAR OR CAPAC
C*   6         EION                                    EIONIZ OR CAPAR
C*   7         KROS               THOPA                CV
C*   8         KPLK               CROPA                FEW (ZBAR)
C*   9         ZBAR               CAPNF(ZBAR)          PBI
C*   10        EGAM                                    ASG (SOUND SPEED)
C*   11                                                EGAM
C*   12                                                EGAM2 OR GAMMA
C
C*   THE OPN ARRAY CONTROLS VARIOUS OPTIONS USED IN PLOTTING
C*   OPN(1) DETERMINES HOW TO MANIPULATE THE VARIABLES TO BE SET UP
C*   FOR THE X-ARRAY
C*   OPN(2) DETERMINES HOW TO MANIPULATE THE VARIABLES TO BE SET UP
C*   FOR THE Y-ARRAY
C
C*   OPN(I), I=1 OR 2     X OR Y ARRAY, J=1 OR 3 RESPECTIVELY
C*                         (ANY VARB ARRAY VARIABLE MAY BE EXPONENTIATED
C*                         BEFORE BEING OPERATED ON IN ONE OF THE FOL-
C*                         LOWING WAYS)
C
C*   1                     VARB(IN(J))
C*   2                     VARB(IN(J)) + XIN(J)
C*   3                     VARB(IN(J)) * XIN(J)
C*   4                     VARB(IN(J)) + VARB(IN(J+1))
C*   5                     (VARB(IN(J)) + VARB(IN(J+1))) + XIN(J)
C*   6                     (VARB(IN(J)) + VARB(IN(J+1))) * XIN(J)
C*   7                     VARB(IN(J) - VARB(IN(J+1))
C*   8                     (VARB(IN(J)) - VARB(IN(J+1))) + XIN(J)
C*   9                     (VARB(IN(J)) - VARB(IN(J+1))) * XIN(J)
C*   10                    VARB(IN(J)) * VARB(IN(J+1))
C*   11                    (VARB(IN(J)) * VARB(IN(J+1))) + XIN(J)
C*   12                    (VARB(IN(J)) * VARB(IN(J+1))) * XIN(J)
C*   13                    VARB(IN(J)) / VARB(IN(J+1))
C*   14                    (VARB(IN(J)) / VARB(IN(J+1))) + XIN(J)
C*   15                    (VARB(IN(J)) / VARB(IN(J+1))) * XIN(J)
C
C*   OPN(3) DETERMINES THE VALUE OF NGRID, THE TYPE OF GRID USED FOR
C*     PLOTTING
C*   TO GET TIC-MARKS ONLY (NO GRID LINES), ADD 6 TO THE VALUE OF NGRID
C*     NECESSARY TO OBTAIN THE TYPE OF GRID WANTED, AND INPUT THAT SUM
C*     FOR OPN(3).  **EXCEPTION - IF NGRID.LE.0, SUBTRACT 8 TO GET THE
C*     CODE TO SCALE WITH TIC-MARKS**
C
C*   OPN(3)    X-AXIS          Y-AXIS
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0016*  160.   C*    0          CODE SCALES     CODE SCALES
0016*  161.   C*    1          LINEAR          LINEAR
0016*  162.   C*    2          LOGARITHMIC     LINEAR
0016*  163.   C*    3          LINEAR          LOGARITHMIC
0016*  164.   C*    4          LOGARITHMIC     LOGARITHMIC
0016*  165.   C*    -1         LIN             CODE WILL SCALE
0016*  166.   C*    -2         LOG             CODE WILL SCALE
0016*  167.   C*    -3         CODE SCALES     LIN
0016*  168.   C*    -4         CODE SCALES     LOG
0016*  169.   C*

0016*  170.   C*    OPN(4) DETERMINES THE VALUE OF NCHAR, THE DECIMAL CODE OF THE
0016*  171.   C*      CHARACTER TO BE PLOTTED.  NORMAL VALUE IS 42, A PLOTTING DOT.
0016*  172.   C*      IF MORE THAN ONE CURVE PER FRAME.
0016*  173.   C*      1) IF (OPN(4).EQ.0), 'A' FOR THE FIRST CURVE, 'B' FOR THE SECOND
0016*  174.   C*         CURVE, ETC. (MAXIMUM OF 26 CURVES PER FRAME)
0016*  175.   C*      2) IF (OPN(4).LT.0), '1' FOR THE FIRST CURVE, '2' FOR THE SECOND
0016*  176.   C*         CURVE, ETC. (MAXIMUM OF 9 CURVES PER FRAME)
0016*  177.   C
0016*  178.   C*    OPN(5) DETERMINES THE VALUE OF ICON, THE OPTION FOR CONNECTING
0016*  179.   C*      POINTS WITH A LINE SEGMENT.
0016*  180.   C*      IF (ICON .EQ. 1) CONNECT POINTS
0016*  181.   C*      IF (ICON .EQ. 2) DO NOT CONNECT POINTS
0016*  182.   C
0016*  183.   C*    OPN(6) CONTROLS THE NUMBER OF PLOTS PER FRAME.
0016*  184.   C*    NOTE - **NO MORE THAN 18 CURVES MAY BE PUT ON ANY GIVEN FRAME**
0016*  185.   C
0016*  186.   C*    OPN(7) DETERMINES WHETHER LABELS WILL BE PRINTED ON THE PLOTS.
0016*  187.   C*      IF (OPN(7) .EQ. 0) PRINT LABELS ALONG THE TOP OF THE FRAME AND
0016*  188.   C*      ALONG THE X- AND Y-AXES (TO BE READ FROM THE THREE INPUT DATA
0016*  189.   C*      CARDS THAT FOLLOW, EACH IN FORMAT 12A6,AND USED TO LABEL THE TOP
0016*  190.   C*      OF THE FRAME, THE X-AXIS, AND THE Y-AXIS, RESPECTIVELY.
0016*  191.   C
0016*  192.   C*    IF (OPN(7) .LT. 0) PRINT A SUMMARY OF ALL THE CURVE LABELS AND
0016*  193.   C*        VALUES IN A BOX IN ONE CORNER (-1 FOR UPPER LEFT, -2 FOR UP-
0016*  194.   C*        PER RIGHT, -3 FOR LOWER LEFT, -4 FOR LOWER RIGHT)
0016*  195.   C
0016*  196.   C*    IF (OPN(7) .EQ. 1) USE THE DIAPHANOUS, DENSER, OR ANDINX ID RECORD
0016*  197.   C*      (READ BY OYPER OR TRANS) TO LABEL THE TOP OF THE GRAPHS, USING
0016*  198.   C*      THE NORMAL PRINOUT (NO BOX)
0016*  199.   C
0016*  200.   C*    TO USE THE ID RECORD READ BY TRANS OR OYPER, PLUS A BOX PRINTOUT,
0016*  201.   C*      SUBTRACT 4 FROM THE VALUE (AS SPECIFIED ABOVE) NECESSARY TO
0016*  202.   C*      INDICATE THE CORNER CHOSEN FOR PRINTING THE BOX.
0016*  203.   C
0016*  204.   C*    IF (OPN(7).EQ.2) DO NO PRINTING ON THE PLOTS
0016*  205.   C
0016*  206.   C*    OPN(8), OPN(9), OPN(10), AND OPN(11) DETERMINE WHETHER LOGARITHMS
0016*  207.   C*      (COMMON OR NATURAL) ARE TO BE TAKEN OF VARB(IN(J)), J=1 TO 4,
0016*  208.   C*      RESPECTIVELY, BEFORE THE X- AND Y-ARRAYS ARE SET UP.
0016*  209.   C*      A) NEGATIVE OPN(I),I=8,9,10,OR 11, MEANS USE NATURAL LOG OF
0016*  210.   C*         (VARB(J)**XIN(J), J=1,4), RESPECTIVELY.
0016*  211.   C*      B) POSITIVE OPN(I),I=8,9,10,OR 11, MEANS USE COMMON LOG OF
0016*  212.   C*         (VARB(J)**XIN(J), J=1,4), RESPECTIVELY.
0016*  213.   C
0016*  214.   C*    OPN(12)=IPLOTT, USED IF THETA CURVES ARE NOT BEING PLOTTED.  SPEC-
0016*  215.   C*      IFIES THE GENERAL CELL LOCATION OF THE CURVE VARIABLE (EX.,
0016*  216.   C*      IPLOTT=2 IF GAMMA CURVES ARE BEING PLOTTED FOR DIAPHANOUS)
0016*  217.   C
0016*  218.   C*    OPN(13) IS A QUANTITY INPUT IFF USER WISHES CODE TO SCALE EITHER
0016*  219.   C*      OR BOTH GRID AXES, USING A LIMITING VALUE DIFFERENT THAN 100
0016*  220.   C*      AS A DECIDING VALUE TO PLOT LOGARITHMICALLY, RATHER THAN
0016*  221.   C*      LINEARLY.
0016*  222.   C
0016*  223.   C
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0o164   224.   C*     (OPN(J),J=14,15) FREE PARAMETERS
0o164   225.   C
0o164   226.   C*     (XIN(J),J=1,4) MAY BE USED TO EXPONENTIATE (VARB(IN(J)),J=1,4),
0o164   227.   C*       RESPECTIVELY, BEFORE THE X- AND Y-ARRAYS ARE SET UP   IF INPUT
0o164   228.   C*       AS ZERO, CODE SETS THEM TO ONE.
0o164   229.   C
0o164   230.   C*     XIN(5) AND XIN(6) ARE ADDITIVE OR MULTIPLICATIVE CONSTANTS USED TO
0o164   231.   C*       MODIFY VARB ARRAY VARIABLES CHOSEN FOR THE X- AND Y-ARRAYS,
0o164   232.   C*       RESPECTIVELY
0o164   233.   C
0o164   234.   C*     XIN(7) IS INPUT IFF OPN(12), I.E., IPLOTT, IS USED.  ALLOWS USER TO
0o164   235.   C*       INPUT A CONSTANT VALUE FOR PLOTTING ONE CURVE (EX., OPN(12)=2,
0o164   236.   C*       XIN(7)=100., TO PLOT A CURVE FOR GAMMA=100., IN DIAPHANOUS.)
0o164   237.   C
0o164   238.   C*     A NORMAL RUN SCALES THE GRID, USES ALPHABETIC CHARACTERS, CONNECTS
0o164   239.   C*       POINTS, AND PLOTS ALL CURVES ON ONE FRAME (MAXIMUM OF 26)
0o164   240.   C*     IF THE INPUT CARD CONTAINS ZEROES (BLANKS) FOR THE VARIABLES CON-
0o164   241.   C*       TROLLING THESE THINGS (OPN(3), OPN(4), OPN(6), ICURVE, RESPEC-
0o164   242.   C*       TIVELY), THE CODE WILL SET THE VALUES NECESSARY TO DO THEM.
0o164   243.   C
0o165   244.          LAST1=        IEND(J2)
0o166   245.          NCELLS=       10
0o167   246.            IF (NAME .EQ. BOLEN) NCELLS=12
0o171   247.          NSETS=        LAST1/NCELLS
0o172   248.          J2SAVE=       J2
0o173   249.          DO 10 NM=1,12
0o176   250.          LABSAV(NM)=   BLAB(NM)
0o177   251.       10 CONTINUE
0o177   252.   C
0o201   253.     502 CONTINUE
0o201   254.   C       READ INPUT CARDS SPECIFYING PLOTTING OPTIONS
0o202   255.           READ (5,1) (IN(J),J=1,4), (OPN(JJ),JJ=1,15), (XIN(JJJ),JJJ=1,7)
0o202   256.          1           ,ICURVE
0o221   257.        1 FORMAT (4(I2,1X), 6X, 15(I2,1X) / 7E10.4, 4X, A6)
0o222   258.            IF (IN(1).EQ.0 .AND. IVPLTD.GT.(-1)) GO TO 500
0o224   259.           WRITE (6,16) (IN(J),J=1,4), (OPN(JJ),JJ=1,15), (XIN(JJJ),JJJ=1,7)
0o224   260.          1           ,ICURVE
0o243   261.       16 FORMAT (17H1INPUT AS READ IS / 14H  IN ARRAY IS,3(I2,1H,1X), I2 /
0o243   262.         115H   OPN ARRAY IS , 14(I2,1H,1X), I2 / 15H   XIN ARRAY IS ,
0o243   263.         2  6(1PE12.4, 1H, 1X), 1PE12.4 / 12H0 ICURVE IS , A6)
0o243   264.   C
0o243   265.   C*     SET IN(1).EQ.0 TO FINISH PLOT TAPE
0o243   266.   C      IS IN(1) .EQ. 0? -'YES,NO'-
0o244   267.            IF (IN(1).EQ.0 .AND. IVPLTD.EQ.(-1)) GO TO 507
0o246   268.           IVPLTD=       IVPLTD + 1
0o246   269.   C
0o246   270.   C
0o246   271.   C*     SET IN(1).EQ.-2 TO RETURN TO THE MAIN PROGRAM TO COMPUTE NEW
0o246   272.   C*       VALUES FOR THE VARB ARRAY
0o246   273.   C      IS IN(1) .EQ. -2? -'YES,NO'-
0o247   274.            IF (IN(1) .EQ. -2) GO TO 503
0o247   275.   C
0o247   276.   C
0o247   277.   C      HAS OPN(1) BEEN INPUT INCORRECTLY?-'YES,NO'-
0o251   278.            IF (OPN(1).LE.0 .OR. OPN(1).GE.16) GO TO 499
0o251   279.   C      HAS OPN(2) BEEN INPUT INCORRECTLY?-'YES,NO'-
0o253   280.            IF (OPN(2).LE.0 .OR. OPN(2).GE.16) GO TO 498
0o253   281.   C
0o253   282.   C      HAS OPN(7) BEEN INPUT INCORRECTLY? -'YES,NO'-
0o255   283.            IF (OPN(7) .GT. 2) GO TO 498
0o257   284.           DO 22 K5=1,LAST1
0o262   285.           AA(K5)=       VARB(K5)
0o263   286.       22 CONTINUE
0o265   287.           J2=           J2SAVE
0o265   288.   C      READ TITLE CARD
0o265   289.   C
0o266   290.           LABOLD=       OPN(7) + 4
0o267   291.             IF (OPN(7) .LT. (-4)) OPN(7)=LABOLD
0o271   292.           READ (5,2) (BLAB(I),I=1,12)
0o277   293.         2 FORMAT (12A6)
0o300   294.       20 CONTINUE
0o301   295.           WRITE (6,5) (BLAB(I), I=1,12)
0o307   296.         5 FORMAT (1X,12A6)
0o310   297.       27 CONTINUE
0o311   298.           READ (5,2) (XLAB(I),I=1,12), (YLAB(I),I=1,12)
0o323   299.           WRITE (6,5) (XLAB(I),I=1,12), (YLAB(I),I=1,12)
0o335   300.             IF (OPN(7).NE.1 .AND.LABOLD.GT.0) GO TO 29
0o337   301.           DO 75 J5=1,12
0o342   302.           BLAB(J5)=     LABSAV(J5)
0o343   303.       75 CONTINUE
0o343   304.   C
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00345   305.      29 CONTINUE
00345   306.   C
00345   307.   C     SET UP PLOTTING OPTIONS
00345   308.   C
00346   309.           IF (NGRID .GT. 8) GO TO 496
00346   310.   C
00350   311.         NNGRID=       0
00351   312.           IF (NGRID .GT. 4) NNGRID=NGRID - 4
00353   313.           IF (NGRID .LT. (-4)) NNGRID=NGRID+5
00353   314.   C
00355   315.           IF (NNGRID.NE. 0) NGRID=NNGRID
00355   316.   C
00357   317.           IF (NGRID.GT. 0 .OR. NGRID.LT.(-4)) GO TO 55
00361   318.           IF (NGRID .EQ. (-1)) ISCALE(1)=LIN
00363   319.           IF (NGRID .EQ. (-2)) ISCALE(1)=LOG
00365   320.           IF (NGRID .EQ. (-3)) ISCALE(2)=LIN
00367   321.           IF (NGRID .EQ. (-4)) ISCALE(2)=LOG
00371   322.      55 CONTINUE
00371   323.   C
00372   324.           IF (NCHAR.EQ.0 .AND. NNTM.EQ.1) NCHAR=42
00374   325.           IF (ICON .EQ. 0) ICON = 1
00376   326.           IF (ICON.LT.1 .OR. ICON.GT.2) GO TO 495
00400   327.           IF (NNTM.GT.J2 .OR. NNTM.GT.18) GO TO 494
00402   328.           IF (NNTM .EQ. 0) NNTM=J2
00404   329.           IF (IPLOTT .EQ. 0) IPLOTT=1
00406   330.           IF (ICURVE .EQ. JBLANK) ICURVE = ITEMP
00410   331.         GSCALE=       100.
00411   332.           IF (OPN(13) .NE. 0) GSCALE=OPN(13)
00413   333.         JCURVE(1)=    ICURVE
00413   334.   C
00413   335.   C     DETERMINE VALUES OF COEFFICIENTS NECESSARY TO SET UP PLOTTING
00413   336.   C     1  VARIABLES
00413   337.   C
00414   338.         DO 18 JKK=1,8
00417   339.         C(JKK)=       1.
00420   340.      18 CONTINUE
00422   341.         KK=           1
00423   342.         DO 20 K=1,2
00426   343.           IF (OPN(K).LE.3 .OR. OPN(K).GE.10) C(KK)=0.
00430   344.           IF (OPN(K).GE.7 .AND. OPN(K).LE.9) C(KK)=-1.
00432   345.           IF (OPN(K) .LE. 9) C(KK+1)=0.
00434   346.           IF (OPN(K) .GE. 13) C(KK+1)=-1.
00436   347.           IF (MOD(OPN(K),3) .NE. 0) C(KK+2)=0.
00440   348.           IF (MOD(OPN(K)-1,3).EQ.0 .OR. MOD(OPN(K),3).EQ.0) C(KK+3)=0.
00442   349.         KK=           5
00443   350.      20 CONTINUE
00445   351.         WRITE (6,15) (C(I), I=1,8)
00453   352.      15 FORMAT (12HOC ARRAY IS , 7(F4.1,2H, ), F4.1)
00454   353.      17 FORMAT (1H1)
00454   354.   C
00454   355.   C
00454   356.   C
00455   357.           IF (ABS(CONSTX) .LT. 1.E-37) CONSTX=1.
00457   358.           IF (ABS(CONSTY) .LT. 1.E-37) CONSTY=1.
00457   359.   C
00461   360.         WRITE (6,25) (IN(J),J=1,4), (OPN(JJ),JJ=1,15), (XIN(JJJ),JJJ=1,8),
00461   361.        1                ICURVE
00500   362.         WRITE (6,5) (GLAB(I),I=1,12),(XLAB(I),I=1,12), (YLAB(I),I=1,12)
00516   363.      25 FORMAT (17HOINPUT AS USED IS / 14H   IN ARRAY IS,3(I2,1H,1X), I2/
00516   364.        11SH   OPN ARRAY IS , 14(I2,1H,1X), I2 / 15H   XIN ARRAY IS ,
00516   365.        2  5(1PE14.4, 1H, 1X), 1PE12.4 / 13H   ICURVE IS , A6)
00517   366.           IF (IPLOTT .EQ. 1) GO TO 750
00521   367.         CALL SEQ(AA, NSETS, NCELLS, IPLOTT, VALS, NVALS)
00522   368.         NROWE=        0
00523   369.         DO 749 JL=1,NVALS
00526   370.         NROWB=        NROWE + 1
00527   371.         CALL SERCH(VALS(JL), IPLOTT, AA, NSETS, NCELLS, NPTS(JL), NROWB,
00527   372.        1           NROWE)
00530   373.         IEND(JL)=     NROWE + NCELLS
00531   374.         WRITE (6,1005) JL, VALS(JL), NPTS(JL), NROWB, NROWE
00540   375.    1005 FORMAT (14, E15.8, I6, I8, I6)
00541   376.     749 CONTINUE
00543   377.           IF (NNTM.EQ.J2 .AND. NVALS.NE.J2) NNTM=NVALS
00545   378.           IF (NVALS .LT. NNTM)  NNTM=NVALS
00547   379.           IF (NNTM .GT. 18) NNTM=18
00551   380.         J2=           NVALS
00552   381.     750 CONTINUE
00552   382.   C
00552   383.   C*    USE (XIN(JJ),JJ=1,4) TO EXPONENTIATE (VARB(IN(JJ)), JJ=1,4),
00552   384.   C*      RESPECTIVELY.
00553   385.           IF (ABS(XIN(1)).LT.1.E-37 .AND. ABS(XIN(2)).LT.1.E-37 .AND.
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00553   386.        1      ABS(XIN(3)).LT.1.E-37 .AND. ABS(XIN(4)).LT.1.E-37) GO TO 72
00555   387.          IF (IN2 .EQ. 0) IN2=1
00557   388.          IF (IN4 .EQ. 0) IN4=1
00561   389.         DO 71 KK6=1,NSETS
00564   390.         K6=          (KK6-1) * NCELLS
00565   391.          IF (ABS(XIN(1)) .GT. 1.E-37) AA(K6+IN1)=AA(K6+IN1)**XIN(1)
00567   392.          IF (ABS(XIN(2)) .GT. 1.E-37) AA(K6+IN2)=AA(K6+IN2)**XIN(2)
00571   393.          IF (ABS(XIN(3)) .GT. 1.E-37) AA(K6+IN3)=AA(K6+IN3)**XIN(3)
00573   394.          IF (ABS(XIN(4)) .GT. 1.E-37) AA(K6+IN4)=AA(K6+IN4)**XIN(4)
00575   395.       71 CONTINUE
00577   396.       72 CONTINUE
00577   397.    C
00600   398.         DO 64 K4=8,11
00603   399.          IF (OPN(K4) .EQ. 0) GO TO 65
00605   400.         DO 69 KK5=1,NSETS
00610   401.         K5=          (KK5-1) * NCELLS
00611   402.         INN=         IN(K4-7)
00612   403.          IF (OPN(K4   ) .LT. 0) GO TO 67
00614   404.         AA(INN+K5)=  ALOG10(AA(INN+K5))
00615   405.         GO TO 68
00616   406.       67 CONTINUE
00617   407.         AA(INN+K5)=  ALOG(AA(INN+K5))
00620   408.       68 CONTINUE
00621   409.       69 CONTINUE
00623   410.       65 CONTINUE
00624   411.       64 CONTINUE
00624   412.    C
00624   413.    C
00624   414.    C
00624   415.    C     MAKE INITIAL CALL TO SETUP
00626   416.          IF (IVPLTD .GT. 0) GO TO 33
00630   417.         NFRAME=      3
00631   418.         CALL SETUP(XDUM, NDUM, ITAPE)
00631   419.    C
00631   420.    C     PLOT INITIAL FRAME CONTAINING TITLE INFORMATION
00632   421.         CALL FRAME (0.0, 1.0, 1.0, 0.0)
00632   422.    C     IS PLOT DATA FROM ANDIMX? -'YES,NO,-
00633   423.          IF (OPN(7) .EQ. 2) GO TO 32
00635   424.          IF (NAME .EQ. ANDIMX) GO TO 30
00637   425.         CALL TSP(0.2, 0.5, ID, 72)
00640   426.         GO TO 32
00640   427.    C
00641   428.       30 CONTINUE
00642   429.         DO 31 J4=1,5
00643   430.         YTYP=        0.56 - FLOAT(J4) * 0.04
00646   431.         CALL TSP( 0.2, YTYP, IDANDI(1,J4), 72)
00647   432.       31 CONTINUE
00651   433.         CALL TSP(0.42, 0.6, SECRET, 20)
00652   434.       32 CONTINUE
00653   435.         CALL ADF
00654   436.         NFRAME=      NFRAME + 1
00655   437.       33 CONTINUE
00655   438.    C
00655   439.    C     SET UP ARRAYS OF POINTS, PER CONSTANT, TO BE PLOTTED
```

```
00656   440.          ISTART=       0
00657   441.          NTM1=         1
00660   442.          LCURVE=       J2 - NNTM * (J2/NNTM)
00661   443.          NNFRAM=       (J2 + NNTM - 1)/NNTM
00662   444.          DO 60 J3=1,NNFRAM
00663   445.            IF (J3.EQ.NNFRAM .AND. LCURVE.NE.0) NCURVE = LCURVE
00665   446.    C
00665   447.    C     SET UP X- AND Y- ARRAYS NECESSARY FOR PLOTTING EACH GRAPH
00667   448.          DO 41 KK2=1,NCURVE
00672   449.          NNPTS=        NPTS(NTM1)
00673   450.          NTM1=         NTM1 + 1
00674   451.          CCURVE(KK2)=  AA(ISTART + IPLOTT)
00674   452.    C
00675   453.          NGOOD=        1
00676   454.          NFGP=         0
00677   455.          DO 42 KL=1,NNPTS
00702   456.          NCHK(KL)=     0
00703   457.       42 CONTINUE
00703   458.    C
00705   459.          DO 40 KK1=1,NNPTS
00710   460.          K1=           ISTART + NCELLS * (KK1 - 1)
00711   461.          X(KK2,KK1)=   ( AA(K1+IN1) + C1*AA(K1+IN2)) * (   AA(K1+IN2)**C2)
00711   462.         1                * (CONSTX**C3) + (C4 * CONSTX)
00712   463.          Y(KK2,KK1)=   (AA(K1+IN3) + C5*AA(K1+IN4)) * (   AA(K1+IN4)**C8)
00712   464.         1                * (CONSTY**C7) + (C8 * CONSTY)
00713   465.            IF (NGRID .EQ. 1) GO TO 48
00715   466.            IF (X(KK2,KK1).LT.1.E-37 .AND. (NGRID.EQ.2 .OR. NGRID.EQ.4 .OR.
00715   467.         1      NGRID.EQ.(-2) .OR. NGRID.EQ.(-5))) NCHK(KK1)=1
00717   468.            IF (Y(KK2,KK1).LT.1.E-37 .AND. (NGRID.EQ.3 .OR. NGRID.EQ.4 .OR.
00717   469.         1      NGRID.EQ.(-4) .OR. NGRID.EQ.(-5))) NCHK(KK1)=1
00721   470.            IF (NCHK(KK1) .EQ. 1) NGOOD=2
00723   471.            IF (NFGP.EQ.0 .AND. NCHK(KK1).EQ.0) NFGP=KK1
00725   472.       48 CONTINUE
00726   473.       40 CONTINUE
00730   474.          ISTART=       IEND(NTM1 - 1)
00730   475.    C
00731   476.          GO TO (43,44), NGOOD
00732   477.       44 CONTINUE
00732   478.    C
00733   479.            IF (NFGP .EQ. 1) GO TO 45
00735   480.          DO 46 JM=NFGP,1,-1
00740   481.          WRITE (6,1000) X(KK2,JM), Y(KK2,JM) , X(KK2,NFGP), Y(KK2,NFGP)
00746   482.    1000 FORMAT (53H0***WARNING*** A NEGATIVE VALUE HAS BEEN FOUND.  X = ,
00746   483.         1        1PE14.8, 6H, Y = , 1PE14.8,  / 19H X IS BEING SET TO ,
00746   484.         2        1PE14.8, 20H, Y IS BEING SET TO , 1PE14.8 //)
00747   485.          X(KK2,JM)=    X(KK2,NFGP)
00750   486.          Y(KK2,JM)=    Y(KK2,NFGP)
00751   487.          NCHK(JM)=     0
00752   488.       46 CONTINUE
00754   489.       45 CONTINUE
00754   490.    C
00755   491.          DO 47 KM=NFGP,NNPTS
00760   492.            IF (NCHK(KM) .NE. 1) GO TO 747
00762   493.          WRITE (6,1000) X(KK2,KM), Y(KK2,KM) , X(KK2,KM-1), Y(KK2,KM-1)
```

```
                X(KK2,KM)=   X(KK2,KM-1)
                Y(KK2,KM)=   Y(KK2,KM-1)
            707 CONTINUE
             87 CONTINUE
             83 CONTINUE
             81 CONTINUE
C
C       SET UP XMIN, XMAX, YMIN, AND YMAX
                XMIN=        X(1,1)
                XMAX=        X(1,1)
                YMIN=        Y(1,1)
                YMAX=        Y(1,1)
C
C       FIND THE MINIMA AND MAXIMA OF THE X- AND Y-ARRAYS
                NTM3=        NTM1 - NCURVE
                DO 80 K2=1,NCURVE
                NWPTS=       NPTS(NTM3)
                NTM3=        NTM3 + 1
                DO 80 L2=1,NWPTS
                XMIN=        AMIN1(XMIN, X(K2,L2))
                XMAX=        AMAX1(XMAX, X(K2,L2))
                YMIN=        AMIN1(YMIN, Y(K2,L2))
                YMAX=        AMAX1(YMAX, Y(K2,L2))
             80 CONTINUE
C
                XMIN=        XMIN * .99
                YMIN=        YMIN * .99
                XMAX=        XMAX * 1.01
                YMAX=        YMAX * 1.01
                WRITE (6,14) J3, XMIN, XMAX, YMIN, YMAX
             14 FORMAT (/////11HOFOR FRAME ,I4,9H, XMIN = ,1PE14.8,9H, XMAX = ,
            1         E14.8,9H, YMIN = ,E14.8,9H, YMAX = ,E14.8)
C
                IF (NGRID .GT. 0) GO TO 85
                IF (NGRID.LT.0 .AND. NGRID.GT.(-3)) GO TO 82
C
C       SCALE X
                XSCALE=      ABS(XMAX/XMIN)
                ISCALE(1)=   LIN
                IF (XSCALE .GT. GSCALE) ISCALE(1)= LOG
                IF (NGRID .NE. 0) GO TO 83
             82 CONTINUE
C
C       SCALE Y
                YSCALE=      ABS(YMAX/YMIN)
                ISCALE(2)=   LIN
                IF (YSCALE .GT. GSCALE) ISCALE(2)= LOG
             83 CONTINUE
                IF (ISCALE(1) .EQ. LOG) GO TO 84
                NGRID=       1
                IF (ISCALE(2) .EQ. LOG) NGRID= 3
                GO TO 81
             84 CONTINUE
                NGRID=       2
```

```
01070   546.          IF (ISCALE(2) .EQ. LOG) NGRID=4
01072   549.       81 CONTINUE
01073   550.          WRITE (6,1010) NGRID, (ISCALE(I),I=1,2)
01102   551.     1010 FORMAT (33H CODE HAS SCALED GRID.  NGRID IS ,I3, 12H, SCALE WAS ,
01102   552.        1    A3,1H-,A3)
01103   553.       85 CONTINUE
01104   554.          NTM=          1
01105   555.          NTM2=         NTM1 - NCURVE
01106   556.          DO 52 JJ4=1,NCURVE
01106   557.  C
01111   558.            IF (OPN(4) .LT. 1) JCHAR=LCHAR(JJ4)
01113   559.            IF (NCURVE.GT.1 .AND. OPN(4).EQ.0) JCHAR=MCHAR(JJ4)
01115   560.          NNPTS=        NPTS(NTM2)
01116   561.          DO 53 JJ=1,NNPTS
01121   562.          XX(JJ)=       X(JJ4,JJ)
01122   563.          YY(JJ)=       Y(JJ4,JJ)
01123   564.       53 CONTINUE
01123   565.  C
01125   566.          CALL SORT(XX,YY,NNPTS)
01126   567.            IF (NTM.EQ.1) WRITE (6,1007)
01131   568.          WRITE (6,19) JCHAR, ICURVE, CCURVE(JJ4)
01136   569.       19 FORMAT (7H CURVE ,A1,12H, ICURVE IS ,A6, 1H=,1PE15.6,21H, X AND Y
01136   570.        1ARRAYS ARE )
01137   571.     1007 FORMAT (49HOARRAYS TO BE PLOTTED HAVE BEEN SORTED AS FOLLOWS  /)
01140   572.          WRITE (6,1006) (I, XX(I), YY(I), I=1,NNPTS)
01150   573.     1006 FORMAT (3(6X,I5,1X,1P2E18.8))
01150   574.  C       PLOT GIVEN SETS, PER CONSTANT.
01150   575.  C       CALL PLOTV
01150   576.  C
01151   577.          NNCHAR=       NCHAR
01152   578.            IF (NCURVE.GT.1 .AND. NCURVE.LT.10 .AND. OPN(4).LT.0)NNCHAR=JJ4
01154   579.            IF(NCURVE.GT.1 .AND. OPN(4).EQ.0) NNCHAR=CHAR(JJ4)
01156   580.          CALL PLOTV(NTM, NGRID, NNCHAR, ICON, NPTS(NTM2), XX, YY, XMIN,
01159   581.         1       XMAX, YMIN, YMAX, XLAB, YLAB, BLAB)
01157   582.            IF (OPN(7) .EQ. 2) GO TO 301
01161   583.          DO 300 L=1,54
01164   584.          LABEL(L)=     JBLANK
01165   585.      300 CONTINUE
01167   586.          MCHAR=        NNCHAR
01170   587.           IF(NCURVE.GT.1.AND.NCURVE.LT.10.AND.OPN(4).LT.0) MCHAR=LCHAR(JJ4)
01172   588.            IF (NCURVE.GT.1 .AND. OPN(4).EQ.0) MCHAR=MCHAR(JJ4)
01174   589.            IF (OPN(7).EQ.0 .OR. OPN(7).EQ.1) GO TO 91
01176   590.          JABEL(JJ4)=   MCHAR
01177   591.          GO TO 301
01200   592.       91 CONTINUE
01201   593.          LABEL(JJ4*3-2)=   ICURVE
01202   594.            IF (NCURVE .LE. 3) GO TO 302
01204   595.          CALL PRINT(MCHAR, CCURVE(JJ4), LABEL(JJ4*3-1))
01205   596.            IF (NTM .EQ. 1) Y1= YY1
01207   597.            IF (JJ4.LE.6) CALL TSP(X1,Y1,LABEL,108)
01211   598.            IF (JJ4.EQ.7 .OR. JJ4.EQ.13) Y1= Y1 - DELTY1
01213   599.            IF(JJ4.GE.7.AND.JJ4.LE.12) CALL TSP(X1,Y1,LABEL(19),108)
01218   600.            IF(JJ4.GE.13) CALL TSP(X1,Y1,LABEL(37),108)
01817   601.          GO TO 303
01220   602.      302 CONTINUE
01221   603.          CALL RITE(0.0232343, 1.02679, 1.0, 90, 72, 1, LABEL)
01222   604.      303 CONTINUE
01223   605.      301 CONTINUE
01224   606.          NTM=          2
01225   607.          NTM2=         NTM2 + 1
01226   608.       52 CONTINUE
01230   609.          X2=           OPN(7)
01231   610.            IF (OPN(7).LT.0) CALL BOX(X2,DUM,NCURVE,CCURVE,YY,JCURVE,JABEL)
01233   611.          NFRAME=       NFRAME + 1
01234   612.       60 CONTINUE
01236   613.          GO TO 502
01236   614.  C
01237   615.      500 CONTINUE
01237   616.  C       PLOT FINAL FRAME CONTAINING TITLE INFORMATION
01240   617.          CALL ADF
01241   618.          NFRAME=       NFRAME + 1
01242   619.          CALL FRAME (0.0, 1.0, 1.0, 0.0)
01243   620.            IF (OPN(7) .EQ. 2) GO TO 63
01243   621.  C       IS PLOT DATA FROM ANDIMX? -'YES,NO'-
01245   622.            IF (NAME .EQ. ANDIMX) GO TO 61
01247   623.          CALL TSP(0.2, 0.5, ID, 72)
01250   624.          GO TO 63
01251   625.       61 CONTINUE
01252   626.          DO 62 J4=1,5
```

```
01255   627.          YTYP=        0.56 - FLOAT(J6) * 0.04
01256   628.          CALL TSP( 0.2, YTYP, IDANDI(1,J6), 72)
01257   629.       62 CONTINUE
01261   630.          CALL TSP(0.42, 0.6, SECRET, 20)
01262   631.       63 CONTINUE
01263   632.          CALL ADF
01264   633.          NFRAME=      NFRAME + 1
01264   634.    C
01264   635.    C     MAKE CALL TO FINISH TO END PLOTTING
01265   636.          CALL FINISH
01266   637.          IFLAG=       2
01266   638.    C
01267   639.       503 CONTINUE
01267   640.    C     WRITE SUCCESSFUL COMPLETION STATEMENT
01270   641.             IF (NAME.EQ.6OLEM) WRITE (6,1006) (VARB(JK),JK=1,LAST1)
01277   642.     1006 FORMAT (46H1SUBROUTINE GRAPH HAS EXECUTED SUCCESSFULLY. / 16H VARB
01277   643.         1 ARRAY WAS  / (1P12E10.3))
01300   644.             IF (NAME.NE.6OLEM) WRITE (6,3) (VARB(JK),JK=1,LAST1)
01307   645.          3 FORMAT ( 46H1SUBROUTINE GRAPH HAS EXECUTED SUCCESSFULLY. / 16H VAR
01307   646.           1U ARRAY WAS  // (1P10E18.5))
01310   647.             IF (IN(1) .EQ. -2) GO TO 506
01310   648.    C
01312   649.       501 CONTINUE
01313   650.          WRITE (6,17)
01318   651.          WRITE (6,4) ITAPE, NFRAME
01321   652.          WRITE (6,4) ITAPE, NFRAME
01328   653.           4 FORMAT (31H PLOTTING IS COMPLETED ON UNIT , I4, 10H THERE ARE, I8
01328   654.          1 ,8H FRAMES.  PLEASE NOTE THIS ON PLOT LABEL, IF THERE IS ONE.)
01330   655.       508 CONTINUE
01327   656.          RETURN
01327   657.    C
01330   658.       506 CONTINUE
01330   659.    C     ZERO-OUT VARB ARRAY BEFORE RETURNING TO MAIN PROGRAM
01331   660.          DO 504 JK=1,LAST1
01334   661.          VARB(JK)=    0.
01335   662.       504 CONTINUE
01337   663.          IFLAG=       1
01340   664.          GO TO 508
01340   665.    C
01340   666.    C     E R R O R   E X I T S
01340   667.    C
01341   668.       494 CONTINUE
01342   669.          WRITE (6,13) OPN(6)
01345   670.          13 FORMAT (46H1OPN(6) HAS BEEN INPUT INCORRECTLY.  OPN(6) = ,I4)
01346   671.          GO TO 507
01347   672.       495 CONTINUE
01350   673.          WRITE (6,12) OPN(5)
01353   674.          12 FORMAT (46H1OPN(5) HAS BEEN INPUT INCORRECTLY.  OPN(5) = ,I4)
01354   675.          GO TO 507
01355   676.       496 CONTINUE
01356   677.          WRITE (6,9) OPN(3)
01361   678.           9 FORMAT (46H1OPN(3) HAS BEEN INPUT INCORRECTLY.  OPN(3) = ,I4)
01362   679.          GO TO 507
01363   680.       497 CONTINUE
01364   681.          WRITE (6,8) OPN(7)
01367   682.           8 FORMAT (46H1OPN(7) HAS BEEN INPUT INCORRECTLY.  OPN(7) = ,I4)
01370   683.          GO TO 507
01371   684.       498 CONTINUE
01372   685.          WRITE (6,7) OPN(2)
01375   686.           7 FORMAT (46H1OPN(2) HAS BEEN INPUT INCORRECTLY.  OPN(2) = ,I4)
01376   687.          GO TO 507
01377   688.       499 CONTINUE
01400   689.          WRITE (6,6) OPN(1)
01403   690.           6 FORMAT (46H1OPN(1) HAS BEEN INPUT INCORRECTLY.  OPN(1) = ,I4)
01404   691.          GO TO 506
01405   692.       507 CONTINUE
01406   693.          CALL MERR
01407   694.          END
```

2. A card in format (12A6), containing title information used as a heading for each frame (may be a blank card)
3. Two cards, each in format 12A6, that specify the appropriate labels for the x- and y-axes, respectively (either one or both cards may be blank)

DESCRIPTION OF INPUT

The IN array controls which variables in the VARB array are to be used for plotting:

1. IN(1) and IN(2) specify variables to be used in the x-array, the array containing abscissas of points to be plotted
2. IN(3) and IN(4) specify variables to be used in the y-array, the array containing the ordinates of points to be plotted

IN(I)	SADY variable	Huebner variable	GOLEM variable
1	TK	TK	THETA (TK)
2	GAMMA		RHO
3	RHO	RHO	P1 (pressure)
4	PRESHR		E (energy)
5	ENERGY		NBAR or CAPAC
6	EION		EIONIZ or CAPAR
7	KROS	TROPA	CV
8	KPLK	CROPA	FEW (ZBAR)
9	ZBAR	CAPNF(ZBAR)	PB1
10	EGAM		ASQ (sound speed)
11			EGAM
12			EGAM2 or GAMMA

The OPN array controls various options used in plotting. OPN(1) determines how to manipulate variables to be set up for the x-array. OPN(2) determines how to manipulate variables to be set up for the y-array.

OPN(I), I=1 or 2 — x- or y-array, J=1 or 3 respectively. (Any VARB array variable may be exponentiated or be replaced by its common or natural logarithm before being operated on in one of the following ways.) XIN(L), (L=5, 6), is discussed below.

1	VARB(IN(J))
2	VARB(IN(J)) + XIN(L)
3	VARB(IN(J)) * XIN(L)
4	VARB(IN(J)) + VARB(IN(J+1))
5	(VARB(IN(J)) + VARB(IN(J+1))) + XIN(L)
6	(VARB(IN(J)) + VARB(IN(J+1))) * XIN(L)
7	VARB(IN(J)) - VARB(IN(J+1))
8	(VARB(IN(J)) - VARB(IN(J+1))) + XIN(L)
9	(VARB(IN(J)) - VARB(IN(J+1))) * XIN(L)
10	VARB(IN(J)) * VARB(IN(J+1))
11	(VARB(IN(J)) * VARB(IN(J+1))) + XIN(L)
12	(VARB(IN(J)) * VARB(IN(J+1))) * XIN(L)
13	VARB(IN(J)) / VARB(IN(J+1))
14	(VARB(IN(J)) / VARB(IN(J+1))) + XIN(L)
15	(VARB(IN(J)) / VARB(IN(J+1))) * XIN(L)

OPN(3) determines value of NGRID, the type of grid used for plotting. To get tick marks only (no grid lines), add 4 to value of NGRID necessary to obtain the type of grid wanted, and input that sum for OPN(3). An exception is if NGRID. LE. 0; then subtract 5 to get the code to scale with tick marks.

OPN(3)	x-axis	y-axis
0	Code scales	Code scales
1	Linear	Linear
2	Logarithmic	Linear
3	Linear	Logarithmic
4	Logarithmic	Logarithmic
-1	Linear	Code will scale
-2	Logarithmic	Code will scale
-3	Code scales	Linear
-4	Code scales	Logarithmic

OPN(4) determines value of NCHAR, the decimal code of the character to be plotted. Normal value is 42, a plotting dot. If more than one curve per frame:

1. If (OPN(4). EQ. 0), 'A' for first curve, 'B' for second curve, etc. (maximum of 18 curves per frame)
2. If (OPN(4). LT. 0), '1' for first curve, '2' for second curve, etc. (maximum of 9 curves per frame)

OPN(5) determines the value of ICON, the option for connecting points with a line segment. If (ICON .EQ. 1), connect points. If (ICON .EQ. 2), do not connect points.

OPN(6) controls number of plots per frame. Note that no more than 18 curves may be put on any given frame.

OPN(7) determines whether labels will be printed on plots. If (OPN(7) .EQ. 0), print labels along top of frame and along x- and y-axes (to be read from three input data cards that follow, each in format 12A6, and used to label top of frame, the x-axis, and the y-axis, respectively).

If (OPN(7) .LT. 0), print a summary of all curve labels and values in a box in one corner (-1 for upper left, -2 for upper right, -3 for lower left, -4 for lower right).

If (OPN(7) .EQ. 1), use DIAPHANOUS, DENSER, GOLEM or ANDIMX ID record (read by DYPER4 or TRANS) to label top of the graphs, using normal printout (no box).

To use ID record read by TRANS or DYPER4 plus a box printout, subtract 4 from value (as specified above) necessary to indicate corner chosen for printing the box.

If (OPN(7) .EQ. 2), do not print on the plots.

OPN(8), OPN(9), OPN(10), and OPN(11) determine whether logarithms (common or natural) are to be taken of (VARB(IN(J)), J=1 to 4), respectively,

before the x- and y-arrays are set up.

a. Negative OPN(I), I=8, 9, 10, or 11, means use natural log of (VARB(J)**XIN(J), J=1, 4), respectively.

b. Positive OPN(I), I=8, 9, 10, or 11, means use common log of (VARB(J)**XIN(J), J=1, 4), respectively.

OPN(12)=IPLOTT, used if THETA curves are not being plotted. Specifies the general cell location of the variable being held constant on each curve (e.g., IPLOTT=2 if gamma curves are being plotted for DIAPHANOUS).

OPN(13) is an input quantity if user wishes code to scale either or both grid axes, using a limiting value different than 100 as a deciding value to plot logarithmically, rather than linearly.

(OPN(J), J=14, 15) free parameters

(XIN(J), J=1, 4) may be used to exponentiate (VARB(IN(J)), J=1, 4), respectively, before the x- and y-arrays are set up. If input as zero, code does not use them.

XIN(5) and XIN(6) are additive or multiplicative constants used to modify VARB array variables chosen for the x- and y-arrays, respectively.

XIN(7) is input if OPN(12), I.E., IPLOTT, is used. Allows user to input a constant value for plotting one curve (e.g., OPN(12)=2, XIN(7)=100., to plot a curve for gamma = 100., in DIAPHANOUS.)

To use the GRAPH subprogram, mount one output (plot) tape on logical unit 16 and specify that it be written with a tape-density of 556 BPI.

GRAPH uses the General Atomic SC-4020 plotting routines discussed in Ref. 12.

TRANS: A PLOTTING PROGRAM ADJUNCT

The TRANS program and its associated subroutines, INPUT, INPUTG, DAR, and ARGE, were coded to read output data cards punched by programs DYPER4 or GOLEM and fill a one-dimensional array of regularly spaced quantities for subroutine GRAPH.

```
xIT FOR.. I=A..../S1UC1
COMPILATION BY ...I.AC 1108 FORTRAN-IV DATED     11 NOV 1966 F4008
THIS COMPI..TIO.. WAS DONE ON 01 NOV 67 AT 14:54:10

00101     1.          COMMON/C1A/VARB(5000)
00103     2.          COMMON/BC11/IEND(100),MPTS(100),NPTS(100),J2,NAME,GLAB(12)
00106     3.          CALL INPUT (GLAB,VARB,NRO,NCOL,NPTS,J2)
00109     4.          NCOL=NCOL*NRO
00106     5.          NAME=-1
00107     6.          NSUM=0
00110     7.          DO 10 I=1,J2
00113     8.          MPTS(I)=NCOL*NPTS(I)
00116     9.          IEND(I)=MPTS(I)+NSUM
00119    10.       10 NSUM=MPTS(I)+NSUM
00117    11.          CALL GRAPH
00120    12.          CALL EXIT
00121    13.          END
```

Input for TRANS

CARD NO.	COLUMNS	FORMAT	VARIABLE NAME	MEANING
1	1-6	A6	Name	If (NAME. EQ. SADY), DIAPHANOUS output data cards (punched by program DYPER4) follow. If (NAME. EQ. GOLEM), GOLEM output data cards (punched by program GOLEM) follow
1A	1-72	12A6	(FMT(I), I= 1, 12)	If (NAME. EQ. SADY), this card is not used. If (NAME. EQ. GOLEM), specifies the format with which the GOLEM output data cards are to be read
	76	I1	IWRIT1	If (IWRIT1. EQ. 0), no printout If (IWRIT1. EQ. 1), input cards and array as set up for GRAPH will be printed
	79-80	I2	ITEMS	Specifies the number of items to be read from each GOLEM output data card
2	1-72	12A6	(ID(I), I=1, 12)	72 columns of identification information
3, . . . , N	Variable	Variable	Variable	Contain the data that are used to fill the array for use by GRAPH
N+1	Variable	Variable	Variable	If the first word on the card is $\leq$ 0., it signifies end of DYPER4 or GOLEM output data cards

DENSER: A DIAPHANOUS TAPE COMPRESSOR CODE

The DENSER program was written to pack the data on DIAPHANOUS tapes so that more data could be written onto one tape. It is in FORTRAN IV language.

DENSER can read a number of DIAPHANOUS binary tapes and condense these onto one card-image tape file which can be read on most computers. The card-image tape is written in even parity at 556 BPI in IBM-compatible

```
      PROGRAM DENSER(INPUT,OUTPUT,TAPE10,TAPE9,TAPE5=INPUT,TAPE6=OUTPUT)
C
C     DIAPHANOUS EDITOR
C*    ALL DENSER RUNS MUST WRITE ON A TAPE IN EVEN PARITY -
C*    THIS IS DONE BY SPECIFYING THE K AND E OPTIONS ON THE TAPE ASSIGN CARD
C     DAPHNE WAS ORIGINALLY MODIFIED BY L. R. NORRIS TO READ A DIAPHANOUS
C     TAPE AND MAKE THIS INTO A CONDENSED TAPE IN ORDER TO SAVE SPACE
C
C     VARIABLE NAME  MEANING
C
C     *** AUGEAS ***
C     DELEPJ (2000)  ENERGY CHANGE DURING A TRANSITION (EV)
C     DELEPS (1500)  IONIZATION POTENTIAL OF A STATE (EV)
C     EIN (15)       ENERGY OF GROUND STATE OF AN IONIZATION LEVEL
C     EPSU (1500)    SAME AS EPS IN DIAPHANOUS
C     FPC (3, 3, 3)  FRACTIONAL PERCENTAGE COEFFICIENT FOR TRANSITION BETWEEN
C                    SPLIT CONFIGURATIONS
C     IJU (2000)     IDENTIFICATION NUMBER OF INITIAL STATE ASSOCIATED WITH A
C                    TRANSITION
C     ISPLIT (15, 40)IDENTIFICATION OF A SPLIT CONFIGURATION
C     MERGED (15, 40)TRUE IF THIS CONFIGURATION IS THE AVERAGE OF SOME OTHER
C                    CONFIGURATIONS IN THE TABLE
C     MJU (2000)     NUMBER OF ELECTRONS IN LEVEL FROM WHICH ONE IS REMOVED IN
C                    THIS TRANSITION
C     NFU (1500)     SAME AS NF IN DIAPHANOUS
C     NJU (2000)     PRINCIPAL QUANTUM NUMBER (OR REDUCED QUANTUM NUMBER) OF
C                    ELECTRON REMOVED IN THIS TRANSITION.
C     NO (6, 15, 40) NUMBER OF ELECTRONS IN AN ELECTRON LEVEL IN A CONFIGURATION
C     NKMAX (15)     NUMBER OF CONFIGURATIONS AT AN IONIZATION LEVEL
C     NKSAVE (1500)  CONFIGURATION IDENTIFICATION OF A STATE
C     NSAVE (1500)   QUANTUM NUMBER OF OUTER ELECTRON, IF BEYOND TABLE, OF A
C                    STATE
C     QU (1500)      SAME AS Q IN DIAPHANOUS
C     QWI (15, 40)   DEGENERACY OF A CONFIGURATION
C     WO (15, 40)    COEFFICIENTS IN QUADRATIC FOR DETERMINING ENERGY OF THIS
C                    CONFIGURATION
C     W1 (15, 40)    COEFFICIENTS IN QUADRATIC FOR DETERMINING ENERGY OF THIS
C                    CONFIGURATION
C     W2 (15, 40)    COEFFICIENTS IN QUADRATIC FOR DETERMINING ENERGY OF THIS
C                    CONFIGURATION
C     *** DIAPH2 ***
C     BE (100)       SAME AS BEJ, INDEXED BY (NF + 1) FOR INITIAL STATE
C     BEJ (1600)     PARAMETER DETERMINING LINE WIDTH FOR A TRANSITION
C     C (10)         CONCENTRATION OF AN ELEMENT (ATOMS/ATOM)
C     COM (12)       COMMENT CARD IN FORMAT 12A6
C     DELE (100)     SUM OF DELI AT PREVIOUS IONIZATION LEVELS (EV)
C     DELEPJ (2200)  ENERGY CHANGE DURING A TRANSITION (EV)
C     DELEPS (1500)  IONIZATION POTENTIAL OF A STATE (EV)
C     DELI (100)     PRESSURE IONIZATION AT AN IONIZATION LEVEL (EV)
C     EPS (1500)     ENERGY OF A STATE, USUALLY REFERRED TO THE ENERGY OF THE
C                    GROUND STATE OF THE NEUTRAL ATOM (EV)
C     EPSPRM (1500)  ENERGY OF A STATE AFTER REDUCTION DUE TO PRESSURE IONIZA-
C                    TION (EV)
C     EX (100)       SAME AS EXJ, INDEXED BY (NF + 1) FOR INITIAL STATE
```

```
C     EXJ (1600)      PARAMETER DETERMINING LINE LOCATIONS FOR A TRANSITION
C     GAMBLK (10)     ARRAY OF GAMMA
C     IJ (2200)       IDENTIFICATION NUMBER OF INITIAL STATE ASSOCIATED WITH A
C                     TRANSITION
C     MAKEZ (1500)    IDENTIFICATION OF STATE TO BE ELIMINATED
C     MJ (2200)       NUMBER OF ELECTRONS IN LEVEL FROM WHICH ONE IS REMOVED IN
C                     THIS TRANSITION
C     NEW (2200)      ORIGINAL IDENTIFICATION NUMBER OF A TRANSITION
C     NF (1500)       NUMBER OF FREE ELECTRONS FOR A STATE
C     NJ (2200)       TOTAL QUANTUM NUMBER (OR REDUCED QUANTUM NUMBER) OF ELEC-
C                     TRON REMOVED DURING A TRANSITION
C     NLAST (10)      INDEX NUMBER OF LAST STATE IN TABLE FOR AN ELEMENT
C     PHI (2200)      STRENGTH OF EDGE DUE TO THIS TRANSITION
C     Q (1500)        DEGENERACY OF A STATE
C     R (1500)        FIRST PROPORTIONAL TO LOG POPULATION AND THEN TO POPULATION
C                      OF A STATE
C     RS (10)         FIRST MAXIMUM R, THEN SUM OF R'S, FOR AN ELEMENT
C     SMALLP (1500)   POPULATION OF A STATE
C     TESTJ (2200)    LOWEST VALUE OF MU AT WHICH THE ABSORPTION COEFFICIENT IS
C                     AFFECTED BY THE LINE SERIES FOR THIS TRANSITION
C     TKBLK (10)      ARRAY OF KT
C     U (5)           COEFFICIENTS IN GAUSSIAN INTEGRATION
C     W (5)           COEFFICIENTS IN GAUSSIAN INTEGRATION
C     UOLD (2200)     LOCATION OF EDGE DUE TO THIS TRANSITION (EV/EV)
C     UPRM (2200)     LOWERED EDGE TO APPROXIMATE HIGH LINES (EV/EV)
C     W (10)          ATOMIC WEIGHT OF AN ELEMENT
C     Z (10)          ATOMIC NUMBER OF AN ELEMENT
C     *** DIAPER ***
C     AMU (1000)      ABSORPTION COEFFICIENT AT A PARTICULAR VALUE OF MU(.6 .LE.
C                     MU .LE. 15) (PER CM)
C     BMU (1000)      BOTTOM OF EDGE OCCURING AT A PARTICULAR VALUE OF MU(MU .GT.
C                      15)(PER CM)
C     ID (12)         COMMENT CARD
C     IMU (1000)      TOP OF EDGE OCCURING AT A PARTICULAR VALUE OF U (U>15) (PER
C                      CM)
C     *** SPECTRA ***
C     DEFECT (100, 4)QUANTUM DEFECT INDEXED BY THE IONIZATION LEVEL AND L + 1
C     DELEPJ (3500)   SAME AS DELEPJ IN DIAPHANOUS
C     EPSJ (1750)     SAME AS EPS IN DIAPHANOUS
C     DELEPS (1750)   SAME AS DELEPS IN DIAPHANOUS
C     IJJ (3500)      SAME AS IJ IN DIAPHANOUS
C     IONZC (100)     ZCORE FOR AN IONIZATION LEVEL
C     L (19)          L FOR AN ELECTRON LEVEL
C     LIN (10)        LEVEL AT WHICH AN ELECTRON IS BEING ADDED
C     LOUT (10)       LEVEL AT WHICH AN ELECTRON IS BEING REMOVED
C     MJJ (3500)      SAME AS MJ IN DIAPHANOUS
C     N (19)          N FOR AN ELECTRON LEVEL
C     NE (92, 19)     NUMBER OF ELECTRONS PER ELECTRON LEVEL IN THE GROUND STATE
C                     OF AN IONIZATION LEVEL
C     NFJ (1750)      SAME AS NF IN DIAPHANOUS
C     NJJ (3500)      SAME AS NJ IN DIAPHANOUS
C     QJ (1750)       SAME AS Q IN DIAPHANOUS
C
      REAL LONG
      REAL LENGTH
```

```
      INTEGER NEWID, BLANK
      INTEGER DASA
      INTEGER GA
      DIMENSION NEWID(12)
      DIMENSION ID(12), A(20), B(2), U1(150), GAMY(150), AMU(150),
     1          DAVE (150),DUMMY(30)
      DIMENSION THETA(5000), XGAMMA(5000), RHO(5000)
      DIMENSION U2(1500), BMU(1500), TMU(1500), COMP(10), IZ(10)
      DATA DENSER/ 6HDENSER /
      DATA INDEXA / 1/
      DATA LRN / 1 / , DUMMY / 30*0. /
      DATA IFILE1 / 0 / , BLANK / 6H       /
C
      MOUT = 10
    1 CONTINUE
C
C     MEND      IF (MEND .EQ. 0) ANOTHER SADY TAPE IS READ
C               IF (MEND .NE. 0) THE RUN TERMINATES
C     IFILE     IF (IFILE .NE. 0) NO END OF FILE MARKER IS PUT ON AFTER
C                  THIS DIAPHANOUS TAPE HAS BEEN READ
C               IF (IFILE .EQ. 0) AN END OF FILE MARKER IS PUT ON AFTER
C                  THIS TAPE HAS BEEN READ
C     IWRIT     IF (IWRIT .NE. 0) THE DIAPHANOUS INPUT TAPE IS EDITED
C               IF (IWRIT .EQ. 0) THE DIAPHANOUS INPUT TAPE IS NOT EDITED
C
C
C     MIN       IS THE INPUT TAPE UNIT.  MIN MUST BE READ FOR EVERY
C                  INPUT TAPE TO BE READ
C
C     ALL DENSER TAPES MUST BE WRITTEN IN 556 BPI -
C     THIS IS ACCOMPLISHED BY SPECIFYING THE H OPTION ON THE TAPE
C     ASSIGNMENT CARD
C
C
      READ (5,8001) MIN, MEND, IFILE, IWRIT, TA, GAM
 8001 FORMAT (4I2, 2E15.8)
      IF (MIN .EQ. 0) MIN=15
      READ (5,8000) NZ, (IZ(K), COMP(K), K=1,NZ)
 8000 FORMAT (I2, 8X 6(I2, 2X, F6.4), / 4(I2, 2X, F6.4) )
      IF ((NZ .LT. 1) .OR. (NZ .GT. 10)) CALL MERR
      WRITE (6,8003) MIN, MEND, IFILE, IWRIT
 8003 FORMAT (1H0,7H MIN = ,I4,8H MEND = ,I4,9H IFILE = ,I4,9H IWRIT = ,
     1I4)
      WRITE (6,8004) NZ,(I,COMP(I),IZ(I),I=1,NZ)
 8004 FORMAT (1H0, 5HNZ = , I2, /(1H ,I2,2X,F6.4,2X,I2/))
      READ (5,8005) (NEWID(I),I=1,12)
 8005 FORMAT (12A6)
      IF (NEWID(1) .NE. BLANK) WRITE (6,8006) (NEWID(I),I=1,12)
 8006 FORMAT (1H0, 12A6)
      NEWIND MIN
      IRCD = 0
      NRCD = 0
      IUMU2 = 1500
C
      IF (IWRIT .NE. 0)
```

```
     1WRITE (6,9990)
      READ(MIN) A(1)
      WRITE (6,9995) A(1)
      IF (A(1))25,999,999
   25 IF(A(1)+1.) 999,2500,999
 2500 CONTINUE
      NRCD = NRCD + 1
      READ (MIN) (ID(I),I=1,12)
      WRITE (6,9999) (ID(K),K=1,12)
      IF (NEWID(1) .EQ. BLANK) GO TO 27
      DO 28 I=1,12
      ID(I) = NEWID(I)
   28 CONTINUE
   27 CONTINUE
      IF (IFILE1 .NE. 0) GO TO 26
      WRITE (MOUT,3) DENSER, (ID(K),K=1,12), NZ, (COMP(K),IZ(K),K=1,NZ)
    3 FORMAT (13A6/I2,(F6.4,I2))
      IRCD = IRCD + 2
   26 CONTINUE
      NRCD = NRCD + 1
      READ(MIN) A(1)
      IF (IWRIT .NE. 0)
     1WRITE (6,9995) A(1)
      IF(A(1)+2.) 999,3002,999
 3002 CONTINUE
      NRCD = NRCD + 1
   32 READ (MIN) (B(I),I=1,2)
      IF (IK .GT. B(1)) GO TO 7000
      IF (GAM .GT. B(2)) GO TO 7000
      WRITE (6,9998) (B(J),J=1,2)
      IF (IWRIT.EQ.0) WRITE (6,9995) A(1)
      THETA (INUEXA)=B(1)
      XGAMMA(INUEXA)=B(2)
 7000 CONTINUE
      J = 2
      M = 6
      ULAST1 = 0.
      ALAST1 = 0.
      U2(J) = 0.
      GAMY(1) = 0.
      UAVE(1) = 0.
      THETA = B(1)
      GAMMA = B(2)
      IF ((IK .LE. B(1)) .AND. (GAM .LE. B(2)))
     2NRCD = NRCD + 1
   34 READ(MIN) A(1), A(2)
      IF ((A(1) .LT. 0.) .AND. ((IK .LE. B(1)) .AND. (GAM .LE. B(2))))
     1WRITE (6,9995) A(1)
      UX = A(1)
      UT = A(2)
      IF ((IK .LE. B(1)) .AND. (GAM .LE. B(2)))
     2NRCD = NRCD + 1
      IF(UX + 3.) 35,65,35
   35 IF(UX + 4.) 40,75,40
   40 IF(UX + 6.) 55,45,55
```

```
   45 READ(MIN) A(1), A(2)
      IF (IWRIT .NE. 0)
     1WRITE (6,9000) A(1),A(2)
      U1(M) = A(1)
      AMU(M) = A(2)
      M = M+1
      UX = A(1)
      UY = A(2)
      IF ((TK .LE. B(1)) .ANU. (GAM .LE. B(2)))
     2NKCD = NKCD + 1
      IF(UX .LE. 0.) GO TO 4500
      ULAST = UX
      ULAST1 = UX
      ALAST1 = UY
      AKLAST = UY
      GO TO 54
 4500 WRITE(6,9000) UX, UY
      REWIND MIN
      CALL EXIT
   55 U1(M) = UX
      AMU(M) = UY
      M = M+1
      GO TO 54
   65 READ(MIN) A(1), A(2), A(3)
      UX = A(1)
      UY = A(2)
      UZ = A(3)
      IF ((TK .LE. B(1)) .ANU. (GAM .LE. B(2)))
     2NKCD = NKCD + 1
      IF(UX + 4.) 70,74,70
   70 U2(J) = UX
      BMU(J) = UY
      TMU(J) = UZ
      J = J+1
      IF(J-10MU2) 65,65,72
   72 WRITE(6,15) IDMU2, THETA, GAMMA, U2(J-1)
   73 READ(MIN) A(1), A(2), A(3)
      UX = A(1)
      UY = A(2)
      UZ = A(3)
      IF ((TK .LE. B(1)) .ANU. (GAM .LE. B(2)))
     2NKCD = NKCD + 1
      IF(UX + 4.) 73,74,73
   74 ULAST=U2(J-1)
      AKLAST=TMU(J-1)
   75 CONTINUE
      M = M - 1
      IF (TK .GT. B(1)) GO TO 7001
      IF (GAM .GT. B(2)) GO TO 7001
      IF (IWRIT .NE. 0)
     1WRITE (6,9980) (U1(K),K=6,M)
      IF(GARY(1) .NE. 0.) WRITE(6,9002) GARY
      IF (IWRIT .NE. 0)
     1WRITE (6,9982) (AMU(K),K=6,M)
      IF(DAVE(1) .NE. 0.) WRITE(6,9002) DAVE
```

```
      IF (DAVE(1) .NE. 0.) CALL MEMR
      READ(MIN) (A(JM), JM=1,8)
      WRITE (6,9997) (A(JM),JM=1,8)
      WRITE (6,4)
    4 FORMAT (1H )
      IF(U2(2) .EQ. 0.) GO TO 76
      J = J - 1
      IF (IWRIT .EQ. 0) GO TO 76
      WRITE (6,9984) (U2(K),K=2,J)
      WRITE (6,9986) (BMU(K),K=2,J)
      WRITE (6,9988) (TMU(K),K=2,J)
   76 CONTINUE
      RHO(INDEXA)=A(2)
      INDEXA=INDEXA+1
      WRITE (MOUT,2) J, M, ULAST1, ALAST1, B(1), B(2), (A(JM),JM=1,20),
     1              (U1(K),K=6,M), (AMU(K),K=6,M), (U2(K),K=2,J),
     2              (BMU(K),K=2,J), (TMU(K),K=2,J)
      NREC = NREC + 1
      IREC1 = 11 + 2 * (M - 5) + 3 * (J - 1)
      IREC2= IREC1 / 14
      IREC14 = IREC2* 14
      IF (IREC1 .GT. IREC14) IREC2= IREC2 + 1
      IREC = IREC + 1 + IREC2
 7001 CONTINUE
      READ (MIN) A(1)
      IF (IWRIT.NE.0) WRITE (6,9996) A(1)
      UX = A(1)
      IF ((1K .LE. B(1)) .AND. (GAM .LE. B(2)))
     2NREC = NREC + 1
      IF(UX + 2.) 77,32,999
   77 IF(UX + 5.) 999,155,999
  155 CONTINUE
      IF (IWRIT.EQ.0) WRITE (6,9995) A(1)
C
      NREC = NREC + 1
C     THE ABOVE RECORD COUNT INCLUDES THE EOF RECORD
      IFILE1 = IFILE
      LONG = FLOAT(NREC) * .0625
      LENGTH = FLOAT(IREC) * .0658
      WRITE (6,8007) LONG, NREC, LENGTH, IREC
      CALL REWI(MIN)
      IF (IFILE .NE. 0) GO TO 1
      I = -5
      WRITE (MOUT,2) I, LHN, DUMMY
      IREC = IREC + 2
 8007 FORMAT (58H0THE DIAPHANOUS TAPE HAS BEEN CONDENSED SUCCESSFULLY FR
     10M , F10.2,10H FEET WITH, I6, 21H PHYSICAL RECORDS TO ,F9.2,/10HOF
     2EET WITH,I5,18H PHYSICAL RECORDS.)
      ENDFILE MOUT
      IF (MENU .EQ. 0) GO TO 1
      REWIND MOUT
      INDEXA=INDEXA-1
      WRITE(6,9001) (THETA(K),XGAMMA(K),RHO(K),K=1,INDEXA)
 9001 FORMAT(1H1,8X,
     1           6HTHETA ,9X, 6HGAMMA ,11X,4HRHO ,//(3(5X,1PE12.5)))
```

```
      CALL EXIT
  999 CONTINUE
      WRITE (6,9901)
 9901 FORMAT (53H THERE IS AN ERROR IN THIS RUN. MERR HAS BEEN CALLED.)
      CALL MERR
C
C     ***************  F O R M A T S  ********************
   15 FORMAT  (42H 2ND SET OF DIAPHANOUS DATA HAS MORE THAN I3, 19H ENTR
     2IES.  THETA = F7.2, 8H, GAMMA=1PE10.5,20H, NO GOOD ABOVE U = UPF6.
     31)
 9000 FORMAT(9HU ULAST = 1PE15.7, 3X 8HAKLAST = E15.7)
 9002 FORMAT(1P10E12.5)
 9980 FORMAT(10HU U1 ARRAY // (1P10E12.5))
 9982 FORMAT(11HU AMU ARRAY // (1P10E12.5))
 9984 FORMAT(10HU U2 ARRAY //(1P10E12.5))
 9986 FORMAT(11HU BMU ARRAY // (1P10E12.5))
 9988 FORMAT(11HU TMU ARRAY // (1P10E12.5))
 9990 FORMAT(1H1)
    2 FORMAT (2I4, 15E9.4, / (14E9.4))
 9995 FORMAT(10H  SIGNAL = F6.1)
 9996 FORMAT(10H1 SIGNAL = F6.1)
 9997 FORMAT(6H ZBAR=F8.4, 1X 4HKMO=1PE11.5, 2X 2HP=E11.5, 2X 2HE=E11.5,
     1 2X 5HKMOS=E11.5, 2X 6HKPLNK=E11.5, 2X 5HEION=E11.5, 2X 5HEGAM=
     2UPF9.3)
 9998 FORMAT(9HU THETA = 1PE15.7, 3X 7HGAMMA = E15.7)
 9999 FORMAT(1HU, 12A6)
      END
```

format. The data from each separate set of DIAPHANOUS input tapes are written onto one file on the output tape. The condensed tape may contain several files, each of which corresponds to some chosen set of DIAPHANOUS tapes.

DENSER reads the DIAPHANOUS tape, under control of the variables TK and GAM (see below), the tape consisting of very short binary records, and stores the data into arrays. These arrays are written onto the output tape in 14 word records. Either the identification record from the DIAPHANOUS tape, or a new identification record, plus a material composition record is written as the first two records of every file on the DENSER output tape. All of the data at a given temperature-gamma point on a DIAPHANOUS tape are preserved in the condensation. The DENSER identification record need not be the same as the identification record that was on the DIAPHANOUS tape.

The output records made by DENSER must incorporate the information that DIAPHANOUS tapes formerly conveyed by signals. The possible situations at a given temperature-gamma point are:

1. The DIAPHANOUS tape had both extrapolated data (before $u = \frac{h\nu}{KT} = 15$) and edge data (i.e., both (-6.) and (-3.) signals were present).
2. The DIAPHANOUS tape had extrapolated data but no edge data (i.e., (-6.), but not a (-3.), signal was present).
3. The DIAPHANOUS tape had edge data but no extrapolated data (a (-3.), but not a (-6.), signal was present).
4. Neither extrapolated nor edge data were present (neither a (-6.) nor a (-3.) signal was present).

In the DENSER program, ULAST1, ALAST1, and U2(2) are all set to zero at the beginning of the processing done for each temperature-gamma point. If they are still zero when the DENSER output record is written, we have case (4). If a (-6.) signal is encountered on the DIAPHANOUS tape, then ULAST1 and ALAST1 are modified to specify the values of $h\nu/KT$ and

the absorption coefficient at the place where extrapolation began. If no (-3.) signal is encountered, U2(2) is still set to zero, and case (2) has been specified. If edge data are present U2(2) is modified to specify the location of the first edge. If a (-6.) had previously been encountered, then U2(2), ULAST1, and ALAST1 are nonzero and we have case (1). If no extrapolation has been performed, and edge data were present, we have case (3) with U2(2) $\neq$ 0., but ULAST1=ALAST1-0.

The DENSER program contains two write statements. They, and their respective formats, are:

```
WRITE (10, 3) DENSER, (ID(K), K=1, 12), NZ, (COMP(K), IZ(K), K=1,NZ)
3 FORMAT (13A6/I2, (F6.4, I2))
```

The above write statement is used once to write identification data at the beginning of each file on the DENSER tape. The named variables are discussed below or are clear from context.

```
WRITE (10, 2)J, M, ULAST1, ALAST1, B(1),B(2), (A(JM), JM=1, 20),
(U1(K), K=6, M), (AMU(K), K=6, M), (U2(K), K=2, J), (BMU(K)K=2, J),
(TMU(K), K=2, J)
2 FORMAT (2I4, 13E9.4, /(14E9.4))
```

The above write statement is used to write the data at each temperature and density point.

The length of the input DIAPHANOUS tapes and the length of each file on the DENSER output tape are computed after each file is completed. These values will help the user determine how many files can be written on a DENSER tape.

One may edit the input DIAPHANOUS tape, if desired, in the same manner as in present use. (DENSER is an adaptation of the DAPHNE code, which is able to edit DIAPHANOUS tapes.) A program was also coded to edit the files on the new condensed DIAPHANOUS tape, and this new program, DASE, can be used as a subroutine of DENSER to edit each file as it is written. DASE is in FORTRAN IV language. (Refer to separate writeup.)

Input for DENSER

CARD NO.	INPUT VARIABLE	COLUMNS	FORMAT
1	MIN	1-2	I2
	MEND	3-4	I2
	IFILE	5-6	I2
	IWRIT	7-8	I2
	TK	9-23	E15.8
	GAM	24-38	E15.8
2	NZ	1-2	I2
	IZ(1)	11-12	I2
	COMP(1)	15-20	F6.4
	IZ(2)	21-22	I2
	COMP(2)	25-30	F6.4
	up to 10	etc.	
3	NEWID	1-72	12A6

These three data cards must be repeated for each DIAPHANOUS input tape. Card 3 needs to contain the above data only when the input tape is the first tape used to create a given file. (For subsequent tapes used to continue this file, it can be a blank card.)

MIN — The unit on which the input tape is mounted. If MIN = 0, MIN is set to 15 in the program

MEND — If MEND $\neq$ 0, the program terminates after this set of input cards is processed; otherwise the program goes back to read the next set of input cards

IFILE — If IFILE $\neq$ 0, no end-of-file is written at the end of the data read from this input tape; otherwise, an end-of-file is written

IWRIT — If IWRIT $\neq$ 0, the DIAPHANOUS tape is edited in the fashion of DAPHNE; otherwise, only a limited printout is allowed

NZ — The number of elements in the material whose data are on the input DIAPHANOUS tape; $1 \leq NZ \leq 10$

IZ — The array of atomic numbers of the elements in the material on the input DIAPHANOUS tape. NZ atomic numbers are written on the DENSER tape

COMP — The array of number fractions corresponding to the elements in the IZ array. NZ number fractions are written on the DENSER tape

NEWID — An array of 12 alphanumeric words that allow a new title to be written on the DENSER tape. If this card is blank, the ID array from the SADY tape will be used as a title on the DENSER tape

To use the DENSER program, the following tapes must be mounted:

1. The input tapes are DIAPHANOUS tapes and may be mounted on any unit except unit 10
2. The output tape must be mounted on unit 10

TK, GAM — If both TK and GAM are nonzero, the DIAPHANOUS input tape is spaced to the data at this temperature-gamma point. Writing on the DENSER tape then starts with the data at this point. GAM is the electronic degeneracy factor and is $\Gamma \simeq [(0.01)(A)\theta^{3/2}]/(\rho\bar{Z})$, where A is the mean atomic weight, θ is the temperature in eV, ρ is the density in gm/cc, and $\bar{Z}$ is the mean ionization (Ref. 2). If TK is zero, the DIAPHANOUS tape is not spaced.

If GAM is zero, the DIAPHANOUS tape is spaced to the first Γ point at which the temperature is TK.

DASE: AN EDITING CODE FOR DENSER-PRODUCED TAPES

DASE has been coded in FORTRAN IV language to edit a tape file from a multifile card-image DENSER tape. Each tape file of a DENSER tape is a condensation of a set of DIAPHANOUS tapes for a certain material. (Refer to the DENSER code writeup.)

DASE edits either the complete file or that part of the file from the beginning of a specified temperature set to the end of the file. DASE also has the ability to space a preliminary DENSER tape file to a specified temperature-gamma data set.

```
      PROGRAM DASE(INPUT,OUTPUT,TAPE10,TAPE5=INPUT,TAPE6=OUTPUT)
C
C     THIS PROGRAM WAS WRITTEN BY L. M. MORRIS
C     THIS ROUTINE WILL EDIT A COMPRESSED DIAPHANOUS TAPE
C  IN THIS PROGRAM TKIN AND GAMIN SPECIFY THE TEMPERATURE AND GAMMA
C  AT WHICH THE TAPE IS SPACED TO
C  TWRITE SPECIFIES THE TEMPERATURE AT WHICH THE PROGRAM STARTS WRITING
C  VALUES FROM THE DENSER TAPE ONTO THE OUTPUT FILE
C  WHEN THETA=TKIN AND GAMMA=GAMIN ARE FOUND, LRN IS RESET FROM ZERO
C  TO ONE
C  ISPACU IS NOT USED BY THIS CODE
C     ISPACU IS IN THIS CODE TO MAINTAIN COMPATIBILITY WITH DAPHNE INPUT
C
      DIMENSION U2(1500), RMU(1500), TMU(1500)
      DIMENSION IU(12),IZ(10), A(20), U1(150), AMU(150), COMP(10)
      INTEGER DENSER
      DATA DENSER / 8HDENSER /,EPS /1.E-6/, ISPACU/0/
C
C     FORMATS
 1001 FORMAT (1HU, A6,3X,12A6)
 1002 FORMAT (1HU, 5HNZ = , I2, /(1H ,12,2X,F6.4,2X,I2/))
 1003 FORMAT (9H1THETA = ,1PE9.4, 3X,8HGAMMA = ,1PE9.4)
 1004 FORMAT (30HOTRANSITIONS WERE EXHAUSTED AT / 1H , 5H U = , 1PE9.4,
     1        10H AND RU = , 1PE9.4)
 1005 FORMAT (10HUU VALUES // (1H ,10(1X,1PE9.4,2X)))
 1006 FORMAT (10HUMU VALUES // (1H ,10(1X,1PE9.4,2X)))
 1007 FORMAT (10HUU VALUES // (1H ,10(1X,1PE9.4,2X)))
 1008 FORMAT (33HOMU VALUES AT THE TOP OF THE EDGE // (1H ,10(1X,1PE9.4,
     12X)))
 1009 FORMAT (36HOMU VALUES AT THE BOTTOM OF THE EDGE //(1H ,10(1X,1PE9.
     14,2X)))
 1010 FORMAT (18HUEDGE DATA FOLLOWS)
 1012 FORMAT (8HOZBAR = ,F8.4,7H RHO = ,1PE9.4,5H P = ,1PE9.4,
     1       5H E = ,1PE9.4,8H RHOS = ,1PE9.4,9H KPLNK = ,1PE9.4,
     2       10H EIPANI = ,1PE9.4,8H EBAR = ,0PF6.3,/(1P6E15.8) )
 1020 FORMAT (2I4, 15E9.4, / (14E9.4))
 1019 FORMAT (13A6/12,(F6.4,I2))
C
      NEW = 10
C     THIS PROGRAM DOES NOT REWIND THE DENSER TAPE BEFORE READING
C     SO THAT THE NTH FILE ON A DENSER TAPE MAY BE EDITED  BY DASE
C     SUCH REWINDING MUST BE DONE BEFORE EXECUTING DASE
      WRITE (6,7001)
 7001 FORMAT (1HI,36H UCU-COMPRESSED DIAPHANOUS EDIT RUN //)
      READ(5,9007) TKIN, GAMIN, TWRITE, ISPACO
 9007 FORMAT (3F10.8,I2)
      WRITE(6,9970) TKIN, GAMIN,TWRITE,ISPACO
 9970 FORMAT (25H THE INPUT TEMPERATURE = ,1PE15.8,/,
     1        19H THE INPUT GAMMA = ,1PE15.8,/
     2        ,11H  TWRITE = ,1PE15.8,10H ISPACO = ,I3)
      DATA LRN / 0 /, NMCU / 0 /, IFLAG/ 0 /
C
   10 CONTINUE
```

```
      READ (NEW,1019) IUX, (ID(I),I=1,12), NZ, (COMP(K),IZ(K),K=1,NZ)
      IF (IUX .NE. DENSEK) CALL MERR
      WRITE (6,1001) IUX, (ID(I),I=1,12)
      WRITE (6,1002) NZ,(L,COMP(L),IZ(L),I=1,NZ)
C
   20 CONTINUE
      READ (NEW,1020) J, M, ULAST, AKLAST, THETA, GAMMA, (A(K),K=1,20),
     1           (U1(I),I=6,M), (AMU(I),I=6,M), (U2(I),I=2,J),
     2           (BMU(I),I=2,J), (TMU(I),I=2,J)
      IF (J .EQ. (-5)) GO TO 100
      NMCD = NMCD + 1
      IF (ABS((THKIN-THETA)/THETA).LT.EPS) GO TO 3000
      GO TO 3001
 3000 CONTINUE
      IF(ABS((GAMIN-GAMMA)/GAMMA).LT.EPS) LRN=1
 3001 CONTINUE
      IF (IWRITE.LE.0.) IFLAG=1
      IF (ABS((IWRITE-THETA)/THETA).LT.EPS) IFLAG=1
      IF(IFLAG.NE.1) GO TO 3002
      WRITE (6,1003) THETA, GAMMA
      IF (ULAST .NE. 0.) WRITE (6,1004) ULAST, AKLAST
C
C     WRITE TRANSITION DATA
      WRITE (6,1005) (U1(I),I=6,M)
      IF ((M .GT. 150) .OR. (J .GT. 500)) CALL MERR
      WRITE (6,1006) (AMU(I),I=6,M)
C
C     WRITE EDGE DATA, IF ANY EXIST
      IF (U2(2) .EQ. 0.) GO TO 30
      WRITE (6,1010)
      WRITE (6,1007) (U2(I),I=2,J)
      WRITE (6,1009) (BMU(I),I=2,J)
      WRITE (6,1008) (TMU(I),I=2,J)
   30 CONTINUE
      WRITE (6,1012) (A(K),K=1,20)
 3002 CONTINUE
      IF(LRN.NE.1) GO TO 20
      WRITE(6,9991) THETA, GAMMA
 9991 FORMAT(61HTHE DENSEK DIAPHANOUS TAPE HAS BEEN SPACED TO AFTER THE
     1IA = , F10.4, 5X, 8H GAMMA = , F10.4)
C
  100 CONTINUE
      WRITE (6,1011) NMCD
 1011 FORMAT (39H1THIS TAPE HAS BEEN EDITED SUCCESSFULLY.//
     1    11H THERE ARE ,I5, 24H THETA, GAMMA DATA SETS.)
      RETURN
      END
```

This feature of the program is useful when a DENSER tape file is not completed in a given DENSER run or when more data are to be added to the file at a later time.

Input for DASE

CARD NO.	INPUT VARIABLE	COLUMNS	FORMAT
1	TKIN	1-10	F10.8
	GAMIN	11-20	F10.8
	TWRITE	21-30	F10.8
	ISPAC0	31-32	I2

TKIN — The temperature to which the tape is spaced. If TKIN is blank, the tape is not spaced. TKIN is in eV

GAMIN — The Γ to which the tape is spaced; if GAMIN is blank, the tape is not spaced. GAMIN is the "dimensionless electron degeneracy factor" (Ref. 2). Both GAMIN and TKIN must be specified to space the tape

TWRITE — The temperature on the tape at which editing is begun. If TWRITE ≤ 0, then the entire tape is edited

ISPAC0 — Not used. (This variable was used in the DAPHNE program, which can edit the original DIAPHANOUS tape. DAPHNE input cards can also be used by DASE.)

To use the DASE program, the DENSER tape must be mounted on unit 10. DENSER tapes are written in event parity and at 556 BPI (bits per inch).

DAPHNE: A DIAPHANOUS TAPE-EDIT CODE

DAPHNE reads the DIAPHANOUS tape (Ref. 3), which contains very short binary records, and stores the data into arrays. DAPHNE then prints out these arrays in a suitable format. DAPHNE edits either the complete tape or that part of the tape from the beginning of a specific temperature set through the end of the data on the tape. DAPHNE also has the capability of spacing a DIAPHANOUS tape to the end of a specified temperature-gamma (Ref. 2) data set and putting an end-of-file mark on the tape, or of terminating

```
      PROGRAM DIAPHNE(INPUT,OUTPUT,TAPE15,TAPE5=INPUT,TAPE6=OUTPUT)
C
C     DIAPHANOUS EDITION
C
C     VARIABLE NAME  MEANING
C
C     *** AUGEAS ***
C     DELEPJ (2000)  ENERGY CHANGE DURING A TRANSITION (EV)
C     DELEPS (1500)  IONIZATION POTENTIAL OF A STATE (EV)
C     EIN (15)       ENERGY OF GROUND STATE OF AN IONIZATION LEVEL
C     EPSJ (1500)    SAME AS EPS IN DIAPHANOUS
C     FPC (3, 5, 5)  FRACTIONAL PERCENTAGE COEFFICIENT FOR TRANSITION BETWEEN
C                    SPLIT CONFIGURATIONS
C     IJU (2000)     IDENTIFICATION NUMBER OF INITIAL STATE ASSOCIATED WITH A
C                    TRANSITION
C     ISPLIT (15, 40)IDENTIFICATION OF A SPLIT CONFIGURATION
C     MERGED (15, 40)TRUE IF THIS CONFIGURATION IS THE AVERAGE OF SOME OTHER
C                    CONFIGURATIONS IN THE TABLE
C     MJU (2000)     NUMBER OF ELECTRONS IN LEVEL FROM WHICH ONE IS REMOVED IN
C                    THIS TRANSITION
C     NPU (1500)     SAME AS NP IN DIAPHANOUS
C     NJU (2000)     PRINCIPAL QUANTUM NUMBER (OR REDUCED QUANTUM NUMBER) OF
C                    ELECTRON REMOVED IN THIS TRANSITION.
C     NQ (6, 15, 40) NUMBER OF ELECTRONS IN AN ELECTRON LEVEL IN A CONFIGURATION
C     NNMAX (15)     NUMBER OF CONFIGURATIONS AT AN IONIZATION LEVEL
C     NNSAVE (1500)  CONFIGURATION IDENTIFICATION OF A STATE
C     NSAVE (1500)   QUANTUM NUMBER OF OUTER ELECTRON, IF BEYOND TABLE, OF A
C                    STATE
C     QU (1500)      SAME AS Q IN DIAPHANOUS
C     QW1 (15, 40)   DEGENERACY OF A CONFIGURATION
C     W0 (15, 40)    COEFFICIENTS IN QUADRATIC FOR DETERMINING ENERGY OF THIS
C                    CONFIGURATION
C     W1 (15, 40)    COEFFICIENTS IN QUADRATIC FOR DETERMINING ENERGY OF THIS
C                    CONFIGURATION
C     W2 (15, 40)    COEFFICIENTS IN QUADRATIC FOR DETERMINING ENERGY OF THIS
C                    CONFIGURATION
C     *** DIAPH2 ***
C     BE (100)       SAME AS BEJ, INDEXED BY (NP + 1) FOR INITIAL STATE
C     BEJ (1000)     PARAMETER DETERMINING LINE WIDTH FOR A TRANSITION
C     C (10)         CONCENTRATION OF AN ELEMENT (ATOMS/ATOM)
C     COM (12)       COMMENT CARD IN FORMAT 12A6
C     DELE (100)     SUM OF DELI AT PREVIOUS IONIZATION LEVELS (EV)
C     DELEPJ (2200)  ENERGY CHANGE DURING A TRANSITION (EV)
C     DELEPS (1500)  IONIZATION POTENTIAL OF A STATE (EV)
C     DELI (100)     PRESSURE IONIZATION AT AN IONIZATION LEVEL (EV)
C     EPS (1500)     ENERGY OF A STATE, USUALLY REFERRED TO THE ENERGY OF THE
C                    GROUND STATE OF THE NEUTRAL ATOM (EV)
C     EPSPRM (1500)  ENERGY OF A STATE AFTER REDUCTION DUE TO PRESSURE IONIZA-
C                    TION (EV)
C     EX (100)       SAME AS EXJ, INDEXED BY (NP + 1) FOR INITIAL STATE
C     EXJ (1000)     PARAMETER DETERMINING LINE LOCATIONS FOR A TRANSITION
C     GAMBLK (10)    AMBAT OF GAMMA
C     IJ (2200)      IDENTIFICATION NUMBER OF INITIAL STATE ASSOCIATED WITH A
C                    TRANSITION
```

```
C     MAKEZ (1500)   IDENTIFICATION OF STATE TO BE ELIMINATED
C     MJ (2200)      NUMBER OF ELECTRONS IN LEVEL FROM WHICH ONE IS REMOVED IN
C                    THIS TRANSITION
C     NEW (2200)     ORIGINAL IDENTIFICATION NUMBER OF A TRANSITION
C     NF (1500)      NUMBER OF FREE ELECTRONS FOR A STATE
C     NJ (2200)      TOTAL QUANTUM NUMBER (OR REDUCED QUANTUM NUMBER) OF ELEC-
C                    TRON REMOVED DURING A TRANSITION
C     NLAST (10)     INDEX NUMBER OF LAST STATE IN TABLE FOR AN ELEMENT
C     PHI (2200)     STRENGTH OF EDGE DUE TO THIS TRANSITION
C     U (1500)       DEGENERACY OF A STATE
C     X (1500)       FIRST PROPORTIONAL TO LOG POPULATION AND THEN TO POPULATION
C                     OF A STATE
C     XS (10)        FIRST MAXIMUM X, THEN SUM OF X'S FOR AN ELEMENT
C     SMALLP (1500)  POPULATION OF A STATE
C     TEST1 (2200)   LOWEST VALUE OF MU AT WHICH THE ABSORPTION COEFFICIENT IS
C                    AFFECTED BY THE LINE SERIES FOR THIS TRANSITION
C     XKBLK (10)     AMRAT OF XT
C     U (5)          COEFFICIENTS IN GAUSSIAN INTEGRATION
C     X (5)          COEFFICIENTS IN GAUSSIAN INTEGRATION
C     VOLD (2200)    LOCATION OF EDGE DUE TO THIS TRANSITION (EV/EV)
C     VPRM (2200)    LOWERED EDGE TO APPROXIMATE HIGH LINES (EV/EV)
C     W (10)         ATOMIC WEIGHT OF AN ELEMENT
C     Z (10)         ATOMIC NUMBER OF AN ELEMENT
C     *** DIAPER ***
C     AMU (1000)     ABSORPTION COEFFICIENT AT A PARTICULAR VALUE OF MU(.G .LE.
C                    MU .LE. 15) (PER CM)
C     BMU (1000)     BOTTOM OF EDGE OCCURING AT A PARTICULAR VALUE OF MU(MU .GT.
C                     15)(PER CM)
C     ID (12)        COMMENT CARD
C     TMU (1000)     TOP OF EDGE OCCURING AT A PARTICULAR VALUE OF U (U>15) (PER
C                    CM)
C     *** SPECTRA ***
C     DELPEC (100, 4)QUANTUM DEFECT INDEXED BY THE IONIZATION LEVEL AND L + 1
C     DELEPJ (3500)  SAME AS DELEPJ IN DIAPHANOUS
C     DELEPS (1750)  SAME AS DELEPS IN DIAPHANOUS
C     EPSU (1750)    SAME AS EPS IN DIAPHANOUS
C     JJU (3500)     SAME AS IJ IN DIAPHANOUS
C     IONZC (100)    ZCORE FOR AN IONIZATION LEVEL
C     L (19)         L FOR AN ELECTRON LEVEL
C     LIN (10)       LEVEL AT WHICH AN ELECTRON IS BEING ADDED
C     LOUT (10)      LEVEL AT WHICH AN ELECTRON IS BEING REMOVED
C     MJU (3500)     SAME AS MJ IN DIAPHANOUS
C     N (19)         N FOR AN ELECTRON LEVEL
C     NE (92, 19)    NUMBER OF ELECTRONS PER ELECTRON LEVEL IN THE GROUND STATE
C                    OF AN IONIZATION LEVEL
C     NFU (1750)     SAME AS NF IN DIAPHANOUS
C     NJU (3500)     SAME AS NJ IN DIAPHANOUS
C     GU (1750)      SAME AS G IN DIAPHANOUS
C
      DIMENSION U2(1000), BMU(1000), TMU(1000)
      DIMENSION ID(12),A(10),B(10),U1(150),GART(150),AMU(150),DAVE(150)
C
      DATA EPS / 1.E-07 /
      DATA IFLAG/0/
C
```

```
C     TKIN       IS THE TEMPERATURE AFTER WHICH AN END OF FILE IS WRITTEN
C                OR THE PROGRAM STOPS SPACING
C     GAMIN      IS THE GAMMA AFTER WHICH AN END OF FILE IS WRITTEN OR
C                THE PROGRAM STOPS SPACING
C     TWRITE     IS THE TEMPERATURE AT WHICH THE PROGRAM STARTS WRITING
C                VALUES FROM THE DAPHNE TAPE ONTO THE OUTPUT TAPE
C
C                IF (TWRITE .LE. 0.) COPY ENTIRE TAPE
C
C     IF (ISPACO .LT. 0)           AN END OF FILE WILL BE PUT ON THE
C                                  DIAPHANOUS TAPE
C     IF (ISPACO .GE. 0)           DAPHNE SPACES THE DIAPHANOUS TAPE
C                                  PAST A CERTAIN TEMPERATURE AND GAMMA
C     IF SAUT IS TO BE USED AFTER THE TAPE IS SPACED BY DAPHNE, THEN THE
C     USER MUST USE AN IO CARD WITH COLUMNS 1 - 6 BLANK AS INPUT TO SAUT
C
C     LRN        IS A SIGNAL WHICH IS SET TO 1 WHEN GAMIN AND TKIN ARE
C                FOUND ON THE TAPE. IT IS TESTED AT THE END OF EACH THETA,
C                GAMMA SET.  ITS VALUE IS ZERO, OTHERWISE.
C
      READ (5,9007) TKIN, GAMIN, TWRITE, ISPACO
      WRITE (6,9970) TKIN, GAMIN, TWRITE, ISPACO
 9007 FORMAT (3F10.8,I2)
 9970 FORMAT (25H THE INPUT TEMPERATURE = ,1PE15.8,/,
     1        19H THE INPUT GAMMA = ,1PE15.8,/
     2        ,11H  TWRITE = ,1PE15.8,10H ISPACO = ,I3)
      MIN = 15
      LRN = 0
      REWIND MIN
      NRCD = 0
      IOMO2 = 1000
C
      WRITE(6,9990)
      READ(MIN) A(1)
      WRITE(6,9995) A(1)
      IF (A(1))25,999,999
   25 IF(A(1)+1.) 999,2500,999
 2500 CONTINUE
      NRCD = NRCD + 1
      READ (MIN) (ID(I),I=1,12)
      WRITE(6,9999) (ID(K), K=1,12)
      NRCD = NRCD + 1
      READ(MIN) A(1)
      WRITE(6,9995) A(1)
      IF(A(1)+2.) 999,3002,999
 3002 CONTINUE
      NRCD = NRCD + 1
   32 READ (MIN) (B(I),I=1,2)
      IF (ABS((TKIN - B(1))/B(1)) .LT. EPS) GO TO 11
      GO TO 115
   11 CONTINUE
      IF (ABS((B(2) - GAMIN)/B(2) ) .LT. EPS) LRN = 1
  115 CONTINUE
      IF (TWRITE .LE. 0.) IFLAG=1
      IF (ABS((TWRITE - B(1))/B(1)) .LT. EPS) IFLAG=1
```

```
      IF (IFLAG.EQ.1) GO TO 30
      IK = B(1)
      U2(J) = 0.
      NRCD = NRCD + 1
   33 CONTINUE
      NRCD = NRCD + 1
      READ (MIN) A(1),A(2)
      NRCD = NRCD + 1
      IF (A(1) + 3.)  31,61,31
   31 CONTINUE
      IF (A(1) + 4.)  41,30,41
   41 CONTINUE
      IF (A(1) + 6.)  33,42,33
   42 CONTINUE
      READ (MIN)  A(1),A(2)
      NRCD = NRCD + 1
      GO TO 33
   61 CONTINUE
      READ (MIN) A(1),A(2),A(3)
      IF (A(1) + 4.) 62,30,62
   62 CONTINUE
      J = J + 1
      IF (J - IUMU2)  61,61,69
   69 CONTINUE
      READ (MIN) A(1),A(2),A(3)
      NRCD = NRCD + 1
      IF (A(1) + 4.)  69,30,69
   30 CONTINUE
      NRCD = NRCD + 1
      READ (MIN) (A(JM),JM=1,8)
      IF (LRN .NE. 1) GO TO 12
   13 CONTINUE
C     SPACE TAPE TO IKIN, GAMIN POSITION ON THE DIAPHANOUS TAPE
      IF (ISPACU .LT. 0) GO TO 14
      WRITE (6,9001) (B(I), I=1,2)
 9001 FORMAT (54HOTHE DIAPHANOUS TAPE HAS BEEN SPACED TO AFTER THETA = ,
     1         1PE15.8,3X,9H GAMMA = ,1PE15.8)
      WRITE (6,9997) (A(JM),JM=1,8)
      WRITE (6,9994) NRCD, LRN
      CALL EXIT
   14 CONTINUE
C     WRITE AN END OF FILE ON THE TAPE
      TNU = -5.
      WRITE (MIN) TNU
      END FILE MIN
      WRITE (6,9995) TNU
      WRITE (6,9003) (B(I), I=1,2)
 9003 FORMAT (61HOAN END OF FILE WAS PUT ON THE DIAPHANOUS TAPE AFTER TH
     1ETA = ,1PE15.8,3X,9H GAMMA = ,1PE15.8)
      GO TO 155
   12 CONTINUE
C
      NRCD = NRCD + 1
      READ (MIN) A(1)
      IF (A(1) + 2.) 77,32,999
```

```
   30 CONTINUE
C
      WRITE (6,9998) (B(J),J=1,2)
      J = 2
      M = 6
      U2(J) = 0.
      GAMT(1) = 0.
      UAVE(1) = 0.
      TK = B(1)
      GAMMA = B(2)
      NRCU = NRCD + 1
   34 READ(MIN) A(1), A(2)
      IF(A(1) .LT. 0.) WRITE(6,9995) A(1)
      UX = A(1)
      UY = A(2)
      NRCU = NRCD + 1
      IF(UX + 3.) 35,65,35
   35 IF(UX + 4.) 40,75,40
   40 IF(UX + 6.) 55,45,55
   45 READ(MIN) A(1), A(2)
      WRITE(6,9000) A(1), A(2)
      U1(M) = A(1)
      AMU(M) = A(2)
      M = M+1
      UX = A(1)
      UY = A(2)
      NRCU = NRCD + 1
      IF(UX .LE. 0.) GO TO 4500
      ULAST = UX
      AKLAST = UY
      GO TO 34
 4500 WRITE(6,9000) UX, UY
      REWIND MIN
      CALL EXIT
   55 U1(M) = UX
      AMU(M) = UY
      M = M+1
      GO TO 34
   65 READ(MIN) A(1), A(2), A(3)
      UX = A(1)
      UY = A(2)
      UZ = A(3)
      NRCU = NRCD + 1
      IF(UX + 4.) 70,74,70
   70 U2(J) = UX
      BMU(J) = UY
      TMU(J) = UZ
      J = J+1
      JJ = J-1
      IF (J .EQ. 801) WRITE (6,9004) JJ
 9004 FORMAT  (42H 2ND SET OF DIAPHANOUS DATA HAS MORE THAN ,I3,19H ENTR
     1IES.  THETA = ,F7.2,8H, GAMMA=1PE10.5,19H, NO GOOD ABOVE U =,0PF6.
     21)
      IF(J-1DMU2) 65,65,72
   72 WRITE(6,15) IDMU2, TK, GAMMA, U2(J-1)
```

```
   73 READ(MIN) A(1), A(2), A(3)
      UX = A(1)
      UT = A(2)
      UZ = A(3)
      NRCD = NRCD + 1
      IF(UX + 4.) 73,74,73
   74 ULAST=U2(J-1)
      AKLAST=AMU(J-1)
   75 CONTINUE
      M = M - 1
      WRITE (6,9980) (U1(I), I=1,M)
      IF(GAMT(1) .NE. 0.) WRITE(6,9002) GAMT
      WRITE (6,9982) (AMU(I), I=1,M)
      IF(UAVE(1) .NE. 0.) WRITE(6,9002) UAVE
      READ(MIN) (A(JM), JM=1,8)
      WRITE(6,9997) (A(JM), JM=1,8)
      IF(U2(2) .EQ. 0.) GO TO 76
      J = J - 1
      WRITE (6,9984) (U2(I), I=1,J)
      WRITE (6,9986) (BMU(I), I=1,J)
      WRITE (6,9988) (TMU(I), I=1,J)
   76 CONTINUE
      NRCD = NRCD + 1
      IF (LRN .EQ. 1) GO TO 13
      READ (MIN) A(1)
      WRITE(6,9996) A(1)
      UX = A(1)
      NRCD = NRCD + 1
      IF(UX + 2.) 77,32,999
   77 IF(UX + 5.) 999,155,999
  155 CONTINUE
C
      NRCD = NRCD + 1
C     THE ABOVE RECORD COUNT INCLUDES THE EOF RECORD
      WRITE (6,9994) NRCD, LRN
      REWIND MIN
      CALL EXIT
  999 CONTINUE
      WRITE (6,9991)
 9991 FORMAT (55H THERE IS AN ERROR IN THIS RUN. MERR HAS BEEN CALLED.)
      CALL MERR
C
C     ********************  F O R M A T S  **********************
   13 FORMAT  (42H 2ND SET OF DIAPHANOUS DATA HAS MORE THAN 13, 19H ENTR
     2IES.  THETA = F7.2, 8H, GAMMA=1PE10.5,20H, NO GOOD ABOVE U = UPP6.
     31)
 9000 FORMAT(9HU ULAST = 1PE15.7, 3X 8HAKLAST = E15.7)
 9002 FORMAT(1P10E12.5)
 9980 FORMAT(1UH0 U1 ARRAY // (1P1UE12.5))
 9982 FORMAT(11H0 AMU ARRAY // (1P1UE12.5))
 9984 FORMAT(10H0 U2 ARRAY //(1P1UE12.5))
 9986 FORMAT(11H0 BMU ARRAY // (1P10E12.5))
 9988 FORMAT(11H0 TMU ARRAY // (1P1UE12.5))
 9990 FORMAT(1H1)
 9994 FORMAT(45H0 TAPE EDITING ON UNIVAC 1108 IS SUCCESSFUL. / 35H0 TOTA
     1L NUMBER OF WRITE RECORDS IS ,I1U / 11H LRN WAS = ,I10)
 9995 FORMAT(1UH0 SIGNAL = F6.1)
 9996 FORMAT(1UH1 SIGNAL = F6.1)
 9997 FORMAT(6HU/BAR=F8.4, 1X 4HRHO=1PE11.5, 2X 2HP=E11.5, 2X 2HE=E11.5,
     1 2X 5HKKOS=E11.5, 2X 6HKPLNK=E11.5, 2X 5HEION=E11.5, 2X 5HEBAR=
     2UPF9.3)
 9998 FORMAT(9HU THETA = 1PE15.7, 3X 7HGAMMA = E15.7)
 9999 FORMAT(1HU, 12A6)
      END
```

the run without rewinding the tape. These features are useful when the end of the DIAPHANOUS tape is reached before a DIAPHANOUS run is finished, a previous run is incomplete, or more data are to be added to the DIAPHANOUS tape.

Input for DAPHNE

CARD NO.	INPUT VARIABLE	COLUMNS	FORMAT
1	TKIN	1-10	F10.8
	GAMIN	11-20	F10.8
	TWRITE	21-30	F10.8
	ISPAC0	31-32	I2

TKIN — The temperature to which the tape is spaced; if TKIN is blank, the tape is not spaced. TKIN is in eV

GAMIN — The Γ to which the tape is spaced; if GAMIN is blank, the tape is not spaced. Γ is the "dimensionless electron degeneracy factor." Both GAMIN and TKIN must be specified to space the tape

TWRITE — The temperature on the tape at which editing is begun. If TWRITE ≤ 0, then the entire tape is edited

ISPAC0 — If ISPAC0 < 0, then an end-of-file will be put on the DIAPHANOUS tape; if ISPAC0 ≥ 0, the tape is spaced to the end of a specified temperature, gamma set, and the run is terminated without rewinding the tape

ANDIMX: CONVERSION OF OPACITY DATA FROM ANN TO DIAPHANOUS FORM

The FORTRAN IV ANDIMX program complex was written to transform ANN opacity data (computed by W. Huebner and D. Koontz at Los Alamos Scientific Laboratory to DIAPHANOUS form.

ANN data tapes are IBM-7094 binary tapes. These are first converted by the ANHIST 1108 machine language program to a UNIVAC-1108 binary tape. In this step, none of the data present on the original ANN tape are modified; however, all the ANN input tape records are brought to a standard UNIVAC-1108 binary format.

BLANK PAGE

```
C                D) A BLANK CARD SIGNIFIES END OF DATA.  IF NO THETA-
C                   RHO SETS ARE TO BE DELETED, A BLANK DATA CARD MUST
C                   FOLLOW THE SIX CARDS DESCRIBED ABOVE IN 1) AND 2).
C
C     **********                    WARNING                    **********
C     CAYT ASSUMED .GE. 100
C     CAYT ASSUMED TO BE CLOSE TO A MULTIPLE OF 100 EV
C     **********                                               **********
C
C
      DIMENSION TITLE(60),B1(14), INPUT(10),SIGNAL(7),B2(11),IB(13)
     1,MU(2971),DTU(2971), MU2(2971), BB1(14), IBB(13), BB2(11)
     2,THETA(1000),DNSITY(1000),CAYTE(1000)

      DIMENSION CAYDEL(100), RHODEL(100,25), NRHO(100), ISAVE(100)
     1          ,CAYGON(50), RHOGON(50,25)
C
      REAL MU, MU2
      INTEGER ANIN, ANOUT, DONE
C
C
      DATA X/-1967./, SIGNAL/-1.,-2.,-3.,-4.,-5.,-6.,-7./,DONE/0/,
     1 NEXT/1/,CAYT/0./,MAXRHO/25/,ANUIMX/6HANUIMX/
C
C     B2(9) AND B2(10) ARE SET TO ZERO IN CASE ANHIST-OUTPUT-TAPES
C     CONTAIN 35-WORD FIRST RECORDS (RATHER THAN 37-WORD FIRST RECORDS)
C     AT EACH TEMPERATURE-DENSITY POINT.
      DATA B2(9), B2(10)/2*0./
C
C     M COUNTS THE NUMBER OF TEMPERATURES FOR WHICH DATA ARE TO BE
C       DELETED.
C     IDELET COUNTS THE NUMBER OF DENSITY SETS TO BE DELETED, PER
C       TEMPERATURE.
C     ISAVE(M) IS SET TO NONE IF NO DATA FOR CAYTNO(M) IS TO BE WRITTEN
C       ON THE ANUIMX-OUTPUT-TAPE ANOUT.
C     KOUNT COUNTS TEMPERATURES FOR WHICH DATA ARE TO BE DELETED, AS
C       THEY ARE LOCATED ON ANIN.
C     J COUNTS RHOPTS, PER TEMPERATURE, FOR WHICH DATA ARE TO BE WRITTEN
C       ON ANUIMX-OUTPUT-TAPE ANOUT
C     KJ COUNTS TEMPERATURE-DENSITY SETS WRITTEN ON ANUIMX-OUTPUT-TAPE
C       ANOUT
C     JDELET IS SET TO NONE IF NO DELETIONS ARE TO BE MADE FOR A
C       TEMPERATURE THAT IS READ FROM ANIN.
C
      DATA M/0/, IDELET/0/, NONE/1/, ISAVE/100 * 0/, KOUNT/0/
      DATA J/0/, KJ/1/
C
      DATA MODIFY/6H THESE/, NOTDO/6H  NO  /, EPSILN/1.E-3/
      DATA ISAVET/0/, JDELET/0/, NRHO/100*0/
C
      EQUIVALENCE (ANIN,INPUT(1)),(ANOUT,INPUT(2)),(IMDONE,B1(1)),
     1(CAYT,B1(3)),(MU(1),DTU(1)),(AMT,B1(2)),(RHO,B1(4)),
     2(CAYTEE, B2(11))
C
      READ (5,1) (TITLE(L1),L1=1,52)
    1 FORMAT (12A6)
C
      READ (5,2) ANIN,ANOUT
    2 FORMAT (I2,1X,I2)
      IF(ANIN.EQ.0) ANIN=14
      IF(ANOUT.EQ.0) ANOUT=12
C
      WRITE (6,3) (TITLE(L3),L3=1,52)
    3 FORMAT(1X,12A6, //)
C
      WRITE (6,8) ANIN,ANOUT
    8 FORMAT (8H ANIN = , I2, 9H ANOUT = , I2)
C                                                 REWIND ALL TAPES
      REWIND ANOUT
```

```
      REWIND ANIN
      REWIND 2
C
      WRITE (ANOUT)ANDIMX,X,X
      READ (ANIN) (TITLE(KM),KM=53,60)
C                                                  WRITE TAPE TITLE
      WRITE (ANOUT)(TITLE(L2),L2=1,60)
      WRITE (6,12) (TITLE(KM),KM=53,60)
   12 FORMAT (1X,8A6, ////)
C
C
C     READ ALL DATA CARDS NECESSARY TO PREVENT SPECIFIED THETA-RHO DATA
C        FROM BEING WRITTEN ON ANOUT, THE ANDIMX OUTPUT TAPE.
C     TEMPERATURES MAY BE SPECIFIED IN ANY ORDER
C     DENSITIES, PER TEMPERATURE, MAY BE SPECIFIED IN any ORDER.
C     IT IS, HOWEVER, MORE EFFICIENT TO INPUT TEMPERATURES IN INCREASING
C        ORDER, AND DENSITIES PER TEMPERATURE IN INCREASING ORDER, AS
C        THAT IS THE ORDER IN WHICH THESE QUANTITIES ARE WRITTEN ON ANIN.
C
  400 CONTINUE
      M=            M + 1
      READ (5,500) CATUEL(M), NRHO(M)
  500 FORMAT (F10.4, 8X, I2)
        IF (CATUEL(M) .EQ. 0.) GO TO 410
        IF (NRHO(M) .NE. 0) GO TO 401
C
C     NRHO(M) .EQ. 0. MEANS DELETE ALL DATA AT THAT TEMPERATURE.
      ISAVE(M)=     NONE
      GO TO 400
C
  401 CONTINUE
      NRHO=         NRHO(M)
      READ (5,501) (RHOUEL(M,M1), M1=1,NRHO)
  501 FORMAT (7E10.5)
C
      GO TO 400
C
C     ALL DATA CARDS HAVE BEEN READ
C
  410 CONTINUE
C     IF (M.EQ.1), NORMAL RUN, NO DELETIONS
        IF (M .EQ. 1) MODIFY = NOTDO
      WRITE (6,502) MODIFY
  502 FORMAT (31HUALL DATA CARDS HAVE BEEN READ, A6, 75H DELETIONS WILL
     1BE MADE (IF NRHO.EQ.0, DELETE ALL DATA AT THE INPUT CATTNO)  )
        IF (MODIFY .EQ. NOTDO) GO TO 480
      WRITE (6,503)
  503 FORMAT (  / 31H     CATTNO      NRHO       NRHONO  /)
C
      DO 470 M3=1,M
      NNRHO=        NRHO(M3)
      WRITE (6,504) CATUEL(M3), NRHO(M3), (RHOUEL(M3,M4), M4=1,NNRHO)
  504 FORMAT (2X, F10.4, 3X, I2, 4X, 1PE10.5, / (21X,1PE10.5))
  470 CONTINUE
      WRITE (6,505)
```

```
  905 FORMAT (1H1)
  480 CONTINUE
C
C
      READ (ANIN) B1,IB,(B2(LC),LC=1,10)
C
C     CATTE STORES THE TEMPERATURE TO BE WRITTEN ON ANOUT.
C     CATTEE STORES THE TEMPERATURE READ FROM ANIN THAT WILL BE
C       WRITTEN AS B2(11) ON ANOUT.
C
      CATTE(KJ)=CATT
      CATTEE = CATT
C
      CATT=     FLOAT (IFIX(CATT/100. + .5 ) * 100 )
CAVEAT    ASSUMES TEMPERATURE .GE. (100-EPSILON)
      ICATT=        CATT
C
  415 CONTINUE
      DO 9 JK=1,MAXNMO
        IF (MODIFY .EQ. NOTDO) GO TO 450
        IF (ICATT .EQ. ISAVET) GO TO 434
C
C     CHECK TO SEE WHETHER CATT IS ONE FOR WHICH DATA ARE TO BE DELETED.
C
      DO 420 M2=1,M
        IF (ABS((CATT-CATDEL(M2))/CATT) .LT. EPSILN) GO TO 430
  420 CONTINUE
      M2=           M
      JDELET=       NONE
      GO TO 450
C
C
C     A TEMPERATURE FOR WHICH DATA ARE TO BE DELETED HAS BEEN LOCATED.
  430 CONTINUE
      KOUNT=        KOUNT + 1
      JDELET=       0
      IDELET=       0
        IF (ISAVE(M2) .EQ. NONE) GO TO 431
      NNMMO=        NMMO(M2)
C
  434 CONTINUE
        IF (JDELET.EQ.NONE .OR. IDELET.EQ.NMMO(M2)) GO TO 450
  435 CONTINUE
      DO 440 M3=1,NNMMO
        IF (ABS((RHO-RMODEL(M2,M3))/RHO) .LT. EPSILN) GO TO 431
  440 CONTINUE
      GO TO 450
C
  431 CONTINUE
C     DELETE THETA-RHO DATA
      ISAVET=       CATT
      READ (ANIN) NOTUSE
      READ (ANIN) NOTUSE
      IDELET=       IDELET + 1
      READ (ANIN) NOTUSE, NOTUSE, CATGON(KOUNT), RMOGON(KOUNT,IDELET)
```

```
      GO TO 14
C
  450 CONTINUE
CAVEAT    ASSUMES .LE. 25=MAXRHO DENSITIES AT EACH TEMPERATURE
      THETA(KJ)=CATT
      DNSITY(KJ)=RHO
      WRITE (2)  B1,IB,B2
C     ANDIMX OUTPUT TAPES ALL HAVE 38 WORD FIRST RECORDS
C     RECORD 1 SAYS ANDIMX
C
      J=J+1
C
      READ(ANIN) NOTUSE
      READ (ANIN)  NMAX, (NOTUSE,I=1,NMAX),(DTU(I),I=1,NMAX)
C
      DO 5 I=1,NMAX
      U OF I = .3 + FLOAT(I-1) * .01
      MU(I)=RHO*DTU(I)*6.47627/(CATTEE*(U OF I**3)*AWT)
C
C     CONNECTION FOR INDUCED EMISSION STILL PRESENT.
    5 CONTINUE
C
      ISAVE1=CATT
      WRITE (2)  NMAX,(MU(I),I=1,NMAX)
      WRITE (6,19)   KJ, THETA(KJ), DNSITY(KJ)
   19 FORMAT (14H DATA AT KJ = ,I4, 12H, FOR CATT = ,E12.4,8H, RHO = ,
     1   E12.5, 27H HAVE BEEN WRITTEN ON DRUM. )
      KJ=KJ+1
C
   14 CONTINUE
C
C
C
      READ (ANIN) B1,IB,(B2(LC),LC=1,10)
      IF (IMDONE .EQ. 0) GO TO 101
C
      CATTE(KJ)=CATT
      CATTEE = CATT
      CATT =    FLOAT (IFIX (CATT/100. +.5) * 100 )
      ICATT=CATT
        IF (ICATT.NE.ISAVET .AND. ISAVE(M2) .EQ. NONE) GO TO 460
        IF (ICATT .NE. ISAVET) GO TO 102
        IF (ISAVE(M2) .EQ. NONE) GO TO 431
        IF (MODIFY.EQ.NOTDO .OR. JDELET.EQ.NONE .OR. IDELET.EQ.NRHO(M2))
     1     GO TO 99
      GO TO 435
C
  101 CONTINUE
      DONE = NEXT
  102 CONTINUE
C     WRITE OUT ALL RECORDS FOR A GIVEN TEMPERATURE ON THE ANDIMX OUTPUT
C       TAPE.
C
        IF (MODIFY .EQ. NOTDO) GO TO 461
        IF (JDELET.NE.NONE .AND. IDELET.NE.NRHO(M2)) GO TO 600
```

```
  461 CONTINUE
      DO 7 I=1,J
      BACKSPACE 2
      READ (2) NMAX2, (MU2(K),K=1,NMAX2)
      BACKSPACE 2
      BACKSPACE 2
      READ (2) BB1,IBB,BB2
      BACKSPACE 2
      WRITE (ANOUT) SIGNAL (7), X, X
      WRITE (ANOUT) BB1, IBB ,BB2
      WRITE (ANOUT)  NMAX2, (MU2(K),K=1,NMAX2)
    7 CONTINUE
C
  460 CONTINUE
        IF (ISAVE(M2) .EQ. NONE) BB1(3)=CAYDEL(M2)
      WRITE (6,20) J, BB1(3)
   20 FORMAT (1H0,I4,81H DATA (NMU) SETS HAVE BEEN WRITTEN ON ANDIMX OUT
     1PUT TAPE ANOUT FOR TEMPERATURE =    ,F10.0,//)
      IF(DONE.EQ.NEXT) GO TO  100
      J=0
      REWIND 2
      GO TO 415
   99 CONTINUE
    9 CONTINUE
C
      WRITE (6,15)  THETA(KJ), (DNSITY(LM), LM=1,25)
   15 FORMAT (58H CHANGE MAXNMO=25. THERE ARE TOO MANY DENSITIES AT THET
     1A= , F10.0 /37H0THE FOLLOWING DENSITIES WERE READ IN/(1P10E13.7))
  499 CONTINUE
      CALL MERR
      RETURN
  100 CONTINUE
        IF (KOUNT .NE. M-1) GO TO 601
      WRITE (ANOUT) SIGNAL(5), X,X
      END FILE ANOUT
      REWIND 2
      REWIND ANIN
      REWIND ANOUT
      WRITE (6,18)
   18 FORMAT (34H1 TAPE WRITING ON ANOUT COMPLETED.  )
      WRITE (6,16)
   16 FORMAT(1H1,1X,50H THE TEMPERATURES AND DENSITIES PUT ON ANOUT WERE
     1 /1H0,14X,16HANIN TEMPERATURE,5X,17HANOUT TEMPERATURE,5X,13HANOUT
     2DENSITY  /)
      DO 498 LL=1,KJ
      WRITE (6,17) LL, CAYTE(LL), THETA(LL), DNSITY(LL)
   17 FORMAT (8X,I4,4X,1PE13.7,9X,1PE13.7,7X,1PE13.7)
  498 CONTINUE
      WRITE(6,13)
   13 FORMAT (36H0 ANDIMX RUN SUCCESSFULLY COMPLETED.
      RETURN
C
C     E R R O R   E X I T S
C     A TEMPERATURE FOR WHICH DATA ARE TO BE DELETED HAS BEEN INPUT.
C       HOWEVER, THE INPUT DENSITY CANNOT BE FOUND ON THE ANIN TAPE.
```

```
  600 CONTINUE
      WRITE (6,650) CATDEL(M2), (RHODEL(M2,M5), M5=1,NNRHO)
  650 FORMAT (64H1 A TEMPERATURE FOR WHICH DATA ARE TO BE DELETED HAS BE
     1EN INPUT. / 61HO HOWEVER, THE INPUT DENSITY CANNOT BE FOUND ON THE
     2 ANIN TAPE / 11HO CATDEL = ,E12.6, 14H, RHODEL SET=  ,E12.6,
     3 (/57X,E12.6) )
      GO TO 499
C
  601 CONTINUE
C     ALL TEMPERATURES ON ANIN HAVE BEEN CHECKED AGAINST INPUT TEMPERA-
C       TURES FOR WHICH DATA ARE TO BE DELETED.  HOWEVER, NOT ALL THE
C       INPUT TEMPERATURES WERE FOUND.  CHECK FOR INPUT ERROR.
      WRITE(6,651)
  651 FORMAT(60H1 INPUT ERROR.  ALL VALUES OF CATNO WERE NOT FOUND ON A
     1NIN. )
      GO TO 499
      END
```

The ANHIST output tape is next processed by the ANDIMX program. Both ANN and ANHIST tapes have three records at a given (temperature, density) point. The first contains some thermodynamic data as well as some data that specify the type of calculation done by the ANN code. The ANHIST tape contains a 38-word first record. (ANN tapes contain 38 or fewer words in the first record. If there are less than 38 words, the ANHIST program fills the record with zeros.) This first record is preserved by the ANDIMX program. The second record on the ANN and ANHIST output tapes contains data on the energy levels and occupation numbers used in the ANN calculation at this (temperature, density) point. These data are not needed by the DIANE or radiation transport-hydrodynamics codes and are not present on the ANDIMX output tapes. The third record on the ANN and ANHIST output tapes contains reduced absorption coefficients. Both the continuous and the total (i.e., the "continuous plus lines") absorption coefficients are present. The ANDIMX program transforms the reduced absorption coefficient to the form expected by the DIANE code by the formula

$$\mu_{\text{ANDIMX output}} = 6.476 \times 10^7 \, (\rho\mu_{\text{ANN output}})/(A\,\theta\,u^3),$$

where ρ is the density in gm/cc, A is the atomic weight in gm/mole, μ is the absorption coefficient, and u is the frequency in units of $h\nu/kT$.

On the ANN and ANHIST output tapes, the data at a given temperature are arranged in order of increasing densities. The DIANE program could process these data. However, the General Atomic radiation transport-hydrodynamics codes expect to find opacity data in decreasing density order at a given temperature. Therefore, the ANDIMX code next re-orders the data, at a given temperature, into a decreasing density order.

The ANDIMX output tape is acceptable input to the DIANE program.

The FORTRAN IV program EDITAN can edit ANHIST output tapes or ANDIMX output tapes.

The ANHIST program was written by J. Clow of General Atomic.

Input for ANDIMX

CARD NO.	FORMAT	DESCRIPTION
1-5	12A6	52 words of TITLE information (these data are combined with the 8 word TITLE already on the ANN tape (the ANHIST output tape))
6	I2, 1X, I2	ANIN, ANOUT } integer variables specifying the input and output tape units. If ANIN=0, it is reset to 14: if ANOUT =0, it is reset to 12
7	F10.4, 8X, I2	CAYDEL: if nonzero, delete data at θ = CAYDEL NRHO: delete NRHO densities at θ = CAYDEL. If NRHO=0, delete all densities at θ = CAYDEL
8, 9, etc	7E10.5	RHODEL(I), I=1, NRHO; the densities to be deleted at θ = CAYDEL

(Card types 7, 8, 9, etc., are repeated as required. If card 7 is blank, no data are to be deleted.)

The ANDIMX program produces a binary output tape.

COMBO: A PROGRAM TO COMBINE OPACITY TAPES

Purpose

COMBO is a FORTRAN IV code written for the UNIVAC-1108. Its purpose is to select temperature-density data sets from any of four possible types of input tapes and transmit these sets to one of two possible types of output tapes. Input tapes for COMBO can be output tapes from either DIAPHANOUS, ANDIMX, DENSER, or ANHIST.

The DENSER and ANDIMX codes have been incorporated into COMBO as subroutines. A DIAPHANOUS-type tape is first converted to a DENSER type and stored temporarily on a drum. An ANHIST-type tape is first converted to an ANDIMX type and similarly stored on a drum. Thus, all input is considered to be either DENSER or ANDIMX.

```
      PROGRAM COMBO(INPUT,OUTPUT,TAPE10,TAPE11,TAPE12,TAPE13,TAPE3,
     1TAPE4,TAPE7,TAPE8,TAPE5=INPUT,TAPE6=OUTPUT)
C                                                                      COM   10
C     PROGRAM COMBO: COMBINES TEMPERATURE-DENSITY DATA SETS FROM FOUR  COM   20
C                    POSSIBLE TYPES OF INPUT TAPES. THESE ARE DIAPHANOUSCOM   30
C                    (BINARY), ANDIMX (BINARY), DENSER(BCD) AND ANNIST COM   40
C                    (BINARY).                                         COM   50
C                                                                      COM   60
C          FOUR OR FEWER INPUT TAPES MAY BE SUPPLIED FOR A GIVEN RUN.  COM   70
C          EACH OF THE FOUR TAPES CAN BE ANY ONE OF THE FOUR TYPES     COM   80
C          MENTIONED ABOVE. IF A DIAPHANOUS TAPE IS SPECIFIED IT IS    COM   90
C          FIRST CONVERTED TO A DENSER TAPE BY SUBROUTINE DENSER, WHICH COM  100
C          IS SIMILAR TO THE DENSER CODE, AND STORED TEMPORARILY ON A  COM  110
C          DRUM.  SIMILARLY, AN ANNIST TAPE IS FIRST CONVERTED TO      COM  120
C          ANDIMX TYPE BY SUBROUTINE ANDIMX (SIMILAR TO ANDIMX CODE) ANDCOM  130
C          STORED ON A DRUM.                                           COM  140
C                                                                      COM  150
C          TWO TYPES OF OUTPUT TAPES MAY BE PRODUCED. THE FIRST OF     COM  160
C          THESE IS IDENTICAL TO A DENSER TAPE (EXCEPT FOR THE HEADER  COM  170
C          AND LAST RECORDS) AND CAN BEREPRODUCED ONLY IF ALL INPUT TAPES COM 180
C          ARE OF DENSER OR DIAPHANOUS TYPES. THE SECOND TYPE IS A     COM  190
C          BINARY TAPE CONSISTING OF TEMPERATURE-DENSITY GROUPS        COM  200
C          IDENTICAL TO THOSE FOUND ON EITHER ANDIMX (3 RECORD GROUPS) COM  210
C          OR DENSER (2 RECORD GROUPS) TAPES.                          COM  220
C                                                                      COM  230
C          THE FIRST RECORD OF EACH OUTPUT TAPE CONTAINS EITHER THE    COM  240
C          WORD 'COMBO1' OR 'COMBO2' FOLLOWED BY TWO DUMMY WORDS.      COM  250
C          COMBO1 REFERS TO A BCD DENSER TYPE OUTPUT WHILE COMBO2      COM  260
C          INDICATES A BINARY ANDIMX-DENSER COMBINATION. THE SECOND    COM  270
C          RECORD IS 244 WORDS IN LENGTH GIVING THE ID INFORMATION     COM  280
C          FOUND ON EACH INPUT TAPE PRECEEDED BY THE WORK 'TAPE I'     COM  290
C          WHERE I=1,2,3 OR 4. IF FEWER THAN FOUR TAPES WERE INPUT, THE COM 300
C          REMAINING WORDS ARE BLANK.                                  COM  310
C                                                                      COM  320
```

```
C          THE LAST 3 RECORDS ON AN OUTPUT TAPE ARE AS FOLLOWS:                    COM  330
C           (1) THE INTEGER -8 FOLLOWED BY DUMMY WORDS.                            COM  340
C           (2) A LIST OF TEMPERATURE DENSITY PAIRS CONTAINED ON THIS              COM  350
C               TAPE AND THE INPUT TAPE 1,2,3 OR 4  FROM WHICH EACH                COM  360
C               CAME.                                                              COM  370
C           (3) THE INTEGER -5 FOLLOWED BY DUMMY WORDS (INDICATES END              COM  380
C               OF TAPE)                                                           COM  390
C                                                                                  COM  400
      INTEGER OUNIT(4)                                                             COM  480
      INTEGER TCLASS(2,2),CLASS(2),PO                                              COM  490
      INTEGER TYPE(4),UNIT(4),       OOUT,TOUT,POPT,TOPT,DSB,DRUM(4),TIUCOM  500
     .(4),HEAD(244),BLANK,IDAM(60),ID1(12) ,DENSOR,ANDMIX,ID2(10),ID3(1UCOM  510
     .),HEADIN(2,8),TTYPE(2,4),STYPE(2,4),SOUT                                     COM  520
      REAL MINUS7                                                                  COM  600
      LOGICAL FLAG(4),GLAG                                                         COM  650
      DIMENSION RHO(4),THERM(38),A(5000),NSV(3,1000),ASV(2,1000),B(2)              COM  700
      DIMENSION TMX(4)                                                             COM  710
      DATA (DRUM(I),I=1,4)/3,4,7,8/,COMBO1/6HCUMBO1/,CUMBO2/6HCOMBO2/,             COM  800
     .(TID(I),I=1,4)/6HTAPE 1,6HTAPE 2,6HTAPE 3,6HTAPE 4/,BLANK/1H /,              COM  810
     .DENSOR/6HDENSER/,ANDMIX/6HANDIMX/,EPS/1.E-6/,MINUS7/-7./,IM7/-7/             COM  820
      DATA (HEADIN(I,1),I=1,6 )/6HOUTPUT,6H TAPE ,6HIS OF ,6HDENSER,6H TCOM  830
     .YPE ,6H(BCD) /,(HEADIN(2,I),I=1,8)/6HOUTPUT,6H TAPE ,6HIS OF ,6HANCOM  840
     .DIMX,6H - COM,6HBO TYP,6HE (BIN,6HARY)  /,(HEADIN(I,1),I=7,8)/2*1HCOM  850
     . /                                                                           COM  860
      DATA((TTYPE(I,J),I=1,2),J=1,4)/6H DIAPH,6HANOUS ,6H   AND,3HIMX,6HCOM  870
     .   DEN,3HSER,6H   ANH,3HIST/,H8/-8/,H5/-5/                                   COM  880
      DATA TMAX/1.E38/                                                             COM  890
      DATA((TCLASS(I,J),J=1,2),I=1,2)/6HUNCLAS,6HSIFIED,6HNEITHE,6HR  COM  900
     . /                                                                           COM  910
C                                                                                  COM  912
C          V A R I A B L E   D E F I N I T I O N S                                 COM  914
C                                                                                  COM  916
C           NAME              MEANING                                            COM  918
C          A(5000)      BUFFER USED FOR TRANSMITTING DATA FROM I/P TAPES         COM  920
C                       TO O/P TAPE.                                             COM  922
C          ALAST1       SAME AS IN DENSER CODE                                   COM  924
C          ANDMIX       CONTAINS THE ALPHANUMERIC WORD 'ANDIMX'                  COM  926
C          ASV(2,1000)  STORAGE FOR THE ITH TEMPERATURE ( ASV(1,I)), AND         COM  928
C                       THE ITH DENSITY (ASV(2,I)) PUT OUT ON O/P TAPE.          COM  930
C                       USED IN SUMMARY PRINTOUT.                                COM  931
C          B(2)         SAME AS IN DENSER   (B(I) = TEMPERATURE )                COM  932
C          BLANK        CONTAINS ALPHANUMERIC BLANK.                             COM  933
C          CLASS(2)     SECURITY CLASSIFICATION AS READ FROM DATA CARD.           COM  934
C          COMBO1       ALPHANUMERIC WORD 'COMBO1'                               COM  935
C          COMBO2       ALPHANUMERIC WORD 'COMBO2'                               COM  936
C          D            DUMMY WORD USED TO SKIP RECORDS WHILE READING            COM  937
C                       BINARY TAPE.                                             COM  938
C          DENSOR       ALPHANUMERIC WORD 'DENSER'                               COM  939
C          DRUM(4)      THE LOGICAL DRUM UNITS USED FOR INTERMEDIATE             COM  940
C                       CONVERSION. (3,4,7 AND 8).                               COM  941
C          DSB          SUBSCRIPT INDICATING CURRENT DRUM BEING USED.            COM  942
C          EPS          AN EPISLON (1.E-6) TOLERANCE FOR COMPAIRING DATA         COM  943
C                       CARD TEMPERATURES TO THOSE READ FROM TAPES.              COM  944
C          FLAG(4)      FOR EACH I/P TAPE, INITALLY .FALSE., SET TRUE IF         COM  945
C                       END OF DATA IS REACHED BEFORE EXAUSTING SPECIFIED        COM  946
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C                 THETA-RHO SETS.                                          COM  947
C       GLAG      INITIALLY FALSE FOR EACH THETA-RHO SET. SET TRUE         COM  948
C                 IF ANY THETA-RHO SPECIFIED IS FOUND ON SOME I/P TAPE     COM  949
C       HEAD(244) STORAGE FOR THE HEADER RECORD O/P ON COMBO TAPE.         COM  950
C       HEADIN(2,8) PRINTER HEADING FOR SUMMARY OUTPUT LIST.               COM  951
C       ID        ID WORD ON I/P TAPE. SHOULD BE EITHER 'DENSER' OR        COM  952
C                 'ANDIMX'.                                                COM  953
C       IDAM(60)  ID ARRAY FOUND ON ANDIMX TYPE TAPES.                     COM  954
C       IDI(12)   ID ARRAY FOUND ON DENSER TYPE TAPES.  EQUIVALENT TO      COM  955
C                 ID IN DENSER.                                            COM  956
C       ID2(10)   EQUIVALENT TO COMP IN DENSER.                            COM  957
C       ID3(10)   EQUIVALENT TO IZ IN DENSER.                              COM  958
C       IL        LENGTH OF THERMODYNAMICS DATA ON DENSER TYPE TAPE.       COM  959
C                 EITHER 8 OR 20.                                          COM  960
C       IM7       -7  (INTEGER)                                            COM  961
C       IPG       PAGE COUNTER FOR PRINTER O/P.                            COM  962
C       ISV       COUNTER ON ASV AND NSV ARRAYS.                           COM  963
C       ITP       SUBSCRIPT ON TAPES.                                      COM  964
C       JM        EQUIVALENT TO J IN DENSER.                               COM  965
C       K         THE PRESENT LOGICAL I/P UNIT.                            COM  966
C       LINE      LINE COUNTER FOR PRINTER O/P.                            COM  967
C       LLF       THE NUMBER OF BLANK LINES BETWEEN THE LAST PRINTED       COM  968
C                 LINE AND THE BOTTOM OF THE PAGE.                         COM  969
C       MINUS7    -7. (REAL)                                               COM  970
C       MM        SAME AS M IN DENSER                                      COM  971
C       M5        -5                                                       COM  972
C       M8        -8                                                       COM  973
C       NSV(3,1000) STORAGE FOR THE ITH TAPE UNIT (NSV(1,I)), THE ITH      COM  974
C                 LOGICAL UNIT DESIGNATION (NSV(2,I)) AND THE ITH          COM  975
C                 TAPE TYPE. (SEE ASV)                                     COM  976
C       NTAPES    THE NUMBER OF I/P TAPES   (L.E. 4).                      COM  977
C       NZ        SAME AS NZ IN DENSER.                                    COM  978
C       OUNIT(4)  THE LOGICAL UNITS OF INPUT TAPES.                        COM  979
C       PO        FLAG INDICATING TYPE OF SECURITY CLASSIFICATION          COM  980
C                 PRINTOUT:    1  SECRET RESTRICTED DATA                   COM A981
C                              2  UNCLASSIFIED                             COM B981
C                              3  NO HEADING                               COM C981
C       POPT      PRINT OPTION:  0 COMPLETE PRINTOUT                       COM D981
C                                1 PRINTOUT WITH NO TITLES                 COM E981
C                                2 NO PRINTOUT                             COM F981
C       RHO(4)    LOWER CUTOFF DENSITIES FOR EACH TAPE.  IF RHO(I)<0.      COM G981
C                 NO TEMP.-DENSITY PAIRS FOR THIS TEMP. ARE TAKEN          COM H981
C                 FROM TAPE I.                                             COM I981
C       R1        UPPER DENSITY CUTOFF, PRESENT TAPE.                      COM J981
C       R2        LOWER DENSITY CUTOFF, PRESENT TAPE.                      COM K981
C       STYPE(2,4) ALPHANUMERIC IDENTIFICATION OF I/P TAPES  (EG, IF       COM L981
C                 TAPE 3 IS DENSER, STYPE(1,3)=   DEN AND                  COM M981
C                 STYPE(2,3)=SER).                                         COM N981
C       TCLASS(2,2) DATA OF WORDS 'UNCLASSIFIED' AND 'NEITHER'             COM O981
C       THERM(38) THERMODYNAMICS DATA FROM ANDIMX TYPE TAPES. SAME AS      COM P981
C                 BB1,IBB AND BB2 IN ANDIMX CODE.                          COM Q981
C                 THERM(3)=TEMPERATURE                                     COM R981
C                 THERM(4)=DENSITY                                         COM S981
C       THETA     TEMPERATURE AS READ FROM DATA CARD.                      COM T981
C       TID(4)    ALPHANUMERIC 'TAPE I' IS IN TID(I).                      COM U981
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C                                                                       COM 1200
C          NOTE:   LEAVING POPT AND TOPT BLANK WILL RESULT IN COMPLETE  COM 1210
C                  PRINTOUT.                                            COM 1220
C                                                                       COM 1230
      DSB=1                                                             COM 1240
C                                                                       COM 125C
C     LOOP 10 DETERMINES TYPE OF TAPE AND CONVERTS TO DENSER  OR        COM 1260
C     ANDIMX IF NECESSARY.                                              COM 1270
C                                                                       COM 1280
      DO 10 I=1,NTAPES                                                  COM 1290
      II=TYPE(I)                                                        COM 1300
      GO TO (11,10,10,12),II                                            COM 1310
   11 CALL DENSER(UNIT(I),DRUM(DSB),TMX(I))                             COM 1320
      TYPE(I)=3                                                         COM 1325
   14 UNIT(I)=DRUM(DSB)                                                 COM 1330
      DSB=DSB+1                                                         COM 1340
      GO TO 10                                                          COM 1350
   12 CALL ANDIMX(UNIT(I),DRUM(DSB),TMX(I))                             COM 1360
      TYPE(I)=2                                                         COM 1365
      SOUT=1                                                            COM 1367
      GO TO 14                                                          COM 1370
   10 CONTINUE                                                          COM 1380
      DO 15 I=1,NTAPES                                                  COM 1382
   15 TYPE(I)=TYPE(I)-1                                                 COM 1385
C                                                                       COM 1390
C     IF TYPE 1 OUTPUT IS SPECIFIED, LOOP 20 INSURES THAT ALL INPUT     COM 1400
C     TAPES ARE OF TYPE 1 OR 3.                                         COM 1410
C                                                                       COM 1420
      IF(TOUT.EQ.2)GO TO 25                                             COM 1430
      DO 20 I=1,NTAPES                                                  COM 1440
      IF(TYPE(I).EQ.1.OR.TYPE(I).EQ.3) GO TO 20                         COM 1450
      WRITE(6,200)I,UNIT(I),TYPE(I)                                     COM 1460
      CALL EXIT                                                         COM 1470
   20 CONTINUE                                                          COM 1480
C                                                                       COM 1490
C     REWIND ALL TAPES                                                  COM 1500
C                                                                       COM 1510
   25 REWIND DOUT                                                       COM 1520
      DO 30 I=1,NTAPES                                                  COM 1530
      II=UNIT(I)                                                        COM 1540
   30 REWIND II                                                         COM 1550
C                                                                       COM 1560
C     WRITE COMBO ID RECORD                                             COM 1570
C                                                                       COM 1580
      GO TO(40,41),TOUT                                                 COM 1590
   40 WRITE(DOUT,500)COMBO1,D,D                                         COM 1600
      GO TO 42                                                          COM 1610
   41 WRITE(DOUT)COMBO2,D,D                                             COM 1620
C                                                                       COM 1700
C     CONSTRUCTION OF HEADER (ID) RECORD                                COM 1710
C                                                                       COM 1720
C     ALSO INSURES THAT FIRST WORD ON EACH I/P TAPE IS EITHER 'DENSER'  COM 1730
C     OR 'ANDIMX'.                                                      COM 1740
C                                                                       COM 1750
   42 DO 43 I=1,244                                                     COM 1760
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   43 HEAD(1)=BLANK                                                    COM 1770
      DO 50 I=1,NTAPES                                                 COM 1780
      J=ITPL(I)                                                        COM 1790
      K=UNIT(I)                                                        COM 1800
      L=61*(I-1)+1                                                     COM 1803
      HEAD(L)=ID(I)                                                    COM 1808
      GO TO(45,46),J                                                   COM 1810
   45 READ(K)ID                                                        COM 1820
      IF(ID.EQ.ANUM1X)GO TO 47                                         COM 1830
      WRITE(6,201)I,K,ID                                               COM 1840
      CALL EXIT                                                        COM 1850
   47 READ(K)IDAM                                                      COM 1860
      DO 48 LL=1,60                                                    COM 1880
   48 HEAD(L+LL)=IDAM(LL)                                              COM 1890
      GO TO 50                                                         COM 1900
   46 READ(K,600)ID,(ID1(M),M=1,12),NZ,(ID2(M),ID3(M),M=1,NZ)          COM 1910
      IF(ID.EQ.DENSOK)GO TO 49                                         COM 1920
      WRITE(6,202)I,K,ID                                               COM 1930
      CALL EXIT                                                        COM 1940
   49 DO 51 LL=1,12                                                    COM 1950
   51 HEAD(L+LL)=ID1(LL)                                               COM 1960
      HEAD(L+13)=NZ                                                    COM 1970
      DO 52 LL=1,NZ                                                    COM 1990
      M=L+12+2*LL                                                      COM 2000
      N=M+1                                                            COM 2010
      HEAD(M)=ID2(LL)                                                  COM 2020
   52 HEAD(N)=ID3(LL)                                                  COM 2030
   50 CONTINUE                                                         COM 2040
C                                                                      COM 2100
C     WRITE THE HEADER RECORD ON THE O/P TAPE.                         COM 2110
C                                                                      COM 2120
      GO TO(55,56),IOUT                                                COM 2130
   55 WRITE(IOUT,501)(HEAD(I),I=1,244)                                 COM 2140
      GO TO 57                                                         COM 2150
   56 WRITE(IOUT)(HEAD(I),I=1,244)                                     COM 2160
   57 ISV=1                                                            COM 2170
      IF(IOPT.NE.0)GO TO 53                                            COM 2180
      WRITE(6,208)                                                     COM 2183
      CALL SHEAD(PO)                                                   COM 2185
      WRITE(6,204)                                                     COM 2190
      LINE=7                                                           COM 2192
C                                                                      COM 2200
C     READ A TEMPERATURE (THETA) AND SET OF DENSITIES (RHO'S)          COM 2210
C                                                                      COM 2220
   53 READ(5,101)THETA,(RHO(I),I=1,NTAPES)                             COM 2230
      EPI=EPS*THETA                                                    COM 2333
      IF(THETA.EQ.-5000.)GO TO 95                                      COM 2235
      WRITE(6,214)THETA                                                COM 2237
      LINE=LINE+3                                                      COMA2237
      GLAG=.FALSE.                                                     COM 2238
C                                                                      COM 2240
C     FIND THETA ON THE FIRST I/P TAPE ON WHICH IT EXISTS.             COM 2250
C                                                                      COM 2260
      ITP=1                                                            COM 2270
   59 IF(FLAG(ITP)) GO TO 90                                           COM 2273
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      IF(RHO(ITP).LT.0.)GO TO 90                                        COM 2275
   94 K=OUNIT(ITP)                                                      COM 2280
      J=TYPE(ITP)                                                       COM 2290
      CALL RHODET(ITP,RHO,R1,R2)                                        COM 2295
      GO TO (60,80),J                                                   COM 2300
C                                                                       COM 2303
C     READS AND1MX TYPE TAPES.                                          COM 2305
C                                                                       COM 2307
   60 READ(K)D                                                          COM 2310
      IF(D.EQ.MINUS7)GO TO 62                                           COM 2320
      IF(D.EQ.-5.)GO TO 70                                              COM 2330
      WRITE(6,203)K,D                                                   COM 2340
      CALL EXIT                                                         COM 2350
   62 READ(K)(THERM(I),I=1,38)                                          COM 2360
      IF(THERM(3)-EPT.LE.THETA) GO TO 65                                COM 2362
   66 BACKSPACE K                                                       COM 2364
      BACKSPACE K                                                       COM 2366
      GO TO 90                                                          COM 2368
   65 IF(THERM(3).GE.(THETA-EPT).AND.(THERM(3).LE.(THETA+EPT)) GO TO 64 COM 2370
   61 READ(K)D                                                          COM 2380
      GO TO 60                                                          COM 2390
   64 IF(THERM(4).GT.R1) GO TO 61                                       COM 2400
      IF(THERM(4).LT.R2) GO TO 66                                       COM 2405
      IF(TOMT.NE.0)GO TO 67                                             COM 2410
      LINE=LINE+9                                                       COM 2412
      IF(LINE.LE.46)GO TO 63                                            COM 2414
      LINE=LINE-9                                                       COM 2416
      LLF=46-LINE                                                       COM 2417
      IF(LLF.EQ.0)GO TO 630                                             COM 2418
      DO 631 I=1,LLF                                                    COM 2419
  631 WRITE(6,216)                                                      COM 2420
  630 CALL SHEAD(PO)                                                    COM 2421
      WRITE(6,208)                                                      COM 2422
      CALL SHEAD(PO)                                                    COM 2423
      WRITE(6,204)                                                      COM 2424
      WRITE(6,214)THETA                                                 COM 2425
      LINE=18                                                           COM 2426
   63 WRITE(6,212)ITP,OUNIT(ITP),(STYPE(J,ITP),J=1,2),(THERM(I),I=1,38) COM 2428
   67 WRITE(DOUT)IM7,D,D,D                                              COM 2430
      WRITE(DOUT)(THERM(I),I=1,38)                                      COM 2440
      READ(K)N,(A(I),I=1,N)                                             COM 2450
      WRITE(DOUT)N,(A(I),I=1,N)                                         COM 2460
      GLAG=.TRUE.                                                       COM 2465
   68 NSV(1,ISV)=ITP                                                    COM 2470
      NSV(2,ISV)=OUNIT(ITP)                                             COM 2480
      NSV(3,ISV)=TTYPE(1,ITP)                                           COM 2490
      GO TO (69,87),J                                                   COM 2495
   69 ASV(1,ISV)=THERM(3)                                               COM 2500
      ASV(2,ISV)=THERM(4)                                               COM 2510
      ISV=ISV+1                                                         COM 2520
      GO TO 60                                                          COM 2530
   70 REWIND K                                                          COM 2540
      FLAG(ITP)=.TRUE.                                                  COM 2545
      GO TO 90                                                          COM 2550
C                                                                       COM 2600
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C     READS DENSER RECORDS FOR TEMP-RHO GROUPS.                                 COM 2610
C                                                                               COM 2620
   80 READ(K,601)JM,MM,ULAST1,ALAST1,B(1),B(2),(A(KM),KM=1,9)                   COM 2630
      IF(JM.EQ.-5)GO TO 70                                                      COM 2640
      LL=2*MM+3*JM-2                                                            COM 2645
      IF(B(1)-EPS.LT.THETA)GO TO 81                                             COM 2650
   83 BACKSPACE K                                                               COM 2660
      GO TO 90                                                                  COM 2670
   81 IF(B(1).GT.(THETA-EPS).AND.B(1).LT.(THETA+EPS))GO TO 82                   COM 2680
   88 READ(K,602)(A(L),L=1,LL)                                                  COM 2690
      GO TO 80                                                                  COM 2700
   82 IF(A(2).GT.R1) GO TO 88                                                   COM 2710
      IF(A(2).LT.R2) GO TO 83                                                   COM 2715
      LLL=LL+10                                                                 COM 2720
      READ(K,602)(A(L),L=11,LLL)                                                COM 2730
      IF(TOP1.NE.0)GO TO 84                                                     COM 2740
      IL=20                                                                     COM 2750
      IF(A(9).EQ.0.)IL=8                                                        COM 2760
      IF(IL.EQ.8)LINE=LINE+3                                                    COM 2761
      IF(IL.EQ.20)LINE=LINE+5                                                   COM 2762
      IF(LINE.LE.46)GO TO 810                                                   COM 2763
      LINE=LINE-3                                                               COM 2764
      IF(IL.EQ.20)LINE=LINE-2                                                   COM 2765
      LLF=46-LINE                                                               COM 2766
      IF(LLF.EQ.0)GO TO 811                                                     COM 2767
      DO 812 I=1,LLF                                                            COM 2768
  812 WRITE(6,216)                                                              COM 2769
  811 CALL SHEAD(PO)                                                            COM 2770
      WRITE(6,208)                                                              COM 2771
      CALL SHEAD(PO)                                                            COM 2772
      WRITE(6,204)                                                              COM 2773
      WRITE(6,214)THETA                                                         COM 2774
      LINE=12                                                                   COMA2774
      IF(IL.EQ.20)LINE=14                                                       COMA2774
  810 WRITE(6,205)ITP,OUNIT(ITP),(STYPE(J,ITP),J=1,2),(A(I),I=1,IL)             COMB2774
   84 GLAG=.TRUE.                                                               COM 2775
      GO TO(85,86),TOUT                                                         COM 2780
   85 WRITE(OUOUT,602)JM,MM,ULAST1,ALAST1,B(1),B(2),(A(L),L=1,LLL)              COM 2790
      GO TO 88                                                                  COM 2800
   86 WRITE(OUOUT)JM,MM,ULAST1,ALAST1                                           COM 2810
      WRITE(OUOUT)B(1),B(2),(A(L),L=1,LLL)                                      COM 2820
      GO TO 88                                                                  COM 2825
   87 ASV(1,ISV)=B(1)                                                           COM 2830
      ASV(2,ISV)=A(2)                                                           COM 2840
      ISV=ISV+1                                                                 COM 2850
      GO TO 80                                                                  COM 2860
   90 ITP=ITP+1                                                                 COM 2900
      IF(ITP.LE.NTAPES)GO TO 59                                                 COM 2910
      IF(GLAG)GO TO 92                                                          COM 2920
      WRITE(6,206)THETA,(RHO(I),I=1,NTAPES)                                     COM 2930
   92 DO 91 I=1,NTAPES                                                          COM 2940
      IF(.NOT.FLAG(I))GO TO 93                                                  COM 2950
   91 CONTINUE                                                                  COM 2960
      WRITE(6,207)                                                              COM 2970
   77 READ(5,101)THETA,(RHO(I),I=1,NTAPES)                                      COM 2973
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      IF(THETA.EQ.-5000.)GO TO 95                                          COM 2976
      WRITE(6,211)THETA,(RHO(I),I=1,NTAPES)                                COM 2979
      GO TO 77                                                             COM 2990
C                                                                          COM 3000
C     ALL INPUT GROUPS HAVE BEEN TRANSFERRED TO THE OUTPUT TAPE.           COM 3010
C                                                                          COM 3020
   95 ISV=ISV-1                                                            COMA3020
      IF(IOPT.NE.0)GO TO 950                                               COM 3021
      LLF=46-LINE                                                          COM 3022
      IF(LLF.EQ.0)GO TO 951                                                COM 3023
      DO 952 I=1,LLF                                                       COM 3024
  952 WRITE(6,216)                                                         COM 3025
  951 CALL SHEAD(PO)                                                       COM 3026
  950 GO TO(96,97),TOUT                                                    COM 3033
   96 WRITE(UOUT,502)M8,M8,(A(I),I=1,30)                                   COM 3040
      WRITE(UOUT,502)ISV,ISV,(A(I),I=1,30)                                 COM 3045
      DO 98 I=1,ISV                                                        COM 3050
   98 WRITE(UOUT,504)(NSV(J,I),J=1,3),(ASV(J,I),J=1,2)                     COM 3060
      WRITE(UOUT,502)M5,M5,(A(I),I=1,30)                                   COM 3070
      GO TO 99                                                             COM 3080
   97 WRITE(UOUT)M8,M8,(A(I),I=1,2)                                        COM 3090
      WRITE(UOUT)ISV,((NSV(J,I),J=1,3),(ASV(J,I),J=1,2),I=1,ISV)           COM 3100
      WRITE(UOUT)M5,M5,(A(I),I=1,2)                                        COM 3110
   99 END FILE UOUT                                                        COM 3120
      REWIND UOUT                                                          COM 3130
      DO 94 I=1,NTAPES                                                     COM 3140
      K=UNIT(I)                                                            COM 3150
   94 REWIND K                                                             COM 3160
      IF(POPT.EQ.2)CALL EXIT                                               COM 3170
C                                                                          COM 3200
C     PRINTOUT OF GROUPS COPIED                                            COM 3210
C                                                                          COM 3220
      LINE=0                                                               COM 3222
      IPG=1                                                                COM 3225
      WRITE(6,208)                                                         COM 3225
      CALL SHEAD(PO)                                                       COM 3227
      IF(POPT.EQ.1)GO TO 75                                                COM 3230
      WRITE(6,209)UOUT,(HEADIN(TOUT,I),I=1,8 ),IPG                         COM 3240
      LINE=6                                                               COM 3245
   75 DO 76 I=1,ISV                                                        COM 3250
      ITP=NSV(1,I)                                                         COM 3255
      LINE=LINE+2                                                          COM 3260
      IF(LINE.LE.46)GO TO 76                                               COM 3270
      CALL SHEAD(PO)                                                       COM 3272
      WRITE(6,208)                                                         COM 3280
      CALL SHEAD(PO)                                                       COM 3285
      LINE=0                                                               COM 3290
      IF(POPT.EQ.1)GO TO 76                                                COM 3300
      IPG=IPG+1                                                            COM 3310
      WRITE(6,209)UOUT,(HEADIN(TOUT,J),J=1,8),IPG                          COM 3320
      LINE=6                                                               COM 3325
   76 WRITE(6,210)(NSV(J,I),J=1,2),(STYPE(J,ITP),J=1,2),(ASV(J,I),J=1,2)COM 3330
      LLF=46-LINE                                                          COM 3340
      IF(LLF.EQ.0)GO TO 73                                                 COM 3350
      DO 72 I=1,LLF                                                        COM 3360
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   72 WRITE(6,216)                                                    COM 3370
   73 CALL SHEAD(PO)                                                  COM 3380
      WRITE(6,208)                                                    COM 3390
      CALL EXIT                                                       COM 3400
C                                                                     COM 6000
C     FORMATS                                                         COM 6010
C                                                                     COM 6020
  100 FORMAT(1615)                                                    COM 6030
  101 FORMAT(5E12.8)                                                  COM 6040
  200 FORMAT(1H1,20X,50HOUTPUT TAPE WAS SPECIFIED AS DENSER TYPE BUT TAPCOM 6100
     .E ,I2, 9H ON UNIT ,I2,20H IS BINARY, OF TYPE ,I2)               COM 6110
  201 FORMAT(1H1,20X,21HFIRST RECORD ON TAPE ,I2, 9H ON UNIT ,I2,5H WAS COM 6120
     .,A6,24H BUT SHOULD BE 'ANDIMX'.)                                COM 6130
  202 FORMAT(1H1,20X,21HFIRST RECORD ON TAPE ,I2, 9H ON UNIT ,I2,5H WAS COM 6140
     .,A6,24H BUT SHOULD BE 'DENSER'.)                                COM 6150
  203 FORMAT(1H1,20X,25HANDIMX TYPE TAPE ON UNIT ,I2,32H SHOULD HAVE -7.COM 6160
     . AS FIRST RECORD/21X, 8HBUT HAS ,1PE16.8)                       COM 6170
  204 FORMAT(1HU,35X,61HTHERMODYNAMICS RECORDS OF TEMP.-DENSITY GROUPS OCOM 6180
     .N OUTPUT TAPE//10A,8H1/P TAPE,10X,4HUNIT,10X,4HTYPE,36X,14HTHERMODUCOM 6190
     .YNAMICS)                                                        COM 6200
  205 FORMAT(1HU,12X,I2,14X,I2,7X,2A6,2X,1P5E16.8/(52X,1P5E16.8/))    COM 6210
  206 FORMAT(1HU,10X,75HTHERE ARE NO TEMPERATURE-DENSITY GROUPS ON THESECOM 6220
     . I/P TAPES FOR TEMPERATURE ,1PE14.7/11X,27HAND LOWER CUTOFF DENSITCOM 6230
     .ILS ,1P4E16.7)                                                  COM 6240
  207 FORMAT(1H1,10X,40HDATA HAS BEEN EXAUSTED ON ALL I/P TAPES, BUT THECOM 6250
     . DATA CARDS LISTED BELOW REMAIN:)                               COM 6260
  211 FORMAT(1HU,5X,1P5E16.8)                                         COM 6270
  208 FORMAT(1H1)                                                     COM 6280
  209 FORMAT(1HU,44X,41HSUMMARY OF OUTPUT TAPE GENERATED ON UNIT ,I2//41COM 6300
     .X,8A6,31X,5HPAGE ,I2//20X,8H1/P TAPE,10X,4HUNIT,14X,4HTYPE,15X,11HCOM 6310
     .TEMPERATURE,15X,7HDENSITY/)                                     COM 6320
  210 FORMAT(1HU,22X,I2,14X,I2,11X,2A6,2(10X,1PE14.7))                COM 6330
  212 FORMAT(1HU,12X,I2,14X,I2,7X,2A6,2X,1P5E16.8/52X,1P5E16.8/52X,1P4E1COM 6340
     .6.8,6X,I8/52X,5(8X,I8)/52X,5(8X,I8)/52X,2(8X,I8),1P3E16.8/52X,1P5ECOM 6350
     .16.8/52X,1P3E16.8)                                              COM 6360
  214 FORMAT(1HU,30X22HTEMPERATURE (THETA) = ,1PE14.7)                COM 6370
  216 FORMAT(1H )                                                     COM 6375
  500 FORMAT(A6,2E9.4)                                                COM 6450
  501 FORMAT(13A6)                                                    COM 6460
  502 FORMAT(2I4,13E9.4,/(14E9.4))                                    COM 6470
  504 FORMAT(2I4,A6,2E9.4)                                            COM 6480
  600 FORMAT(13A6/I2,(F6.4,I2))                                       COM 6500
  601 FORMAT(2I4,13E9.4)                                              COM 6510
  602 FORMAT(14E9.4)                                                  COM 6520
      END                                                             COM 8000
```

Temperature-density groups to be transmitted to the output tape are specified by supplying a temperature and a lower cutoff density for each input tape. Temperatures are supplied in increasing magnitudes. For each temperature, all temperature-density groups with densities greater than the first lower cutoff density are transmitted to the output tape from the first input tape. For the second input tape, all groups with densities less than the first cutoff and greater than the second are transmitted, etc., until all input tapes are exhausted.

Two types of output tapes may be produced. The first is a BCD tape identical to a DENSER tape (except for the header and last records) and can be produced only if all input tapes are DENSER or DIAPHANOUS types. The second is a binary tape consisting of temperature-density groups identical to those found on either ANDIMX tapes (if input is ANDIMX or ANHIST) or DENSER tapes (if input is DENSER or DIAPHANOUS).

Input for COMBO

Input Data Cards

CARD NO.	COLUMNS	FORMAT	DESCRIPTION
1		(16I5)	
	1-5	I5	Number of input tapes ($\leq$4)
	6-10	I5	Logical unit, first I/P tape
	11-15	I5	Type*, first I/P tape
	16-20	I5	Logical unit, second I/P tape (if necessary
	21-25	I5	Type*, second I/P tape
	etc.		

* Type designators:
1 DIAPHANOUS
2 ANDIMX
3 DENSER
4 ANHIST

(continued)

CARD NO.	COLUMNS	FORMAT	DESCRIPTION
2		(5E12.8)	
	1-12	E12.8	Maximum temperature to copy from first I/P tape
	13-24	E12.8	Maximum temperature to copy from second I/P tape
	etc.		

NOTE: Data on card type 2 are applicable only when a tape is of type 1 or 4 (i.e., must first be converted to a type 3 or 2). Execution time can be reduced by converting only those temperature-density groups with temperatures less than some required maximum. If all temperatures are required, or if all tapes are of type 2 or 3, a blank card will suffice

3		(16I5)	
	1-5	I5	Logical unit, output tape
	6-10	I5	Type of output tape: 1. BCD (similar to DENSER) 2. Binary (combination of DENSER and ANDIMX types)
	11-15	I5	Print option: 0. Complete printout 1. Complete printout without titles 2. No printout
	16-20	I5	Thermodynamics print option: 0. Print thermodynamics data for each group copied 1. Do not print thermiodynamics
4		(2A6)	
	1-12	2A6	Type of security classification: If UNCLASSIFIED, UNCLASSIFIED DATA will print at the top and bottom of each page. If NEITHER, no classification information will be printed. A blank card or any other alphanumeric information will cause the SECRET/RD clause to be printed at the top and bottom of each page

(continued)

CARD NO.	COLUMNS	FORMAT	DESCRIPTION
		(5E12.8)	
5	1-12	E12.8	A temperature for conversion of data
	13-24	E12.8	A lowest density to convert at this temperature, first tape
	25-36	E12.8	A lowest density to convert at this temperature, second tape
	etc.		

NOTE: A negative density will cause the appropriate tape to be skipped for that temperature.

As many of card type 5 as required to specify all temperatures should be supplied. The last data card of a set should have -5000. as the temperature, signaling end-of-data

The code may be run using a deck setup as follows:

```
  ▽          ASG        X=2293
  ▽          ASG        A=(1st I/P tape)
  ▽          ASG        B=(2nd I/P tape)
                .
                .             etc.
                .
(3)▽         ASG        E=(output tape)
(1)▽F        ASG        2=100000
(2)▽F        ASG        3=100000
(2)▽F        ASG        4=100000
(2)▽F        ASG        7=100000
(2)▽F        ASG        8=100000
  ▽          XQT        CUR
             IN         X
             TRI        X
             TOC
  ▽N         HDG
  ▽          XQT        COMBO/A1
        (DATA CARDS)
```

1. Drum 2 is required if any I/P tape is of ANHIST type
2. One scratch drum is required for each I/P tape of either DIAPHANOUS or ANHIST type. 3 being the first drum used, 4 the second, etc.
3. Of course, the output tape can be any logical unit not used for I/P

The COMBO Program was written by R. Korts of General Atomic.

```
      SUBROUTINE ANDIMX(BIN,BOUT,IMX)
C     PROGRAM TO CONVERT HUEBNERS TAPE TO AN ANDY ACCEPTABLE FORMAT.
C
C
C     ORIGINALLY CODED BY LEW SCHALIT        JANUARY, 1967
C     MODIFIED ON JULY 7,1967, BY CHRIS IMS, TO DELETE SPECIFIED
C       TEMPERATURE-DENSITY DATA
C
C     THIS PROGRAM DOES NOT ACHIEVE THE SAME RESULTS AS 'ANDIMX'
C      IT IS A MODIFICATION OF ANDIMX TO BE USED ONLY WITH COMBO.
C
C     THIS VERSION MODIFIED BY R. KORIS, OCT, 1967 TO ACT AS A
C     SUBROUTINE TO COMBO PROGRAM.
C     MODIFICATIONS:
C           (1)  NO DATA CARDS READ BY ANDIMX. ANIN AND ANOUT ARE
C                SPECIFIED AS ARGUMENTS. (TITLE(I),I=1,52) IS
C                SPECIFIED IN DATA STATEMENT AS 'THIS PSUDO-ANDIMX TAPE
C                GENERATED BY ANDIMX SUBROUTINE OF COMBO' FOLLOWED BY
C                BLANKS. NO THETA-RHO SETS ARE DELETED.
C           (2)  ALL PRINTER OUTPUT REMOVED EXCEPT FOR ERROR MESSAGES.
C           (3)  CERTAIN SECTIONS OF CODE RELATING TO DELETION OF THETA
C                RHO SETS HAVE BEEN REMOVED.
C
C     THIS PROGRAM USES ANHIST-OUTPUT-TAPES AS INPUT DATA.
C     THIS PROGRAM ASSUMES THE HUEBNER-MADE-AT-LASL ANN TAPE HAS BEEN
C        CONVERTED TO AN 1108 TAPE BY J. CLOWS ANHIST PROGRAM.  THAT
C        PROGRAM READ ANN TAPES WITH ANY SIZE RECORD (E.G., EITHER A 35-
C        OR 37-WORD FIRST RECORD (AT EACH TEMPERATURE-DENSITY POINT),
C        AND VARIABLE SIZE SECOND RECORDS)  AND PRODUCED LOGICAL OUTPUT
C        RECORDS WITH A MINIMUM OF 253 WORDS.  THE FINAL RECORD OF THE
C        7094 TAPE WAS A 4-WORD ALL-ZERO RECORD.  ANHIST CONVERTED THIS
C        TO A 253-ZERO-WORD RECORD.
C
C     THIS PROGRAM WILL PRODUCE AN OUTPUT TAPE WHICH HAS
C                 A) A FIRST RECORD OF: ANDIMX
C                 B) A SECOND RECORD OF: 60 IDENTIFICATION WORDS
C                 C) A SIGNAL RECORD OF: -7. (DATA FOLLOWS FOR A GIVEN
C                       TEMPERATURE-DENSITY POINT
C                 D) A 38 WORD RECORD  (CAYT IS WORD(3), RHO IS WORD(4))
C                 E) A RECORD WITH (NMAX+1) WORDS: NMAX,(MU(J),J=1,NMAX)
C
C                 RECORDS (C,D,AND E) ARE THEN REPEATED. TEMPERATURES
C                 AND DENSITIES ARE MONOTONIC. TEMPERATURES ARE LOWEST
C                 AT THE BEGINNING OF THE TAPE.THE HIGHEST DENSITY FOR
C                 A GIVEN TEMPERATURE IS THE FIRST DENSITY AT THAT
```

```
C                 TEMPERATURE.
C
C                 F) A SIGNAL RECORD OF: -5. SIGNIFIES END OF DATA.
C
C
C
C     CODE WILL READ ALL DATA ON THE ANHIST-OUTPUT-TAPE ANIN, THEN
C     PREVENT SPECIFIED (INPUT-CONTROLLED) TEMPERATURE-DENSITY DATA FROM
C     BEING WRITTEN ON THE ANDIMX-OUTPUT-TAPE ANOUT.
C
C
C     **********                      NOTE                       **********
C     IF USE STANDARD INPUT UNIT=14, STANDARD OUTPUT UNIT=12, AND ALL
C     DATA ARE TO BE KEPT, TWO BLANK CARDS ARE REQUIRED TO END THE INPUT
C     SET AS SPECIFIED BELOW
C     **********                                                 **********
C
C     INPUT NEEDED IS AT LEAST SEVEN CARDS WITH THE FOLLOWING
C        INFORMATION
C
C     1) 52 TITLE WORDS (PUNCHED ON 5 CARDS WITH 12 WORDS IN 12A6
C        FORMAT ON FIRST 4 TITLE CARDS AND 4 WORDS IN 4A6 FORMAT ON
C        FIFTH TITLE CARD)
C     2) A CARD SPECIFYING THE INPUT TAPE UNIT AND THE OUTPUT TAPE UNIT
C        WRITTEN WITH A FORMAT OF (I2,1X,I2)
C        IF THE INPUT TAPE UNIT SPECIFICATION FIELD IS BLANK, THE INPUT
C        TAPE IS ASSUMED TO BE ON UNIT 14
C        IF THE OUTPUT TAPE UNIT SPECIFICATION FIELD IS BLANK,THE OUTPUT
C        TAPE IS ASSUMED TO BE ON UNIT 12
C     3) IF DATA FOR ANY THETA-RHO SETS ARE TO BE DELETED, CARDS WITH
C        THE FOLLOWING INFORMATION MUST BE INPUT
C                  A) TEMPERATURE FOR WHICH DATA ARE TO BE DELETED, AND
C                     THE NUMBER OF RHO SETS WHICH ARE TO BE DELETED.
C                     (IN FORMAT (F10.4,8X,I2)).
C                  B) IF NUMBER OF RHO SETS TO BE DELETED IS ZERO, ALL
C                     DATA FOR THAT TEMPERATURE WILL BE DELETED.
C                  C) IF NUMBER OF RHO SETS TO BE DELETED IS SPECIFIED,
C                     CARDS (IN FORMAT (7E10.4)) CONTAINING THE DENSITIES
C                     INVOLVED MUST FOLLOW.
C                  D) A BLANK CARD SIGNIFIES END OF DATA.  IF NO THETA-
C                     RHO SETS ARE TO BE DELETED, A BLANK DATA CARD MUST
C                     FOLLOW THE SIX CARDS DESCRIBED ABOVE IN 1) AND 2).
C
C     **********                      WARNING                    **********
C     CAYT ASSUMED .GE. 100
C     CAYT ASSUMED TO BE CLOSE TO A MULTIPLE OF 100 EV
C     **********                                                 **********
C
C
      DIMENSION TITLE(60),B1(14), INPUT(10),SIGNAL(7),B2(11),IB(13)
     1,MU(2971),UTU(2971), MU2(2971), BB1(14), IBB(13), BB2(11)
     2,THETA(1000),DNSITY(1000),CAYTE(1000)
      DIMENSION CAYDEL(100), RHODEL(100,25), NRHO(100), ISAVE(100)
     1          ,CAYGON(50), RHOGUN(50,25)
C
```

```
      REAL MU, MU2
      INTEGER BIN,BOUT
      INTEGER ANIN, ANOUT, DONE
C
C
      DATA X/-1967./, SIGNAL/-1.,-2.,-3.,-4.,-5.,-6.,-7./,DONE/0/,
     1 NEXT/1/,CAYT/0./,MAXRHO/25/,ANDIMX/6HANDIMX/
      DATA(TITLE(I),I=1,11)/6HTHIS P,6HSUDO-A,6HNDIMX ,6HTAPE G,6HENERAT
     ,,6HED BY ,6HANDIMX,6H SUBRO,6HUTINE ,6HOF COM,2HBO/,(TITLE(I),I=12
     ,,52)/41*1H /
C
C     B2(9) AND B2(10) ARE SET TO ZERO IN CASE ANMIST-OUTPUT-TAPES
C     CONTAIN 35-WORD FIRST RECORDS (RATHER THAN 37-WORD FIRST RECORDS)
C     AT EACH TEMPERATURE-DENSITY POINT.
      DATA B2(9), B2(10)/2*0./
C
C     M COUNTS THE NUMBER OF TEMPERATURES FOR WHICH DATA ARE TO BE
C       DELETED.
C     IDELET COUNTS THE NUMBER OF DENSITY SETS TO BE DELETED, PER
C       TEMPERATURE.
C     ISAVE(M) IS SET TO NONE IF NO DATA FOR CAYTNO(M) IS TO BE WRITTEN
C       ON THE ANDIMX-OUTPUT-TAPE ANOUT.
C     KOUNT COUNTS TEMPERATURES FOR WHICH DATA ARE TO BE DELETED, AS
C       THEY ARE LOCATED ON ANIN.
C     J COUNTS RHOPTS, PER TEMPERATURE, FOR WHICH DATA ARE TO BE WRITTEN
C       ON ANDIMX-OUTPUT-TAPE ANOUT
C     KJ COUNTS TEMPERATURE-DENSITY SETS WRITTEN ON ANDIMX-OUTPUT-TAPE
C       ANOUT
C     JDELET IS SET TO NONE IF NO DELETIONS ARE TO BE MADE FOR A
C       TEMPERATURE THAT IS READ FROM ANIN.
C
      DATA M/0/, IDELET/0/, NONE/1/, ISAVE/100 * 0/, KOUNT/0/
      DATA J/0/, KJ/1/
C
      DATA MODIFY/6H THESE/, NOTDO/6H  NO  /, EPSILN/1.E-3/
      DATA ISAVET/0/, JDELET/0/, NRHO/100*0/
C
      EQUIVALENCE (ANIN,INPUT(1)),(ANOUT,INPUT(2)),(IMDONE,B1(1)),
     1(CAYT,B1(3)),(MU(1),DTU(1)),(AWT,B1(2)),(RHO,B1(4)),
     2(CAYTEE, B2(11))
C
    1 FORMAT (12A6)
C
    2 FORMAT (I2,1X,I2)
C
      ANIN=BIN
      ANOUT=BOUT
C                                              REWIND ALL TAPES
      REWIND ANOUT
      REWIND ANIN
      REWIND 2
C
      WRITE(ANOUT)ANDMX,X,X
      READ (ANIN) (TITLE(KM),KM=55,60)
C                                              WRITE TAPE TITLE
```

```
      WRITE (ANOUT)(TITLE(L2),L2=1,60)
  400 CONTINUE
      M=              M + 1
C
  410 CONTINUE
C     IF (M.EQ.1), NORMAL RUN, NO DELETIONS
        IF (M .EQ. 1) MODIFY = NOTDO
  480 CONTINUE
C
C
      READ (ANIN) B1,IB,(B2(LC),LC=1,10)
      IF(B1(3).GT.TMX)*GO TO 101
C
C     CAYTE STORES THE TEMPERATURE TO BE WRITTEN ON ANOUT.
C     CAYTEE STORES THE TEMPERATURE READ FROM ANIN THAT WILL BE
C       WRITTEN AS B2(11) ON ANOUT.
C
      CAYTE(KJ)=CAYT
      CAYTEE = CAYT
C
      CAYT=      FLOAT (IFIX(CAYT/100. + .5 ) * 100 )
CAVEAT    ASSUMES TEMPERATURE .GE. (100-EPSILON)
      ICAYT=          CAYT
C
  415 CONTINUE
      DO 9 JK=1,MAXRHO
        IF (MODIFY .EQ. NOTDO) GO TO 450
        IF (ICAYT .EQ. ISAVET) GO TO 434
C
C     CHECK TO SEE WHETHER CAYT IS ONE FOR WHICH DATA ARE TO BE DELETED.
C
      DO 420 M2=1,M
        IF (ABS((CAYT-CAYDEL(M2))/CAYT) .LT. EPSILN) GO TO 430
  420 CONTINUE
      M2=             M
      JDELET=         NONE
      GO TO 450
C
C
C     A TEMPERATURE FOR WHICH DATA ARE TO BE DELETED HAS BEEN LOCATED.
  430 CONTINUE
      KOUNT=          KOUNT + 1
      JDELET=         0
      IDELET=         0
        IF (ISAVE(M2) .EQ. NONE) GO TO 431
      NNRHO=          NRHO(M2)
C
  434 CONTINUE
        IF (JDELET.EQ.NONE .OR. IDELET.EQ.NRHO(M2)) GO TO 450
  435 CONTINUE
      DO 440 M3=1,NNRHO
        IF (ABS((RHO-RHODEL(M2,M3))/RHO) .LT. EPSILN) GO TO 431
  440 CONTINUE
      GO TO 450
C
```

```
  431 CONTINUE
C     DELETE THETA-RHO DATA
      ISAVET=      CATT
      READ (ANIN) NOTUSE
      READ (ANIN) NOTUSE
      IDELET=      IDELET + 1
      READ (ANIN) NOTUSE, NOTUSE, CATGON(KOUNT), RHOGON(KOUNT,IDELET)
      GO TO 14
C
  450 CONTINUE
CAVEAT    ASSUMES .LE. 25=MAXRHO DENSITIES AT EACH TEMPERATURE
      THETA(KJ)=CATT
      DNSITY(KJ)=RHO
      WRITE (2)  B1,IB,B2
C     ANDIMX OUTPUT TAPES ALL HAVE 38 WORD FIRST RECORDS
C     RECORD 1 SAYS ANDIMX
C
      J=J+1
C
      READ(ANIN) NOTUSE
      READ (ANIN)  NMAX, (NOTUSE,I=1,NMAX),(DTU(I),I=1,NMAX)
C
      DO 5 I=1,NMAX
      U OF I = .3 + FLOAT(I-1) * .01
      MU(I)=RHO*DTU(I)*6.476E7/(CATTEE*(U OF I**3)*AWT)
C
C     CORRECTION FOR INDUCED EMISSION STILL PRESENT.
    5 CONTINUE
C
      ISAVET=CATT
      WRITE (2), NMAX,(MU(I),I=1,NMAX)
      KJ=KJ+1
C
   14 CONTINUE
C
C
C
      READ (ANIN) B1,IB,(B2(LC),LC=1,10)
      IF (IMDONE .EQ. 0) GO TO 101
      IF(B1(3).GT.TMX)GO TO 101
C
      CATTE(KJ)=CATT
      CATTEE = CATT
      CATT =    FLOAT (IFIX (CATT/100. +.5) * 100 )
      ICATT=CATT
        IF (ICATT.NE.ISAVET .AND. ISAVE(M2) .EQ. NONE) GO TO 460
        IF (ICATT .NE. ISAVET) GO TO 102
        IF (ISAVE(M2) .EQ. NONE) GO TO 431
        IF (MODIFY.EQ.NOTDO .OR. JDELET.EQ.NONE .OR. IDELET.EQ.NRHO(M2))
     1     GO TO 99
      GO TO 435
C
  101 CONTINUE
      DONE = NEXT
  102 CONTINUE
```

```
C      WRITE OUT ALL RECORDS FOR A GIVEN TEMPERATURE ON THE ANDIMX OUTPUT
C        TAPE.
C
         IF (MODIFY .EQ. NOTDO) GO TO 461
         IF (IDELET.NE.NONE .AND. IDELET.NE.NRHO(M2)) GO TO 600
  461 CONTINUE
      DO 7 I=1,J
      BACKSPACE 2
      READ (2) NMAX2, (MU2(K),K=1,NMAX2)
      BACKSPACE 2
      BACKSPACE 2
      READ (2) BB1,IBB,BB2
      BACKSPACE 2
      WRITE (ANOUT) SIGNAL (7), X, X
      WRITE (ANOUT) BB1, IBB ,BB2
      WRITE (ANOUT)  NMAX2, (MU2(K),K=1,NMAX2)
    7 CONTINUE
C
  460 CONTINUE
         IF (ISAVE(M2) .EQ. NONE) BB1(3)=CATDEL(M2)
      IF(IDONE.EQ.NEXT) GO TO  100
      REWIND 2
      J=0
      GO TO 415
   99 CONTINUE
    9 CONTINUE
C
      WRITE (6,15)  THETA(KJ), (DNSITY(LM), LM=1,25)
   15 FORMAT (58H CHANGE MAXRHO=25. THERE ARE TOO MANY DENSITIES AT THET
     1A= , F10.0 /37HOTHE FOLLOWING DENSITIES WERE READ IN/(1P10E13.7))
  499 CONTINUE
      CALL MERR
      RETURN
  100 CONTINUE
         IF (KOUNT .NE. M-1) GO TO 601
      WRITE (ANOUT) SIGNAL(5), X,X
      END FILE ANOUT
      REWIND 2
      REWIND ANIN
      REWIND ANOUT
      RETURN
C
C      E R R O R   E X I T S
C      A TEMPERATURE FOR WHICH DATA ARE TO BE DELETED HAS BEEN INPUT.
C        HOWEVER, THE INPUT DENSITY CANNOT BE FOUND ON THE ANIN TAPE.
  600 CONTINUE
      WRITE (6,650) CATDEL(M2), (RHODEL(M2,M5), M5=1,NNRHO)
  650 FORMAT (64H1 A TEMPERATURE FOR WHICH DATA ARE TO BE DELETED HAS BE
     1EN INPUT. / 61H0 HOWEVER, THE INPUT DENSITY CANNOT BE FOUND ON THE
     2 ANIN TAPE / 11H0 CATDEL = ,E12.6, 14H, RHODEL SET=  ,E12.6,
     3 (/37X,E12.6) )
      GO TO 499
C
  601 CONTINUE
C      ALL TEMPERATURES ON ANIN HAVE BEEN CHECKED AGAINST INPUT TEMPERA-
C        TURES FOR WHICH DATA ARE TO BE DELETED.  HOWEVER, NOT ALL THE
C        INPUT TEMPERATURES WERE FOUND.  CHECK FOR INPUT ERROR.
      WRITE(6,651)
  651 FORMAT(60H1 INPUT ERROR.  ALL VALUES OF CATTNO WERE NOT FOUND ON A
     1NIN. )
      GO TO 499
      END
```

```
      SUBROUTINE DENSER(MIN,MOUT,IMX)
C
C     DIAPHANOUS EDITOR
C*    ALL DENSER RUNS MUST WRITE ON A TAPE IN EVEN PARITY -
C*    THIS IS DONE BY SPECIFYING THE K AND E OPTIONS ON THE TAPE ASSIGN CARD
C     DAPHNE WAS ORIGINALLY MODIFIED BY L. R. NORRIS TO READ A DIAPHANOUS
C     TAPE AND MAKE THIS INTO A CONDENSED TAPE IN ORDER TO SAVE SPACE
C
C
C     DENSER WAS MODIFIED BY R. KORTS, OCT., 1967, TO BE A SUBROUTINE
C     TO COMBO.
C
C     THIS PROGRAM DOES NOT ACHIEVE THE SAME RESULTS AS 'DENSER'
C      IT IS A MODIFICATION OF DENSER TO BE USED ONLY WITH COMBO.
C
C
C     MIN, MOUT SPECIFIED AS SUBROUTINE ARGUMENTS.
C     IFILE=1
C     IWRIT=0
C     MENU=1
C
C     WRITE STATEMENTS, EXCEPT FOR ERROR MESSAGES, HAVE BEEN REMOVED.
C
C     VARIABLE NAME  MEANING
C
C     *** AUGEAS ***
C     DELEPJ (2000)  ENERGY CHANGE DURING A TRANSITION (EV)
C     DELEPS (1300)  IONIZATION POTENTIAL OF A STATE (EV)
C     EIN (15)       ENERGY OF GROUND STATE OF AN IONIZATION LEVEL
C     EPSD (1300)    SAME AS EPS IN DIAPHANOUS
C     FPC (3, 3, 3)  FRACTIONAL PERCENTAGE COEFFICIENT FOR TRANSITION BETWEEN
C                    SPLIT CONFIGURATIONS
C     IJU (2000)     IDENTIFICATION NUMBER OF INITIAL STATE ASSOCIATED WITH A
C                    TRANSITION
C     ISPLIT (15, 40)IDENTIFICATION OF A SPLIT CONFIGURATION
C     MERGED (15, 40)TRUE IF THIS CONFIGURATION IS THE AVERAGE OF SOME OTHER
C                    CONFIGURATIONS IN THE TABLE
C     MJU (2000)     NUMBER OF ELECTRONS IN LEVEL FROM WHICH ONE IS REMOVED IN
C                    THIS TRANSITION
C     NFD (1300)     SAME AS NF IN DIAPHANOUS
C     NJU (2000)     PRINCIPAL QUANTUM NUMBER (OR REDUCED QUANTUM NUMBER) OF
C                    ELECTRON REMOVED IN THIS TRANSITION.
C     NQ (6, 15, 40) NUMBER OF ELECTRONS IN AN ELECTRON LEVEL IN A CONFIGURATION
C     NRMAX (15)     NUMBER OF CONFIGURATIONS AT AN IONIZATION LEVEL
C     NRSAVE (1300)  CONFIGURATION IDENTIFICATION OF A STATE
C     NSAVE (1300)   QUANTUM NUMBER OF OUTER ELECTRON, IF BEYOND TABLE, OF A
C                    STATE
```

```
C      GO (1500)        SAME AS G IN DIAPHANOUS
C      GWT (15, 40)     DEGENERACY OF A CONFIGURATION
C      WO (15, 40)      COEFFICIENTS IN QUADRATIC FOR DETERMINING ENERGY OF THIS
C                       CONFIGURATION
C      W1 (15, 40)      COEFFICIENTS IN QUADRATIC FOR DETERMINING ENERGY OF THIS
C                       CONFIGURATION
C      W2 (15, 40)      COEFFICIENTS IN QUADRATIC FOR DETERMINING ENERGY OF THIS
C                       CONFIGURATION
C      *** DIAPH2 ***
C      BE (100)         SAME AS BEJ, INDEXED BY (NF + 1) FOR INITIAL STATE
C      BEJ (1600)       PARAMETER DETERMINING LINE WIDTH FOR A TRANSITION
C      C (10)           CONCENTRATION OF AN ELEMENT (ATOMS/ATOM)
C      COM (12)         COMMENT CARD IN FORMAT 12A6
C      DELE (100)       SUM OF DELI AT PREVIOUS IONIZATION LEVELS (EV)
C      DELEPJ (2200)    ENERGY CHANGE DURING A TRANSITION (EV)
C      DELEPS (1500)    IONIZATION POTENTIAL OF A STATE (EV)
C      DELI (100)       PRESSURE IONIZATION AT AN IONIZATION LEVEL (EV)
C      EPS (1500)       ENERGY OF A STATE, USUALLY REFERRED TO THE ENERGY OF THE
C                       GROUND STATE OF THE NEUTRAL ATOM (EV)
C      EPSPRM (1500)    ENERGY OF A STATE AFTER REDUCTION DUE TO PRESSURE IONIZA-
C                       TION (EV)
C      EX (100)         SAME AS EXJ, INDEXED BY (NF + 1) FOR INITIAL STATE
C      EXJ (1600)       PARAMETER DETERMINING LINE LOCATIONS FOR A TRANSITION
C      GAMBLK (10)      ARRAY OF GAMMA
C      IJ (2200)        IDENTIFICATION NUMBER OF INITIAL STATE ASSOCIATED WITH A
C                       TRANSITION
C      MAKEZ (1500)     IDENTIFICATION OF STATE TO BE ELIMINATED
C      MJ (2200)        NUMBER OF ELECTRONS IN LEVEL FROM WHICH ONE IS REMOVED IN
C                       THIS TRANSITION
C      NEW (2200)       ORIGINAL IDENTIFICATION NUMBER OF A TRANSITION
C      NF (1500)        NUMBER OF FREE ELECTRONS FOR A STATE
C      NJ (2200)        TOTAL QUANTUM NUMBER (OR REDUCED QUANTUM NUMBER) OF ELEC-
C                       TRON REMOVED DURING A TRANSITION
C      NLAST (10)       INDEX NUMBER OF LAST STATE IN TABLE FOR AN ELEMENT
C      PHI (2200)       STRENGTH OF EDGE DUE TO THIS TRANSITION
C      Q (1500)         DEGENERACY OF A STATE
C      R (1500)         FIRST PROPORTIONAL TO LOG POPULATION AND THEN TO POPULATION
C                        OF A STATE
C      RS (10)          FIRST MAXIMUM R, THEN SUM OF R'S, FOR AN ELEMENT
C      SMALLP (1500)    POPULATION OF A STATE
C      TESTJ (2200)     LOWEST VALUE OF MU AT WHICH THE ABSORPTION COEFFICIENT IS
C                       AFFECTED BY THE LINE SERIES FOR THIS TRANSITION
C      TKULK (10)       ARRAY OF KT
C      U (5)            COEFFICIENTS IN GAUSSIAN INTEGRATION
C      H (5)            COEFFICIENTS IN GAUSSIAN INTEGRATION
C      UOLD (2200)      LOCATION OF EDGE DUE TO THIS TRANSITION (EV/EV)
C      UPRM (2200)      LOWERED EDGE TO APPROXIMATE HIGH LINES (EV/EV)
C      W (10)           ATOMIC WEIGHT OF AN ELEMENT
C      Z (10)           ATOMIC NUMBER OF AN ELEMENT
C      *** DIAPER ***
C      AMU (1000)       ABSORPTION COEFFICIENT AT A PARTICULAR VALUE OF MU(.6 .LE.
C                       MU .LE. 15) (PER CM)
C      BMU (1000)       BOTTOM OF EDGE OCCURING AT A PARTICULAR VALUE OF MU(MU .GT.
C                        15)(PER CM)
C      ID (12)          COMMENT CARD
```

```
C      TMU (1000)      TOP OF EDGE OCCURING AT A PARTICULAR VALUE OF U (U>15) (PER
C                       CM)
C      *** SPECTRA ***
C      DEFECT (100, 4)QUANTUM DEFECT INDEXED BY THE IONIZATION LEVEL AND L + 1
C      DELEPJ (3500)   SAME AS DELEPJ IN DIAPHANOUS
C      EPSD (1750)     SAME AS EPS IN DIAPHANOUS
C      DELEPS (1750)   SAME AS DELEPS IN DIAPHANOUS
C      IJU (3500)      SAME AS IJ IN DIAPHANOUS
C      IONZC (100)     ZCORE FOR AN IONIZATION LEVEL
C      L (19)          L FOR AN ELECTRON LEVEL
C      LIN (10)        LEVEL AT WHICH AN ELECTRON IS BEING ADDED
C      LOUT (10)       LEVEL AT WHICH AN ELECTRON IS BEING REMOVED
C      MJU (3500)      SAME AS MJ IN DIAPHANOUS
C      N (19)          N FOR AN ELECTRON LEVEL
C      NE (92, 19)     NUMBER OF ELECTRONS PER ELECTRON LEVEL IN THE GROUND STATE
C                      OF AN IONIZATION LEVEL
C      NFU (1750)      SAME AS NF IN DIAPHANOUS
C      NJU (3500)      SAME AS NJ IN DIAPHANOUS
C      QU (1750)       SAME AS Q IN DIAPHANOUS
C
       REAL LONG
       REAL LENGTH
       INTEGER NEWID, BLANK
       DIMENSION NEWID(12)
       DIMENSION ID(12), A(20), B(2), U1(150), GARY(150), AMU(150),
      1          UAVE (150),DUMMY(30)
       DIMENSION THETA(5000), XGAMMA(5000), RHO(5000)
       DIMENSION U2(1500), BMU(1500), TMU(1500), COMP(10), IZ(10)
       DATA DENSOR/6HDENSER /
       DATA IFILE/1/,IWRIT/0/,MENU/1/
       DATA INDEXA / 1/
       DATA LRN / 1 / , DUMMY / 30*0. /
       DATA IFILE1 / 0 / , BLANK / 6H       /
C
    1  CONTINUE
C
C      MENU       IF (MENU .EQ. 0) ANOTHER SADY TAPE IS READ
C                 IF (MENU .NE. 0) THE RUN TERMINATES
C      IFILE      IF (IFILE .NE. 0) NO END OF FILE MARKER IS PUT ON AFTER
C                    THIS DIAPHANOUS TAPE HAS BEEN READ
C                 IF (IFILE .EQ. 0) AN END OF FILE MARKER IS PUT ON AFTER
C                    THIS TAPE HAS BEEN READ
C      IWRIT      IF (IWRIT .NE. 0) THE DIAPHANOUS INPUT TAPE IS EDITED
C                 IF (IWRIT .EQ. 0)THE DIAPHANOUS INPUT TAPE IS NOT EDITED
C
C
C      MIN        IS THE INPUT TAPE UNIT.  MIN MUST BE READ FOR EVERY
C                    INPUT TAPE TO BE READ
C
C      ALL DENSER TAPES MUST BE WRITTEN IN 556 BPI -
C      THIS IS ACCOMPLISHED BY SPECIFYING THE H OPTION ON THE TAPE
C      ASSIGNMENT CARD
C
C
       READ (5,8000) NZ, (IZ(K), COMP(K), K=1,NZ)
```

```
 8000 FORMAT (12, 8X, 7(I2, 2X, F6.4))
      READ (5,8005) (NEWID(I),I=1,12)
 8005 FORMAT (12A6)
      REWIND MIN
      IRCD = 0
      NRCD = 0
      IDMU2 = 1500
C
      IF (IWRIT .NE. 0)
     1WRITE (6,9990)
      READ(MIN) A(1)
      IF (A(1))25,999,999
   25 IF(A(1)+1.) 999,2500,999
 2500 CONTINUE
      NRCD = NRCD + 1
      READ (MIN) (ID(I),I=1,12)
      IF (NEWID(1) .EQ. BLANK) GO TO 27
      DO 28 I=1,12
      ID(I) = NEWID(I)
   28 CONTINUE
   27 CONTINUE
      IF (IFILE1 .NE. 0) GO TO 26
      WRITE (MOUT,3) DENSOR, (ID(K),K=1,12), NZ, (COMP(K),IZ(K),K=1,NZ)
    3 FORMAT (13A6/12,(F6.4,I2))
      IRCD = IRCD + 2
   26 CONTINUE
      NRCD = NRCD + 1
      READ(MIN) A(1)
      IF (IWRIT .NE. 0)
     1WRITE (6,9995) A(1)
      IF(A(1)+2.) 999,3002,999
 3002 CONTINUE
      NRCD = NRCD + 1
   32 READ (MIN) (B(I),I=1,2)
      IF(B(1).GT.TMX) GO TO 155
      THETA (INDEXA)=B(1)
      XGAMMA(INDEXA)=B(2)
      J = 2
      M = 6
      ULAST1 = 0.
      ALAST1 = 0.
      U2(J) = 0.
      GAMY(1) = 0.
      DAVE(1) = 0.
      TK = B(1)
      GAMMA = B(2)
      NRCD = NRCD + 1
   34 READ(MIN) A(1), A(2)
      UX = A(1)
      UY = A(2)
      NRCD = NRCD + 1
      IF(UX + 3.) 35,65,35
   35 IF(UX + 4.) 40,75,40
   40 IF(UX + 6.) 55,45,55
   45 READ(MIN) A(1), A(2)
```

```
      IF (IWRIT .NE. 0)
     1WRITE (6,9000) A(1),A(2)
      U1(M) = A(1)
      AMU(M) = A(2)
      M = M+1
      UX = A(1)
      UY = A(2)
      NRCD = NRCD + 1
      IF(UX .LE. 0.) GO TO 4500
      ULAST = UX
      ULAST1 = UX
      ALAST1 = UY
      AKLAST = UY
      GO TO 34
 4500 CONTINUE
      REWIND MIN
      CALL EXIT
   55 U1(M) = UX
      AMU(M) = UY
      M = M+1
      GO TO 34
   65 READ(MIN) A(1), A(2), A(3)
      UX = A(1)
      UY = A(2)
      UZ = A(3)
      NRCD = NRCD + 1
      IF(UX + 4.) 70,74,70
   70 U2(J) = UX
      BMU(J) = UY
      TMU(J) = UZ
      J = J+1
      IF(J-IDMU2) 65,65,72
   72 CONTINUE
   73 READ(MIN) A(1), A(2), A(3)
      UX = A(1)
      UY = A(2)
      UZ = A(3)
      NRCD = NRCD + 1
      IF(UX + 4.) 73,74,73
   74 ULAST=U2(J-1)
      AKLAST=TMU(J-1)
   75 CONTINUE
      M = M - 1
      IF (IWRIT .NE. 0)
     1WRITE (6,9980) (U1(K),K=6,M)
      IF (IWRIT .NE. 0)
     1WRITE (6,9982) (AMU(K),K=6,M)
      IF (DAVE(1) .NE. 0.) CALL MERR
      READ(MIN) (A(JM), JM=1,8)
    4 FORMAT (1H )
      RMU(INUEXA)=A(2)
      INUEXA=INUEXA+1
      IF(U2(2) .EQ. 0.) GO TO 76
      J = J - 1
      IF (IWRIT .NE. 0)
```

```
      IWRITE (6,9984) (U2(K),K=2,J)
       IF (IWRIT .NE. 0)
      IWRITE (6,9986) (BMU(K),K=2,J)
       IF (IWRIT .NE. 0)
      IWRITE (6,9988) (TMU(K),K=2,J)
   76 CONTINUE
      WRITE (MOUT,2) J, M, ULAST1, ALAST1, B(1), B(2), (A(JM),JM=1,20),
     1               (U1(K),K=6,M), (AMU(K),K=6,M), (U2(K),K=2,J),
     2               (BMU(K),K=2,J), (TMU(K),K=2,J)
       NRCD = NRCD + 1
       IRCD1 = 11 + 2 * (M - 5) + 3 * (J - 1)
       IRCD2= IRCD1 / 14
       IRCD14 = IRCD2* 14
       IF (IRCD1 .GT. IRCD14) IRCD2= IRCD2 + 1
       IRCD = IRCD + 1 + IRCD2
       READ (MIN) A(1)
       IF (IWRIT.NE.0) WRITE (6,9996) A(1)
       UX = A(1)
       NRCD = NRCD + 1
       IF(UX + 2.) 77,32,999
   77 IF(UX + 5.) 999,155,999
  155 CONTINUE
C
       NRCD = NRCD + 1
C      THE ABOVE RECORD COUNT INCLUDES THE EOF RECORD
       IFILE1 = IFILE
       LONG = FLOAT(NRCD) * .0625
       LENGTH = FLOAT(IRCD) * .0658
       I = -5
       WRITE (MOUT,2) I, LRN, DUMMY
       IRCD = IRCD + 2
 8007 FORMAT (58HOTHE DIAPHANOUS TAPE HAS BEEN CONDENSED SUCCESSFULLY FR
     10M , F10.2,10H FEET WITH, I6, 21H PHYSICAL RECORDS TO ,F9.2,/10HOP
     2EET WITH,I5,18H PHYSICAL RECORDS.)
       ENDFILE MOUT
       IF (MEND .EQ. 0) GO TO 1
       REWIND MIN
       REWIND MOUT
       INDEXA=INDEXA-1
       RETURN
  999 CONTINUE
       WRITE (6,9901)
 9901 FORMAT (55H THERE IS AN ERROR IN THIS RUN. MERR HAS BEEN CALLED.)
       CALL MERR
C
C      ********************  F O R M A T S  **********************
   15 FORMAT  (42H 2ND SET OF DIAPHANOUS DATA HAS MORE THAN I3, 19H ENTR
     2IES.  THETA = F7.2, 8H, GAMMA=1PE10.5,20H, NO GOOD ABOVE U = UPF6.
     31)
 9000 FORMAT(9H0 ULAST = 1PE15.7, 3X 8HALAST = E15.7)
 9002 FORMAT(1P10E12.5)
 9980 FORMAT(10HU U1 ARRAY // (1P10E12.5))
 9982 FORMAT(11H0 AMU ARRAY // (1P10E12.5))
 9984 FORMAT(10H0 U2 ARRAY //(1P10E12.5))
 9986 FORMAT(11H0 BMU ARRAY // (1P10E12.5))
 9988 FORMAT(11H0 TMU ARRAY // (1P10E12.5))
 9990 FORMAT(1H1)
    2 FORMAT (2I4, 13E9.4, / (14E9.4))
 9995 FORMAT(10H  SIGNAL = F6.1)
 9996 FORMAT(10H1 SIGNAL = F6.1)
 9997 FORMAT(6H ZBAR=F8.4, 1X 4HHHO=1PE11.5, 2X 2HP=E11.5, 2X 2HE=E11.5,
     1 2X 5HKMOS=E11.5, 2X 6HKPLNK=E11.5, 2X 5HEION=E11.5, 2X 5HEGAM=
     20PF9.3)
 9998 FORMAT(9H0 THETA = 1PE15.7, 3X 7HGAMMA = E15.7)
 9999 FORMAT(1H0, 12A6)
      END
```

```
      SUBROUTINE RHOUET(ITP,RHO,R1,R2)                                  RDT   10
C                                                                       RDT   20
C     DETERMINES THE UPPER (R2) AND LOWER (R1) RANGES FOR RHO ON TAPE   RDT   30
C     ITP.                                                              RDT   40
C                                                                       RDT   50
      DATA RMAX/1.E38/                                                  RDT   65
      DIMENSION RHO(1)                                                  RDT   60
      R2=RHO(ITP)                                                       RDT   70
      IF(ITP.GT.1)GO TO 9                                               RDT   80
    6 R1=RMAX                                                           RDT   90
      RETURN                                                            RDT  100
    9 II=ITP                                                            RDT  110
    8 II=II-1                                                           RDT  120
      IF(II.LT.1)GO TO 6                                                RDT  130
      IF(RHO(II).LT.0.)GO TO 8                                          RDT  140
      R1=RHO(II)                                                        RDT  150
      RETURN                                                            RDT  160
      END                                                               RDT  500
```

```
      SUBROUTINE SHEAD(I)                                               SHD   10
C                                                                       SHD   20
C     PRINTS APPROPRIATE CLASSIFICATION HEADING                         SHD   30
C                                                                       SHD   40
      GO TO (10,20,30),I                                                SHD  100
   10 WRITE(6,200)                                                      SHD  110
      GO TO 30                                                          SHD  120
   20 WRITE(6,201)                                                      SHD  130
   30 RETURN                                                            SHD  140
  200 FORMAT(1H0,32X,67H*** S E C R E T / R E S T R I C T E D  D A T A  SHD  150
     .   G R O U P  1 ***)                                              SHD  160
  201 FORMAT(1H0,47X,40H*** U N C L A S S I F I E D  D A T A ***)       SHD  170
      END                                                               SHD  500
```

DIANTC: A DIANE TRANSFER PROGRAM (TAPE TO CARDS OR TAPE)

The DIANTC program was coded to read a DIANE binary data tape file and do one of two input-controlled operations: (1) punch DIANE data cards or (2) write a DIANE BCD card-image data tape. The card image tape is written in even parity at 556 BPI in IBM-compatible BCD format, and it may contain several files (written by repeated executions of the DIANTC program).

The DIANTC program contains five formatted (BCD) write statements. They and their respective formats are as follows, where MOUT is defined as the logical tape unit on which the output tape is mounted:

```
      WRITE(MOUT, 3) IDA
    3 FORMAT(I12)
      WRITE(MOUT, 4)(ID(II), II=1, 12)
    4 FORMAT(12A6)
```

The two above write statements are used once to write identification data at the beginning of each file on the DIANTC output tape. The named variables are discussed below or are clear from context.

```
      WRITE(MOUT, 5)HNUT, FNWD
    5 FORMAT(6E12.7)
```

The above write statement is used to write the first of two records preceding each frequency group.

Name variables are discussed below.

```
      WRITE(MOUT, 7)X1, X2, IX
    7 FORMAT(2E12.7, 49X, I3, 4H   0)
```

The above write statement is used to write the second of two records preceding each frequency group.

```
      WRITE(MOUT, 6)((BUFS(IWD), IWD=KMIN, KMAX), IX, KK)
    6 FORMAT(6E12.7, 1X, I3, I4)
```

The above write statement is used repetitively to write the data for each frequency group.

The code punches data cards, if it does not write a card-image tape, in the same manner and with the same formats that it uses to write the card-image tape. One may edit any file of the DIANTC card image output tape by using the EDIANE program, which is in FORTRAN IV language. One may also use either the output data cards or the output card image tape to write a binary DIANE-format tape using the program DIANTC, which is in FORTRAN IV language.

Input for DIANTC

DIANTC requires no card input. It is a subroutine with two input parameters, the meaning of which follows:

PARAMETER	VALUE	MEANING
UNIT	Variable	UNIT specifies the logical unit on which the input DIANE binary tape is mounted
IBIN0	0	If IBIN0 =0, the code assumes the input DIANE tape is written in binary with a binary identification record (ID array), and it punches cards
	1	If IBIN0 =1, the code assumes the input DIANE tape is written in binary with a BCD (formatted) identification record, and it punches cards
	>1	If IBIN0 > 1 the code assumes the input DIANE tape is written in binary with a binary identification record, and it does one of two things:
	2	1. If IBIN0 =2, the code writes a BCD card image tape on unit MOUT= IBIN0 +10=12
	>2	2. If IBIN0 > 2, the code writes two BCD card image tapes on units MOUT= IBIN0 +10 and MOUT2=MOUT+1

The code rewinds the input DIANE binary tape and the output BCD tape, if written, only when IBIN0 $\leq$ 2.

```
      SUBROUTINE DIANIC(M,N)
C
C     NO EXTRA DATA CARDS ARE REQUIRED TO RUN DIANIC
C
C     OUTPUT CARD FORM IS AS FOLLOWS
C
C     1       I12       1 - 12    IDA          12-DIGIT IDENTIFICATION
C                                                NUMBER
C     2       12A6      1 - 72    ID           HEADING FROM IDENTIFICATION
C                                                (HEADER) CARD
C     3       E12.7     1 - 12    FNUT         NUMBER OF FREQUENCY GROUPS
C     3       E12.7     13 - 24   FNWD         NUMBER OF WORDS/FREQUENCY
C                                                GROUP
C     4       E12.7     1 - 12    X1           IF X1 .LT.0.0 INDICATES
C                                                THAT THE GHEY ABSORPTION
C                                                COEFFICIENTS FOLLOW
C                                              IF X1.GT.0.0 THEN X1 IS THE
C                                                VALUE OF THE LOWER END
C                                                OF A FREQUENCY BAND
C     4       E12.7     13 - 24   X2           NUMBER OF TEMPERATURES
C     5       E12.7     1 - 12    BUFS(1WD),
C                                 IWD=1        LN THETA
C     5       E12.7     13 - 24   BUFS(1WD),
C                                 IWD=2        NUMBER OF TAU'S
C     5       6E12.7    1ST CARD: BUFS(1WD),
C                        5 - 72   IWD=3,NWD       LN KR, LN KP, LN TAU,
C                                                 LN KR, LN KP,...
C                       SUCCEEDING
C                       CARDS:
C             12        75 - 76   IA           2-DIGIT SEQUENCING NUMBER
C                                                INDICATES THE ORDER
C                                                NUMBER OF EACH FREQUENCY
C                                                GROUPING SET
C             13        78 - 80   KK           3-DIGIT SEQUENCING NUMBER
C                                                INDICATES CARD NUMBER
C                                                WITHIN A PARTICULAR
C                                                FREQUENCY GROUPING SET
C
      DIMENSION  ID(12), BUFS(1000)
      DIMENSION IDENT(2)
      DATA IDENT/6HBINARY,5H BCD /
      INTEGER UNIT
      IBINU = N
      UNIT = M
    3 FORMAT  (I12)
    4 FORMAT  (12A6)
    5 FORMAT  (6E12.7)
    6 FORMAT(6E12.7, 1X I3, I4)
    7 FORMAT(2E12.7, 49X I3, 4H   U)
    8 FORMAT(38H PUNCHING IS COMPLETED NO. OF CARDS = ,I5)
 7009 FORMAT (46H THE CARD COUNT DOES NOT INCLUDE THE RUN CARD.)
 7000 FORMAT (I12,12A6)
 7001 FORMAT (1H0,25X,20H DIANTC, RUN ON UNIT,I3,6H WITH ,A6,45H TAPE ID
```

```
     1ENTIFICATION, COMPLETED SUCCESSFULLY./1H1)
         IF (IBINU .EQ. 1) READ (UNIT,7000) IDA, (ID(I), I=1,12)
         IF (IBINU .EQ. 0) READ (UNIT) IDA, (ID(I), I=1,12)
C
C      IF (IBINU.GT.1) WRITE CARD IMAGE (BCD) TAPE ON UNIT MOUT=IBINU+10
C       IF (IBINU .GT. 2)  WRITE BCD (CARD IMAGE) TAPES ON UNITS
C        MOUT = IBINU+10  AND MOUT2 = MOUT+1.
C
         IF (IBINU .GT. 1) GO TO 100
       PUNCH 3, IDA
       PUNCH 4, (ID(I), I=1,12)
  101 CONTINUE
       READ (UNIT) MNUT, FNWD
         IF (IBINU .GT. 1) GO TO 102
       PUNCH 5,  MNUT, FNWD
  103 CONTINUE
       NWD = FNWD
       NVECES = MNUT + 1.
       IF (NWD .GT. 1000)  CALL DUMP
       XX=        FNWD/6.
       KX=        NWD/6
       AX=        KX
       IF(XX.GT.AX) KX= KX+ 1
       DO  20  I = 1, NVECES
       IX = I
       READ (UNIT) X1,X2
         IF (IBINU .GT. 1) GO TO 104
       PUNCH 7,  X1, X2, IX
       GO TO 105
  104 CONTINUE
       WRITE (MOUT,7) X1, X2, IX
         IF (MOUT2.GT.13) WRITE (MOUT2,7) X1, X2, IX
C
  105 CONTINUE
       READ (UNIT) (BUFS(IWD), IWD = 1, NWD)
       KMAX = 0
       DO 10 K=1,KX
       KK = K
       KMIN = KMAX + 1
       KMAX = KMAX + 6
         IF (IBINO .GT. 1) GO TO 106
       PUNCH 6, ((BUFS(IWD), IWD=KMIN,KMAX), IX, KK)
       GO TO 107
  106 CONTINUE
       WRITE (MOUT,6) ((BUFS(IWD),IWD=KMIN,KMAX), IX, KK)
         IF (MOUT2.GT.13) WRITE (MOUT2,6) (BUFS(IWD),IWD=KMIN,KMAX), IX,
     1     KK
C
  107 CONTINUE
   10 CONTINUE
   20 CONTINUE
       NOC = NVECES * (KX+1) + 3
         IF (IBINO .GT. 1) GO TO 120
       WRITE(6,8) NOC
       WRITE (6,7009)
```

```
      REWIND UNIT
      WRITE (6,7001) UNIT, IDENT(IBINO+1)
      RETURN
C
C
  100 CONTINUE
      MOUT=          IBINO + 10
      MOUT2=         MOUT + 1
      READ (UNIT) IDA, (ID(II), I=1,12)
      WRITE (MOUT,3) IDA
        IF (MOUT2.GT.13) WRITE (MOUT2,3) IDA
      WRITE (MOUT,4) (ID(II), II=1,12)
        IF (MOUT2.GT.13) WRITE (MOUT2,4) (ID(II),II=1,12)
      GO TO 101
C
  102 CONTINUE
      WRITE (MOUT,5) MNUT, FNWD
        IF (MOUT2.GT.13) WRITE (MOUT2,5) MNUT, FNWD
      GO TO 103
C
  120 CONTINUE
      END FILE MOUT
        IF (MOUT2.GT.13) END FILE MOUT2
        IF (IBINO .EQ. 2) REWIND UNIT
        IF (IBINO.EQ. 2) REWIND MOUT
      WRITE (6,7002) UNIT, MOUT
 7002 FORMAT (28HODDIANTC, INPUT TAPE ON UNIT ,I3, 25H, COMPLETED SUCCESS
     1FULLY, / 44H A BCD DATA TAPE WAS WRITTEN ON UNIT MOUT = ,I3)
        IF (MOUT2.GT.13) WRITE (6,7003) MOUT2
 7003 FORMAT (64H A SECOND COPY OF THE BCD DATA TAPE WAS WRITTEN ON UNIT
     1 MOUT2 = ,I3)
      WRITE (6,7004) (ID(II),II=1,12)
 7004 FORMAT (14H ID RECORD IS ,9X, 12A6)
      RETURN
      END
```

```
      SUBROUTINE DIANCT(M,N)
C     *****WARNING - THIS PROGRAM ALLOWS ONLY 17 DENSITY SETS PER  *****
C                    THETA SET, 25 THETA SETS PER FREQUENCY GROUP.
      DIMENSION THETAK(25), NUMBER(17), XRHO(25,17)
C
C     THE LNTHTK ARRAY STORES LN THETAK
      REAL LNTHTK(25)
C
      DATA TEST/1.E-3/, LN/0/, KOUNT/1/, XX2/0./
C
C     ASSUMES ALL DELETIONS AT A GIVEN THETA ARE SPECIFIED IN ORDER OF
C       DECREASING RHO.  THAT IS, THE FIRST RHO SET TO BE DELETED AT
C       A GIVEN THETA MUST BE THAT FOR THE HIGHEST RHO.
C
C
C     DESCRIPTION OF INPUT CARDS CONTROLLING DELETIONS OF THETA-RHO
C     POINTS
C
C     IF BLANK INPUT CARD IS USED, NO DELETIONS, DO NORMAL DIANCT RUN.
C     OTHERWISE READ DELETION CARDS UNTIL A BLANK CARD IS READ.
C
C     READ ONE INPUT CARD PER MODIFIED THETA SET .
C
C     COLUMNS  FORMAT  VARIABLE NAME  MEANING
C
C     1-10     E10.6   THETAK(IC)     TEMPERATURE AT WHICH DATA IS TO BE
C                                       DELETED
C     13-14    I2      NM             NUMBER OF DENSITY SETS TO BE
C                                       DELETED
```

```
C                                          IF (THETAK(IC).EQ.-THETAK(IC)),
C                                            DELETE ENTIRE THETA-RHO SET
C                                            (NUMBER OF RHO SETS TO BE
C                                            DELETED MUST BE SPECIFIED)
C                                          IF (THETAK(IC).EQ.0., IC.EQ.1),
C                                            DO NOT DELETE ANY POINTS
C                                          IF (THETAK(IC).EQ.0., IC.GT.1),
C                                            DO NOT DELETE ANY MORE POINTS
C     17-16,   22(I2,  JRHO(IC,J)       1ST,2ND,...,JTH,...,NM-TH NUMBERED
C     20-21,       1X)                   RHO(IC) SETS TO BE DELETED
C      ...,                              (IF ENTIRE THETA SET IS TO BE
C     62-63                              DELETED, THESE NEED NOT BE
C                                        SPECIFIED)
      DIMENSION IDENT(2)
      DATA IDENT/6HBINARY,5H BCD /
      INTEGER UNIT
      UNIT = M
      IBINO = N
      MIN=          5
        IF (IBINO .LE. 1) GO TO 400
      MIN=          IBINO + 10
      IBINO=        0
      N=            0
  400 CONTINUE
    4 FORMAT  (12A6)
    5 FORMAT  (6E12.7)
    6 FORMAT (I12)
 7000 FORMAT (I12,12A6)
 7001 FORMAT (1HO,26X,19HDIANCT, RUN ON UNIT,I3,6H WITH ,A6,45H TAPE IDE
     1NTIFICATION, COMPLETED SUCCESSFULLY./1H1)
 7002 FORMAT (28H NWO.GT.1000 .OR. MNO.GE.0. )
C
      WRITE (6,7004)
 7004 FORMAT (43H1BEGIN DIANCT.  THE FOLLOWING DATA IS INPUT ,///)
C
C     READ INPUT CARDS CONTROLLING DELETIONS OF THETA-RHO POINTS.
      DO 700 IC=1,25
      READ (5,7003) THETAK(IC), NM, (JRHO(IC,J), J=1,NM)
 7003 FORMAT (E10.6, 2X, I2, 2X, 17(I2,1X) )
      NUMBER(IC)=  NM
        IF (THETAK(IC)) 51,701,52
   51 CONTINUE
      XX2=          XX2 + 1.
      LN=           LN + 2
   52 CONTINUE
      LN=           LN + 3 + NUMBER(IC)
      LNTHTK(IC)=  ALOG(ABS(THETAK(IC)))
C
      WRITE (6,7005) IC, THETAK(IC), LNTHTK(IC), NM, (JRHO(IC,J),
     1               J=1,NM)
 7005 FORMAT (10HOTHETA SET ,I2 /10H THETAK = ,E12.6, 11H, LNTHTK = ,
     1        E12.6, 23H, DELETE THE FOLLOWING ,I2, 14H RHO SET(S) = ,
     2        10(I2,2X) / (84X, 10(I2,2X)) )
C
  700 CONTINUE
```

```
      IC=           25
  701 CONTINUE
C
C     IC1 COUNTS THE NUMBER OF TEMPERATURES FOR WHICH DENSITY SETS ARE
C       TO BE REMOVED.
      IC1=          IC - 1
C
      READ (MIN,6) IDA
      READ (MIN,4) (ID(I), I=1,12)
         IF (IBINO .EQ. 1) WRITE (UNIT,7000) IDA, (ID(I), I=1,12)
         IF (IBINU .EQ. 0) WRITE (UNIT) IDA, (ID(I), I=1,12)
      READ (MIN,5) MNUT, FNWD
      NWD=          IFIX(FNWD + .5)
        IF (MIN .EQ. 5) GO TO 403
      XX=           FNWD/6.
      KX=           NWD/6
      AX=           KX
        IF (XX .GT. AX) KX= KX+1
  403 CONTINUE
C     LN IS THE TOTAL NUMBER OF CELLS IN THE BUFS ARRAY THAT ARE TO BE
C       REMOVED.
      NEWNWD=       NWD - LN
      FFNWD=        FLOAT(NEWNWD)
      WRITE (UNIT)  MNUT, FFNWD
      WRITE (6,7006) LN, NEWNWD
 7006 FORMAT (55H0LN IS THE TOTAL NUMBER OF POINTS TO BE REMOVED.  LN =
     1, I4,23H.  NEWNWD = NWD - LN = , I4)
      NVECES = MNUT + 1.
      IF (NWD.GT.1000) GO TO 40
      DO  200 I = 1, NVECES
      READ (MIN,5) X1,X2
      X2=           X2 - XX2
      WRITE (6,7012) XX2,X2
 7012 FORMAT (118H1XX2 IS THE TOTAL NUMBER OF TEMPERATURE SETS TO BE REM
     1OVED.  X2 IS THE NUMBER OF TEMPERATURE SETS PER FREQUENCY GROUP. /
     2/H XX2 = ,F12.3, 10X, 6H X2 = ,F12.3)
      WRITE (UNIT) X1,X2
        IF (MIN .NE. 5) GO TO 401
      READ (MIN,5) (BUFS(IWD),IWD=1,NWD)
      GO TO 402
  401 CONTINUE
      KMAX=         0
      DO 404 K=1,KX
      KMIN=         KMAX + 1
      KMAX=         KMAX + 6
      READ (MIN,409) ((BUFS(IWD),IWD=KMIN,KMAX), IX, KK)
  409 FORMAT (6E12.7, 1X, I3, I4)
  404 CONTINUE
  402 CONTINUE
C
      I1=           1
      I2=           1
      NOWNWD=       NWD
        IF (LN .EQ. 0) GO TO 450
C
```

```
  710 CONTINUE
C     FIND THETAK(I1), I1=1,IC1
C
      WRITE (6,7014) LNTHTK(I1), BUFS(I2), I2
 7014 FORMAT (32H   DIANCT IS COMPARING LNTHTK = ,E12.6,  18H  WITH BUFS
     1(I2) = , E12.6, 8H,  I2 = ,I4)
        IF (ABS( (LNTHTK(I1)-BUFS(I2))/BUFS(I2)) .LT. TEST) GO TO 720
      I2LAST=       I2
      I2=           I2 + (IFIX(BUFS(I2+1)+.5)) * 3 + 2
C
C     CHECK THE VALUE OF I2.  THE FOLLOWING IF TEST SHOULD BE PASSED
C       ONLY IF THETA(I1) IS INPUT INCORRECTLY, OR IF THE BUFS ARRAY
C       CARDS ARE OUT OF ORDER.
        IF (I2.GT.(NWD-1) .OR. I2.LT.(I2LAST + 5)) GO TO 999
      GO TO 710
C
  720 CONTINUE
C     THETAK(I1) HAS BEEN LOCATED AS BUFS(I2)
      WRITE (6,7011) THETAK(I1), I2
 7011 FORMAT (14HOTHETAK(I1) = ,E12.6,39H HAS BEEN LOCATED AS BUFS(I2),
     1    I2 =  ,I4)
        IF (THETAK(I1) .GT. 0.) GO TO 761
      ISKIP=        IFIX(BUFS(I2+1) + .5) * 3 + 2
      I3=           I2
      GO TO 751
C
  761 CONTINUE
C     THETAK .GT. 0., DELETE RHO SET(S), ONE AT A TIME
C
        IF (NUMBER(I1) .GT. IFIX(BUFS(I2+1) + .5))  GO TO 999
      ISKIP=        3
      BUFS(I2+1)=   FLOAT(IFIX(BUFS(I2+1)+.5) - NUMBER(I1))
      WRITE (6,7013) THETAK(I1), BUFS(I2 + I)
 7013 FORMAT (14H FOR THETAK = , E12.6, 32H, BUFS(I2+I) WAS MODIFIED TO
     1BE , E12.6)
C
  750 CONTINUE
      I3=           I2 + 2 + 3*(JRHO(I1,KOUNT)  - KOUNT)
  751 CONTINUE
C
C
      NOWNWD=       NOWNWD - ISKIP
      DO 752 I4=I3,NOWNWD
      BUFS(I4)=     BUFS(I4 + ISKIP)
  752 CONTINUE
C
        IF (THETAK(I1) .LT. 0.) GO TO 709
      KOUNT=        KOUNT + I
        IF (KOUNT .GT. NUMBER(I1)) GO TO 709
      GO TO 750
  709 CONTINUE
      I1=           I1 + 1
      I2=           I
      KOUNT=        1
  450 CONTINUE
```

```
        IF (I1 .LT. IC) GO TO 710
      WRITE (UNIT) (BUFS(IWD), IWD=1,NOWNWD)
      LRN1=          I
      WRITE (6,7008) LRN1, NOWNWD
 7008 FORMAT (7//8OLRN1 COUNTS THE NUMBER OF FREQUENCY GROUPS THAT HAVE B
     1EEN WRITTEN.   LRN1 = , I4, 15H, AND NOWNWD = , I5)
  200 CONTINUE
      END FILE UNIT
      REWIND UNIT
        IF (MIN .NE. 5) WRITE (6,410) MIN
  410 FORMAT (40HUDIANC1, RUN USING BCD INPUT TAPE MIN = ,I3, 12H, COMPL
     1ETED.  )
      WRITE (6,7001) UNIT, IDENT(IBINU+1)
      RETURN
   40 WRITE (6,7002)
      REWIND UNIT
      RETURN
  999 CONTINUE
C     E R R O R   E X I T
C
      WRITE (6,7007)
 7007 FORMAT (85H112 TOO LARGE, OR LESS THAN (I2LAST+5), OR THETAK(I1).E
     1Q.0., OR NUMBER(I1) TOO LARGE.   )
      CALL MERR
      RETURN
      END
```

DIANE TAPE AND DIANE CARD FORMAT

The DIANE cards, together with the DIANTC (tape to cards), DIANCT (card to tape), and DYPDIN (refer to later writeup) programs form an effective mechanism for transfer of opacity data from one user to another or from one computer to another. Data have been transferred this way between the IBM-7044, the UNIVAC-1108, and the CDC 3600, 6400, 6600 computers. This is possible because the cards are in decimal format and the programs are all in compatible FORTRAN IV.

The DIANE cards punched by the DIANTC (tape to cards) program have the following format:

CARD PUNCHED	FORMAT	COLUMNS USED	NAME IN PROGRAM	DESCRIPTION
1	I12	1 - 12	IDA	12-digit identification number
2	12A6	1 - 72	ID	Heading from identification (header) card
3	E12.7	1 - 12	HNUT	Number of frequency groups
3	E12.7	13 - 24	FNWD	Number of words/frequency grouping
4	E12.7	1 - 12	X1	If X1 < 0, indicates that the grey absorption coefficients follow If X1 > 0, then X1 is the value of the lower end of a frequency band
4	E12.7	13 - 24	X2	Number of temperatures
5	E12.7	1 - 12	BUFS(IWD), IWD=1	$\ell n\ \theta_1$
5	E12.7	13 - 24	BUFS(IWD), IWD=2	Number of τ's at θ_1 (τ is the specific volume in cc/gm)
5	6E12.7	1st card: 25 - 72	BUFS(IWD), IWD=3, LAST	$\ell n\ K_R$, $\ell n\ K_P$, $\ell n\ \tau$, $\ell n\ K_R$, $\ell n\ K_P$, ...
			LAST=(3* BUFS(2))+2	
		succeeding cards: 1 - 72		$\ell n\ \theta_2$, No. of τ's at θ_2, $\ell n\ K_R$, $\ell n\ K_P$, $\ell n\ \tau$, ...

```
      SUBROUTINE DIANE(M,N)
C     D I A N E   F O R T R A N
C
C     MODIFIED BY BILL LINDLEY ON FEB. 27, 1967, TO ACCEPT DATA FROM
C       LASL (ANDIMX TAPES) AND DIAPHANOUS OPACITY DATA.  (CODE WAS
C       CALLED ANDY FROM FEB. 27,1967 UNTIL JUNE 12, 1967.)
C
C     MODIFIED BY C. IMES TO COMBINE DIANE WITH SCATTERING AND DIANE WITHOUT
C        SCATTERING ON JANUARY 30, 1967
C
C*    ALL DIANE RUNS USING CONDENSED DIAPHANOUS TAPES (DENSER TAPES)
C*    MUST READ THESE TAPES IN EVEN PARITY -
C*    THIS IS DONE BY SPECIFYING THE K AND E OPTIONS ON THE TAPE ASSIGN CARD
C
      REAL LOWLIM
      INTEGER SCAT
      INTEGER HOBIO
      INTEGER DENSER
      DIMENSION A(20), IZ(10), COMP(10)
      DIMENSION NOSCAT(3)
      DATA NOSCAT / 6H WITH , 6H  NO  , 6H.397/  /
      DATA DENSER / 6HDENSER /
      DATA  HOBIO/6HANDIMX/
      DATA DIMMMU/15.0/, IDMMMO/17/, IDMU2/500/, DIMCMU/2000./,
     1     IDMBUF/1000/, IDMIM/25/
C
      COMMON/WBL/AMU(150), U1(150), U2(500), BMU(500), TMU(500),
     1           CMU(2000), UR(300)
C
      DIMENSION AK(15,25,17), RO(25,17), AKT(15), ID(13)
     1,KAMAX(25), PK(15,25,17), THETA(25), BUFS(1000), ANUK(5)
     2,AKLW(5), AKUP(5), IP(5), BKLW(5), BKUP(5), PCHA(20), BHNU(152)
     3,PKT(15), SKP(25,17), SKR(25,17), JDID(25,12)
      DIMENSION  HOBMU(3000)
      EQUIVALENCE (HOBMU, AMU)
      EQUIVALENCE(IUX,UX)
      EQUIVALENCE (A(1),ZBAR), (A(2),RHO), (A(3),BIGP), (A(4),EPSMAL),
     1            (A(5),AKAPPA), (A(6),WAMBDA), (A(7),EIPART),
     2            (A(8),GAMNEW)
C
C     NOTE ID(13) IS USED AS KAMAX(0)
C
      SCAT = M
      LOWLIM=      .2
      IBCDD = N
      IF (SCAT .EQ. 2) LOWLIM = .3977
         IF (SCAT .EQ. 1) LOWLIM= 1.E-10
C
C     TO RUN DIANE, THESE DATA CARDS ARE REQUIRED:
C     (ALL INPUT TEMPERATURES AND FREQUENCIES ARE IN UNITS OF ELECTRON
C     VOLTS)
C
C     THE FIRST DATA CARD REQUIRED HAS AN IDENTIFICATION NUMBER IN COLUMNS
C     1-12 (FORMAT (I12)).  THIS IS AN OPTIONAL NUMBER, BUT IT IS HELPFUL
```

```
C     TO USE IT AS A SEQUENCING NUMBER, INCREASING ITS VALUE BY ONE EACH TIME
C     A RUN IS MADE.
C
C     THE SECOND DATA CARD REQUIRED HAS A HEADER IN (12A6) FORMAT WITH ANY
C     TITLE INFORMATION DESIRED FOR THE RUN.  SUGGESTED DATA INCLUDE MATERIAL,
C     RUN TYPE, DIAPHANOUS TAPES USED, DATE, TEMPERATURE RANGE, NUMBER OF
C     FREQUENCY SETS, USER/REQUESTER, ETC.
C
C     THE THIRD DATA CARD REQUIRED CONTAINS THE FOLLOWING INFORMATION:
C
C     COLUMNS   VARIABLE NAME   FORMAT   DATA
C
C     1-10      HNUT            F10.4    NUMBER OF FREQUENCY GROUPS
C     11-20     TP(1)           F10.4    TP(1).EQ.2. - DESIGNATES SCRATCH TAPE 2
C     21-30     TP(2)           F10.4    TP(2).EQ.3. - DESIGNATES SCRATCH TAPE 3
C     31-40     TP(3)           F10.4    TP(3).EQ.4. - DESIGNATES SCRATCH TAPE 4
C     41-50     TP(4)           F10.4    TP(4).EQ.7. - DESIGNATES SCRATCH TAPE 7
C     51-60     TP(5)           F10.4    TP(5).EQ.8. - DESIGNATES SCRATCH TAPE 8
C
C     THE FOURTH, ETC., DATA CARD(S) REQUIRED CONTAIN THE FREQUENCY INPUT VALUES
C     THEY MUST BE SPECIFIED IN DESCENDING ORDER, FORMAT (7F10.4).
C     EACH FREQUENCY GIVEN IS AT THE LOWER END OF ITS GROUP, AND THE LAST
C     FREQUENCY IN THE INPUT MUST BE .001 OR SOME OTHER SMALL BUT FINITE NUMBER.
C
C     FOLLOWING THE FREQUENCY INPUT CARDS IS A DATA CARD (NEXT-TO-LAST DATA
C     CARD IF ONLY DIAPHANOUS (AND/OR ANDIMX) OR SILVIA OR ZSAZSU DATA
C     ARE USED.  THIRD-FROM-LAST CARD, OTHERWISE) CONTAINING THE
C     FOLLOWING INFORMATION:
C
C     COLUMNS   VARIABLE NAME   FORMAT   DATA
C
C     1-10      THN             F10.4    THN.EQ.0.IS THE NORMAL CASE: SIGNALS
C                                          THAT DATA IS TO BE READ FROM DIAPHA-
C                                          NOUS AND/OR ANDIMX DATA
C                                        THN.LT.0. SIGNALS THAT SPECIAL LOW
C                                          TEMPERATURE DATA WILL BE READ FROM
C                                          TAPE H, A DATA TAPE MADE BY ZSAZSU,
C                                          SILVIA, OR ALVETO
C                                        THN.GT.0. SIGNALS THAT CARD INPUT
C                                          FOR LOW TEMPERATURE POINTS WILL BE
C                                          READ (TO DATE, CH2 IS THE ONLY
C                                          MATERIAL THAT HAS BEEN TREATED
C                                          THIS WAY)
C
C     11-20     THSKIP          F10.4    THSKIP.EQ.0 IS THE NORMAL CASE:
C                                          IF(THN.EQ.0.), THSKIP IS NOT USED
C                                          IF(THN.NE.0..AND. THSKIP.NE.0.):
C                                          THSKIP.GT.0. MEANS SKIP THSKIP
C                                          TEMPERATURES AT LOW END
C                                          THSKIP.LT.0. MEANS PICK UP EACH
C                                          THSKIP'TH TEMPERATURE
C
C     NEXT DATA CARD REQUIRED ONLY IF SILVIA, ZSAZSU, OR ALVETO DATA
C     ARE USED
C
```

```
C     COLUMNS   VARIABLE NAME   FORMAT   DATA
C
C     1-10      ANUK(K)         F10.4    THIS IS A HIGHER FREQUENCY
C                                         THAN THE LAST ONE AVAILABLE ON
C                                         INPUT TAPE OR CARDS.  IT IS
C                                         THE FREQUENCY OF AN 'EDGE' FOR
C                                         WHICH OPACITY DATA ARE TO BE
C                                         PROVIDED AS INDICATED BELOW.
C
C     11-20     AKLW(K)         F10.4    WHEN KAPPA=A+B*RHO, THIS IS A
C                                         FOR THE LOWER KAPPA VALUE AT
C                                         THE INPUT ANUK(K).
C                                        OTHERWISE, IT IS THE LOWER
C                                         VALUE OF KAPPA AT THE INPUT
C                                         ANUK(K).
C
C     21-30     AKUP(K)         F10.4    WHEN KAPPA=A+B*RHO, THIS IS A
C                                         FOR THE UPPER KAPPA VALUE AT
C                                         THE INPUT ANUK(K).
C                                        OTHERWISE, IT IS THE UPPER
C                                         VALUE OF KAPPA AT THE INPUT
C                                         ANUK(K).
C
C     31-40     BKLW(K)         F10.4    WHEN KAPPA=A+B*RHO THIS IS B
C                                         FOR THE LOWER KAPPA VALUE AT
C                                         THE INPUT ANUK(K).
C                                        OTHERWISE, IT IS ZERO.
C
C     41-50     BKUP(K)         F10.4    WHEN KAPPA=A+B*RHO, THIS IS B
C                                         FOR THE UPPER KAPPA VALUE AT
C                                         THE INPUT ANUK(K).
C                                        OTHERWISE, IT IS ZERO.
C
C
C     LAST DATA CARD MUST CONTAIN THE FOLLOWING INFORMATION (ALL
C     COMMENTS REFERRING TO DIAPHANOUS TAPES ARE APPLICABLE TO ANDIMX
C     TAPES, AS WELL)
C
C
C     COLUMNS   VARIABLE NAME   FORMAT   DATA
C
C     1-10      TAPES           F10.4    IF (TAPES.GT.0.), INDICATES THE
C                                         NUMBER OF DIAPHANOUS (AND/OR
C                                         ANDIMX) TAPES THAT ARE TO BE
C                                         USED.
C                                        IF (TAPES.LE.0.), INDICATES
C                                         THAT NO DIAPHANOUS OR ANDIMX
C                                         TAPES WILL BE USED.
C     11-20     THMAX           F10.4    HIGHEST TEMPERATURE TO BE ACCEPTED FROM
C                                         DIAPHANOUS
C     21-30     THMIN           F10.4    LOWEST TEMPERATURE TO BE ACCEPTED FROM
C                                         DIAPHANOUS
C     31-40     THM1            F10.4    HIGHEST TEMPERATURE TO BE ACCEPTED FROM
C                                         FIRST DIAPHANOUS TAPE (ON UNIT 0),
C                                         IF MORE THAN ONE SUCH TAPE IS USED.
```

```
C                                          THM1.EQ.0. OTHERWISE
C      41-50      THM2          F10.4      HIGHEST TEMPERATURE TO BE ACCEPTED FROM
C                                           SECOND DIAPHANOUS TAPE (ON UNIT E),
C                                           IF MORE THAN TWO SUCH TAPES ARE USED,
C                                           THM2.EQ.0. OTHERWISE
C      51-60      THM3          F10.4      HIGHEST TEMPERATURE TO BE ACCEPTED FROM
C                                           THIRD DIAPHANOUS TAPE (ON UNIT F),
C                                           IF MORE THAN THREE SUCH TAPES ARE USED
C                                           THM3.EQ.0. OTHERWISE
C      61-70      THM4          F10.4      HIGHEST TEMPERATURE TO BE ACCEPTED FROM
C                                           FOURTH DIAPHANOUS TAPE (ON UNIT G),
C                                           IF FIVE SUCH TAPES ARE USED,
C                                           THM4.EQ.0. OTHERWISE
C
C      ***** NOTE: TAPES MUST BE .LE. 4 IF SILVIA, ZSAZSU, ALUETO, OR ANY OTHER
C            LOW TEMPERATURE DATA IS USED.                                    *****
C
C      ***** PLEASE NOTE:                                                     *****
C      *** THE NUMBER OF SCRATCH TAPES WHICH MUST BE ASSIGNED BY DRUM ASG      ***
C          CARDS IS DETERMINED BY THIS EQUATION:
C            INT (HNU1/(DIMHNU+.001 .EQ. 15.001)) + 1
C          THREE SCRATCH TAPES MAY BE ASSIGNED FOR EVERY RUN, BUT
C          1. 1-30 FREQUENCY GROUPS REQUIRE 1 SCRATCH TAPE
C          2. 31-45 FREQUENCY GROUPS REQUIRE 2 SCRATCH TAPES
C          3. 46-60 FREQUENCY GROUPS REQUIRE 3 SCRATCH TAPES
C
C          PROGRAM NEEDS MORE SCRATCH TAPE ASSIGNMENTS IF MORE THAN 60 FREQUENCY
C          GROUPS ARE SPECIFIED.
C          TO ADD TWO MORE (MAXIMUM ALLOWED) SCRATCH AREAS, ADD ASG DRUM/ AND
C          ASG DRUMB CARDS.
C      *****                                                                  *****
C
C
C
C      F O R M A T S
 3003 FORMAT (1X,8HTAPES = ,F10.4,12H WHEN THN = ,F10.4,/120H THIS COMBI
     1NATION OF LOW TEMPERATURE INPUT (USING TAPE H) AND 5 DIAPHANOUS TA
     2PES (FIFTH ONE ON TAPE H) IS NOT POSSIBLE. )
 7000 FORMAT (1H0, 42X, 7HDIANE, , A6, 35HSCATTERING, COMPLETED SUCCESSF
     1ULLY. / 1H1)
    1 FORMAT  (39H TOO MUCH DATA FOR BUFS STORAGE.  TILT.)
    2 FORMAT (15H FOR THETA = F7.2, 8H, RHO = 1PE10.5, 28H, DIAPHANOUS D
     2ATA ABOVE U = 0PF6.1,43H ARE BEING REJECTED DUE TO LACK OF STORAGE
     2.)
    3 FORMAT  (7F10.4)                                                    00000120
 7003 FORMAT (1X,7F10.4)
    4 FORMAT  (I12)
 7004 FORMAT (1X,I12)
    5 FORMAT  (10H1HNU FROM  ,F12.4,  5H  TO , F12.4)
    6 FORMAT  (/9H THETA = ,F12.4)
    7 FORMAT  (1P8E15.8)
    9 FORMAT  (12A6)                                                      00000170
 7009 FORMAT (1X,12A6)
   10 FORMAT  (41H DIAPHANOUS TAPE SEEMS TO HAVE MORE THAN 12, 11H DENSI
     2TIES.)
```

```
   11 FORMAT  (10H DENSITIES)
   12 FORMAT  (1H1)
   13 FORMAT  (11Z, 12A6)
   14 FORMAT  (15HIAVERAGE KAPPAS)
   15 FORMAT  (42H 2ND SET OF DIAPHANOUS DATA HAS MORE THAN 13, 19H ENTR
     2IES.  THETA = F7.2, 8H, RHO = 1PE10.5,20H, NO GOOD ABOVE U = UPF6.
     31)
   16 FORMAT  (23H WARNING.  FOR THETA = F10.4, 11H AND RHO = E10.4, 8H,
     2 GROUP 12, 24H HAS A U DISCREPANCY OF 1PE9.3, 8H VERSUS 1PE9.3)
C
C      GENERALLY FOR LOW TEMPERATURES, DATA FROM CARD INPUT.  BUT FOR AIR,
C      DATA FROM ZSAZSU - FIXED TABLES IN FREQUENCY, DENSITY, TEMPERATURE
C      UP TO FIVE DIAPHANOUS TAPES (D,E,F,G,H RESPECTIVELY)
C      *** NOTE:  NUMBER OF DIAPHANOUS INPUT TAPES MUST BE .LE. 4 IF SILVIA,
C      ZSAZSU, ALUETO, OR ANY OTHER LOW TEMPERATURE DATA IS USED.              ***
C      DIANE TAPE ON C
C      INPUT TAPE FROM ZSAZSU OR SILVIA ON H
       CALL UVCKON
       CALL UVCHK(KUMT)
       IUMMNU = UIMMNU                                                  00000240
       IUMCMU = UIMCMU
C      P R O C E S S   I N P U T                                        00000250
       READ (5,4)  IDA
       WRITE (6,7004)  IDA
       READ (5,9)  (ID(I), I = 1, 12)
       WRITE (6,7009)  (ID(I), I=1,12)
       READ  (5,3)MNUT, (IP(I), I = 1, 5)                               00000260
       WRITE (6,7003) MNUT, (IP(I),I=1,5)
       NMNU=        MNUT + .5
       BMNU(1) = 1.E6
C      FREQUENCY RANGE LIMITED BY CMU STORAGE
       NP1 = NMNU + 1
       READ (5,3) (BMNU(I), I = 2, NP1)
       WRITE (6,7003)  (BMNU(I), I=2,NP1)
C
C      BMNU(1) .EQ. 1.E6 IS THE PRESENT UPPER FREQUENCY LIMIT IN DIANE
C
       IF (BMNU(NP1) .LT. .001) BMNU(NP1) = .001
       NSCT = INT(MNUT/ (UIMMNU+ .001)) + 1                             00000320
       IF (NSCT .GT. 6)  CALL DUMP
       DO  501  I = 2, NSCT
       IIP = IP(I-1)
  501  REWIND IIP
CARD INPUT FOR LOW-TEMPERATURE POINTS
       READ (5,3)  THN, IHSKIP
       WRITE (6,7003)  THN,IHSKIP
       IF (THN)  507, 506, 508
  506  JA = 0
       NTHETA = 0
       GO TO 20
C
C      NEGATIVE THN SIGNALS THAT DATA SHALL BE READ FROM TAPE H,
C      A DATA TAPE MADE BY ZSAZSU, SILVIA, OR ALUETO
C      DATA TAPE MATERIALS INCLUDE AIR, REFRASIL, CARBON PHENOLIC,
C      POLYATOMIC CARBON, ALUMINUM, AND IRON.
```

```
C      POSITIVE IHSKIP MEANS SKIP IHSKIP TEMPERATURES AT LOW END
C      NEGATIVE IHSKIP MEANS PICK UP EACH IHSKIP)TH TEMPERATURE
  507 REWIND 16
      READ (16) IHSN,INHNU, HNUMIN, DHNU
      CBIM = HNUMIN
      FBIM = HNUMIN - 0.5 * DHNU
      HW = 0.5 * DHNU
      W = DHNU
      WI = 1. / DHNU
      HIP = DHNU * INHNU + FBIM
      IF (IHSKIP .GT. 0.0)  GO TO 500
      NIHETA = IHSN
      GO TO 502
  500 NSK = IHSKIP
      NIHETA = IHSN - IHSKIP
      DO  504  I = 1, NSK
      READ (16) XX, KHON
      MRP = KHON
      DO  503  J = 1, MRP
  503 READ (16)
  504 CONTINUE
  502 NIHNU = INHNU
      NUP = 2
      ANUK(1) = HIP
      BKUP(1) = 0.
      DO  510  K = 2, NUP
      READ (5,3)  ANUK(K), AKLW(K), AKUP(K), BKLW(K), BKUP(K)
  510 WRITE (6,7)  ANUK(K), AKLW(K), AKUP(K), BKLW(K), BKUP(K)
      GO TO 509
  508 NIHETA = IHN
C     B E G I N   T E M P E R A T U R E   L O O P
  509 JA = 0
      DO  580  JAQ = 1, NIHETA
      IF (IHN)  1500, 1504, 1502
 1504 CALL DUMP
 1500 IF (IHSKIP .GT. (-.5)) GO TO 1505
      IF (AMOD(FLOAT(JAQ), -IHSKIP) .EQ. 0.0)  GO TO 1501
      READ (16) XX, KHON
      MRP = KHON
      DO  1503  J = 1, MRP
 1503 READ (16)
      GO TO 580
 1501 JA = JA + 1
      GO TO 1506
 1505 JA = JAQ
 1506 READ (16)  THETA(JA), KHON
      PTHET = THETA(JA)
      MRP = KHON
      GO TO 1508
 1502 READ (5,3)  PTHET, PKM, PNU, PA, PB, PC, PD
      WRITE (6,7)  PTHET, PKM, PNU, PA, PB, PC, PD
      IF (PKM .GT. FLOAT(IDMKMO))  CALL DUMP
      MRP = PKM
      READ (5,3)  (RO(JA,J), J = 1, MRP)
      WRITE (6,7)  (RO(JA,J), J = 1, MRP)
```

```
      IF (PNU .LT. 0.5 .OR. PNU .GT. 5.0)  CALL DUMP
      NUP = PNU
      DO  1509  K = 1, NUP
      READ (5,3)  ANUK(K), AKLW(K), AKUP(K), BKLW(K), BKUP(K)
 1509 WRITE (6,7)  ANUK(K), AKLW(K), AKUP(K), BKLW(K), BKUP(K)
C     B E G I N   D E N S I T Y   L O O P
 1508 DO  575  KA = 1, MKP
      IF (IMN) 1510, 1504, 1511
 1510 READ (16) RO(JA,KA), (UR(N), N=1,NTHNU)
      AKUP(1) = AMAX1(UR(NTHNU), 1.E-10)
      GO TO 1512
 1511 AKLPNU = PA + PB * SQRT(RO(JA,KA)) + PC * RO(JA,KA) + PD *
     2 RO(JA,KA)**2
 1512 ANUTST = ANUK(1)
CONSTRUCT TABLE OF ABS COEFFS(CMU) FOR HIGH FREQUENCIES FROM EDGE DATA
      IX = 1                                                          00000740
      CMU(1) = AKUP(1) + BKUP(1) * RO(JA,KA)
      DO  520  K = 2, NUP                                             00000760
      CKUP = AKUP(K-1) + BKUP(K-1) * RO(JA,KA)                        00000770
      CKLW = AKLW(K) + BKLW(K) * RO(JA,KA)                            00000780
  517 IX = IX + 1                                                     00000790
      IF (IX - 200)  1516, 1516, 1517
 1516 DNU = 0.5
      GO TO 1518
 1517 DNU = 5.0
 1518 ANUTST = ANUTST + DNU
      IF (ANUTST - ANUK(K))  516, 519, 519                            00000810
  516 CMU(IX) = EXP(ALOG(CKUP) + ALOG(CKLW/ CKUP) / ALOG(ANUK(K) /    A00000820
     1NUK(K-1)) * ALOG(ANUTST/ ANUK(K-1)))                            00000830
      IF (IX -  IDMCMU) 517, 521, 521
  519 IX = IX - 1                                                     00000850
      ANUTST = ANUTST - DNU
  520 CONTINUE                                                        00000870
      CKUP = AKUP(NUP) + BKUP(NUP) * RO(JA,KA)
C     KAPPA GOES AS HNU**-3 BEYOND LAST EDGE
  514 IX = IX + 1
      IF (IX - 200)  1513, 1513, 1514
 1513 DNU = 0.5
      GO TO 1515
 1514 DNU = 5.0
 1515 ANUTST = ANUTST + DNU
      CMU(IX) = AMAX1(CKUP * (ANUK(NUP) / ANUTST)**3,LOWLIM)
      IF (IX - IDMCMU)  514, 521, 521
  521 CALL OVCHK (KOUOFX)                                             00000880
       GO TO(1522,522),KOUOFX                                         00000890
 1522 CALL DUMP                                                       00000900
  522 SKP(JA,KA) = 0.0
      SKR(JA,KA) = 0.0
      DO  570  I = 1, NSCT
      ITP = IP(I-1)
      IF (I - NSCT)  524, 525, 505                                    00000920
  505 CALL DUMP                                                       00000930
  524 MMNU = IDMMNU                                                   00000940
      GO TO 530                                                       00000950
  525 MMNU = NMNU - IDMMNU * (I - 1)                                  00000960
```

```
C     B E G I N   F R E Q U E N C Y   L O O P
  550 DO  565  IA = 1, MMNU                                          00000970
      IA1 = IA + IDMMNU * (I - 1)                                    00000980
      HNUL = BMNU(IA1+1)
      UTL = HNUL  / PIMET
      UTU = BMNU(IAT) / PIMET
      IF (BMNU(IA1+1) .GE. ANUK(1))  GO TO 554
      IF (BMNU(IAT) .LE. ANUK(1))  GO TO 544
      HNUU = ANUK(1)
      GO TO 546                                                      00001100
  544 HNUU = BMNU(IA1)
C     SUM OVER FREQUENCIES BELOW FIRST EDGE
  546 IF (IMN)  1544, 505, 1540
C     GENERAL LOW-FREQUENCY INTEGRATION(CONSTANT KAPPA)
 1540 ULL = HNUL / PIMET
      ULU = HNUU / PIMET
      ULM = 0.5 * (ULL + ULU)
      ELM = 1.0 - EXP(-ULM)
      IF (ULL .GT. 15.)  GO TO 1542
      PLN = PLNKUT(ULL,ULU)
      ELL = EXP(-ULL)
      ELU = EXP(-ULU)
      SUMKAP = (PLN + .03849/433 * (ULL**4 * ELL / (1.0 - ELL) - ULU**4
     2 * ELU / (1.0 - ELU))) / ELM / AKLMNU
      GO TO 1543
CASE OF LARGE U.  ULL HERE IS UTL, SO NORMALIZATION IS SIMPLER.
 1542 ELU = EXP(-ULU)
      PLN = .153989733 * (((ULL + 3.) * ULL + 6.) * ULL + 6. - ELU *
     2 (((ULU + 3.) * ULU + 6.) * ULU + 6.))
      SUMKAP = (PLN + .03849/433 * (ULL**4 - ULU**4 * ELU)) / ELM /
     2 AKLMNU
 1543 SUMPKA = AKLMNU * ELM * PLN
      GO TO 551
C     LOW-FREQUENCY INTEGRATION FOR MATERIALS WHOSE KAPPAS COME FROM A DATA TAPE
 1544 IL = MAX1(WI * (HNUL - FBTM) + 1.0, 1.0)
      IU = MAX1(WI * (HNUU - FBTM) + 1.0, 1.0)
      SUMKAP = 0.0
      SUMPKA = 0.0
      DO  550  L = IL, IU                                            00001190
C     ZERO INPUT OPACITIES NOW POSSIBLE                              00001200
      UK(L) = AMAX1(UK(L), 1.E-20)
      HNULL = AMAX1(HNUL, FLOAT(L-1) * W+ FBTM)                      00001220
      HNULU = AMIN1(HNUU, FLOAT(L) * W+ FBTM)                        00001230
      ULL = HNULL / PIMET                                            00001240
      ULLP = HNULU / PIMET                                           00001250
      ULM = 0.5 * (ULL + ULLP)                                       00001260
      ELM = 1.0 - EXP(-ULM)
      IF (UTL .LE. 15.)  GO TO 548
CASE OF LARGE U FOR DATA TAPE MATERIALS
      ELLP = EXP(-ULLP + UTL)
      ELL = EXP(-ULL + UTL)
      PLN = .153989733 * ((((ULL + 3.) * ULL + 6.) * ULL + 6.) * ELL -
     2 ELLP * (((ULLP + 3.) * ULLP + 6.) * ULLP + 6.))
      SUMKAP = SUMKAP + (PLN + .038497433 * (ULL**4 * ELL - ULLP**4 *
     2 ELLP)) / ELM / UK(L)
```

```
      GO TO 549
  548 ELL = EXP(-ULL)                                                    00001270
      ELLP = EXP(-ULLP)                                                  00001280
      PLN = PLNKUT(ULL, ULLP)
      SUMKAP = SUMKAP + (PLN + .038497433 * (ULL**4 * ELL / (1.0 - ELL)
     2 - ULLP**4 * ELLP / (1.0 - ELLP))) / ELM / UR(L)
  549 SUMPKA = UR(L) * ELM * PLN + SUMPKA
      CALL OVCHK (KOOOFX)                                                00001320
       GO TO( 547,550),KOOOFX
  547 CALL DUMP
  550 CONTINUE
  551 IF (BMNU(IAT) .LE. ANUK(1))  GO TO 560
      MNUL = ANUK(1)
      GO TO 555
  554 SUMKAP = 0.0                                                       00001410
      SUMPKA = 0.0
  555 MNUU = BMNU(IAT)
C     SUM OVER FREQUENCIES ABOVE FIRST EDGE
      IF (MNUL - ANUK(1) .GT. 100.)  GO TO 557
      IL = 2.0* (MNUL - ANUK(1)) + 1.0
      GO TO 558
  557 IL = 201. + 0.2 * (MNUL - ANUK(1) - 100.)
      GO TO 559
  558 IF (MNUU - ANUK(1) .GT. 100.)  GO TO 559
      IU = 2.0* (MNUU - ANUK(1))
      GO TO 1548
  559 IU = 200. + 0.2 * (MNUU - ANUK(1) - 100.)
      IF (IU .LT. IDMCMU)  GO TO 1548
      IF (IL .LT. IDMCMU)  GO TO 1545
      AKI(IA) = LOWLIM
      PKI(IA) = LOWLIM
      GO TO 567
 1545 IU = IDMCMU
      UTUP = ((FLOAT(IDMCMU) - 200.) * 5.0 + 100. + ANUK(1)) / PTHET
      IF (UTUP .LT. 1000.)  WRITE (6,16)  PTHET, RO(JA,KA), IAT,UTU,UTUP
 1548 DO  561  IX = IL, IU
      IF (IX .GT. 200)  GO TO 1552
      UNU = 0.5
      HUNU = 0.25
      GO TO 1553
 1552 UNU = 5.0
      HUNU = 2.5
 1553 IF (IX .GT. IL)  GO TO 1554
      HNULL = HNUL
      GO TO 1560
 1554 HNULL = HNULL + UNU
 1560 ULL = HNULL / PTHET                                                00001560
      ULLP = (HNULL + UNU) / PTHET
      ELM = 1. - EXP((-HNULL - HUNU) / PTHET)
      IF (UTL .LE. 15.0)  GO TO 1555
      ELLP = EXP(-ULLP + UTL)
      ELL = EXP(-ULL + UTL)
      PLN = .159989733 * ((((ULL + 3.) * ULL + 6.) * ULL + 6.) * ELL -
     2 ELLP * ((((ULLP + 3.) * ULLP + 6.) * ULLP + 6.))
      SUMKAP = SUMKAP + (PLN + .038497433 * (ULL**4 * ELL - ULLP**4 *
```

```
     2 ELLP)) / ELM / CMU(IX)
       GO TO 1556
1555 ELL = EXP(-ULL)                                                    00001580
     ELLP = EXP(-ULLP)                                                  00001590
     PLN = PLNKUT(ULL,ULLP)
     SUMKAP = SUMKAP + (PLN                    + .038497433 * (ULL**4 *
    1 ELL / (1.0- ELL) - ULLP**4 * ELLP / (1.0- ELLP))) / CMU(IX) / ELM
1556 SUMPKA = SUMPKA + PLN * CMU(IX) * ELM
     CALL OVCHK (KOUOFX)                                                00001630
      GO TO(1561,561),KOUOFX                                            00001640
1561 CALL DUMP                                                          00001650
 561 CONTINUE                                                           00001660
CALCULATE NORMALIZING FACTOR, FORM AVERAGE ABS COEFF, AND DO BOOKKEEPING
 560 IF (UTL - 15.0)  1558, 1558, 1557
1557 ETU = EXP(-UTU + UTL)
     FR = EXP(-UTL)
     PLN = .153989733 * (((UTL + 3.) * UTL + 6.) * UTL + 6.  - ETU *
    2 (((UTU + 3.) * UTU + 6.) * UTU + 6.))
     DENOM = PLN + .038497433 * (UTL**4 - UTU**4 * ETU)
     GO TO 1559
1558 ETL = EXP(-UTL)                                                    00001690
     ETU = EXP(-UTU)                                                    00001700
     FR = 1.
     PLN = PLNKUT(UTL, UTU)
     IF (PLN)  562, 562, 563
 563 DENOM = PLN                    + .038497433 * (UTL**4 * ETL / (1.0 -
    1 ETL) - UTU**4 * ETU / (1.0- ETU))                                 00001720
1559 IF (SUMKAP)  562, 562, 566                                         00001730
 562 CALL DUMP                                                          00001740
 566 AKI(IA)       = DENOM / SUMKAP
     PKI(IA) = SUMPKA / PLN
 567 CALL OVCHK (KOUOFX)                                                00001760
      GO TO(1565,564),KOUOFX
1565 CALL DUMP                                                          00001780
 564 PKI(IA) = ALOG(PKI(IA))
     SKP(JA,KA) = SKP(JA,KA) + SUMPKA * FR
     SKR(JA,KA) = SKR(JA,KA) + SUMKAP * FR
 565 AKI(IA) = ALOG(AKI(IA))
     IF (I - 1)  568, 568, 571
 568 DO  569  IA = 1, MMNU
     AK(IA,JA,KA) = AKI(IA)
 569 PK(IA,JA,KA) = PKI(IA)
     GO TO 570
 571 WRITE (11P)  (AKI(IA), PKI(IA), IA = 1, MMNU)
 570 CONTINUE
     SKR(JA,KA) = -ALOG(SKR(JA,KA))
     SKP(JA,KA) = ALOG(SKP(JA,KA))
 575 RO(JA,KA) = -ALOG(RO(JA,KA))                                       00001820
     THETA(JA) = ALOG(PTHET)
     KAMAX(JA) = MRP
 580 CONTINUE
     IF (THN .LT. 0.0 .AND. THSKIP .LT. 0.0)  NTHETA = JA               00001840
     JA = NTHETA
     KA = KAMAX(JA)
C
```

```
C     D I A P H A N O U S    S E C T I O N
   20 CONTINUE
      READ (5,3) TAPES, THMAX, THMIN, THM1, THM2, THM3, THM4
      WRITE (6,7003) TAPES, THMAX, THMIN, THM1, THM2, THM3, THM4
         IF (TAPES .LT. .001) GO TO 160
         IF (THMAX .LT. .001) THMAX = 1.E5
         IF (THM1 .LT. .001) THM1 = 1.E5
         IF (THM2 .LT. .001) THM2 = 1.E5
         IF (THM3 .LT. .001) THM3 = 1.E5
         IF (THM4 .LT. .001) THM4 = 1.E5
C     ***** NOTE: TAPES MUST BE .LE. 4 IF SILVIA, ZSAZSU, ALUETO, OR ANY OTHER
C           LOW TEMPERATURE DATA IS USED.                                    *****
         IF (THN.LT.0. .AND. TAPES.GT.4.5) GO TO 3002
      MEDIA = 12
      TEST1 = 0.0                                                          00001920
      TAPEN = 1.0                                                          00001930
      KA = 0                                                               00001940
      MID = 1
      GO TO 22
 3002 CONTINUE
      WRITE (6,3003) TAPES, THN
  999 CALL DUMP                                                            00001970
C
   22 CONTINUE
      IF (IBCDD .EQ. 0) GO TO 350
      READ (MEDIA) UX
      IF (IUX .EQ. HOBIO) GO TO 300
      IIUX=UX-.5
      IF(IIUX .EQ. (-1)) GO TO 30
      WRITE(6,7999) UX, IIUX, IUX, IUX
 7999 FORMAT (26H PROBLEM WITH FIRST RECORD /5X,1PE15.8,2X,I4,2X,A6, 2X0
     1I2)
      CALL MERR
C
  350 CONTINUE
      LHUB=1
      READ (MEDIA,7350) IUX, (IU(I),I=1,12), NZ, (COMP(I),IZ(I),I=1,NZ)
 7350 FORMAT (13A6/12, (F6.4,I2))
      IF (IUX .NE. DENSER) CALL MERR
      WRITE (6,7351)
 7351 FORMAT (47H WE ARE PROCESSING A CONDENSED DIAPHANOUS TAPE.)
      WRITE (6,1001) IUX, (IU(I),I=1,12)
 1001 FORMAT (1H0, 13A6)
      WRITE (6,1002) NZ,(I,COMP(I),IZ(I),I=1,NZ)
 1002 FORMAT (1H0,5HNZ = ,I2,/(1H ,I2,2X,F5.4,2X,I2/))
C
  355 CONTINUE
      READ (MEDIA,7352) JJ, II, ULAST, AKLAST, TK, GAMMA, (A(K),K=1,20),
     1                  (U1(K),K=6,II), (AMU(K),K=6,II), (U2(K),K=2,JJ),
     2                  (BMU(K), K=2,JJ), (TMU(K), K=2,JJ)
 7352 FORMAT (2I4, 13E9.4, /  (14E9.4))
      IF (JJ .EQ. (-5)) GO TO 79
      IF ((II .GT. 150).OR.(JJ .GT. IUMU2)) GO TO 353
      IF (II .LT. 6) WRITE (6,8) TK, GAMMA
      IF (ULAST .GT. U.) GO TO 351
```

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C       ULAST .GT. 0. IMPLIES TRANSITIONS EXHAUSTED AT ULAST . LT. (U=15.)
          IF (U2(2) .EQ. 0.) GO TO 356
  354 CONTINUE
        U2(1) = U1(II)
        AMU(1) = AMU(II)
        ULAST = U2(JJ)
        AKLAST = AMU(JJ)
  352 CONTINUE
        AMU(1) = AMAX1(AMU(1), LOWLIM*RHO)
        IMAX = II
        JMAX = JJ
        JLESS = JJ-1
        NEND = 4
        GO TO 80
  356 CONTINUE
        ULAST=       U1(II)
        AKLAST =     AMU(II)
  351 CONTINUE
        U2(1) = 15.
        AMU(1) = AKLAST * (ULAST / 15.)**3
C       U2(2) .EQ. 0. IMPLIES THERE IS NO EDGE DATA
        IF (U2(2) .EQ. 0.) GO TO 352
        GO TO 354
  353 CONTINUE
        WRITE (6,7353) II, JJ, IDMU2, TK, GAMMA
 7353 FORMAT (9H 150 .LT. , I3, 6H .OR. , I3, 6H .GT. , I4, 9H FOR TK =,
     1        1PE15.8, 12H AND GAMMA = , 1PE15.8)
        CALL MERR
        CALL DUMP
C       READ START OF ANDIMX TAPE
  300 MTP = MID + 4
        WRITE (6,7700) UX
 7700 FORMAT (22H WE ARE PROCESSING AN ,A6,7H TAPE. )
        READ (MEDIA) ((DDID(MX,J), J=1,12), MX=MID,MTP)
        MID = MID + 5
        READ (MEDIA)  UX
        IF (ABS(UX + 2.0) .LT. 1.E-4)  GO TO 32
        IF (ABS(UX + 7.0) .LT. 1.E-4)  GO TO 310
        CALL DUMP
C       PROCESS HUEBNER DATA SET FOR GIVEN T, RHO
  310 READ (MEDIA)  XX, XX, TK, RHO, (XX,I=1,24), U1STR, DUI,
     2 (XX,I=1,7)
        READ (MEDIA)  NMAX, (HUBMU(I), I=1,NMAX)
        LHUB = 2
        IF (NMAX .GT. 2971)  CALL DUMP
CODE ASSUMES START AT .3, DELTA U = .01
        IF (ABS(U1STR - 0.3) .GT. 1.E-4 .OR. ABS(DUI - 0.01) .GT. 1.E-5)
     2 CALL DUMP
        DO  315  I = 1, 2971
        IBK=    2972-I
  315 HUBMU(IBK+29) = HUBMU(IBK)
        DO  320  I = 1, 29
        HUBMU(I)=HUBMU(30)*(30./FLOAT(I))**3
  320 CONTINUE
        GO TO 76
```

```
   30 READ  (MEDIA) (DUID(MID,I), I=1,12)
      MID = MID + 1
      READ  (MEDIA)UX                                                    00002030
      IF (UX + 2.0) 999, 32, 999                                         00002040
C     READ IN MU VERSUS U FOR GIVEN T, GAMMA                             00002050
C     THIS IS A DIAPHANOUS DATA SET ON EITHER A DIAPHANOUS OR AN ANDIMX TAPE.
   32 READ  (MEDIA)TK,GAMMA                                              00002060
      LMUB = 1
      J = 2
CAVEAT.  THIS ASSUMES FIRST MU ALWAYS GIVEN AT .6                        00002920
      I = 6
      M6 = 1
C     READ FIRST SET OF DATA
   34 READ  (MEDIA)UX,UY                                                 00002090
      IF (UX + 3.0)  35, 60, 35                                          00002110
   35 IF (UX + 4.0)  40, 50, 40                                          00002120
   40 IF (UX + 6.0)  55, 45, 55                                          00002130
   45 READ (MEDIA)  UX, UY
      IF (UX .LE. 0.0)  CALL DUMP
      ULAST = UX
      AKLAST = UY
      M6 = 2
      GO TO 34                                                           00002170
C     WHEN (-4.) FOUND, TEST IF ULAST, AKLAST ALREADY SET
   50 GO TO (51, 52), M6
   51 ULAST = U1(I-1)
      AKLAST = AMU(I-1)
   52 U2(1) = 15.
      IMU(1) =  AKLAST * (ULAST /15.)**3
      GO TO 75                                                           00002190
   55 U1(I) = UX                                                         00002200
      AMU(I) = UY                                                        00002210
      I = I + 1                                                          00002220
      GO TO 34                                                           00002230
   60 IF (I - 6)  61, 61, 64
CASE OF NO FIRST FRAME
   61 CONTINUE
      WRITE (6,8) TK, GAMMA
    8 FORMAT (50X,28H********** CAVEAT ********** /43X,56H DIANE FOUND N
     1O DATA ON THE DIAPHANOUS TAPE FOR U.LT.15 /50X,28H******************
     2************ )
      CALL DUMP
C     READ SECOND SET OF DATA
   64 U2(1) = U1(I-1)
      IMU(1) = AMU(I-1)
   65 READ  (MEDIA)UX,UY,UZ                                              00002260
      IF (UX + 4.0)  70, 74, 70                                          00002270
   70 U2(J) = UX                                                         00002280
      BMU(J) = UY                                                        00002290
      TMU(J) = UZ                                                        00002300
      J = J + 1                                                          00002310
      IF (J - IUMU2)  65, 65, 72
   72 WRITE (6,15)  IUMU2, TK, RMO, U2(J-1)
   73 READ (MEDIA)  UX, UY, UZ
      IF (UX + 4.0)  73, 74, 73
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   74 ULAST = U2(J-1)                                                    00002330
      AKLAST = IMU(J-1)                                                  00002340
   75 READ  (MEDIA)ZBAR,RHO,BIGP,EPSMAL,AKAPPA,WAMBDA,EIPART,GAMNEW     00002350
      IMU(1) = AMAXI(IMU(1), LOWLIM * RHO)
      IMAX = I - 1                                                       00002360
      JMAX = J - 1                                                       00002370
      JLESS = JMAX - 1                                                   00002380
   76 READ  (MEDIA)UX                                                    00002390
      IF (ABS(UX + 2.) .LT. 1.E-4)  GO TO 78
      IF (ABS(UX + 5.) .LT. 1.E-4)  GO TO 79
      IF (ABS(UX + 7.) .LT. 1.E-4)  GO TO 77
      CALL DUMP
   77 NENU = 3
      GO TO 80
   78 NENU = 1                                                           00002420
      GO TO 80                                                           00002430
   79 NENU = 2                                                           00002440
CHECK STATUS OF TEMPERATURE-DENSITY TABLE BEING BUILT FROM DIAPHANOUS DATA
   80 IF (TK .LT. THMIN)  GO TO 133
      IF (TK .GT. TESTT) GO TO 585
      KA = KA + 1
      IF (KA .LE. IDMRHO)  GO TO 150
      WRITE (6,10)  IDMRHO
      GO TO 133
  585 IF (NTHETA .LE. 0)  GO TO 588
C     REJECT DIAPHANOUS TEMPERATURES WHICH OVERLAP THE LOW-THETA RANGE
C     WHERE DATA ARE PROVIDED BY ZSAZSA(FOR AIR) OR CARD INPUT(FOR ALL ELSE)
      IF (TK .LT. 1.001 * THETA(NTHETA)) GO TO 133
C     REJECT HIGHER TEMPERATURES IF STORAGE FULL                         00002530
      IF (JA .LE. NTHETA)  GO TO 589
  588 KAMAX(JA) = KA                                                     00002550
C     JA.EQ.0 INITIALLY AND KAMAX(0) USES ID(13)
  589 IF (JA - IDMTH)  141, 160, 143
  141 IF (TK - THMAX)  140, 140, 160                                     00002570
  143 CALL DUMP                                                          00002580
  140 NTP = IAPEN
      GO TO (142,144,3000,3001,147), NTP
  142 THM = THM1
      GO TO 146
  144 THM = THM2
      GO TO 146
 3000 CONTINUE
      THM =     THM3
      GO TO 146
 3001 CONTINUE
      THM=      THM4
      GO TO 146
  147 THM = 1.E5
  146 IF (TK .LE. THM)  GO TO 145
      NENU = 2
      GO TO 133
  145 JA = JA + 1
      TESTT = TK                                                         00002600
      THETA(JA) = ALOG(TK)                                               00002610
      KA = 1                                                             00002620
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  150 GO TO (151, 640), LMUB
C     FILL IN MU VS U FOR U = 0.--.6 -- USED LATER ONLY IF UTU .GT. .6
  151 DO  149  IX = 1, 5
  149 AMU(IX) = AMU(6) * 216.0/ FLOAT(IX)**3                                    00002640
      FLIN1 = 0.1
      UTP = BMNU(1) / TK
        IF (ULAST.GT.14.9 .AND. ULESS.GE.1) GO TO 154
CONSTRUCT TABLE OF MU = U**-3 AS FAR AS NEEDED FOR ULAST LESS THAN 14.9
      II = 10.0* (ULAST - .05) + 1.0
      DO  152  IX = II, 150
      UGM = (FLOAT(IX) - 1.0) * 0.1 + .05                                       00002680
  152 AMU(IX) = AMAX1((ULAST / UGM)**3 * AKLAST, LOWLIM * RHO)
      IF (UTP - 14.9)  640, 640, 628
  628 ITL = 1
  627 IF (UTP - 100.)  621, 621, 622
  621 ITU = (UTP - 15.) * 2. + 1.
      GO TO 623
  622 ITU = MIN1(171. + (UTP - 100.) * 0.2, DIMCMU)
  623 DO  626  IX = ITL, ITU
      IF (IX - 170)  624, 624, 625
  624 UGM = (FLOAT(IX) - 1.) * 0.5 + 15.25
      GO TO 626
  625 UGM = (FLOAT(IX) - 171.) * 5. + 102.5
  626 CMU(IX) = AMAX1((ULAST / UGM)**3 * AKLAST / RHO, LOWLIM)
      GO TO 640
CONSTRUCT TABLE OF MU VS U ABOVE U = 15, USING AVAILABLE DIAPHANOUS DATA
CORRECTION FOR INDUCED EMISSION UNNECESSARY FOR LARGE U
                                                                              00002700
  154 UTST = U2(1)                                                            00002710
      IX = 1
      CMU(1) = TMU(1) / RHO
      DO  638  JX = 1, JLESS                                                  00002730
  632 IX = IX + 1                                                             00002740
      IF (UTST - UTP)  633, 633, 640
  633 IF (IX - 170)  635, 635, 637
  635 DU = 0.5
      GO TO 631
  637 DU = 5.0
  631 UTST = UTST + DU
      IF (UTST - U2(JX+1))  634, 636, 636                                     00002760
  634 CMU(IX) = EXP(ALOG(TMU(JX)) + ALOG(BMU(JX+1) / TMU(JX)) / ALOG(U2(      00002770
     1JX+1)/U2(JX)) * ALOG(UTST/U2(JX))) / RHO
      IF (IX - IDMCMU)  632, 639, 639
  636 IX = IX - 1                                                             00002800
      UTST = UTST - DU
  638 CONTINUE                                                                00002820
      ITL = IX
      GO TO 627
  639 WRITE (6,2)  TK, RHO, UTST
  640 SKP(JA,KA) = 0.0
      SKM(JA,KA) = 0.0
C     BEGIN DIAPHANOUS FREQUENCY LOOP
      DO  132  I = 1, NSCT
      ITP = TP(I-1)
      IF (I - NSCT)  81, 82, 143                                              00002840
   81 MMNU = IDMMNU                                                           00002850
```

```
      GO TO 83                                                          00002860
   82 MMNU = NMNU - IUMMNU * (I - 1)                                    00002870
   83 DO  130  IA = 1, MMNU                                             00002880
      IAT = IA + IUMMNU * (I - 1)                                       00002890
      UTL = BMNU(IAT+1) / TK
      UTU = BMNU(IAT) / TK
      GO TO (88, 325), LMUB
C     PROCESS MUELBNER DATA
  325 IL = AMAX1(100. * (UTL - .005) + 1., 1.)
      IU = AMIN1(100. * (UTU - .005) + 1., 3000.)
      PLINT = 0.01
      FR = 1.
      SUMKAP = 0.0
      SUMPKA = 0.0
      UTL1 = UTL
      UTU1 = UTU
      ETL = EXP(-UTL1)
      ETU = EXP(-UTU1)
      IF (UTU .LT. 30.01)  GO TO 105
      IF (UTL .LT. 80.)  GO TO 330
      AK(IA) = LOWLIM
      PK(IA) = LOWLIM
      GO TO 125
C     4157./227 IS 30**3 * 15 / PI**4
  330 SUMPKA = MUBMU(3000) / RHO * 4157.7227 * (ETL - ETU)
      TERML = ETL * (1. + UTL * (2. + UTL * (3. + UTL * (4. + UTL * (5.
     2 + UTL * (6. + UTL * (7. + UTL)))))))
      IF (UTU .LT. 80.)  GO TO 335
      TERMU = 0.0
      GO TO 340
  335 TERMU = ETU * (1. + UTU *(2. + UTU * (3.+ UTU * (4. + UTU * (5. +
     2UTU *(6. + UTU * (7. + UTU ))))))
C     5.70332335E-6 IS 15 / PI**4 / (30**3)
  340 SUMKAP = 5.70332335E-6 / MUBMU(3000) * RHO * (TERML - TERMU)
      IF (IL .GT. 3000)  GO TO 117
      GO TO 105
   88 IF (UTL - 14.9)  90, 91, 91
   90 IL = AMAX1(10.0 * (UTL - .05) + 1.0, 1.0)
      GO TO 94                                                          00002980
   91 UTL2 = UTL
      UTU2 = UTU
C     DO ROSSELAND AND PLANCK AVERAGES FOR U OVER 15
   93 SUMKAP = 0.
      SUMPKA = 0.
      IF (UTL2- U2(1))  650, 650, 652
  650 IL = 1
      GO TO 654
  652 IF (UTL2 - U2(1) - 85.)  653, 653, 655
  653 IL = 2. * (UTL2+ .5  - U2(1))
      GO TO 654
  655 IL = 171. + 0.2 * (UTL2 - U2(1) - 85.)
  654 IF (UTU2- U2(1))  656, 656, 658
  656 IU = 1
      GO TO 660
  658 IF (UTU2 - U2(1) - 85.)  657, 657, 659
```

```
  657 IU = 2. * (UTU2+ .5  - U2(1))
      GO TO 660
  659 IU = 170. + 0.2 * (UTU2   - U2(1) - 85.)
  660 IF (IU .LT. IDMCMU)  GO TO 667
      IF (IL .LT. IDMCMU)  GO TO 661
      AK(IA) = LOWLIM
      PK(IA) = LOWLIM
      GO TO 125
  661 IU = IDMCMU
      UTUP = (FLOAT(IDMCMU) - 170.) * 5. + 85. + U2(1)
      IF (UTUP .LT. 1000.)  WRITE (6,16)  TK, RHO, IAT, UTU, UTUP
  667 DO  675  IX = IL, IU
      IF (IX .GT. 170)  GO TO 663
      DUX = 0.5
      AUU = 0.
      IAUU = 0
      GO TO 665
  663 DUX = 5.0
      AUU = 85.0
      IAUU = 170
  665 IF (IX .GT. IL)  GO TO 664
      UXL = UTL2
      GO TO 666
  664 UXL = (FLOAT(IX - IAUU) - 1.0) * DUX + AUU + U2(1)
  666 IF (IX - IU)  668, 670, 670
  668 UXU = (FLOAT(IX - IAUU))* DUX + AUU + U2(1)
      GO TO 672
  670 UXU = UTU2
  672 EXL = EXP(-UXL + UTL2)
      EXU = EXP(-UXU + UTL2)
      PLN = .159989733 * (EXL * (((UXL + 3.) * UXL + 6.) * UXL + 6.) -
     2 EXU * (((UXU + 3.) * UXU + 6.) * UXU + 6.))
C     NOTE = .159989733=  15. / P1**4
C
      SUMPKA = SUMPKA + CMU(IX) * PLN
  675 SUMKAP = SUMKAP + (PLN + .038497433 * (UXL**4 * EXL - UXU**4 * EXU
     2)) / CMU(IX)
C     NOTE = .038497433=  15. / (4 * P1**4)
C
      IF (SUMKAP)  120, 120, 677
  677 ETL = 1.
      ETU = EXP(-UTU2 + UTL2)
      PLN2= .159989733 * (ETL * (((UTL2+ 3.) * UTL2+ 6.) * UTL2+ 6.) -
     2 ETU * (((UTU2+ 3.) * UTU2+ 6.) * UTU2+ 6.))
      DENOM2= PLN2+ .038497433 * (UTL2**4 * ETL - UTU2**4 * ETU)
      IF (UTL - 14.9)  676, 680, 680
  676 ETS = EXP(-UTL2)
      DENOM = DENOM1 + DENOM2 * ETS
      PLN = PLN1 + PLN2 * ETS
      SUMKAP = SUMKAP * ETS + SUMKP1
      SUMPKA = SUMPKA * ETS + SUMP1
      GO TO 126
  680 PR = EXP(-UTL2)
      DENOM = DENOM2
      PLN = PLN2
```

```
      GO TO 126
C     DO ROSSELAND AND PLANCK AVERAGES FOR U UNDER 15
CORRECTION FOR INDUCED EMISSION POSTPONED TO WITHIN INTEGRATION LOOP(NEAR 116)
   94 UTL1 = UTL
      FR = 1.
      IF (UTU - .1)  96, 96, 98
   96 IU = 1                                                          00003050
      UTU1 = UTU
      GO TO 104                                                       00003060
   98 IF (UTU - 15.0)  100, 100, 102
  100 IU = 10.0* (UTU - .05) + 1.0                                    00003080
      UTU1 = UTU
      GO TO 104                                                       00003090
  102 UTU1 = 15.0
      UTL2 = 15.0
      UTU2 = UTU
      IU = 150
  104 SUMKAP = 0.0                                                    00003110
      SUMPKA = 0.0
      ETL = EXP(-UTL1)
      ETU = EXP(-UTU1)
      IF (UTU .LE. 0.6)  GO TO 107
  105 DO  118  IX = IL, IU                                            00003120
      IF (IX - IL)  106, 106, 108                                     00003130
  106 UXL = UTL1                                                      00003140
      GO TO 110                                                       00003150
  108 UXL = (FLOAT(IX) - 0.5) * PLINT
  110 CONTINUE
      IF (IX .GE. IU) GO TO 114
      UXU = (FLOAT(IX) + 0.5) * PLINT
      GO TO 116                                                       00003190
  114 UXU = UTU1                                                      00003200
  116 UBAR = 0.5 * (UXL + UXU)                                        00003210
      EXL = EXP(-UXL)                                                 00003220
      EXU = EXP(-UXU)                                                 00003230
      CIE = 1. - EXP(-UBAR)
C     THE HUEBNER AND DIAPHANOUS DATA ARE STORED IN THE SAME PLACE.
C     CIE IS THE CORRECTION FOR INDUCED EMISSION
C
      AKNP = AMU(IX) / RHO * CIE
      PLN = PLNKUT(UXL, UXU)
      SUMPKA = SUMPKA + PLN * AKNP
  118 SUMKAP = SUMKAP + (PLN                    + .038497433 * (UXL**4 *  00003250
     1 EXL / (1.0- EXL) - UXU**4 * EXU / (1.0- EXU))) / AKNP           00003260
      GO TO 117
C     ANALYTIC FIT FOR WHOLE BAND UNDER U=.6
  107 SUMKAP = RHO / AMU(6) * .048285     * (UTU**5 * (1. - .416666667 *
     2 UTU) - UTL**5 * (1. - .416666667 * UTL))
      SUMPKA = AMU(6) * .0182548 / RHO * (UTU - UTL)
  117 PLN = PLNKUT(UTL1, UTU1)
      IF (PLN)  120, 120, 119
  119 DENOM = PLN                   + .038497433 * (UTL1**4 * ETL / (1.0-
     1 ETL) - UTU1**4 * ETU / (1.0- ETU))
  121 IF (SUMKAP)  120, 120, 122
  120 CALL DUMP                                                       00003320
```

```
  122 IF (DIU .LE. 15.0 .OR. LHUB .EQ. 2)  GO TO 126
      DENOM1 = DENOM
      SUMKP1 = SUMKAP
      SUMP1 = SUMPKA
      PLN1 = PLN
      GO TO 99
  126 AK(IA)       = DENOM / SUMKAP
      PK(IA) = SUMPKA / PLN
  125 CALL OVCHK (KUUUFX)
      SKP(JA,KA) = SUMPKA * PH + SKP(JA,KA)
      SKH(JA,KA) = SUMKAP * PH + SKH(JA,KA)
      GO TO (1130, 1131), KUUUFX
 1130 CALL DUMP                                                    00003390
 1131 IF (AMIN1(PKT(IA), AKT(IA)))  1130, 1130, 129
  129 PK(IA) = ALOG(PK(IA))
  130 AK(IA) = ALOG(AK(IA))
C     S I U M I N G   L O G   K A P P A                            00003410
      IF (I - 1)  131, 131, 134
  131 DO  127  IA = 1, MMNU
      PK(IA,JA,KA) = PK(IA)
  127 AK(IA,JA,KA) = AK(IA)
      GO TO 132
  134 WRITE (ITP)  (AK(IA), PK(IA), IA = 1, MMNU)
  132 CONTINUE
      IF (AMIN1(SKP(JA,KA), SKH(JA,KA)))  1320, 1320, 1321
 1320 CALL DUMP
 1321 SKP(JA,KA) = ALOG(SKP(JA,KA))
      SKH(JA,KA) = -ALOG(SKH(JA,KA))
      HO(JA,KA) = -ALOG(HMO)                                       00003460
  133 GO TO (132, 155, 310, 355), NEND
  155 IF (IAPEN - TAPES)  156, 160, 160                            00003480
  156 IAPEN = IAPEN + 1.0                                          00003490
      WRITE(6,7012) MEDIA, TMM
 7012 FORMAT (55HUUIANE HAS FINISHED READING FROM THE INPUT TAPE ON UNI
     1 , I3, 1H./5UH  THE HIGHEST TEMPERATURE TAKEN FROM THIS TAPE WAS ,
     2 F12.4)
      MEDIA = MEDIA + 1                                            00003500
      GO TO 22                                                     00003530
  160 JAMAX = JA                                                   00003540
      KAMAX(JA) = KA
      WRITE (6,7012) MEDIA, TMMAX
C     W R I T E   D I A N E   T A P E   A N D   E U I T   R E S U L T S 00003580
      NEWINU 11
      DO  596  I = 2, NSCI
      ITP = IP(I-1)
  596 NEWINU ITP
      NWU = 0                                                      00003760
      DO  166 JA = 1, JAMAX                                        00003770
  166 NWU = NWU + 3 * KAMAX(JA) + 2
      FNWU = NWU
      WRITE (11)  IDA, (ID(I), I=1,12)
      WRITE (11)  MMU1, FNWU
      WRITE (6,12)
      WRITE (6,7009)  (ID(I), I=1,12)
      WRITE (6,11)
```

```
      IWU = 1
      DO  180  JA = 1, JAMAX
      KAM = KAMAX(JA)
      PRIMET = EXP(THETA(JA))
      WRITE (6,6)  PRIMET
      DO  179  KA = 1, KAM
  179 PCHA(KA) = EXP(-RO(JA,KA))
  180 WRITE (6,7) (PCHA(KA), KA = 1, KAM)
      FJAMAX = JAMAX
      DO  175  I = 1, NSCT                                          00003640
      IF (I - NSCT)  161, 162, 163                                  00003660
  161 MHNU = IUMHNU                                                 00003670
      GO TO 163                                                     00003680
  162 MHNU = NHNU - IUMHNU * (I - 1)                                00003690
  163 IF (I - 1)  172, 172, 164
  164 IIP = IP(I-1)
      DO  165 JA = 1, JAMAX
      KAM = KAMAX(JA)
      DO  165  KA = 1, KAM                                          00003710
  165 READ (11IP) (AK(IA,JA,KA), PK(IA,JA,KA), IA = 1, MHNU)        00003720
  172 DO  171  IA = 1, MHNU
      IAI = IA + IUMHNU * (I - 1)                                   00003740
      WRITE (11) BHNU(IAI+1), FJAMAX                                00003750
      WRITE (6,5) BHNU(IAI+1), BHNU(IAI)
      IWU = 1
      DO  170  JA = 1, JAMAX
      PRIMET = EXP(THETA(JA))                                       00003820
      WRITE (6,6)PRIMET                                             00003830
      KAM = KAMAX(JA)                                               00003840
      BUFS(IWU) = THETA(JA)                                         00003850
      BUFS(IWU + 1) = KAM                                           00003860
      IWU = IWU + 2
      DO  167  KA = 1, KAM
      BUFS(IWU) = AK(IA,JA,KA)                                      00003880
      BUFS(IWU+1) = PK(IA,JA,KA)                                    00003900
      BUFS(IWU+2) = RO(JA,KA)
      IWU = IWU + 3
      IF (IWU .LE. IUMBUF)  GO TO 167
      WRITE (6,1)
      CALL DUMP
  167 CONTINUE
      DO  168  KA = 1, KAM
  168 PCHA(KA) = EXP(PK(IA,JA,KA))                                  00003930
      WRITE (6,7)(PCHA(KA), KA = 1, KAM)
      DO  169  KA = 1, KAM                                          00003950
  169 PCHA(KA) = EXP(AK(IA,JA,KA))                                  00003960
  170 WRITE (6,7)(PCHA(KA),KA = 1, KAM)                             00003970
  171 WRITE (11)(BUFS(IWU), IWU = 1, NWD)                           00003980
  175 CONTINUE                                                      00003990
      IWU = 1                                                       00004000
      SILLY = -BHNU(1)
      WRITE (11) SILLY, FJAMAX
      WRITE (6,14)
      DO  178  JA = 1, JAMAX
      PRIMET = EXP(THETA(JA))
```

```
      WRITE (6,6)PRTHET
      KAM = KAMAX(JA)
      BUFS(IWD) = THETA(JA)
      BUFS(IWD + 1) = KAM
      IWD = IWD + 2
      DO  177  KA = 1, KAM
      BUFS(IWD)= SKR(JA,KA)
      BUFS(IWD+1) = SKP(JA,KA)
      BUFS(IWD+2) = RO(JA,KA)
  177 IWD = IWD + 3
      DO  176  KA = 1, KAM
  176 PCHA(KA) = EXP(SKP(JA,KA))
      WRITE (6,7)(PCHA(KA), KA = 1, KAM)
      DO  174  KA = 1, KAM
  174 PCHA(KA) = EXP(SKR(JA,KA))
  178 WRITE (6,7)(PCHA(KA),KA = 1, KAM)
      WRITE (11)(BUFS(IWD), IWD = 1, NWD)
      END FILE 11
      REWIND 11
      WRITE (6,7000) NOSCAT(SCAT+1)
      RETURN
      END                                                    00004020
```

(continued)

CARD PUNCHED	FORMAT	COLUMNS USED	NAME IN PROGRAM	DESCRIPTION
1st card of each set	I2	75 - 76	IX	2-digit sequencing number; indicates the order number of each frequency grouping set
1st card of each set	I3	78 - 80	KK	3-digit sequencing number; indicates card number within a particular frequency grouping

1. Let there be M θ values: $\theta_1, \theta_2, \ldots, \theta_M$
2. Let there be N τ values (N=n_1 τ values at θ_1 + n_2 τ values at θ_2 + ... + n_M τ values at θ_M)
3. Then FNWD = 3N+2M
   Thus FNWD counts all the words on records of card type 5 only

The total number of groups of cards that will be punched by the DIANTC program is HNUT (the number of frequency groups) plus the group of grey absorption coefficients. This number is indicated in the routine by this arithmetic statement:

NVECES = HNUT + 1.

Each set of cards punched for a frequency group consists of X1, X2, and (BUFS (IWD), IWD = 3, LAST).

The cards are sequenced numerically in two ways: (1) by the order number of the frequency group set, and (2) within each frequency group set.

A number (IX in the program) is punched in columns 75 and 76; this is the order number of the frequency grouping. It ranges in value from 1 to NVECES, as there are NVECES groups punched.

Another number (KK in the program) is punched in columns 78 through 80, and this indicates the card number within the frequency group set. The card numbers within each particular frequency grouping range from 0 to KX.

where KX is determined this way:

KX = NWD/6, NWD is a multiple of 6

or

KX = (NWD/6)+1; NWD is not a multiple of 6

There is also a counter (NOC in the program) that indicates the number of cards punched by the routine; it calculates that number in this way:

NOC = NVECES * (KX+1) + 3

Before using the DIANE cards-to-tape program, remove the run card; then, the output cards punched by DIANE tape-to-cards may be read in by the cards-to-tape program.

NOTE: The run card must be removed before using the DIANE cards-to-tape program.

The DIANCT (card-to-tape) program can read the DIANE cards and recreate a binary DIANE tape. Cards 1 and 2 form the first tape record. Card 3 forms the second tape record. Card 4 forms the third tape record. The fourth tape record contains BUFS (IWD), IWD = 1, LAST. Records of type 3 and 4 are repeated until the tape is complete

GREYS: A GREY OPACITY TAPE FROM DIANE DATA

Grey opacities are defined to be those Rosseland and Planck means over the entire frequency spectrum: $0 \leq h\nu \leq \infty$. The DIANE code calculates an approximation to these (as well as to the Rosseland and Planck means over specific frequency bands as determined by input parameters) from data produced by the GA DIAPHANOUS code or the LASL ANN code. (The grey frequency band is taken to be 10^{-3} eV $\leq h\nu \leq 10^{6}$ eV.)

```
      SUBROUTINE GREYS
C
C     CODED BY LAURA K. NORRIS   JANUARY, 1967
C
C     USER MUST WRITE ON A TAPE ON LOGICAL UNIT 11
C     THIS PROGRAM WILL ADD A SET OF GREYS TO THE GREY OPACITY DIANE
C     TAPE FROM INPUT CARDS
C
      COMMON/GRETAP/ARRAY(1025),TITLE(36),ID(12)
C
C     FORMATS
C
    1 FORMAT (I12/12A6)
    2 FORMAT (6E12.7)
    3 FORMAT (3I4)
    4 FORMAT (12A6)
    5 FORMAT (I3,9X,E12.7)
    6 FORMAT (1H0,12A6)
    7 FORMAT (1H0,27H THE NUMBER OF GREY SETS IS,I3)
C
C
      L = 11
      REWIND L
C
C     KSET IS THE NUMBER OF SETS OF GREYS TO BE ADDED TO THE TAPE
C
      READ (5,3) KSET,NEWTAP
C     INITIALIZE ISGN AND READ AND WRITE A TITLE
      IF (NEWTAP.EQ.0) GO TO 10
      ISGN = -1
      READ (5,4) (TITLE(I),I=1,36)
      WRITE (L)  (TITLE(I),I=1,36)
      GO TO 100
C
C
C     SPACE TAPE TO PROPER POINT
C
   10 CONTINUE
      READ (L) (TITLE(I),I=1,36)
   20 CONTINUE
      READ (L) IDNO,(ID(I),I=1,12),ISGN
      IF (ISGN.GT.0) GO TO 60
      READ (L) MNO,XNWO
      READ (L) XMATNO,TEMPNO
      NWO = XNWO
      READ (L) (ARRAY(I),I=1,NWO)
      GO TO 20
C
   60 CONTINUE
      BACKSPACE L
  100 CONTINUE
C
C     READ DIANE INPUT CARDS
C
```

```
      DO 150 J=1,KSET
      READ (5,1) IUNO,(IU(I),I=1,12)
      READ (5,2) MNU,ANWU
      NWU = XNWU
C
C     MNU IS THE NUMBER OF FREQUENCY GROUPS ON THE ORIGINAL DIANE TAPE
C     XNWU IS THE NUMBER OF WORDS IN A FREQUENCY GROUP
C
      READ (5,2) XMAINU,ITMPNU
C
C     XMAINU IS THE SPUTTER-IONPAK MATERIAL NUMBER
C     JAMAX  IS THE NUMBER OF TEMPERATURES IN THE FREQUENCY GROUP
C
      READ (5,2) (AMMAT(I),I=1,NWU)
      WRITE (L) IUNO,(IU(I),I=1,12),ISGN
      WRITE (L) MNU,XNWU
      WRITE (L) XMATNU,ITEMPNU
      WRITE (L) (AMMAT(I),I=1,NWU)
      ISGN = ISGN + 1
  150 CONTINUE
C
C     ESTABLISH A SIGNAL = POSITIVE NUMBER OF GREYS ON THE TAPE
      ISGN = -ISGN + 1
      READ (5,1) IUNO, (IU(I),I=1,12)
      WRITE (L) IUNO,(IU(I),I=1,12),ISGN
      END FILE L
      REWIND L
      WRITE (6,6) (TITLE(I),I=1,36)
      WRITE (6,7) ISGN
      RETURN
      END
```

DIANE results are available as magnetic tape files and as card decks. The FORTRAN IV GREYS program can read these card decks, select the grey opacities from each given (input) DIANE card deck, and produce a data tape (called the GREY tape) which contains only the grey opacity set for each material present.

The GREY tape has an initial heading record. Then, for each set of grey opacities, the heading record of the DIANE input card deck is written and is followed by its concomitant grey opacities. The set of grey opacities for each material is in standard DIANE tape format.

The GREYS program either writes a new tape or adds grey sets to an old tape. This feature of the program allows grey sets from later DIANE runs on new materials to be added to the GREY tape without completely rewriting the tape.

A program, EGREY, has been written in FORTRAN IV language to edit the GREY tape, and may be used as a subroutine of GREYS.

Input for GREYS

CARD NO.	INPUT VARIABLE	COLUMNS	FORMAT
1	KSET	1-4	I4
	NEWTAP	5-8	I4
2-4	TITLE Array	1-72	12A6

KSET — The number of grey sets to be added to the tape

NEWTAP — If NEWTAP ≠ 0, the program writes a new tape; if NEWTAP = 0, the program adds new grey sets to the previous GREY tape, and cards 2 through 4 are not read

TITLE — An array of 36 alphanumeric words that are written on the GREY tape as a header record

The DIANE tape format is specified in a separate writeup.

EGREY: AN EDITING CODE FOR THE GREY OPACITY TAPE

The program EGREY was written in FORTRAN IV language to edit the GREY tape. EGREY is an adaptation of EDIANE, a routine that edits a DIANE tape.

EGREY reads the GREY tape and edits either the entire tape or only specified grey sets, as determined by input. Also refer to the GREYS code writeup.

Input for EGREY

CARD NO.	INPUT VARIABLE	COLUMNS	FORMAT
1	NSET	1-5	I5
2	XMAT(1)	1-15	E15.8
	XMAT(2)	16-30	E15.8
subsequent cards	up to NSET	etc.	

NSET — The number of grey sets to be edited; if NSET = 0, the whole tape is to be edited

XMAT — The array of material numbers corresponding to the grey sets to be edited; this array must be in the same order as the grey sets on the tape; if NSET = 0, the XMAT array is not used. (Only the first input card is required in this case.)

REDGRE: TRANSFER OF GREY OPACITY DATA

REDGRE is a FORTRAN IV program written to obtain opacity data from the GREY tape for use in other programs (refer to GREYS writeup).

The GREY tape contains opacity data for many materials. For each material, there is a set of data containing temperatures and densities, and Rosseland and Planck opacities at these temperatures. (The Rosseland and Planck opacities are computed at the given temperature and at the specified densities.) REDGRE reads desired opacity sets for desired materials from the GREY tape as determined by input. REDGRE either

```
      SUBROUTINE EGRET
C
C     CODED BY LAURA M. NORRIS   JANUARY, 1967
C
C     USER MUST READ FROM A TAPE ON LOGICAL UNIT 10
C
C     THIS PROGRAM READS ANY NUMBER OF SETS OF GRETS ACCORDING TO THE
C     MATERIAL NUMBER
C
C     EDITS THE TAPE MADE BY GRETS IN THE FOLLOWING MANNER
C               THETA RATHER THAN LN THETA                                  0030
C               RHO   RATHER THAN LN TAU                                    0040
C
C
C     INPUT VARIABLES
C     NSET          IS THE NUMBER OF SETS OF GRETS TO BE READ
C     XMAT          IS AN ARRAY OF MATERIAL NUMBERS WHICH INDICATE WHICH
C                   MATERIALS ARE TO BE READ FROM THE TAPE
C
      DIMENSION KCNT(40),FKAPR(40),FKAPP(40),DENS(40)                       0080
      DIMENSION XMAT(100)
C
      COMMON/GRETAP/BUFS(1000),TITLE(36),ID(12)
C
      II = 11
      REWIND II
C
      READ (5,1020) NSET
      READ (5,1130) (XMAT(I),I=1,NSET)
      J = 1
      KSET = 1
      MLINE =5                                                              0150
      READ  (II)     (TITLE(I),I=1,36)
      WRITE (6,1000) (TITLE(I),I=1,36)
      IF (NSET .EQ. 0) GO TO 90
   10 CONTINUE
C
      READ  (II) IDA,(ID(I),I=1,12),ISGN
      READ (II) HNO, XNWO
      READ (II) XNO, FJAMAX
      IF (XNO.EQ.XMAT(J)) GO TO 100
      NX = XNWO
      J = J + 1
      READ (II)
      READ (II) (BUFS(I),I=1,NX)
      GO TO 10
   90 CONTINUE
C
      READ  (II) IDA,(ID(I),I=1,12),ISGN
   95 CONTINUE
      READ (II) HNO,XNWO
      READ (II) XNO,FJAMAX
  100 CONTINUE
C
```

```
      NX=XNBU                                                          0130
      MATERL =  XNU
      JAMAX=FJAMAX                                                     0170
      IF (MLINE .EQ. 0) WRITE (6,1090)                                 0180
      WRITE (6,1010) IDA, (ID(I), I=1,12), MATERL,NX
      NLINE=MLINE+6                                                    0190
      MLINE=0                                                          0200
      WRITE (6,1030) JAMAX                                             0220
      READ  (11) (BUFS(I),I=1,NX)
      KCNT(1)=0                                                        0260
      NCNT=1                                                           0270
C
      DO 130 JA=1,JAMAX                                                0280
      THETA=EXP(BUFS(NCNT))                                            0290
      KAMAX=BUFS(NCNT+1)                                               0300
      IF (NLINE .LE. 50) GO TO 112                                     0310
      WRITE (6,1110)
      NLINE=6                                                          0340
C
  112 WRITE (6,1050) THETA, KAMAX                                      0350
      NLINE=NLINE+3                                                    0360
C
      DO 115 I=1,25                                                    0370
      DENS(I)=0.0                                                      0380
      FKAPP(I)=0.0                                                     0390
      FKAPR(I)=0.0                                                     0400
  115 CONTINUE                                                         0410
C
      DO 120 KA=1,KAMAX                                                0420
      IKAPR=NCNT-1+3*KA                                                0430
      IKAPP=IKAPR+1                                                    0440
      IDENS=IKAPR+2                                                    0450
      FKAPR(KA)=EXP(BUFS(IKAPR))                                       0460
      FKAPP(KA)=EXP(BUFS(IKAPP))                                       0470
      DENS(KA)=EXP(-BUFS(IDENS))                                       0480
  120 CONTINUE                                                         0490
C
      DO 125 I=1,3                                                     0500
      KM8=8*I                                                          0510
      KL=KM8-7                                                         0520
      IF (KL .GT. KAMAX) GO TO 127                                     0530
      KM=KAMAX                                                         0540
      IF (KM8 .LT. KAMAX) KM=KM8                                       0550
      IF (NLINE .LE. 53) GO TO 122                                     0560
      WRITE (6,1110)
      WRITE (6,1120) THETA                                             0590
      NLINE=9                                                          0600
  122 WRITE (6,1060) (DENS(K), K=KL,KM)                                0610
      WRITE (6,1070) (FKAPP(K), K=KL,KM)                               0620
      WRITE (6,1080) (FKAPR(K), K=KL,KM)                               0630
      NLINE=NLINE+4                                                    0640
  125 CONTINUE                                                         0650
C
  127 KCNT(JA+1)=KCNT(JA)+3*KAMAX+2                                    0660
      NCNT=NCNT+3*KAMAX+2                                              0670
```

```
  130 CONTINUE                                                          0860
C
      IF (NSET .EQ. 0) GO TO 140
      IF (KSET .EQ. NSET) GO TO 150
      KSET = KSET + 1
      J = J + 1
      GO TO 10
C
  140 CONTINUE
      READ  (11) IDA,(ID(I),I=1,12),ISGN
      IF (ISGN.LT.0) GO TO 160
C
  150 CONTINUE
      WRITE  (6,1035)
      WRITE(6,1040) ISGN,NSET
      REWIND 11
      RETURN
C
  160 CONTINUE
      GO TO 95
C
 1000 FORMAT  (1H 12A6)
 1010 FORMAT         (113,9X,12A6,9X,9HMATERL = ,I4,5X,5HMX = ,I4)
 1020 FORMAT (I5)
 1030 FORMAT (1H0
     1        29H GREY ABSORPTION COEFFICIENTS,I15,15H   TEMPERATURES  )  0750
 1035 FORMAT (27H TAPE EDITING IS SUCCESSFUL)
 1040 FORMAT (34H THE NUMBER OF GREY SETS EDITED IS ,I5,38H THE NUMBER O
     1F GREY SETS REQUESTED IS ,I5)
 1050 FORMAT (/9H THETA = ,F12.5, 20X, I5, 12H   DENSITIES/)             0780
 1060 FORMAT (9H  DENSITY, 1P8E15.8)                                    0790
 1070 FORMAT (9H KAPPA(P), 1P8E15.8)                                    0800
 1080 FORMAT (9H KAPPA(R), 1P8E15.8/)                                   0810
 1090 FORMAT (1H1)                                                      0820
 1100 FORMAT (1H1///13H MNU     FROM, F13.4, 7H     TO, F13.4,          0830
     1                  14H     CONTINUED//)                           0840
 1110 FORMAT (1H1///42H GREY ABSORPTION COEFFICIENTS    CONTINUED//)    0850
 1120 FORMAT (/9H THETA = ,F12.5, 12H   CONTINUED/)                     0860
 1130 FORMAT (1PE15.8)
      END                                                               0870
```

```
      SUBROUTINE REDGRE
C     CODED BY LAURA R. NORRIS   JANUARY, 1967
C
C     USER MUST READ FROM A TAPE ON LOGICAL UNIT 10
C     USER MUST WRITE ON A TAPE ON LOGICAL UNIT 11
C     PATH OPTION IS DESIGNATED BY LRN AND LRN IS AN INPUT VARIABLE
C     IF LRN = 0, DATA IS WRITTEN ON THE MOTET PROGRAM TAPE
C     IF LRN = 1, DATA STATEMENTS ARE PUNCHED
C     ISGN          IS THE NUMBER OF EACH SET ON THE TAPE
C     TITLE         IS THE HEADING WRITTEN ON THE TAPE
C     IDNO          IS THE IDENTIFICATION NUMBER FROM THE HEADING ON THE
C                   DIANE TAPE
C     ID            IS THE TITLE FROM THE HEADING ON THE DIANE TAPE
C     MNO           IS THE NUMBER OF FREQUENCIES ON THE DIANE TAPE
C     XNWO          IS THE NUMBER OF ELEMENTS IN THE BUFS ARRAY
C     XMAINO        IS THE ETONX-SPUTTER MATERIAL NUMBER
C     TEMPNO        IS THE NUMBER OF TEMPERATURES
C
      DIMENSION BUFS(1000),TITLE(36),ID(12),XMAI(100)
      DIMENSION THETAI(25),KAMAX(25),KC(25)
C
C     FORMATS
    2 FORMAT (12,1P5E15.8)
    3 FORMAT (6X11HDATA JAMAX/,15,6H/,NWO/,15,1H/)
    4 FORMAT (6X11HDATA KAMAX/,4(I12,1H,))
    5 FORMAT (5X11,5(E12.7,1H,))
    6 FORMAT (5X11,E12.7,4(1H,,E12.7),1H/)
    7 FORMAT (6X9HDATA BUFS,12,1H/)
    8 FORMAT (6X16HCOMMON/LRN/BUFS(,13,1H))
    9 FORMAT (6X14HDIMENSION BUFS,12,1H(,12,1H))
   11 FORMAT (6X18HEQUIVALENCE (BUFS(,13,6H),BUFS,12,4H(1)))
   12 FORMAT (6X12HDATA THETAI/,4(E12.7,1H,))
   13 FORMAT (6X,10HDATA KCNI/,4(I12,1H,))
   14 FORMAT (6X19HCOMMON/LRNA/THETAI(,12,8H),KAMAX(,12,7H),KCNT(,
     1         12,1H))
   15 FORMAT (5X,11,5(I12,1H,))
   16 FORMAT   (5X,11,I12,4(1H,,I12),1H/)
   18 FORMAT (11)
   19 FORMAT (5X,11,E12.7,1H/)
   21 FORMAT (5X,11,E12.7,1H,,E12.7,1H/)
   22 FORMAT (5X,11,E12.7,2(1H,,E12.7),1H/)
   23 FORMAT (5X,11,E12.7,3(1H,,E12.7),1H/)
   24 FORMAT (5X,11,I12,1H/)
   25 FORMAT (5X,11,I12,1H,,I12,1H/)
   26 FORMAT (5X,11,I12,2(1H,,I12),1H/)
   27 FORMAT (5X,11,I12,3(1H,,I12),1H/)
C
C     PATH IS DETERMINED BY INPUT VARIABLE
C
      READ (5,18)LRN
C
      11 = 10
      L = 11
C
```

```
C     INITIALIZE COUNTER
C
      J = 1
C
C     READ NUMBER OF MATERIALS AND MATERIAL ATOMIC NUMBERS
C
      READ (5,2) NSET,(XMAT(I),I=1,NSET)
C
C     READ FIRST PHYSICAL RECORD ON GREY TAPE
C
    1 CONTINUE
      REWIND 11
      READ(11)   (TITLE(I),I=1,36)
C
C     SEARCH FOR REQUIRED OPACITY SETS
C
   10 CONTINUE
      READ (11) IDA,( ID(I),I=1,12),ISGN
      IF (ISGN .EQ. 29) GO TO 20
      READ (11)  MNU,FNWU
      READ (11)  XNO,FJAMAX
      NX = FNWU
      IF (INT(XNO+.1) .EQ. INT(XMAT(J)+.1)) GO TO 50
      READ (11)  (BUFS(I),I=1,NX)
      GO TO 10
   20 CONTINUE
      GO TO 1
C
C     READ GRETAP AND STORE THE BUFS ARRAY IN A SMALLER ARRAY FOR MOTET
C
   50 CONTINUE
      READ (11)  (BUFS(I),I=1,NX)
      K = 1
      K1 = 1
      SUM = 0.
      JAMAX = FJAMAX
      DO 80 JA = 1,JAMAX
      BUFS(K1) = BUFS(K)
      BUFS(K1+1) = BUFS(K+1)
      KK = BUFS(K+1)
      DO 60 I = 1,KK
      I2 = 2 * (I - 1)
      I3 = I2 + I - 1
      BUFS(K1+2+I2) = BUFS(K+2+I3)
      BUFS(K1+3+I2) = BUFS(K+4+I3)
   60 CONTINUE
      SUM = SUM + KK
      K2 = KK + KK + 2
      K1 = K1 + K2
      K  = K  +KK + K2
   80 CONTINUE
C
C     ESTABLISH THETA1, KAMAX, AND KCNT ARRAYS
C
      NWU = FNWU - SUM
```

```
      FNWD = NWD
      KC(1) = 0
      NC    = 1
      DO 120 JA = 1,JAMAX
      THETAT(JA) = BUFS(NC)
      KAMAX(JA)  = BUFS(NC+1)
      K2 = 2 * KAMAX(JA) + 2
      IF (JA - JAMAX) 100,110,110
  100 KC(JA+1) = KC(JA) + K2
  110 NC = NC + K2
  120 CONTINUE
      IF (LRN .EQ. 1) GO TO 200
C
C     WRITE ON MOTET PROGRAM TAPE
C
      WRITE (L) JAMAX, NWD,XNO
      WRITE (L) (THETAT(I),I=1,JAMAX),(KAMAX(I),I=1,JAMAX),(KC(I),I=1,JA
     1MAX)
      WRITE (L) (BUFS(I),I=1,NWD)
      IF (J . NE. NSET) GO TO 150
      END FILE L
      RETURN
  150 CONTINUE
      J = J + 1
      IF ((-J) .LE. (-29)) GO TO 1
      GO TO 10
C
  200 CONTINUE
      WRITE (6,8) NWD
      WRITE (6,3) JAMAX, NWD
      WRITE (6,4) (KAMAX(I),I=1,4)
      WRITE (6,13) (KC(I),I=1,4)
      WRITE (6,12) (THETAT(I),I=1,4)
C
      N = 1
      JA = JAMAX / 5
      JMAX = (JA -1) * 5
      IF ((JMAX+5) .EQ. JAMAX) JMAX = JMAX - 5
      IF (JAMAX .LT. 10) GO TO 220
      DO 210 M = 5,JMAX,5
      MM = M + 4
      WRITE (6,5) N,(THETAT(I),I=M,MM)
      WRITE(6,15) N,(KAMAX(I),I=M,MM)
      WRITE(6,15) N,(KC(I),I=M,MM)
      N = N + 1
  210 CONTINUE
  220 CONTINUE
      JM = JMAX + 5
      WRITE (6,14) JAMAX,JAMAX,JAMAX
      NU = JAMAX - JM + 1
      GO TO(225,226,227,228,229),NU
  225 CONTINUE
      WRITE (6,19)N,(THETAT(I),I=JM,JAMAX)
      WRITE (6,24) N,(KAMAX(I),I=JM,JAMAX)
      WRITE (6,24)  N,(KC(I),I=JM,JAMAX)
```

```
      GO TO 230
  226 CONTINUE
      WRITE (6,21)N,(THETAT(I),I=JM,JAMAX)
      WRITE (6,25) N,(KAMAX(I),I=JM,JAMAX)
      WRITE (6,25)  N,(KC(I),I=JM,JAMAX)
      GO TO 230
  227 CONTINUE
      WRITE (6,22)N,(THETAT(I),I=JM,JAMAX)
      WRITE (6,26) N,(KAMAX(I),I=JM,JAMAX)
      WRITE (6,26)  N,(KC(I),I=JM,JAMAX)
      GO TO 230
  228 CONTINUE
      WRITE (6,23)N,(THETAT(I),I=JM,JAMAX)
      WRITE (6,27) N,(KAMAX(I),I=JM,JAMAX)
      WRITE (6,27)  N,(KC(I),I=JM,JAMAX)
      GO TO 230
  229 CONTINUE
      WRITE (6,6) N,(THETAT(I),I=JM,JAMAX)
      WRITE (6,16) N,(KAMAX(I),I=JM,JAMAX)
      WRITE (6,16)  N,(KC(I),I=JM,JAMAX)
C
  230 CONTINUE
      NX = NWD / 5
      N2 = NX * 5
      NY = NX / 8
      N1 = NY * 8
      LK = 1
      IL = 45
      IK = 1
      N9 = 9
      IF (N2 .NE. NWD) GO TO 235
      N2 = N2 - 5
      IF (NX .EQ.N1) NY = NY - 1
      N1 = NY * 8
C
  235 CONTINUE
      DO 260 IJ = 1,NY
      WRITE (6,7) IK
      DO 240 JJ = 1,8
      LN = LK + 4
      WRITE (6,5)  JJ,(BUFS(I),I=LK,LN)
      LK = LK + 5
  240 CONTINUE
      LN = LK + 4
      WRITE (6,6)  N9,(BUFS(I),I=LK,LN)
      LK = LK + 5
      LS = LK - 44
      WRITE (6,9) IK,IL
      WRITE (6,11)LS,IK
      IK = IK + 1
  260 CONTINUE
C
      N = 1
      N5 = N1 * 5
      ND = NWD - N5
```

```
      WRITE (6,7) IK
      IF ((NX - N1) .EQ. 1) GO TO 280
      N15 = N5 + 1
      DO 270 JJ = N15,N2,5
      J4 = JJ + 4
      WRITE (6,5)  N,(BUFS(I),I=JJ,J4)
      N = N + 1
  270 CONTINUE
  280 CONTINUE
      N3 = N2 + 1
      NK = NWD - N3 + 1
      GO TO (281,282,283,284,285),NK
  281 CONTINUE
      WRITE (6,19) N,(BUFS(I),I=N3,NWD)
      GO TO 300
  282 CONTINUE
      WRITE (6,21) N,(BUFS(I),I=N3,NWD)
      GO TO 300
  283 CONTINUE
      WRITE (6,22) N,(BUFS(I),I=N3,NWD)
      GO TO 300
  284 CONTINUE
      WRITE (6,23) N,(BUFS(I),I=N3,NWD)
      GO TO 300
  285 CONTINUE
      WRITE (6,6)  N,(BUFS(I),I=N3,NWD)
  300 CONTINUE
      IK = IK + 1
      WRITE (6,9) IK,NU
      WRITE (6,11)N5,IK
      IF ((-J) .LE. (-29)) GO TO 1
      IF (J .EQ. NSET)  RETURN
      J = J + 1
      GO TO 10
      END
```

punches the opacity data in the form of DATA statements for use in a FORTRAN IV program or writes the data on a binary tape.

All of the data in each material opacity set are read by REDGRE. However, the information punched on DATA statements or written on a tape by REDGRE contains all of the data from the opacity sets except the Planck opacities.

Input for REDGRE

CARD NO.	INPUT VARIABLE	COLUMNS	FORMAT
1	LRN	1	I1
2	NSET (1)	1-2	I2
and others needed	XMAT	3-18	E15.8
	XMAT (2) up to NSET	19-32	E15.8

LRN — If LRN = 0, sets of grey opacities, temperatures, and densities are written on a tape; if LRN = 1, similar sets are punched in the form of DATA statements for use in a FORTRAN program

XMAT — An array of material numbers corresponding to the grey sets to be obtained from the GREY tape

To use the REDGRE program, the following tapes must be mounted:

1. The GREY tape must be mounted on unit 10
2. The output tape must be mounted on unit 11 unless the user intends to punch DATA statements rather than write a tape.

TEDIUS: A GOLEM ADJUNCT

TEDIUS is a FORTRAN IV program, which converts weight fractions to number fractions. One input card is read (for each compound present) by:

```
READ (5, 201) (KA1NO(N), ISTOIC (N), N = 1, 10), WTFRCT
201 FORMAT (20 (I2, IX), F10.5)
```

```
      PROGRAM TEDIUS(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT)
C
C
C     TEDIUS WRITTEN /JULY1967 BY A.KNUPP
C
C     TEDIUS INPUTS COMPOUND FORMULAS AND WEIGHT FRACTIONS FOR MATERIALS
C     AND COMPUTES WEIGHT AND NUMBER FRACTIONS FOR THE ELEMENTS PRESENT.
C
C     A BLANK DATA CARD IS USED TO COMPLETE AND TERMINATE CALCULATIONS.
C
C     TEDIUS COMPUTES ONLY ONE MATERIAL PER RUN.
C
C
C     ALPHABETICAL DICTIONARY OF TERMS:
C
C     AINO (KAINO)  THE ATOMIC NUMBER (AINO IS USED FOR PRINTOUT)
C     AIWT:  THE ATOMIC WEIGHT
C     COEF (ISTOIC):  THE SUBSCRIPT SPECIFYING THE NUMBER OF MOLES OF AN
C       ELEMENT IN A COMPOUND  (COEF IS USED FOR PRINTOUT).
C     COEMOL IS THE NUMBER OF MOLES OF THE COMPOUND.
C     FRACTZ IS THE WEIGHT FRACTION OF AN ELEMENT.
C     FRCTN IS THE NUMBER FRACTION OF AN ELEMENT.
C     ISTOIC (COEF):  THE SUBSCRIPT SPECIFYING THE NUMBER OF MOLES OF AN
C       ELEMENT IN A COMPOUND.
C     KAINO IS THE ATOMIC NUMBER (INPUT DATA)
C     KNTR COUNTS THE NUMBER OF COMPOUNDS IN A MATERIAL.
C     NOLMNT 'COUNTS' THE NUMBER OF ELEMENTS PER COMPOUND.
C     SUMMOL IS THE SUM OF THE MOLES OF ALL ELEMENTS COMPUTED.
C     SUMOL IS THE SUM OF THE MOLES OF AN ELEMENT.
C     SUMWT IS THE SUM OF THE GRAM MOLECULAR WEIGHTS FOR ALL ELEMENTS.
C     WEIGHT IS THE GRAM MOLECULAR WEIGHT OF AN ELEMENT.
C     WTFRCT IS THE WEIGHT FRACTION OF A COMPOUND IN THE MATERIAL(INPUT)
C     WTMOL IS THE GRAM MOLECULAR WEIGHT OF A COMPOUND.
C
C
C
      DIMENSION SUMOL(100), FRACTZ(100), FRCTN(100), WEIGHT(100)
      DATA SUMOL/100*0./
      DATA SUMMOL/0./
      DATA SUMWT/0./
      COMMON /LMSB/U(1)
      DIMENSION ATWT(100)
      DATA AIWT /100*0./
      DIMENSION KATNO(10), ISTOIC(10)
      KNTR=0
C     KNTR COUNTS THE NUMBER OF DATA CARDS
C
C
  105 CONTINUE
      KNTR=KNTR+1
      READ (5,201) (KATNO(N),ISTOIC(N),N=1,10),WTFRCT
  201 FORMAT(20(I2,1X),F10.5)
C     WEIGHT FRACTIONS ARE READ FROM COLUMNS 61 THRU 70
      WRITE(6,202)
```

```
  202 FORMAT (///10(1X,4HATNO,1X,4HCOEF),6X,6HWTFRCT)
      WRITE(6,203)((KATNO(N),ISTOIC(N),N=1,10),WTFRCT)
  203 FORMAT (10(2X,I2,4X,I2),3X,F10.5/)
      IF(KATNO(1).EQ.0) GO  TO 3000
C     IF KATNO(1).EQ.0, ALL DATA CARDS ARE READ, BEGIN FINAL CALCULATION
      WTMOL=0.
C     WTMOL IS THE GRAM MOLECULAR WEIGHT OF A COMPOUND.
      DO 1000 N=1,10
      IF (KATNO(N).EQ.0) GO TO 1001
      K=1
C
C
  101 CONTINUE
      IF (IFIX(U(K)+.5).EQ.KATNO(N)) GO TO 102
      K=K+IFIX(U(K)+.5)+2
      GO TO 101
C
C
  102 ATWT(N)=U(K+1)
      WTMOL=ATWT(N)*FLOAT(ISTOIC(N))+WTMOL
      WRITE(6,302) (ATWT(N),ISTOIC(N),WTMOL)
  302 FORMAT (26H USING AN ATOMIC WEIGHT OF,F10.5,20H WITH THE SUBSCRIPT
     1 ,I2,5OH, THE CURRENT MOLECULAR WEIGHT OF THIS COMPOUND IS ,F13.6)
C
C
 1000 CONTINUE
      N=11
C
C
 1001 CONTINUE
      NOLMNT=N-1
      COEMOL=WTFRCT/WTMOL
C     COEMOL IS THE NUMBER OF MOLES OF THE COMPOUND.
C
C
      WRITE (6,303)
  303 FORMAT (1H )
      DO 2000 N=1,NOLMNT
C     IZ IS THE ATOMIC NUMBER.
      IZ=KATNO(N)
C     SUMOL IS THE TOTAL MOLES FOR EACH ELEMENT.
      SUMOL(IZ)=SUMOL(IZ)+COEMOL*FLOAT(ISTOIC(N))
C     WEIGHT(IZ) CONTAINS WEIGHT FRACTIONS OF ELEMENTS
      WEIGHT(IZ)=SUMOL(IZ)*ATWT(N)
      WRITE (6,402) (IZ,SUMOL(IZ),ATWT(N),WEIGHT(IZ))
  402 FORMAT (13H FOR ELEMENT ,I2,13H,    SUMOL = ,F13.6,12H,    ATWT =
     1,F10.5,3/H,    AND THE GRAM MOLECULAR WEIGHT = ,F13.6)
 2000 CONTINUE
C
C
C
      GO TO 105
 3000 CONTINUE
      KNTR=KNTR-1
C
```

```
C
      DO 3001 I=1,100
      SUMMOL=SUMOL(I)+SUMMOL
C     SUMMOL IS THE TOTAL NUMBER OF MOLES OF ALL ELEMENTS
      SUMWT=WEIGHT(I)+SUMWT
 3001 CONTINUE
C     FRCTN(J) CONTAINS NUMBER FRACTIONS OF ELEMENTS
C
C
      DO 4000 J=1,100
      IF (SUMOL(J).EQ.0.) GO TO 4040
      FRCTN(J)=SUMOL(J)/SUMMOL
      FRACTZ(J)=WEIGHT(J)/SUMWT
      WRITE (6,502) (J,FRCTN(J), FRACTZ(J))
  502 FORMAT (5H0Z = ,I3,10X,19H NUMBER FRACTION = ,F13.6,10X,19H WEIGHT
     1 FRACTION = ,F13.6)
 4040 CONTINUE
 4000 CONTINUE
      WRITE(6,602) KNTR, SUMMOL
  602 FORMAT (//45H0THE NUMBER OF COMPOUNDS IN THIS MATERIAL IS ,I3,42H
     1 AND THE TOTAL MOLES OF THIS MATERIAL IS ,F13.6)
      WRITE (6,702)
  702 FORMAT (47H0TEDIOUS COMPLETED SUCCESSFULLY (AND TEDIOUSLY).)
      CALL EXIT
      CALL MARIE
       RETURN
      END
```

where KATNO (N) is the atomic number for the Nth element, ISTOIC (N) is the smallest integer subscript (for the Nth element) when the compound is written as

$$A_{\alpha} B_{\beta} C_{\kappa} D_{\delta} E_{\epsilon} \ldots ,$$

and WTFRCT is the number of grams of this compound. (WTFRCT can thus be the weight-percent if 100 grams are considered present.)

TEDIUS uses the MARIE subprogram (previously described) as its data source for atomic weights for all the elements. The compound molecular weight is calculated as

$$A = \sum_{N=1}^{N=M\leq 10} (M_N^o)\,(I_N),$$

where M_N^o is the atomic weight of the Nth element in the compound and I_N = ISTOIC(N) as defined above. The number of moles of the compound is then calculated as

$$B = WTFRCT/A$$

In addition, a cumulative summation is made of the number of moles and of the weight of each element present.

When all compound cards have been read, a blank final card signals the final computation phase. The total number of moles (of all elements) and the total weight (of all compounds present) is calculated. The total weight will ordinarily equal 100 gm if the several variables WTFRCT were the weight-percents of the compounds read in. However, this calculation allows the variables WTFRCT to sum to any number since the renormalization is then done. Finally, the number fraction and weight fraction are calculated for each element present in the total mixture.

EDSILV: A SILVIA TAPE EDIT PROGRAM

EDSILV can edit tapes written in SILVIA format. SILVIA, ZSASIL and ALOUETTE tapes are assumed to have the following SILVIA-tape format:

1. A first binary record containing:
   a. FNTH, the number of temperatures
   b. FIH, the number of absorption coefficients for each temperature-density point
   c. HNUMIN, a number specifying the middle of the first frequency band, in eV
   d. DHNV, a $\Delta h\nu$ in eV used as a frequency increment
2. A second binary record containing:
   a. DIANET, the temperature in eV
   b. FNRHO, the number of densities at that temperature
3. Third, fourth, ... FNRHO-th binary records containing, per record,
   a. RHO, the density in gm/cc
   b. SMU(k), the array of absorption coefficients for the Ith temperature and Jth density point
      $1 \leq K \leq FIH$
4. Binary records of types 2 and 3 follow until all temperature-density points have been completed

EDSILV was used to prepare the SILVIA, ZSAZSA, and ALOUETTE data for the DASIAC. The EDSILV output tapes are written in IBM compatible BCD format in even parity at 556 BPI. As each binary record is read from the SILVIA-type data tape, the data are written with the formats specified below onto a new data tape. All of the data are preserved in the transfer.

```
00101     1.          SUBROUTINE EDSILV
00101     2.    C     PROGRAM TO READ AND EDIT SILVIA-TYPE-FORMAT TAPE MADE BY ZSASIL
00101     3.    C    1  OR SILVIA OR ALUETO
00101     4.    C
00101     5.    C     THIS PROGRAM HAS BEEN MODIFIED TO WRITE A SILVIA BCD TAPE
00101     6.    C     BY L. R. MORRIS
00101     7.    C
00101     8.    C     THE BCD TAPE MUST BE WRITTEN IN EVEN PARITY AT 556 BPI - THIS IS
00101     9.    C     ACCOMPLISHED BY SPECIFYING THE K.E. AND H OPTIONS ON THE ASSIGN-
00101    10.    C     MENT CARD
00101    11.    C
00101    12.    C
00101    13.    C     CODED BY CHRIS INES APRIL 28, 1967
00101    14.    C
00101    15.    C     ZSASIL, SILVIA, AND ALUETO WRITE DATA TAPES IN THE FOLLOWING
00101    16.    C       FORMAT
00101    17.    C
00101    18.    C         1) A FIRST RECORD CONTAINING
00101    19.    C            A) FNTH, NUMBER OF THETAS
00101    20.    C            B) FIM, NUMBER OF ABSORPTION COEFFICIENTS FOR EACH THETA-RHO
00101    21.    C               POINT
00101    22.    C            C) HNUMIN, VALUE IN THE MIDDLE OF THE FIRST FREQUENCY BAND
00101    23.    C               (WAVES/CM CONVERTED TO EV)
00101    24.    C            D) DHNU, A CONSTANT USED TO INCREMENT THE FREQUENCY
00101    25.    C               (WAVES/CM CONVERTED TO EV)
00101    26.    C
00101    27.    C         2) A SECOND RECORD CONTAINING
00101    28.    C            A) DIANET, TEMPERATURE IN EV
00101    29.    C            B) FIRHO, THE NUMBER OF DENSITIES FOR THAT TEMPERATURE
00101    30.    C
00101    31.    C         3) THIRD, FOURTH,....FIRHO-TH RECORDS CONTAINING, PER RECORD,
00101    32.    C            A) RHO
00101    33.    C            B) SMU(K), THE ARRAY OF ABSORPTION COEFFICIENTS FOR THE
00101    34.    C               I-TH THETA, J-TH RHO POINT.   THE VALUE OF K RANGES FROM
00101    35.    C               1 TO (IHEIFIA(FIM)), THE NUMBER OF ABSORPTION COEFFICIENTS
00101    36.    C
00101    37.    C         4) RECORDS OF TYPES 2 AND 3 FOLLOW UNTIL ALL THETA-RHO POINTS
00101    38.    C            ARE COMPLETED
00101    39.    C
00101    40.    C
00103    41.          DIMENSION THETA(16), RHO(20), SMU(300)
00104    42.          INTEGER SILOUT
00105    43.          SILOUT=      16
00106    44.          REWIND SILOUT
00106    45.    C
00107    46.          READ (5,30) IEDITO, IBCD1
00113    47.       30 FORMAT (2I2)
00113    48.    C     IBCD1          IS THE UNIT ON WHICH THE BCD TAPE IS MOUNTED, UNLESS
00113    49.    C                    IBCD1 = 6
00113    50.    C     IF IBCD1 IS 6, THEN SILVIA DATA CARDS ARE PUNCHED
00113    51.    C     IF IBCD1 IS 6 AND IEDITO IS .NE. 0, THEN IBCD IS SET TO 15
00114    52.          IF ((IBCD1 .EQ. 6) .AND. (IEDITO .NE. 0)) IBCD  = 15
00114    53.    C     IF IEDITO      IS 0, THEN A SILVIA, ZSASIL, OR ALUETO TAPE IS EDITED
00114    54.    C                    IS .LT. 0, THEN A SILVIA, ZSASIL, OR ALUETO TAPE IS
00114    55.    C                    WRITTEN IN BCD ONLY
00114    56.    C                    IS .GT. 0, THEN A SILVIA, ZSASIL, OR ALUETO TAPE IS
00114    57.    C                    WRITTEN IN BCD AND THE BCD TAPE IS EDITED
00114    58.    C     RHO IN GM/CM3
00114    59.    C     THETA IN EV
00114    60.    C
00114    61.    C
00114    62.    C     READ RECORD 1 OF THE ZSASIL (OR SILVIA) TAPE
00116    63.          READ (SILOUT) FNTH,FIM, HNUMIN,DHNU
00116    64.    C
00116    65.    C     FNTH IS WORD 1 OF RECORD 1, NUMBER OF TEMPERATURES
00116    66.    C     FIM IS WORD 2 OF RECORD 1, THE NUMBER OF ABSORPTION COEFFICIENTS
00116    67.    C     HNUMIN IS WORD 3 OF RECORD 1, THE FREQUENCY VALUE AT THE MIDDLE
00116    68.    C       OF THE FIRST BAND (WAVES/CM CONVERTED TO EV)
00116    69.    C     DHNU IS WORD 4 OF RECORD 1, THE FREQUENCY INCREMENT (WAVES/CM
00116    70.    C       CONVERTED TO EV)
00116    71.    C
00124    74.          IM=          IFIX(FIM + .5)
00125    75.          NFNTH=       IFIX(FNTH + .5)
00125    76.    C
00126    77.          IF (IEDITO .NE. 0)
00126    78.         1WRITE (IBCD,3) FNTH, FIM, HNUMIN, DHNU
00135    79.          IF (IBCD1 .NE. 6) GO TO 77
00137    80.          XA = FIM / 9.
00140    81.          KA = IM / 9
00141    82.          AA = KX
00142    83.          IF (XA .GT. AA) KA = KX + 1
```

```
00164     56.       77 CONTINUE
00165     57.          IF (IUCD1 .EQ. 6) PUNCH 5, FNTH,FIH, HNUMIN, DHNU
00166     58.          IF (ILDITO .EQ. 0)
00167     59.         1WRITE (6,5002) FNTH, FIH, HNUMIN, DHNU
00168     60.        5 FORMAT (2F5.2,2L15.8)
00169     61.     8002 FORMAT (51H1THE FOLLOWING DATA WAS READ FROM  SILOUT /21H RECORD I
00170     62.         1 CONTAINING ,2X,6HFNTH =,F10.0,6H FIH =,F10.0,9H HNUMIN =,F10.4,
00171     63.         27H DHNU =,F10.4)
00172     64.          IF (ILDITO .EQ. 0)
00173     65.         1WRITE (6,8005)
00174     66.     8005 FORMAT (29H0RECORDS 2,3,...,N CONTAINING )
00175     67.    C
00176     68.    C
00177     69.    C      READ  RECORDS CONTAINING TEMPERATURE, NUMBER OF RHO'S, AND
00178     70.    C      ABSORPTION COEFFICIENTS
00179     71.    C
00180     72.    C
00181     73.          DO 10 I=1,NFNTH
00182     74.          READ (SILOUT) DIANET, FNRHO
00183     75.    C
00184     76.    C     FNRHO IS THE NUMBER OF DENSITIES AT EACH THETA
00185     77.          NRHO=          IFIX(FNRHO + .5)
00186     78.          THETA(I)=      DIANET
00187     79.          IF (ILDI(0 .NE. 0)
00188     80.         1WRITE(IBCD,1) DIANET, FNRHO
00189     81.        1 FORMAT (F10.4, F6.2)
00190     82.          IF (ILDITO .EQ. 0)
00191     83.         1WRITE (6,8003) DIANET, FNRHO
00192     84.          IF (IUCD1  .EQ. 6) PUNCH 6, DIANET, FNRHO, I
00193     85.        6 FORMAT (F10.4, F6.2, 57X, I3, 4H   0)
00194     86.     8003 FORMAT (10H1 DIANET = , F10.5,5X, 7HFNRHO = ,1PE10.4)
00195     87.          DO 20 J=1,NRHO
00196     88.          READ (SILOUT) RHO(J), (SMU(K), K=1,IM)
00197     89.          IF (ILDITO .NE. 0)
00197     90.         1WRITE (IUCD,2) RHO(J), (SMU(K),K=1,IM)
00198     91.          IF (IUCD1 .NE. 6)  GO TO 75
```

```
00251   110.          KMAX = 0
00252   119.          KK = 1
00253   120.          PUNCH 7, RHO(J), J, KK
00260   124.        7 FORMAT (E20.3, 65X, I3, I4)
00261   125.          DO 70 L=1,KK
00264   129.          KK = L + 1
00265   130.          KMIN = KMAX + 1
00266   135.          KMAX = KMAX + 9
00267   136.          PUNCH 5, (SMU(K),K=KMIN,KMAX), J, KK
00277   147.        5 FORMAT (9E8.3, 1X, I3, I4)
00300   153.       70 CONTINUE
00306   159.       75 CONTINUE
00303   130.        2 FORMAT (E10.3, 15E8.3 / (16E8.3))
00304   134.          IF (IEDITO .EQ. 0)
00305   136.         1WRITE (6,8004) RHO(J), (SMU(K), K=1,IM)
00314   150.     8004 FORMAT (1E40  FOR RHO =,1PE10.4,14H, SMU ARRAY IS /(36X,6P4E15.8))
00315   154.       60 CONTINUE
00317   158.       10 CONTINUE
00317   159.    C
00321   167.          IF (IEDIT0 .NE.0) END FILE IBCD
00323   170.          REWIND SILOUT
00324   171.          IF (IEDITO .NE.0) REWIND IBCD
00326   174.          IF (IEDIT0 .EQ. 0) GO TO 31
00330   141.          READ (IBCD,3) FNTH, FIM, HNUMIN, DHNU
00336   142.          WRITE (6,8002) FNTH, FIM, HNUMIN, DHNU
00344   147.          WRITE (6,8003)
00340   144.          NPNTHS        =IFIX(FNTH + .5)
00347   145.          IM=           IFIX(FIM + .5)
00350   146.          DO 50 I=1,NFNTH
00357   147.          READ (IBCD,1) DIAMET, FNRHO
00367   148.          WRITE (6,8005) DIAMET, FNRHO
00363   149.          NRHO=         IFIX(FNRHO + .5)
00364   150.          DO 40 J=1,NRHO
00367   151.          READ (IBCD,2) RHO(J), (SMU(K),K=1,IM)
00376   152.          WRITE (6,8004) RHO(J), (SMU(K), K=1,IM)
00405   155.       40 CONTINUE
00407   154.       50 CONTINUE
00411   155.          WRITE (6,42)
00413   156.       42 FORMAT (57H0 A BCD DATA TAPE HAS BEEN WRITTEN AND EDITED SUCCESSFU
00413   157.         1LLY.)
00414   158.          RETURN
00415   159.       31 CONTINUE
00416   160.          IF (IEDITO .EQ. 0) GO TO 7700
00420   161.          WRITE (6,41)
00422   162.       41 FORMAT (48H0 A BCD DATA TAPE HAS BEEN WRITTEN SUCCESSFULLY.)
00423   163.          RETURN
00424   164.     7700 CONTINUE
00425   165.          WRITE (6,7777) SILOUT
00430   166.     7777 FORMAT (26H1 EOSIL RUN COMPLETED SUCCESSFULLY.  SILOUT DATA TAPE W
00430   167.         1AS ON UNIT , I3, 1H.)
00431   168.          RETURN
00432   169.          END

      END OF LISTING.     0 *DIAGNOSTIC* MESSAGE(S).
```

EDSILV contains three write statements. These statements and their respective formats are:

```
      WRITE(IBCD, 3) FNTH, FIH, HNUMIN, DHNU
3     FORMAT(2F6.2, 2E15.8)
      WRITE(IBCD, 1) DIANET, FNRHO
1     FORMAT(F10.4, F6.2)
      WRITE(IBCD, 2) RHO(J), (SMU(K), K=1, IH)
2     FORMAT(E10.5, 15E8.3, / (16E8.3))
```

The first write statement is used once to write the number of temperatures, the number of absorption coefficients for each temperature and density, the frequency value at the center of the first band, and the frequency increment used. The second write statement writes the temperature and the number of densities before a given set of densities and opacity values at that temperature. The last write statement writes the density and all of the absorption coefficient data at that density for each of the densities for a given temperature.

LEVELS: PARTIAL SUMS OF IONIZATION POTENTIALS

LEVELS is a FORTRAN IV subroutine used by AUGEAS in the preparation of tables of the possible states of a group of elements and tables of the transitions between the allowed states for each element. These tables are used by DIAPHANOUS (Ref. 3). LEVELS uses the MARI block data program as the source of the required ionization potentials. These are assembled into partial sums of the form:

$$S_n^i = \sum_{j=\ell}^{n} \phi_j^i; \qquad n = \ell,\ \ell+1,\ \ell+2,\ \ldots,\ Z^i\ ,$$

where $\ell = \max(1,\ Z^i - 14)$, Z^i is the atomic number of the ith element in

```
      SUBROUTINE LEVELS(NELT,NZ,WI,EIN)
C     THIS PROGRAM SUMS THE IONIZATION POTENTIALS FOR ONE  ELEMENT IN
C     THE MAKI DECK EACH TIME THIS ROUTINE IS CALLED UNTIL THE ELEMENTS
C     IN THE MAKI DECK HAVE BEEN EXHAUSTED
      COMMON / LMSB / POTENL(5350)
      COMMON/LKNA/K,L
      DIMENSION SUM(100),SUMP(15),EIN(15),Z(100)
C
C     INITIALIZE VARIABLES
      DO 5 I = 1,15
      SUMP(I) = 0.
      EIN(I) = 0.
    5 CONTINUE
C
C     TEST TO SEE IF FIRST TIME THROUGH ROUTINE. IF SO,SKIP TO 10
      IF (NZ .GT. 0) GO TO 10
C
      L = 1
      K = 1
      Z(1) = POTENL(1)
      NZ = Z(1) + .5
      IZ = NZ
      GO TO 60
   10 CONTINUE
C
C     TEST TO SEE IF ARE AT END OF MAKI DECK
      IF (K .NE. (-NELT + 1)) GO TO 30
      RETURN
   30 CONTINUE
C     FIND THE NEXT ELEMENT
      Z(K) = POTENL(L)
      NZ = Z(K) + .5
      IZ = NZ
      J = K - 1
      DO 50 I = 1,J
      IF (IFIX(Z(I)+.5) .NE. IZ) GO TO 40
      L = L + IZ + 2
      GO TO 10
   40 CONTINUE
   50 CONTINUE
   60 CONTINUE
      WI = POTENL(L+1)
C
C     CHECK HIGHEST IONIZATION POTENTIAL TO MAKE SURE THIS ELEMENT HAS A
C     COMPLETE SET OF IONIZATION POTENTIALS
      IF (POTENL(L+IZ+1) .GT. 0.) GO TO 70
      L = L + IZ + 2
      GO TO 10
C
   70 CONTINUE
C     SUM UP THE POTENTIALS TO OBTAIN THE DESIRED SUMS
      M1 = MAXO(1,IZ-14)
      SUM(1) = 0.
      DO 200 I = 1,M1
```

```
      SUM(I+1) = SUM(I) + POTENL(L+1+1)
  200 CONTINUE
      SUMP(1) = SUM(M1+1)
      LZ = MINU(IZ,14)
      IF (IZ .EQ. 1) GO TO 350
      DO 300 I = 1,LZ
      SUMP(I+1) = SUMP(I) + POTENL(M1+1+1+L)
  300 CONTINUE
  350 CONTINUE
C
C     STORE SUMS IN EIN ARRAY
      M = 1
      IF (NZ .GE. 15) LZ = 15
      DO 400 II = 1,LZ
      I = LZ + 1 - II
      EIN(I) = SUMP(M)
      M = M + 1
  400 CONTINUE
      L = L + IZ + 2
      K = K + 1
      WRITE (6,110) NZ,WT,EIN
  110 FORMAT (17H1ATOMIC NUMBER = ,I3,3X,22H GRAM ATOMIC WEIGHT = ,F10.6
     1       , // 3(1A,1P5E15.8/ ))
      RETURN
C
      CALL MAR1
      RETURN
      END
      SUBROUTINE MERR
      RETURN
      END
```

the material,

$$\phi^{1}_{\ell} \equiv \sum_{k=1}^{k=\ell} V^{i}_{k} \qquad \phi^{i}_{j>\ell} \equiv V^{i}_{j}$$

and V^{i}_{m} is the mth ionization potential of the ith element where $1 \leq m \leq Z^{i}$.

AUGEAS was modified to call LEVELS if a blank card replaces the former input set of data cards, on which these partial sums were entered for the several elements (Ref. 3). (AUGEAS can thus be run in either mode.)

DLISTR: A DIAPHANOUS CARD EDIT CODE

The FORTRAN IV program DLISTR was written to prepare edits of DIAPHANOUS data from DYPER4 output cards. These cards contain summaries of the DIAPHANOUS thermodynamic data and approximations to the grey Rosseland and Planck opacities.

Tabular data prepared by DLISTR for most of the presently available DIAPHANOUS tapes are presented in reference 1. The table captions are self-explanatory.

DYPDIN: A RAPID TECHNIQUE FOR MAKING PSEUDO-DIANE TAPES

The DYPDIN program was written to provide extremely rapid response to the need for grey opacities for hydro code usage. DIAPHANOUS or ANN-ANHIST-ANDIMX code summary output is available in card form. These cards are read by DYPDIN and a pseudo-DIANE tape file is created in DIANE-tape format. At the same time, a set of DIANE cards can be punched (refer to DIANE card writeup).

```
00101     1.          SUBROUTINE OLISTR
00101     2.     C    OLISTR IS A PROGRAM THAT  'ADS AND LISTS DIAPHANOUS OUTPUT CARDS.
00101     3.     C    CODED BY CHRIS IMLS  FEBR  'Y,1967
00101     4.     C
00101     5.     C    THIS PROGRAM ASSUMES DIAPHANOUS CARDS OCCUR IN SETS. ONE SET PER
00101     6.     C       DIAPHANOUS RUN.
00101     7.     C    THIS PROGRAM ASSUMES AT LEAST ONE SUCH SET IS INPUT.
00101     8.     C
00101     9.     C    THE FIRST TWO CARDS OF A GIVEN SET CONTAIN COMMENTS ABOUT THAT SET.
00101    10.     C       THESE CARDS MAY SPECIFY ANY MESSAGE THE PROGRAMMER DESIRES, OR
00101    11.     C       THEY MAY BE LEFT BLANK.
00101    12.     C
00101    13.     C    THE THIRD CARD OF A GIVEN SET IS A TITLE CARD WHICH IS IDENTICAL TO
00101    14.     C       THE TITLE ON THE CORRESPONDING DIAPHANOUS OUTPUT TAPE, THE DIAPHANOUS
00101    15.     C       OUTPUT PRINTOUT, AND THE DIAPHANOUS OUTPUT PLOTS FROM THE RUN WHICH
00101    16.     C       PRODUCED THIS CARD SET.
00101    17.     C
00101    18.     C    THE FOURTH CARD OF A GIVEN SET IS A 'THETA' CARD.  IT CONTAINS ONLY
00101    19.     C       A VALUE FOR THETA.  IT IS FOLLOWED BY ONE OR MORE 'RHO' CARDS, EACH OF
00101    20.     C       WHICH CONTAINS THE FOLLOWING DATA
00101    21.     C       1. RHO
00101    22.     C       2. PRESSURE (PRESHR)
00101    23.     C       3. ENERGY
00101    24.     C       4. EION
00101    25.     C       5. KROS (CAPAR)
00101    26.     C       6. KPLK (CAPAC)
00101    27.     C       7. ZBAR
00101    28.     C       8. EGAM
00101    29.     C       THESE CARDS CONTINUE UNTIL THE NEXT THETA CARD FOR THAT MATERIAL,
00101    30.     C       OR UNTIL A NEW OLISTR CONTROL CARD IS ENCOUNTERED.
00101    31.     C
00101    32.     C
00101    33.     C    O L I S T R   C O N T R O L   C A R D S
00101    34.     C    THERE ARE TWO TYPES OF OLISTR CONTROL CARDS
00101    35.     C
00101    36.     C    VARIABLE NAME  COLUMNS  FORMAT  MEANING
00101    37.     C
00101    38.     C       DO ME          1-6       A6    DO ME HAS ONLY THREE VALUES
00101    39.     C                                      1. IF(DO ME.EQ.START) THE RUN BEGINS,
00101    40.     C                                         OLISTR WRITES MESSAGES AND EXPECTS
00101    41.     C                                         TO READ ANOTHER CONTROL CARD.
00101    42.     C                                      2. IF(DO ME.EQ.NEWSET) CODE EXPECTS TO
00101    43.     C                                         BEGIN READING AND LISTING DIAPHANOUS
00101    44.     C                                         OUTPUT CARDS.
00101    45.     C                                      3. IF(DO ME.EQ.ENDRUN) CODE CALLS EXIT.
00101    46.     C       ICHECK         67-72    F6.3  ICHECK HAS ONLY THREE VALUES
00101    47.     C                                      1. IF(ICHECK.LT.0) OLISTR EXPECTS
00101    48.     C                                         READ ANOTHER 'DO ME' CARD.
00101    49.     C                                      2. IF(ICHECK.EQ.0) CODE ASSUMES IT
00101    50.     C                                         IS READING A THETA CARD
00101    51.     C                                      3. IF(ICHECK.GT.0) CODE ASSUMES IT
00101    52.     C                                         IS READING A RHO CARD
00101    53.     C
00101    54.     C
00101    55.     C    TO RUN OLISTR, THE CONTROL CARDS MUST BE PLACED CORRECTLY.
00101    56.     C    THE FIRST DATA CARD OF ANY RUN MUST CONTAIN THE WORD 'START' AS
00101    57.     C      THE VALUE OF THE VARIABLE 'DO ME'.  IT ALSO CONTAINS THE NAME OF THE
00101    58.     C      PERSON DOING THE RUN AND THE DATE OF THE RUN
00101    59.     C
00101    60.     C    VARIABLE NAME   COLUMNS   FORMAT   VALUE
00101    61.     C
00101    62.     C        DO ME          1-6       A6    START
00101    63.     C        LISTER         7-24      3A6   (NAME OF PERSON DOING RUN)
```

```
00101    64.   C          MONTH          25-30       A6      (CURRENT MONTH)
00101    65.   C           DAY           31-33       A3      (CURRENT DAY)
00101    66.   C          YEAR           34-37       A4      (CURRENT YEAR)
00101    67.   C          TYPE           41-47       A6      TYPE.EQ.NORMAL IF STANDARD GAMMA SET;
00101    68.   C                                              TYPE.EQ.0 IF NON-STANDARD GAMMA SET
00101    69.   C
00101    70.   C     THE SECOND DATA CARD OF ANY RUN MUST CONTAIN THE WORD 'NEWSET'
00101    71.   C       AS THE VALUE OF THE VARIABLE 'DO ME'.  'NEWSET' MEANS A SET
00101    72.   C       OF DIAPHANOUS OUTPUT CARDS WILL BE READ IN NEXT.
00101    73.   C
00101    74.   C     FOLLOWING THE SECOND DATA CARD IS THE SET OF DIAPHANOUS OUTPUT CARDS.
00101    75.   C
00101    76.   C     ***** NOTE - TWO HEADER CARDS, FORMAT(12A6/9A6),MUST PRECEDE
00101    77.   C                  EACH COMPLETE DIAPHANOUS OUTPUT CARD SET        *****
00101    78.   C
00101    79.   C
00101    80.   C     FOLLOWING THE LAST DATA CARD OF ANY PARTICULAR DIAPHANOUS OUTPUT CARD
00101    81.   C       SET IS A CONTROL CARD WITH A NEGATIVE NUMBER IN COLUMNS 67-72,
00101    82.   C       AS THE VALUE OF 'ICHECK'.
00101    83.   C       WHEN THIS CARD IS READ, CODE EXPECTS THE NEXT CARD READ TO BE A
00101    84.   C       DLISTR CONTROL CARD WITH A VALUE FOR 'DO ME'.
00101    85.   C     IF THE FOLLOWING CARD CONTAINS 'NEWSET' AS THE VALUE OF 'DO ME', THE
00101    86.   C       PROGRAM WILL EXPECT TO READ ANOTHER DIAPHANOUS OUTPUT CARD SET.
00101    87.   C       IF THAT CARD, HOWEVER, CONTAINS 'ENDRUN' AS THE VALUE OF 'DO ME', THE
00101    88.   C       PROGRAM WILL EXIT NORMALLY.
00101    89.   C
00101    90.   C     CODE WILL EXPECT TO READ A CONTROL CARD HAVING 'START' AS THE VALUE
00101    91.   C       OF 'DO ME' ONLY ONCE; AS THE FIRST DATA CARD OF ANY DLISTR RUN.
00101    92.   C     CODE WILL EXPECT TO READ A CONTROL CARD HAVING 'ENDRUN' AS THE VALUE
00101    93.   C       OF 'DO ME' ONLY ONCE; AS THE LAST DATA CARD OF ANY DLISTR RUN.
00101    94.   C
00101    95.   C     EACH DIAPHANOUS OUTPUT CARD SET MUST BE PRECEDED BY A DLISTR CONTROL CARD
00101    96.   C       HAVING 'NEWSET' AS THE VALUE OF 'DO ME'.
00101    97.   C     EACH DIAPHANOUS OUTPUT CARD SET MUST BE FOLLOWED BY A DLISTR CONTROL CARD
00101    98.   C       HAVING A NEGATIVE NUMBER AS THE VALUE OF 'ICHECK'.
00101    99.   C
00103   100.         INTEGER DO ME, ENDRUN, START, TYPE
00104   101.         INTEGER HEADER,REMARK
00105   102.         DIMENSION LISTER(3)
00106   103.         DIMENSION REMARK(24), HEADER(12), WORD(8)
00107   104.         DIMENSION TEMSTO(500)
00110   105.         DIMENSION GAMMA(13)
00110   106.   C
00110   107.   C     DLISTR CONTROL CARDS
00111   108.         DATA ENDRUN/6HENDRUN/
00113   109.         DATA NEWSET/6HNEWSET/
00115   110.         DATA START/6HSTART /
00117   111.         DATA NORMAL/6HNORMAL/
00121   112.         DATA GAMMA/20., 100., 500., 2.5E3, 1.25E4, 6.25E4, 3.0E5, 2.E6,
00121   113.        1           1.3E7, 1.E8, 8.5E8, 8.E9, 8.5E10/
00121   114.   C
00121   115.   C     F O R M A T S
00121   116.   C
00183   117.    7000 FORMAT (126H ********************************** CURRENT DIAPHA
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00123   118.        INDUS DATA VALUES FOR SELECTED MATERIALS ••••••••••••••••••••••••••
00123   119.        2••••••)
00124   120.     7002 FORMAT (1H1,12A6,9A6)
00125   121.     7003 FORMAT (        122H  THETA SETS DONE FOR GAMMA VALUES OF  20.,•100.
00125   122.        1•500.,•2.5•03,•1.25•04,•6.25•04,•3.4•05,•2.•06,•1.3•07,•1.•08,•8.5•08,•8,•0
00125   123.        29•8.5•10 )
00126   124.     7004 FORMAT (1X,12A6)
00127   125.     7500 FORMAT (5A6,A3,A4,3X,A6)
00130   126.     7501 FORMAT (42X,13HLIST MADE BY ,3A6,3HON ,A6,A3,1X,A4)
00131   127.     7502 FORMAT (1H1)
00132   128.     7503 FORMAT (12A6/9A6/12A6)
00133   129.     7505 FORMAT  (/8H THETA = ,1PE10.4, 15H ELECTRON VOLTS)
00134   130.     7506 FORMAT (1P6E10.4,•0P2F6.3)
00135   131.     7507 FORMAT (13H   RHO(G/CM3),9X,7HP(BARS),10X,11HENG(ERGS/G),6X,  12HE
00135   132.        1IO(ERGS/G),6X,11HCROS(CM2/G),7X,11HKPLK(CM2/G),10X,4HZBAR, 8X,
00135   133.        24HEGAM/(6(1PE12.4,6X),2(2X,0PF8.3,2X)))
00136   134.     7600 FORMAT (80HODLISTR CONTROL CARD ERROR. CHECK FOR MISSPELLED WORD O
00136   135.        1R MISPLACED CARD IN NSET= ,I3,1H.)
00137   136.     7601 FORMAT (88H1DIAPHANOUS CARD ERROR. DLISTR WAS EXPECTING TO READ A
00137   137.        1THETA CARD, BUT IT FOUND WORD(2)= ,E12.4 / 46HOCHECK FOR MISPLACED
00137   138.        2 OR MISSING CARD IN NSET= ,I3,1H.)
00140   139.     7602 FORMAT (100H1DIAPHANOUS CARD ERROR. DLISTR WAS EXPECTING TO READ A
00140   140.        1 THETA CARD. BUT IT FOUND A CARD WITH THETA=0./36HOCHECK FOR AN IN
00140   141.        2VALID CARD IN NSET= ,I3,1H.)
00141   142.     7603 FORMAT (119H1DIAPHANOUS CARD INPUT ERROR. DLISTR WAS EXPECTING TO
00141   143.        1READ THE FIRST RHO CARD, BUT THE CARD IT READ HAS A VALUE OF ZERO/
00141   144.        255HOFOR THE PRESSURE.  CHECK FOR AN INVALID CARD IN NSET= ,I3,1H.)
00142   145.     7604 FORMAT (121H1DIAPHANOUS CARD INPUT ERROR. DLISTR WAS EXPECTING TO
00142   146.        1READ THE FIRST RHO CARD, BUT THE CARD IT READ HAS A VALUE LESS THA
00142   147.        2N/46H01 FOR K.  CHECK FOR AN INVALID CARD IN NSET= ,I3,1H.)
00143   148.     7605 FORMAT (111H1DIAPHANOUS CARD INPUT ERROR. DLISTR WAS EXPECTING TO
00143   149.        1READ A RHO CARD, BUT THE CARD IT READ HAS A VALUE OF ZERO/47HOFOR
00143   150.        2RHO.  CHECK FOR AN INVALID CARD IN NSET= ,I3,1H.)
00144   151.     7900 FORMAT (1H1,42X,48HLISTING OF DIAPHANOUS OUTPUT CARDS IS COMPLETED
00144   152.        1.)
00144   153.     C
00144   154.     C
00144   155.     C     B E G I N   T H E   R U N
00145   156.           NSET=   -1
00146   157.       500 CONTINUE
00147   158.           NSET=   NSET+1
00150   159.           READ (5,7500) DD ME, (LISTER(L),L=1,3), MONTH, DAY, YEAR, TTPE
00163   160.             IF (DD ME .EQ. ENDRUN) GO TO 530
00165   161.             IF (DD ME .EQ. START) GO TO  510
00167   162.             IF (DD ME .EQ. NEWSET) GO TO 520
00171   163.           GO TO 600
00171   164.     C     DO ME .EQ. START
00172   165.       510 CONTINUE
00173   166.           WRITE (6,7502)
00175   167.           WRITE (6,7000)
00177   168.           WRITE (6,7501)(LISTER(L),L=1,3), MONTH, DAY, YEAR
00210   169.           GO TO 500
00210   170.     C     DO ME .EQ. NEWSET.  START READING DIAPHANOUS OUTPUT CARD SET
00211   171.       560 CONTINUE
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00212   174.            IF (NSET .EQ. 0) GO TO 600
00214   175.          KOUNTT = 1
00215   176.          READ (5,7503) (REMARK(II),II=1,21), (HEADER(JJ),JJ=1,12)
00227   177.          WRITE (6,7002) (REMARK(II),II=1,21)
00227   178.   C
00227   179.   C      K COUNTS THE NUMBER OF RHO CARDS FOR A GIVEN THETA.  K=0 FOR THE
00227   180.   C        THETA CARD. AND K=1,2,...,N FOR THE NTH RHO CARD.
00235   181.          K=      -1
00236   182.            IF (TYPE .EQ. NORMAL) GO TO 1
00240   183.          GO TO 550
00240   184.   C
00240   185.   C      TYPE .EQ. NORMAL,  PRINT OUT STANDARD GAMMA SET
00241   186.        1 CONTINUE
00242   187.          WRITE (6,7003)
00242   188.   C
00244   189.      550 CONTINUE
00245   190.          WRITE (6,7004) (HEADER(JJ), JJ=1,12)
00253   191.      540 CONTINUE
00253   192.   C      READ DATA CARD AND CHECK TO SEE WHETHER IT IS A CONTROL CARD, OR A
00253   193.   C      DIAPHANOUS THETA OR RHO CARD
00254   194.          K=      K + 1
00255   195.          READ (5,7506) (WORD(N), N=1,8)
00263   196.            IF (WORD(8) .LT. 0.) GO TO 521
00263   197.   C      WORD(8) .LT. 0. MEANS A CONTROL CARD SIGNALING THE END OF THAT
00263   198.   C        DIAPHANOUS OUTPUT CARD SET WAS READ
00263   199.   C
00265   200.            IF (WORD(8) .GT. 0.) GO TO 524
00265   201.   C      WORD(8) .GT. 0. MEANS A RHO CARD WAS JUST READ
00265   202.   C
00265   203.   C      PAST THIS POINT WE SHOULD HAVE ONLY THETA CARDS.  WORD(1).LE.0. .OR.
00265   204.   C        WORD(2).NE.0. IS AN ERROR ON A THETA CARD.
00265   205.   C
00267   206. •DIAGNOSTIC• THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00267   207.            IF (WORD(2) .NE. 0.) GO TO 523
00271   208. •DIAGNOSTIC• THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00271   209.            IF (WORD(1) .LE. 0.) GO TO 522
00273   210.            IF (K .GE. 1) GO TO 528
00275   211.          WRITE (6,7505) WORD(1)
00300   212.          GO TO 540
00301   213.      400 CONTINUE
00302   214.          M =     1
00303   215.          GO TO 529
00303   216.   C
00303   217.   C      ICHECK.GT.0., CHECK VALUES OF K, WORD(1), AND WORD(2)
00303   218.   C      EXPECT THAT A RHO CARD IS BEING READ
00304   219.      524 CONTINUE
00305   220.            IF (K .EQ. 1) GO TO 400
00307   221.      529 CONTINUE
00310   222.            IF (K .LT. 1) GO TO 531
00312   223. •DIAGNOSTIC• THE TEST FOR EQUALITY BETWEEN NON-INTEGERS MAY NOT BE MEANINGFUL.
00312   224.            IF (WORD(2) .EQ. 0.) GO TO 525
00312   225.   C
00312   226.   C
00312   227.   C      PUT THE VALUES FROM THE RHO CARD INTO TEMPORARY STORAGE
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00314   223.      526 CONTINUE
00315   224.          DO 527 NN=1,8
00320   225.          TEMSTO(M)= WORD(NN)
00321   226.          M=       M+1
00322   227.      527 CONTINUE
00324   228.          GO TO 540
00324   229.    C
00324   230.    C     WRITE DIAPHANOUS OUTPUT CARD SET
00325   231.      528 CONTINUE
00326   232.      701 CONTINUE
00327   233.          KK=      8 * (K-1)
00330   234.          WRITE (6,7507) (TEMSTO(L), L=1,KK)
00336   235.          K=       0
00336   236.    C     K COUNTS THE NUMBER OF RHO CARDS FOR A GIVEN THETA,  K=0 FOR THE
00336   237.    C       THETA CARD, AND K=1,2,...,N FOR THE NTH RHO CARD.
00337   238.            IF (WORD(8) .LT. 0.) GO TO 500
00341   239.          KOUNTT = KOUNTT+1
00342   240.          IF (KOUNTT.GT.3)  WRITE (6,7502)
00345   241.          IF (KOUNTT.GT.3)  KOUNTT=1
00347   242.          WRITE (6,7505) WORD(1)
00352   243.          GO TO 540
00352   244.    C
00352   245.    C     NORMAL EXIT POINT
00353   246.      530 CONTINUE
00354   247.            IF (NSET .EQ. 0) GO TO 600
00356   248.          WRITE (6,7502)
00360   249.          WRITE (6,7900)
00362   250.          RETURN
00362   251.    C
00363   252.      521 CONTINUE
00364   253.            IF (K .LE. 1) GO TO 600
00366   254.          GO TO 701
00366   255.    C
00366   256.    C     E R R O R   E X I T S
00366   257.    C
00366   258.    C     ERROR FOUND IN CHECKING THE VALUES OF A THETA CARD)  THETA.EQ.0.
00367   259.      522 CONTINUE
00370   260.          WRITE (6,7502)
00372   261.          WRITE (6,7602) NSET
00375   262.          RETURN
00375   263.    C
00375   264.    C     ERROR FOUND IN CHECKING THE VALUES OF A THETA CARD)  WORD(2) .NE. 0
00376   265.      523 CONTINUE
00377   266.          WRITE (6,7502)
00401   267.          WRITE (6,7601) WORD(2), NSET
00405   268.          RETURN
00405   269.    C
00405   270.    C     ERROR FOUND IN CHECKING A RHO CARD:  WORD(2) .EQ. 0.
00406   271.      525 CONTINUE
00407   272.          WRITE (6,7502)
00411   273.          WRITE (6,7603) NSET
00414   274.          RETURN
00414   275.    C
00414   276.    C     ERROR FOUND IN CHECKING A RHO CARD) K.LT.1
00415   277.      531 CONTINUE
00416   278.          WRITE (6,7502)
00420   279.          WRITE (6,7604) NSET
00423   280.          RETURN
00423   281.    C
00423   282.    C     ERROR FOUND IN CHECKING A RHO CARD) WORD(1),EQ.0.
00424   283.      532 CONTINUE
00425   284.          WRITE (6,7502)
00427   285.          WRITE (6,7605) NSET
00432   286.          RETURN
00432   287.    C
00432   288.    C     DLIST CONTROL CARD ERROR
00433   289.      600 CONTINUE
00434   290.          WRITE (6,7502)
00436   291.          WRITE (6,7600) NSET
00441   292.          RETURN
00442   293.          END

      END OF LISTING.     3 *DIAGNOSTIC* MESSAGE(S).
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Input for DYPDIN

CARD NO.	COLUMNS	FORMAT	DESCRIPTION
1	1-12	I12	IDA: a right-justified DIANE run identification number
2	1-72	12A6	The DIANE tape title
3	1-2	I2	UNIT: tape mounting unit
3	5-6	I2	IDO : if 0, write tape and punch DIANE cards. If 1, only punch DIANE cards. If 2, only write tape

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00101     1.          SUBROUTINE DYPDIN
00101     2.    C
00101     3.    C     PROGRAM TO READ DIAPHANOUS-TYPE OUTPUT DATA CARDS AND PUNCH
00101     4.    C       DIANTC-FORMAT DATA CARDS AND/OR WRITE A DIANE NEW-FORMAT-STYLE
00101     5.    C       DATA TAPE (ONE FREQUENCY GROUP ONLY).
00101     6.    C
00101     7.    C
00103     8.          DIMENSION ID(12),WORD(8),BUFS(1000),TEMSTO (100)
00104     9.          DATA  K/-1/,M/1/, IWD/1/,KCOUNT/0/,KK/0/,MNUT/1./,X1/-1.E6/
00114    10.          INTEGER UNIT
00114    11.    C
00115    12.          READ(5,7000) IDA, ID,UNIT, IDO
00126    13.     7000 FORMAT ( I12/ 12A6/ I2,2X,I2)
00127    14.          WRITE (6,700) IDA, ID, UNIT, IDO
00140    15.      700 FORMAT ( 18H INPUT AS READ IS / 5X,7H IDA = ,I12 / 5X,6H ID = ,
00140    16.         1          12A6 / 5X, 8H UNIT = ,I2 / 5X, 7H IDO = ,I2)
00140    17.    C
00140    18.    C     IDA  IS A 12 DIGIT IDENTIFICATION NUMBER, RIGHT JUSTIFIED
00140    19.    C     ID   IS A  HEADER CARD ARRAY
00140    20.    C
00140    21.    C     IDO=0  IF WRITE TAPE AND PUNCH CARDS
00140    22.    C     IDO=1  IF PUNCH CARDS ONLY
00140    23.    C     IDO=2  IF WRITE TAPE ONLY
00140    24.    C
00140    25.    C     READ DIAPHANOUS-TYPE DATA CARDS
00140    26.    C
00141    27.        1 CONTINUE
00142    28.          READ(5,7001) (WORD(N), N=1,8)
00150    29.     7001 FORMAT(6E10.4,2F6.3)
00151    30.          K=K+1
00151    31.    C
00151    32.    C     WORD(8).GT.0. MEANS A RHD CARD WAS JUST READ
00152    33.          IF(WORD(8).GT.0.) GO TO 10
00152    34.    C
00154    35.          IF (K .GE. 1) GO TO 20
00156    36.          BUFS(IWD)= ALOG(WORD(1))
00157    37.          GO TO 1
00157    38.    C
00157    39.    C
00160    40.       10 CONTINUE
00161    41.          IF (K.EQ.1) M=2
00163    42.       11 CONTINUE
00163    43.    C
00164    44.          TEMSTO (M) = ALOG(WORD(5))
00165    45.          TEMSTO (M+1) = ALOG (WORD(6))
00166    46.          TEMSTO (M+2) =ALOG (WORD(1))
00167    47.          M=M+3
00170    48.          GO TO 1
00170    49.    C
00170    50.    C
00171    51.       60 CONTINUE
00172    52.          KK= 3 *(K-1) +KK
00173    53.          TEMSTO(1)= K-1
00174    54.          MM=          M - 1
00174    55.    C
00175    56.          DO 21  MMM=1,MM
00200    57.          IIWD = IWD + MMM
00201    58.          BUFS(IIWD) = TEMSTO (MMM)
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00202    59.       21 CONTINUE
00204    60.          IWD = I1WD+1
00205    61.          K=0
00206    62.          KCOUNT = KCOUNT + 1
00206    63.    C
00207    64.          KWORD=        WORD(1) + .5
00210    65.            IF (KWORD .EQ. 0) GO TO 30
00212    66.          BUFS(IWD)= ALOG(WORD(1))
00213    67.          GO TO 1
00213    68.    C
00214    69.       30 CONTINUE
00215    70.          FNWD=         2 * KCOUNT + KK
00216    71.          XK= KCOUNT
00217    72.          IF (IDO.EQ.2) GO TO 40
00221    73.          PUNCH 7503,IDA
00224    74.     7503 FORMAT (I12)
00225    75.          PUNCH 7504, (ID(I),I=1,12)
00233    76.     7504 FORMAT (12A6)
00234    77.          PUNCH 7505, MNUT,FNWD
00240    78.     7505 FORMAT (6E12.7)
00241    79.          NWD= FNWD
00242    80.          IF(NWD.GT.1000)CALL WERR
00244    81.          XX= FNWD/6.
00245    82.          KX = NWD/6
00246    83.          AX= KX
00247    84.          IF(XX.GT.AX) KX= KX+1
00251    85.          DO 31 I=1,2
00254    86.          IX=I
00255    87.          IF (I.EQ.2) X1=.001
00257    88.          PUNCH 7507,X1,X2,IX
00264    89.     7507 FORMAT(2E12.7,49X,I3,4H   0)
00265    90.          KMAX=0
00266    91.          DO 31 KLIND=1,KX
00271    92.          KKLIND= KLIND
00272    93.          KMIN= KMAX +1
00273    94.          KMAX= KMAX +6
00274    95.          PUNCH 7506,((BUFS(IWD),IWD=KMIN,KMAX),IX,KKLIND)
00304    96.     7506 FORMAT (6E12.7,1X,I3,I4)
00305    97.       31 CONTINUE
00310    98.          NOC = 2*(KX+1) + 3
00311    99.          WRITE (6,7508) NOC
00314   100.     7508 FORMAT (38H PUNCHING IS COMPLETED NO. OF CARDS = ,I8)
00315   101.          IF(IDO.EQ.1) GO TO 50
00317   102.       40 CONTINUE
00320   103.          REWIND UNIT
00321   104.          WRITE (UNIT) IDA,(ID(I),I=1,12)
00330   105.          WRITE (UNIT) MNUT,FNWD
00334   106.          DO 41 I=1,2
00337   107.          X1=           -1.E6
00340   108.            IF (I .EQ. 2) X1 = .001
00342   109.          WRITE (UNIT) X1,X2
00346   110.          WRITE (UNIT) (BUFS(IWD),IWD=1,NWD)
00354   111.       41 CONTINUE
00356   112.          END FILE UNIT
00357   113.          REWIND UNIT
00360   114.          WRITE (6,7601) UNIT
00363   115.     7601 FORMAT (30H DIANE TAPE WRITTEN ON UNIT = ,I2)
00364   116.          CALL EDIANE(10,0)
00364   117.    C
00364   118.    C
00365   119.       50 CONTINUE
00366   120.          WRITE (6,7602)
00370   121.     7602 FORMAT ( 22H DYPDIN RUN COMPLETED.)
00370   122.    C
00371   123.          RETURN
00372   124.          END
       END OF LISTING.      0 *DIAGNOSTIC* MESSAGE(S).
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APPENDIX I

AIRMOL AND CMOL DATA TABULATED BY GOLEM

AIRMOL RESULTS

The following output illustrates AIRMOL/EIONX answers for selected temperature-density rectangles (TRAIL = 7.) done by GOLEM. The column captions refer to:

COLUMN	NAME	UNITS	MEANING
1	THETA	^{o}K	temperature; ordinarily given in eV (1 eV=11605.4^{o}K)
2	RHO	gm/cc	ρ, density
3	P1	atm	
4	E	ergs/gm	specific internal energy; includes $E_o \simeq 2.9 \times 10^{11}$ ergs/gm
5	NBAR EIONIZ		NBAR, the mean no. of atoms/molecule, is printed when NBAR $\neq$ 1. EIONIZ, the ionization contribution to the specific internal energy, is printed when NBAR = 1
6	SYNPOT		SYNPOT = θ_{eV} $\ell n\, \Gamma$ [$\Gamma \simeq 0.01A\, \theta^{3/2}/(\rho\bar{Z})$] (A $\simeq$ 14.549 for AIRMOL)
7	FEW		FEW $\equiv$ ZBAR $\equiv \bar{Z}$, the mean ion charge
8	CV	ergs/gm/eV	CV $\equiv (\frac{\partial E}{\partial \theta})_{\rho}$; θ in eV
9	PB1	ergs/cc	PB1 $\equiv (\frac{\partial E}{\partial \tau})_{\theta}$; $\tau = 1/\rho$
10	ASQ	cm/sec	equilibrium sound speed
11	EGAM		$1 + P/[\rho(E-E_o)]$; $E_o \simeq 2.9 \times 10^{11}$ ergs/gm for AIRMOL
12	EGAM2		$1 + P/(\rho E)$

THETA	RHO	P1	E	CAPAR/ EIONIZ	CAPAC/ SYNPOT	FEw	CV	PB1	ASO	EGAw	EGAM2/ GAMMA
5.000+02	1.293-10	1.832-07	3.668+09	1.991+00	2.679+00	.00000	8.987+10	0.000	4.436+04	9.950-01	1.391+00
5.000+02	1.293-09	1.832-06	3.668+09	1.991+00	2.580+00	.00000	8.987+10	0.000	4.436+04	9.950-01	1.391+00
5.000+02	1.293-08	1.832-05	3.668+09	1.991+00	2.480+00	.00000	8.987+10	0.000	4.436+04	9.950-01	1.391+00
5.000+02	1.293-07	1.832-04	3.668+09	1.991+00	2.381+00	.00000	8.987+10	0.000	4.436+04	9.950-01	1.391+00
5.000+02	1.293-06	1.832-03	3.668+09	1.991+00	2.282+00	.00000	8.987+10	0.000	4.436+04	9.950-01	1.391+00
5.000+02	1.293-05	1.832-02	3.668+09	1.991+00	2.183+00	.00000	8.987+10	0.000	4.436+04	9.950-01	1.391+00
5.000+02	1.293-04	1.832-01	3.668+09	1.991+00	2.084+00	.00000	8.987+10	0.000	4.436+04	9.950-01	1.391+00
5.000+02	1.293-03	1.832+00	3.668+09	1.991+00	1.984+00	.00000	8.987+10	0.000	4.436+04	9.950-01	1.391+00
5.000+02	1.293-02	1.832+01	3.668+09	1.991+00	1.885+00	.00000	8.987+10	0.000	4.436+04	9.950-01	1.391+00
5.000+02	1.293-01	1.832+02	3.668+09	1.991+00	1.786+00	.00000	8.987+10	0.000	4.436+04	9.950-01	1.391+00
5.000+02	1.293+00	1.832+03	3.668+09	1.991+00	1.687+00	.00000	8.987+10	0.000	4.436+04	9.950-01	1.391+00
1.000+03	1.293-10	3.663-07	7.719+09	1.991+00	5.447+00	.00000	9.789+10	0.000	6.203+04	9.898-01	1.372+00
1.000+03	1.293-09	3.663-06	7.719+09	1.991+00	5.249+00	.00000	9.789+10	0.000	6.203+04	9.898-01	1.372+00
1.000+03	1.293-08	3.663-05	7.719+09	1.991+00	5.051+00	.00000	9.789+10	0.000	6.203+04	9.898-01	1.372+00
1.000+03	1.293-07	3.663-04	7.719+09	1.991+00	4.852+00	.00000	9.789+10	0.000	6.203+04	9.898-01	1.372+00
1.000+03	1.293-06	3.663-03	7.719+09	1.991+00	4.654+00	.00000	9.789+10	0.000	6.203+04	9.898-01	1.372+00
1.000+03	1.293-05	3.663-02	7.719+09	1.991+00	4.455+00	.00000	9.789+10	0.000	6.203+04	9.898-01	1.372+00
1.000+03	1.293-04	3.663-01	7.719+09	1.991+00	4.257+00	.00000	9.789+10	0.000	6.203+04	9.898-01	1.372+00
1.000+03	1.293-03	3.663+00	7.719+09	1.991+00	4.058+00	.00000	9.789+10	0.000	6.203+04	9.898-01	1.372+00
1.000+03	1.293-02	3.663+01	7.719+09	1.991+00	3.860+00	.00000	9.789+10	0.000	6.203+04	9.898-01	1.372+00
1.000+03	1.293-01	3.663+02	7.719+09	1.991+00	3.662+00	.00000	9.789+10	0.000	6.203+04	9.898-01	1.372+00
1.000+03	1.293+00	3.663+03	7.719+09	1.991+00	3.463+00	.00000	9.789+10	0.000	6.203+04	9.898-01	1.372+00
1.500+03	1.293-10	5.503-07	1.236+10	1.988+00	8.014+00	.00000	1.316+11	1.580-02	7.392+04	9.845-01	1.349+00
1.500+03	1.293-09	5.497-06	1.220+10	1.990+00	7.952+00	.00000	1.187+11	4.893-02	7.442+04	9.845-01	1.353+00
1.500+03	1.293-08	5.496-05	1.215+10	1.990+00	7.654+00	.00000	1.108+11	1.589-01	7.489+04	9.845-01	1.355+00
1.500+03	1.293-07	5.495-04	1.213+10	1.991+00	7.357+00	.00000	1.083+11	4.901-01	7.506+04	9.845-01	1.355+00
1.500+03	1.293-06	5.495-03	1.212+10	1.991+00	7.059+00	.00000	1.073+11	1.551+00	7.512+04	9.845-01	1.355+00
1.500+03	1.293-05	5.495-02	1.212+10	1.991+00	6.762+00	.00000	1.071+11	4.900+00	7.514+04	9.845-01	1.355+00
1.500+03	1.293-04	5.495-01	1.212+10	1.991+00	6.464+00	.00000	1.070+11	1.552+01	7.515+04	9.845-01	1.355+00
1.500+03	1.293-03	5.495+00	1.212+10	1.991+00	6.166+00	.00000	1.070+11	4.837+01	7.515+04	9.845-01	1.355+00
1.500+03	1.293-02	5.495+01	1.212+10	1.991+00	5.869+00	.00000	1.070+11	1.640+02	7.515+04	9.845-01	1.355+00
1.500+03	1.293-01	5.495+02	1.212+10	1.991+00	5.571+00	.00000	1.070+11	5.600+02	7.515+04	9.845-01	1.355+00
1.500+03	1.293+00	5.495+03	1.212+10	1.991+00	5.273+00	.00000	1.070+11	1.152+03	7.515+04	9.845-01	1.355+00
2.000+03	1.293-10	8.240-07	3.806+10	1.770+00	8.509+00	.00000	1.148+12	7.819-01	8.392+04	9.744-01	1.170+00
2.000+03	1.293-09	7.719-06	2.603+10	1.889+00	8.310+00	.00000	7.797+11	5.006+00	8.155+04	9.771-01	1.232+00
2.000+03	1.293-08	7.464-05	2.012+10	1.954+00	8.112+00	.00000	3.778+11	1.961+01	8.143+04	9.783-01	1.291+00
2.000+03	1.293-07	7.371-04	1.798+10	1.978+00	7.913+00	.00000	2.062+11	6.622+01	8.290+04	9.788-01	1.321+00
2.000+03	1.293-06	7.341-03	1.727+10	1.987+00	7.715+00	.00000	1.469+11	2.138+02	8.444+04	9.789-01	1.333+00
2.000+03	1.293-05	7.331-02	1.705+10	1.989+00	7.516+00	.00000	1.277+11	6.804+02	8.527+04	9.789-01	1.337+00
2.000+03	1.293-04	7.328-01	1.697+10	1.990+00	7.318+00	.00000	1.215+11	2.156+03	8.559+04	9.790-01	1.338+00
2.000+03	1.293-03	7.327+00	1.695+10	1.991+00	7.120+00	.00000	1.196+11	6.817+03	8.570+04	9.790-01	1.339+00
2.000+03	1.293-02	7.327+01	1.694+10	1.991+00	6.922+00	.00000	1.190+11	2.151+04	8.573+04	9.790-01	1.339+00
2.000+03	1.293-01	7.326+02	1.694+10	1.991+00	6.687+00	.00000	1.188+11	6.755+04	8.575+04	9.790-01	1.339+00
2.000+03	1.293+00	7.326+03	1.694+10	1.991+00	6.455+00	.00000	1.187+11	2.097+05	8.575+04	9.790-01	1.339+00
2.500+03	1.293-10	1.107-06	5.688+10	1.647+00	8.966+00	.00000	1.290+11	2.172-02	1.071+05	9.628-01	1.152+00
2.500+03	1.293-09	1.101-05	5.582+10	1.656+00	8.718+00	.00000	2.198+11	1.337+00	1.027+05	9.632-01	1.155+00
2.500+03	1.293-08	1.067-04	4.983+10	1.708+00	8.470+00	.00000	6.091+11	5.935+01	9.718+04	9.652-01	1.168+00
2.500+03	1.293-07	9.969-04	3.705+10	1.829+00	8.222+00	.00000	7.042+11	6.936+02	9.342+04	9.691-01	1.211+00
2.500+03	1.293-06	9.469-03	2.791+10	1.925+00	7.974+00	.00000	4.086+11	3.344+03	9.191+04	9.717-01	1.264+00
2.500+03	1.293-05	9.263-02	2.413+10	1.968+00	7.726+00	.00000	2.308+11	1.203+04	9.256+04	9.727-01	1.301+00
2.500+03	1.293-04	9.192-01	2.283+10	1.983+00	7.478+00	.00000	1.637+11	3.959+04	9.375+04	9.730-01	1.315+00

THETA	RHO	P1	E	CAPAR/ EIONIZ	CAPAC/ SYNPOT	FEW	CV	P81	ASQ	EGAM	EGAM2/ GAMMA
2.500+03	1.293-03	9.169+00	2.241+10	1.988+00	7.230+00	.00000	1.413+11	1.268+05	9.447+04	9.731-01	1.321+00
2.500+03	1.293-02	9.161+01	2.228+10	1.990+00	6.982+00	.00000	1.381+11	4.026+05	9.475+04	9.732-01	1.322+00
2.500+03	1.293-01	9.159+02	2.224+10	1.990+00	6.734+00	.00000	1.318+11	1.276+06	9.485+04	9.732-01	1.323+00
2.500+03	1.293+00	9.158+03	2.222+10	1.991+00	6.486+00	.00000	1.311+11	4.043+06	9.488+04	9.732-01	1.323+00
3.000+03	1.293-10	1.338-06	6.423+10	1.635+00	9.427+00	.00000	2.941+11	1.635-01	1.107+05	9.536-01	1.163+00
3.000+03	1.293-09	1.331-05	6.245+10	1.643+00	9.129+00	.00000	1.722+11	5.833-01	1.144+05	9.541-01	1.167+00
3.000+03	1.293-08	1.327-04	6.159+10	1.649+00	8.832+00	.00000	1.495+11	5.472+00	1.158+05	9.545-01	1.169+00
3.000+03	1.293-07	1.312-03	5.944+10	1.668+00	8.534+00	.00000	2.497+11	2.412+02	1.116+05	9.554-01	1.173+00
3.000+03	1.293-06	1.254-02	5.096+10	1.745+00	8.236+00	.00000	5.176+11	6.950+03	1.061+05	9.589-01	1.193+00
3.000+03	1.293-05	1.172-01	3.879+10	1.867+00	7.939+00	.00000	4.557+11	5.640+04	1.025+05	9.634-01	1.237+00
3.000+03	1.293-04	1.125+00	3.184+10	1.944+00	7.641+00	.00000	2.752+11	2.397+05	1.016+05	9.658-01	1.277+00
3.000+03	1.293-03	1.108+01	2.919+10	1.975+00	7.344+00	.00000	1.870+11	8.304+05	1.022+05	9.667-01	1.297+00
3.000+03	1.293-02	1.102+02	2.829+10	1.986+00	7.046+00	.00000	1.555+11	2.703+06	1.028+05	9.670-01	1.305+00
3.000+03	1.293-01	1.100+03	2.801+10	1.989+00	6.748+00	.00000	1.451+11	8.633+06	1.031+05	9.671-01	1.308+00
3.000+03	1.293+00	1.099+04	2.792+10	1.990+00	6.451+00	.00000	1.418+11	2.747+07	1.032+05	9.671-01	1.309+00
3.500+03	1.293-10	1.688-06	1.012+11	1.512+00	9.889+00	.00000	1.827+12	2.074+00	1.195+05	9.299-01	1.131+00
3.500+03	1.293-09	1.596-05	7.803+10	1.599+00	9.542+00	.00000	7.137+11	7.287+00	1.177+05	9.410-01	1.160+00
3.500+03	1.293-08	1.564-04	7.015+10	1.631+00	9.195+00	.00000	3.108+11	2.443+01	1.197+05	9.442-01	1.173+00
3.500+03	1.293-07	1.551-03	6.733+10	1.645+00	8.847+00	.00000	1.867+11	1.081+02	1.230+05	9.454-01	1.181+00
3.500+03	1.293-06	1.534-02	6.502+10	1.663+00	8.500+00	.00000	2.022+11	2.001+03	1.222+05	9.465-01	1.185+00
3.500+03	1.293-05	1.477-01	5.805+10	1.728+00	8.153+00	.00000	3.720+11	6.081+04	1.168+05	9.501-01	1.199+00
3.500+03	1.293-04	1.381+00	4.619+10	1.848+00	7.806+00	.00000	3.841+11	6.025+05	1.122+05	9.556-01	1.234+00
3.500+03	1.293-03	1.319+01	3.845+10	1.935+00	7.459+00	.00000	2.573+11	2.774+06	1.105+05	9.589-01	1.269+00
3.500+03	1.293-02	1.295+02	3.534+10	1.972+00	7.111+00	.00000	1.858+11	9.859+06	1.105+05	9.601-01	1.287+00
3.500+03	1.293-01	1.286+03	3.428+10	1.984+00	6.764+00	.00000	1.592+11	3.238+07	1.108+05	9.606-01	1.294+00
3.500+03	1.293+00	1.283+04	3.393+10	1.989+00	6.417+00	.00000	1.503+11	1.040+08	1.110+05	9.607-01	1.296+00
4.000+03	1.293-10	2.518-06	2.360+11	1.158+00	1.035+01	.00002	3.583+12	5.502+00	1.462+05	6.341-01	1.084+00
4.000+03	1.293-09	2.108-05	1.455+11	1.384+00	9.955+00	.00001	2.617+12	3.968+01	1.338+05	8.856-01	1.114+00
4.000+03	1.293-08	1.891-04	9.773+10	1.542+00	9.559+00	.00000	1.131+12	1.614+02	1.276+05	9.229-01	1.152+00
4.000+03	1.293-07	1.810-03	7.991+10	1.612+00	9.162+00	.00000	4.632+11	5.609+02	1.272+05	9.325-01	1.177+00
4.000+03	1.293-06	1.778-02	7.360+10	1.641+00	8.765+00	.00000	2.381+11	2.238+03	1.298+05	9.356-01	1.189+00
4.000+03	1.293-05	1.748-01	6.973+10	1.669+00	8.368+00	.00000	2.143+11	2.745+04	1.301+05	9.378-01	1.196+00
4.000+03	1.293-04	1.671+00	6.173+10	1.745+00	7.971+00	.00000	3.212+11	6.276+05	1.251+05	9.426-01	1.212+00
4.000+03	1.293-03	1.565+01	5.047+10	1.864+00	7.574+00	.00000	3.060+11	5.376+06	1.205+05	9.488-01	1.243+00
4.000+03	1.293-02	1.502+02	4.373+10	1.942+00	7.178+00	.00000	2.192+11	2.364+07	1.187+05	9.522-01	1.269+00
4.000+03	1.293-01	1.477+03	4.109+10	1.974+00	6.781+00	.00000	1.738+11	8.287+07	1.184+05	9.535-01	1.282+00
4.000+03	1.293+00	1.469+04	4.020+10	1.985+00	6.384+00	.00000	1.572+11	2.706+08	1.185+05	9.539-01	1.286+00
4.500+03	1.293-10	3.239-06	3.200+11	1.013+00	1.082+01	.00021	6.207+11	1.039+00	1.723+05	1.842+00	1.079+00
4.500+03	1.293-09	2.999-05	2.730+11	1.094+00	1.037+01	.00007	2.387+12	4.584+01	1.607+05	-3.942-01	1.086+00
4.500+03	1.293-08	2.516-04	1.786+11	1.304+00	9.923+00	.00002	2.566+12	4.933+02	1.468+05	8.228-01	1.110+00
4.500+03	1.293-07	2.190-03	1.148+11	1.498+00	9.477+00	.00001	1.254+12	2.296+03	1.377+05	9.028-01	1.149+00
4.500+03	1.293-06	2.056-02	8.893+10	1.596+00	9.031+00	.00000	5.226+11	8.342+03	1.355+05	9.198-01	1.181+00
4.500+03	1.293-05	2.000-01	7.938+10	1.641+00	8.584+00	.00000	2.646+11	3.504+04	1.372+05	9.256-01	1.197+00
4.500+03	1.293-04	1.944+00	7.322+10	1.688+00	8.138+00	.00000	2.365+11	4.214+05	1.367+05	9.297-01	1.208+00
4.500+03	1.293-03	1.836+01	6.321+10	1.788+00	7.691+00	.00000	2.896+11	6.469+06	1.316+05	9.365-01	1.228+00
4.500+03	1.293-02	1.729+02	5.335+10	1.898+00	7.245+00	.00000	2.423+11	4.113+07	1.275+05	9.427-01	1.254+00
4.500+03	1.293-01	1.677+03	4.847+10	1.957+00	6.799+00	.00000	1.870+11	1.633+08	1.261+05	9.456-01	1.271+00
4.500+03	1.293+00	1.658+04	4.668+10	1.979+00	6.352+00	.00000	1.626+11	5.544+08	1.257+05	9.466-01	1.278+00
5.000+03	1.293-10	3.647-06	3.332+11	1.001+00	1.128+01	.00135	1.893+11	1.798-01	1.988+05	1.660+00	1.004+00
5.000+03	1.293-09	3.607-05	3.260+11	1.011+00	1.079+01	.00043	4.638+11	8.904+00	1.049+05	1.784+00	1.007+00
5.000+03	1.293-08	3.370-04	2.841+11	1.082+00	1.029+01	.00014	1.819+12	4.260+02	1.716+05	-3.545+00	1.093+00

THETA	RHO	P1	E	CAPAR/ EIONIZ	CAPAC/ SYNPOT	FEW	CV	PB1	ASO	EGAM	EGAM2/ GAMMA
5.000+03	1.293-07	2.838-03	1.907+11	1.285+00	9.793+00	.00004	2.167+12	5.115+03	1.567+05	7.758-01	1.117+00
5.000+03	1.293-06	2.852-02	1.231+11	1.487+00	9.297+00	.00001	1.109+12	2.484+04	1.464+05	8.848-01	1.156+00
5.000+03	1.293-05	2.286-01	9.478+10	1.595+00	8.801+00	.00000	6.784+11	9.329+04	1.436+05	9.082-01	1.189+00
5.000+03	1.293-04	2.206+00	9.347+10	1.653+00	8.305+00	.00000	2.628+11	4.652+05	1.445+05	9.163-01	1.207+00
5.000+03	1.293-03	2.108+01	1.454+10	1.730+00	7.809+00	.00000	2.514+11	5.917+06	1.421+05	9.233-01	1.222+00
5.000+03	1.293-02	1.975+02	6.358+10	1.846+00	7.313+00	.00000	2.469+11	5.556+07	1.369+05	9.316-01	1.243+00
5.000+03	1.293-01	1.886+03	5.632+10	1.933+00	6.817+00	.00000	1.969+11	2.652+08	1.339+05	9.367-01	1.262+00
5.000+03	1.293+00	1.850+04	5.332+10	1.971+00	6.321+00	.00000	1.667+11	9.569+08	1.329+05	9.387-01	1.272+00
5.500+03	1.293-10	4.035-06	3.829+11	1.000+00	1.175+01	.00627	3.022+11	4.041-01	1.999+05	1.597+00	1.092+00
5.500+03	1.293-09	4.013-05	3.379+11	1.002+00	1.120+01	.00199	2.041+11	2.490+00	2.071+05	1.655+00	1.093+00
5.500+03	1.293-08	3.956-04	3.285+11	1.014+00	1.066+01	.00063	4.814+11	1.129+02	1.936+05	1.804+00	1.094+00
5.500+03	1.293-07	3.649-03	2.793+11	1.099+00	1.011+01	.00020	1.659+12	4.686+03	1.793+05	-1.710+00	1.102+00
5.500+03	1.293-06	3.056-02	1.851+11	1.312+00	9.565+00	.00006	1.713+12	4.840+04	1.635+05	7.716-01	1.129+00
5.500+03	1.293-05	2.662-01	1.229+11	1.506+00	9.020+00	.00002	8.493+11	2.239+05	1.537+05	8.751-01	1.170+00
5.500+03	1.293-04	2.469+00	9.708+10	1.612+00	8.474+00	.00001	3.875+11	8.844+05	1.512+05	8.989-01	1.201+00
5.500+03	1.293-03	2.376+01	8.502+10	1.668+00	7.928+00	.00000	2.528+11	5.989+06	1.507+05	9.091-01	1.219+00
5.500+03	1.293-02	2.231+02	7.374+10	1.798+00	7.383+00	.00000	2.404+11	6.356+07	1.462+05	9.191-01	1.237+00
5.500+03	1.293-01	2.106+03	6.450+10	1.904+00	6.837+00	.00000	2.026+11	3.738+08	1.418+05	9.268-01	1.256+00
5.500+03	1.293+00	2.047+04	6.009+10	1.959+00	6.291+00	.00000	1.697+11	1.461+09	1.399+05	9.302-01	1.267+00
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	.00000	0.000	0.000	0.000	0.000	0.000

THETA	RHO	P1	E	CAPAR/ EIONIZ	CAPAC/ SYNPOT	FEW	CV	PB1	ASO	EGAW	EGAW2/ GAMMA
6.000+03	1.293-10	4.474-06	3.632+11	1.000+00	1.223+01	.02249	6.987+11	1.395+00	2.012+05	1.478+00	1.097+00
6.000+03	1.293-09	4.406-05	3.481+11	1.000+00	1.162+01	.00722	3.006+11	4.766+00	2.093+05	1.593+00	1.099+00
6.000+03	1.293-08	4.373-04	3.417+11	1.003+00	1.103+01	.00229	2.243+11	3.698+01	2.145+05	1.662+00	1.100+00
6.000+03	1.293-07	4.270-03	3.262+11	1.025+00	1.043+01	.00073	6.185+11	1.839+03	1.995+05	1.922+00	1.103+00
6.000+03	1.293-06	3.816-02	2.599+11	1.147+00	9.834+00	.00023	1.601+12	5.379+04	1.840+05	2.243-03	1.115+00
6.000+03	1.293-05	3.186-01	1.685+11	1.374+00	9.239+00	.00007	1.254+12	4.125+05	1.680+05	7.944-01	1.148+00
6.000+03	1.293-04	2.829+00	1.179+11	1.547+00	8.644+00	.00002	5.928+11	1.767+06	1.599+05	8.711-01	1.188+00
6.000+03	1.293-03	2.654+01	9.673+10	1.649+00	8.049+00	.00001	3.057+11	8.191+06	1.579+05	8.923-01	1.215+00
6.000+03	1.293-02	2.493+02	8.372+10	1.755+00	7.453+00	.00000	2.393+11	6.949+07	1.548+05	9.052-01	1.233+00
6.000+03	1.293-01	2.336+03	7.288+10	1.877+00	6.858+00	.00000	2.059+11	4.782+08	1.498+05	9.157-01	1.251+00
6.000+03	1.293+00	2.249+04	6.698+10	1.946+00	6.263+00	.00000	1.722+11	2.045+09	1.469+05	9.210-01	1.263+00
6.500+03	1.293-10	5.048-06	4.097+11	1.000+00	1.272+01	.06508	1.549+12	3.921+00	2.099+05	1.330+00	1.097+00
6.500+03	1.293-09	4.841-05	3.665+11	1.000+00	1.205+01	.02143	5.945+11	1.345+01	2.111+05	1.495+00	1.103+00
6.500+03	1.293-08	4.769-04	3.518+11	1.001+00	1.140+01	.00687	2.726+11	4.895+01	2.198+05	1.604+00	1.106+00
6.500+03	1.293-07	4.719-03	3.435+11	1.007+00	1.075+01	.00218	2.732+11	6.570+02	2.197+05	1.690+00	1.108+00
6.500+03	1.293-06	4.501-02	3.137+11	1.054+00	1.011+01	.00069	8.805+11	3.276+04	2.031+05	2.481+00	1.112+00
6.500+03	1.293-05	3.854-01	2.271+11	1.230+00	9.460+00	.00022	1.403+12	5.488+05	1.855+05	5.188-01	1.133+00
6.500+03	1.293-04	3.261+00	1.486+11	1.454+00	8.815+00	.00007	8.357+11	3.096+06	1.713+05	8.191-01	1.172+00
6.500+03	1.293-03	2.960+01	1.117+11	1.601+00	8.170+00	.00002	4.011+11	1.314+07	1.656+05	8.698-01	1.208+00
6.500+03	1.293-02	2.762+02	9.404+10	1.716+00	7.525+00	.00001	2.547+11	8.106+07	1.626+05	8.895-01	1.230+00
6.500+03	1.293-01	2.574+03	8.142+10	1.841+00	6.881+00	.00000	2.094+11	5.795+08	1.575+05	9.032-01	1.248+00
6.500+03	1.293+00	2.455+04	7.398+10	1.930+00	6.236+00	.00000	1.745+11	2.693+09	1.537+05	9.109-01	1.260+00
7.000+03	1.293-10	5.900-06	5.048+11	1.000+00	1.324+01	.15576	2.948+12	8.827+00	2.255+05	1.215+00	1.092+00
7.000+03	1.293-09	5.379-05	4.032+11	1.000+00	1.249+01	.05390	1.160+12	3.309+01	2.184+05	1.372+00	1.105+00
7.000+03	1.293-08	5.193-04	3.671+11	1.000+00	1.177+01	.01759	4.581+11	1.127+02	2.218+05	1.527+00	1.111+00
7.000+03	1.293-07	5.123-03	3.541+11	1.002+00	1.107+01	.00562	2.466+11	5.182+02	2.304+05	1.625+00	1.113+00
7.000+03	1.293-06	5.021-02	3.400+11	1.019+00	1.038+01	.00178	4.116+11	1.469+04	2.214+05	1.785+00	1.116+00
7.000+03	1.293-05	4.563-01	2.830+11	1.119+00	9.682+00	.00056	1.131+12	5.044+05	2.037+05	-4.173+00	1.126+00
7.000+03	1.293-04	3.802+00	1.891+11	1.343+00	8.988+00	.00018	1.029+12	4.546+06	1.853+05	7.043-01	1.157+00
7.000+03	1.293-03	3.315+01	1.315+11	1.540+00	8.293+00	.00006	5.235+11	2.097+07	1.745+05	8.360-01	1.198+00
7.000+03	1.293-02	3.044+02	1.055+11	1.677+00	7.599+00	.00002	2.886+11	1.043+08	1.700+05	8.707-01	1.226+00
7.000+03	1.293-01	2.820+03	9.021+10	1.810+00	6.905+00	.00001	2.161+11	6.908+08	1.649+05	8.893-01	1.245+00
7.000+03	1.293+00	2.667+04	8.110+10	1.914+00	6.210+00	.00000	1.774+11	3.407+09	1.604+05	8.999-01	1.258+00
7.500+03	1.293-10	7.128-06	6.593+11	1.000+00	1.382+01	.30328	4.003+12	1.352+01	2.479+05	1.151+00	1.085+00
7.500+03	1.293-09	6.110-05	4.713+11	1.000+00	1.294+01	.11729	2.052+12	6.920+01	2.310+05	1.268+00	1.102+00
7.500+03	1.293-08	5.685-04	3.935+11	1.000+00	1.216+01	.03956	7.953+11	2.479+02	2.272+05	1.430+00	1.113+00
7.500+03	1.293-07	5.535-03	3.664+11	1.001+00	1.140+01	.01278	3.382+11	8.720+02	2.336+05	1.567+00	1.118+00
7.500+03	1.293-06	5.454-02	3.539+11	1.007+00	1.065+01	.00407	2.665+11	7.920+03	2.372+05	1.668+00	1.121+00
7.500+03	1.293-05	5.169-01	3.223+11	1.055+00	9.907+00	.00129	7.011+11	3.356+05	2.207+05	2.256+00	1.126+00
7.500+03	1.293-04	4.431+00	2.350+11	1.235+00	9.162+00	.00041	1.072+12	5.479+06	2.010+05	3.670-01	1.148+00
7.500+03	1.293-03	3.733+01	1.567+11	1.465+00	8.418+00	.00013	6.498+11	3.108+07	1.851+05	7.803-01	1.187+00
7.500+03	1.293-02	3.347+02	1.187+11	1.634+00	7.674+00	.00004	3.374+11	1.422+08	1.776+05	8.467-01	1.221+00
7.500+03	1.293-01	3.075+03	9.942+10	1.779+00	6.930+00	.00001	2.275+11	8.309+08	1.721+05	8.735-01	1.242+00
7.500+03	1.293+00	2.884+04	8.838+10	1.896+00	6.186+00	.00000	1.812+11	4.205+09	1.669+05	8.878-01	1.256+00
8.000+03	1.293-10	8.697-06	8.584+11	1.000+00	1.447+01	.49084	5.007+12	1.918+01	2.742+05	1.120+00	1.079+00
8.000+03	1.293-09	7.138-05	5.836+11	1.000+00	1.343+01	.22357	3.181+12	1.229+02	2.491+05	1.190+00	1.096+00
8.000+03	1.293-08	6.296-04	4.382+11	1.000+00	1.255+01	.07955	1.312+12	4.870+02	2.367+05	1.333+00	1.113+00
8.000+03	1.293-07	5.985-03	3.845+11	1.000+00	1.173+01	.02623	5.168+11	1.690+03	2.375+05	1.496+00	1.122+00
8.000+03	1.293-06	5.867-02	3.650+11	1.003+00	1.093+01	.00841	2.678+11	7.614+03	2.454+05	1.612+00	1.126+00
8.000+03	1.293-05	5.706-01	3.456+11	1.025+00	1.013+01	.00267	4.145+11	1.932+05	2.369+05	1.802+00	1.129+00
8.000+03	1.293-04	5.069+00	2.789+11	1.147+00	9.338+00	.00085	9.377+11	5.377+05	2.171+05	-2.620+00	1.103+00

THETA	RHO	P1	E	CAPAR/ IONIZ	CAPAC/ SYNPOT	FEW	CV	PBI	ASO	EGAM	EGAM2/ GAMMA
8.000+03	1.293-03	4.221+01	1.870+11	1.382+00	8.544+00	.00027	7.506+11	4.185+07	1.972+05	6.785-01	1.177+00
8.000+03	1.293-02	3.680+02	1.344+11	1.585+00	7.750+00	.00008	5.951+11	1.950+08	1.859+05	8.146-01	1.215+00
8.000+03	1.293-01	3.340+03	1.093+11	1.747+00	6.957+00	.00003	2.439+11	1.017+09	1.791+05	8.551-01	1.240+00
8.000+03	1.293+00	3.107+04	9.588+10	1.877+00	6.163+00	.00001	1.864+11	5.116+09	1.732+05	8.745-01	1.254+00
8.500+03	1.293-10	9.664-06	9.370+11	1.000+00	1.535+01	.55910	1.591+12	6.049+00	2.942+05	1.117+00	1.081+00
8.500+03	1.293-09	8.439-05	7.308+11	1.000+00	1.398+01	.36156	3.738+12	1.601+02	2.711+05	1.150+00	1.090+00
8.500+03	1.293-08	7.095-04	5.089+11	1.000+00	1.297+01	.14474	1.995+12	8.521+02	2.501+05	1.254+00	1.109+00
8.500+03	1.293-07	6.503-03	4.122+11	1.000+00	1.207+01	.04924	7.874+11	3.111+03	2.440+05	1.417+00	1.124+00
8.500+03	1.293-06	6.289-02	3.779+11	1.001+00	1.121+01	.01596	3.404+11	1.128+04	2.497+05	1.560+00	1.130+00
8.500+03	1.293-05	6.157-01	3.604+11	1.012+00	1.036+01	.00509	2.945+11	1.224+05	2.511+05	1.684+00	1.134+00
8.500+03	1.293-04	5.712+00	3.145+11	1.087+00	9.515+00	.00161	7.090+11	4.395+06	2.325+05	2.823+00	1.142+00
8.500+03	1.293-03	4.772+01	2.206+11	1.300+00	8.671+00	.00051	7.985+11	5.081+07	2.105+05	4.607-01	1.170+00
8.500+03	1.293-02	4.050+02	1.525+11	1.531+00	7.828+00	.00016	4.543+11	2.605+08	1.949+05	7.689-01	1.208+00
8.500+03	1.293-01	3.619+03	1.199+11	1.713+00	6.985+00	.00005	2.646+11	1.262+09	1.862+05	8.332-01	1.236+00
8.500+03	1.293+00	3.336+04	1.037+11	1.858+00	6.141+00	.00002	1.929+11	6.177+09	1.794+05	8.596-01	1.252+00
9.000+03	1.293-10	1.060-05	1.007+12	1.000+00	1.625+01	.61533	1.657+12	6.686+00	3.081+05	1.116+00	1.083+00
9.000+03	1.293-09	9.923-05	8.931+11	1.000+00	1.460+01	.51196	1.372+12	6.019+01	3.000+05	1.129+00	1.087+00
9.000+03	1.293-08	8.139-04	6.113+11	1.000+00	1.340+01	.24014	2.759+12	1.327+03	2.675+05	1.198+00	1.104+00
9.000+03	1.293-07	7.124-03	4.537+11	1.000+00	1.242+01	.08555	1.153+12	5.295+03	2.534+05	1.341+00	1.123+00
9.000+03	1.293-06	6.744-02	3.951+11	1.001+00	1.149+01	.02820	4.651+11	1.861+04	2.542+05	1.502+00	1.134+00
9.000+03	1.293-05	6.583-01	3.724+11	1.006+00	1.059+01	.00904	2.723+11	1.051+05	2.607+05	1.625+00	1.139+00
9.000+03	1.293-04	6.269+00	3.403+11	1.050+00	9.694+00	.00287	5.015+11	3.193+06	2.472+05	1.975+00	1.144+00
9.000+03	1.293-03	5.364+01	2.548+11	1.225+00	8.800+00	.00091	7.804+11	5.555+07	2.244+05	-1.970-01	1.165+00
9.000+03	1.293-02	4.460+02	1.732+11	1.472+00	7.907+00	.00029	5.073+11	3.336+08	2.048+05	7.005-01	1.202+00
9.000+03	1.293-01	3.913+03	1.316+11	1.677+00	7.014+00	.00009	2.880+11	1.568+09	1.934+05	8.063-01	1.233+00
9.000+03	1.293+00	3.572+04	1.118+11	1.838+00	6.121+00	.00003	2.009+11	7.418+09	1.856+05	8.429-01	1.250+00
9.500+03	1.293-10	1.158-05	1.080+12	1.000+00	1.714+01	.67124	1.749+12	7.465+00	3.218+05	1.115+00	1.084+00
9.500+03	1.293-09	1.082-04	9.541+11	1.000+00	1.540+01	.56249	1.455+12	6.766+01	3.131+05	1.128+00	1.089+00
9.500+03	1.293-08	9.390-04	7.362+11	1.000+00	1.389+01	.35552	3.037+12	1.598+03	2.877+05	1.165+00	1.100+00
9.500+03	1.293-07	7.888-03	5.127+11	1.000+00	1.278+01	.13865	1.598+12	8.326+03	2.656+05	1.277+00	1.121+00
9.500+03	1.293-06	7.250-02	4.187+11	1.000+00	1.178+01	.04682	6.385+11	3.016+04	2.605+05	1.441+00	1.136+00
9.500+03	1.293-05	7.010-01	3.846+11	1.003+00	1.082+01	.01513	3.034+11	1.238+05	2.667+05	1.580+00	1.143+00
9.500+03	1.293-04	6.765+00	3.587+11	1.029+00	9.875+00	.00482	3.677+11	2.267+06	2.609+05	1.770+00	1.148+00
9.500+03	1.293-03	5.967+01	2.869+11	1.163+00	8.931+00	.00153	7.049+11	5.500+07	2.383+05	-1.471+01	1.163+00
9.500+03	1.293-02	4.910+02	1.959+11	1.412+00	7.988+00	.00048	5.472+11	4.072+08	2.154+05	5.907-01	1.196+00
9.500+03	1.293-01	4.226+03	1.443+11	1.640+00	7.045+00	.00015	3.124+11	1.934+09	2.009+05	7.725-01	1.229+00
9.500+03	1.293+00	3.815+04	1.203+11	1.816+00	6.102+00	.00005	2.099+11	8.861+09	1.916+05	8.238-01	1.249+00
1.000+04	1.293-10	1.260-05	1.158+12	1.010+12	1.804+01	.72727	1.841+12	8.287+00	3.355+05	1.114+00	1.085+00
1.000+04	1.293-09	1.176-04	1.018+12	1.000+00	1.621+01	.61287	1.510+12	7.405+01	3.264+05	1.127+00	1.091+00
1.000+04	1.293-08	1.081-03	8.757+11	1.000+00	1.443+01	.48300	3.361+12	1.950+03	3.093+05	1.145+00	1.097+00
1.000+04	1.293-07	8.829-03	5.920+11	1.000+00	1.316+01	.21084	2.083+12	1.210+04	2.807+05	1.229+00	1.117+00
1.000+04	1.293-06	7.828-02	4.508+11	1.000+00	1.208+01	.07362	8.582+11	4.662+04	2.686+05	1.381+00	1.136+00
1.000+04	1.293-05	7.454-01	3.990+11	1.002+00	1.106+01	.02407	3.686+11	1.712+05	2.717+05	1.535+00	1.146+00
1.000+04	1.293-04	7.224+00	3.730+11	1.017+00	1.006+01	.00770	3.022+11	1.742+06	2.727+05	1.681+00	1.152+00
1.000+04	1.293-03	6.556+01	3.150+11	1.115+00	9.062+00	.00244	5.987+11	5.001+07	2.520+05	3.043+00	1.163+00
1.000+04	1.293-02	5.398+02	2.199+11	1.352+00	8.070+00	.00077	5.691+11	4.730+08	2.266+05	3.954-01	1.192+00
1.000+04	1.293-01	4.559+03	1.581+11	1.600+00	7.077+00	.00024	3.362+11	2.348+09	2.088+05	7.289-01	1.226+00
1.000+04	1.293+00	4.065+04	1.292+11	1.794+00	6.085+00	.00008	2.198+11	1.051+10	1.977+05	8.017-01	1.247+00
1.050+04	1.293-10	1.365-05	1.239+12	1.078+12	1.894+01	.78340	1.933+12	9.152+00	3.492+05	1.113+00	1.086+00
1.050+04	1.293-09	1.273-04	1.085+12	1.000+00	1.701+01	.66303	1.585+12	8.101+01	3.396+05	1.126+00	1.092+00
1.050+04	1.293-08	1.182-03	9.469+11	1.000+00	1.511+01	.54388	1.289+12	7.293+02	3.295+05	1.141+00	1.098+00

THETA	RHO	P1	E	CAPAR/ EIONIZ	CAPAC/ SYNPOT	FEW	CV	P81	ASO	EGAM	EGAM2/ GAMMA
1.050+04	1.293-07	9.966-03	6.916+11	1.000+00	1.336+01	.30186	2.532+12	1.623+04	2.983+05	1.194+00	1.113+00
1.050+04	1.293-06	8.500-02	8.932+11	1.000+00	1.238+01	.11021	1.117+12	6.882+04	2.787+05	1.328+00	1.135+00
1.050+04	1.293-05	7.929-01	9.168+11	1.001+00	1.130+01	.03662	4.603+11	2.467+05	2.772+05	1.490+00	1.149+00
1.050+04	1.293-04	7.606+00	3.855+11	1.011+00	1.024+01	.01177	2.039+11	1.586+06	2.818+05	1.629+00	1.156+00
1.050+04	1.293-03	7.113+01	3.385+11	1.081+00	9.196+00	.0037	9.919+11	4.280+07	2.651+05	2.147+00	1.165+00
1.050+04	1.293-02	5.914+02	2.445+11	1.297+00	8.153+00	.00118	5.711+11	5.237+08	2.383+05	-2.103-02	1.190+00
1.050+04	1.293-01	4.914+03	1.729+11	1.559+00	7.111+00	.00037	3.576+11	2.796+09	2.170+05	6.709-01	1.223+00
1.050+04	1.293+00	4.325+04	1.386+11	1.771+00	6.069+00	.00012	2.302+11	1.237+10	2.037+05	7.760-01	1.245+00
1.100+04	1.293-10	1.476-05	1.328+12	1.151+12	1.985+01	.03961	2.025+12	1.006+01	3.629+05	1.112+00	1.087+00
1.100+04	1.293-09	1.374-04	1.154+12	1.000+00	1.782+01	.71330	1.660+12	8.996+01	3.525+05	1.125+00	1.093+00
1.100+04	1.293-08	1.274-03	1.004+12	1.000+00	1.582+01	.58869	1.335+12	7.932+02	3.421+05	1.140+00	1.099+00
1.100+04	1.293-07	1.121-02	7.975+11	1.000+00	1.401+01	.39696	2.563+12	1.767+04	3.169+05	1.173+00	1.110+00
1.100+04	1.293-06	9.206-02	5.476+11	1.000+00	1.270+01	.15778	1.402+12	9.537+04	2.906+05	1.283+00	1.133+00
1.100+04	1.293-05	8.445-01	4.390+11	1.001+00	1.154+01	.05358	5.749+11	3.516+05	2.837+05	1.484+00	1.151+00
1.100+04	1.293-04	8.105+00	3.979+11	1.007+00	1.043+01	.01733	2.961+11	1.659+06	2.887+05	1.588+00	1.160+00
1.100+04	1.293-03	7.636+01	3.577+11	1.057+00	9.331+00	.00552	4.044+11	3.558+07	2.774+05	1.883+00	1.167+00
1.100+04	1.293-02	6.456+02	2.688+11	1.246+00	8.238+00	.00175	5.544+11	5.582+08	2.501+05	-1.391+00	1.180+00
1.100+04	1.293-01	5.290+03	1.885+11	1.518+00	7.146+00	.00055	3.753+11	3.259+09	2.255+05	5.910-01	1.220+00
1.100+04	1.293+00	4.594+04	1.485+11	1.747+00	6.054+00	.00018	2.405+11	1.442+10	2.099+05	7.455-01	1.282+00

CMOL RESULTS

The following output illustrates CMOL/EIONX answers for a portion of the molecular checkout set (TRAIL = 6.) done by GOLEM. The column captions refer to:

COLUMN	NAME	UNITS	MEANING
1	THETA	^{o}K	temperature; ordinarily given in eV (1 eV = 11605.4 ^{o}K)
2	RHO	gm/cc	density, ρ
3	P1	dynes/cm^2	pressure
4	E	ergs/gm	specific internal energy; includes $E_o \simeq 6 \times 10^{11}$ ergs/gm
5	NBAR EIONIZ	ergs/gm	NBAR, the mean no. of atoms/molecule, is printed when NBAR $\neq$ 1. EIONIZ is printed when NBAR = 1. EIONIZ is the ionization contribution to the specific internal energy
6	SYNPOT		$\theta_{eV}\ \ell n\ \Gamma$ [$\Gamma \simeq 0.01\ A\ \theta^{3/2}/(\rho\bar{Z})$] where A is the mean atomic weight. (A $\simeq$ 12. for CMOL)
7	FEW		FEW = ZBAR = $\bar{Z}$, the mean ion charge
8	CV	ergs/gm/eV	$CV \equiv \left(\frac{\partial E}{\partial \theta}\right)_\rho$; θ in eV
9	PB1	ergs/cc	$PB1 \equiv \left(\frac{\partial E}{\partial \tau}\right)_\theta$; $\tau = 1/\rho$
10	ASQ	cm/sec	equilibrium sound speed
11	EGAM		$1 + \frac{P}{\rho(E-E_o)}$; $E_o \simeq 6 \times 10^{11}$ ergs/gm for CMOL
12	EGAM2		$1 + \frac{P}{\rho E}$

THETA	RHO	P1	E	CAPAR/ EIONIZ	CAPAC/ SYNPOT	FEW	CV	PB1	ASO	EGAW	EGAM2/ GAMMA
5.000+02	1.000-10	3.795-08	1.351+11	9.000+00	7.275-01	.00000	1.492+11	0.000	2.019+04	9.992-01	1.003+00
5.000+02	1.000-09	3.795-07	1.351+11	9.000+00	6.283-01	.00000	1.492+11	0.000	2.019+04	9.992-01	1.003+00
5.000+02	1.000-08	3.795-06	1.351+11	9.000+00	5.291-01	.00000	1.492+11	0.000	2.019+04	9.992-01	1.003+00
5.000+02	1.000-07	3.795-05	1.351+11	9.000+00	4.299-01	.00000	1.492+11	0.000	2.019+04	9.992-01	1.003+00
5.000+02	1.000-06	3.795-04	1.351+11	9.000+00	3.307-01	.00000	1.492+11	0.000	2.019+04	9.992-01	1.003+00
5.000+02	1.000-05	3.795-03	1.351+11	9.000+00	2.315-01	.00000	1.492+11	0.000	2.019+04	9.992-01	1.003+00
5.000+02	1.000-04	3.795-02	1.351+11	9.000+00	1.323-01	.00000	1.492+11	0.000	2.019+04	9.992-01	1.003+00
5.000+02	1.000-03	3.795-01	1.351+11	9.000+00	3.305-02	.00000	1.492+11	0.000	2.019+04	9.992-01	1.003+00
5.000+02	1.000-02	3.795+00	1.351+11	9.000+00	-6.615-02	.00000	1.492+11	0.000	2.019+04	9.992-01	1.003+00
5.000+02	1.000-01	3.795+01	1.351+11	9.000+00	-1.654-01	.00000	1.492+11	0.000	2.019+04	9.992-01	1.003+00
5.000+02	1.000+00	3.795+02	1.351+11	9.000+00	-2.646-01	.00000	1.492+11	0.000	2.019+04	9.992-01	1.003+00
5.000+02	1.000+01	3.795+03	1.351+11	9.000+00	-3.638-01	.00000	1.492+11	0.000	2.019+04	9.992-01	1.003+00
1.000+03	1.000-10	7.590-08	1.421+11	9.000+00	1.545+00	.00000	1.735+11	0.000	2.844+04	9.983-01	1.005+00
1.000+03	1.000-09	7.590-07	1.421+11	9.000+00	1.346+00	.00000	1.735+11	0.000	2.844+04	9.983-01	1.005+00
1.000+03	1.000-08	7.590-06	1.421+11	9.000+00	1.148+00	.00000	1.735+11	0.000	2.844+04	9.983-01	1.005+00
1.000+03	1.000-07	7.590-05	1.421+11	9.000+00	9.493-01	.00000	1.735+11	0.000	2.844+04	9.983-01	1.005+00
1.000+03	1.000-06	7.590-04	1.421+11	9.000+00	7.509-01	.00000	1.735+11	0.000	2.844+04	9.983-01	1.005+00
1.000+03	1.000-05	7.590-03	1.421+11	9.000+00	5.525-01	.00000	1.735+11	0.000	2.844+04	9.983-01	1.005+00
1.000+03	1.000-04	7.590-02	1.421+11	9.000+00	3.541-01	.00000	1.735+11	0.000	2.844+04	9.983-01	1.005+00
1.000+03	1.000-03	7.590-01	1.421+11	9.000+00	1.557-01	.00000	1.735+11	0.000	2.844+04	9.983-01	1.005+00
1.000+03	1.000-02	7.590+00	1.421+11	9.000+00	-4.271-02	.00000	1.735+11	0.000	2.844+04	9.983-01	1.005+00
1.000+03	1.000-01	7.590+01	1.421+11	9.000+00	-2.411-01	.00000	1.735+11	0.000	2.844+04	9.983-01	1.005+00
1.000+03	1.000+00	7.590+02	1.421+11	9.000+00	-4.395-01	.00000	1.735+11	0.000	2.844+04	9.983-01	1.005+00
1.000+03	1.000+01	7.590+03	1.421+11	9.000+00	-6.379-01	.00000	1.735+11	0.000	2.844+04	9.983-01	1.005+00
1.500+03	1.000-10	1.139-07	1.500+11	9.000+00	6.781+00	.00000	1.919+11	4.225-14	3.475+04	9.974-01	1.008+00
1.500+03	1.000-09	1.139-06	1.500+11	9.000+00	6.632+00	.00000	1.919+11	1.336-13	3.475+04	9.974-01	1.008+00
1.500+03	1.000-08	1.139-05	1.500+11	9.000+00	6.483+00	.00000	1.919+11	4.225-13	3.475+04	9.974-01	1.008+00
1.500+03	1.000-07	1.139-04	1.500+11	9.000+00	6.335+00	.00000	1.919+11	1.336-12	3.475+04	9.974-01	1.008+00
1.500+03	1.000-06	1.139-03	1.500+11	9.000+00	6.186+00	.00000	1.920+11	4.225-12	3.475+04	9.974-01	1.008+00
1.500+03	1.000-05	1.139-02	1.500+11	9.000+00	6.037+00	.00000	1.919+11	1.336-11	3.475+04	9.974-01	1.008+00
1.500+03	1.000-04	1.139-01	1.500+11	9.000+00	6.098-01	.00000	1.919+11	0.000	3.475+04	9.974-01	1.008+00
1.500+03	1.000-03	1.139+00	1.500+11	9.000+00	3.122-01	.00000	1.919+11	0.000	3.475+04	9.974-01	1.008+00
1.500+03	1.000-02	1.139+01	1.500+11	9.000+00	1.454-02	.00000	1.920+11	0.000	3.475+04	9.974-01	1.008+00
1.500+03	1.000-01	1.139+02	1.500+11	9.000+00	-2.831-01	.00000	1.919+11	0.000	3.475+04	9.974-01	1.008+00
1.500+03	1.000+00	1.139+03	1.500+11	9.000+00	-5.807-01	.00000	1.919+11	0.000	3.475+04	9.974-01	1.008+00
1.500+03	1.000+01	1.139+04	1.500+11	9.000+00	-8.783-01	.00000	1.919+11	0.000	3.475+04	9.974-01	1.008+00
2.000+03	1.000-10	4.476-07	2.406+11	3.052+00	7.202+00	.00000	4.870+11	1.948-01	7.046+04	9.873-01	1.019+00
2.000+03	1.000-09	4.046-06	2.289+11	3.377+00	7.004+00	.00000	1.780+12	1.028+01	6.626+04	9.889-01	1.018+00
2.000+03	1.000-08	2.841-05	1.958+11	4.809+00	6.806+00	.00000	2.471+12	1.438+02	5.524+04	9.929-01	1.015+00
2.000+03	1.000-07	2.008-04	1.726+11	6.803+00	6.607+00	.00000	1.180+12	6.090+02	4.626+04	9.952-01	1.012+00
2.000+03	1.000-06	1.704-03	1.640+11	8.018+00	6.409+00	.00000	5.425+11	2.078+03	4.251+04	9.960-01	1.011+00
2.000+03	1.000-05	1.600-02	1.610+11	8.541+00	6.210+00	.00000	3.316+11	7.690+03	4.115+04	9.963-01	1.010+00
2.000+03	1.000-04	1.559-01	1.598+11	8.765+00	6.012+00	.00000	2.603+11	3.323+04	4.061+04	9.964-01	1.010+00
2.000+03	1.000-03	1.540+00	1.593+11	8.871+00	5.814+00	.00000	2.325+11	1.638+05	4.036+04	9.964-01	1.010+00
2.000+03	1.000-02	1.530+01	1.590+11	8.928+00	5.615+00	.00000	2.199+11	8.674+05	4.023+04	9.965-01	1.010+00
2.000+03	1.000-01	1.525+02	1.588+11	8.961+00	5.417+00	.00000	2.137+11	4.658+06	4.015+04	9.965-01	1.010+00
2.000+03	1.000+00	1.521+03	1.588+11	8.980+00	5.218+00	.00000	2.104+11	2.363+07	4.010+04	9.965-01	1.010+00
2.000+03	1.000+01	1.519+04	1.587+11	8.993+00	5.020+00	.00000	2.089+11	9.339+07	4.006+04	9.965-01	1.010+00
2.500+03	1.000-10	7.222-07	3.012+11	2.365+00	7.632+00	.00000	4.656+12	2.962+00	8.812+04	9.754-01	1.024+00
2.500+03	1.000-09	6.073-06	2.632+11	2.812+00	7.384+00	.00000	1.399+12	7.962+00	8.106+04	9.817-01	1.023+00
2.500+03	1.000-08	5.725-05	2.522+11	2.983+00	7.136+00	.00000	6.051+11	3.112+01	7.936+04	9.833-01	1.023+00

THETA	RHO	P1	E	CAPAR/ EIONIZ	CAPAC/ SYNPOT	FEW	CV	PB1	ASO	EGAM	EGAM2/ BAMMA
2.500+03	1.000-07	5.334-04	2.430+11	3.202+00	6.888+00	.00000	8.523+11	6.558+02	7.667+04	9.848-01	1.022+00
2.500+03	1.000-06	4.095-03	2.162+11	4.170+00	6.640+00	.00000	1.692+12	1.501+04	6.675+04	9.891-01	1.019+00
2.500+03	1.000-05	2.798-02	1.878+11	6.103+00	6.392+00	.00000	1.065+12	8.474+04	5.480+04	9.931-01	1.015+00
2.500+03	1.000-04	2.239-01	1.754+11	7.626+00	6.144+00	.00000	5.294+11	3.086+05	4.879+04	9.946-01	1.013+00
2.500+03	1.000-03	2.042+00	1.710+11	8.363+00	5.896+00	.00000	3.313+11	1.131+06	4.650+04	9.952-01	1.012+00
2.500+03	1.000-02	1.966+01	1.693+11	8.684+00	5.648+00	.00000	2.633+11	4.690+06	4.559+04	9.954-01	1.012+00
2.500+03	1.000-01	1.933+02	1.685+11	8.837+00	5.400+00	.00000	2.376+11	2.176+07	4.517+04	9.954-01	1.012+00
2.500+03	1.000+00	1.915+03	1.682+11	8.918+00	5.152+00	.00000	2.267+11	1.046+08	4.495+04	9.955-01	1.012+00
2.500+03	1.000+01	1.905+04	1.680+11	8.967+00	4.904+00	.00000	2.218+11	4.495+08	4.481+04	9.955-01	1.011+00
3.000+03	1.000-10	1.996-06	6.103+11	1.027+00	8.088+00	.00000	1.590+12	1.522+00	1.506+05	2.731+00	1.033+00
3.000+03	1.000-09	1.547-05	4.932+11	1.325+00	7.771+00	.00000	8.591+12	8.316+01	1.299+05	8.512-01	1.032+00
3.000+03	1.000-08	9.705-05	3.384+11	2.112+00	7.473+00	.00000	4.656+12	4.274+02	1.027+05	9.622-01	1.029+00
3.000+03	1.000-07	7.596-04	2.804+11	2.698+00	7.175+00	.00000	1.578+12	1.307+03	9.094+04	9.758-01	1.027+00
3.000+03	1.000-06	6.849-03	2.611+11	2.992+00	6.878+00	.00000	7.510+11	6.120+03	8.683+04	9.794-01	1.027+00
3.000+03	1.000-05	5.868-02	2.423+11	3.492+00	6.580+00	.00000	1.041+12	1.198+05	8.041+04	9.833-01	1.025+00
3.000+03	1.000-04	4.104-01	2.106+11	4.994+00	6.283+00	.00000	1.080+12	1.255+06	6.673+04	9.893-01	1.020+00
3.000+03	1.000-03	2.990+00	1.903+11	6.853+00	5.985+00	.00000	5.989+11	5.431+06	5.650+04	9.926-01	1.016+00
3.000+03	1.000-02	2.563+01	1.825+11	7.996+00	5.687+00	.00000	3.611+11	1.989+07	5.209+04	9.938-01	1.014+00
3.000+03	1.000-01	2.404+02	1.795+11	8.525+00	5.390+00	.00000	2.761+11	7.762+07	5.037+04	9.942-01	1.014+00
3.000+03	1.000+00	2.336+03	1.783+11	8.773+00	5.092+00	.00000	2.452+11	3.312+08	4.961+04	9.944-01	1.013+00
3.000+03	1.000+01	2.302+04	1.778+11	8.903+00	4.795+00	.00000	2.329+11	1.406+09	4.922+04	9.945-01	1.013+00
3.500+03	1.000-10	2.389-06	6.286+11	1.001+00	8.510+00	.00011	1.631+11	4.153-02	1.911+05	1.805+00	1.039+00
3.500+03	1.000-09	2.373-05	6.252+11	1.008+00	8.163+00	.00004	3.921+11	3.849+00	1.744+05	1.902+00	1.038+00
3.500+03	1.000-08	2.198-04	5.881+11	1.088+00	7.815+00	.00001	2.994+12	4.023+02	1.572+05	-1.126+00	1.038+00
3.500+03	1.000-07	1.506-03	4.338+11	1.587+00	7.468+00	.00000	5.497+12	7.096+03	1.288+05	9.074-01	1.035+00
3.500+03	1.000-06	1.020-02	3.211+11	2.344+00	7.121+00	.00000	2.425+12	2.877+04	1.058+05	9.627-01	1.032+00
3.500+03	1.000-05	8.413-02	2.799+11	2.842+00	6.774+00	.00000	1.012+12	1.112+05	9.622+04	9.733-01	1.030+00
3.500+03	1.000-04	7.060-01	2.554+11	3.387+00	6.427+00	.00000	8.902+11	1.250+06	8.833+04	9.792-01	1.028+00
3.500+03	1.000-03	4.983+00	2.231+11	4.798+00	6.079+00	.00000	8.832+11	1.307+07	7.365+04	9.866-01	1.023+00
3.500+03	1.000-02	3.588+01	2.014+11	6.663+00	5.732+00	.00000	5.274+11	5.960+07	6.187+04	9.908-01	1.018+00
3.500+03	1.000-01	3.029+02	1.927+11	7.893+00	5.385+00	.00000	3.383+11	2.230+08	5.657+04	9.924-01	1.016+00
3.500+03	1.000+00	2.816+03	1.894+11	8.491+00	5.038+00	.00000	2.686+11	8.624+08	5.445+04	9.930-01	1.015+00
3.500+03	1.000+01	2.723+04	1.881+11	8.781+00	4.690+00	.00000	2.431+11	3.483+09	5.350+04	9.933-01	1.015+00
4.000+03	1.000-10	2.736-06	6.358+11	1.000+00	8.956+00	.00126	1.965+11	6.275-02	1.989+05	1.744+00	1.044+00
4.000+03	1.000-09	2.732-05	6.348+11	1.001+00	8.559+00	.00040	1.695+11	4.873-01	2.031+05	1.765+00	1.044+00
4.000+03	1.000-08	2.716-04	6.318+11	1.006+00	8.162+00	.00013	2.941+11	3.057+01	1.912+05	1.628+00	1.044+00
4.000+03	1.000-07	2.570-03	6.053+11	1.063+00	7.766+00	.00004	1.612+12	2.791+03	1.724+05	9.840+00	1.043+00
4.000+03	1.000-06	1.897-02	4.770+11	1.440+00	7.369+00	.00001	4.178+12	7.119+04	1.456+05	8.419-01	1.040+00
4.000+03	1.000-05	1.258-01	3.493+11	2.171+00	6.972+00	.00000	2.340+12	3.651+05	1.181+05	9.488-01	1.037+00
4.000+03	1.000-04	9.836-01	2.944+11	2.778+00	6.575+00	.00000	1.065+12	1.556+06	1.043+05	9.672-01	1.034+00
4.000+03	1.000-03	7.762+00	2.613+11	3.520+00	6.178+00	.00000	8.576+11	1.521+07	9.264+04	9.767-01	1.030+00
4.000+03	1.000-02	5.334+01	2.278+11	5.123+00	5.781+00	.00000	6.677+11	1.189+08	7.603+04	9.854-01	1.024+00
4.000+03	1.000-01	3.948+02	2.090+11	6.921+00	5.385+00	.00000	4.208+11	5.051+08	6.473+04	9.897-01	1.019+00
4.000+03	1.000+00	3.402+03	2.016+11	8.032+00	4.988+00	.00000	2.982+11	1.893+09	5.984+04	9.913-01	1.017+00
4.000+03	1.000+01	3.184+04	1.987+11	8.562+00	4.591+00	.00000	2.533+11	7.298+09	5.782+04	9.919-01	1.016+00
4.500+03	1.000-10	3.100-06	6.486+11	1.000+00	9.408+00	.00844	4.544+11	4.000-01	1.959+05	1.628+00	1.048+00
4.500+03	1.000-09	3.082-05	6.431+11	1.000+00	8.960+00	.00268	2.407+11	1.314+00	2.062+05	1.701+00	1.049+00
4.500+03	1.000-08	3.074-04	6.410+11	1.001+00	8.514+00	.00085	1.875+11	8.335+00	2.125+05	1.735+00	1.049+00
4.500+03	1.000-07	3.048-03	6.366+11	1.009+00	8.067+00	.00027	3.177+11	4.349+02	2.017+05	1.812+00	1.049+00
4.500+03	1.000-06	2.836-02	6.026+11	1.084+00	7.621+00	.00008	1.507+12	3.295+04	1.822+05	8.048+00	1.048+00
4.500+03	1.000-05	2.069-01	4.739+11	1.486+00	7.174+00	.00003	3.085+12	6.589+05	1.530+05	8.318-01	1.044+00

THETA	RHO	P1	E	CAPAR/ EIONIZ	CAPAC/ SYNPUT	FEW	CV	PB1	ASO	EGAM	EGAM2/ GAMMA
4.500+03	1.000-04	1.399+00	3.555+11	2.197+00	6.728+00	.00001	1.804+12	3.499+06	1.251+05	9.417-01	1.040+00
4.500+03	1.000-03	1.070+01	2.991+11	2.873+00	6.281+00	.00000	9.509+11	1.812+07	1.092+05	9.638-01	1.036+00
4.500+03	1.000-02	7.767+01	2.593+11	3.958+00	5.835+00	.00000	7.598+11	1.656+08	9.250+04	9.768-01	1.030+00
4.500+03	1.000-01	5.298+02	2.290+11	5.803+00	5.389+00	.00000	5.069+11	9.179+08	7.535+04	9.855-01	1.023+00
4.500+03	1.000+00	4.153+03	2.151+11	7.403+00	4.942+00	.00000	3.331+11	3.572+09	6.613+04	9.890-01	1.020+00
4.500+03	1.000+01	3.785+04	2.099+11	8.296+00	4.496+00	.00000	2.648+11	1.337+10	6.233+04	9.903-01	1.018+00
5.000+03	1.000-10	3.547-06	6.833+11	1.000+00	9.869+00	.03840	1.300+12	1.800+00	2.012+05	1.424+00	1.053+00
5.000+03	1.000-09	3.458-05	6.584+11	1.000+00	9.367+00	.01231	5.175+11	5.857+00	2.057+05	1.586+00	1.053+00
5.000+03	1.000-08	3.428-04	6.503+11	1.000+00	8.869+00	.00391	2.638+11	1.957+01	2.157+05	1.672+00	1.053+00
5.000+03	1.000-07	3.413-03	6.469+11	1.002+00	8.372+00	.00124	2.084+11	1.509+02	2.214+05	1.716+00	1.053+00
5.000+03	1.000-06	3.354-02	6.381+11	1.019+00	7.876+00	.00039	4.296+11	8.724+03	2.079+05	1.860+00	1.053+00
5.000+03	1.000-05	2.959-01	5.811+11	1.154+00	7.380+00	.00012	1.732+12	4.691+05	1.862+05	-7.192-01	1.052+00
5.000+03	1.000-04	2.065+00	4.454+11	1.654+00	6.884+00	.00004	2.242+12	5.725+06	1.534+05	8.633-01	1.047+00
5.000+03	1.000-03	1.441+01	3.468+11	2.370+00	6.388+00	.00001	1.279+12	2.974+07	1.274+05	9.420-01	1.042+00
5.000+03	1.000-02	1.062+02	2.930+11	3.216+00	5.892+00	.00000	8.110+11	2.001+08	1.088+05	9.648-01	1.037+00
5.000+03	1.000-01	7.141+02	2.525+11	4.783+00	5.396+00	.00000	5.810+11	1.395+09	8.808+04	9.791-01	1.029+00
5.000+03	1.000+00	5.124+03	2.303+11	6.665+00	4.900+00	.00000	3.715+11	5.944+09	7.355+04	9.859-01	1.023+00
5.000+03	1.000+01	4.307+04	2.216+11	7.930+00	4.404+00	.00000	2.787+11	2.205+10	6.713+04	9.884-01	1.020+00
5.500+03	1.000-10	4.241-06	7.765+11	1.000+00	1.035+01	.12875	3.228+12	5.762+00	2.175+05	1.242+00	1.055+00
5.500+03	1.000-09	3.917-05	6.937+11	1.000+00	9.782+00	.04268	1.217+12	2.007+01	2.123+05	1.417+00	1.057+00
5.500+03	1.000-08	3.808-04	6.659+11	1.000+00	9.229+00	.01370	4.931+11	6.566+01	2.169+05	1.573+00	1.058+00
5.500+03	1.000-07	3.771-03	6.566+11	1.001+00	8.681+00	.00435	2.610+11	2.350+02	2.267+05	1.658+00	1.058+00
5.500+03	1.000-06	3.742-02	6.514+11	1.005+00	8.135+00	.00138	2.457+11	3.220+03	2.285+05	1.717+00	1.058+00
5.500+03	1.000-05	3.578-01	6.301+11	1.050+00	7.589+00	.00044	6.995+11	2.047+05	2.106+05	2.151+00	1.058+00
5.500+03	1.000-04	2.863+00	5.355+11	1.312+00	7.043+00	.00014	1.820+12	5.843+06	1.830+05	5.399-01	1.054+00
5.500+03	1.000-03	1.952+01	4.083+11	1.924+00	6.498+00	.00004	1.541+12	4.502+07	1.495+05	8.960-01	1.048+00
5.500+03	1.000-02	1.390+02	3.301+11	2.702+00	5.952+00	.00001	9.221+11	2.584+08	1.253+05	9.475-01	1.043+00
5.500+03	1.000-01	9.458+02	2.788+11	3.972+00	5.407+00	.00000	6.418+11	1.871+09	1.021+05	9.700-01	1.034+00
5.500+03	1.000+00	6.362+03	2.472+11	5.906+00	4.861+00	.00000	4.122+11	8.958+09	8.213+04	9.817-01	1.026+00
5.500+03	1.000+01	5.007+04	2.340+11	7.504+00	4.315+00	.00000	2.958+11	3.344+10	7.225+04	9.861-01	1.022+00
6.000+03	1.000-10	5.432-06	9.733+11	1.000+00	1.088+01	.32534	5.884+12	1.267+01	2.459+05	1.147+00	1.057+00
6.000+03	1.000-09	4.581-05	7.726+11	1.000+00	1.021+01	.11766	2.557+12	5.330+01	2.273+05	1.267+00	1.060+00
6.000+03	1.000-08	4.258-04	6.964+11	1.000+00	9.597+00	.03883	9.761+11	1.840+02	2.233+05	1.441+00	1.062+00
6.000+03	1.000-07	4.149-03	6.700+11	1.000+00	8.995+00	.01245	4.158+11	6.070+02	2.292+05	1.582+00	1.063+00
6.000+03	1.000-06	4.107-02	6.618+11	1.002+00	8.397+00	.00395	2.499+11	2.822+03	2.382+05	1.658+00	1.063+00
6.000+03	1.000-05	4.028-01	6.513+11	1.019+00	7.801+00	.00125	3.558+11	8.897+04	2.313+05	1.774+00	1.063+00
6.000+03	1.000-04	3.580+00	5.984+11	1.145+00	7.206+00	.00040	1.115+12	4.187+06	2.081+05	-1.676+02	1.061+00
6.000+03	1.000-03	2.583+01	4.754+11	1.587+00	6.611+00	.00013	1.526+12	5.478+07	1.735+05	7.875-01	1.055+00
6.000+03	1.000-02	1.764+02	3.727+11	2.297+00	6.015+00	.00004	1.050+12	3.439+08	1.428+05	9.200-01	1.049+00
6.000+03	1.000-01	1.220+03	3.077+11	3.359+00	5.420+00	.00001	7.001+11	2.350+09	1.166+05	9.575-01	1.040+00
6.000+03	1.000+00	7.894+03	2.658+11	5.193+00	4.825+00	.00000	4.548+11	1.251+10	9.173+04	9.760-01	1.030+00
6.000+03	1.000+01	5.821+04	2.472+11	7.041+00	4.230+00	.00000	3.171+11	4.746+10	7.770+04	9.832-01	1.024+00
6.500+03	1.000-10	6.772-06	1.176+12	1.073+12	1.158+01	.52505	1.768+12	3.940+00	2.804+05	1.119+00	1.058+00
6.500+03	1.000-09	5.611-05	9.212+11	1.000+00	1.068+01	.26367	4.365+12	1.086+02	2.511+05	1.176+00	1.062+00
6.500+03	1.000-08	4.851-04	7.550+11	1.000+00	9.977+00	.09256	1.805+12	4.279+02	2.357+05	1.314+00	1.065+00
6.500+03	1.000-07	4.574-03	6.944+11	1.000+00	9.314+00	.03026	7.062+11	1.451+03	2.346+05	1.484+00	1.067+00
6.500+03	1.000-06	4.480-02	6.741+11	1.001+00	8.663+00	.00967	3.323+11	5.056+03	2.425+05	1.601+00	1.067+00
6.500+03	1.000-05	4.418-01	6.643+11	1.005+00	8.017+00	.00307	2.704+11	5.129+04	2.466+05	1.681+00	1.067+00
6.500+03	1.000-04	4.154+00	6.352+11	1.070+00	7.371+00	.00097	6.443+11	2.550+06	2.283+05	2.148+00	1.066+00
6.500+03	1.000-03	3.254+01	5.364+11	1.365+00	6.726+00	.00031	1.284+12	5.662+07	1.968+05	9.693-01	1.061+00
6.500+03	1.000-02	2.250+02	4.198+11	1.973+00	6.081+00	.00010	1.122+12	4.277+08	1.612+05	8.725-01	1.054+00

THETA	RHO	P1	E	CAPAR/ EIONIZ	CAPAC/ SYNPOT	FEW	CV	PB1	ASB	EGAM	EGAM2/ GAMMA
6.500+03	1.000-01	1.535+03	3.393+11	2.892+00	5.437+00	.00003	7.663+11	2.873+09	1.315+05	9.400-01	1.046+00
6.500+03	1.000+00	9.737+03	2.864+11	4.561+00	4.792+00	.00001	5.013+11	1.653+10	1.021+05	9.684-01	1.034+00
6.500+03	1.000+01	6.760+04	2.614+11	6.568+00	4.167+00	.00000	3.436+11	6.394+10	8.341+04	9.797-01	1.026+00
7.000+03	1.000-10	7.615-06	1.255+12	1.000+00	1.247+01	.59253	1.900+12	4.584+00	2.971+05	1.118+00	1.062+00
7.000+03	1.000-09	7.078-05	1.140+12	1.000+00	1.121+01	.48011	5.564+12	1.604+02	2.825+05	1.132+00	1.063+00
7.000+03	1.000-08	5.648-04	8.564+11	1.000+00	1.038+01	.18956	2.938+12	8.289+02	2.543+05	1.224+00	1.067+00
7.000+03	1.000-07	5.090-03	7.341+11	1.000+00	9.642+00	.06441	1.169+12	3.043+03	2.441+05	1.380+00	1.070+00
7.000+03	1.000-06	4.880-02	6.914+11	1.000+00	8.934+00	.02084	4.860+11	1.025+04	2.471+05	1.532+00	1.072+00
7.000+03	1.000-05	4.795-01	6.759+11	1.004+00	8.235+00	.00664	2.813+11	4.985+04	2.552+05	1.628+00	1.072+00
7.000+03	1.000-04	4.625+00	6.573+11	1.036+00	7.539+00	.00210	4.129+11	1.525+06	2.466+05	1.797+00	1.071+00
7.000+03	1.000-03	3.894+01	5.852+11	1.229+00	6.844+00	.00067	9.819+11	4.735+07	2.177+05	-1.952+00	1.067+00
7.000+03	1.000-02	2.770+02	4.681+11	1.727+00	6.150+00	.00021	1.110+12	4.806+08	1.795+05	7.848-01	1.060+00
7.000+03	1.000-01	1.892+03	3.739+11	2.528+00	5.455+00	.00007	8.416+11	3.435+09	1.462+05	9.147-01	1.051+00
7.000+03	1.000+00	1.190+04	3.092+11	4.018+00	4.761+00	.00002	5.575+11	2.101+10	1.130+05	9.583-01	1.039+00
7.000+03	1.000+01	7.833+04	2.769+11	6.105+00	4.066+00	.00001	3.771+11	8.278+10	8.929+04	9.753-01	1.029+00
7.500+03	1.000-10	8.506-06	1.338+12	1.209+12	1.336+01	.66019	2.010+12	5.275+00	3.141+05	1.117+00	1.064+00
7.500+03	1.000-09	7.968-05	1.223+12	1.102+12	1.198+01	.55529	1.647+12	4.707+01	3.062+05	1.129+00	1.066+00
7.500+03	1.000-08	6.847-04	1.007+12	1.000+00	1.082+01	.33647	4.019+12	1.373+03	2.793+05	1.170+00	1.069+00
7.500+03	1.000-07	5.750-03	7.966+11	1.000+00	9.983+00	.12237	1.780+12	6.158+03	2.582+05	1.294+00	1.073+00
7.500+03	1.000-06	5.330-02	7.161+11	1.000+00	9.210+00	.04046	6.977+11	2.483+04	2.549+05	1.459+00	1.075+00
7.500+03	1.000-05	5.183-01	6.886+11	1.001+00	8.457+00	.01298	3.350+11	1.325+05	2.629+05	1.583+00	1.076+00
7.500+03	1.000-04	5.075+00	6.742+11	1.014+00	7.710+00	.00412	4.134+11	2.174+06	2.612+05	1.680+00	1.076+00
7.500+03	1.000-03	4.563+01	6.257+11	1.124+00	6.965+00	.00131	1.030+12	5.974+07	2.423+05	2.706+00	1.074+00
7.500+03	1.000-02	3.381+02	5.106+11	1.516+00	6.221+00	.00041	1.123+12	6.278+08	2.084+05	6.106-01	1.067+00
7.500+03	1.000-01	2.324+03	4.048+11	2.205+00	5.476+00	.00013	8.231+11	4.656+09	1.714+05	8.785-01	1.058+00
7.500+03	1.000+00	1.456+04	3.277+11	3.519+00	4.732+00	.00004	4.909+11	2.969+10	1.339+05	9.455-01	1.045+00
7.500+03	1.000+01	9.067+04	2.840+11	5.651+00	3.988+00	.00001	1.789+11	1.044+11	1.065+05	9.708-01	1.032+00
8.000+03	1.000-10	9.443-06	1.428+12	1.284+12	1.425+01	.72801	2.143+12	6.015+00	3.308+05	1.115+00	1.067+00
8.000+03	1.000-09	8.830-05	1.297+12	1.162+12	1.278+01	.61582	1.755+12	5.370+01	3.221+05	1.128+00	1.069+00
8.000+03	1.000-08	8.226-04	1.180+12	1.055+12	1.132+01	.50524	1.410+12	4.725+02	3.135+05	1.143+00	1.071+00
8.000+03	1.000-07	6.613-03	8.889+11	7.884+11	1.036+01	.21000	2.512+12	9.150+03	2.764+05	1.231+00	1.075+00
8.000+03	1.000-06	5.858-02	7.527+11	6.636+11	9.494+00	.07198	1.014+12	3.420+04	2.645+05	1.385+00	1.079+00
8.000+03	1.000-05	5.592-01	7.047+11	6.197+11	8.682+00	.02335	4.179+11	1.139+05	2.685+05	1.534+00	1.080+00
8.000+03	1.000-04	5.506+00	6.890+11	6.053+11	7.883+00	.00744	2.161+11	3.661+05	2.816+05	1.617+00	1.081+00
8.000+03	1.000-03	5.372+01	6.747+11	1.020+00	7.088+00	.00236	1.259+12	7.600+07	2.657+05	1.715+00	1.081+00
8.000+03	1.000-02	4.169+02	5.668+11	1.306+00	6.294+00	.00075	1.516+12	8.516+08	2.359+05	-3.369-01	1.075+00
8.000+03	1.000-01	2.905+03	4.463+11	1.882+00	5.500+00	.00024	1.130+12	6.551+09	1.949+05	8.066-01	1.066+00
8.000+03	1.000+00	1.810+04	3.523+11	3.020+00	4.706+00	.00007	6.669+11	4.296+10	1.514+05	9.255-01	1.052+00
8.000+03	1.000+01	1.052+05	2.924+11	5.197+00	3.912+00	.00002	2.116+11	1.319+11	1.156+05	9.652-01	1.036+00
8.500+03	1.000-10	1.043-05	1.523+12	1.364+12	1.514+01	.79598	2.276+12	6.804+00	3.474+05	1.114+00	1.069+00
8.500+03	1.000-09	9.735-05	1.375+12	1.227+12	1.357+01	.67651	1.864+12	6.077+01	3.380+05	1.127+00	1.072+00
8.500+03	1.000-08	9.050-04	1.243+12	1.106+12	1.203+01	.55866	1.497+12	5.351+02	3.286+05	1.142+00	1.074+00
8.500+03	1.000-07	7.709-03	1.012+12	8.949+11	1.073+01	.32772	3.171+12	1.308+04	2.986+05	1.189+00	1.077+00
8.500+03	1.000-06	6.495-02	8.046+11	7.059+11	9.787+00	.11866	1.405+12	5.517+04	2.771+05	1.319+00	1.082+00
8.500+03	1.000-05	6.034-01	7.257+11	6.340+11	8.913+00	.03918	5.640+11	1.905+05	2.749+05	1.481+00	1.084+00
8.500+03	1.000-04	5.879+00	6.993+11	6.099+11	8.059+00	.01256	2.646+11	6.193+05	2.855+05	1.591+00	1.085+00
8.500+03	1.000-03	5.830+01	6.908+11	6.022+11	7.213+00	.00399	1.665+11	1.975+06	2.992+05	1.641+00	1.088+00
8.500+03	1.000-02	5.309+02	6.447+11	1.095+00	6.369+00	.00126	2.157+12	1.216+09	2.715+05	2.185+00	1.083+00
8.500+03	1.000-01	3.726+03	5.051+11	1.559+00	5.525+00	.00040	1.647+12	9.729+09	2.258+05	5.960-01	1.075+00
8.500+03	1.000+00	2.305+04	3.868+11	2.520+00	4.682+00	.00013	9.574+11	8.477+10	1.742+05	8.898-01	1.068+00
8.500+03	1.000+01	1.225+05	3.024+11	4.743+00	3.839+00	.00004	2.542+11	1.675+11	1.280+05	9.581-01	1.041+00

THETA	RHO	P1	E	CAPAR/ EIONIZ	CAPAC/ SYNPOT	FEW	CV	PBI	ASQ	EGAM	EGAM2/ GAMMA
9.000+03	1.000-10	1.146-05	1.624+12	1.450+12	1.603+01	.86408	2.409+12	7.642+00	3.640+05	1.113+00	1.072+00
9.000+03	1.000-09	1.06?-04	1.457+12	1.295+12	1.437+01	.73734	1.973+12	6.828+01	3.538+05	1.126+00	1.074+00
9.000+03	1.000-08	9.942-04	1.309+12	1.159+12	1.273+01	.61223	1.584+12	6.015+02	3.436+05	1.141+00	1.077+00
9.000+03	1.000-07	9.018-03	1.158+12	1.021+12	1.115+01	.46685	3.521+12	1.620+04	3.237+05	1.163+00	1.079+00
9.000+03	1.000-06	7.272-02	8.743+11	7.638+11	1.009+01	.18278	1.836+12	8.200+04	2.925+05	1.267+00	1.084+00
9.000+03	1.000-05	6.529-01	7.538+11	6.546+11	9.148+00	.06193	7.454+11	2.990+05	2.833+05	1.426+00	1.088+00
9.000+03	1.000-04	6.271+00	7.120+11	6.167+11	8.238+00	.02002	3.270+11	9.883+05	2.901+05	1.560+00	1.089+00
9.000+03	1.000-03	6.187+01	6.98?+11	6.043+11	7.340+00	.00637	1.867+11	3.169+06	3.041+05	1.628+00	1.090+00
9.000+03	1.000-02	6.160+02	6.940+11	6.004+11	6.446+00	.00202	1.415+11	1.006+07	3.147+05	1.654+00	1.090+00
9.000+03	1.000-01	4.976+03	5.945+11	1.237+00	5.552+00	.00064	2.618+12	1.568+10	2.697+05	-1.154+01	1.085+00
9.000+03	1.000+00	3.043+04	4.382+11	2.021+00	4.659+00	.00020	1.489+12	1.045+11	2.059+05	8.077-01	1.070+00
9.000+03	1.000+01	1.434+05	3.145+11	4.289+00	3.767+00	.00006	3.110+11	2.150+11	1.379+05	9.489-01	1.046+00
9.500+03	1.000-10	1.254-05	1.731+12	1.540+12	1.693+01	.93228	2.544+12	8.528+00	3.806+05	1.112+00	1.073+00
9.500+03	1.000-09	1.167-04	1.545+12	1.367+12	1.517+01	.79830	2.082+12	7.622+01	3.696+05	1.125+00	1.077+00
9.500+03	1.000-08	1.081-03	1.380+12	1.215+12	1.343+01	.66594	1.671+12	6.718+02	3.587+05	1.140+00	1.079+00
9.500+03	1.000-07	9.967-03	1.235+12	1.084+12	1.173+01	.53584	1.309+12	5.815+03	3.478+05	1.159+00	1.082+00
9.500+03	1.000-06	8.206-02	9.625+11	8.378+11	1.042+01	.26456	2.247+12	1.124+05	3.108+05	1.228+00	1.086+00
9.500+03	1.000-05	7.092-01	7.904+11	6.826+11	9.391+00	.09291	9.573+11	4.432+05	2.936+05	1.375+00	1.091+00
9.500+03	1.000-04	6.687+00	7.277+11	6.260+11	8.421+00	.03038	4.035+11	1.500+06	2.958+05	1.525+00	1.093+00
9.500+03	1.000-03	6.553+01	7.069+11	6.073+11	7.470+00	.00971	2.119+11	4.844+06	3.088+05	1.613+00	1.094+00
9.500+03	1.000-02	6.510+02	7.003+11	6.014+11	6.525+00	.00308	1.496+11	1.542+07	3.210+05	1.648+00	1.094+00
9.500+03	1.000-01	6.496+03	6.982+11	5.994+11	5.582+00	.00098	1.297+11	4.887+07	3.274+05	1.661+00	1.094+00
9.500+03	1.000+00	4.267+04	5.233+11	1.522+00	4.639+00	.00031	2.625+12	1.890+11	2.544+05	4.253-01	1.083+00
9.500+03	1.000+01	1.693+05	3.295+11	3.834+00	3.696+00	.00010	3.891+11	2.802+11	1.519+05	9.363-01	1.052+00
1.000+04	1.000-10	1.367-05	1.843+12	1.635+12	1.782+01	1.00059	2.678+12	9.464+00	3.972+05	1.111+00	1.075+00
1.000+04	1.000-09	1.270-04	1.637+12	1.444+12	1.597+01	.85937	2.191+12	8.460+01	3.855+05	1.124+00	1.079+00
1.000+04	1.000-08	1.175-03	1.453+12	1.275+12	1.414+01	.71978	1.758+12	7.460+02	3.737+05	1.139+00	1.082+00
1.000+04	1.000-07	1.081-02	1.293+12	1.129+12	1.234+01	.58245	1.377+12	6.462+03	3.619+05	1.158+00	1.085+00
1.000+04	1.000-06	9.299-02	1.067+12	9.253+11	1.077+01	.36132	2.563+12	1.420+05	3.313+05	1.201+00	1.088+00
1.000+04	1.000-05	7.740-01	8.366+11	7.189+11	9.642+00	.13312	1.190+12	6.231+05	3.057+05	1.330+00	1.094+00
1.000+04	1.000-04	7.133+00	7.469+11	6.385+11	8.607+00	.04420	4.938+11	2.177+06	3.026+05	1.487+00	1.097+00
1.000+04	1.000-03	6.928+01	7.167+11	6.114+11	7.602+00	.01420	2.423+11	7.103+06	3.136+05	1.594+00	1.098+00
1.000+04	1.000-02	6.862+02	7.069+11	6.026+11	6.606+00	.00451	1.594+11	2.268+07	3.270+05	1.642+00	1.098+00
1.000+04	1.000-01	6.841+03	7.038+11	5.999+11	5.612+00	.00143	1.328+11	7.195+07	3 348+05	1.658+00	1.098+00
1.000+04	1.000+00	6.685+04	6.916+11	1.022+00	4.620+00	.00045	5.813+12	4.250+11	3.433+05	1.728+00	1.098+00
1.000+04	1.000+01	2.022+05	3.485+11	3.380+00	3.628+00	.00014	5.007+11	3.731+11	1.689+05	9.181-01	1.059+00
1.050+04	1.000-10	1.464-05	1.961+12	1.736+12	1.872+01	1.06900	2.812+12	1.045+01	4.137+05	1.110+00	1.077+00
1.050+04	1.000-09	1.378-04	1.733+12	1.524+12	1.677+01	.92053	2.301+12	9.343+01	4.012+05	1.123+00	1.081+00
1.050+04	1.000-08	1.272-03	1.531+12	1.338+12	1.485+01	.77373	1.845+12	8.241+02	3.887+05	1.138+00	1.084+00
1.050+04	1.000-07	1.169-02	1.354+12	1.176+12	1.295+01	.62920	1.445+12	7.143+03	3.761+05	1.157+00	1.087+00
1.050+04	1.000-06	1.052-01	1.181+12	1.021+12	1.114+01	.46720	2.712+12	1.645+05	3.533+05	1.183+00	1.090+00
1.050+04	1.000-05	8.485-01	8.929+11	7.640+11	9.902+00	.18295	1.427+12	8.335+05	3.197+05	1.292+00	1.096+00
1.050+04	1.000-04	7.617+00	7.704+11	6.546+11	8.798+00	.06199	5.964+11	3.040+06	3.106+05	1.449+00	1.100+00
1.050+04	1.000-03	7.316+01	7.279+11	6.167+11	7.737+00	.02004	2.777+11	1.005+07	3.188+05	1.573+00	1.102+00
1.050+04	1.000-02	7.218+02	7.140+11	6.043+11	6.689+00	.00638	1.709+11	3.222+07	3.326+05	1.633+00	1.102+00
1.050+04	1.000-01	7.187+03	7.096+11	6.004+11	5.645+00	.00202	1.365+11	1.023+08	3.419+05	1.656+00	1.103+00
1.050+04	1.000+00	7.177+04	7.082+11	5.991+11	4.603+00	.00064	1.256+11	3.240+08	3.459+05	1.663+00	1.103+00
1.050+04	1.000+01	2.452+05	3.734+11	2.926+00	3.561+00	.00020	6.681+11	5.122+11	1.900+05	8.896-01	1.067+00
1.100+04	1.000-10	1.606-05	2.085+12	1.841+12	1.962+01	1.13751	2.947+12	1.148+01	4.303+05	1.109+00	1.078+00
1.100+04	1.000-09	1.489-04	1.835+12	1.609+12	1.758+01	.98179	2.411+12	1.027+02	4.170+05	1.122+00	1.082+00
1.100+04	1.000-08	1.373-03	1.612+12	1.404+12	1.556+01	.82779	1.933+12	9.061+02	4.036+05	1.137+00	1.086+00

THETA	RHO	P1	E	CAPAR/ EIONIZ	CAPAC/ SYNPOT	FEW	CV	PB1	ASO	EGAM	EGAM2/ GAMMA
1.100+04	1.000-07	1.259-02	1.418+12	1.226+12	1.357+01	.67606	1.513+12	7.858+03	3.902+05	1.156+00	1.090+00
1.100+04	1.000-06	1.148-01	1.250+12	1.076+12	1.162+01	.52762	1.150+12	6.656+04	3.770+05	1.178+00	1.093+00
1.100+04	1.000-05	9.333-01	9.593+11	8.175+11	1.017+01	.24209	1.650+12	1.063+06	3.353+05	1.262+00	1.099+00
1.100+04	1.000-04	8.147+00	7.985+11	6.747+11	8.993+00	.08415	7.088+11	4.097+06	3.197+05	1.413+00	1.103+00
1.100+04	1.000-03	7.720+01	7.407+11	6.234+11	7.874+00	.02742	3.181+11	1.377+07	3.244+05	1.550+00	1.106+00
1.100+04	1.000-02	7.580+02	7.217+11	6.065+11	6.773+00	.00876	1.842+11	4.438+07	3.381+05	1.624+00	1.106+00
1.100+04	1.000-01	7.535+03	7.156+11	6.011+11	5.679+00	.00278	1.408+11	1.412+08	3.487+05	1.652+00	1.107+00
1.100+04	1.000+00	7.521+04	7.137+11	5.994+11	4.587+00	.00088	1.269+11	4.474+08	3.536+05	1.662+00	1.107+00
1.100+04	1.000+01	3.041+05	4.078+11	2.472+00	3.496+00	.00028	9.358+11	7.342+11	2.176+05	8.388-01	1.076+00
1.150+04	1.000-10	1.733-05	2.215+12	1.952+12	2.052+01	1.20610	3.082+12	1.256+01	4.468+05	1.109+00	1.079+00
1.150+04	1.000-09	1.605-04	1.941+12	1.697+12	1.838+01	1.04315	2.521+12	1.124+02	4.328+05	1.121+00	1.084+00
1.150+04	1.000-08	1.478-03	1.698+12	1.473+12	1.627+01	.88192	2.020+12	9.921+02	4.186+05	1.136+00	1.088+00
1.150+04	1.000-07	1.354-02	1.484+12	1.279+12	1.418+01	.72302	1.581+12	8.607+03	4.044+05	1.155+00	1.092+00
1.150+04	1.000-06	1.231-01	1.301+12	1.114+12	1.214+01	.56741	1.201+12	7.296+04	3.903+05	1.178+00	1.096+00
1.150+04	1.000-05	1.029+00	1.035+12	8.782+11	1.046+01	.30932	1.836+12	1.293+06	3.523+05	1.239+00	1.101+00
1.150+04	1.000-04	8.728+00	8.316+11	6.989+11	9.194+00	.11097	8.276+11	5.346+06	3.299+05	1.380+00	1.106+00
1.150+04	1.000-03	8.143+01	7.554+11	6.316+11	8.013+00	.03653	3.630+11	1.835+07	3.307+05	1.526+00	1.109+00
1.150+04	1.000-02	7.948+02	7.299+11	6.091+11	6.860+00	.01170	1.992+11	5.953+07	3.435+05	1.613+00	1.110+00
1.150+04	1.000-01	7.865+03	7.218+11	6.019+11	5.715+00	.00371	1.456+11	1.898+08	3.551+05	1.648+00	1.111+00
1.150+04	1.000+00	7.865+04	7.192+11	5.996+11	4.573+00	.00118	1.284+11	6.016+08	3.610+05	1.661+00	1.111+00
1.150+04	1.000+01	3.895+05	4.568+11	2.018+00	3.432+00	.00037	1.404+12	1.121+12	2.557+05	7.216-01	1.086+00
1.200+04	1.000-10	1.865-05	2.351+12	2.067+12	2.142+01	1.27477	3.217+12	1.370+01	4.634+05	1.108+00	1.080+00
1.200+04	1.000-09	1.725-04	2.052+12	1.790+12	1.919+01	1.10459	2.631+12	1.225+02	4.486+05	1.120+00	1.085+00
1.200+04	1.000-08	1.587-03	1.786+12	1.545+12	1.698+01	.93615	2.108+12	1.082+03	4.336+05	1.135+00	1.090+00
1.200+04	1.000-07	1.451-02	1.554+12	1.333+12	1.480+01	.77008	1.649+12	9.390+03	4.185+05	1.154+00	1.095+00
1.200+04	1.000-06	1.318-01	1.354+12	1.154+12	1.266+01	.60732	1.253+12	7.965+04	4.035+05	1.177+00	1.099+00
1.200+04	1.000-05	1.133+00	1.117+12	9.445+11	1.076+01	.38256	1.966+12	1.502+06	3.705+05	1.222+00	1.103+00
1.200+04	1.000-04	9.366+00	8.698+11	7.275+11	9.401+00	.14256	9.487+11	6.770+06	3.412+05	1.350+00	1.109+00
1.200+04	1.000-03	8.587+01	7.720+11	6.415+11	8.156+00	.04751	4.119+11	2.385+07	3.375+05	1.502+00	1.113+00
1.200+04	1.000-02	8.323+02	7.389+11	6.124+11	6.948+00	.01528	2.157+11	7.798+07	3.489+05	1.601+00	1.114+00
1.200+04	1.000-01	8.237+03	7.282+11	6.030+11	5.753+00	.00486	1.509+11	2.492+08	3.614+05	1.644+00	1.115+00
1.200+04	1.000+00	8.210+04	7.247+11	6.000+11	4.560+00	.00154	1.301+11	7.907+08	3.681+05	1.659+00	1.115+00
1.200+04	1.000+01	5.244+05	5.348+11	1.564+00	3.369+00	.00049	2.336+12	1.890+12	3.133+05	1.666-01	1.099+00
1.250+04	1.000-10	2.001-05	2.492+12	2.188+12	2.232+01	1.34353	3.352+12	1.488+01	4.799+05	1.107+00	1.081+00
1.250+04	1.000-09	1.850-04	2.168+12	1.887+12	2.000+01	1.16611	2.741+12	1.331+02	4.643+05	1.119+00	1.086+00
1.250+04	1.000-08	1.700-03	1.879+12	1.641+12	1.769+01	.99047	2.196+12	1.176+03	4.485+05	1.134+00	1.092+00
1.250+04	1.000-07	1.552-02	1.626+12	1.391+12	1.542+01	.81724	1.718+12	1.021+04	4.326+05	1.153+00	1.097+00
1.250+04	1.000-06	1.407-01	1.409+12	1.195+12	1.319+01	.64733	1.304+12	8.664+04	4.167+05	1.176+00	1.101+00
1.250+04	1.000-05	1.246+00	1.203+12	1.014+12	1.108+01	.45903	2.028+12	1.666+06	3.894+05	1.209+00	1.105+00
1.250+04	1.000-04	1.067+01	9.133+11	7.603+11	9.614+00	.17884	1.067+12	8.338+06	3.534+05	1.324+00	1.112+00
1.250+04	1.000-03	9.055+01	7.909+11	6.533+11	8.302+00	.06049	4.639+11	3.030+07	3.450+05	1.477+00	1.116+00
1.250+04	1.000-02	8.706+02	7.486+11	6.162+11	7.039+00	.01954	2.338+11	1.000+08	3.545+05	1.588+00	1.118+00
1.250+04	1.000-01	8.592+03	7.348+11	6.042+11	5.791+00	.00622	1.568+11	3.206+08	3.675+05	1.639+00	1.118+00
1.250+04	1.000+00	8.556+04	7.304+11	6.003+11	4.549+00	.00197	1.320+11	1.018+09	3.751+05	1.658+00	1.119+00
1.250+04	1.000+01	7.697+05	6.765+11	1.110+00	3.308+00	.00062	4.635+12	3.782+12	4.137+05	2.000+00	1.115+00
1.300+04	1.000-10	2.142-05	2.640+12	2.314+12	2.323+01	1.41235	3.488+12	1.611+01	4.964+05	1.106+00	1.082+00
1.300+04	1.000-09	1.978-04	2.288+12	1.988+12	2.080+01	1.22770	2.852+12	1.442+02	4.800+05	1.119+00	1.088+00
1.300+04	1.000-08	1.816-03	1.976+12	1.700+12	1.840+01	1.04487	2.285+12	1.273+03	4.634+05	1.134+00	1.093+00
1.300+04	1.000-07	1.656-02	1.702+12	1.450+12	1.604+01	.86046	1.786+12	1.106+04	4.467+05	1.152+00	1.099+00
1.300+04	1.000-06	1.499-01	1.466+12	1.239+12	1.371+01	.68743	1.356+12	9.392+04	4.299+05	1.175+00	1.104+00
1.300+04	1.000-05	1.346+00	1.269+12	1.065+12	1.146+01	.51542	9.920+11	7.730+05	4.133+05	1.203+00	1.107+00

THETA	RHO	P1	E	CAPAR/ EIONIZ	CAPAC/ SYNPOT	FEW	CV	PBI	ASO	EGAM	EGAM2/ GAMMA
1.300+04	1.000-04	1.083+01	9.617+11	7.971+11	9.835+00	.21953	1.178+12	1.000+07	3.666+05	1.302+00	1.114+00
1.300+04	1.000-03	9.551+01	8.120+11	6.669+11	8.451+00	.07555	5.184+11	3.771+07	3.531+05	1.453+00	1.119+00
1.300+04	1.000-02	9.098+02	7.590+11	6.208+11	7.131+00	.02454	2.533+11	1.259+08	3.603+05	1.574+00	1.121+00
1.300+04	1.000-01	8.950+03	7.417+11	6.056+11	5.832+00	.00783	1.632+11	4.051+08	3.734+05	1.634+00	1.122+00
1.300+04	1.000+00	8.902+04	7.361+11	6.008+11	4.539+00	.00248	1.341+11	1.288+09	3.819+05	1.656+00	1.123+00
1.300+04	1.000+01	8.887+05	7.344+11	5.993+11	3.249+00	.00079	1.248+11	4.080+09	3.854+05	1.663+00	1.123+00
1.350+04	1.000-10	2.268-05	2.793+12	2.445+12	2.413+01	1.48125	3.624+12	1.739+01	5.129+05	1.106+00	1.083+00
1.350+04	1.000-09	2.111-04	2.414+12	2.093+12	2.161+01	1.28937	2.963+12	1.556+02	4.958+05	1.118+00	1.089+00
1.350+04	1.000-08	1.936-03	2.076+12	1.782+12	1.912+01	1.09934	2.373+12	1.375+03	4.784+05	1.133+00	1.094+00
1.350+04	1.000-07	1.763-02	1.780+12	1.512+12	1.666+01	.91177	1.855+12	1.195+04	4.607+05	1.151+00	1.100+00
1.350+04	1.000-06	1.593-01	1.526+12	1.284+12	1.424+01	.72762	1.407+12	1.015+05	4.430+05	1.174+00	1.106+00
1.350+04	1.000-05	1.428+00	1.313+12	1.096+12	1.189+01	.54851	1.029+12	8.361+05	4.256+05	1.203+00	1.110+00
1.350+04	1.000-04	1.166+01	1.015+12	8.374+11	1.006+01	.26413	1.276+12	1.169+07	3.806+05	1.284+00	1.116+00
1.350+04	1.000-03	1.008+02	8.356+11	6.824+11	8.603+00	.09274	5.743+11	4.607+07	3.617+05	1.431+00	1.122+00
1.350+04	1.000-02	9.502+02	7.704+11	6.260+11	7.225+00	.03032	2.739+11	1.559+08	3.663+05	1.560+00	1.125+00
1.350+04	1.000-01	9.311+03	7.488+11	6.073+11	5.874+00	.00969	1.700+11	5.035+08	3.793+05	1.628+00	1.126+00
1.350+04	1.000+00	9.250+04	7.419+11	6.013+11	4.531+00	.00307	1.363+11	1.603+09	3.885+05	1.654+00	1.126+00
1.350+04	1.000+01	9.231+05	7.397+11	5.994+11	3.190+00	.00097	1.255+11	5.079+09	3.925+05	1.663+00	1.126+00
1.400+04	1.000-10	2.418-05	2.906+12	2.539+12	2.505+01	1.52872	2.285+12	1.072+01	5.341+05	1.106+00	1.084+00
1.400+04	1.000-09	2.248-04	2.544+12	2.202+12	2.242+01	1.35110	3.074+12	1.676+02	5.115+05	1.117+00	1.090+00
1.400+04	1.000-08	2.060-03	2.180+12	1.867+12	1.983+01	1.15388	2.462+12	1.481+03	4.933+05	1.132+00	1.096+00
1.400+04	1.000-07	1.874-02	1.862+12	1.577+12	1.728+01	.95915	1.924+12	1.287+04	4.748+05	1.150+00	1.102+00
1.400+04	1.000-06	1.691-01	1.588+12	1.331+12	1.477+01	.76790	1.459+12	1.094+05	4.562+05	1.173+00	1.108+00
1.400+04	1.000-05	1.513+00	1.358+12	1.128+12	1.233+01	.58170	1.067+12	9.016+05	4.378+05	1.202+00	1.113+00
1.400+04	1.000-04	1.255+01	1.071+12	8.806+11	1.030+01	.31197	1.356+12	1.335+07	3.954+05	1.269+00	1.119+00
1.400+04	1.000-03	1.064+02	8.615+11	6.999+11	8.759+00	.11207	6.307+11	5.532+07	3.710+05	1.410+00	1.125+00
1.400+04	1.000-02	9.917+02	7.827+11	6.319+11	7.321+00	.03691	2.956+11	1.900+08	3.725+05	1.546+00	1.128+00
1.400+04	1.000-01	9.677+03	7.563+11	6.093+11	5.917+00	.01182	1.773+11	6.167+08	3.850+05	1.621+00	1.130+00
1.400+04	1.000+00	9.599+04	7.479+11	6.020+11	4.523+00	.00375	1.386+11	1.966+09	3.949+05	1.652+00	1.130+00
1.400+04	1.000+01	9.575+05	7.452+11	5.996+11	3.133+00	.00119	1.262+11	6.234+09	3.995+05	1.662+00	1.130+00
1.450+04	1.000-10	2.544-05	3.006+12	2.620+12	2.598+01	1.56824	2.363+12	1.151+01	5.474+05	1.107+00	1.086+00
1.450+04	1.000-09	2.390-04	2.678+12	2.315+12	2.323+01	1.41290	3.185+12	1.799+02	5.272+05	1.116+00	1.090+00
1.450+04	1.000-08	2.188-03	2.288+12	1.956+12	2.055+01	1.20848	2.550+12	1.590+03	5.082+05	1.131+00	1.097+00
1.450+04	1.000-07	1.988-02	1.946+12	1.644+12	1.790+01	1.00660	1.993+12	1.382+04	4.889+05	1.149+00	1.103+00
1.450+04	1.000-06	1.791-01	1.652+12	1.379+12	1.530+01	.80825	1.511+12	1.175+05	4.694+05	1.172+00	1.110+00
1.450+04	1.000-05	1.600+00	1.405+12	1.162+12	1.276+01	.61498	1.104+12	9.696+05	4.500+05	1.201+00	1.115+00
1.450+04	1.000-04	1.349+01	1.131+12	9.261+11	1.055+01	.36220	1.415+12	1.488+07	4.107+05	1.257+00	1.121+00
1.450+04	1.000-03	1.123+02	8.899+11	7.193+11	8.919+00	.13350	6.864+11	6.537+07	3.807+05	1.390+00	1.128+00
1.450+04	1.000-02	1.034+03	7.959+11	6.387+11	7.420+00	.04434	3.180+11	2.285+08	3.790+05	1.531+00	1.132+00
1.450+04	1.000-01	1.005+04	7.641+11	6.114+11	5.962+00	.01424	1.949+11	7.455+08	3.908+05	1.615+00	1.133+00
1.450+04	1.000+00	9.950+04	7.539+11	6.027+11	4.517+00	.00452	1.411+11	2.381+09	4.013+05	1.649+00	1.134+00
1.450+04	1.000+01	9.919+05	7.506+11	5.999+11	3.077+00	.00143	1.270+11	7.552+09	4.063+05	1.661+00	1.134+00
1.500+04	1.000-10	2.672-05	3.110+12	2.704+12	2.691+01	1.60780	2.443+12	1.233+01	5.607+05	1.108+00	1.087+00
1.500+04	1.000-09	2.536-04	2.818+12	2.433+12	2.404+01	1.47477	3.296+12	1.927+02	5.430+05	1.116+00	1.091+00
1.500+04	1.000-08	2.319-03	2.400+12	2.048+12	2.127+01	1.26315	2.639+12	1.704+03	5.231+05	1.130+00	1.098+00
1.500+04	1.000-07	2.105-02	2.033+12	1.713+12	1.853+01	1.05412	2.062+12	1.481+04	5.029+05	1.149+00	1.105+00
1.500+04	1.000-06	1.894-01	1.718+12	1.430+12	1.583+01	.84864	1.563+12	1.260+05	4.825+05	1.171+00	1.112+00
1.500+04	1.000-05	1.689+00	1.453+12	1.196+12	1.320+01	.64833	1.141+12	1.040+06	4.621+05	1.200+00	1.118+00
1.500+04	1.000-04	1.449+01	1.193+12	9.728+11	1.081+01	.41386	1.451+12	1.621+07	4.284+05	1.247+00	1.123+00
1.500+04	1.000-03	1.185+02	9.207+11	7.405+11	9.083+00	.15696	7.404+11	7.610+07	3.910+05	1.373+00	1.130+00
1.500+04	1.000-02	1.079+03	8.101+11	6.461+11	7.520+00	.05262	3.411+11	2.713+08	3.858+05	1.517+00	1.135+00

THETA	RHO	P1	E	CAPAR/ EIGNIZ	CAPAC/ SYMPOT	FEW	CV	PBI	ASO	EGAM	EGAM2/ GAMMA
1.500+04	1.000-01	1.042+04	7.723+11	6.139+11	6.008+00	.01695	1.929+11	8.905+08	3.966+05	1.608+00	1.137+00
1.500+04	1.000+00	1.030+05	7.600+11	6.034+11	4.512+00	.00539	1.436+11	2.849+09	4.075+05	1.647+00	1.137+00
1.500+04	1.000+01	1.026+06	7.561+11	6.001+11	3.022+00	.00171	1.278+11	9.044+09	4.129+05	1.660+00	1.138+00
1.550+04	1.000-10	2.803-05	3.217+12	2.791+12	2.784+01	1.64739	2.523+12	1.317+01	5.740+05	1.108+00	1.088+00
1.550+04	1.000-09	2.669-04	2.929+12	2.523+12	2.487+01	1.52103	2.086+12	1.183+02	5.647+05	1.116+00	1.092+00
1.550+04	1.000-08	2.456-03	2.516+12	2.143+12	2.199+01	1.31749	2.728+12	1.821+03	5.380+05	1.130+00	1.099+00
1.550+04	1.000-07	2.225-02	2.124+12	1.785+12	1.915+01	1.10171	2.131+12	1.583+04	5.170+05	1.148+00	1.106+00
1.550+04	1.000-06	2.000-01	1.786+12	1.482+12	1.636+01	.88913	1.615+12	1.347+05	4.956+05	1.171+00	1.113+00
1.550+04	1.000-05	1.781+00	1.503+12	1.232+12	1.384+01	.68176	1.179+12	1.113+06	4.743+05	1.199+00	1.120+00
1.550+04	1.000-04	1.552+01	1.256+12	1.020+12	1.107+01	.46594	1.461+12	1.728+07	4.424+05	1.239+00	1.125+00
1.550+04	1.000-03	1.252+02	9.537+11	7.634+11	9.252+00	.18232	7.918+11	8.735+07	4.018+05	1.357+00	1.133+00
1.550+04	1.000-02	1.124+03	8.253+11	6.544+11	7.622+00	.06176	3.646+11	3.184+08	3.928+05	1.502+00	1.138+00
1.550+04	1.000-01	1.080+04	7.808+11	6.166+11	6.055+00	.01996	2.011+11	1.052+09	4.024+05	1.601+00	1.140+00
1.550+04	1.000+00	1.066+05	7.663+11	6.043+11	4.509+00	.00636	1.463+11	3.374+09	4.136+05	1.644+00	1.141+00
1.550+04	1.000+01	1.061+06	7.616+11	6.004+11	2.968+00	.00201	1.287+11	1.072+10	4.195+05	1.659+00	1.141+00
1.600+04	1.000-10	2.937-05	3.327+12	2.881+12	2.877+01	1.68701	2.603+12	1.405+01	5.872+05	1.109+00	1.089+00
1.600+04	1.000-09	2.794-04	3.020+12	2.596+12	2.571+01	1.55641	2.152+12	1.262+02	5.774+05	1.117+00	1.094+00
1.600+04	1.000-08	2.593-03	2.635+12	2.241+12	2.271+01	1.37268	2.818+12	1.942+03	5.529+05	1.129+00	1.100+00
1.600+04	1.000-07	2.349-02	2.217+12	1.860+12	1.978+01	1.14935	2.200+12	1.689+04	5.318+05	1.147+00	1.107+00
1.600+04	1.000-06	2.109-01	1.857+12	1.536+12	1.689+01	.92967	1.667+12	1.438+05	5.088+05	1.170+00	1.115+00
1.600+04	1.000-05	1.875+00	1.555+12	1.270+12	1.408+01	.71527	1.216+12	1.188+06	4.865+05	1.199+00	1.122+00
1.600+04	1.000-04	1.649+01	1.310+12	1.059+12	1.137+01	.50904	8.470+11	9.405+06	4.646+05	1.235+00	1.128+00
1.600+04	1.000-03	1.322+02	9.888+11	7.879+11	9.425+00	.20943	8.395+11	9.857+07	4.130+05	1.343+00	1.135+00
1.600+04	1.000-02	1.171+03	8.415+11	6.635+11	7.727+00	.07176	3.883+11	3.697+08	4.002+05	1.489+00	1.141+00
1.600+04	1.000-01	1.118+04	7.896+11	6.196+11	6.104+00	.02328	2.096+11	1.231+09	4.083+05	1.593+00	1.144+00
1.600+04	1.000+00	1.101+05	7.726+11	6.053+11	4.506+00	.00742	1.491+11	3.956+09	4.196+05	1.641+00	1.144+00
1.600+04	1.000+01	1.096+06	7.672+11	6.007+11	2.915+00	.00235	1.296+11	1.258+10	4.259+05	1.658+00	1.145+00
1.650+04	1.000-10	3.073-05	3.441+12	2.976+12	2.970+01	1.72666	2.683+12	1.495+01	6.003+05	1.110+00	1.090+00
1.650+04	1.000-09	2.922-04	3.114+12	2.670+12	2.654+01	1.59223	2.217+12	1.343+02	5.900+05	1.118+00	1.095+00
1.650+04	1.000-08	2.736-03	2.758+12	2.343+12	2.342+01	1.42753	2.907+12	2.068+03	5.672+05	1.128+00	1.101+00
1.650+04	1.000-07	2.476-02	2.313+12	1.937+12	2.040+01	1.19705	2.270+12	1.799+04	5.450+05	1.146+00	1.108+00
1.650+04	1.000-06	2.221-01	1.930+12	1.592+12	1.743+01	.97028	1.719+12	1.531+05	5.219+05	1.169+00	1.117+00
1.650+04	1.000-05	1.971+00	1.608+12	1.308+12	1.452+01	.74884	1.254+12	1.266+06	4.987+05	1.198+00	1.126+00
1.650+04	1.000-04	1.731+01	1.347+12	1.084+12	1.172+01	.53562	8.727+11	1.003+07	4.758+05	1.234+00	1.130+00
1.650+04	1.000-03	1.395+02	1.026+12	8.138+11	9.602+00	.23810	8.826+11	1.107+08	4.246+05	1.331+00	1.138+00
1.650+04	1.000-02	1.220+03	8.587+11	6.733+11	7.833+00	.08262	4.120+11	4.251+08	4.077+05	1.475+00	1.144+00
1.650+04	1.000-01	1.157+04	7.988+11	6.229+11	6.155+00	.02691	2.163+11	1.427+09	4.142+05	1.586+00	1.147+00
1.650+04	1.000+00	1.137+05	7.791+11	6.063+11	4.505+00	.00859	1.520+11	4.599+09	4.256+05	1.638+00	1.148+00
1.650+04	1.000+01	1.130+06	7.728+11	6.010+11	2.864+00	.00272	1.305+11	1.463+10	4.323+05	1.657+00	1.148+00
1.700+04	1.000-10	3.213-05	3.559+12	3.070+12	3.063+01	1.76634	2.763+12	1.588+01	6.135+05	1.110+00	1.091+00
1.700+04	1.000-09	3.052-04	3.211+12	2.748+12	2.738+01	1.62788	2.283+12	1.427+02	6.027+05	1.118+00	1.096+00
1.700+04	1.000-08	2.883-03	2.886+12	2.448+12	2.415+01	1.48243	2.996+12	2.197+03	5.827+05	1.128+00	1.101+00
1.700+04	1.000-07	2.607-02	2.413+12	2.016+12	2.103+01	1.24481	2.339+12	1.911+04	5.591+05	1.146+00	1.109+00
1.700+04	1.000-06	2.335-01	2.005+12	1.650+12	1.796+01	1.01095	1.772+12	1.628+05	5.350+05	1.168+00	1.118+00
1.700+04	1.000-05	2.070+00	1.663+12	1.348+12	1.496+01	.78248	1.292+12	1.347+06	5.108+05	1.197+00	1.126+00
1.700+04	1.000-04	1.814+01	1.385+12	1.109+12	1.207+01	.56228	8.984+11	1.068+07	4.869+05	1.234+00	1.133+00
1.700+04	1.000-03	1.473+02	1.065+12	8.410+11	9.785+00	.26811	9.205+11	1.224+08	4.366+05	1.328+00	1.140+00
1.700+04	1.000-02	1.271+03	8.770+11	6.838+11	7.992+00	.09432	4.356+11	4.844+08	4.156+05	1.462+00	1.147+00
1.700+04	1.000-01	1.197+04	8.084+11	6.265+11	6.206+00	.03085	2.271+11	1.641+09	4.201+05	1.578+00	1.150+00
1.700+04	1.000+00	1.173+05	7.857+11	6.075+11	4.584+00	.00986	1.549+11	5.302+09	4.314+05	1.635+00	1.151+00
1.700+04	1.000+01	1.165+06	7.784+11	6.014+11	2.813+00	.00313	1.315+11	1.688+10	4.385+05	1.656+00	1.152+00

APPENDIX II

EGREY OUTPUT AND CARD INPUT

USED WITH GREYS

EGREY OUTPUT

(Edit output of GREY tape made by using card input.
A listing of the card input follows this edit.)

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BEGIN INES2 RUN.  INPUT IS

    REMAKE OF GREY TAPE TO ADD NEW OPACITY SETS


INPUT JPATH VALUES ARE   5  Y

DIANE GREY TAPE 10/11/67 A.KNOPP  MATERIALS ARE AIR,WET ALLUVIUM,AL,BE,

C,CF2,CH2,C-PHENOLGC,FE,GINA-IRONIC,GRANITE,GROUT,H,H-H-H-X,LIH,LIMESTONE,

NE,PHENOLIC,PLYCA,PLYFE,WET TUFF,REFRASIL,SEAWATER,S,SHALE,W,XE

 THE NUMBER OF GREY SETS IS 31
DIANE GREY TAPE 10/11/67 A.KNOPP  MATERIALS ARE AIR,WET ALLUVIUM,AL,BE,
C,CF2,CH2,C-PHENOLGC,FE,GINA-IRONIC,GRANITE,GROUT,H,H-H-H-X,LIH,LIMESTONE,
NE,PHENOLIC,PLYCA,PLYFE,WET TUFF,REFRASIL,SEAWATER,S,SHALE,W,XE
     1001201          DIANE AIR-18A ,12 FREQUENCIES DECEMBER 21,1965 COMBINED WITH AIR-11F            MATERL = 1102     MX = 702

 GREY ABSORPTION COEFFICIENTS              23   TEMPERATURES

THETA =      1.29400                        8   DENSITIES

 DENSITY  1.29299964-02  1.29300025-03  1.29299390-04  1.29294884-05  1.29305887-06  1.29303950-07  1.29302039-08  1.29300121-09
KAPPA(P)  1.03073428+04  9.39018160+03  6.15770680+03  2.96072650+03  7.25600020+02  9.02559900+01  6.92699640+00  9.33720930-01
KAPPA(R)  0.73379030+02  4.63477240+02  2.78921370+02  1.50525120+02  4.21763640+01  5.46563330+00  6.30704570-01  1.29737770-01

THETA =      1.50400                        10   DENSITIES

 DENSITY  1.23166417+00  1.13442486-01  7.62045460-03  4.76815950-04  3.66331450-05  5.04203940-06  0.16048090-07  1.34756020-07
KAPPA(P)  2.72824790+04  2.60090520+04  2.34517300+04  1.07552680+04  0.44204600+03  2.11600900+03  3.78597960+02  9.63712670+01
KAPPA(R)  9.87019450+02  8.73361040+02  6.50300640+02  6.99705790+02  3.82955940+02  1.16125321+02  8.38733740+01  4.07609030+00

 DENSITY  2.03415570-06  2.41105850-09
KAPPA(P)  6.67764520+00  1.66729739+00
KAPPA(R)  1.21208595+00  5.30003320-01

THETA =      1.65400                        10   DENSITIES

 DENSITY  3.80151280-01  3.39549710-02  2.59530610-03  2.41519580-04  3.37037990-05  6.04050150-06  1.06877227-06  1.67899360-07
KAPPA(P)  6.31141280+04  5.66643150+04  4.35733040+04  2.28681390+04  6.21107930+03  1.19971570+03  2.09979500+02  4.47007370+01
KAPPA(R)  4.48193410+03  3.57557040+03  2.92292450+03  1.56258990+03  4.94726900+02  1.17577767+02  2.97229640+01  1.01795721+01

 DENSITY  2.84190600-08  2.86259730-09
KAPPA(P)  1.32489719+01  2.67504980+00
KAPPA(R)  3.76478440+00  9.40712600-01

THETA =      2.25400                        10   DENSITIES

 DENSITY  1.77698630-01  1.72927140-02  1.72482483-03  8.33184330-04  4.08830360-05  7.82560030-06  1.17867866-06  1.89034090-07
KAPPA(P)  9.90278970+04  7.81869010+04  4.90336190+04  1.73120820+04  4.30339640+03  1.0076238R+03  8.81066100+02  7.97300980+01
```

KAPPA(R)	1.24923470+04	1.01171772+04	6.28210190+03	2.52910290+03	6.95986300+02	2.36386920+02	8.61939470+01	2.28842740+01
DENSITY	1.99966730-08	2.47481590-09						
KAPPA(P)	1.50133627+01	2.13962800+00						
KAPPA(R)	3.73653980+00	6.65189040-01						

THETA = 2.75000 10 DENSITIES

DENSITY	1.14246146-01	1.30435702-02	1.69690376-03	2.75528380-04	4.79879830-05	7.68607800-06	1.11684820-06	1.70658740-07
KAPPA(P)	1.81127618+05	7.81902270+04	3.97951330+04	1.58172140+04	4.86596290+03	1.53106670+03	3.73538878+02	6.54823060+01
KAPPA(R)	3.48865700+04	2.22545090+04	1.14106217+04	4.57311510+03	1.58072670+03	4.82492340+02	8.57617578+01	1.33347063+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 2.75000 CONTINUED

DENSITY	2.49672740-08	2.86356120-09
KAPPA(P)	1.04268916+01	1.96861252+00
KAPPA(R)	2.84160770+00	7.70564430-01

THETA = 3.40002 10 DENSITIES

DENSITY	9.54894040-02	1.28886270-02	1.94024699-03	3.11824520-04	4.83018880-05	7.97339710-06	1.33670902-06	2.84528020-07
KAPPA(P)	1.23871497+05	7.45853940+04	4.29890190+04	2.11710500+04	6.54037580+03	1.50016430+03	2.82647330+02	5.95603440+01
KAPPA(R)	6.88234020+04	3.91243360+04	1.94666180+04	6.62920380+03	1.55387950+03	2.75682540+02	6.07440990+01	1.75099890+01

DENSITY	2.65483640-08	3.11542580-09
KAPPA(P)	1.27658631+01	2.15698840+00
KAPPA(R)	4.15067650+00	7.98070770-01

THETA = 5.00001 10 DENSITIES

DENSITY	9.30023960-02	1.49107922-02	2.25514720-03	3.56455920-04	6.04031120-05	1.02186098-05	1.64774991-06	2.53779540-07
KAPPA(P)	1.26033103+05	8.45839650+04	5.14980850+04	2.06791240+04	5.69645840+03	1.47568200+03	3.09531530+02	6.30368810+01
KAPPA(R)	9.33582160+04	4.74864610+04	1.51200941+04	4.51513310+03	1.50390440+03	4.16513940+02	8.80654220+01	1.80035680+01

DENSITY	3.43693100-08	4.07905700-09
KAPPA(P)	1.17390091+01	1.82964506+00
KAPPA(R)	3.45550780+00	7.24204830-01

THETA = 7.00600 10 DENSITIES

DENSITY	1.04353615-01	1.69616560-02	2.69620520-03	4.37440450-04	7.35209670-05	1.27982775-05	2.07365848-06	3.18064400-07
KAPPA(P)	1.26155533+05	8.60255760+04	5.62071860+04	2.29207960+04	6.62198160+03	1.45799850+03	2.62295040+02	4.83990390+01
KAPPA(R)	9.17203180+04	4.98513070+04	2.19337100+04	6.95989690+03	1.69605450+03	4.23041370+02	9.32020710+01	1.71268948+01

DENSITY	4.42601730-08	5.45791040-09
KAPPA(P)	9.29664510+00	1.45799614+00
KAPPA(R)	2.85601080+00	5.80127710-01

THETA = 10.00005 10 DENSITIES

DENSITY	1.25508730-01	2.09943900-02	3.39171360-03	5.62826040-04	9.57787270-05	1.68763050-05	2.82528880-06	4.59190830-07
KAPPA(P)	1.15832440+05	7.53651250+04	4.87275530+04	1.81034890+04	4.40656140+03	9.17176540+02	1.69738670+02	2.69933348+01
KAPPA(R)	6.89888310+04	4.95481360+04	2.28544230+04	7.31790960+03	1.83422980+03	3.73732380+02	6.43765840+01	1.88790662+01

DENSITY	6.84868920-08	8.87524430-09
KAPPA(P)	4.14573450+00	7.10340390-01
KAPPA(R)	1.65859687+00	4.01694670-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 15.00000 10 DENSITIES

DENSITY	1.61364410-01	2.76654760-02	4.62000260-03	7.94077110-04	1.42759380-04	2.69184140-05	4.82596460-06	8.15144880-07
KAPPA(P)	6.66905280+04	5.92961670+04	3.34999750+04	9.23937920+03	1.95493060+03	3.52207310+02	5.61760180+01	8.61737040+00
KAPPA(R)	3.12539140+04	2.74906140+04	1.77187730+04	5.70307030+03	1.16217670+03	1.85113650+02	2.73282230+01	4.24066450+00
DENSITY	1.25244260-07	1.62788360-08						
KAPPA(P)	1.40094057+00	3.53518310-01						
KAPPA(R)	6.28197190-01	3.11981930-01						

THETA = 22.50011 10 DENSITIES

DENSITY	2.29957680-01	4.02007350-02	7.04681180-03	1.28077695-03	2.45719480-04	4.82816010-05	8.81108550-06	1.49572430-06
KAPPA(P)	5.63647920+04	5.39620820+04	1.36836911+04	2.96564540+03	5.25804740+02	9.60952590+01	1.61322430+01	2.62915100+00
KAPPA(R)	1.01698209+04	7.95996580+03	4.89833180+03	1.72592770+03	3.65402670+02	6.66236720+01	1.11675246+01	1.88559229+00
DENSITY	2.30042960-07	2.98852780-08						
KAPPA(P)	5.07352420-01	1.92451710-01						
KAPPA(R)	4.29318460-01	1.87006720-01						

THETA = 33.99998 11 DENSITIES

DENSITY	3.61815610-01	6.49290580-02	1.20081463-02	2.30033610-03	4.50316460-04	8.93026050-05	1.62161980-05	2.67168040-06	
KAPPA(P)	2.65962190+04	1.28520672+04	3.68298890+03	7.51762120+02	1.39971660+02	2.63742980+01	5.37033330+00	1.49065595+00	
KAPPA(R)	3.08991640+03	1.72074040+03	6.94255430+02	1.96505410+02	4.61104670+01	1.01548351+01	2.31135280+00	7.00060170-01	
DENSITY	3.85818630-07	4.77159640-08	4.42011590-09						
KAPPA(P)	5.42591600-01	2.65492150-01	2.12843100-01						
KAPPA(R)	3.11961930-01	2.19524820-01	2.02066180-01						

THETA = 49.99965 11 DENSITIES

DENSITY	5.85767100-01	1.09169889-01	2.05990570-02	3.99981680-03	7.64904190-04	1.43569690-04	2.47422060-05	3.98989550-06	
KAPPA(P)	1.19890615+04	4.52906120+03	1.31332840+03	3.30960810+02	1.00148089+02	3.24655650+01	9.31457120+00	2.51571980+00	
KAPPA(R)	1.52361630+03	6.08201090+02	1.93612730+02	5.12317760+01	1.39779345+01	4.15295440+00	1.34497576+00	5.28834890-01	
DENSITY	5.72759460-07	7.26799820-08	7.17832410-09						
KAPPA(P)	6.50128110-01	2.73632310-01	2.10693660-01						
KAPPA(R)	2.71300620-01	2.11658750-01	2.00865850-01						

THETA = 70.00033 11 DENSITIES

DENSITY	9.22436440-01	1.72375510-01	3.21948100-02	5.93995850-03	1.09835682-03	2.04431030-04	3.59457630-05	5.98853840-06	
KAPPA(P)	8.82249400+03	3.43282890+03	1.17890340+03	3.89210360+02	1.20486770+02	3.37391860+01	7.51995360+00	1.51866566+00	
KAPPA(R)	1.54288510+03	5.19008350+02	1.54979050+02	4.55900720+01	1.24450129+01	3.40689050+00	9.52857960-01	3.66667630-01	

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 76.00033 CONTINUED

DENSITY	9.13940660-07	1.18672302-07	1.10646807-08
KAPPA(P)	4.07002680-01	2.29456910-01	2.05288290-01
KAPPA(R)	2.35143530-01	2.09504510-01	2.02333090-01

THETA = 99.99998 11 DENSITIES

DENSITY	1.47040317+00	2.67239500-01	4.82157260-02	8.84431800-03	1.67768572-03	3.27800960-04	5.97895320-05	1.01391606-05	
KAPPA(P)	8.74292400+03	3.92907720+03	1.22840260+03	3.24566330+02	7.40166430+01	1.54701596+01	2.94594590+00	6.67372840-01	
KAPPA(R)	2.24078450+03	7.41555460+02	2.11486240+02	5.04443100+01	1.01676385+01	2.06273540+00	5.86874070-01	3.15476830-01	
DENSITY	1.55847939-06	2.02586280-07	2.02583250-08						
KAPPA(P)	2.72512720-01	2.10430680-01	2.02699640-01						
KAPPA(R)	2.42508440-01	2.09670080-01	2.00145630-01						

THETA = 150.00069 11 DENSITIES

DENSITY	4.39295010+00	4.30671350-01	7.92966020-02	1.52371311-02	3.00171950-03	5.97710090-04	1.09681490-04	1.86157970-05	
KAPPA(P)	6.29795530+03	2.26434300+03	5.85572450+02	1.21690099+02	2.44231140+01	4.94412490+00	1.05174790+00	3.36680790-01	
KAPPA(R)	2.31255690+03	9.10888030+02	2.28777510+02	4.08431840+01	6.85105890+00	1.52713738+00	5.58070040-01	2.94239060-01	
DENSITY	2.86311600-06	3.72175660-07	3.72170100-08						
KAPPA(P)	2.16963550-01	2.04358390-01	2.02626680-01						
KAPPA(R)	2.14516410-01	2.01235380-01	1.99580020-01						

THETA = 224.99990 11 DENSITIES

DENSITY	3.97510630+00	7.32341740-01	1.40571360-01	2.76251140-02	5.49855490-03	1.09729193-03	2.01861960-04	3.81960650-05	
KAPPA(P)	3.01645670+03	8.38957430+02	1.98229120+02	3.81257520+01	7.54503780+00	1.59388769+00	4.23921910-01	2.32668640-01	
KAPPA(R)	6.67420610+02	2.62967360+02	7.25836690+01	1.56154371+01	3.22860440+00	7.77860550-01	3.06692390-01	2.17101570-01	
DENSITY	5.26989470-06	6.83731910-07	6.83721780-08						
KAPPA(P)	2.06720610-01	2.03217180-01	2.02764510-01						
KAPPA(R)	2.01787520-01	1.99510180-01	1.99211140-01						

THETA = 340.00048 11 DENSITIES

DENSITY	6.89205970+00	1.31239669+00	2.57552940-01	5.11685590-02	1.01981396-02	2.03709600-03	3.74121470-04	6.35201810-05	
KAPPA(P)	9.35994630+02	2.52073300+02	5.48855420+01	1.13339199+01	2.34166440+00	5.70170770-01	2.55050680-01	2.00151310-01	
KAPPA(R)	1.08578120+02	3.73080800+01	9.40846660+00	2.14001020+00	5.91471960-01	2.07477690-01	2.16921440-01	2.01100640-01	
DENSITY	9.78994490-06	1.27011904-06	1.27010000-07						
KAPPA(P)	2.01380150-01	2.00339870-01	2.00211690-01						
KAPPA(R)	1.98158120-01	1.97696950-01	1.97641600-01						

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 500.00074 11 DENSITIES

DENSITY	1.17994250+01	2.31348480+00	4.57455340-01	9.11909160-02	1.81784220-02	3.63073560-03	6.67027060-04	1.13285440-04
KAPPA(P)	3.5c940880+02	6.90760030+01	1.93976120+01	3.92336610+00	8.90362140-01	3.11863400-01	2.16068450-01	2.00556350-01
KAPPA(R)	2.52642400+01	7.30734490+00	1.74220925+00	5.21146540-01	2.75532410-01	2.16821680-01	2.00753000-01	1.96543790-01

DENSITY	1.74233290-05	2.26508130-06	2.26504740-07
KAPPA(P)	1.96267130-01	1.97922450-01	1.97876930-01
KAPPA(R)	1.95765060-01	1.95641760-01	1.95624160-01

THETA = 699.99976 9 DENSITIES

DENSITY	3.01105400-02	6.01349000-03	1.10469058-03	1.87657890-04	2.88615600-05	3.75208090-06	3.75202490-07	3.75196930-08
KAPPA(P)	9.17686130-01	2.29675000-01	2.00047590-01	1.95366110-01	1.94599820-01	1.94477270-01	1.94461710-01	1.94459760-01
KAPPA(R)	2.19542c30-01	2.00570390-01	1.95319230-01	1.94098410-01	1.93877260-01	1.93840420-01	1.93836550-01	1.93836610-01

DENSITY	3.75191c80-09
KAPPA(P)	1.9445976C-01
KAPPA(R)	1.93836610-01

THETA = 1000.00468 9 DENSITIES

DENSITY	5.13685060-02	1.02642324-02	1.88586254-03	3.20419340-04	4.92820850-05	6.40648380-06	6.40638890-07	6.40629480-08
KAPPA(P)	2.70974650-01	2.04319570-01	1.93762910-01	1.92144030-01	1.91867550-01	1.91825340-01	1.91819590-01	1.91819590-01
KAPPA(R)	2.01579790-01	1.94745820-01	1.92869780-01	1.92469030-01	1.92390140-01	1.92376670-01	1.92374740-01	1.92374740-01

DENSITY	6.40619760-09
KAPPA(P)	1.91817660-01
KAPPA(R)	1.92374740-01

THETA = 1499.99930 9 DENSITIES

DENSITY	9.45656010-02	1.88547570-02	3.46442030-03	5.84649300-04	9.05371790-05	1.17694906-05	1.17693148-06	1.17691391-07
KAPPA(P)	2.2uA9A520-01	1.96066770-01	1.91717950-01	1.90948780-01	1.90815170-01	1.90794180-01	1.90792280-01	1.90792280-01
KAPPA(R)	1.9486C070-01	1.91976940-01	1.91340390-01	1.91271770-01	1.91250730-01	1.91246900-01	1.91244990-01	1.91244990-01

DENSITY	1.17AA0648-08
KAPPA(P)	1.9C79UC70-01
KAPPA(R)	1.91244990-01

THETA = 2250.01618 9 DENSITIES

DENSITY	1.73218c40-01	3.0A2A4360-02	6.36373380-03	1.0A14202A-03	1.66327090-04	2.16219840-05	2.16214620-06	2.16213610-07
KAPPA(P)	1.9726C240-01	1.91401AA0-01	1.90342540-01	1.90142780-01	1.90108860-01	1.90102890-01	1.90102090-01	1.90102090-01
KAPPA(R)	1.9a317v40-01	1.91399960-01	1.91220130-01	1.91179980-01	1.91172320-01	1.91170420-01	1.91170420-01	1.91170420-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 2250.01010 CONTINUED

DENSITY	2.16218E+00
KAPPA(P)	1.90162E+01
KAPPA(R)	1.91170E+01

39 DIANE/SCAT ALLUVIUM-1B INPUT TAPES(4407,2006,3403) 11-7-67 CI/LN MATERL = 113A NR = 006

ONLY ABSORPTION COEFFICIENTS 24 TEMPERATURES

THETA = 1.00000 13 DENSITIES

DENSITY	6.49[illegible]	6.90472050-02	2.98403150-03	3.36976300-04	3.84777670-05	5.17091980-06	7.74274040-07	1.10788280-07
KAPPA(P)	5.13774610+05	3.46126640+05	2.49132430+05	9.85766790+04	2.34154170+04	4.72095270+03	8.87287420+02	1.30374700+02
KAPPA(R)	1.80251780+05	1.27465367+05	6.51319170+04	2.14662010+04	5.01139600+03	1.12475890+03	2.12853250+02	3.00776300+01
DENSITY	1.79429270-08	2.29769400-09	2.51350770-10	2.13476420-11	1.72714748-12			
KAPPA(P)	1.78995550+01	2.26465720+00	3.52302180-01	1.02927339-01	5.85514750-02			
KAPPA(R)	3.81373490+00	5.21769740-01	1.18659936-01	6.03372280-02	5.37251000-02			

THETA = 2.25000 13 DENSITIES

DENSITY	1.16728905-01	1.46265050-02	1.67903514-03	2.28986390-04	3.76709990-05	6.91788630-06	1.18680003-06	1.72017450-07
KAPPA(P)	6.83[illegible]1640+05	4.55545050+05	2.98465580+05	1.01470148+05	1.78122720+04	2.79122540+03	4.75008150+02	9.69493750+01
KAPPA(R)	5.09[illegible]4020+05	2.88924260+05	1.24341848+05	3.55430490+04	7.34422800+03	1.20365250+03	1.90665190+02	3.40314120+01
DENSITY	2.10861910-08	2.63134700-09	2.92736030-10	2.89098140-11	2.43703280-12			
KAPPA(P)	1.77177650+01	2.43349980+00	3.59830570-01	9.80633100-02	7.14518130-02			
KAPPA(R)	5.31711040+00	7.42574250-01	1.56164080-01	7.45880490-02	6.83815640-02			

THETA = 3.40000 13 DENSITIES

DENSITY	8.56537740-02	1.22107937-02	1.87447066-03	3.10937700-04	5.16879990-05	8.62711880-06	1.42733711-06	2.22889440-07
KAPPA(P)	5.66096550+05	3.39184630+05	1.97940140+05	6.97791050+04	1.58718913+04	2.85581620+03	4.62020830+02	7.47542400+01
KAPPA(R)	4.75803380+05	2.85594960+05	1.24917647+05	3.49348410+04	6.91011050+03	1.21113820+03	1.90142340+02	2.98024910+01
DENSITY	3.07824650-08	3.63269950-09	4.14486860-10	4.26446210-11	3.66372830-12			
KAPPA(P)	1.16545420+01	1.68226079+00	2.65810670-01	9.79493280-02	8.50721990-02			
KAPPA(R)	4.38136050+00	6.59863290-01	1.51557930-01	8.58437950-02	8.27419950-02			

THETA = 5.00000 13 DENSITIES

DENSITY	9.03926790-02	1.51805852-02	2.40041660-03	3.87463470-04	6.67735210-05	1.17350558-05	1.93794990-06	3.11829290-07
KAPPA(P)	4.15002540+05	2.78048260+05	1.67548810+05	5.40065100+04	1.08229476+04	1.83917420+03	2.79488160+02	4.21206860+01
KAPPA(R)	3.41365e00+05	2.23760140+05	1.04738280+05	2.98729870+04	5.40414720+03	8.37115440+02	1.2536769C+02	1.83280360+01
DENSITY	4.99817110-08	5.41046920-09	6.11724060-10	6.05603940-11	5.38464370-12			
KAPPA(P)	7.25328e80+00	1.16163870+00	2.20080700-01	1.11616107-01	1.01512534-01			
KAPPA(R)	2.86871560+00	4.81992070-01	1.45851250-01	1.02125787-01	9.91081130-02			

THETA = 7.00000 13 DENSITIES

DENSITY	1.08022038-01	1.84191020-02	3.01465770-03	5.07812160-04	8.81743960-05	1.61130670-05	2.71977910-06	4.33490080-07
KAPPA(P)	3.04169370+05	2.11096350+05	1.19699530+05	3.32081300+04	6.07024338+03	1.02290506+03	1.72275850+02	2.93985980+01
KAPPA(R)	2.08626510+05	1.54697970+05	7.31501850+04	1.86403880+04	2.77679860+03	4.59500460+02	8.12833320+01	1.31981542+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 7.00000 CONTINUED

DENSITY	6.21795420-06	7.56290970-09	8.30319980-10	8.10139380-11	7.40474710-12
KAPPA(P)	5.3x659930+00	6.63697140-01	2.07926420-01	1.24885420-01	1.21230570-01
KAPPA(R)	2.08251x40+00	3.72981740-01	1.51257090-01	1.22323879-01	1.18696554-01

THETA = 10.00000 13 DENSITIES

DENSITY	1.40382130-01	2.427359x0-02	4.07865500-03	7.07515520-04	1.25235710-04	2.28685050-05	3.86175070-06	6.03336990-07	
KAPPA(P)	2.12832x20+05	1.47047560+05	7.69768830+04	2.03792170+04	3.82310030+03	7.00569090+02	1.23097911+02	2.20303500+01	
KAPPA(R)	1.20905x77+05	9.22216300+04	5.[illegible]60+04	9.06549650+03	1.66071070+03	2.99005500+02	5.12780600+01	8.81079260+00	
DENSITY	8.54008x90-08	1.06690388-08	1.21737387-09	1.26821570-10	1.16318981-11				
KAPPA(P)	4.00961400+00	6.65767950-01	1.93841400-01	1.34279070-01	1.31086350-01				
KAPPA(R)	1.45681x95+00	3.06753430-01	1.51975800-01	1.28933690-01	1.28741850-01				

THETA = 15.00000 13 DENSITIES

DENSITY	1.93620730-01	3.45468120-02	5.94434480-03	1.04135142-03	1.83582930-04	3.32708140-05	5.73312390-06	9.39286950-07	
KAPPA(P)	1.35698x90+05	9.51995010+04	4.44819860+04	1.13563682+04	2.11735080+03	3.77057600+02	6.29021070+01	1.06177592+01	
KAPPA(R)	8.42816x80+04	5.74557240+04	2.44858320+04	6.34372400+03	1.16682300+03	1.90628590+02	2.82311780+01	4.30004140+00	
DENSITY	1.40473x60-07	1.77645700-08	2.03123900-09	2.10345440-10	1.92319150-11				
KAPPA(P)	1.78804x52+00	3.63376920-01	1.67016110-01	1.44376030-01	1.45258840-01				
KAPPA(R)	8.25365x60-01	2.39042240-01	1.54648880-01	1.41710070-01	1.42636900-01				

THETA = 22.49999 13 DENSITIES

DENSITY	2.93266x50-01	5.02109570-02	8.71795040-03	1.54022163-03	2.81927110-04	5.35933810-05	9.50141330-06	1.56355270-06	
KAPPA(P)	9.33396x40+04	6.35835940+04	2.48350160+04	5.61578090+03	1.03651450+03	1.84746370+02	3.20992870+01	6.00610010+00	
KAPPA(R)	5.9x266070+04	4.05913340+04	1.71151090+04	3.80722130+03	5.89307410+02	9.55321600+01	1.64105750+01	2.71960590+00	
DENSITY	2.33015710-07	2.93272140-08	3.34145400-09	3.44161580-10	3.14947630-11				
KAPPA(P)	1.10[illegible]+00	2.87873250-01	1.71635370-01	1.60242010-01	1.62730470-01				
KAPPA(R)	5.5[illegible]30-01	2.21968670-01	1.63783480-01	1.56979030-01	1.59738530-01				

THETA = 33.99998 13 DENSITIES

DENSITY	4.26860x20-01	7.59262090-02	1.35662257-02	2.49733030-03	4.70001350-04	8.90599790-05	1.58954130-05	2.80765300-06	
KAPPA(P)	5.8[illegible]20+04	3.71611780+04	1.40417307+04	3.35713320+03	5.63635040+02	1.02147610+02	1.80600690+01	3.59722600+00	
KAPPA(R)	2.612319x0+04	2.09187230+04	8.84681590+03	1.90811840+03	3.25224910+02	5.37557140+01	9.03709220+00	1.72034210+00	
DENSITY	3.88291-40-07	4.90787360-08	5.58875200-09	5.70304950-10	5.22730690-11				
KAPPA(P)	7.51971760-01	2.49205600-01	1.81714230-01	1.78618510-01	1.82005930-01				
KAPPA(R)	4.25600x60-01	2.03172680-01	1.72953070-01	1.74696170-01	1.78684600-01				

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 50.00000 13 DENSITIES

DENSITY	6.52368030-01	1.19955313-01	2.19763150-02	4.11935370-03	7.78968480-04	1.48844580-04	2.62233590-05	4.25902630-06
KAPPA(P)	2.49455000+04	1.13710500+04	4.06741470+03	9.43615690+02	2.28635710+02	5.38844520+01	1.09164080+01	2.26156960+00
KAPPA(R)	1.03437404+04	6.35175790+03	2.53813020+03	5.48001480+02	1.19967986+02	2.47053790+01	4.62448020+00	9.00354500-01
DENSITY	6.32067010-07	7.90907460-08	9.86994320-09	9.58049500-10	8.99380650-11			
KAPPA(P)	5.51215740-01	2.42241290-01	1.94982980-01	1.89877230-01	1.88562450-01			
KAPPA(R)	3.01037930-01	2.02118930-01	1.88130010-01	1.85235920-01	1.85128520-01			

THETA = 69.99998 13 DENSITIES

DENSITY	9.02621850-01	1.80861990-01	3.34227650-02	6.27083380-03	1.17386335-03	2.22054000-04	3.91625370-05	6.44168000-06
KAPPA(P)	1.30651798+04	6.27080460+03	2.14536500+03	5.25497760+02	1.38647110+02	3.23517130+01	7.01289070+00	1.48640327+00
KAPPA(R)	6.16483460+03	3.70147590+03	1.42974720+03	3.13266090+02	6.62764710+01	1.19067797+01	2.27797680+00	5.66977520-01
DENSITY	9.77908650-07	1.26535880-07	1.48359900-08	1.57011024-09	1.47223420-10			
KAPPA(P)	3.97997180-01	2.16649590-01	1.92697240-01	1.90389940-01	1.90765750-01			
KAPPA(R)	2.62921770-01	2.00195280-01	1.88688650-01	1.87145850-01	1.87330280-01			

THETA = 99.99998 13 DENSITIES

DENSITY	1.53864278+00	2.82546370-01	5.17074710-02	9.58358090-03	1.81048052-03	3.50691740-04	6.36637010-05	1.07629597-05
KAPPA(P)	8.92735710+03	4.32292230+03	1.36745410+03	3.26844530+02	7.58321970+01	1.65875430+01	3.38536220+00	7.25914170-01
KAPPA(R)	4.55051160+03	2.67444440+03	9.01863150+02	1.85075890+02	3.34604110+01	6.11766000+00	1.22337898+00	3.98430700-01
DENSITY	1.64849139-06	2.13429350-07	2.50120070-08	2.63261070-09	2.43245520-10			
KAPPA(P)	2.72410600-01	2.02088410-01	1.93119320-01	1.93681730-01	1.97128790-01			
KAPPA(R)	2.33704210-01	1.98663270-01	1.90180060-01	1.90206490-01	1.93539050-01			

THETA = 149.99995 13 DENSITIES

DENSITY	2.55366070+00	4.63977930-01	8.56485490-02	1.62699240-02	3.18195030-03	6.30369110-04	1.15138141-04	.93931620-05
KAPPA(P)	6.02158560+03	2.60822180+03	6.71995740+02	1.45613950+02	3.02865870+01	6.34640000+00	1.37983772+00	4.20822510-01
KAPPA(R)	2.66462090+03	1.48486470+03	4.49013510+02	8.86213650+01	1.58216596+01	3.17871170+00	8.06720860-01	3.28939320-01
DENSITY	2.93309360-06	3.74123470-07	4.34654300-08	4.60547560-09	4.33313410-10			
KAPPA(P)	2.61480390-01	2.07766360-01	2.03599770-01	2.03320850-01	2.03282830-01			
KAPPA(R)	2.22914540-01	2.01462100-01	1.99694220-01	1.99595390-01	1.99583220-01			

THETA = 224.99990 13 DENSITIES

DENSITY	4.29256900+00	7.85758790-01	1.49364290-01	2.90611220-02	5.70568070-03	1.11875700-03	2.01878410-04	3.39517580-05
KAPPA(P)	3.04871630+03	9.56170220+02	2.12867720+02	5.07012700+01	1.28773115+01	3.59187730+00	1.00376011+00	3.55281510-01
KAPPA(R)	1.17636440+03	5.42645890+02	1.54246800+02	3.57316080+01	7.68800240+00	1.73404668+00	5.00595750-01	2.61716610-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 224.99998 CONTINUED

DENSITY	5.20792040-06	6.76671460-07	7.96033410-08	8.45777380-09	7.96025580-10
KAPPA(P)	2.27071360-01	2.06359800-01	2.03642760-01	2.03317190-01	2.03282220-01
KAPPA(R)	2.11740670-01	2.02196960-01	2.00204080-01	1.99658070-01	1.99580820-01

THETA = 300.00012 13 DENSITIES

DENSITY	7.31696050+00	1.38803558+00	2.67914690-01	5.17932730-02	1.01552753-02	2.01586680-03	3.69841520-04	6.28485310-05
KAPPA(P)	1.38690000+03	5.92396170+02	1.12380674+02	3.04478680+01	7.40412280+00	1.71281667+00	4.80348210-01	2.56390150-01
KAPPA(R)	5.66499370+02	2.16204980+02	6.88878920+01	1.53561836+01	3.13172190+00	7.81943720-01	3.28860710-01	2.33826240-01

DENSITY	9.60837650-06	1.25686505-06	1.47859990-07	1.57052620-08	1.47619226-09
KAPPA(P)	2.10468770-01	2.04210490-01	2.03396900-01	2.03362130-01	2.03621580-01
KAPPA(R)	2.08231460-01	2.00958470-01	1.99749930-01	1.99661070-01	1.99909800-01

THETA = 499.99993 13 DENSITIES

DENSITY	1.24303056+01	2.37112080+00	4.59865880-01	9.03905110-02	1.79648180-02	3.58767830-03	6.59257090-04	1.12039619-04
KAPPA(P)	6.74428750+02	2.42349060+02	6.22127500+01	1.37032081+01	2.88283440+00	7.32366940-01	2.99580830-01	2.19909180-01
KAPPA(R)	2.81651020+02	1.30496700+02	3.42786930+01	6.98698390+00	1.53108845+00	5.08336270-01	2.76426580-01	2.15088330-01

DENSITY	1.72203490-05	2.23497620-06	2.62556380-07	2.78835240-08	2.62417340-09
KAPPA(P)	2.06221480-01	2.04268290-01	2.04218450-01	2.04263790-01	2.04270940-01
KAPPA(R)	2.02476580-01	2.00516650-01	2.00494390-01	2.00543110-01	2.00546930-01

THETA = 699.99976 13 DENSITIES

DENSITY	1.97766000+01	3.83807130+00	7.52576060-01	1.49214560-01	2.97265700-02	5.93610570-03	1.08944162-03	1.84922840-04
KAPPA(P)	3.81631490+02	1.05067285+02	2.43022500+01	5.04009020+00	1.19965016+00	4.18000850-01	2.48564470-01	2.12839690-01
KAPPA(R)	1.12753467+02	4.70054690+01	1.22804060+01	2.71499450+00	7.48770830-01	3.31990470-01	2.29341980-01	2.06426050-01

DENSITY	2.84278000-05	3.69500030-06	4.34695560-07	4.61859610-08	4.34691290-09
KAPPA(P)	2.05670480-01	2.04433610-01	2.04287690-01	2.04273600-01	2.04272170-01
KAPPA(R)	2.01403460-01	2.00756210-01	2.00565580-01	2.00549730-01	2.00548130-01

THETA = 999.99967 13 DENSITIES

DENSITY	3.30705210+01	6.40028190+00	1.27982910+00	2.54153720-01	5.06054510-02	1.01024731-02	1.85588032-03	3.15455160-04
KAPPA(P)	1.57107000+02	3.91434450+01	8.69855560+00	2.08704670+00	6.54060710-01	3.08116590-01	2.22756950-01	2.07010030-01
KAPPA(R)	3.79945930+01	1.42875134+01	3.69891670+00	9.92690140-01	4.05468010-01	2.58027780-01	2.14505260-01	2.02978950-01

DENSITY	4.85303120-05	6.30889530-06	7.42227580-07	7.88617240-08	7.42227800-09
KAPPA(P)	2.04635480-01	2.04316500-01	2.04276670-01	2.04271960-01	2.04271550-01
KAPPA(R)	2.00831100-01	2.00577620-01	2.00548930-01	2.00545520-01	2.00545120-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 1499.99930 13 DENSITIES

DENSITY	5.99623910+01	1.18261831+01	2.34112780+00	4.65381760-01	9.27996900-02	1.85476710-02	3.68899750-03	5.79513270-04
KAPPA(P)	6.37506450+01	1.53306177+01	3.96880500+00	1.03290815+00	3.73620920-01	2.34677900-01	2.09193210-01	2.05050910-01
KAPPA(R)	1.46347957+01	5.88945810+00	1.76092597+00	5.77109750-01	2.94640880-01	2.18753440-01	2.03268190-01	2.00929740-01

DENSITY	8.91550640-05	1.15902087-05	1.36354860-06	1.44877110-07	1.36354885-08
KAPPA(P)	2.04376340-01	2.04270120-01	2.04256040-01	2.04254400-01	2.04254200-01
KAPPA(R)	2.00568430-01	2.00511030-01	2.00503410-01	2.00502610-01	2.00502410-01

THETA = 2249.99870 13 DENSITIES

DENSITY	1.09262029+02	2.15644900+01	4.27604270+00	8.53630030-01	1.70449530-01	3.40726250-02	6.26268040-03	1.06463319-03
KAPPA(P)	2.68351630+01	7.05858070+00	1.70752677+00	4.90340310-01	2.55283390-01	2.13668610-01	2.05729510-01	2.04252760-01
KAPPA(R)	7.26161410+00	1.84842438+00	6.35800530-01	2.95400120-01	2.18966390-01	2.04050650-01	2.00840140-01	2.00204280-01

DENSITY	1.63789090-04	2.12926220-05	2.50500480-06	2.66156870-07	2.50500520-08
KAPPA(P)	2.03996180-01	2.03956200-01	2.03951100-01	2.03950490-01	2.03950290-01
KAPPA(R)	2.00092630-01	2.00074990-01	2.00072800-01	2.00072590-01	2.00072390-01

THETA = 3000.00050 13 DENSITIES

DENSITY	2.00559000+02	3.97095760+01	7.93821140+00	1.58542481+00	3.16609860-01	6.32917060-02	1.16333305-02	1.97762630-03
KAPPA(P)	9.06383190+00	2.23059920+00	5.07923350-01	2.75778310-01	2.17303130-01	2.05149970-01	2.02698030-01	2.02277240-01
KAPPA(R)	9.35507950-01	4.30445910-01	2.63133970-01	2.14625630-01	2.02667350-01	1.99335280-01	1.98566740-01	1.98438110-01

DENSITY	3.04249030-04	3.95525660-05	4.65322540-06	4.94405410-07	4.65322680-08
KAPPA(P)	2.02440350-01	2.02429010-01	2.02427600-01	2.02427390-01	2.02427390-01
KAPPA(R)	1.98571910-01	1.98568530-01	1.98568130-01	1.98568130-01	1.98567930-01

THETA = 4999.99870 13 DENSITIES

DENSITY	3.50965090+02	7.09079790+01	1.41535057+01	2.82573920+00	5.64618550-01	1.12870960-01	2.07463080-02	3.52680120-03
KAPPA(P)	4.25806140+00	1.04596650+00	3.59620800-01	2.28796110-01	2.04816660-01	2.00196080-01	1.99253370-01	1.98994910-01
KAPPA(R)	4.06308600-01	2.58169460-01	2.15015320-01	2.01500580-01	1.97412860-01	1.96370120-01	1.96132850-01	1.96121680-01

DENSITY	5.62582720-04	7.05357480-05	8.29829970-06	8.81694710-07	8.29830220-08
KAPPA(P)	1.98964670-01	1.98960100-01	1.98959500-01	1.98959580-01	1.98959580-01
KAPPA(R)	1.96114030-01	1.96112850-01	1.96112660-01	1.96112660-01	1.96112660-01

THETA = 6999.99690 13 DENSITIES

DENSITY	5.90758690+02	1.17417144+02	2.34431650+01	4.68072480+00	9.35205640-01	1.86970760-01	3.63662950-02	5.80215240-03
KAPPA(P)	2.16789590+00	5.67110780-01	2.64044660-01	2.09308710-01	1.98720290-01	1.96639140-01	1.96211520-01	1.96131290-01
KAPPA(R)	2.05572680-01	2.19491450-01	2.01594900-01	1.96430620-01	1.94775820-01	1.94369170-01	1.94278230-01	1.94260930-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 6999.9990 CONTINUED

DENSITY	8.96790140-04	1.16842581-04	1.37461740-05	1.46053187-06	1.37461770-07
KAPPA(P)	1.96117960-01	1.96115200-01	1.96115010-01	1.96115010-01	1.96115010-01
KAPPA(R)	1.94257630-01	1.94257440-01	1.94257240-01	1.94257240-01	1.94257240-01

THETA = 9999.9920 13 DENSITIES

DENSITY	1.90811541+03	2.00948220+02	3.99885420+01	7.99204740+00	1.59696458+00	3.19246410-01	5.86793740-02	9.97530280-03
KAPPA(P)	1.01468030+00	5.41623510-01	2.17700500-01	1.96276480-01	1.88417690-01	1.88172530-01	1.88131140-01	1.88123930-01
KAPPA(R)	4.30029400-01	2.02259450-01	1.94450820-01	1.92347430-01	1.91089180-01	1.90978200-01	1.90962720-01	1.90959860-01

DENSITY	1.53465606-03	1.99505270-04	2.34711160-05	2.49380740-06	2.34711200-07
KAPPA(P)	1.88122110-01	1.88121730-01	1.88121730-01	1.88121730-01	1.88121730-01
KAPPA(R)	1.90959490-01	1.90959290-01	1.90959100-01	1.90959100-01	1.90959100-01

1050301 DIANE ALUMINUM 3A -- 12 FREQUENCIES -- OCTOBER 15, 1965 MATERL = 1013 NT = 998

GREY ABSORPTION COEFFICIENTS 25 TEMPERATURES

THETA = .10000 17 DENSITIES

DENSITY	2.70000060+00	8.53814770-01	2.70000900-01	8.53811440-02	2.69999570-02	8.53815780-03	2.70000940-03	8.53811640-04
KAPPA(P)	1.40531550-16	1.40531550-16	1.40531550-16	1.40531550-16	1.40531550-16	1.40531560-16	1.40531550-16	1.40531550-16
KAPPA(R)	6.43680190-18	6.43680190-18	6.43680190-18	6.43680190-18	6.43680190-18	6.43680190-18	6.43680190-18	6.43680190-18
DENSITY	2.69999650-04	8.53815990-05	2.69992910-05	8.53786220-06	2.69988880-06	8.53773490-07	2.70011850-07	8.53846130-08
KAPPA(P)	1.40531550-16	1.40531550-16	1.40531550-16	1.40531550-16	1.40531550-16	1.40531550-16	1.40531550-16	1.40531550-16
KAPPA(R)	6.43680190-18	6.43680190-18	6.43680190-18	6.43680190-18	6.43680190-18	6.43680190-18	6.43680190-18	6.43680190-18
DENSITY	2.70007650-08							
KAPPA(P)	1.40531550-16							
KAPPA(R)	6.43680190-18							

THETA = .20000 17 DENSITIES

DENSITY	2.70000060+00	8.53814770-01	2.70000900-01	8.53811440-02	2.69999570-02	8.53815780-03	2.70000940-03	8.53811640-04
KAPPA(P)	1.81120140-04	1.81120140-04	1.81120140-04	1.81120140-04	1.81120140-04	1.81120140-04	1.81120140-04	1.81120140-04
KAPPA(R)	1.58063310-05	1.58063310-05	1.58063310-05	1.58063310-05	1.58063310-05	1.58063310-05	1.58063310-05	1.58063310-05
DENSITY	2.69999650-04	8.53815990-05	2.69992910-05	8.53786220-06	2.69988880-06	8.53773490-07	2.70011850-07	8.53846130-08
KAPPA(P)	1.81120140-04	1.81120140-04	1.81120140-04	1.81120140-04	1.81118330-04	1.81116520-04	1.81112890-04	1.81107470-04
KAPPA(R)	1.58063310-05	1.58063310-05	1.58063310-05	1.58063310-05	1.58063310-05	1.58063310-05	1.58063310-05	1.58047500-05
DENSITY	2.70007650-08							
KAPPA(P)	1.81098460-04							
KAPPA(R)	1.58047500-05							

THETA = .30000 17 DENSITIES

DENSITY	2.70000060+00	8.53814770-01	2.70000900-01	8.53811440-02	2.69999570-02	8.53815790-03	2.70000940-03	8.53811640-04
KAPPA(P)	1.17047423+00	1.17047187+00	1.17046837+00	1.17046134+00	1.17044848+00	1.17042623+00	1.17038644+00	1.17031621+00
KAPPA(R)	1.50563550-01	1.50563550-01	1.50563550-01	1.50562050-01	1.50560[illegible]-01	1.50557530-01	1.50553010-01	1.50543980-01
DENSITY	2.69999650-04	8.53815990-05	2.69992910-05	8.53786220-06	2.69988880-06	8.53773490-07	2.70011850-07	8.53846130-08
KAPPA(P)	1.17019100+00	1.16996869+00	1.16957330+00	1.16887059+00	1.16762058+00	1.16540303+00	2.16146947+00	1.15458764+00
KAPPA(R)	1.50527420-01	1.50498820-01	1.50447660-01	1.50357420-01	1.50196630-01	1.49911520-01	1.49405670-01	1.48510040-01
DENSITY	2.70007850-08							
KAPPA(P)	1.14823657+00							
KAPPA(R)	1.48931520-01							

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = .40000 17 DENSITIES

DENSITY	2.70000000+00	8.53814770-01	2.70000900-01	8.53811440-02	2.69999570-02	8.53815780-03	2.70000940-03	8.53811640-04
KAPPA(P)	7.29489570+01	7.29967850+01	7.29931170+01	7.29365530+01	7.29248850+01	7.29037430+01	7.28672980+01	7.28010190+01
KAPPA(R)	1.23964015+01	1.23980595+01	1.23974399+01	1.23903241+01	1.23943407+01	1.23908708+01	1.23845532+01	1.23734119+01
DENSITY	2.69999650-04	8.53815990-05	2.69992910-05	8.53786220-06	2.69988880-06	8.53773490-07	2.70011850-07	8.53846130-08
KAPPA(P)	7.20446490+01	7.24770480+01	7.21105210+01	7.14622950+01	7.03244780+01	6.83457900+01	6.49657330+01	5.93753960+01
KAPPA(R)	1.23535468+01	1.23183493+01	1.22559310+01	1.21457579+01	1.19523744+01	1.16160757+01	1.10416002+01	1.00914605+01
DENSITY	2.70007650-08							
KAPPA(P)	5.06530760+01							
KAPPA(R)	8.80901360+00							

THETA = .50000 17 DENSITIES

DENSITY	2.70000000+00	8.53814770-01	2.70000900-01	8.53811440-02	2.69999570-02	8.53815780-03	2.70000940-03	8.53811640-04
KAPPA(P)	7.48800020+02	7.47967840+02	7.47765910+02	7.47410510+02	7.46779510+02	7.45652700+02	7.43657030+02	7.40125660+02
KAPPA(R)	1.58046000+02	1.58022900+02	1.57960230+02	1.57904420+02	1.57771840+02	1.57533790+02	1.57112180+02	1.56366080+02
DENSITY	2.69999650-04	8.53815990-05	2.69992910-05	8.53786220-06	2.69988880-06	8.53773490-07	2.70011850-07	8.53846130-08
KAPPA(P)	7.33883470+02	7.22986550+02	7.03804030+02	6.71087810+02	6.16729150+02	5.31206020+02	4.09423450+02	2.64229720+02
KAPPA(R)	1.55867450+02	1.52728210+02	1.48692430+02	1.41780470+02	1.30296160+02	1.12227714+02	8.64987510+01	5.58221050+01
DENSITY	2.70007650-08							
KAPPA(P)	1.34393420+02							
KAPPA(R)	2.83932080+01							

THETA = .60000 17 DENSITIES

DENSITY	2.70000000+00	8.53814770-01	2.70000900-01	8.53811440-02	2.69999570-02	8.53815780-03	2.70000940-03	8.53811640-04
KAPPA(P)	3.19224550+03	3.19074580+03	3.18809840+03	3.18338360+03	3.17502230+03	3.16016610+03	3.13398260+03	3.08791050+03
KAPPA(R)	6.06835600+02	6.06464570+02	6.05787920+02	6.04595750+02	6.02482440+02	7.98735570+02	7.92109750+02	7.80465070+02
DENSITY	2.69999650-04	8.53815990-05	2.69992910-05	8.53786220-06	2.69988880-06	8.53773490-07	2.70011850-07	8.53846130-08
KAPPA(P)	3.00786650+03	2.87020850+03	2.64149900+03	2.28891040+03	1.76539530+03	1.14656980+03	5.87566010+02	2.30846220+02
KAPPA(R)	7.80191260+02	7.25401140+02	6.67633880+02	5.76496880+02	4.46201210+02	2.89793890+02	1.48588170+02	8.03680990+01
DENSITY	2.70007650-08							
KAPPA(P)	8.36699540+01							
KAPPA(R)	2.11678740+01							

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = .70000 17 DENSITIES

DENSITY	2.70000000+00	6.53814770-01	2.70000900-01	8.53811440-02	2.69999570-02	8.53815780-03	2.70000940-03	8.53811640-04
KAPPA(P)	8.37251790+03	6.36356390+03	8.34760510+03	8.31903720+03	8.26942240+03	8.18124740+03	8.02686970+03	7.75947070+03
KAPPA(R)	2.46910280+03	2.46643710+03	2.46175540+03	2.45382420+03	2.43867450+03	2.41269570+03	2.36714520+03	2.28828970+03
DENSITY	2.69999650-04	8.53815990-05	2.69992910-05	8.53786220-06	2.69988880-06	8.53773490-07	2.70011850-07	8.53846130-08
KAPPA(P)	7.30628630+03	6.56698360+03	5.44267930+03	3.93572310+03	2.31598400+03	1.06537260+03	4.00863100+02	1.35346788+02
KAPPA(R)	2.15466430+03	1.93664030+03	1.60560150+03	1.16065520+03	6.82989820+02	3.14178070+02	1.18213221+02	3.99113190+01
DENSITY	2.70007650-08							
KAPPA(P)	4.37713710+01							
KAPPA(R)	1.29054037+01							

THETA = .80000 17 DENSITIES

DENSITY	2.70000000+00	6.53814770-01	2.70000900-01	8.53811440-02	2.69999570-02	8.53815780-03	2.70000940-03	8.53811640-04
KAPPA(P)	1.63519685+04	1.63189111+04	1.62602686+04	1.61566972+04	1.59740367+04	1.56545981+04	1.51021128+04	1.41685093+04
KAPPA(R)	5.54062630+03	5.52904260+03	5.50917380+03	5.47808250+03	5.41224860+03	5.30396480+03	5.11677670+03	4.80047410+03
DENSITY	2.69999650-04	8.53815990-05	2.69992910-05	8.53786220-06	2.69988880-06	8.53773490-07	2.70011850-07	8.53846130-08
KAPPA(P)	1.28537031+04	1.03720893+04	7.36813550+03	4.23115370+03	1.90013450+03	7.04289820+02	2.36377860+02	7.64166030+01
KAPPA(R)	4.28724650+03	3.51417460+03	2.49638740+03	1.43352250+03	6.43736820+02	2.38564550+02	8.00282690+01	2.58290540+01
DENSITY	2.70007650-08							
KAPPA(P)	2.45028630+01							
KAPPA(R)	8.23917510+00							

THETA = .90000 17 DENSITIES

DENSITY	2.70000000+00	8.53814770-01	2.70000900-01	8.53811440-02	2.69999570-02	8.53815780-03	2.70000940-03	8.53811640-04
KAPPA(P)	2.63467420+04	2.62599420+04	2.61028560+04	2.58276250+04	2.53466010+04	2.45140080+04	2.31032780+04	2.07913000+04
KAPPA(R)	1.01786735+04	1.01486317+04	1.00845505+04	9.97881900+03	9.79247880+03	9.47052780+03	8.92427120+03	8.03232960+03
DENSITY	2.69999650-04	8.53815990-05	2.69992910-05	8.53786220-06	2.69988880-06	8.53773490-07	2.70011850-07	8.53846130-08
KAPPA(P)	1.72719650+04	1.25387601+04	7.41892830+03	3.43258040+03	1.29771480+03	4.48539450+02	1.48271930+02	4.77563810+01
KAPPA(R)	6.67263570+03	4.84401870+03	2.86587780+03	1.32570530+03	5.00811590+02	1.69585960+02	5.50862620+01	1.77753820+01
DENSITY	2.70007650-08							
KAPPA(P)	1.71878010+01							
KAPPA(R)	5.93863980+00							

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 1.00000 11 DENSITIES

DENSITY	1.70892000-01	2.00136640-02	1.78050193-03	1.77629630-04	2.51111160-05	4.50968968-06	8.04050040-07	1.33420510-07
KAPPA(P)	4.94867470+04	4.25825560+04	3.41972290+04	1.98092300+04	6.24439750+03	1.27512560+03	2.23900100+02	4.19429330+01
KAPPA(R)	9.21520490+03	7.03167290+03	5.68814790+03	3.10063800+03	1.00272030+03	2.51607410+02	4.40135250+01	8.60230330+00

DENSITY	1.84426490-08	1.75886017-09	1.67992020-10
KAPPA(P)	1.06575051+01	3.35227760+00	5.97536440-01
KAPPA(R)	2.40520940+00	7.05229500-01	1.44910340-01

THETA = 1.50000 11 DENSITIES

DENSITY	7.76524440-02	9.79767660-03	1.30139402-03	2.12204550-04	3.80927550-05	6.39752100-06	8.99884070-07	1.30982780-07
KAPPA(P)	8.15278260+04	5.20000500+04	2.82514460+04	1.26769405+04	4.90563560+03	1.69729210+03	4.65707720+02	9.30391110+01
KAPPA(R)	4.74674720+04	3.15774930+04	1.77734310+04	7.13722910+03	2.30900860+03	7.75299940+02	2.11104030+02	3.79929250+01

DENSITY	1.91033940-08	2.26045470-09	2.18092900-10
KAPPA(P)	1.82165750+01	2.39089440+00	4.38144410-01
KAPPA(R)	5.78760700+00	9.02994330-01	1.76077680-01

THETA = 2.25000 11 DENSITIES

DENSITY	7.29019430-02	1.07401098-02	1.48341638-03	2.63412330-04	4.18424170-05	7.29515590-06	1.16475476-06	1.68000338-07
KAPPA(P)	7.61758600+04	4.94540860+04	3.42928310+04	2.20595280+04	7.91060200+03	1.84857420+03	4.84224320+02	8.11265250+01
KAPPA(R)	4.80368960+04	3.36914690+04	2.04696780+04	1.12525488+04	4.40894170+03	1.15910090+03	2.49218490+02	4.04145550+01

DENSITY	2.40483420-08	3.08042000-09	3.51666010-10
KAPPA(P)	1.23266056+01	1.52070035+00	2.08367900-01
KAPPA(R)	5.22487040+00	6.45227700-01	1.24574660-01

THETA = 3.00002 11 DENSITIES

DENSITY	6.71791590-02	1.36250756-02	2.09695290-03	3.31709850-04	5.46435160-05	9.66402860-06	1.69979990-06	2.86078000-07
KAPPA(P)	6.78530650+04	4.69575820+04	3.56248920+04	2.05757800+04	6.09479200+03	1.16383970+03	1.80337470+02	2.65630160+01
KAPPA(R)	3.53375000+04	3.14766090+04	2.57554090+04	1.40950636+04	4.27679800+03	8.35783780+02	1.26321466+02	1.77626660+01

DENSITY	4.39286480-08	5.70912540-09	6.71639080-10
KAPPA(P)	3.73807200+00	4.97261110-01	9.60928860-02
KAPPA(R)	2.41569730+00	3.41700730-01	8.53265200-02

THETA = 5.00001 11 DENSITIES

DENSITY	1.14333665-01	1.79343040-02	2.80374300-03	4.64880590-04	8.46318580-05	1.64349570-05	2.99939510-06	5.09110000-07
KAPPA(P)	5.01914480+04	3.45720190+04	2.26836570+04	8.99581130+03	1.96815130+03	3.45405250+02	5.57075090+01	8.54229740+00
KAPPA(R)	1.38731409+04	1.17556583+04	8.20697670+03	3.64579570+03	9.82254020+02	2.02103500+02	3.48753390+01	5.48644220+00

GHEY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00001 CONTINUED

DENSITY	7.82388600-08	1.01053597-08	1.13605988-09
KAPPA(P)	1.26305697+00	1.99861620-01	7.28516560-02
KAPPA(R)	8.98807400-01	1.61266010-01	6.56206960-02

THETA = 7.00000 11 DENSITIES

DENSITY	1.55545030-01	2.50400180-02	4.11770220-03	7.23304700-04	1.37226190-04	2.69588220-05	4.84773000-06	7.64992420-07
KAPPA(P)	2.85467960+04	1.72888990+04	9.03231540+03	2.99918740+03	6.20173910+02	1.20045396+02	2.35011640+01	5.74207510+00
KAPPA(R)	4.33536020+03	2.89777920+03	1.93520610+03	5.63676200+02	1.50645580+02	3.80670850+01	1.00989261+01	3.55309830+00
DENSITY	1.03883066-07	1.26197855-08	1.37873038-09					
KAPPA(P)	1.39676960+00	2.77107430-01	1.01751673-01					
KAPPA(R)	8.82993660-01	1.93292630-01	8.71678260-02					

THETA = 10.00005 11 DENSITIES

DENSITY	2.38887960-01	3.91858320-02	6.50373440-03	1.16366589-03	2.08560800-04	3.70812170-05	6.25831200-06	9.67258590-07
KAPPA(P)	1.53939513+04	8.98426490+03	4.65743390+03	1.76726770+03	5.46842040+02	1.77634840+02	3.80659420+01	7.63099860+00
KAPPA(R)	1.74566340+03	9.75041430+02	4.81752240+02	2.30423730+02	1.12830869+02	4.54703280+01	1.36470037+01	3.54919200+00
DENSITY	1.35617950-07	1.62902360-08	1.74327589-09					
KAPPA(P)	1.53905699+00	3.29038660-01	1.25407390-01					
KAPPA(R)	7.54842620-01	1.94525890-01	1.07250292-01					

THETA = 15.00000 11 DENSITIES

DENSITY	3.61082670-01	5.85227330-02	9.71464670-03	1.64361047-03	2.84729760-04	5.08403630-05	8.43[illegible]-06	1.30950537-06
KAPPA(P)	1.30532175+04	9.02216830+03	5.99811700+03	2.14486080+03	6.37930880+02	1.71261210+02	4.0053[illegible]+01	8.21843650+00
KAPPA(R)	1.61004910+03	8.90987110+02	6.36069940+02	3.78474970+02	1.59599890+02	5.42135020+01	1.53353[illegible]+01	3.49100910+00
DENSITY	1.84263630-07	2.20599970-08	2.38539770-09					
KAPPA(P)	1.64226265+00	3.59507580-01	1.58844430-01					
KAPPA(R)	7.07165480-01	2.14436840-01	1.36550610-01					

THETA = 22.50011 11 DENSITIES

DENSITY	4.67714120-01	7.99303230-02	1.36090540-02	2.29629120-03	3.94532120-04	6.99982730-05	1.16139920-05	1.79968310-06
KAPPA(P)	1.45990992+04	9.11220390+03	5.70301100+03	2.33507650+03	7.33670450+02	1.79878210+02	4.18618440+01	1.01329296+01
KAPPA(R)	3.68363630+03	1.80122080+03	9.42108050+02	4.50109890+02	1.88288880+02	6.16068420+01	1.50382955+01	3.16249990+00
DENSITY	2.53957650-07	3.04189550-08	3.33197770-09					
KAPPA(P)	1.89630358+00	3.84929140-01	1.88033520-01					
KAPPA(R)	6.91347970-01	2.40749090-01	1.70547740-01					

OHEY ABSORPTION COEFFICIENTS CONTINUED

THETA = 30.00000 10 DENSITIES

DENSITY	5.80553660-01	1.03608697-01	1.77439620-02	3.09818760-03	5.48703820-04	9.88657190-05	1.65586810-05	2.60987040-06
KAPPA(P)	2.63819040+04	1.50860230+04	7.90820170+03	2.41095530+03	6.41193960+02	1.55920610+02	3.85277150+01	6.89286240+00
KAPPA(R)	1.37306793+04	6.52928650+03	2.52010510+03	8.14650310+02	2.33549710+02	5.86624590+01	1.15090563+01	2.10094150+00

DENSITY	3.84131650-07	6.93351120-08
KAPPA(P)	1.13576655+00	2.91713560-01
KAPPA(R)	6.69097230-01	2.08451470-01

THETA = 50.00000 10 DENSITIES

DENSITY	6.32171670-01	1.44756820-01	2.49885390-02	4.30870980-03	7.91882160-04	1.47359860-04	2.81780330-05	4.40143500-06
KAPPA(P)	1.89913040+04	1.24116016+04	5.08736300+03	1.50364420+03	3.53662010+02	7.08743750+01	1.25589628+01	2.2814023e+00
KAPPA(R)	9.79597570+03	6.28624980+03	2.67921460+03	7.99470750+02	1.70724470+02	2.91412000+01	4.59419730+00	8.53513090-01

DENSITY	6.75663970-07	8.78056600-08
KAPPA(P)	4.77236450-01	2.04829270-01
KAPPA(R)	2.83105080-01	1.07104870-01

THETA = 69.99998 10 DENSITIES

DENSITY	1.14998900+00	1.98817260-01	3.50670970-02	6.35831430-03	1.20061184-03	2.35148020-04	4.29493130-05	7.27076050-06
KAPPA(P)	1.44607153+04	9.56262860+03	3.65416110+03	7.90510500+02	1.40561340+02	2.69199050+01	4.72517210+00	9.11181370-01
KAPPA(R)	6.87344750+03	3.78188910+03	1.95501460+03	6.92040360+02	7.50053580+01	1.21270921+01	1.95252633+00	6.91300160-01

DENSITY	1.11894477-06	1.45444680-07
KAPPA(P)	2.78493100-01	1.79774670-01
KAPPA(R)	2.00063360-01	1.77692990-01

THETA = 90.99998 10 DENSITIES

DENSITY	1.64406732+00	2.97588650-01	5.40658790-02	1.02623237-02	2.01081330-03	3.99501910-04	7.32220560-05	1.24222676-05
KAPPA(P)	8.99321760+03	5.48106100+03	1.52269330+03	2.74680600+02	5.06736460+01	9.53405370+00	1.81866565+00	4.44866490-01
KAPPA(R)	1.67274950+03	1.16709600+03	5.11750000+02	1.35906610+02	2.70361540+01	4.91141450+00	1.03231390+00	3.41691840-01

DENSITY	1.90663632-06	2.44982260-07
KAPPA(P)	2.10929150-01	1.75514960-01
KAPPA(R)	1.97666200-01	1.69865380-01

THETA = 149.99995 10 DENSITIES

DENSITY	2.73960570+00	5.02313630-01	9.47805570-02	1.85847480-02	3.67271170-03	7.25631710-04	1.29593100-04	2.09825300-05
KAPPA(P)	9.18229300+03	1.77154080+03	4.23838690+02	7.97921370+01	1.64012090+01	4.15977500+00	1.48382309+00	5.72605540-01
KAPPA(R)	4.05483330+02	1.79349368+00	8.53964110+00	1.90537500+01	4.53089090+00	1.24133019+00	4.67833080-01	2.55220430-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 149.99995 CONTINUED

DENSITY	3.07320390-06	3.88555450-07
KAPPA(P)	2.94798460-01	2.11936200-01
KAPPA(R)	2.0[illegible]3620-01	1.93298040-01

THETA = 224.99990 10 DENSITIES

DENSITY	4.60203410+00	5.82662330-01	1.70160360-01	3.27691910-02	6.22727770-03	1.18471622-03	2.11227460-04	3.55667270-05
KAPPA(P)	1.65719400+00	5.71963940+02	1.68152610+02	5.31154570+01	1.67145250+01	5.71935470+00	1.95933723+00	9.24107500-01
KAPPA(R)	2.49623430+02	8.80948860+01	2.73653600+01	7.24067170+00	2.15797540+00	7.48905100-01	3.40268930-01	2.27164690-01

DENSITY	5.45793560-06	7.09241390-07
KAPPA(P)	2.31151420-01	1.99711590-01
KAPPA(R)	2.01313470-01	1.95448760-01

THETA = 699.99976 4 DENSITIES

DENSITY	7.91224430-01	1.56805360-01	3.12251940-02	6.23728710-03
KAPPA(P)	3.22146670+01	6.78626010+00	1.51332162+00	4.08052270-01
KAPPA(R)	1.15605676+01	2.37506540+00	6.22305590-01	2.77681630-01

52 DIANE/SCAT AL-109 TEMP(1.-7000.EV) 10 FREQ. C1/WBL 10-26-67 MATERL = 3013 NN = 903

GREY ABSORPTION COEFFICIENTS 23 TEMPERATURES

THETA = 1.00000 13 DENSITIES

DENSITY	1.69120e30-01	1.98609050-02	1.76698250-03	1.74290100-04	2.09202340-05	4.47600830-06	7.90900040-07	1.32443470-07
KAPPA(P)	7.93d58040+05	6.58773070+05	5.07564050+05	1.24730342+05	2.03132560+04	2.74036900+03	4.10169200+02	7.00731020+01
KAPPA(R)	1.50363700+05	1.26386505+05	7.97952990+04	2.79141300+04	5.23498030+03	6.50021040+02	7.37836350+01	1.10710006+01

DENSITY	1.80118390-08	1.78662616-09	1.66759260-10	1.70169710-11	1.58105340-12
KAPPA(P)	1.59386042+01	1.48758080+00	7.60962320-01	1.11836870-01	3.83167560-02
KAPPA(R)	2.82306100+00	3.01550100-01	1.57864690-01	5.11299930-02	3.39506250-02

THETA = 1.50000 13 DENSITIES

DENSITY	7.36293170-02	9.61303A00-03	1.28860891-03	2.10277620-04	3.77994390-05	6.35117990-06	8.93392380-07	1.38023580-07
KAPPA(P)	7.17167e30+05	5.15942160+05	2.59048340+05	7.11168790+04	1.61487177+04	3.75209640+03	7.75381320+02	1.63180620+02
KAPPA(R)	4.78140e50+05	3.34e37260+05	1.40623380+05	3.66812320+04	6.74861070+03	1.48271990+03	2.91574610+02	6.73644040+01

DENSITY	1.89608e00-08	2.24374910-09	2.16879510-10	2.10510640-11	1.95609710-12
KAPPA(P)	2.09449540+01	3.20461190+00	5.90800610-01	1.09321521-01	5.12988470-02
KAPPA(R)	6.76518700+00	1.03268440+00	1.90958870-01	6.67116650-02	4.85023020-02

THETA = 2.25000 13 DENSITIES

DENSITY	6.53896700-02	1.05807490-02	1.66526173-03	2.61341910-04	4.15326830-05	7.24104410-06	1.15612116-06	1.66743350-07
KAPPA(P)	5.34197e00+05	3.22223270+05	1.99300690+05	1.19039200+05	2.77399790+04	6.81126310+03	7.69841750+02	1.14013020+02
KAPPA(R)	2.79380500+05	2.26846740+05	1.19159701+05	4.13960170+04	9.36172190+03	1.86705940+03	3.62984080+02	5.25910080+01

DENSITY	2.30e96e50-08	3.05786410-09	3.54963680-10	3.81303790-11	3.58863260-12
KAPPA(P)	1.51301e79+01	1.76540574+00	2.35629700-01	6.48004320-02	4.69280340-02
KAPPA(R)	5.04435960+00	7.00902140-01	1.29531260-01	5.74443870-02	4.62458290-02

THETA = 3.00000 13 DENSITIES

DENSITY	7.74791610-02	1.29069806-02	2.08821500-03	3.29237560-04	5.42375540-05	9.59258740-06	1.68714976-06	2.83937980-07
KAPPA(P)	3.75250610+05	2.53700540+05	1.89619590+05	7.19034910+04	1.39118459+04	1.88842780+03	2.30873030+02	3.14565020+01
KAPPA(R)	9.87058960+04	9.12063640+04	6.83707220+04	2.99139980+04	7.00964910+03	1.14247690+03	1.52763190+02	2.81225080+01

DENSITY	4.30012510-08	5.66666750-09	6.66616000-10	7.08270580-11	6.66560080-12
KAPPA(P)	4.31785170+00	5.84632040-01	1.03576512-01	5.09297010-02	4.54852580-02
KAPPA(R)	2.64490780+00	3.65761540-01	8.90599520-02	5.07089930-02	4.49968000-02

THETA = 5.00000 13 DENSITIES

DENSITY	9.55e59500-02	1.71717270-02	2.77031590-03	4.61425020-04	8.40027550-05	1.63132990-05	2.97716220-06	5.05316960-07
KAPPA(P)	1.98356e50+05	1.40967100+05	8.07012990+04	1.99702290+04	3.00477770+03	4.55763480+02	6.70611300+01	9.92076340+00
KAPPA(R)	3.13299550+04	2.48069490+04	1.51206097+04	5.83964270+03	1.42710030+03	2.73790970+02	4.07767330+01	6.78200700+00

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00000 CONTINUED

DENSITY	7.7e557e00-08	1.00299541-06	1.12763886-09	1.03905448-10	9.01191630-12
KAPPA(P)	1.00032e00+00	2.20113870-01	7.77141440-02	6.12440240-02	6.01325490-02
KAPPA(R)	1.00n11387+00	1.81287520-01	6.98303190-02	5.84364180-02	5.90237130-02

THETA = 7.00000 13 DENSITIES

DENSITY	1.24562nn7-01	2.34755930-02	3.95715490-03	7.17936840-04	1.36206300-04	2.67581890-05	9.81189330-06	7.59261200-07
KAPPA(P)	1.07649932+05	6.35822700+04	2.76013490+04	5.53593600+03	9.56385390+02	1.75216600+02	3.32989530+01	7.69008020+00
KAPPA(R)	1.51049021+04	8.72478390+03	4.02010740+03	1.17664080+03	2.97807090+02	7.02561570+01	1.75882540+01	4.73469020+00

DENSITY	1.03107e97-07	1.25261192-06	1.36851455-09	1.30090590-10	1.16571676-11
KAPPA(P)	1.78504e76+00	3.35221420-01	1.10539318-01	7.97483680-02	7.66817930-02
KAPPA(R)	1.041554J6+00	2.10847950-01	8.9894e160-02	7.59429140-02	7.54005280-02

THETA = 10.00000 13 DENSITIES

DENSITY	1.0470906J-01	3.41620960-02	6.24998030-03	1.15530952-03	2.066617A0-04	3.67493530-05	6.28050800-06	9.59983290-07
KAPPA(P)	1.34773JA0+05	7.08627330+04	2.26573590+04	5.61088600+03	1.304869A0+03	3.14872240+02	5.89840450+01	1.04840582+01
KAPPA(R)	1.093544J8+04	6.51327770+03	2.00678640+03	7.74372470+02	3.09908460+02	9.63783830+01	2.12962280+01	4.43380630+00

DENSITY	1.34403520-07	1.61691940-08	1.72983896-09	1.72347220-10	1.48519496-11
KAPPA(P)	1.90780614+00	3.76239640-01	1.31582400-01	9.91406220-02	1.02469918-01
KAPPA(R)	8.00589020-01	2.02864300-01	1.08788664-01	9.55854180-02	1.00814811-01

THETA = 15.00000 13 DENSITIES

DENSITY	2.85015700-01	5.30384910-02	9.15923160-03	1.58592885-03	2.79243890-04	5.02672930-05	8.36503520-06	1.29830639-06
KAPPA(P)	2.3218272+05	1.42143150+05	4.23316330+04	9.09481690+03	1.58502580+03	2.68858960+02	5.11276770+01	9.67257090+00
KAPPA(R)	1.8246599+04	8.81621530+03	4.82569700+03	1.74518350+03	4.24769200+02	8.97313290+01	1.94688350+01	3.88960280+00

DENSITY	1.92594.40-07	2.18638790-08	2.36532590-09	2.33310740-10	2.08225820-11
KAPPA(P)	1.80160496+00	3.88291750-01	1.61982660-01	1.32353620-01	1.36503360-01
KAPPA(R)	7.0640140J-01	2.1760A440-01	1.36697340-01	1.28310260-01	1.34470430-01

THETA = 22.49999 13 DENSITIES

DENSITY	3.9e836740-02	7.35205060-02	1.25930776-02	2.15920680-03	3.84363440-04	6.89568920-05	1.14939481-05	1.78471830-06
KAPPA(P)	2.29527590+05	1.13038937+05	2.61052030+04	5.45177210+03	1.17856500+03	2.23122940+02	4.55790850+01	1.06721547+01
KAPPA(R)	4.82335590+04	2.41780380+04	9.90276120+03	1.93108630+03	5.30368920+02	7.27208350+01	1.62223500+01	3.24989920+00

DENSITY	2.52037600-07	3.01934760-08	3.30718010-09	3.33592800-10	3.09973320-11
KAPPA(P)	1.99748618+00	3.94807690-01	1.89471050-01	1.66669910-01	1.64849230-01
KAPPA(R)	6.96375450-01	2.41817730-01	1.70705480-01	1.62904880-01	1.62370910-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 30.99998 13 DENSITIES

DENSITY	5.75743620-01	1.02791459-01	1.75928440-02	3.07219820-03	5.40958490-04	9.75609860-05	1.63899870-05	2.58886750-06
KAPPA(P)	1.066107E2+05	5.39462190+04	1.21003656+04	2.79698400+03	7.02625470+02	1.66075850+02	3.20683950+01	6.22079050+00
KAPPA(R)	3.65431E10+04	2.27167980+04	5.95063900+03	1.05950380+03	2.68340300+02	6.42085870+01	1.22272855+01	2.13764090+00
DENSITY	3.81231.70-07	4.89674550-08	5.75055220-09	6.10862160-10	5.74911650-11			
KAPPA(P)	1.143776930+00	2.91781510-01	1.79253950-01	1.66170490-01	1.64777700-01			
KAPPA(R)	4.71018950-01	2.08695080-01	1.69261400-01	1.63725990-01	1.62635620-01			

THETA = 50.00000 13 DENSITIES

DENSITY	8.25393030-01	1.43522280-01	2.47884860-02	4.36627510-03	7.81492510-04	1.45473450-04	2.58945080-05	4.36557010-06
KAPPA(P)	3.817626490+04	1.79813240+04	5.03544580+03	1.62354770+03	3.80657470+02	7.41701630+01	1.28401805+01	2.21266230+00
KAPPA(R)	1.491780E8+04	1.00536602+04	3.26865850+03	8.53811090+02	1.87972370+02	3.13927010+01	6.79127710+00	8.82722980-01
DENSITY	6.76508500-07	8.71513320-08	1.02527509-08	1.04935524-09	1.02527327-10			
KAPPA(P)	4.773524.0-01	2.04190680-01	1.69136700-01	1.65120790-01	1.64692660-01			
KAPPA(R)	2.83794.90-01	1.87255170-01	1.68054320-01	1.63171090-01	1.62471120-01			

THETA = 69.99998 13 DENSITIES

DENSITY	1.14011.98+00	1.98250280-01	3.48048330-02	6.31098210-03	1.18624787-03	2.32426620-04	4.25109070-05	7.21960750-06
KAPPA(P)	1.800896501+04	1.06140404+04	3.66943500+03	8.14866660+02	1.51173010+02	2.71162170+01	4.76927820+00	9.13711700-01
KAPPA(R)	5.901972701+03	4.37869320+03	2.10470150+03	5.10761600+02	7.96355770+01	1.20527070+01	1.97863046+00	4.99074310-01
DENSITY	1.11050629-06	1.44360820-07	1.69833930-08	1.80421560-09	1.69540610-10			
KAPPA(P)	2.780220101-01	1.79195300-01	1.66440060-01	1.64968780-01	1.65068950-01			
KAPPA(R)	2.406694101-01	1.77889620-01	1.64423640-01	1.62394810-01	1.62640960-01			

THETA = 99.99998 13 DENSITIES

DENSITY	1.67097583+00	2.95342670-01	5.36637790-02	1.01859800-02	1.99015650-03	3.95177710-04	7.25213920-05	1.23214377-05
KAPPA(P)	1.01247E04+04	5.88362250+03	1.58231450+03	2.80153860+02	5.10759110+01	9.64892290+00	1.83130010+00	4.46430030-01
KAPPA(R)	1.868324.0+03	1.26247950+03	5.37253580+02	1.40054590+02	2.73815380+01	4.98000040+00	1.05173205+00	3.44191190-01
DENSITY	1.89225752-06	2.43156660-07	2.74173490-08	2.77102140-09	2.48962220-10			
KAPPA(P)	2.108749.0-01	1.75247680-01	1.76527780-01	1.83960360-01	1.92322430-01			
KAPPA(R)	1.981294.0-01	1.69880000-01	1.72470680-01	1.80601920-01	1.89088900-01			

THETA = 149.99995 13 DENSITIES

DENSITY	2.71916610+00	4.98576620-01	9.40765000-02	1.84467330-02	3.63922240-03	7.18305200-04	1.28390520-04	2.88097280-05
KAPPA(P)	4.461427201+03	1.88072930+03	4.35339850+02	8.11329320+01	1.68150270+01	4.22416770+00	1.42801532+00	5.75499110-01
KAPPA(R)	5.210666501+02	2.54610000+02	8.14933710+01	1.94162430+01	4.67438680+00	1.26357194+00	4.73320460-01	2.55365790-01

GRET ABSORPTION COEFFICIENTS CONTINUED

THETA = 149.99995 CONTINUED

DENSITY	3.04988460-06	3.85656030-07	4.51150530-08	4.79002620-09	4.50789880-10
KAPPA(P)	2.94130240-01	2.11951460-01	1.97514360-01	1.95701440-01	1.95505060-01
KAPPA(R)	2.01695750-01	1.93250690-01	1.92121360-01	1.91971760-01	1.91871580-01

THETA = 224.99990 13 DENSITIES

DENSITY	4.56779620+00	6.76296740-01	1.68920350-01	3.25069290-02	6.16220270-03	1.17281201-03	2.99306280-04	3.52689120-05
KAPPA(P)	1.75083520+03	5.97781290+02	1.70402620+02	5.32898020+01	1.90095780+01	5.82350310+00	1.47727703+00	6.28168570-01
KAPPA(R)	2.64595470+02	9.19712440+01	2.61854810+01	7.46691540+00	2.22613230+00	7.51499900-01	3.41812820-01	2.28299830-01
DENSITY	5.91655740-06	7.03956040-07	8.28147260-08	8.79906820-09	8.28147400-10			
KAPPA(P)	2.31622550-01	2.00228110-01	1.96282570-01	1.96010110-01	1.95996000-01			
KAPPA(R)	2.01297770-01	1.95430790-01	1.92437660-01	1.92044720-01	1.92031470-01			

THETA = 499.99993 13 DENSITIES

DENSITY	1.35081497+01	2.53356840+00	4.82882410-01	9.41447300-02	1.86933950-02	3.73260100-03	6.85902570-04	1.16595710-04
KAPPA(P)	1.00677702+03	3.53986580+02	8.28153960+01	1.84187310+01	3.84847120+00	9.07136980-01	3.09234920-01	2.10469610-01
KAPPA(R)	3.33458070+02	1.20438827+02	2.80776800+01	5.09492010+00	1.20061831+00	4.56209640-01	2.55302290-01	2.02986260-01
DENSITY	1.79376470-05	2.33189340-06	2.74339360-07	2.91485720-08	2.74339460-09			
KAPPA(P)	1.99816070-01	1.98700620-01	1.98558990-01	1.98542120-01	1.98540330-01			
KAPPA(R)	1.98239490-01	1.95628850-01	1.95551980-01	1.95542600-01	1.95541620-01			

THETA = 699.99976 13 DENSITIES

DENSITY	2.14972720+01	4.04030420+00	7.85335860-01	1.54322450-01	3.09371670-02	6.18187310-03	1.13615788-03	1.93139870-04
KAPPA(P)	5.43267590+02	1.55349110+02	3.28088720+01	6.76285400+00	1.51035936+00	4.11165320-01	2.25167840-01	2.02586770-01
KAPPA(R)	1.41102610+02	5.06081170+01	1.16596013+01	2.39292710+00	6.13773200-01	2.77125440-01	2.08149480-01	1.98811930-01
DENSITY	2.97137720-05	3.86275490-06	4.54444520-07	4.82847560-08	4.54444650-09			
KAPPA(P)	1.99898610-01	1.99526140-01	1.99477070-01	1.99471080-01	1.99470480-01			
KAPPA(R)	1.98695720-01	1.96696560-01	1.96676700-01	1.96674340-01	1.96673940-01			

THETA = 999.99967 13 DENSITIES

DENSITY	3.51560590+01	6.79008860+00	1.33457561+00	2.64909510-01	5.28108840-02	1.05547952-02	1.93903465-03	3.29779948-04
KAPPA(P)	2.39413660+02	5.77960240+01	1.25902203+01	2.56809760+00	6.22726670-01	2.62655240-01	2.07423430-01	1.99987180-01
KAPPA(R)	3.25378450+01	9.81966470+00	2.37229650+00	6.31351450-01	2.91336010-01	2.15216450-01	1.99137440-01	1.98500190-01
DENSITY	5.87350640-05	6.59558590-06	7.75940330-07	8.24485550-08	7.75940550-09			
KAPPA(P)	1.98802780-01	1.98617780-01	1.98596530-01	1.98593940-01	1.98593700-01			
KAPPA(R)	1.96154620-01	1.96085010-01	1.96078140-01	1.96077350-01	1.96077350-01			

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 1499.99930 13 DENSITIES

DENSITY	9.33517760+01	1.22707572+01	2.43709870+00	8.86451480-01	9.70099250-02	1.93099770-02	3.56307940-03	6.85004020-04
KAPPA(P)	8.63906500+01	2.07007920+01	8.37708330+00	9.73894630-01	3.27502360-01	2.17589440-01	1.99743550-01	1.96003950-01
KAPPA(R)	6.80391160+00	1.76322513+00	5.63728960-01	2.78877780-01	2.16282030-01	1.99661070-01	1.99507000-01	1.99703770-01
DENSITY	9.32063650-05	1.21167713-05	1.42551137-06	1.51660650-07	1.42551162-08			
KAPPA(P)	1.96402920-01	1.96325350-01	1.96314950-01	1.96313780-01	1.96313570-01			
KAPPA(R)	1.99550790-01	1.99526080-01	1.99522780-01	1.99522390-01	1.99522390-01			

THETA = 2249.99070 13 DENSITIES

DENSITY	1.16971172+02	2.24831240+01	4.47393780+00	8.93494860-01	1.78210470-01	3.56213180-02	6.58720470-03	1.11380583-03
KAPPA(P)	3.26921460+01	7.22119890+00	1.64033795+00	4.43869400-01	2.34753090-01	2.80591050-01	1.99775240-01	1.93769180-01
KAPPA(R)	1.63865510+00	5.31783420-01	2.62502180-01	2.14664870-01	1.99172500-01	1.94342930-01	1.93158540-01	1.92927260-01
DENSITY	1.71231020-04	2.22599840-05	2.61883760-06	2.78248860-07	2.61883840-08			
KAPPA(P)	1.93567650-01	1.93559170-01	1.93555500-01	1.93555110-01	1.93555110-01			
KAPPA(R)	1.92884250-01	1.92877310-01	1.92876340-01	1.92876150-01	1.92876150-01			

THETA = 3000.00050 13 DENSITIES

DENSITY	2.09122440+02	4.17105030+01	8.30761010+00	1.65718203+00	3.31029760-01	6.61686160-02	1.21619263-02	2.06748170-03
KAPPA(P)	5.46027410+00	1.25969848+00	3.73809040-01	2.15155560-01	1.91752650-01	1.88619220-01	1.88119660-01	1.88001990-01
KAPPA(R)	4.39128450-01	2.56615350-01	2.09152420-01	1.95828500-01	1.92077170-01	1.91167740-01	1.90949780-01	1.90920340-01
DENSITY	3.18072500-04	4.13495110-05	4.86462990-06	5.16867150-07	4.86463130-08			
KAPPA(P)	1.88028450-01	1.88026380-01	1.88026190-01	1.88026000-01	1.88026000-01			
KAPPA(R)	1.90915000-01	1.90914030-01	1.90914030-01	1.90914030-01	1.90914030-01			

THETA = 4999.99070 13 DENSITIES

DENSITY	3.72295910+02	7.43373060+01	1.48126563+01	2.95518710+00	5.90334060-01	1.18001492-01	2.16889580-02	3.68704500-03
KAPPA(P)	2.65282490+00	6.58523100-01	2.62316630-01	1.98270890-01	1.89460260-01	1.88226920-01	1.88030270-01	1.87998930-01
KAPPA(R)	3.19820440-01	2.26158990-01	2.00682540-01	1.93406320-01	1.91448770-01	1.91001880-01	1.90930840-01	1.90916900-01
DENSITY	5.67235000-04	7.37406050-05	8.67539230-06	9.21760930-07	8.67539590-08			
KAPPA(P)	1.87992720-01	1.87991780-01	1.87991600-01	1.87991600-01	1.87991600-01			
KAPPA(R)	1.90918420-01	1.90914030-01	1.90914030-01	1.90914030-01	1.90914030-01			

THETA = 6999.99090 13 DENSITIES

DENSITY	6.16102020+02	1.23099501+02	2.46713240+01	4.89514050+00	9.77882490-01	1.95469480-01	3.59277960-02	6.18739640-03
KAPPA(P)	1.02826938+00	4.06735370-01	2.20741260-01	1.92455170-01	1.88678260-01	1.88087690-01	1.87992160-01	1.87979300-01
KAPPA(R)	2.64924870-01	2.11442750-01	1.96544770-01	1.92290120-01	1.91213820-01	1.90959100-01	1.90922630-01	1.90915300-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 6999.99890 CONTINUED

DENSITY	9.39626000-04	1.22151440-04	1.43706884-05	1.52688629-06	1.43706910-07
KAPPA(P)	1.87971290-01	1.87970740-01	1.87970740-01	1.87970740-01	1.87970740-01
KAPPA(R)	1.90914230-01	1.90914030-01	1.90914030-01	1.90914030-01	1.90914030-01

7 DIAM2/SCAT BE(MI/LO)-2 10 FREQ. TEMP(1.-2250.) CI/JP 12-9-66 000000 MATERL = 1004 NR = 001

GREY ABSORPTION COEFFICIENTS 21 TEMPERATURES

THETA = 1.00000 13 DENSITIES

DENSITY	1.62809860-04	1.84836040-02	1.43322087-03	1.05590304-04	1.05555377-05	1.59352834-06	2.70928760-07	4.68943310-08
KAPPA(P)	2.09461360+05	1.96005866+05	1.62860750+05	1.15364265+05	4.02232270+04	7.01188560+03	1.09431390+03	1.81621910+02
KAPPA(R)	7.37156820+04	6.65913670+04	5.68544590+04	3.73508100+04	1.40367048+04	2.81765420+03	3.95105960+02	5.54581660+01
DENSITY	8.56106530-09	8.59868900-10	5.80921630-11	5.71989900-12	5.33301300-13			
KAPPA(P)	3.58128480+01	9.28267200+00	1.96325390+00	3.09774700-01	1.10755525-01			
KAPPA(R)	1.05314612+04	2.57002470+00	5.26361660-01	1.51621800-01	9.71952920-02			

THETA = 1.50000 13 DENSITIES

DENSITY	3.67113250-04	4.59943870-03	3.30221560-04	7.56024440-05	1.32832063-05	2.35481130-06	3.38067620-07	4.56542130-08
KAPPA(P)	4.66072490+05	3.40728070+05	2.28819520+05	1.12955576+05	3.02723470+04	7.34762920+03	1.67729550+03	3.14977110+02
KAPPA(R)	3.23075660+05	2.46611600+05	1.38514450+05	6.63242050+04	1.18546193+04	2.92653370+03	6.54696650+02	1.10632206+02
DENSITY	6.56594260-09	6.33789790-10	9.79024040-11	1.03996400-11	9.78769820-13			
KAPPA(P)	4.72978600+01	5.60272110+00	7.53715670-01	1.57384250-01	9.61781590-02			
KAPPA(R)	1.84604615+04	1.73054379+00	2.83760130-01	1.15455859-01	9.30847420-02			

THETA = 2.25000 13 DENSITIES

DENSITY	2.72233600-04	4.34465920-03	6.34491940-04	9.90146250-05	1.53086900-05	2.61271680-06	4.55837290-07	7.66091080-08
KAPPA(P)	3.16861460+05	3.56443110+05	2.88321050+05	1.69040040+05	5.30220230+04	5.01713280+03	6.82471630+02	9.93059990+01
KAPPA(R)	2.75160920+05	2.40857300+05	1.53977220+05	5.70292700+04	1.30326050+04	2.09435930+03	2.83593240+02	3.72360350+01
DENSITY	2.17614680-04	1.52846816-05	1.79811890-10	1.91048310-11	1.79810130-12			
KAPPA(P)	1.42567280+01	1.77985392+00	2.75373470-01	1.09321084-01	9.18435210-02			
KAPPA(R)	4.82454060+00	6.66887610-01	1.79856490-01	1.06346142-01	9.07842010-02			

THETA = 3.00000 13 DENSITIES

DENSITY	3.27569650-04	5.12910550-03	6.06719940-04	1.29587670-04	2.35319870-05	4.57899980-06	8.36323930-07	1.41992730-07
KAPPA(P)	3.94214610+05	4.65717830+05	1.90768290+05	4.73342760+04	8.05355540+03	1.24709160+03	1.89122690+02	2.89575210+01
KAPPA(R)	4.15911150+04	7.83115120+04	4.64176140+04	1.77113500+04	3.98606140+03	7.19806190+02	1.13392922+02	1.65823020+01
DENSITY	2.16400660-05	2.63909700-09	3.34010060-10	3.54885930-11	3.34010120-12			
KAPPA(P)	-2.20902280+00	8.00859760-01	1.48787970-01	9.62226030-02	9.05679400-02			
KAPPA(R)	2.37997650+00	4.61346670-01	1.36110660-01	9.42093950-02	8.89104140-02			

THETA = 5.00000 13 DENSITIES

DENSITY	4.31768420-04	6.97711360-03	1.18364810-03	2.13992220-04	4.10430130-05	8.12414560-06	1.68996193-06	2.53178790-07
KAPPA(P)	2.15916490+05	1.17678305+05	4.53261720+04	1.21349606+04	2.15622860+03	3.57057540+02	5.73665250+01	9.13258440+00
KAPPA(R)	4.42988260+04	1.43061979+04	6.34793520+03	1.91390110+03	4.61327380+02	9.83646980+01	1.85077570+01	3.30475710+00

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00000 CONTINUED

DENSITY	3.89475910-08	5.06308430-09	5.95636810-10	6.32668260-11	5.93480660-12
KAPPA(P)	1.03228970+00	2.60479520-01	1.10580824-01	9.21669200-02	9.05338020-02
KAPPA(R)	6.45949790-01	1.81897300-01	1.02009738-01	8.99011100-02	8.88211040-02

THETA = 7.00000 13 DENSITIES

DENSITY	5.57549540-02	1.03565928-02	1.85421107-03	3.48052930-04	6.76669960-05	1.30031620-05	2.46736450-06	4.19131990-07
KAPPA(P)	1.02921301+05	4.10682210+04	1.41374547+04	5.28071240+03	6.26404250+02	1.15349072+02	1.99805620+01	3.37854790+00
KAPPA(R)	7.80633260+03	3.37227170+03	1.20182670+03	3.26498130+02	7.63404530+01	1.64883810+01	3.34029450+00	7.64167850-01
DENSITY	6.42765400-08	8.16646260-09	8.48221030-10	7.43453520-11	6.61970760-12			
KAPPA(P)	6.30469140-01	2.07407880-01	1.49239140-01	1.37584630-01	1.35326760-01			
KAPPA(R)	2.54460410-01	1.33511450-01	1.15301826-01	1.27317790-01	1.31992390-01			

THETA = 10.00000 13 DENSITIES

DENSITY	8.87110360-02	1.67567520-02	3.09122140-03	5.89353130-04	1.14979352-04	2.26409580-05	3.98184790-06	5.82789920-07
KAPPA(P)	5.46513680+04	1.91198620+04	5.26216020+03	1.22555080+03	2.69537880+02	6.09837960+01	2.11372090+01	8.80361180+00
KAPPA(R)	3.01927770+03	1.10019520+03	3.46615790+02	8.98925410+01	2.22113400+01	6.48821650+00	2.76669090+00	1.30147664+00
DENSITY	7.73890760-08	9.56638980-09	1.07735177-09	9.98661850-11	8.55769700-12			
KAPPA(P)	2.39282910+00	4.88455450-01	1.99726570-01	1.76680270-01	1.78941910-01			
KAPPA(R)	4.58130640-01	1.97777230-01	1.49767970-01	1.60779890-01	1.74277570-01			

THETA = 15.00000 13 DENSITIES

DENSITY	1.55902670-01	2.81416670-02	5.32831120-03	9.90650300-04	1.69590810-04	2.96995110-05	5.08991230-06	7.90223560-07
KAPPA(P)	2.29077370+04	1.28477750+04	4.84496300+03	1.70289650+03	6.24569720+02	1.79183240+02	4.15907990+01	1.07851153+01
KAPPA(R)	1.58578360+03	6.15763490+02	2.17720240+02	9.61533140+01	4.61135940+01	1.39515832+01	3.91793990+00	1.40763176+00
DENSITY	1.07509455-07	1.32820825-08	1.54938162-09	1.68449100-10	1.54758570-11			
KAPPA(P)	2.76624650+00	5.74236240-01	2.27486360-01	1.85027090-01	1.80449920-01			
KAPPA(R)	4.92833640-01	2.34558090-01	1.84176820-01	1.77675400-01	1.76957090-01			

THETA = 22.49999 13 DENSITIES

DENSITY	2.41987550-01	4.48194990-02	7.68294800-03	1.32733514-03	2.36979690-04	4.21675350-05	7.26080480-06	1.21381697-06
KAPPA(P)	4.07148640+04	2.56161940+04	8.79861990+03	2.35235630+03	6.35807580+02	1.72231230+02	3.71372290+01	8.73688560+00
KAPPA(R)	4.06450790+03	1.81610970+03	7.51414130+02	2.44650090+02	7.13313510+01	1.86835780+01	3.84734880+00	7.72488360-01
DENSITY	1.86005440-07	2.81679130-08	2.84307450-09	3.02073770-10	2.84304660-11			
KAPPA(P)	1.12848230+00	3.02595300-01	1.93824920-01	1.81101280-01	1.80385790-01			
KAPPA(R)	2.87815470-01	1.99703000-01	1.83684620-01	1.78379130-01	1.77428950-01			

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 33.99998 13 DENSITIES

DENSITY	3.70004760-01	6.46078740-02	1.11918390-02	1.95648630-03	3.67223830-04	7.21748490-05	1.32151065-05	2.29485430-06
KAPPA(P)	3.92548470+04	2.34747330+04	7.38688850+03	1.67758230+03	3.29065480+02	6.44317780+01	1.13859718+01	2.05867230+00
KAPPA(R)	1.08147139+04	4.85446860+03	1.52531600+03	3.31185790+02	5.26564890+01	7.73426590+00	1.33924262+00	4.37095360-01
DENSITY	3.95314600-07	4.48900350-06	5.28118050-09	5.61123540-10	5.28116150-11			
KAPPA(P)	4.65224410-01	2.12032650-01	1.84023220-01	1.82743820-01	1.82645890-01			
KAPPA(R)	2.63575610-01	2.00632580-01	1.82391090-01	1.81697390-01	1.81648940-01			

THETA = 50.00000 13 DENSITIES

DENSITY	5.45230950-01	9.66093280-02	1.71916920-02	3.26079910-03	8.42943970-04	1.28190770-04	2.35469360-05	4.68282990-06
KAPPA(P)	2.80212920+04	1.16042738+04	3.09372140+03	6.09151690+02	1.13463617+02	2.15730518+01	4.01902770+00	8.02616220-01
KAPPA(R)	9.04110700+03	4.40216570+03	1.24371470+03	2.14043220+02	3.24034200+01	5.48583310+00	1.10736514+00	4.11977390-01
DENSITY	6.15808410-07	6.00543580-08	9.41812390-09	1.00067608-09	9.41812550-11			
KAPPA(P)	2.59566650-01	1.92991910-01	1.88465740-01	1.87759780-01	1.87719200-01			
KAPPA(R)	2.25496570-01	1.91088020-01	1.88489120-01	1.87946860-01	1.87927510-01			

THETA = 69.99998 13 DENSITIES

DENSITY	8.02348920-01	1.45313870-01	2.74952540-02	5.36674680-03	1.06265693-03	2.12249320-04	3.90854280-05	6.63856920-06
KAPPA(P)	1.36730830+04	6.82976390+03	1.00886373+03	1.93254110+02	3.85675390+01	7.43395460+00	1.46178900+00	3.65209790-01
KAPPA(R)	2.87881620+03	1.15784640+03	3.11356010+02	6.55501600+01	1.25957563+01	2.47065470+00	5.88708990-01	2.55217280-01
DENSITY	1.02007950-06	1.32610460-07	1.56011690-08	1.65762531-09	1.56011720-10			
KAPPA(P)	2.08366570-01	1.93779760-01	1.92469790-01	1.92316660-01	1.92303200-01			
KAPPA(R)	1.99604370-01	1.93140370-01	1.92570680-01	1.92521010-01	1.92516390-01			

THETA = 99.99998 13 DENSITIES

DENSITY	1.29680751+00	2.38987020-01	4.63091830-02	9.10273860-03	1.81332163-03	3.62362300-04	6.65991380-05	1.13214665-05
KAPPA(P)	5.36213670+03	1.73131400+03	3.62088980+02	7.19491010+01	1.45608581+01	3.00707540+00	6.15493360-01	2.44225570-01
KAPPA(R)	5.03480450+02	2.15595260+02	5.42084600+01	1.19840306+01	2.53029930+00	8.48353440-01	2.83479620-01	2.09330650-01
DENSITY	1.74175034-06	2.26427750-07	2.66367250-08	2.83036570-09	2.66384620-10			
KAPPA(P)	1.99529130-01	1.94648290-01	1.94072200-01	1.94122670-01	1.94115870-01			
KAPPA(R)	1.95904640-01	1.94143440-01	1.93930770-01	1.93985080-01	1.93982370-01			

THETA = 149.99995 13 DENSITIES

DENSITY	2.21008700+00	4.31883670-01	8.46507780-02	1.67035000-02	3.33048290-03	6.65667090-04	1.22349230-04	2.07989180-05
KAPPA(P)	2.30182360+03	5.86686120+02	1.20729917+02	2.52291220+01	5.10877870+00	1.09564463+00	3.25777380-01	2.10835070-01
KAPPA(R)	1.65586680+02	3.98676400+01	9.18031000+00	2.07507160+00	5.74956600-01	2.83563420-01	2.14735480-01	1.97781180-01

GRET ABSORPTION COEFFICIENTS CONTINUED

THETA = 149.99995 CONTINUED

DENSITY	3.19980740-06	6.15975300-07	8.89380900-08	5.19967430-09	6.89380990-10
KAPPA(P)	1.95869430-01	1.93870660-01	1.93623630-01	1.93378670-01	1.93375190-01
KAPPA(R)	1.96191400-01	1.93582790-01	1.93508270-01	1.93435330-01	1.93434170-01

THETA = 224.99990 13 DENSITIES

DENSITY	3.98803670+00	7.87080850-01	1.55211740-01	3.06712050-02	6.11780460-03	1.22288312-03	2.24768860-04	3.82097870-05
KAPPA(P)	2.86243e00+02	6.94267320+01	2.27787700+01	9.90883660+00	1.08919459+00	2.76458100-01	1.98196170-01	1.88779098-01
KAPPA(R)	1.82557e78+01	3.44948520+00	8.82561500-01	3.51691110-01	2.32752870-01	2.02006180-01	1.93468160-01	1.91321580-01
DENSITY	5.87943e00-06	7.64197170-07	8.99052080-08	9.55243670-09	8.99052230-10			
KAPPA(P)	1.87717530-01	1.87584660-01	1.87567220-01	1.87564960-01	1.87564780-01			
KAPPA(R)	1.90839420-01	1.90834450-01	1.90825860-01	1.90824900-01	1.90824710-01			

THETA = 300.00012 13 DENSITIES

DENSITY	7.34373e00+00	1.45713837+00	2.88041990-01	5.69590320-02	1.13636116-02	2.27156100-03	4.17522560-04	7.09774020-05
KAPPA(P)	2.3e032740+02	3.18701230+01	6.99424730+00	1.52589556+00	4.12771340-01	2.19518450-01	1.91319010-01	1.88026088-01
KAPPA(R)	6.82891e20+00	1.63389901+00	5.06946500-01	2.69813650-01	2.11909700-01	1.96452220-01	1.92852790-01	1.91823850-01
DENSITY	1.09196e48-05	1.61953681-06	1.67005350-07	1.77443270-08	1.67005398-09			
KAPPA(P)	1.87631960-01	1.87573400-01	1.87565710-01	1.87564960-01	1.87564780-01			
KAPPA(R)	1.90856230-01	1.90828910-01	1.90825280-01	1.90824710-01	1.90824710-01			

THETA = 499.99993 13 DENSITIES

DENSITY	1.3e3886e8+01	2.54e93030+00	5.09166910-01	1.01564623-01	2.02646960-02	4.05096570-03	7.44587640-04	1.28877610-04
KAPPA(P)	6.80e654e0+01	1.57279934+01	3.35722920+00	7.66510100-01	2.77483450-01	1.99599780-01	1.89034070-01	1.87768390-01
KAPPA(R)	3.37994e50+00	8.89084670-01	3.51249670-01	2.32460490-01	2.02690230-01	1.93722410-01	1.91396510-01	1.90012890-01
DENSITY	1.9e734e20-05	2.93158720-06	2.97847910-07	3.18442330-08	2.97828000-09			
KAPPA(P)	1.87595730-01	1.87568720-01	1.87565160-01	1.87564780-01	1.87564780-01			
KAPPA(R)	1.90839600-01	1.90826620-01	1.90824980-01	1.90824710-01	1.90824710-01			

THETA = 699.99976 13 DENSITIES

DENSITY	2.1e500e00+01	4.21952660+00	8.43236090-01	1.68230200-01	3.35679680-02	6.71041180-03	1.23341870-03	2.09676020-04
KAPPA(P)	3.62349e50+01	8.21701480+00	1.76326400+00	4.57998560-01	2.26712410-01	1.92713820-01	1.88253090-01	1.87667030-01
KAPPA(R)	1.84185e73+00	5.59447940-01	2.80756360-01	2.14848320-01	1.97267100-01	1.92408450-01	1.91128980-01	1.90972840-01
DENSITY	3.2e878e40-05	4.19352050-06	4.93353490-07	5.28188310-08	4.93353580-09			
KAPPA(P)	1.87580630-01	1.87566860-01	1.87564960-01	1.87564780-01	1.87564780-01			
KAPPA(R)	1.90838e00-01	1.90825660-01	1.90824980-01	1.90824710-01	1.90824710-01			

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 999.99967 13 DENSITIES

DENSITY	3.67420900+01	7.20154070+00	1.43956089+00	2.87234020-01	5.73156260-02	1.14577949-02	2.10681026-03	5.98015290-04	
KAPPA(P)	1.84668490+01	4.12068550+00	9.20165120-01	3.04207200-01	2.03469940-01	1.89709180-01	1.87859670-01	1.87819870-01	
KAPPA(R)	1.01150910+00	3.84103820-01	2.40918770-01	2.04222950-01	1.94320570-01	1.91626710-01	1.90948228-01	1.90840970-01	
DENSITY	5.50791480-05	7.15029090-06	8.42383960-07	8.95033440-08	8.42384200-09				
KAPPA(P)	1.87572460-01	1.87565710-01	1.87564960-01	1.87564780-01	1.87564780-01				
KAPPA(R)	1.90828520-01	1.90825280-01	1.90824900-01	1.90824710-01	1.90824710-01				

THETA = 1499.99950 13 DENSITIES

DENSITY	6.74335690+01	1.32259920+01	2.64433600+00	5.27664080-01	1.05294722-01	2.10492780-02	3.86898930-03	6.57716229-04	
KAPPA(P)	8.46721260+00	1.89481307+00	4.82906640-01	2.30819100-01	1.93262670-01	1.88402620-01	1.87695930-01	1.87587280-01	
KAPPA(R)	5.71081070-01	2.86760180-01	2.16365110-01	1.97725210-01	1.92514840-01	1.91189910-01	1.90884830-01	1.90839780-01	
DENSITY	1.01186023-04	1.31543244-05	1.54756169-06	1.64428520-07	1.54756200-08				
KAPPA(P)	1.87569548-01	1.87565340-01	1.87564960-01	1.87564960-01	1.87564960-01				
KAPPA(R)	1.90826010-01	1.90825280-01	1.90825090-01	1.90825090-01	1.90825090-01				

THETA = 2249.99670 13 DENSITIES

DENSITY	1.23816166+02	2.42931390+01	4.85753430+00	9.69357130-01	1.93437660-01	3.86699290-02	7.18778240-03	1.28830229-03	
KAPPA(P)	5.88923700+00	9.04814710-01	3.01605920-01	2.03091430-01	1.89671620-01	1.87882038-01	1.87623070-01	1.87579470-01	
KAPPA(R)	3.74161760-01	2.39662640-01	2.04030860-01	1.94256070-01	1.91614648-01	1.90956610-01	1.90853150-01	1.90836250-01	
DENSITY	1.85892130-04	2.41658530-05	2.84305920-06	3.02075170-07	2.84305970-08				
KAPPA(P)	1.87567220-01	1.87565980-01	1.87565710-01	1.87565710-01	1.87565710-01				
KAPPA(R)	1.90826440-01	1.90825480-01	1.90825480-01	1.90825480-01	1.90825480-01				

1060000 C-4A.14 FREQ,TEMP(.12925-10),2-3-66 REMADE 3-28-67, 4 DENSITIES DELETED MATERL = 1006 NX = 706

WHEY ABSORPTION COEFFICIENTS 21 TEMPERATURES

THETA = .12925 12 DENSITIES

DENSITY	2.63360090-01	8.77757520-02	2.63277960-02	8.77410940-03	2.63145070-03	8.76845290-04	2.62922030-04	8.75983290-05
KAPPA(P)	1.59516060+05	1.59547970+05	1.59563930+05	1.59579890+05	1.59595850+05	1.59595850+05	1.59611810+05	1.59611810+05
KAPPA(R)	5.22048250+02	5.22131750+02	5.22173520+02	5.22241410+02	5.22293630+02	5.22319760+02	5.22377200+02	5.22450340+02
DENSITY	2.62584430-05	8.74349990-06	2.61930910-06	8.71543590-07				
KAPPA(P)	1.59627770+05	1.59627770+05	1.59627770+05	1.59643720+05				
KAPPA(R)	5.22628000+02	5.22389400+02	5.23412540+02	5.24276900+02				

THETA = .17434 12 DENSITIES

DENSITY	1.96974660-01	6.55396490-02	1.96260010-02	6.52770430-03	1.95207969-03	6.48116580-04	1.93264680-04	6.39154180-05
KAPPA(P)	1.29340001+05	1.29430571+05	1.29534158+05	1.29598952+05	1.29663763+05	1.29702658+05	1.29715633+05	1.29850796+05
KAPPA(R)	1.27161460+03	1.27301060+03	1.27474310+03	1.27679710+03	1.28058200+03	1.28639620+03	1.29645640+03	1.30834720+03
DENSITY	1.89292920-05	6.19604160-06	1.79986318-06	5.71100860-07				
KAPPA(P)	1.29469412+05	1.29055766+05	1.28001843+05	1.25881960+05				
KAPPA(R)	1.32099620+03	1.32740330+03	1.32420820+03	1.30637310+03				

THETA = .21542 12 DENSITIES

DENSITY	4.55548140-01	5.15362420-02	1.53173369-02	5.04292020-03	1.48197445-03	4.79522380-04	1.36361660-04	4.10926570-05
KAPPA(P)	8.89028690+04	8.90897800+04	8.92324400+04	8.92681460+04	8.91343630+04	8.86720460+04	8.73431560+04	8.45670470+04
KAPPA(R)	2.27091920+03	2.28360350+03	2.30376480+03	2.33001490+03	2.36444820+03	2.38928620+03	2.38696900+03	2.33199620+03
DENSITY	1.08374817-05	2.94942600-06	6.89292650-07	1.95756300-07				
KAPPA(P)	7.70991780+04	6.47312880+04	4.19108470+04	2.23727720+04				
KAPPA(R)	2.15994920+03	1.81739590+03	1.20659780+03	6.78951670+02				

THETA = .25651 12 DENSITIES

DENSITY	1.25255450-01	4.08209440-02	1.17802608-02	3.70830660-03	1.00331072-03	2.87723680-04	6.85032080-05	1.84305670-05
KAPPA(P)	6.12243260+04	6.13469030+04	6.11631370+04	6.04093950+04	5.81976320+04	5.35461900+04	4.31785870+04	2.93838330+04
KAPPA(R)	3.70052470+03	3.75202120+03	3.81143090+03	3.84782050+03	3.76769950+03	3.51512360+03	2.88032950+03	2.00650580+03
DENSITY	4.76506280-06	1.48425149-06	4.23589930-07	1.33909720-07				
KAPPA(P)	1.67923700+04	1.08578105+04	8.36607380+03	8.06637850+03				
KAPPA(R)	1.19143040+03	7.93378160+02	6.19182440+02	5.97407810+02				

THETA = .30460 12 DENSITIES

DENSITY	9.89718530-02	3.07913950-02	8.17618180-03	2.29817490-03	5.42300660-04	1.48434020-04	3.89707280-05	1.20284643-05
KAPPA(P)	4.60780170+04	4.57204040+04	4.41787850+04	4.06396690+04	3.30739080+04	2.42434050+04	1.72792200+04	1.44085994+04
KAPPA(R)	5.76044470+03	5.82619760+03	5.75451470+03	5.37191580+03	4.39134080+03	3.18020160+03	2.19355750+03	1.77719220+03

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = .30160 CONTINUED

DENSITY	3.30458410-06	9.77468270-07	2.35960850-07	5.96960580-08
KAPPA(P)	1.30850260+04	1.81899602+04	1.47576956+04	1.20532238+04
KAPPA(R)	1.67998460+03	1.77495430+03	1.90038160+03	1.70516980+03

THETA = .34468 12 DENSITIES

DENSITY	7.37156010-02	2.10309520-02	5.00273770-03	1.34367081-03	3.40328240-04	1.01800045-04	2.69615190-05	7.63475300-06	
KAPPA(P)	4.06392910+04	3.93764720+04	3.53965420+04	2.97385660+04	2.43893040+04	2.19111280+04	2.10429300+04	2.06450300+04	
KAPPA(R)	8.35077710+03	8.18231150+03	7.33747400+03	5.93682590+03	4.53708440+03	3.89558810+03	3.75269660+03	3.83609300+03	
DENSITY	1.76616016-06	4.58686020-07	1.17950597-07	3.74522160-08					
KAPPA(P)	1.83321490+04	1.23795349+04	5.26249200+03	1.93807390+03					
KAPPA(R)	3.64424040+03	2.56714570+03	1.11016060+03	4.02872630+02					

THETA = .38776 12 DENSITIES

DENSITY	5.10979560-02	1.35654389-02	3.23841920-03	9.26774760-04	2.39621490-04	6.74603890-05	1.57715950-05	4.14959450-06	
KAPPA(P)	4.80949420+04	4.10686320+04	3.63700120+04	3.31235570+04	3.12195550+04	2.96139230+04	2.52050570+04	1.67932110+04	
KAPPA(R)	1.06162670+04	9.92071150+03	8.42298780+03	7.31827500+03	6.83950040+03	6.72179150+03	6.08553480+03	4.25623350+03	
DENSITY	1.06248505-06	3.34844400-07	9.84319950-08	3.26213170-08					
KAPPA(P)	7.32047530+03	2.75212860+03	8.61185520+02	2.90496040+02					
KAPPA(R)	1.88755740+03	7.03283410+02	2.17868130+02	7.33578800+01					

THETA = .43085 12 DENSITIES

DENSITY	3.47435960-02	9.31434130-03	2.31765360-03	6.54741540-04	1.57173540-04	4.14550870-05	1.01540353-05	3.08919530-06	
KAPPA(P)	5.40442060+04	5.04733070+04	4.67794800+04	4.41655320+04	3.93047200+04	2.97177560+04	1.55150237+04	6.44083910+03	
KAPPA(R)	1.14942638+04	1.08929376+04	1.01475733+04	9.76617280+03	9.03995890+03	7.07866000+03	3.76066000+03	1.56077840+03	
DENSITY	8.92981470-07	2.94378360-07	8.79673600-08	2.92876510-08					
KAPPA(P)	2.10365150+03	7.19078090+02	2.17602490+02	7.27435300+01					
KAPPA(R)	5.11777490+02	1.78129350+02	5.59260320+01	1.93826820+01					

THETA = .47493 11 DENSITIES

DENSITY	2.87715370-02	1.66429852-03	4.47568930-04	1.05642479-04	3.01025700-05	8.32373120-06	2.69988880-06	8.01885598-07	
KAPPA(P)	7.06857930+04	6.12627000+04	5.31673600+04	3.62393160+04	1.87704660+04	8.94133830+03	2.47590180+03	7.61107670+02	
KAPPA(R)	1.07873596+04	1.04624705+04	9.33550330+03	6.47620510+03	3.38791500+03	1.28568320+03	4.86195090+02	1.66769060+02	
DENSITY	2.66497750-07	7.98672620-08	2.66187600-08						
KAPPA(P)	2.56685960+02	7.69557010+01	2.57336620+01						
KAPPA(R)	8.23011530+01	2.01466890+01	7.08011390+00						

ONLY ABSORPTION COEFFICIENTS CONTINUED

THETA = .51702 12 DENSITIES

DENSITY	1.04588450-02	5.04105460-03	1.19662524-03	3.23177160-04	8.22662270-05	2.54055230-05	7.41201740-06	2.44613850-06
KAPPA(P)	9.05310450+04	8.39939370+04	7.11111860+04	4.98862150+04	2.43990610+04	9.90336560+03	3.21139240+03	1.09921220+03
KAPPA(R)	8.87407420+03	8.83105600+03	7.75916490+03	5.56120430+03	2.03398730+03	1.25986510+03	4.90610200+02	2.11329580+02
DENSITY	7.30307640-07	2.42588320-07	7.23898460-08	2.39355750-08				
KAPPA(P)	3.29967430+02	1.09815311+02	3.29064920+01	1.11066052+01				
KAPPA(R)	7.65604600+01	2.81199690+01	9.09222800+00	3.15037020+00				

THETA = .56010 10 DENSITIES

DENSITY	9.08977700-04	2.59119820-04	7.09851450-05	2.28079510-05	6.77277310-06	2.24478600-06	6.69050050-07	2.21779550-07
KAPPA(P)	6.80501490+04	3.72236620+04	1.44529946+04	5.25038900+03	1.62577510+03	5.45634850+02	1.64002220+02	5.53457570+01
KAPPA(R)	4.50030450+03	2.66093240+03	1.27566120+03	6.35092060+02	2.86692420+02	1.19952993+02	4.22422100+01	1.55415950+01
DENSITY	6.56912690-08	2.14659090-08						
KAPPA(P)	1.77514990+01	7.22220270+00						
KAPPA(R)	5.13751750+00	1.99845221+00						

THETA = .60319 11 DENSITIES

DENSITY	1.09952743-02	7.44453620-04	2.24310360-04	6.40901470-05	2.10039500-05	6.24760230-06	2.06950730-06	6.14903860-07
KAPPA(P)	1.26050317+05	5.50006330+04	2.48173890+04	8.50883190+03	2.95197570+03	8.97560960+02	3.02031090+02	9.42729410+01
KAPPA(R)	4.67437430+03	2.55838100+03	1.51319710+03	8.32597170+02	4.54732780+02	1.89697360+02	7.79626560+01	2.75581980+01
DENSITY	2.01979430-07	5.69368200-08	1.98208630-08					
KAPPA(P)	3.57146440+01	1.56363758+01	9.89966220+00					
KAPPA(R)	1.07251241+01	4.22306000+00	2.11567510+00					

THETA = .86400 12 DENSITIES

DENSITY	1.40017171+01	4.47985180+00	1.66719070+00	2.94890840-01	3.73411260-02	5.10676070-03	5.37436460-04	6.69516410-05
KAPPA(P)	6.63603520+03	6.59904350+03	6.50606380+03	6.02853900+03	5.70636740+03	5.22113430+03	3.52434520+03	2.25986400+03
KAPPA(R)	2.58330490+02	2.52370920+02	2.52307040+02	2.51947310+02	2.50137300+02	2.44160030+02	2.26166160+02	1.96436640+02
DENSITY	7.03579450-06	1.60993800-07	1.03725008-08	9.78891960-10				
KAPPA(P)	1.43306470+03	4.71297710+02	5.94318320+01	5.72418390+00				
KAPPA(R)	1.53377150+02	5.46006530+01	7.38240080+00	7.50606970-01				

THETA = 1.10000 12 DENSITIES

DENSITY	1.77573647+00	5.24595390-01	1.96655610-01	3.14473670-02	3.09691520-03	5.45822410-04	6.48859160-05	1.07425300-05
KAPPA(P)	3.05097400+04	3.00104200+04	2.97054490+04	2.76422280+04	2.58379570+04	2.20475690+04	1.45336209+04	7.87259730+03
KAPPA(R)	1.86270670+03	1.75869960+03	1.75461360+03	1.73559050+03	1.67058630+03	1.51339300+03	1.18015360+03	7.52017000+02

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 1.10000 CONTINUED

DENSITY	1.97460650-05	1.46140120-07	1.40717030-08	1.39677496-09					
KAPPA(P)	2.00050070+03	3.00900590+02	2.69987340+01	2.62140910+00					
KAPPA(R)	3.33742570+02	3.75712810+01	3.50025930+00	3.98960440-01					

THETA = 1.30000 12 DENSITIES

DENSITY	4.45018660-01	1.23946819-01	4.29662650-02	7.20391980-03	9.63931040-04	1.65296450-04	2.96989170-05	7.76703850-06	
KAPPA(P)	7.67032960+04	7.38580200+04	7.25840140+04	6.67360040+04	5.62809250+04	4.03004060+04	1.77508720+04	6.15518420+03	
KAPPA(R)	8.37335230+03	7.55450930+03	7.44263280+03	7.04927440+03	6.03849740+03	4.24119340+03	2.08286570+03	8.19653780+02	
DENSITY	2.07967470-06	1.97367160-07	1.90347430-08	1.55482949-09					
KAPPA(P)	1.71433400+03	1.50310020+02	1.53537537+01	2.83854040+00					
KAPPA(R)	2.08879780+02	2.29307770+01	3.11964740+00	7.53097180-01					

THETA = 1.50000 12 DENSITIES

DENSITY	3.00201910-01	6.23999860-02	2.99974690-02	4.07351420-03	7.01254260-04	1.36049750-04	2.84716990-05	8.16054170-06	
KAPPA(P)	9.89792510+04	9.41175630+04	9.14639310+04	8.12036310+04	6.27679560+04	4.05463040+04	1.63795672+04	5.14201330+03	
KAPPA(R)	1.36920400+04	1.20841501+04	1.17721277+04	1.07438625+04	8.36607380+03	5.13445970+03	2.12975810+03	7.69553090+02	
DENSITY	2.29609680-06	2.20515040-07	1.97147260-08	1.39273082-09					
KAPPA(P)	1.37913250+03	1.26775774+02	1.71731990+01	3.95760870+00					
KAPPA(R)	2.25545460+02	2.44448600+01	4.73887600+00	1.17131492+00					

THETA = 2.25000 12 DENSITIES

DENSITY	9.78039820-02	2.70743090-02	1.00996959-02	2.24206770-03	5.03322240-04	1.46224130-04	4.02621030-05	1.23210676-05	
KAPPA(P)	1.67527610+05	1.42343710+05	1.24119404+05	8.64293460+04	4.73347500+04	2.21909440+04	8.29153160+03	3.47350650+03	
KAPPA(R)	7.14247660+04	5.69369610+04	4.88946810+04	3.28026350+04	1.68532690+04	7.66730070+03	3.08362130+03	1.37621180+03	
DENSITY	3.16201640-06	2.27367110-07	2.06572400-08	1.96671770-09					
KAPPA(P)	1.45316210+03	2.21220500+02	2.22390550+01	2.47639520+00					
KAPPA(R)	5.39784470+02	5.74267360+01	5.47531600+00	7.70732430-01					

THETA = 3.40002 12 DENSITIES

DENSITY	8.23291540-02	2.44433050-02	1.01586472-02	2.66625610-03	6.49576490-04	1.79300040-04	4.47956290-05	1.34034299-05	
KAPPA(P)	1.55920640+05	1.33572540+05	1.16378120+05	9.41175630+04	6.94178950+04	3.67575880+04	1.33337802+04	4.46663210+03	
KAPPA(R)	1.17113636+05	9.52633020+04	7.70164230+04	4.72732500+04	2.14352030+04	8.43875300+03	2.77939890+03	1.04149240+03	
DENSITY	3.72479040-06	3.06392160-07	2.60382340-08	2.39903350-09					
KAPPA(P)	1.38025490+03	1.07395240+02	2.27300980+01	2.69202580+00					
KAPPA(R)	3.85295470+02	6.05621390+01	6.92612160+00	8.95497370-01					

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00e01 12 DENSITIES

DENSITY	8.75303e50-02	2.75404340-02	1.17104931-02	5.11430280-03	7.62719680-04	2.19857720-04	5.71392150-05	1.69270110-05
KAPPA(P)	1.87148e50+05	1.31534130+05	1.20632001+05	1.10117518+05	6.67684250+04	3.51718010+04	1.28860415+04	4.56028260+03
KAPPA(R)	1.09869e34+05	9.40422970+04	7.76448080+04	6.60599910+04	2.49143670+04	1.30051399+04	4.74046220+03	1.65560330+03

DENSITY	4.62377e90-06	3.95505970-07	3.49846690-08	3.80677430-09
KAPPA(P)	1.34062e40+03	1.45637400+02	1.67157260+01	1.75040815+00
KAPPA(R)	4.86227e00+02	5.42596e20+01	5.20167130+00	6.01424060-01

THETA = 7.00e00 12 DENSITIES

DENSITY	9.93456e00-02	3.25561170-02	1.41194786-02	5.83042310-03	9.47873080-04	2.74047260-04	7.27115770-05	2.19751140-05
KAPPA(P)	1.22051e90+05	1.08423480+05	1.00669677+05	9.37231000+04	5.90889940+04	2.72579350+04	9.16016950+03	2.99032740+03
KAPPA(R)	7.63970910+04	7.13105750+04	6.57950520+04	5.21719310+04	2.89261100+04	1.25505515+04	4.09339490+03	1.43049100+03

DENSITY	6.05213e30-06	5.68025250-07	5.63096460-08	5.62637880-09
KAPPA(P)	6.32314e60+02	7.77648830+01	6.62532870+00	7.27326350-01
KAPPA(R)	3.88168e70+02	2.47518430+01	2.00541090+00	3.33644240-01

THETA = 10.00e05 12 DENSITIES

DENSITY	1.21823742-01	4.09169850-02	1.80640780-02	5.03475730-03	1.27932043-03	3.77734110-04	1.03380175-04	3.29836030-05
KAPPA(P)	8.63271e50+04	7.87946130+04	7.40429010+04	6.10287260+04	3.27284460+04	1.27474935+04	3.51450130+03	1.02073560+03
KAPPA(R)	3.61500e40+04	3.54826790+04	3.37251790+04	2.71464070+04	1.63566520+04	7.42293570+03	2.10932610+03	5.65000640+02

DENSITY	9.70082e10-06	9.61568560-07	9.60689360-06	9.60576960-09
KAPPA(P)	2.71881710+02	2.35472720+01	2.30112000+00	3.02630200-01
KAPPA(R)	1.30606950+02	9.37859510+00	9.98482670-01	2.56922710-01

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56        DIANE/SCAT  C-1A  TEMP(1-2250 EV) 11-7-67  SADY INPUT TAPES(1363.1159)          MATERL = 3006     NX = 861

GREY ABSORPTION COEFFICIENTS              21  TEMPERATURES

THETA =      1.00000                      13  DENSITIES

 DENSITY  3.65519600+00  4.02481910-01  2.88954830-02  1.83568764-03  8.54247240-05  5.25080120-06  4.72240790-07  6.37657310-08
 KAPPA(P) 1.84082610+04  1.79490760+04  1.59935197+04  1.45871160+04  8.97078040+03  3.72177460+03  1.05526168+03  1.93580020+02
 KAPPA(R) 9.03953620+02  8.66710440+02  8.57943250+02  8.10982880+02  6.64497390+02  3.95256520+02  1.20711318+02  2.42800440+01

 DENSITY  9.35341610-09  1.20675627-09  1.41370100-10  1.45867150-11  1.11852567-12
 KAPPA(P) 2.86292600+01  3.54025930+00  4.33707390-01  8.36249810-02  5.24529070-02
 KAPPA(R) 3.57504630+00  4.78921290-01  9.31138830-02  4.50417240-02  4.57837078-02

THETA =      1.50000                      13  DENSITIES

 DENSITY  4.95550670-01  2.80683810-02  2.10740710-03  1.74926900-04  2.16832620-05  3.71062628-06  6.53966350-07  1.07704993-07
 KAPPA(P) 1.00192620+05  9.23970130+04  7.41347730+04  4.46585020+04  1.31922386+04  2.30557178+03  3.84785068+02  6.49443593+01
 KAPPA(R) 1.38030517+04  1.18622925+04  9.91993820+03  5.69786930+03  1.74843600+03  3.65798250+02  6.69123788+01  1.39693267+01

 DENSITY  1.46241754-08  1.38230986-09  1.35189990-10  1.39012840-11  1.30215583-12
 KAPPA(P) 1.44958674+01  3.98309430+00  6.95726120-01  1.37039910-01  7.42705340-02
 KAPPA(R) 4.06449690+00  1.17124640+00  2.44852900-01  8.91683680-02  6.88532400-02

THETA =      2.25000                      13  DENSITIES

 DENSITY  8.70485690-02  9.67161460-03  1.15402371-03  1.77193130-04  3.14972630-05  5.30496390-06  7.99519768-07  1.87376741-07
 KAPPA(P) 1.80105630+05  1.20004037+05  6.90179850+04  2.58194240+04  6.91191480+03  2.02370640+03  9.73308580+02  1.12402396+02
 KAPPA(R) 6.91338600+04  5.04001980+04  2.62978760+04  9.08283780+03  2.60278400+03  7.73198600+02  1.78871980+02  2.76381760+01

 DENSITY  1.97044600-08  1.99294450-09  1.99570550-10  1.76894480-11  1.59910740-12
 KAPPA(P) 1.71604270+01  2.47471140+00  5.02815250-01  1.59776310-01  1.07779909-01
 KAPPA(R) 4.28367930+00  7.65740500-01  2.06391170-01  1.21310244-01  1.02991171-01

THETA =      3.00000                      13  DENSITIES

 DENSITY  8.76349400-02  9.58474070-03  1.44972867-03  2.20337760-04  3.46327770-05  6.00364470-06  9.99734930-07  1.62207700-07
 KAPPA(P) 1.85817440+05  1.23768720+05  6.58116720+04  4.21327210+04  1.08784050+04  2.16396140+03  4.61248660+02  1.02682013+02
 KAPPA(R) 1.30423660+05  8.24427980+04  3.48681010+04  9.94436060+03  2.32114740+03  5.83233320+02  1.46109800+02  3.21318090+01

 DENSITY  1.96960660-08  2.38094140-09  2.63140920-10  2.39376160-11  2.22630960-12
 KAPPA(P) 1.76816600+01  2.67597930+00  5.29181930-01  1.83252000-01  1.39765670-01
 KAPPA(R) 5.29790650+00  8.71804530-01  2.45091420-01  1.53197240-01  1.35315930-01

THETA =      5.00000                      13  DENSITIES

 DENSITY  6.94565480-02  1.09485748-02  1.46020698-03  2.67790610-04  4.41666760-05  7.57854000-06  1.24873442-06  1.86663280-07
 KAPPA(P) 1.94967040+05  1.39247750+05  9.53891320+04  4.07006750+04  1.06933240+04  2.19458000+03  3.99210948+02  7.75998050+01
 KAPPA(R) 1.30773710+05  8.69644290+04  3.81755240+04  1.44450963+04  3.92136450+03  7.80294130+02  1.49499338+02  2.73998620+01
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GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00000 CONTINUED

DENSITY	2.65159060-06	3.38115000-09	3.96680530-10	4.21334180-11	3.96533850-12
KAPPA(P)	1.30163_34+01	1.76109151+00	3.20717690-01	1.54929210-01	1.37168660-01
KAPPA(R)	3.97261430+00	6.01428690-01	1.98381360-01	1.42524980-01	1.34674160-01

THETA = 7.00000 13 DENSITIES

DENSITY	7.86757070-02	1.27176056-02	2.03996220-03	3.31046070-04	5.63298530-05	9.87622800-06	1.68510958-06	2.80517620-07
KAPPA(P)	1.85160080+05	1.35004030+05	9.12903080+04	3.29188240+04	7.54527610+03	1.38496190+03	2.40186070+02	3.70378360+01
KAPPA(R)	9.19913580+04	7.93782690+04	4.65918050+04	1.49426074+04	3.38745740+03	6.66266660+02	9.03092580+01	1.11311221+01

DENSITY	4.29413560-08	5.58343600-09	6.56866770-10	6.97907250-11	6.56853720-12
KAPPA(P)	5.16202780+00	7.33484750-01	2.03572100-01	1.42409720-01	1.35860990-01
KAPPA(R)	1.55866_45+00	3.33649920-01	1.67794880-01	1.40659100-01	1.33804030-01

THETA = 10.00000 13 DENSITIES

DENSITY	9.7_405_40-02	1.60603780-02	2.69570370-03	4.40162440-04	8.03571130-05	1.54469350-05	2.81088840-06	4.76870950-07
KAPPA(P)	1.49790_60+05	1.09211306+05	5.97843970+04	1.66950730+04	2.82655780+03	4.61909480+02	7.36723040+01	1.16772206+01
KAPPA(R)	4.18656050+04	3.87044580+04	2.55785630+04	9.49433450+03	1.74367980+03	2.32752570+02	3.09304450+01	4.51796640+00

DENSITY	7.33377750-08	9.53334790-09	1.12156607-09	1.19166450-10	1.12156628-11
KAPPA(P)	1.81112_81+00	3.46224460-01	1.59646220-01	1.37741710-01	1.35433980-01
KAPPA(R)	8.10266350-01	2.56905240-01	1.56621840-01	1.35764290-01	1.33041780-01

THETA = 15.00000 13 DENSITIES

DENSITY	1.35125030-01	2.34587430-02	4.05668160-03	7.39364910-04	1.41978490-04	2.81031180-05	5.15393580-06	8.75763330-07
KAPPA(P)	6.83542_40+04	5.14054750+04	2.02936800+04	4.18274870+03	7.26835360+02	1.27949581+02	2.15160030+01	3.56223080+00
KAPPA(R)	1.19164_46+04	8.52512430+03	4.42473330+03	1.44146610+03	3.20217350+02	6.09100960+01	1.05100399+01	1.82206612+00

DENSITY	1.34719640-07	1.75098910-08	2.05656250-09	2.15325580-10	1.85951580-11
KAPPA(P)	6.42725660-01	2.01039070-01	1.43500750-01	1.38525480-01	1.50043650-01
KAPPA(R)	4.25143640-01	1.82387260-01	1.39752830-01	1.35749230-01	1.47206340-01

THETA = 22.49999 13 DENSITIES

DENSITY	2.11762470-01	3.78096090-02	6.98834200-03	1.32560680-03	2.59137950-04	5.15095210-05	9.42193610-06	1.56991367-06
KAPPA(P)	3.92226600+04	1.84134540+04	5.39630620+03	1.15914150+03	2.17771630+02	4.09765170+01	7.64475350+00	1.95468270+00
KAPPA(R)	3.65200490+03	1.82885420+03	6.12226290+02	1.70634520+02	3.99289240+01	8.82937270+00	2.03625280+00	6.63628090-01

DENSITY	2.24156630-07	2.64724900-08	2.96363320-09	2.88175940-10	2.55023670-11
KAPPA(P)	7.45223_80-01	3.03516090-01	1.96727880-01	1.93365710-01	2.01267050-01
KAPPA(R)	3.16488_70-01	1.95857090-01	1.75424620-01	1.86135940-01	1.97187500-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 33.99998 13 DENSITIES

DENSITY	3.57042510-01	6.57716750-02	1.24559110-02	2.41059180-03	4.55965240-04	8.36199860-05	1.61772784-05	2.23958510-06
KAPPA(P)	1.72278400+04	6.10854530+03	1.74105230+03	4.63839220+02	1.56897530+02	5.66018100+01	1.59852935+01	6.10127130+00
KAPPA(R)	1.72392160+03	6.32984500+02	1.96090230+02	5.25801660+01	1.69213970+01	5.96390010+00	1.86366400+00	6.97282440-01
DENSITY	3.16665620-07	4.00775310-08	4.69090660-09	4.98095180-10	4.68762490-11			
KAPPA(P)	1.07365225+00	3.31343730-01	2.18171960-01	2.04403560-01	2.02916850-01			
KAPPA(R)	3.16098630-01	2.19064520-01	2.01651360-01	1.99563850-01	1.99255970-01			

THETA = 50.00000 13 DENSITIES

DENSITY	5.99264640-01	1.10880638-01	2.02032060-02	3.60821890-03	6.57595880-04	1.21109679-04	2.12347840-05	3.56327680-06
KAPPA(P)	1.40862980+04	6.39145970+03	2.34700880+03	7.54893900+02	2.14843950+02	6.07209170+01	1.31576504+01	2.35983758+00
KAPPA(R)	1.82073940+03	6.61163370+02	2.32211810+02	7.33517210+01	2.05369140+01	5.55555310+00	1.36935976+00	4.48210660-01
DENSITY	5.46839800-07	7.10608050-08	8.35972800-09	8.88212590-10	8.35964580-11			
KAPPA(P)	5.38849540-01	2.45747160-01	2.07282430-01	2.03056700-01	2.02804960-01			
KAPPA(R)	2.49397070-01	2.11392220-01	2.03252550-01	1.99504000-01	1.99135060-01			

THETA = 69.99998 13 DENSITIES

DENSITY	9.15697790-01	1.59828640-01	2.93762150-02	5.12326170-03	9.65467630-04	1.09408050-04	3.46570200-05	5.88637660-06
KAPPA(P)	1.47031630+04	7.07486710+03	2.20362920+03	5.74795290+02	1.29204440+02	2.69753360+01	4.86941180+00	9.92809980-01
KAPPA(R)	2.87292420+03	1.17768620+03	3.75621480+02	8.72543080+01	1.68437720+01	3.07541240+00	7.00165580-01	3.31758160-01
DENSITY	9.05853440-07	1.17706698-07	1.38477925-08	1.47132892-09	1.38477940-10			
KAPPA(P)	3.19981420-01	2.14473730-01	2.03609770-01	2.02935110-01	2.02881340-01			
KAPPA(R)	2.05976610-01	2.09848800-01	1.99968580-01	1.99332890-01	1.99291040-01			

THETA = 99.99996 13 DENSITIES

DENSITY	1.36320633+00	2.40521930-01	4.30407480-02	8.18653170-03	1.61434336-03	3.21837780-04	5.91207880-05	1.00491757-05
KAPPA(P)	1.18254618+04	6.65241580+03	1.20624670+03	2.45749790+02	4.80244880+01	9.55704200+00	1.89341180+00	4.72331580-01
KAPPA(R)	3.64270170+03	1.51376310+03	4.08468160+02	7.16383770+01	1.10212251+01	2.08475280+00	6.47270290-01	3.24091580-01
DENSITY	1.58599952-06	2.00980100-07	2.36446280-08	2.51224280-09	2.36446320-10			
KAPPA(P)	2.33552290-01	2.05524330-01	2.03249290-01	2.03045130-01	2.03023610-01			
KAPPA(R)	2.19675900-01	2.01080690-01	1.99610760-01	1.99494820-01	1.99402450-01			

THETA = 149.99995 13 DENSITIES

DENSITY	2.20411370+00	4.00272030-01	7.57305230-02	1.48543578-02	2.95739060-03	5.90904000-04	1.00399798-04	1.80611070-05
KAPPA(P)	5.49543480+03	1.51911460+03	3.61312770+02	7.18036960+01	1.43434725+01	3.00666358+00	6.76000880-01	2.62011470-01
KAPPA(R)	1.18354790+03	4.48653980+02	1.26792891+02	2.53373850+01	4.78970240+00	1.06547993+00	3.60453258-01	2.24464218-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 149,99535 CONTINUED

DENSITY	2.84016660-05	5.69221170-07	4.34360600-08	4.61529580-09	4.34380670-10
KAPPA(P)	2.08417500-01	2.02804930-01	2.02385090-01	2.02326000-01	2.02319730-01
KAPPA(R)	2.01716500-01	1.98986360-01	1.98776140-01	1.98752280-01	1.98749710-01

THETA = 224,99590 13 DENSITIES

DENSITY	3.72025420+00	7.03822280-01	1.37719670-01	2.72229480-02	5.43022360-03	1.08544094-03	1.99506450-04	3.39154480-05
KAPPA(P)	1.89172730+03	5.48122060+02	1.15629018+02	2.37078440+01	4.90743790+00	1.02397479+00	3.17504590-01	2.14416470-01
KAPPA(R)	1.95470730+02	7.50516420+01	1.84021950+01	4.03798570+00	9.43810310-01	3.53170260-01	2.27351960-01	2.01580790-01

DENSITY	5.21772690-05	6.78304240-07	7.98001860-08	8.47877530-09	7.98002000-10
KAPPA(P)	2.01657410-01	1.99926190-01	1.99957180-01	1.99930590-01	1.99927790-01
KAPPA(R)	1.97397650-01	1.96788050-01	1.96866190-01	1.96856740-01	1.96855760-01

THETA = 340,00012 13 DENSITIES

DENSITY	8.56854260+00	1.29235132+00	2.54979280-01	5.05293470-02	1.00853341-02	2.01621150-03	3.70594540-04	6.29999960-05
KAPPA(P)	7.95407630+02	1.87547080+02	3.94975620+01	8.19512830+00	1.71355386+00	4.56636910-01	2.33932420-01	2.01916710-01
KAPPA(R)	5.02476730+01	1.33886185+01	3.11143170+00	7.88113860-01	3.29422220-01	2.28538410-01	2.02276040-01	1.99902880-01

DENSITY	9.69228610-06	1.25999860-06	1.48234560-07	1.57499290-08	1.48234590-09
KAPPA(P)	1.97349300-01	1.96658810-01	1.96567770-01	1.96556960-01	1.96555790-01
KAPPA(R)	1.94799490-01	1.94605470-01	1.94579200-01	1.94576080-01	1.94575700-01

THETA = 499,99593 13 DENSITIES

DENSITY	1.15742658+01	2.29412970+00	4.54122950-01	9.00835250-02	1.79844650-02	3.59556190-03	6.40898040-04	1.12351870-04
KAPPA(P)	1.04099164+02	3.57580700+01	7.92621780+00	1.74347A04+00	4.73173900-01	2.11783650-01	1.91016780-01	1.88898210-01
KAPPA(R)	5.15401490+00	1.28708077+00	4.40009390-01	2.54999420-01	2.08695080-01	1.95471630-01	1.91928760-01	1.91131420-01

DENSITY	1.72846610-05	2.2470104D-06	2.6435577D-07	2.89878160-08	2.64355850-09
KAPPA(P)	1.88139600-01	1.88094270-01	1.88088250-01	1.88087490-01	1.88087490-01
KAPPA(R)	1.90971510-01	1.90954510-01	1.90952230-01	1.90951850-01	1.90951858-01

THETA = 699,99576 13 DENSITIES

DENSITY	1.90668640+01	3.79238840+00	7.51741390-01	1.49201730-01	2.97903430-02	5.95601310-03	1.09477762-03	1.86109760-04
KAPPA(P)	5.66047470+01	1.29192440+01	2.83699950+00	6.74994730-01	2.63204230-01	1.90267330-01	1.89409670-01	1.88269650-01
KAPPA(R)	2.82315490+00	7.64284630-01	3.26631900-01	2.27443820-01	2.00821460-01	1.93438620-01	1.91446090-01	1.91023270-01

DENSITY	2.86321610-05	3.72218400-06	4.37902330-07	4.65271430-08	4.37902410-09
KAPPA(P)	1.88114620-01	1.88090880-01	1.88087870-01	1.88087490-01	1.88087490-01
KAPPA(R)	1.90961960-01	1.90953180-01	1.90952030-01	1.90951850-01	1.90951850-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 999.99567 13 DENSITIES

DENSITY	3.24466750+01	6.46293780+00	1.27599240+00	2.54733590-01	5.08650620-02	1.01696656-02	1.86929859-03	3.17776610-04
KAPPA(P)	2.92910660+01	6.53625900+00	1.46201369+00	4.04399790-01	2.19275570-01	1.92335320-01	1.88709400-01	1.88172150-01
KAPPA(R)	1.51246094+00	4.67332130-01	2.66814930-01	2.11378270-01	1.96396240-01	1.92270896-01	1.91221080-01	1.90983160-01
DENSITY	4.88866490-05	6.35549990-06	7.47710520-07	7.94442860-08	7.47710740-09			
KAPPA(P)	1.88160490-01	1.88009190-01	1.88087690-01	1.88007490-01	1.88087490-01			
KAPPA(R)	1.90956010-01	1.90952410-01	1.90951850-01	1.90951850-01	1.90951850-01			

THETA = 1499.99930 13 DENSITIES

DENSITY	5.94780650+01	1.17249609+01	2.34363460+00	4.67945330-01	9.34437160-02	1.86820170-02	3.43411860-03	5.83793050-04
KAPPA(P)	1.36761647+01	3.06934130+00	7.17594950-01	2.70746310-01	1.99410250-01	1.89705390-01	1.88335190-01	1.88125120-01
KAPPA(R)	7.97725090-01	3.38708980-01	2.29802970-01	2.01406290-01	1.93656560-01	1.91550460-01	1.91058510-01	1.90966170-01
DENSITY	8.96140660-05	1.16758270-05	1.37362132-06	1.45947340-07	1.37362156-08			
KAPPA(P)	1.88093140-01	1.88088250-01	1.88087490-01	1.88007490-01	1.88087490-01			
KAPPA(R)	1.90956430-01	1.90952030-01	1.90951050-01	1.90951050-01	1.90951050-01			

THETA = 2249.99870 13 DENSITIES

DENSITY	1.09132661+02	2.15324900+01	4.30497780+00	8.59637320-01	1.71665580-01	3.43228710-02	6.38887440-03	1.07209363-03
KAPPA(P)	6.32650210+00	1.43120963+00	3.99303220-01	2.10568680-01	1.92259550-01	1.88758660-01	1.88105090-01	1.88104230-01
KAPPA(R)	4.76386520-01	2.65345110-01	2.11050670-01	1.96305140-01	1.92252050-01	1.91240010-01	1.90980120-01	1.90950340-01
DENSITY	1.64999640-04	2.14999130-05	2.52350960-06	2.68123000-07	2.52351000-08			
KAPPA(P)	1.88009540-01	1.88007690-01	1.88087490-01	1.88007490-01	1.88007490-01			
KAPPA(R)	1.90952800-01	1.90952030-01	1.90951850-01	1.90951050-01	1.90951050-01			

10 JIANE/SCAT CF2-10A C1/JT, REDO OF RUN 1-6-67, TEMP(1-2250), TAPE 1032 MATERL = 1103 NX = 855

GREY ABSORPTION COEFFICIENTS 21 TEMPERATURES

THETA = 1.00600 13 DENSITIES

DENSITY	1.50488636+01	1.65645286+00	1.18931093-01	6.73166340-03	3.51395220-04	2.15391160-05	1.90175153-06	2.31769440-07
KAPPA(P)	1.15498676+05	9.59718290+04	8.42943390+04	4.08901530+04	1.06987157+04	2.52259880+03	5.15940260+02	9.22286610+01
KAPPA(R)	1.89542220+03	1.81688170+03	1.52447740+03	1.00419746+03	5.37082620+02	2.32125450+02	6.20957750+01	1.12740203+01
DENSITY	2.35865230-08	1.95465950-09	2.01011320-10	2.07550430-11	1.80890430-12			
KAPPA(P)	1.74224220+01	3.33345730+00	4.56761270-01	7.27607240-02	3.24682083-02			
KAPPA(R)	2.13248710+00	4.01599320-01	7.43899070-02	3.13399380-02	2.76817750-02			

THETA = 1.50600 13 DENSITIES

DENSITY	1.12861643+00	1.06821185-01	7.91111160-03	6.23696300-04	6.47193090-05	7.76495500-06	1.02585931-06	1.56056150-07
KAPPA(P)	3.06480650+05	2.50276070+05	1.99029810+05	6.47714340+04	1.44453795+04	2.96958330+03	5.77438510+02	9.73975410+01
KAPPA(R)	3.63951200+04	3.27035840+04	2.13000770+04	8.41605930+03	1.97822240+03	3.96921660+02	6.96996280+01	1.14822341+01
DENSITY	2.25078930-08	2.55797480-09	2.72163030-10	2.54694080-11	1.96362290-12			
KAPPA(P)	1.53250662+01	2.44131210+00	3.56990900-01	7.66758870-02	5.01732130-02			
KAPPA(R)	2.20956200+00	4.62496440-01	9.56302580-02	4.46515170-02	4.54529750-02			

THETA = 2.25600 13 DENSITIES

DENSITY	2.45000200-01	2.45959130-02	2.42440300-03	2.96516410-04	4.76055640-05	8.53239950-06	1.36791902-06	2.00061710-07
KAPPA(P)	5.28897480+05	3.42329820+05	2.95456450+05	8.45636600+04	1.54708500+04	2.78560390+03	4.63669000+02	7.37939220+01
KAPPA(R)	2.24612050+05	1.57782050+05	6.75470690+04	1.52088524+04	2.47553280+03	4.39584070+02	8.44697910+01	1.42209893+01
DENSITY	2.53593690-08	2.87026930-09	3.10463610-10	3.07079410-11	2.76760170-12			
KAPPA(P)	1.32573548+01	2.07944360+00	3.29678260-01	8.99711710-02	6.20525910-02			
KAPPA(R)	2.76344200+00	4.74012350-01	1.16554185-01	6.56214980-02	5.87834960-02			

THETA = 3.40600 13 DENSITIES

DENSITY	1.17157746-01	1.58203845-02	2.24940400-03	3.65701560-04	5.93507440-05	9.65475570-06	1.53642849-06	2.36159120-07
KAPPA(P)	6.32616630+05	4.69622260+05	2.49389190+05	6.12090260+04	1.24104107+04	2.34641058+03	4.08306020+02	6.77213160+01
KAPPA(R)	8.07138420+05	2.23154570+05	6.98901410+04	1.31428468+04	2.06438150+03	4.14724710+02	8.60994460+01	1.61396660+01
DENSITY	3.34026730-08	3.77672010-09	3.89767810-10	3.94091490-11	3.52819220-12			
KAPPA(P)	1.05930630+01	1.75794339+00	3.25512640-01	1.09892293-01	8.81287030-02			
KAPPA(R)	2.81591710+00	5.48354660-01	1.58385870-01	9.22753710-02	8.54312780-02			

THETA = 5.00600 13 DENSITIES

DENSITY	1.11560413-01	1.74922040-02	2.64711750-03	4.17228730-04	7.06065240-05	1.23768842-05	1.96837950-06	2.96689930-07
KAPPA(P)	5.77278180+05	4.27034460+05	2.16971200+05	5.70520910+04	1.12788657+04	2.09979700+03	3.48851370+02	5.51200860+01
KAPPA(R)	4.00568430+05	2.10424020+05	6.20297870+04	1.23295806+04	2.65456210+03	5.31411640+02	1.07706715+02	1.80557820+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00000 CONTINUED

DENSITY	4.23321160-08	5.01847940-09	5.55390370-10	5.68343660-11	6.92473890-12
KAPPA(P)	8.62056610+00	1.37146086+00	2.63587210-01	1.19673031-01	1.10989019-01
KAPPA(R)	2.74256080+00	4.73108600-01	1.54420630-01	1.07786379-01	1.08618776-01

THETA = 7.00000 13 DENSITIES

DENSITY	1.21098749-01	1.97640430-02	3.16674520-03	5.20935160-04	8.72906690-05	1.53605200-05	2.53874680-06	3.90888690-07	
KAPPA(P)	4.93747090+05	4.6801740+05	2.19269910+05	9.95288140+04	4.36791400+03	1.31729530+03	2.22638180+02	3.82230978+01	
KAPPA(R)	3.21955910+05	2.03848010+05	6.74680820+04	1.46636494+04	2.74538600+03	8.60857690+02	7.29933210+01	1.20489587+01	
DENSITY	5.75994930-08	6.91439760-09	7.71341510-10	7.64067720-11	6.81612640-12				
KAPPA(P)	6.16958.40+00	1.02454359+00	2.38068220-01	1.39192690-01	1.31563980-01				
KAPPA(R)	2.21082110+00	4.28407340-01	1.65536260-01	1.30208660-01	1.29231740-01				

THETA = 10.00000 13 DENSITIES

DENSITY	1.44804750-01	2.40732740-02	4.02920180-03	6.71746200-04	1.15750110-04	2.09689030-05	3.53976610-06	5.68035598-07	
KAPPA(P)	4.06870400+05	3.47444390+05	1.19434086+05	2.24202530+04	3.98749680+03	7.14993140+02	1.34913240+02	2.49958790+01	
KAPPA(R)	1.74786400+05	1.26341013+05	5.16543640+04	1.04055529+04	1.61376290+03	2.89037080+02	5.68518610+01	9.88892780+00	
DENSITY	8.00879950-08	9.76979870-09	1.07652243-09	1.10926875-10	1.03920507-11				
KAPPA(P)	4.39101750+00	7.40670810-01	2.25017070-01	1.53543550-01	1.46129650-01				
KAPPA(R)	1.56041.40+00	3.47057780-01	1.77965070-01	1.48531680-01	1.43899370-01				

THETA = 15.00000 13 DENSITIES

DENSITY	1.91084410-01	3.26839880-02	5.51972100-03	9.50340050-04	1.70243470-04	3.10503650-05	5.28053150-06	8.43429180-07	
KAPPA(P)	2.81469150+05	1.40262360+05	4.47148040+04	9.70883960+03	2.13598670+03	4.4599509[+02	8.25357650+01	1.67129788+01	
KAPPA(R)	7.31911640+04	5.95070450+04	2.67609730+04	5.65045270+03	1.03697580+03	1.98599840+02	3.86075880+01	5.68184680+00	
DENSITY	1.25772650-07	1.62368920-08	1.90763800-09	2.01998690-10	1.86344360-11				
KAPPA(P)	2.39368130+00	4.26526450-01	1.76770320-01	1.49227390-01	1.49190240-01				
KAPPA(R)	9.46314.60-01	2.52332660-01	1.58146100-01	1.46509350-01	1.47333290-01				

THETA = 22.49999 13 DENSITIES

DENSITY	2.76282520-01	4.68799590-02	8.15712910-03	1.43858259-03	2.60925930-04	4.90935460-05	8.81223050-06	1.48343934-06	
KAPPA(P)	1.00533671+05	5.09128120+04	1.94069970+04	4.71169840+03	9.89120280+02	1.78423510+02	2.92810530+01	4.87464350+00	
KAPPA(R)	2.66091.60+04	2.24324880+04	1.21749150+04	2.99804260+03	5.81202920+02	8.53468020+01	1.19103471+01	1.81830784+00	
DENSITY	2.24064920-07	2.84369540-08	3.30215720-09	3.42369760-10	3.16501000-11				
KAPPA(P)	9.29795630-01	2.66449090-01	1.69452260-01	1.60019110-01	1.61247150-01				
KAPPA(R)	4.38013260-01	2.07009620-01	1.64322550-01	1.57611050-01	1.58928480-01				

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 33.99690			11 DENSITIES					
DENSITY	4.0609754D-01	7.2402394D-02	1.2777284D-02	2.3900963D-03	4.4602658D-04	8.6167116D-05	1.8468875D-05	8.5764950E-06
KAPPA(P)	4.0745464D+04	6.1810416D+04	7.6499617D+03	1.6288897D+03	3.0127188D+02	6.0768221D+01	1.2100139E+01	8.4003944D+00
KAPPA(R)	1.1337863D+04	0.8140926D+03	4.1756319D+03	1.1279718D+03	1.8597718D+02	8.9559A12D+01	0.2674A9AE+00	1.1103188D+00
DENSITY	3.8743947D-07	4.9907750D-08	5.8661327D-09					
KAPPA(P)	3.8294350D-01	8.1971994D-01	1.8723148D-01					
KAPPA(R)	3.5028864D-01	1.8811946D-01	1.8541826D-01					
THETA = 50.00000			13 DENSITIES					
DENSITY	8.2961371D-01	1.1419737E-01	2.0708770E-02	3.8947177D-03	7.4669035D-04	1.4503711D-04	2.6252482D-05	8.4369206D-06
KAPPA(P)	1.9287460D+04	9.7199027D+03	2.0953322D+03	6.4911592D+02	1.3492026D+02	2.9994157D+01	5.7412271D+00	1.1075382D+00
KAPPA(R)	8.6796102D+03	3.9165556D+03	1.4781668D+03	3.4460965D+02	6.4638224D+01	1.2591311E+01	2.3025907D+00	5.2022275D-01
DENSITY	8.7535321D-07	8.4441234D-08	9.5007034D-09	9.6499657D-10	8.7687660D-11			
KAPPA(P)	3.2466533D-01	2.0070933D-01	1.8313164D-01	1.8482835D-01	1.9262634D-01			
KAPPA(R)	2.3249726D-01	1.8298758D-01	1.7854939D-01	1.8379927D-01	1.8990999D-01			
THETA = 69.99998			13 DENSITIES					
DENSITY	9.3869666D-01	1.7291623D-01	3.2221834D-02	6.1253462D-03	1.1892683E-03	2.3292223D-04	4.1340004D-05	6.7153414D-06
KAPPA(P)	1.0972053D+04	4.6750583D+03	1.3356708D+03	2.9390940D+02	6.4290054D+01	1.5179866D+01	4.2510882D+00	1.2551999D+00
KAPPA(R)	5.8185635D-07	7.7494155D-04	7.0383713D+02	1.4167631D+02	2.5657167D+01	4.8757648D+00	1.2002810D+00	4.0536665D-01
DENSITY	9.8749959D-07	1.4238021D-07	1.4446842E-08	1.5331522D-09	1.4827789D-10			
KAPPA(P)	4.3356784D-01	2.3529740D-01	1.9907373D-01	1.9449030D-01	1.9399498D-01			
KAPPA(R)	2.4669403D-01	2.0108954D-01	1.9240167D-01	1.9130237D-01	1.9115398D-01			
THETA = 99.99998			13 DENSITIES					
DENSITY	1.4874285D+00	2.7635998D-01	5.2252580D-02	9.8944826D-03	1.8775579E-03	3.5722777D-04	6.3007067D-05	1.0320341D-05
KAPPA(P)	7.0650800D+03	2.5014403D+03	6.6420907D+02	1.8517864D+02	5.5511598D+01	1.6191703D+01	3.9557886D+00	8.9730890D-01
KAPPA(R)	3.3589575D+03	1.4052633D+03	3.5945535D+02	7.6938437D+01	1.6640808D+01	4.2004261D+00	1.0560616D+00	3.5761975D-01
DENSITY	1.6119917D-06	2.0941666D-07	2.4634942D-08	2.6174381D-09	2.4634700D-10			
KAPPA(P)	3.0416163D-01	2.0806203D-01	1.9536787D-01	1.9399187D-01	1.9391507D-01			
KAPPA(R)	2.2042649D-01	1.9706079D-01	1.9284032D-01	1.9133642D-01	1.9122491D-01			
THETA = 149.9995			13 DENSITIES					
DENSITY	2.9374643D+00	4.6961925D-01	8.7023770D-02	1.6293550D-02	3.1331920D-03	6.1008228D-04	1.1323390D-04	1.9236906D-05
KAPPA(P)	4.8407695D+03	1.8264526D+03	5.4750630D+02	1.4378299D+02	3.4756200D+01	7.2982603D+00	1.5021347D+00	9.1485231D-01
KAPPA(R)	2.3650340D+03	8.7026950D+02	2.2951467D+02	6.8179169D+01	8.8154509D+00	1.7656861D+00	6.9012815D-01	2.6912106D-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 149.99995 CONTINUED

DENSITY	2.959175D0-06	5.84685410-07	4.52569360-08	4.83855140-09	4.52569430-10
KAPPA(P)	2.24669630-01	1.97080110-01	1.94906170-01	1.94746610-01	1.94732780-01
KAPPA(R)	2.16705320-01	1.94660550-01	1.92447670-01	1.92314740-01	1.92306080-01

THETA = 224.99990 13 DENSITIES

DENSITY	4.26502400+00	7.65087810-01	1.47652750-01	2.86401800-02	5.67040910-03	1.13143111-03	2.07879710-04	3.53362930-05
KAPPA(P)	3.09334670+03	1.11626540+03	2.72546690+02	5.51336380+01	1.14749452+01	2.36110650+00	5.76921770-01	2.47801810-01
KAPPA(R)	1.23651630+03	5.52110910+02	1.38806920+02	2.34468030+01	.07450800+00	9.83655060-01	3.80910820-01	2.27208300-01

DENSITY	5.43625000-06	7.06706780-07	8.31425030-08	8.83389440-09	8.31425150-10
KAPPA(P)	2.01780460-01	1.97391740-01	1.96931960-01	1.96884890-01	1.96879980-01
KAPPA(R)	1.97915120-01	1.95046950-01	1.94779910-01	1.94757130-01	1.94754590-01

THETA = 340.00012 13 DENSITIES

DENSITY	7.31996400+00	1.38316312+00	2.67903080-01	5.23659930-02	1.05173608-02	2.10104380-03	3.86127470-04	6.56386410-05
KAPPA(P)	1.42163450+03	5.80672450+02	1.29935570+02	1.63369420+01	3.43840590+00	8.11074630-01	2.05246940-01	2.09306620-01
KAPPA(R)	5.06731050+02	1.15795993+02	2.96905250+01	6.10269810+00	1.30882827+00	4.07478870-01	2.32250670-01	2.01370110-01

DENSITY	1.04961.29-05	1.31275850-06	1.54443110-07	1.64095920-08	1.54443184-09
KAPPA(P)	2.06323640-01	1.99081900-01	1.98939810-01	1.98922490-01	1.98920768-01
KAPPA(R)	1.97275200-01	1.96695780-01	1.96636390-01	1.96629310-01	1.96628520-01

THETA = 499.99993 13 DENSITIES

DENSITY	1.25440266+01	2.41878900+00	4.75077560-01	9.41567820-02	1.87506470-02	3.74666990-03	6.88592460-04	1.17056086-04
KAPPA(P)	5.17238570+02	1.18204590+02	2.69047800+01	5.63962170+00	1.22648626+00	3.67597010-01	2.21838410-01	2.02076490-01
KAPPA(R)	5.76409690+01	1.60103750+01	4.12589920+00	1.02941253+00	3.74182990-01	2.35129460-01	2.02714030-01	1.96926240-01

DENSITY	1.80866.60-05	..341122.0-06	2.7..5180-07	2.99A39140-08	2.75425190-09
KAPPA(P)	1.99192410-01	1.98004760-01	1.98894480-01	1.98917320-01	1.98910520-01
KAPPA(R)	1.96004630-01	1.96004630-01	1.95964040-01	1.95981700-01	1.95981300-01

THETA = 699.99976 13 DENSITIES

DENSITY	2.04700410+01	3.94953150+00	7.82308820-01	1.55904130-01	3.10574670-02	6.20623430-03	1.14065001-03	1.93904078-04
KAPPA(P)	6.07348690+02	1.62120410+01	1.28252305+01	2.50457930+00	6.16095190-01	2.61878920-01	2.06788030-01	1.98227588-01
KAPPA(R)	1.34413150+01	4.36046210+00	1.08840636+00	3.91017760-01	2.44380440-01	2.07094300-01	1.97124650-01	1.94933858-01

DENSITY	2.98313740-05	3.67.042.0-06	4.56243120-07	4.84798640-08	4.56243310-09
KAPPA(P)	1.96915420-01	1.96712500-01	1.96685950-01	1.96682800-01	1.96682410-01
KAPPA(R)	1.96578410-01	1.96522190-01	1.96514800-01	1.96513630-01	1.96513830-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 999.99567 13 DENSITIES

DENSITY	3.38435540+01	6.72335300+00	1.33279107+00	2.66141800-01	5.30268450-02	1.05960342-02	1.99762229-03	3.31085150-04
KAPPA(P)	9.92580410+01	2.30714280+01	6.46302650+00	1.06477850+00	3.41737970-01	2.17961460-01	1.97845270-01	1.94527458-01
KAPPA(R)	6.74396360+00	1.27997979+00	6.41314460-01	2.54773330-01	2.09422610-01	1.97137070-01	1.93799530-01	1.93053100-01
DENSITY	5.09359820-05	8.62168990-06	7.79019390-07	8.27708460-08	7.79019520-09			
KAPPA(P)	1.95986050-01	1.94557410-01	1.94543340-01	1.94543980-01	1.94543790-01			
KAPPA(R)	1.92927080-01	1.93209720-01	1.93206830-01	1.93206440-01	1.93206440-01			

THETA = 1499.99450 13 DENSITIES

DENSITY	6.16884.10+01	1.22944256+01	2.44730390+00	4.87856970-01	9.74132540-02	1.94674780-02	3.57800480-03	6.08242450-04
KAPPA(P)	1.77967630+01	3.99421070+00	9.21066520-01	3.09294920-01	2.06210660-01	1.90751450-01	1.88660900-01	1.88395330-01
KAPPA(R)	9.54179510-01	3.73177950-01	2.39081690-01	2.04131070-01	1.94486350-01	1.91707210-01	1.91042180-01	1.90930260-01
DENSITY	9.35752.80-05	1.21647273-05	1.43115326-06	1.52060100-07	1.43115369-08			
KAPPA(P)	1.88306560-01	1.88298840-01	1.88297900-01	1.88297710-01	1.88297710-01			
KAPPA(R)	1.90913090-01	1.90910220-01	1.90909840-01	1.90909840-01	1.90909840-01			

THETA = 2249.99670 13 DENSITIES

DENSITY	1.13421457+02	2.25066460+01	4.49466420+00	8.96185190-01	1.78956050-01	3.57639100-02	6.57321000-03	1.11741197-03
KAPPA(P)	8.22313060+00	1.A3966333+00	4.82568260-01	2.32518840-01	1.94263070-01	1.89117830-01	1.88312480-01	1.88193020-01
KAPPA(R)	3.51336.90-01	2.02347130-01	2.15797250-01	1.97666700-01	1.92562790-01	1.91279400-01	1.90980820-01	1.90919080-01
DENSITY	1.71908710-04	2.23440840-05	2.62920250-06	2.79350120-07	2.62920290-08			
KAPPA(P)	1.88172720-01	1.88169330-01	1.88168960-01	1.88168960-01	1.88168960-01			
KAPPA(R)	1.90911370-01	1.90910030-01	1.90909840-01	1.90909840-01	1.90909840-01			

29 DIANE/SCAT CM2-16A TEMP(1.5-1.E6) 6-19-67 INPUT TAPES(1032,1980) MATERL = 1101 NK = 900

GREY ABSORPTION COEFFICIENTS 24 TEMPERATURES

THETA = 1.50000 13 DENSITIES

DENSITY	2.50607070-01	2.35845130-02	1.70459802-03	1.25594270-04	1.20383882-05	1.62817605-06	2.62818840-07	4.29139090-08
KAPPA(P)	4.22979690+05	3.23611810+05	2.77013060+05	1.51836560+05	3.88910700+04	7.21348190+03	1.13134560+03	1.78946528+02
KAPPA(R)	1.74067010+04	1.52707409+04	1.31185922+04	8.31179540+03	3.21305010+03	8.14242300+02	1.53948930+02	2.82000048+01
DENSITY	6.26648660-09	7.17491540-10	7.74135040-11	8.09293390-12	7.59876950-13			
KAPPA(P)	3.02541160+01	5.63618420+00	9.01893980-01	2.00678330-01	1.23963761-01			
KAPPA(R)	6.52307368+00	1.53657050+00	3.32352870-01	1.44029230-01	1.18748201-01			

THETA = 2.25000 13 DENSITIES

DENSITY	5.79339040-02	5.77883620-03	5.89922730-04	7.71702980-05	1.30555139-05	2.38815380-06	3.90268870-07	6.18218858-08
KAPPA(P)	7.44681770+05	5.28428760+05	3.16807610+05	8.30958430+04	1.52128526+04	3.19213710+03	7.23996180+02	1.32869780+02
KAPPA(R)	1.27363432+05	9.39670920+04	5.04914810+04	1.79258280+04	4.46251120+03	1.13179080+03	2.56560368+02	4.24478318+01
DENSITY	9.14635970-09	1.16234076-09	1.25579760-10	1.21883246-11	1.11682642-12			
KAPPA(P)	1.98686650+01	2.82820710+00	5.63322660-01	2.02819680-01	1.51045220-01			
KAPPA(R)	6.19079470+00	9.45562780-01	2.71248780-01	1.70272870-01	1.46208490-01			

THETA = 3.40000 13 DENSITIES

DENSITY	5.40769210-02	5.49439660-03	6.61286940-04	1.07978551-04	1.89615000-05	3.54344930-06	6.12761530-07	9.47178250-08
KAPPA(P)	6.04329460+05	3.06937640+05	1.44639260+05	5.16182190+04	1.16550974+04	2.20586270+03	4.58051200+02	9.81689010+01
KAPPA(R)	2.71028690+05	1.70430000+05	7.88024930+04	2.43812550+04	5.03963470+03	8.54567928+02	1.79735610+02	3.39322530+01
DENSITY	1.36995910-08	1.70430237-09	1.83398790-10	1.85363040-11	1.73089961-12			
KAPPA(P)	1.67526430+01	2.58093390+00	5.33811440-01	2.17356590-01	1.77944060-01			
KAPPA(R)	5.87728.00+00	9.45102620-01	2.95361270-01	1.92407060-01	1.73128880-01			

THETA = 5.00000 13 DENSITIES

DENSITY	3.54160400-02	5.63044160-03	9.27662120-04	1.58912550-04	2.84165170-05	5.19699530-06	8.94125310-07	1.46171390-07
KAPPA(P)	3.54568420+05	1.87912170+05	9.70886690+04	3.84559970+04	9.85584500+03	2.01970750+03	3.66863910+02	7.82794150+01
KAPPA(R)	1.88012670+05	1.02784510+05	6.95888520+04	2.09522830+04	4.37925960+03	8.06729140+02	1.52327520+02	2.80537858+01
DENSITY	2.04688080-08	2.62703550-09	3.08490540-10	3.27699300-11	3.08413530-12			
KAPPA(P)	1.17523942+01	1.63420735+00	3.40882640-01	1.91080170-01	1.75603260-01			
KAPPA(R)	6.12772.30+00	6.51654410-01	2.36293640-01	1.80596680-01	1.72653430-01			

THETA = 7.00000 13 DENSITIES

DENSITY	5.45676460-02	7.55845870-03	1.27119743-03	2.23717390-04	4.03883190-05	7.42491070-06	1.29946242-06	2.17832390-07
KAPPA(P)	2.40915130+05	1.42824230+05	8.41511560+04	2.99507600+04	6.77398540+03	1.24587020+03	2.15393368+02	3.32580210+01
KAPPA(R)	9.30296640+04	8.31606410+04	4.86151260+04	1.50050266+04	3.22525380+03	6.30293720+02	8.48706820+01	1.05215756+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 7.00000 CONTINUED

DENSITY	3.34213650-08	4.34282830-09	5.10893580-10	5.42819220-11	5.10088550-12
KAPPA(P)	4.64019770+00	7.13202340-01	2.35089010-01	1.80324000-01	1.74412860-01
KAPPA(R)	1.58603771+00	3.69915860-01	2.06856080-01	1.78423560-01	1.71593150-01

THETA = 10.00000 13 DENSITIES

DENSITY	5.16114640-02	1.04430878-02	1.86944633-03	3.31865130-04	6.14842250-05	1.19667331-05	2.18452900-06	3.70849330-07
KAPPA(P)	1.55361000+05	1.03869435+05	5.38867530+04	1.49593521+04	2.55044460+03	4.17476800+02	6.66483920+01	1.06205904+01
KAPPA(R)	3.79385610+04	3.45927680+04	2.31072100+04	8.52237180+03	1.57865570+03	2.11952660+02	2.04576200+01	4.25031000+00

DENSITY	3.76396100-08	7.81478400-09	6.72324210-10	9.26844870-11	8.72324360-12
KAPPA(P)	1.69454419+00	3.65908120-01	1.95996200-01	1.76121000-01	1.74020710-01
KAPPA(R)	8.26859670-01	2.95571940-01	1.93094030-01	1.73328270-01	1.70911220-01

THETA = 15.00000 13 DENSITIES

DENSITY	9.47068340-02	1.66486600-02	3.03019900-03	5.67351700-04	1.10046130-04	2.18410360-05	4.00003290-06	8.81130630-07
KAPPA(P)	8.10879690+04	4.66752100+04	1.80557750+04	3.72824900+03	6.49041680+02	1.14175869+02	1.92306620+01	3.22796880+00
KAPPA(R)	1.04629631+04	7.44461240+03	3.86225690+03	1.25544570+03	2.79236470+02	5.32796250+01	9.28477500+00	1.68045063+00

DENSITY	1.04762411-07	1.36198102-08	1.60054774-09	1.64396470-10	1.49880020-11
KAPPA(P)	6.26933670-01	2.32697490-01	1.91209580-01	1.75694150-01	1.86542160-01
KAPPA(R)	4.40256720-01	2.15637100-01	1.76782340-01	1.73234870-01	1.83044310-01

THETA = 22.49999 13 DENSITIES

DENSITY	1.56057150-01	2.81217220-02	5.32956860-03	1.02530312-03	2.01274090-04	4.00624940-05	7.33913210-06	1.23097903-06
KAPPA(P)	5.84573400+04	1.69204650+04	4.89550580+03	1.05075600+03	1.96854320+02	3.69817660+01	7.00926730+00	1.78499285+00
KAPPA(R)	3.27074460+03	1.62141410+03	5.38648360+02	1.50606720+02	3.49361790+01	7.00526520+00	1.07970684+00	6.56591250-01

DENSITY	1.80007620-07	2.18824710-08	2.48403440-09	2.47527370-10	2.22555430-11
KAPPA(P)	7.05407630-01	3.19449520-01	2.26876380-01	2.23680910-01	2.30433950-01
KAPPA(R)	3.24921670-01	2.25919490-01	2.07473010-01	2.16431320-01	2.25030170-01

THETA = 33.99998 13 DENSITIES

DENSITY	2.71031150-01	4.99767690-02	9.52766070-03	1.87741580-03	3.60556030-04	6.70994290-05	1.17879030-05	1.98071602-06
KAPPA(P)	1.67936130+04	5.75029090+03	1.60383500+03	4.19662550+02	1.30858990+02	4.94285090+01	1.58466375+01	3.99057160+00
KAPPA(R)	1.61928440+03	5.78950590+02	1.75963040+02	4.66276150+01	1.40735424+01	5.26572580+00	1.70286470+00	6.74000130-01

DENSITY	2.75708670-07	3.50167270-08	4.10341060-09	4.35825210-10	4.10167790-11
KAPPA(P)	9.82670670-01	3.42423500-01	2.44988010-01	2.33140500-01	2.31861510-01
KAPPA(R)	3.32549660-01	2.45257150-01	2.29017440-01	2.24000600-01	2.27690730-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 50.00000 13 DENSITIES

DENSITY	4.65282000-01	5.60461090-02	1.60616150-02	2.97523280-03	5.55347800-04	1.04515628-04	1.85461190-05	3.12223960-06
KAPPA(P)	1.29558522+04	5.70923860+03	2.06653170+03	6.57201700+02	1.86254670+02	5.25401670+01	1.13923260+01	2.80909788+00
KAPPA(R)	1.76790000+03	6.13449530+02	2.07833220+02	6.39047680+01	1.79105150+01	4.89861730+00	1.26772123+00	4.46682830-01
DENSITY	4.79449190-07	8.23096320-08	7.33029690-09	7.74836570-10	7.33022470-11			
KAPPA(P)	3.19129190-01	2.68061730-01	2.34969630-01	2.31308720-01	2.31030390-01			
KAPPA(R)	2.73778740-01	2.39215610-01	2.30996890-01	2.26809460-01	2.26296770-01			

THETA = 69.99998 13 DENSITIES

DENSITY	7.05973060-01	1.29604210-01	2.37663390-02	4.40167110-03	8.41816950-04	1.65865560-04	3.03820070-05	5.16131070-06
KAPPA(P)	1.31605438+04	6.25036970+03	1.40465260+03	5.00204470+02	1.11956229+02	2.33637330+01	4.25837230+00	9.11079598-01
KAPPA(R)	2.83382020+03	1.11046030+03	3.31299220+02	7.66239130+01	1.47719183+01	2.75922540+00	6.88042960-01	3.55985950-01
DENSITY	7.93954680-07	1.03212092-07	1.21425514-08	1.29014666-09	1.21425540-10			
KAPPA(P)	3.30305430-01	2.40050010-01	2.30359380-01	2.29566160-01	2.29491110-01			
KAPPA(R)	2.73233090-01	2.34279600-01	2.23851580-01	2.22976160-01	2.22786580-01			

THETA = 99.99998 13 DENSITIES

DENSITY	1.08396376+00	2.02755340-01	3.71392840-02	7.15369730-03	1.41494728-03	2.82180120-04	5.18398240-05	8.81170210-06
KAPPA(P)	1.04363798+04	4.06430450+03	1.05566980+03	2.13705930+02	4.23994330+01	8.32480000+00	1.68853603+00	4.58229578-01
KAPPA(R)	3.42539120+03	1.36067570+03	3.54279690+02	6.29909420+01	9.75122560+00	1.93209013+00	6.51963370-01	3.38981410-01
DENSITY	1.35502635-06	1.76231040-07	2.07329830-08	2.20288090-09	2.07329910-10			
KAPPA(P)	2.52700320-01	2.27581930-01	2.25125550-01	2.24882550-01	2.24856690-01			
KAPPA(R)	2.35565520-01	2.17447240-01	2.15631790-01	2.15460430-01	2.15441900-01			

THETA = 149.99995 13 DENSITIES

DENSITY	1.84499983+00	3.45724670-01	6.40630390-02	1.30199436-02	2.59390460-03	5.18167000-04	9.52278710-05	1.61880050-05
KAPPA(P)	4.97093570+03	1.34983150+03	3.16508600+02	6.27629510+01	1.25155672+01	2.65208170+00	6.26626250-01	2.70098790-01
KAPPA(R)	1.32795740+03	3.91751190+02	1.10647666+02	2.21906710+01	4.24487760+00	9.75810440-01	3.50908420-0*	2.29956750-01
DENSITY	2.49044060-06	3.23757850-07	3.80890140-08	4.04695940-09	3.80890210-10			
KAPPA(P)	2.22613400-01	2.17092240-01	2.16470720-01	2.16399290-01	2.16391720-01			
KAPPA(R)	2.09508910-01	2.06944700-01	2.06550160-01	2.06515660-01	2.06511940-01			

THETA = 224.99990 13 DENSITIES

DENSITY	3.20305480+00	6.14646540-01	1.20438264-01	2.38751520-02	4.76340760-03	9.51858890-04	1.70982020-04	2.97390390-05
KAPPA(P)	1.76984670+03	4.84967540+02	1.01878806+02	2.08241000+01	4.31615950+00	9.23270450-01	3.11205130-01	2.21319710-01
KAPPA(R)	1.79240630+02	6.51423540+01	1.59313520+01	3.49597740+00	8.41206170-01	3.35014660-01	2.26175050-01	2.04194150-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 220.99960 CONTINUED

DENSITY	4.57529030-05	5.99776520-07	6.99741550-08	7.43475710-09	6.99741670-10
KAPPA(P)	2.09268120-01	2.07546970-01	2.07737300-01	2.07710710-01	2.07707790-01
KAPPA(R)	2.00304020-01	1.99940390-01	2.00102200-01	2.00093600-01	2.00092600-01

THETA = 340.00012 13 DENSITIES

DENSITY	5.70054040+00	1.12613970+00	2.23161430-01	4.43236000-02	8.84722920-03	1.76808896-03	3.24965020-04	5.52423900-05
KAPPA(P)	7.15049060+02	1.6702774O+02	3.49790380+01	7.16009320+00	1.5262018O+00	4.27785190-01	2.34177480-01	2.05499730-01
KAPPA(R)	4.43731240+01	1.1724374O+01	2.72058520+00	7.11023140-01	3.13918460-01	2.25308210-01	2.02309620-01	1.96947310-01

DENSITY	3.49970000-06	1.10434907-06	1.29981990-07	1.39104560-08	1.29982031-09
KAPPA(P)	2.01267330-01	2.00553950-01	2.00465320-01	2.00454700-01	2.00453490-01
KAPPA(R)	1.95960030-01	1.95783660-01	1.95759770-01	1.95756840-01	1.95756640-01

THETA = 499.99993 13 DENSITIES

DENSITY	1.30749491+01	2.00134320+00	3.07577930-01	7.89626770-02	1.57712290-02	3.15309810-03	5.79524870-04	9.85165600-05
KAPPA(P)	9.99387470+01	5.33044820+01	7.29496810+00	1.60103990+00	4.47077280-01	2.10045520-01	1.91524000-01	1.89195190-01
KAPPA(R)	4.90201610+00	1.20956770+00	4.21056710-01	2.50323050-01	2.07514720-01	1.95182160-01	1.91985380-01	1.91290320-01

DENSITY	1.51563062-05	1.97030950-06	2.31802529-07	2.46290350-08	2.31802620-09
KAPPA(P)	1.88999940-01	1.88789030-01	1.88782070-01	1.88781310-01	1.88781120-01
KAPPA(R)	1.91147.00-01	1.91121380-01	1.91117850-01	1.91117280-01	1.91117280-01

THETA = 6[illegible].99976 13 DENSITIES

DENSITY	1.60195710+01	3.31006910+00	6.58248670-01	1.30787160-01	2.61244400-02	5.22306980-03	9.59983960-04	1.63192080-04
KAPPA(P)	5.33499060+01	1.19776089+01	2.60538460+00	6.27024230-01	2.55922650-01	1.98050340-01	1.90059330-01	1.88992490-01
KAPPA(R)	2.66739080+00	7.22629280-01	3.19443840-01	2.24772390-01	2.00144830-01	1.93354690-01	1.91560660-01	1.91211100-01

DENSITY	2.51083450-05	3.26382750-06	3.83902090-07	4.07981190-08	3.83982200-09
KAPPA(P)	1.88813780-01	1.88785460-01	1.88781690-01	1.88781310-01	1.88781120-01
KAPPA(R)	1.91132070-01	1.91119380-01	1.91117470-01	1.91117280-01	1.91117280-01

THETA = 999.99967 13 DENSITIES

DENSITY	2.93054090+01	5.6443271O+00	1.12362267+00	2.23299130-01	4.46059510-02	8.91820120-03	1.63914280-03	2.78646600-04
KAPPA(P)	2.74469750+01	5.03493190+00	1.33225473+00	3.82635890-01	2.16737350-01	1.92731160-01	1.89369980-01	1.88884980-01
KAPPA(R)	1.92602692+00	4.65893870-01	2.60639510-01	2.09862020-01	1.96039320-01	1.92300890-01	1.91358040-01	1.91165450-01

DENSITY	4.28686420-05	5.57292790-06	6.55636090-07	6.96613630-08	6.55636210-09
KAPPA(P)	1.88797350-01	1.88783580-01	1.88781690-01	1.88781500-01	1.88781500-01
KAPPA(R)	1.91125300-01	1.91118620-01	1.91117850-01	1.91117660-01	1.91117660-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA =	1099.99v30		13 DENSITIES					
DENSITY	5.191[illegible]+01	1.03623285+01	2.03525350+00	9.10206290-01	8.19454910-02	1.63837380-02	3.01129510-03	5.11906880-04
KAPPA(P)	1.27337e31+01	2.76754e0+00	6.66333020-01	2.62737980-01	1.99059990-01	1.90340660-01	1.89052220-01	1.88027760-01
KAPPA(R)	7.5e021540-01	3.25557230-01	2.24965330-01	2.00758010-01	1.93541560-01	1.91665810-01	1.91235620-01	1.91139260-01
DENSITY	7.87595[illegible]-05	1.02340445-05	1.20449316-06	1.27976400-07	1.20448352-08			
KAPPA(P)	1.88788e60-01	1.88782630-01	1.88781580-01	1.88781690-01	1.88781690-01			
KAPPA(R)	1.91120e10-01	1.91118040-01	1.91117660-01	1.91117660-01	1.91117660-01			
THETA =	2299.99e70		13 DENSITIES					
DENSITY	9.54[illegible]32e10+01	1.89630490+01	3.77536870+00	7.5357e490-01	1.50542320-01	3.00988290-02	5.53209898-03	9.40032280-04
KAPPA(P)	3.84575e20+00	1.87407e02+00	4.93588400-01	2.40789060-01	1.98836180-01	1.91876950-01	1.90580420-01	1.90337700-01
KAPPA(R)	4.5e460e70-01	2.60044990-01	2.09611800-01	1.9603e220-01	1.92346270-01	1.91423890-01	1.91218790-01	1.91172140-01
DENSITY	1.8[illegible]81030-04	1.88085320-05	2.21276000-06	2.35105450-07	2.21278280-08			
KAPPA(P)	1.90295720-01	1.90289060-01	1.90288180-01	1.90287920-01	1.90287920-01			
KAPPA(R)	1.91163730-01	1.91162390-01	1.91162200-01	1.9116220e-01	1.91162200-01			
THETA =	3300.00e50		13 DENSITIES					
DENSITY	1.7e499e10+02	3.50334830+01	7.01256810+00	1.39978897+00	2.79641660-01	5.59105050-02	1.02762889-02	1.74691650-03
KAPPA(P)	4.1e105e00+00	9.57634810-01	3.24450600-01	2.13297790-01	1.99799780-01	1.91535900-01	1.90884630-01	1.90762890-01
KAPPA(R)	3.20380e40-01	2.26082790-01	2.00647030-01	1.93662560-01	1.91842990-01	1.91419290-01	1.91313850-01	1.91292420-01
DENSITY	2.68755e00-04	3.49381920-05	4.11035990-06	4.36725930-07	4.11036070-08			
KAPPA(P)	1.90781720-01	1.90738290-01	1.90737900-01	1.90737900-01	1.90737900-01			
KAPPA(R)	1.91288e00-01	1.91297830-01	1.91287830-01	1.91287830-01	1.91287830-01			
THETA =	4999.99e70		13 DENSITIES					
DENSITY	3.15378e10+02	6.24714660+01	1.24929437+01	2.49628660+00	4.98697240-01	9.97080380-02	1.83261360-02	3.11536490-03
KAPPA(P)	1.97581e39+00	5.25274550-01	2.47492500-01	2.00540510-01	1.92584160-01	1.91110780-01	1.90810020-01	1.90753740-01
KAPPA(R)	2.58728e40-01	2.09780610-01	1.96184250-01	1.92501560-01	1.91566360-01	1.91359960-01	1.91308680-01	1.91298540-01
DENSITY	4.79284e10-04	6.23069860-05	7.33025740-06	7.78898180-07	7.33025860-08			
KAPPA(P)	1.90784e10-01	1.90742490-01	1.90742290-01	1.90742290-01	1.90742290-01			
KAPPA(R)	1.91296e20-01	1.91296440-01	1.91296440-01	1.91296440-01	1.91296440-01			
THETA =	9999.99e90		13 DENSITIES					
DENSITY	5.2[illegible]30+02	1.03474612+02	2.06941690+01	4.13507710+00	8.26091770-01	1.65146370-01	3.03573880-02	5.16860740-03
KAPPA(P)	1.07e37961+00	3.50418900-01	2.17844130-01	1.99526960-01	1.91662360-01	1.90912890-01	1.90760230-01	1.90731080-01
KAPPA(R)	6.30108810-01	2.01977090-01	1.9405350[illegible]-01	1.91935670-01	1.91431350-01	1.91311750-01	1.91284580-01	1.91279410-01

OHEY ABSORPTION COEFFICIENTS CONTINUED

THETA = 9999.99640 CONTINUED

DENSITY	7.93935780-04	1.03211636-04	1.21424862-05	1.29013988-06	1.21424880-07
KAPPA(P)	1.90726640-01	1.90725890-01	1.90725890-01	1.90725890-01	1.90725890-01
KAPPA(R)	1.91279660-01	1.91278270-01	1.91278270-01	1.91278270-01	1.91278270-01

THETA = 9999.99520 13 DENSITIES

DENSITY	9.91900980+02	1.76679950+02	3.53341870+01	7.06048670+00	1.41029950+00	2.81996390-01	5.18341550-02	8.81158480-03
KAPPA(P)	6.03308390-01	2.63239240-01	2.03127790-01	1.93030510-01	1.91203300-01	1.90835590-01	1.90760610-01	1.90746680-01
KAPPA(R)	6.13003660-01	1.97192270-01	1.92755250-01	1.91617510-01	1.91375080-01	1.91313080-01	1.91299890-01	1.91297080-01

DENSITY	1.35562191-03	1.76230640-04	2.07330820-05	2.20289100-06	2.07330850-07
KAPPA(P)	1.90744390-01	1.90744010-01	1.90743820-01	1.90743820-01	1.90743820-01
KAPPA(R)	1.91296820-01	1.91296810-01	1.91296820-01	1.91296820-01	1.91296820-01

1 DIANE/NOSCT CH2 TEMP(100.-2250.) 11 FREQ. C1/MY 11/18/66 000000 MATERL = 2101 NX = 369

GREY ABSORPTION COEFFICIENTS 9 TEMPERATURES

THETA = 99.99998 13 DENSITIES

DENSITY	1.09662099+00	2.01927610-01	3.70605570-02	7.13851890-03	1.41194511-03	2.81581420-04	5.17297888-05	8.79304090-06
KAPPA(P)	1.04591759+04	9.07342670+03	1.05769960+03	2.14156690+02	4.29911570+01	8.34648870+00	1.69217890+00	9.58897030-01
KAPPA(R)	3.93276020+03	1.36356100+03	3.65051310+02	6.31215330+01	9.77154870+00	1.93619264+00	6.53206488-01	3.27952488-01
DENSITY	1.35275148-06	1.75856070-07	2.76990810-08	2.19821560-09	2.86890840-10			
KAPPA(P)	2.44187470-01	2.09836840-01	2.05267970-01	2.04738240-01	2.04681320-01			
KAPPA(R)	1.72460080-01	1.23306891-01	1.19856035-01	1.18495933-01	1.18392243-01			

THETA = 149.99995 13 DENSITIES

DENSITY	1.88109792+00	3.44995810-01	6.59228610-02	1.29923187-02	2.58839850-03	5.17067570-04	9.58257240-05	1.61535630-05
KAPPA(P)	4.88149050+03	1.35178730+03	3.17239800+02	6.24972190+01	1.25617185+01	2.65760220+00	6.21845200-01	2.37860480-01
KAPPA(R)	1.03020490+03	3.92602240+02	1.10887031+02	2.22357860+01	4.24878470+00	9.51150100-01	2.49971080-01	8.22472780-02
DENSITY	2.98518390-06	3.23068970-07	3.60083500-08	4.03834950-09	3.80083570-10			
KAPPA(P)	1.69459080-01	1.58884960-01	1.57569130-01	1.57414000-01	1.57397310-01			
KAPPA(R)	4.82863400-02	4.27070190-02	4.19684130-02	4.18803310-02	4.18708670-02			

THETA = 224.99990 13 DENSITIES

DENSITY	3.19866630+00	6.13382540-01	1.20182605-01	2.34244950-02	4.75330070-03	9.49835290-04	1.74570660-04	2.96760580-05
KAPPA(P)	1.77367860+03	4.86015710+02	1.92099309+02	2.04687950+01	4.32415600+00	9.08195500-01	2.50937340-01	1.27855570-01
KAPPA(R)	1.79629960+02	6.52836740+01	1.59659168+01	3.49918430+00	7.34015590-01	1.60596060-01	4.11476280-02	1.83773960-02
DENSITY	4.56551490-06	5.93517030-07	6.98252670-08	7.41893780-09	6.98252790-10			
KAPPA(P)	1.06188725-01	1.02678143-01	1.03803977-01	1.03750635-01	1.03744928-01			
KAPPA(R)	1.03917526-02	1.37598559-02	1.41053235-02	1.40953826-02	1.40943115-02			

THETA = 340.00012 13 DENSITIES

DENSITY	5.68985410+00	1.12375043+00	2.22687910-01	4.42295570-02	8.82845750-03	1.76433582-03	3.24275230-04	5.51251020-05
KAPPA(P)	7.16995600+02	1.67399920+02	3.50554900+01	7.17351660+00	1.50566790+00	3.52955300-01	1.14608773-01	6.92969238-02
KAPPA(R)	4.44692070+01	1.17495152+01	2.70068740+00	5.80395450-01	1.23381651-01	2.87579500-02	9.15341750-03	5.46157958-03
DENSITY	8.48076660-06	1.10250027-06	1.29705420-07	1.37812086-08	1.29705461-09			
KAPPA(P)	6.15088930-02	6.02776430-02	6.01153530-02	6.00960000-02	6.00938940-02			
KAPPA(R)	4.81967400-03	4.71800140-03	4.70458860-03	4.7029891D-03	4.70281500-03			

THETA = 499.99993 13 DENSITIES

DENSITY	1.00535219+01	1.99709713+00	3.96734250-01	7.87951370-02	1.57377650-02	3.14639480-03	5.78295250-04	9.83870330-05
KAPPA(P)	9.92020780+01	3.33760630+01	7.29496940+00	1.59277708+00	3.35866830-01	5.56830230-02	2.05379680-02	1.39360866-02
KAPPA(R)	4.90612480+00	1.12900079+00	2.46877510-01	5.26643250-02	1.15066291-02	2.59627640-03	8.58027850-04	5.31536050-04

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 899.99993 CONTINUED

DENSITY	1.51241169-05	1.96613680-06	2.31309330-07	2.45766300-08	2.31309400-09
KAPPA(P)	1.27964050-02	1.26089045-02	1.25849708-02	1.25821180-02	1.25818125-02
KAPPA(R)	4.74836040-04	4.65859260-04	4.64675150-04	4.64534390-04	4.64519050-04

THETA = 699.99976 13 DENSITIES

DENSITY	1.65943620+01	3.30304570+00	6.56851770-01	1.30509660-01	2.60689850-02	5.21198240-03	9.57986180-04	1.62846420-04
KAPPA(P)	3.35150400+01	1.20014679+01	2.59808330+00	5.49994050-01	1.21910147-01	3.46058000-02	1.66436590-02	1.32732972-02
KAPPA(R)	2.64655420+00	5.93805320-01	1.27843420-01	2.79439490-02	5.87176870-03	1.55382756-03	6.65418770-04	4.98719370-04

DENSITY	2.50531760-05	3.25691540-06	3.83165070-07	4.07113110-08	3.83165180-09
KAPPA(P)	1.26982663-02	1.25956219-02	1.25834099-02	1.25819632-02	1.25817997-02
KAPPA(R)	4.69782050-04	4.65201940-04	4.64598020-04	4.64526030-04	4.64518140-04

THETA = 999.99967 13 DENSITIES

DENSITY	2.82453620+01	5.63235130+00	1.12123829+00	2.22825120-01	4.45113080-02	8.89927950-03	1.63566309-03	2.78055870-04
KAPPA(P)	2.75059420+01	6.04063410+00	1.29046960+00	2.77508970-01	6.63027440-02	2.33869050-02	1.45732736-02	1.29208088-02
KAPPA(R)	1.36018183+00	2.98591160-01	6.36654030-02	1.35672025-02	3.12148330-03	9.98930860-04	5.63006710-04	4.81279220-04

DENSITY	4.27774270-05	5.56107070-06	6.54241060-07	6.95131580-08	6.54247720-09
KAPPA(P)	1.26341008-02	1.25887843-02	1.25829061-02	1.25820893-02	1.25820136-02
KAPPA(R)	4.67097300-04	4.64852690-04	4.64556680-04	4.64521370-04	4.64517660-04

THETA = 1499.99930 13 DENSITIES

DENSITY	5.10982910+01	1.03403822+01	2.09089150+00	4.09335640-01	8.17715420-02	1.63489770-02	3.00490300-03	5.10820150-04
KAPPA(P)	1.27594963+01	2.75213500+00	5.92447390-01	1.30993280-01	3.65140190-02	1.73888340-02	1.34675799-02	1.27329528-02
KAPPA(R)	6.30859050-01	1.35940740-01	2.91421700-02	6.31835130-03	1.64815968-03	7.02255000-04	5.08303440-04	4.71967288-04

DENSITY	7.85873410-05	1.02163626-05	1.20192044-06	1.27708100-07	1.20192067-08
KAPPA(P)	1.26055431-02	1.25853461-02	1.25826802-02	1.25823660-02	1.25823405-02
KAPPA(R)	4.65664220-04	4.64864310-04	4.64534860-04	4.64519520-04	4.64517660-04

THETA = 2249.99870 13 DENSITIES

DENSITY	9.54810780+01	1.88230270+01	3.76735430+00	7.51975150-01	1.50222910-01	3.00349370-02	5.52036130-03	9.38436840-04
KAPPA(P)	8.43636040+00	1.83305814+00	3.87970720-01	9.00683920-02	2.94196990-02	1.71668170-02	1.46578687-02	1.41888673-02
KAPPA(R)	2.89965060-01	6.29865060-02	1.33161199-02	3.07615760-03	9.91416320-04	5.70222460-04	4.83977090-04	4.67827930-04

DENSITY	1.44376400-04	1.87686950-05	2.20807390-06	2.34607950-07	2.20807460-08
KAPPA(P)	1.91069431-02	1.90937058-02	1.90920007-02	1.90918032-02	1.90917748-02
KAPPA(R)	4.69087010-04	4.68849000-04	4.68829580-04	4.68818580-04	4.68817660-04

1100302 DIANE CARBON PHENOLIC 38 -- 12 FREQUENCIES -- JANUARY 21, 1966 MATERL = 1115 MX = 870

GREY ABSORPTION COEFFICIENTS 23 TEMPERATURES

THETA = .12x5 12 DENSITIES

DENSITY	1.10916457-01	3.69182230-02	1.10689656-02	3.64774540-03	1.10563527-03	3.68359950-04	1.10436493-04	3.67899380-05
KAPPA(P)	1.12538634-05	1.78322840-05	2.95064990-05	4.66970340-05	7.71954540-05	1.22123230-04	1.91851150-04	3.19580950-04
KAPPA(R)	9.58679930-07	1.59346452-06	2.79216620-06	4.68193090-06	8.30543910-06	1.41117897-05	2.54447780-05	4.39881950-05
DENSITY	1.10277629-05	3.67263950-06	1.10044048-06	3.66391490-07				
KAPPA(P)	5.29789940-04	8.42817620-04	1.40435910-03	2.26556750-03				
KAPPA(R)	8.07930460-05	1.42084300-04	2.66086280-04	4.74964750-04				

THETA = .17x4 12 DENSITIES

DENSITY	8.28792970-02	2.75988820-02	8.26934440-03	2.75284600-03	8.24428660-04	2.74280290-04	8.20657350-05	2.72706380-05
KAPPA(P)	1.20038642-02	1.88163330-02	3.10930800-02	4.96433910-02	8.38456570-02	1.36705670-01	2.36733560-01	3.98765240-01
KAPPA(R)	2.36812440-03	3.92711590-03	6.99171090-03	1.17593100-02	2.06134810-02	3.41180060-02	5.86692230-02	9.53129110-02
DENSITY	8.14423720-06	2.69988880-06	8.03490900-07	2.65195120-07				
KAPPA(P)	6.98393x10-01	1.18313652+00	2.11485650+00	3.58604520+00				
KAPPA(R)	1.60596340-01	2.56237630-01	4.23861300-01	6.65566320-01				

THETA = .21x2 12 DENSITIES

DENSITY	6.59525x30-02	2.19321870-02	6.55785640-03	2.17727760-03	6.49368660-04	2.14897380-04	6.37800600-05	2.09808600-05
KAPPA(P)	1.42338698+00	2.23909540+00	3.70532130+00	5.89135510+00	9.80428930+00	1.55461028+01	2.55789560+01	3.99880540+01
KAPPA(R)	1.62343630-01	2.59035540-01	4.30382470-01	6.81592030-01	1.12332606+00	1.76483111+00	2.88028710+00	4.67497148+00
DENSITY	6.17069x60-06	2.00573500-06	5.77706430-07	1.81828960-07				
KAPPA(P)	6.46372660+01	1.01604719+02	1.7073283U+02	2.85037260+02				
KAPPA(R)	7.19367320+00	1.10023619+01	1.73900810+01	2.625 300+01				

THETA = .25x1 12 DENSITIES

DENSITY	5.44408760-02	1.80449400-02	5.36799940-03	1.77052359-03	5.22706750-04	1.70698900-04	4.95662700-05	1.57952710-05
KAPPA(P)	2.73194760+01	4.24849530+01	6.06163590+01	1.05253314+02	1.66622360+02	2.52451700+02	4.01762040+02	6.28515048+02
KAPPA(R)	2.64152990+00	4.1547x060+00	6.79753670+00	1.05731734+01	1.70324440+01	2.61709490+01	4.18511790+01	6.45461170+01
DENSITY	4.3x772670-06	1.31417693-06	3.35816850-07	9.53129840-08				
KAPPA(P)	1.06693x90+03	1.78838800+03	3.16750640+03	5.03853130+03				
KAPPA(R)	1.04959x20+02	1.65274870+02	2.69697230+02	4.00282200+02				

THETA = .30x9 12 DENSITIES

DENSITY	4.59119430-02	1.51210123-02	4.45232000-03	1.44796693-03	4.17101920-04	1.31260070-04	3.56379350-05	1.03430751-05
KAPPA(P)	1.94782x50+02	2.95509190+02	4.62899480+02	6.95193390+02	1.09643570+03	1.69756460+03	2.82685470+03	4.57595130+03
KAPPA(R)	2.22x50x00+01	3.45348850+01	5.55959280+01	8.58063920+01	1.38212170+02	2.16902930+02	3.62842900+02	5.86868558+02

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = .30460 CONTINUED

DENSITY	2.5363160E-06	6.9274774D-07	1.67346390-07	4.57671190-08
KAPPA(P)	7.4871220E+03	1.0394373E+04	1.19358275+04	9.9486499D+03
KAPPA(R)	9.5745600E+02	1.3381455D+03	1.8608252D+03	1.3181308D+03

THETA = .34468 12 DENSITIES

DENSITY	3.9135345D-02	1.2734760E-02	3.5701233D-03	1.1549479E-03	3.1293658D-04	9.0064009D-05	2.1888344D-05	5.6378939D-06
KAPPA(P)	7.7473845D+02	1.1622596D+03	1.8234216D+03	2.7852697D+03	4.5295591D+03	7.1388713D+03	1.1237817D+04	1.4535078D+04
KAPPA(R)	1.1695040E+02	1.8098243D+02	2.9410845D+02	4.6360365D+02	7.7908485D+02	1.2654081D+03	2.0695158D+03	2.7977197D+03

DENSITY	1.3229379E-06	3.7135777D-07	1.0151088D-07	3.2889909D-08
KAPPA(P)	1.3922895D+04	8.9141928D+03	3.5976275D+03	1.3036457D+03
KAPPA(R)	2.8688967D+03	1.8797422D+03	7.6384123D+02	2.7184443D+02

THETA = .38776 12 DENSITIES

DENSITY	3.3250947D-02	1.0597575E-02	2.9148664D-03	8.5600872D-04	2.0615960D-04	5.2883987D-05	1.2058992D-05	3.3565397D-06
KAPPA(P)	2.2441851D+03	3.4024122D+03	5.4675172D+03	8.5237353D+03	1.3599386D+04	1.8440229D+04	1.8396393D+04	1.2042651D+04
KAPPA(R)	4.6510197E+02	6.9563833D+02	1.1628276D+03	1.8422817D+03	3.1435873D+03	4.4787081D+03	4.7404622D+03	3.2280706D+03

DENSITY	9.1036341D-07	2.9340853D-07	8.6944147D-08	2.8871815D-08
KAPPA(P)	5.0621026D+03	1.8547218D+03	5.7592943D+02	1.9464160D+02
KAPPA(R)	1.3559959D+03	4.9550130D+02	1.5255268D+02	5.1171871D+01

THETA = .43685 12 DENSITIES

DENSITY	2.6021049D-02	8.5122416D-03	2.1547082D-03	5.6561326D-04	1.2417360D-04	3.2884800D-05	8.5208028D-06	2.6807875D-06
KAPPA(P)	5.5230190D+03	8.5657755D+03	1.3986089D+04	2.0920189D+04	2.6087197D+04	2.1420633D+04	1.0843920D+04	4.3802488D+03
KAPPA(R)	1.3049645D+03	2.1371319D+03	3.5147356D+03	5.6100219D+03	7.2978857D+03	6.1821410D+03	3.1556506D+03	1.2659396D+03

DENSITY	7.8606578D-07	2.6015195D-07	7.7724152D-08	2.5786883D-08
KAPPA(P)	1.4167364D+03	4.8352351D+02	1.4823219D+02	5.1330236D+01
KAPPA(R)	4.0656651D+02	1.3915966D+02	4.1829423D+01	1.4046875D+01

THETA = .47593 12 DENSITIES

DENSITY	2.2026290E-02	8.4355016D-03	1.4561344D-03	3.6136212D-04	8.5671529D-05	2.5490621D-05	7.2565944D-06	2.3771697D-06
KAPPA(P)	1.2388946D+04	1.9440123D+04	3.0055470D+04	3.5182356D+04	2.5925958D+04	1.3069282D+04	4.7123876D+03	1.6699683D+03
KAPPA(R)	3.3668263D+03	5.4489948D+03	8.6103475D+03	1.0265970D+04	7.6113053D+03	3.7980381D+03	1.3593065D+03	4.8007388D+02

DENSITY	7.0748962D-07	2.3436175D-07	6.9537491D-08	2.2857195D-08
KAPPA(P)	5.1698700D+02	1.6054490D+02	5.9103489D+01	2.1776667D+01
KAPPA(R)	1.8756263D+02	9.9852067D+01	1.5218624D+01	5.1660067D+00

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = .51702 12 DENSITIES

DENSITY	1.77528570-02	4.56777070-03	9.44595210-04	2.63865780-04	6.98996450-05	2.22048470-05	6.52675940-06	2.15547000-06
KAPPA(P)	2.55552990+04	3.84187120+04	4.64763990+04	3.55966040+04	1.69850680+04	6.75285000+03	2.10799300+03	7.63482320+02
KAPPA(R)	7.45581610+03	1.13216252+04	1.37536548+04	1.08222676+04	4.87380360+03	1.92382360+03	6.21173220+02	2.13467300+02
DENSITY	5.39486760-07	2.10222380-07	6.21012630-08	2.04476070-08				
KAPPA(P)	2.46423.00+02	9.00621480+01	2.93819330+01	1.03107804+01				
KAPPA(R)	6.56271600+01	2.23779130+01	6.86836080+00	2.34833600+00				

THETA = .56010 12 DENSITIES

DENSITY	1.32018678-02	3.23193110-03	7.46003700-04	2.14903620-04	6.17053500-05	2.01019260-05	5.94719110-06	1.95601770-06
KAPPA(P)	4.60020540+04	5.90594590+04	6.21944900+04	2.81028540+04	9.89910810+03	3.60515480+03	1.15729410+03	4.17034920+02
KAPPA(R)	1.41449075+04	1.79340400+04	1.43537992+04	7.55209260+03	2.82467880+03	1.02810230+03	3.29663710+02	1.11917272+02
DENSITY	5.77071330-07	1.89740070-07	5.61016840-08	1.83583390-08				
KAPPA(P)	1.37127.30+02	4.87838340+01	1.60521050+01	6.50958240+00				
KAPPA(R)	3.47187.30+01	1.20138407+01	3.91634950+00	1.54894400+00				

THETA = .60019 12 DENSITIES

DENSITY	9.73575010-03	2.47258770-03	6.25061920-04	1.93614800-04	5.61131730-05	1.83882270-05	5.42062220-06	1.77857163-06
KAPPA(P)	7.03657.50+04	6.70973540+04	3.37699160+04	1.71184120+04	5.87146760+03	2.11136510+03	6.91071320+02	2.49183600+02
KAPPA(R)	2.2.3.9.3+04	2.08302170+04	1.15646684+04	6.94788730+03	1.70962610+03	6.11998590+02	1.99316940+02	6.76447670+01
DENSITY	5.25617.50-07	1.72546360-07	5.06693340-08	1.61992650-08				
KAPPA(P)	8.12710370+01	3.14695370+01	1.40158650+01	8.93578910+00				
KAPPA(R)	2.18558790+01	8.36779130+00	3.35976150+00	1.78872332+00				

THETA = .64027 12 DENSITIES

DENSITY	7.53135730-03	2.05929820-03	5.53073320-04	1.76134970-04	5.14953010-05	1.68476390-05	5.96399350-06	1.63119130-06
KAPPA(P)	8.56[1.50+04	6.10348300+04	2.81302260+04	1.11833339+04	3.72696650+03	1.35002710+03	4.40623140+02	1.61785270+02
KAPPA(R)	2.81[400.0+04	1.93131130+04	9.[130550+03	3.[007980+03	1.12938660+03	4.05944640+02	1.31012130+02	4.82599000+01
DENSITY	4.[63744[0-07	1.[0[1360-07	4.[0[9820-08	1.[0[6[51-08				
KAPPA(P)	6.17553.00+01	3.31306080+01	2.24965050+01	1.79453310+01				
KAPPA(R)	1.78167.00+01	8.26715130+00	6.39053010+00	2.95852240+00				

THETA = .68936 12 DENSITIES

DENSITY	6.23965760-03	1.80824239-03	5.02703850-04	1.61976400-04	4.74022940-05	1.55243630-05	4.58234380-06	1.50111863-06
KAPPA(P)	8.62409140+04	4.98762370+04	2.01200060+04	7.65351290+03	2.53601690+03	9.16076570+02	3.11970910+02	1.35493088+02
KAPPA(R)	2.93261920+04	1.57599927+04	6.12975430+03	2.39955840+03	8.15849540+02	2.98378650+02	1.02903322+02	4.28163488+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = .68936 CONTINUED

DENSITY	4.37276960-07	1.39514120-07	3.87862560-08	1.17114381-08				
KAPPA(P)	7.34086490+01	5.40349510+01	4.29243900+01	3.31065260+01				
KAPPA(R)	1.9629650+01	1.1145071+01	7.42061900+00	5.35087440+00				

THETA = .86200 12 DENSITIES

DENSITY	1.46017471+01	4.47935180+00	1.06719070+00	2.94690840-01	3.73411260-02	5.10676070-03	5.37436460-04	6.69516410-05
KAPPA(P)	6.6560352+03	6.5990435+03	6.50604380+03	6.02853900+03	5.78636740+03	5.22113430+03	3.52434520+03	2.25986400+03
KAPPA(R)	2.5633890+02	2.52370920+02	2.52307840+02	2.51947310+02	2.50137300+02	2.44169830+02	2.26166160+02	1.96436640+02

DENSITY	7.03579450-06	1.60993800-07	1.03725808-08	9.78891960-10
KAPPA(P)	1.4930670+03	4.71297710+02	5.94319320+01	5.72418390+00
KAPPA(R)	1.53377.50+02	5.46406530+01	7.38240880+00	7.59686970-01

THETA = 1.10000 12 DENSITIES

DENSITY	1.77573647+03	5.24595399-01	1.86655610-01	3.14473670-02	3.89691520-03	5.45422410-04	6.48859160-05	1.07425300-05
KAPPA(P)	3.05097000+04	3.00108200+04	2.97058690+04	2.76422280+04	2.58379570+04	2.28475690+04	1.45336209+04	7.47253730+03
KAPPA(R)	1.6027867+03	1.75869960+03	1.75441360+03	1.73555050+03	1.67058630+03	1.51339380+03	1.18015360+03	7.52017800+02

DENSITY	1.97468650-06	1.46140120-07	1.40717034-08	1.39677496-09
KAPPA(P)	2.88061750+03	3.00900590+02	2.69987340+01	2.62141430+00
KAPPA(R)	3.33742570+02	3.75712810+01	3.50825930+00	3.98960840-01

THETA = 1.38000 12 DENSITIES

DENSITY	4.45014080-01	1.23965819-01	4.29602650-02	7.20391980-03	9.63931840-04	1.65296450-04	2.96989170-05	7.74703450-06
KAPPA(P)	7.67032960+04	7.38654080+04	7.25840140+04	6.67360040+04	5.62409250+04	4.03804060+04	1.77508720+04	6.15518420+03
KAPPA(R)	8.37335530+03	7.55450930+03	7.44263280+03	7.04927440+03	6.00849740+03	4.24119340+03	2.08286570+03	8.15653780+02

DENSITY	2.07967470-06	1.97367160-07	1.90347430-08	1.85482949-09
KAPPA(P)	1.71833400+03	1.50310920+02	1.33539070+01	2.63856880+00
KAPPA(R)	2.4837970+02	2.29307770+01	3.11964740+00	7.53097930-01

THETA = 1.50000 12 DENSITIES

DENSITY	3.00201910-01	8.23999880-02	2.84974690-02	4.87351420-03	7.01254260-04	1.36049750-04	2.84716990-05	8.16054170-06
KAPPA(P)	9.8992510+04	9.41175630+04	9.14639310+04	8.12836310+04	6.27679560+04	4.05463040+04	1.63797312+04	5.14201330+03
KAPPA(R)	1.3692040+04	1.20841501+04	1.17721277+04	1.07438625+04	8.36607380+03	5.13485970+03	2.12975010+03	7.69553090+02

DENSITY	2.29609680-06	2.20515040-07	1.97167260-08	1.39273002-09
KAPPA(P)	1.37913650+03	1.26775770+02	1.71733710+01	3.95760970+00
KAPPA(R)	2.2554506+02	2.44848600+01	4.73887600+00	1.17131492+00

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 2.25000 12 DENSITIES

DENSITY	9.7e039e20-02	2.70743090-02	1.00996959-02	2.24286770-03	5.03322240-04	1.46224130-04	4.02621030-05	1.23210676-05
KAPPA(P)	1.6e708140+05	1.41874760+05	1.23722931+05	8.65605880+04	4.71976780+04	2.21390850+04	8.26705100+03	3.46205920+03
KAPPA(R)	7.14247e60+04	5.69369610+04	4.88466410+04	3.29826350+04	1.68539460+04	7.66760770+03	3.08374650+03	1.37626690+03
DENSITY	3.16201640-05	2.27367110-07	2.06572400-08	1.96671770-09				
KAPPA(P)	1.44805990+03	2.20392470+02	2.21531560+01	2.46640300+00				
KAPPA(R)	5.39406e90+02	5.78278830+01	5.47542560+00	7.70750930-01				

THETA = 3.40e02 12 DENSITIES

DENSITY	6.23291540-02	2.46433050-02	1.01586472-02	2.66625610-03	6.49576490-04	1.79300040-04	4.67956290-05	1.34034299-05
KAPPA(P)	1.55542e00+05	1.33519110+05	1.16331592+05	9.40893280+04	6.94040120+04	3.67465610+04	1.33269022+04	4.46422870+03
KAPPA(R)	1.17113e36+05	9.52633020+04	7.70184230+04	4.72732500+04	2.14356330+04	8.43883930+03	2.77942660+03	1.04150280+03
DENSITY	3.72479e40-05	3.06392160-07	2.60382340-08	2.39903350-09				
KAPPA(P)	1.3e758e60+03	1.87327790+02	2.27223720+01	2.69109450+00				
KAPPA(R)	3.85245170+02	6.05627450+01	6.92619080+00	8.95509000-01				

THETA = 5.00e01 12 DENSITIES

DENSITY	8.75303e50-02	2.75404340-02	1.17104931-02	3.11430280-03	7.62719680-04	2.19857720-04	5.71392150-05	1.69270110-05
KAPPA(P)	1.47428e90+05	1.31557580+05	1.20401004+05	1.00207667+05	6.80234620+04	3.52105130+04	1.29044888+04	4.56696598+03
KAPPA(R)	1.09e09e34+05	9.40422970+04	7.76448080+04	4.60599910+04	2.49143670+04	1.30044795+04	4.74036730+03	1.65537828+03
DENSITY	4.62377e90-06	3.95505970-07	3.49446690-08	3.40677430-09				
KAPPA(P)	1.34277e00+03	1.45813720+02	1.67368010+01	1.75270970+00				
KAPPA(R)	4.80222e90+02	5.42585170+01	5.20161930+00	6.01414430-01				

THETA = 7.00e00 12 DENSITIES

DENSITY	9.93456e00-02	3.25561170-02	1.41194786-02	3.85092310-03	9.47873080-04	2.74047260-04	7.27115770-05	2.19751140-05
KAPPA(P)	1.2e051e90+05	1.08423480+05	1.00669677+05	9.37231000+04	5.90830840+04	2.72579350+04	9.15998620+03	2.99026770+03
KAPPA(R)	7.63970e10+04	7.13105750+04	6.57950520+04	5.21719310+04	2.89261100+04	1.25505515+04	4.09339490+03	1.43869100+03
DENSITY	6.05213e30-06	5.68025250-07	5.63096460-08	5.62637880-09				
KAPPA(P)	8.32269e00+02	7.77633260+01	6.62519620+00	7.27308160-01				
KAPPA(R)	3.85168e70+02	2.47515960+01	2.00541090+00	3.33644240-01				

THETA = 10.00e05 12 DENSITIES

DENSITY	1.21823742-01	4.09169850-02	1.80640780-02	5.03475730-03	1.27932843-03	3.77734110-04	1.03388175-04	3.29036030-05
KAPPA(P)	8.63e49e30+04	7.88103750+04	7.40503070+04	6.10348300+04	3.27317200+04	1.27492776+04	3.51508840+03	1.02807910+03
KAPPA(R)	3.61960e40+04	3.58026790+04	3.37251790+04	2.71464070+04	1.63573051+04	7.42323310+03	2.18941560+03	5.85110040+02

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 10.00E05 CONTINUED

DENSITY	9.70082E-10-06	9.61568560-07	9.60689380-08	9.60578960-09
KAPPA(P)	2.71885E20+02	2.35519820+01	2.30160100+00	3.42885050-01
KAPPA(R)	1.30409560+02	9.37878270+00	9.98480850-01	2.56932980-01

21 DIANE/SCAT FE-1GA THETA(50-10000) 10 FREQ C1/FCT 5-24-67 TRY 2 MATERL = 1026 NX = 720

GREY ABSORPTION COEFFICIENTS 18 TEMPERATURES

THETA = 50.00000 13 DENSITIES

DENSITY	8.23434060-01	1.63902920-01	3.22282780-02	6.33555960-03	1.33376195-03	2.11691190-04	3.71985790-05	6.22523110-06
KAPPA(P)	1.25985497+04	6.06178130+03	2.61292610+03	8.40121020+02	2.64516320+02	6.53582010+01	1.23571889+01	2.10156260+00
KAPPA(R)	9.91357650+03	2.69803220+03	1.19482730+03	4.66248590+02	1.40382650+02	3.12301810+01	6.05779960+00	1.03249120+00
DENSITY	9.54527400-07	1.23975760-07	1.45038164-08	1.51693697-09	1.36368560-10			
KAPPA(P)	4.14743061-01	1.53669050-01	1.20946255-01	1.19276733-01	1.20381476-01			
KAPPA(R)	2.64148190-01	1.41135330-01	1.19747610-01	1.17369757-01	1.22161787-01			

THETA = 69.99998 13 DENSITIES

DENSITY	1.32450605+00	2.60314430-01	4.85779780-02	9.03612380-03	1.71016921-03	3.32271920-04	6.04435940-05	1.01734822-05
KAPPA(P)	8.22362940+03	4.37305430+03	1.67822220+03	5.86022950+02	1.31936130+02	2.62545940+01	4.71723100+00	9.36977080-01
KAPPA(R)	2.24398770+03	1.80619610+03	1.13142470+03	3.92525300+02	8.42356260+01	1.64469970+01	2.81284650+00	6.07981200-01
DENSITY	1.51940767-06	1.87484450-07	2.06725330-08	2.03838980-09	1.78784500-10			
KAPPA(P)	2.70341310-01	1.54130590-01	1.40101790-01	1.47291300-01	1.57165370-01			
KAPPA(R)	2.20535650-01	1.46102030-01	1.37071440-01	1.44528970-01	1.54279710-01			

THETA = 99.99998 12 DENSITIES

DENSITY	4.04181640-01	7.59521330-02	1.45211222-02	2.80199120-03	5.36661520-04	9.33027520-05	1.47865888-05	2.10370620-06
KAPPA(P)	2.70212950+03	9.79419420+02	2.23682570+02	5.54007950+01	1.46446287+01	3.72465410+00	9.38554600-01	3.06994020-01
KAPPA(R)	8.39437090+02	4.41512790+02	1.35262440+02	3.58682140+01	8.97061270+00	2.03868680+00	5.12136490-01	2.26450250-01
DENSITY	2.54954700-07	2.86157120-08	2.95242260-09	2.75023860-10				
KAPPA(P)	1.87210990-01	1.71483020-01	1.73039560-01	1.74129670-01				
KAPPA(R)	1.73503410-01	1.67132390-01	1.69732940-01	1.70947980-01				

THETA = 149.99995 11 DENSITIES

DENSITY	1.27654220-01	2.37112180-02	4.35502980-03	8.00346340-04	1.37133870-04	2.22570890-05	3.33622720-06	4.30215370-07	
KAPPA(P)	6.22406210+02	1.93083740+02	6.27531620+01	1.47080354+01	3.58398740+00	8.41024150-01	2.84712610-01	1.88477990-01	
KAPPA(R)	2.10403660+02	7.77650510+01	2.30007770+01	5.94087230+00	1.40200071+00	4.16320280-01	2.14954050-01	1.78134570-01	
DENSITY	5.05496460-09	5.37009660-09	5.05410620-10						
KAPPA(P)	1.75928960-01	1.74456130-01	1.74296390-01						
KAPPA(R)	1.72419640-01	1.71413070-01	1.71151010-01						

THETA = 224.99990 13 DENSITIES

DENSITY	3.92392940+00	1.09257642+00	1.98633860-01	3.61062610-02	6.71507020-03	1.29099893-03	2.33362630-04	3.94995990-05	
KAPPA(P)	2.65292730+03	1.41671310+03	4.21503940+02	1.35154150+02	3.67659060+01	7.66675910+00	1.50610235+00	3.98411370-01	
KAPPA(R)	1.09455700+03	5.37003680+02	1.53720550+02	4.94596880+01	1.36395677+01	2.93628450+00	6.58894530-01	2.63312960-01	

GRET ABSORPTION COEFFICIENTS CONTINUED

THETA = 224.99990 CONTINUED

DENSITY	6.07189350-06	7.99236370-07	9.28500670-08	9.84522500-09	9.28491560-10
KAPPA(P)	2.09443970-01	1.79166810-01	1.74791570-01	1.74335270-01	1.74286280-01
KAPPA(R)	1.93673600-01	1.77123330-01	1.71944760-01	1.71206130-01	1.71124990-01

THETA = 300.00012 13 DENSITIES

DENSITY	9.50176690+00	1.74153496+00	3.20625020-01	6.09113410-02	1.18455620-02	2.35090248-03	4.31371050-04	7.33868920-05
KAPPA(P)	1.74580360+03	7.98116800+02	2.93910980+02	5.76248530+01	1.18688932+01	2.42558358+00	5.76387610-01	2.41952460-01
KAPPA(R)	6.49819000+02	3.23804510+02	1.33863220+02	3.09850850+01	5.70820700+00	1.17098701+00	3.86801630-01	2.25634690-01
DENSITY	1.12771725-05	1.46590183-06	1.72349770-07	1.82161030-08	1.67668032-09			
KAPPA(P)	1.84791690-01	1.75611700-01	1.74568510-01	1.75396720-01	1.79280260-01			
KAPPA(R)	1.82270570-01	1.72635820-01	1.71417870-01	1.72158790-01	1.76020120-01			

THETA = 499.99993 13 DENSITIES

DENSITY	1.52232566+01	2.84569970+00	5.43006710-01	1.04144702-01	2.09923130-02	4.18569300-03	7.68328670-04	1.30059968-04
KAPPA(P)	9.07516710+02	4.37739600+02	9.12866200+01	1.84539970+01	3.84357140+00	8.88383910-01	3.09619230-01	2.02317710-01
KAPPA(R)	1.88382760+02	1.03399998+02	3.59196670+01	8.73971830+00	1.99729683+00	5.62415880-01	2.57777968-01	1.89829518-01
DENSITY	1.96927510-05	2.49171380-06	2.86341700-07	3.01992130-08	2.83952280-09			
KAPPA(P)	1.85133140-01	1.84599060-01	1.87534590-01	1.88636190-01	1.88784710-01			
KAPPA(R)	1.77925210-01	1.80021490-01	1.83885500-01	1.85180730-01	1.85350250-01			

THETA = 699.99976 13 DENSITIES

DENSITY	2.39615660+01	4.53439160+00	8.44541050-01	1.74580730-01	3.45733200-02	6.81631690-03	1.22314606-03	2.02959660-04
KAPPA(P)	5.10036340+02	1.52332560+02	3.55078560+01	7.75098520+00	2.01232600+00	7.98721040-01	3.73456890-01	2.36073750-01
KAPPA(R)	7.05989490+01	2.67915610+01	9.08603810+00	2.37867610+00	7.14076190-01	3.20295590-01	2.18307830-01	1.92377830-01
DENSITY	3.08488030-05	3.99942510-06	4.70340040-07	4.99716600-08	4.70316570-09			
KAPPA(P)	1.97660940-01	1.90006110-01	1.88905190-01	1.88813600-01	1.88811140-01			
KAPPA(R)	1.87085410-01	1.85943370-01	1.85556840-01	1.85399930-01	1.85396960-01			

THETA = 999.99967 13 DENSITIES

DENSITY	3.96113610+01	7.61190120+00	1.49044135+00	2.90300700-01	5.63252710-02	1.10361392-02	2.01226370-03	3.41637140-04
KAPPA(P)	4.29455010+02	7.99932260+01	1.79822460+01	6.20272060+00	2.31129750+00	7.91799810-01	3.85302568-01	2.00533200-01
KAPPA(R)	4.14739470+01	1.41736413+01	3.76977380+00	1.07879430+00	4.48175858-01	2.73798730-01	2.12287048-01	1.95181570-01
DENSITY	5.25106500-05	6.82601220-06	8.03057128-07	8.53280100-08	8.03049318-09			
KAPPA(P)	1.91305620-01	1.89164938-01	1.89054870-01	1.89045220-01	1.89044090-01			
KAPPA(R)	1.88391138-01	1.86068940-01	1.85967198-01	1.85961290-01	1.85960688-01			

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 1499.99930 13 DENSITIES

DENSITY	6.9021845D+01	1.3563725D+01	2.6375570D+00	5.0409284D-01	1.0052837D-01	2.0077140D-02	3.6887043D-03	6.2701634D-04
KAPPA(P)	1.4141664D+02	5.0488419D+01	1.6275975D+01	4.6327098D+00	1.1945514D+00	3.7811545D-01	2.1827511D-01	1.9320954D-01
KAPPA(R)	3.9693263D+01	1.2738768D+01	3.2686105D+00	9.2292460D-01	4.0219517D-01	2.6384169D-01	2.0852820D-01	1.9874821D-01

DENSITY	9.6462355D-05	1.2540088E-05	1.4752989D-06	1.5475057D-07	1.4752993D-08
KAPPA(P)	1.9091803D-01	1.9071139D-01	1.9058470D-01	1.9069146D-01	1.9068107D-01
KAPPA(R)	1.8088934D-01	1.8879434D-01	1.8870131D-01	1.8877990D-01	1.8877961D-01

THETA = 2249.99870 13 DENSITIES

DENSITY	1.2315667D+02	2.3858128D+01	4.6663024D+00	9.2427016D-01	1.8441806D-01	3.6864914D-02	6.7759208D-03	1.1518833E-03
KAPPA(P)	8.8052800D+01	2.8510259D+01	7.5996028D+00	1.7338267D+00	4.7746567D-01	2.3567536D-01	1.9909265D-01	1.9489877D-01
KAPPA(R)	3.1002256D+01	1.0843064D+01	2.8321070D+00	7.7040078D-01	3.2040130D-01	2.1591953D-01	1.9866707D-01	1.9351584D-01

DENSITY	1.7721246D-04	2.3037668D-05	2.7103033D-06	2.8796999D-07	2.7103038D-08
KAPPA(P)	1.9428403D-01	1.9420236D-01	1.9419276D-01	1.9419159D-01	1.9419140D-01
KAPPA(R)	1.9319603D-01	1.9316123D-01	1.9315699D-01	1.9315641D-01	1.9315641D-01

THETA = 2499.99990 13 DENSITIES

DENSITY	1.4297473D+02	2.7759902D+01	5.4518009D+00	1.0919941D+00	2.1596390D-01	4.3175504D-02	7.9360075D-03	1.3491008E-03
KAPPA(P)	6.8650179D+01	2.2586039D+01	5.3050382D+00	1.2006214D+00	3.6817331D-01	2.1762715D-01	1.9700789D-01	1.9545736D-01
KAPPA(R)	2.3503163D+01	8.4964206D+00	1.9592436D+00	5.5660643D-01	2.6804028D-01	2.0548053D-01	1.9535810D-01	1.9420752D-01

DENSITY	2.0755308D-04	2.6982016D-05	3.1743428D-06	3.3727406D-07	3.1743433D-08
KAPPA(P)	1.9509706D-01	1.9503792D-01	1.9503231D-01	1.9503136D-01	1.9503136D-01
KAPPA(R)	1.9403902D-01	1.9401185D-01	1.9400837D-01	1.9400798D-01	1.9400778D-01

THETA = 2749.99940 13 DENSITIES

DENSITY	1.6382732D+02	3.1890590D+01	6.2803394D+00	1.2476611D+00	2.4913584D-01	4.9810324D-02	9.1556694D-03	1.5584417E-03
KAPPA(P)	5.6946941D+01	1.7864552D+01	4.0177337D+00	9.6584356D-01	3.1214920D-01	2.0945424D-01	1.9654595D-01	1.9497791D-01
KAPPA(R)	1.6751248D+01	6.4751579D+00	1.5433284D+00	4.6106677D-01	2.4515441D-01	2.0178429D-01	1.9532254D-01	1.9461500D-01

DENSITY	2.3965246D-04	3.1128713D-05	3.6622239D-06	3.8911150D-07	3.6622249D-08
KAPPA(P)	1.9470978D-01	1.9473667D-01	1.9473239D-01	1.9473181D-01	1.9473181D-01
KAPPA(R)	1.9458359D-01	1.9453212D-01	1.9453076D-01	1.9453056D-01	1.9453056D-01

THETA = 3000.00100 13 DENSITIES

DENSITY	1.8594779D+02	3.6227770D+01	7.1490537D+00	1.4212750D+00	2.8385549D-01	5.6754179D-02	1.0932107E-02	1.7730367E-03
KAPPA(P)	5.3792281D+01	1.4562241D+01	3.2852047D+00	7.6577307D-01	2.8211429D-01	2.0658073D-01	1.9683686D-01	1.9554377D-01
KAPPA(R)	1.3777336D+01	4.6573517D+00	1.1898210D+00	3.8973864D-01	2.3089551D-01	2.0015404D-01	1.9562103D-01	1.9507015D-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 3000.00000 CONTINUED

DENSITY	2.72935920-04	3.54687010-05	4.17277190-06	4.83357260-07	4.17277370-08
KAPPA(P)	1.95319810-01	1.95284260-01	1.95279580-01	1.95278990-01	1.95278990-01
KAPPA(R)	1.94971060-01	1.94955290-01	1.94953150-01	1.94952950-01	1.94952760-01

THETA = 3400.00000 13 DENSITIES

DENSITY	2.22616810+02	4.35697440+01	8.61710330+00	1.71440775+00	3.42861850-01	6.84766960-02	1.25865815-02	2.13989490-03	
KAPPA(P)	4.24357840+01	1.04203852+01	2.31576290+00	5.84120600-01	2.53210530-01	2.03877290-01	1.97063950-01	1.96016590-01	
KAPPA(R)	8.32713400+00	2.69516090+00	7.54616200-01	3.10900300-01	2.16917540-01	1.98739970-01	1.95857090-01	1.95416520-01	
DENSITY	3.29183640-04	4.27936870-05	5.03458280-06	5.34924640-07	5.03458370-08				
KAPPA(P)	1.95962050-01	1.95936040-01	1.95932510-01	1.95932120-01	1.95932120-01				
KAPPA(R)	1.95624920-01	1.95414370-01	1.95413000-01	1.95412810-01	1.95412810-01				

THETA = 4999.99670 10 DENSITIES

DENSITY	3.92145900+02	7.72306980+01	1.53947283+01	3.05633040+00	6.10684330-01	1.22112444-01	2.24461990-02	3.81582660-03	
KAPPA(P)	1.66583900+01	3.62889060+00	9.27543170-01	3.14449740-01	2.13271980-01	1.98346650-01	1.95770150-01	1.95042650-01	
KAPPA(R)	1.74394519+00	5.66216300-01	3.01162590-01	2.21325460-01	2.00413810-01	1.95957590-01	1.95067620-01	1.94792770-01	
DENSITY	5.87049160-04	7.63163950-05							
KAPPA(P)	1.94963480-01	1.94951200-01							
KAPPA(R)	1.94762150-01	1.94757510-01							

THETA = 6999.99690 13 DENSITIES

DENSITY	6.85964760+02	1.27731315+02	2.58052530+01	5.06218380+00	1.01157251+00	2.02278460-01	3.71821670-02	6.32092330-03	
KAPPA(P)	7.34033130+00	1.58159208+00	4.64959630-01	2.37374070-01	2.01033640-01	1.95086930-01	1.93922050-01	1.93702850-01	
KAPPA(R)	6.26364660-01	3.02741490-01	2.26349280-01	2.02255000-01	1.95615360-01	1.94065610-01	1.93707880-01	1.93638420-01	
DENSITY	9.72648950-04	1.26418350-04	1.48727894-05	1.58023029-06	1.48727510-07				
KAPPA(P)	1.93664690-01	1.93658690-01	1.93657910-01	1.93657910-01	1.93657910-01				
KAPPA(R)	1.93623650-01	1.93621900-01	1.93621700-01	1.93621700-01	1.93621700-01				

THETA = 9999.99020 13 DENSITIES

DENSITY	1.09944950+03	2.16915730+02	4.32764220+01	8.64292440+00	1.72720292+00	3.45383120-01	6.34073890-02	1.07927790-02	
KAPPA(P)	1.83567464+00	4.92219600-01	2.03174490-01	1.99397490-01	1.91801740-01	1.89526580-01	1.89246100-01	1.89193490-01	
KAPPA(R)	2.50715720-01	2.10407320-01	1.96761680-01	1.92872490-01	1.91860060-01	1.91042760-01	1.91002260-01	1.90996290-01	
DENSITY	1.66042619-03	2.15855360-04	2.53947030-05	2.69818830-06	2.53947070-07				
KAPPA(P)	1.89184910-01	1.89182900-01	1.89182710-01	1.89182710-01	1.89182710-01				
KAPPA(R)	1.90992710-01	1.90992520-01	1.90992520-01	1.90992520-01	1.90992520-01				

0 GREY DIANE LIVERMORE IRON DATA, BINA IRONIC APRIL 5, 1966 MATERL = 3026 MM = 010

GAMMA ABSORPTION COEFFICIENTS 14 TEMPERATURES

THETA = 99.99965 7 DENSITIES

DENSITY	1.06000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	2.95998630+03	4.98700040+03	5.55797930+03	4.58098790+03	3.81799200+03	1.47800720+03	7.81996270+02
KAPPA(R)	2.95998630+03	4.98700040+03	5.55797930+03	4.58098790+03	3.81799200+03	1.47800720+03	7.81996270+02

THETA = 75.00014 7 DENSITIES

DENSITY	1.06000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	3.07100420+03	3.94301090+03	3.34001290+03	2.33199620+03	1.77500750+03	6.59802110+02	3.47999130+02
KAPPA(R)	3.07100420+03	3.94301090+03	3.34001290+03	2.33199620+03	1.77500750+03	6.59802110+02	3.47999130+02

THETA = 99.99998 7 DENSITIES

DENSITY	1.06000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	3.09799360+03	2.85400900+03	2.29000650+03	1.40499630+03	1.05699990+03	3.73699740+02	1.96999250+02
KAPPA(R)	3.09799360+03	2.85400900+03	2.29000650+03	1.40499630+03	1.05699990+03	3.73698740+02	1.96999250+02

THETA = 150.00069 7 DENSITIES

DENSITY	1.06000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	2.61298670+03	1.91433430+03	1.55200340+03	6.97498220+02	4.81102330+02	1.50000690+02	7.72994920+01
KAPPA(R)	2.61298670+03	1.91433430+03	1.55200340+03	6.97498220+02	4.81102330+02	1.50000690+02	7.72994920+01

THETA = 200.00052 7 DENSITIES

DENSITY	1.06000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	2.11900690+03	1.58799890+03	1.28200420+03	5.00501180+02	2.83899390+02	8.86698540+01	3.89999340+01
KAPPA(R)	2.11900690+03	1.58799890+03	1.28200420+03	5.00501180+02	2.83899390+02	8.86698540+01	3.89999340+01

THETA = 299.99925 7 DENSITIES

DENSITY	1.06000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	9.44900790+02	7.63001460+02	6.25999730+02	2.10399690+02	1.07499906+02	1.86799350+01	8.11001710+00
KAPPA(R)	9.44900790+02	7.63001460+02	6.25999730+02	2.10399690+02	1.07499906+02	1.86799350+01	8.11001710+00

THETA = 399.99817 7 DENSITIES

DENSITY	1.06000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	4.02300750+02	2.58700220+02	1.70000260+02	4.91998200+01	2.55999390+01	5.25999460+00	2.68999940+00
KAPPA(R)	4.02300750+02	2.58700220+02	1.70000260+02	4.91998200+01	2.55999390+01	5.25999460+00	2.68999940+00

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 500.00058 7 DENSITIES

DENSITY	1.00000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	1.77899710+02	9.82701150+01	6.36997080+01	1.72000100+01	9.36004390+00	2.21000100+00	1.20999954+00
KAPPA(R)	1.77899710+02	9.82701150+01	6.36997080+01	1.72000100+01	9.36004390+00	2.21000100+00	1.20999954+00

THETA = 699.99976 7 DENSITIES

DENSITY	1.00000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	4.78002070+01	1.81400090+01	1.01499621+01	2.71999490+00	1.58000023+00	5.41000000-01	3.98999940-01
KAPPA(R)	4.78002070+01	1.81400090+01	1.01499621+01	2.71999490+00	1.58000023+00	5.41000000-01	3.98999940-01

THETA = 799.99657 7 DENSITIES

DENSITY	1.00000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	3.12300250+01	1.04699577+01	5.84999020+00	1.63999959+00	1.01099994+00	4.08000040-01	3.24000570-01
KAPPA(R)	3.12300250+01	1.04699577+01	5.84999020+00	1.63999959+00	1.01099994+00	4.08000040-01	3.24000570-01

THETA = 1000.00068 7 DENSITIES

DENSITY	1.00000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	1.74200170+01	5.07400270+00	2.89999780+00	9.16000010-01	6.19000000-01	3.10000920-01	2.62000200-01
KAPPA(R)	1.74200170+01	5.07400270+00	2.89999780+00	9.16000010-01	6.19000000-01	3.10000920-01	2.62000200-01

THETA = 1499.99930 7 DENSITIES

DENSITY	1.00000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	1.02799971+01	2.34999920+00	1.39000034+00	5.30000140-01	3.84999980-01	2.46999240-01	2.19000780-01
KAPPA(R)	1.02799971+01	2.34999920+00	1.39000034+00	5.30000140-01	3.84999980-01	2.46999240-01	2.19000780-01

THETA = 1999.99300 7 DENSITIES

DENSITY	1.00000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	7.53003710+00	1.70599922+00	1.01999996+00	4.16000010-01	3.21001330-01	2.19999500-01	1.99999580-01
KAPPA(R)	7.53003710+00	1.70599922+00	1.01999996+00	4.16000010-01	3.21001330-01	2.19999500-01	1.99999580-01

THETA = 2500.00080 7 DENSITIES

DENSITY	1.00000487+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	3.22999510+00	8.65499910-01	5.75999770-01	3.06999240-01	2.64998790-01	1.96000120-01	1.87700060-01
KAPPA(R)	3.22999510+00	8.65499910-01	5.75999770-01	3.06999240-01	2.64998790-01	1.96000120-01	1.87700060-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA =	3500.00600		7 DENSITIES				
DENSITY	1.0000[illegible]67+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	8.69000[illegible]30-01	3.80000000-01	2.93998670-01	2.01000070-01	1.90000230-01	1.79999720-01	1.78499400-01
KAPPA(R)	8.69060130-01	3.80000000-01	2.93998670-01	2.01000070-01	1.90000230-01	1.79999720-01	1.78499400-01
THETA =	4999.98020		7 DENSITIES				
DENSITY	1.0000[illegible]67+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	2.99[illegible]0510-01	2.03999040-01	1.91999980-01	1.74999880-01	1.73000630-01	1.73000630-01	1.72499660-01
KAPPA(R)	2.99[illegible]0510-01	2.03999040-01	1.91999980-01	1.74999880-01	1.73000630-01	1.73000630-01	1.72499660-01
THETA =	7500.01270		7 DENSITIES				
DENSITY	1.0000[illegible]67+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	1.92999[illegible]50-01	1.76999210-01	1.72000140-01	1.69999470-01	1.69999470-01	1.69800680-01	1.69800680-01
KAPPA(R)	1.92999[illegible]50-01	1.76999210-01	1.72000140-01	1.69999470-01	1.69999470-01	1.69800680-01	1.69800680-01
THETA =	9999.99520		7 DENSITIES				
DENSITY	1.0000[illegible]87+01	1.99999961+00	1.00000000+00	1.99999580-01	9.99995100-02	2.00000600-02	1.00000020-02
KAPPA(P)	1.64000[illegible]10-01	1.61000150-01	1.59000170-01	1.58000040-01	1.58000040-01	1.58400280-01	1.58400280-01
KAPPA(R)	1.64000210-01	1.61000150-01	1.59000170-01	1.58000040-01	1.58000040-01	1.58400280-01	1.58400280-01

16 DIANE/SCAT GRANITE-1A TEMP(1-2250) 1 FREQ C1/KDP 2-16-67 MATERL = 1128 NX = 861

GREY ABSORPTION COEFFICIENTS 21 TEMPERATURES

THETA = 1.00000 13 DENSITIES

DENSITY	9.62634990-01	1.09456618-01	8.51119440-03	6.27154300-04	6.22404780-05	8.94997830-06	1.24496902-06	1.38146670-07
KAPPA(P)	1.21313617+04	1.18916995+04	1.08551172+04	8.08056380+03	3.73197170+03	9.82785600+02	2.48106720+02	7.03545850+01
KAPPA(R)	6.74282010+02	1.01114732+03	9.28097570+02	7.18716480+02	3.61072210+02	1.18715153+02	2.93934820+01	7.97682900+00
DENSITY	1.57126468-08	1.67631180-09	1.77262410-10	1.84597250-11	1.73309935-12			
KAPPA(P)	1.57975048+01	3.13602160+00	4.77266130-01	7.63845370-02	3.22825970-02			
KAPPA(R)	1.98699738+00	4.57933550-01	9.74900460-02	3.97113990-02	2.95705890-02			

THETA = 1.50000 13 DENSITIES

DENSITY	2.24553340-01	2.64007460-02	2.79690460-03	3.63011020-04	4.40026850-05	6.25962670-06	9.27549290-07	1.40558790-07
KAPPA(P)	8.14609620+04	3.26761220+04	2.28830090+04	1.31340304+04	5.65107450+03	2.01973560+03	4.32063240+02	7.33910490+01
KAPPA(R)	1.03782531+04	6.87695560+03	6.74603360+03	4.01358030+03	1.66628850+03	5.36235790+02	1.31956980+02	2.25210620+01
DENSITY	2.09108040-08	2.66849980-09	2.87859100-10	2.38020390-11	1.91068390-12			
KAPPA(P)	1.07270243+01	1.41187781+00	2.47540270-01	8.26621880-02	5.15666060-02			
KAPPA(R)	3.05153460+00	4.26540270-01	1.01236896-01	5.36058550-02	4.82477050-02			

THETA = 2.25000 13 DENSITIES

DENSITY	1.19328989-01	1.56336010-02	1.91901168-03	2.72109230-04	4.45089620-05	8.07191400-06	1.36835676-06	1.94104340-07
KAPPA(P)	7.84868040+04	3.56579330+04	3.57390770+04	1.73353130+04	5.41935940+03	1.20409430+03	2.60118250+02	6.52594550+01
KAPPA(R)	4.98129520+04	3.39658200+04	1.98210920+04	8.05746620+03	2.50519010+03	6.39042130+02	1.33717850+02	2.71748510+01
DENSITY	2.42936750-08	2.90219070-09	3.19057440-10	3.11368270-11	2.62775870-12			
KAPPA(P)	1.31304500+01	1.85169991+00	2.38080880-01	8.65296650-02	6.55180890-02			
KAPPA(R)	4.52275000+00	6.45069830-01	1.35494400-01	6.82575650-02	6.31718170-02			

THETA = 3.40000 13 DENSITIES

DENSITY	9.54239220-02	1.40501670-02	2.18979570-03	3.59647910-04	5.85604510-05	9.60026350-06	1.56972523-06	2.42001980-07
KAPPA(P)	8.99059940+04	5.55284040+04	3.11669370+04	1.67201000+04	6.21158200+03	1.53783660+03	3.00954160+02	5.55105980+01
KAPPA(R)	7.19128440+04	4.56167370+04	2.43617600+04	1.02607673+04	3.07608160+03	7.06155140+02	1.32117000+02	2.38435630+01
DENSITY	3.32217690-08	3.92519420-09	4.48191720-10	4.61608120-11	3.97757000-12			
KAPPA(P)	9.30271480+00	1.39462940+00	2.26983940-01	8.79726790-02	7.79614360-02			
KAPPA(R)	3.72923650+00	5.62256790-01	1.38414430-01	7.91501180-02	7.60670570-02			

THETA = 5.00000 13 DENSITIES

DENSITY	1.01475366-01	1.73274730-02	2.71256670-03	4.30893760-04	7.30887640-05	1.27184688-05	2.09530800-06	3.37348290-07
KAPPA(P)	8.51363950+04	5.18645090+04	3.32639630+04	1.71219740+04	6.96324460+03	1.69348700+03	1.99943730+02	3.40229390+01
KAPPA(R)	7.16931090+04	4.25910740+04	2.27236150+04	9.39292650+03	2.77921540+03	5.91094520+02	9.88224650+01	1.58879183+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00000 CONTINUED

DENSITY	4.07563770-08	5.87876100-09	6.65461770-10	6.60189940-11	5.87808620-12				
KAPPA(P)	5.86517210+00	9.53633750-01	1.87670030-01	1.00559972-01	9.28099890-02				
KAPPA(R)	2.49504900+00	4.15216290-01	1.31013100-01	9.30345820-02	9.07177740-02				

THETA = 7.00000 13 DENSITIES

DENSITY	1.19963649-01	2.05367160-02	3.33209830-03	5.50464030-04	9.51732150-05	1.74367600-05	2.95187530-06	4.71441900-07	
KAPPA(P)	7.95634410+04	5.02914260+04	3.16448260+04	1.37028878+04	3.15523720+03	6.56915210+02	1.30317520+02	2.37844250+01	
KAPPA(R)	6.24360670+04	4.26140750+04	2.37007010+04	7.96733180+03	1.62284970+03	3.34760708+02	6.42389670+01	1.13500364+01	
DENSITY	6.77575490-08	8.25266380-09	9.05078020-10	8.77991000-11	7.99527940-12				
KAPPA(P)	5.20169210+00	8.24149770-01	1.86918040-01	1.19071157-01	1.12191392-01				
KAPPA(R)	1.79348024+00	3.28538580-01	1.37434750-01	1.12995251-01	1.09899277-01				

THETA = 10.00000 13 DENSITIES

DENSITY	1.54582060-01	2.66062820-02	4.46014070-03	7.60231170-04	1.35302160-04	2.48530540-05	4.20410560-06	6.54967720-07	
KAPPA(P)	6.90504150+04	4.22817140+04	2.51942220+04	9.56708570+03	2.26426610+03	4.83079370+02	9.67663130+01	1.85840510+01	
KAPPA(R)	4.69345760+04	3.36790050+04	1.61156555+04	4.60926300+03	1.00553394+03	2.07925520+02	4.29953930+01	7.98473540+00	
DENSITY	9.23020030-08	1.14901030-08	1.30259160-09	1.35079190-10	1.23154087-11				
KAPPA(P)	3.32916990+00	5.74660000-01	1.76205730-01	1.25566350-01	1.23798255-01				
KAPPA(R)	1.27962060+00	2.77204870-01	1.41529660-01	1.21067021-01	1.21619738-01				

THETA = 15.00000 13 DENSITIES

DENSITY	2.11093730-01	3.78476260-02	6.48847130-03	1.12181989-03	1.97471750-04	3.58008150-05	6.14654780-06	1.00142166-06	
KAPPA(P)	5.27089410+04	3.46873350+04	1.93027710+04	6.59913550+03	1.58046900+03	3.25303290+02	5.85364710+01	9.76819560+00	
KAPPA(R)	3.37403250+04	2.49049010+04	1.16065777+04	3.47128070+03	8.18479170+02	1.52479920+02	2.50891870+01	4.17719510+00	
DENSITY	1.48891400-07	1.67140750-08	2.12653950-09	2.19021780-10	1.99067980-11				
KAPPA(P)	1.62358091+00	3.41451380-01	1.59149380-01	1.39024930-01	1.40382270-01				
KAPPA(R)	7.75671440-01	2.28297880-01	1.47756440-01	1.36467870-01	1.37846020-01				

THETA = 22.49999 13 DENSITIES

DENSITY	3.06306210-01	5.44090930-02	9.39981770-03	1.63198859-03	2.98681430-04	5.66244920-05	9.98087410-06	1.63179989-06	
KAPPA(P)	4.01051470+04	2.79300910+04	1.32081571+04	4.52082120+03	9.26284100+02	1.55146830+02	2.63915620+01	5.09056580+00	
KAPPA(R)	2.60320520+04	2.01060060+04	9.53058020+03	2.51594300+03	4.28587080+02	8.13889850+01	1.51070060+01	2.35060010+00	
DENSITY	2.41610240-07	3.02140200-08	3.42139260-09	3.50377530-10	3.19039930-11				
KAPPA(P)	9.71496160-01	2.69764210-01	1.67281540-01	1.57435570-01	1.60648900-01				
KAPPA(R)	4.90281380-01	2.07156060-01	1.59425100-01	1.54226340-01	1.57690970-01				

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 33.99998 13 DENSITIES

DENSITY	8.5e452790-01	8.10723760-02	1.43859103-02	2.59811270-03	4.87843450-04	9.29718330-05	1.63446500-05	2.66816400-06
KAPPA(P)	2.7306240+04	1.66857590+04	6.76850850+03	1.83377310+03	4.01935640+02	8.7448669e+01	1.84486910+01	4.0990940+00
KAPPA(R)	1.538915760+04	1.0963478e+04	4.61684990+03	1.12126290+03	2.24120070+02	4.30719080+01	7.65791670+00	1.40101992+00

DENSITY	3.9465e510-07	4.96776890-08	5.66454130-09	5.80086790-10	5.32965270-11
KAPPA(P)	7.85343e60-01	2.49788930-01	1.79488520-01	1.74578330-01	1.78506550-01
KAPPA(R)	3.8405516e0-01	1.9905446e0-01	1.70614100-01	1.71730480-01	1.75257320-01

THETA = 50.00000 13 DENSITIES

DENSITY	7.04599e70-01	1.24912099-01	2.27003710-02	4.20319230-03	7.98993300-04	1.54188600-04	2.73730940-05	4.85537220-06
KAPPA(P)	1.3906e817+04	6.9384445e+03	3.08806180+03	9.99713730+02	2.20233410+02	4.50053540+01	9.10606760+00	2.02137520+00
KAPPA(R)	6.513e6930+03	4.3620914e+03	2.48530810+03	7.58733790+02	1.48863670+02	2.76309900+01	4.7719784e+00	9.46932370-01

DENSITY	6.59964410-07	8.23382640-08	9.40532450-09	9.84878280-10	9.25104100-11
KAPPA(P)	5.07845e70-01	2.31975150-01	1.88652800-01	1.83037360-01	1.83317250-01
KAPPA(R)	3.0447720-01	1.98494670-01	1.82269300-01	1.79486730-01	1.79971100-01

THETA = 69.99998 13 DENSITIES

DENSITY	1.03738945+00	1.88303730-01	3.44780980-02	6.44989780-03	1.21687890-03	2.31351350-04	4.07400220-05	6.67901580-06
KAPPA(P)	9.13196e50+03	4.4629038e+03	1.89194360+03	5.48554690+02	1.25797055+02	2.8914609e+01	6.44769680+00	1.4277871e+00
KAPPA(R)	4.3351173e+03	2.8507943e+03	1.48840590+03	4.09719560+02	7.63265580+01	1.4264415e+01	2.69735690+00	6.20863470-01

DENSITY	1.00979833-06	1.30152370-07	1.51937770-08	1.60349565-09	1.49771560-10
KAPPA(P)	3.91241e30-01	2.11257400-01	1.38196610-01	1.86441270-01	1.87521640-01
KAPPA(R)	2.6193943e-01	1.94505270-01	1.54058250-01	1.83226350-01	1.84137230-01

THETA = 99.99998 13 DENSITIES

DENSITY	1.6368774e+00	2.93965460-01	5.34092140-02	9.88883440-03	1.87360677-03	3.62427910-04	6.55712020-05	1.10360881-05
KAPPA(P)	6.4e695e70+03	3.3602071e+03	1.18195590+03	3.03497680+02	7.0540e480+01	1.6013169e+01	3.39389420+00	7.62144730-01
KAPPA(R)	3.4e236e80+03	2.1208239e+03	8.34112210+02	1.91247960+02	3.58685900+01	7.21443500+00	1.35051715+00	3.92366790-01

DENSITY	1.6e223e62-0e	2.16782800-07	2.53043430-08	2.66284750-09	2.47233000-10
KAPPA(P)	2.79584e70-01	2.01215460-01	1.91204830-01	1.91502760-01	1.93948810-01
KAPPA(R)	2.3032241e-01	1.96081280-01	1.88172530-01	1.88094650-01	1.90420780-01

THETA = 149.99995 13 DENSITIES

DENSITY	2.6e584e00+00	4.80097960-01	8.79104150-02	1.67023480-02	3.26232220-03	6.43147190-04	1.16806290-04	1.96402810-05
KAPPA(P)	4.73a18e60+03	2.0916090e+03	6.02059320+02	1.41328220+02	3.24691030+01	7.02668460+00	1.55587297+00	4.51256390-01
KAPPA(R)	2.43669e60+03	1.3013116e+03	4.05551940+02	8.63408620+01	1.6946104e+01	3.9463992e+00	8.26245020-01	3.28004530-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 149.9995 CONTINUED

DENSITY	2.97488960-06	3.81864530-07	4.45172150-08	4.72045910-09	4.44171730-10
KAPPA(P)	2.40651360-01	2.03524270-01	1.98852680-01	1.98362320-01	1.98313130-01
KAPPA(R)	2.21442790-01	1.98162080-01	1.95200900-01	1.94769000-01	1.94707080-01

THETA = 220.9990 13 DENSITIES

DENSITY	4.37785470+00	8.10519950-01	1.52329850-01	2.95126590-02	5.78620900-03	1.13758692-03	2.06163730-04	3.47698470-05
KAPPA(P)	2.64429010+03	8.78007330+02	2.50737340+02	6.13940510+01	1.43327766+01	3.63706488+00	9.53926788-01	3.39866858-01
KAPPA(R)	1.29967080+03	5.00671370+02	1.97097380+02	8.66580660+01	8.99759200+00	1.92261451+00	5.38336960-01	2.66287330-01

DENSITY	5.33757060-06	6.93621100-07	8.15964720-08	8.66824190-09	8.14627710-10
KAPPA(P)	2.20462060-01	2.01152890-01	1.98649160-01	1.98379180-01	1.98639230-01
KAPPA(R)	2.10072410-01	1.97788500-01	1.95298910-01	1.94801340-01	1.95021200-01

THETA = 340.0012 13 DENSITIES

DENSITY	7.54038490+00	1.42053093+00	2.71163040-01	5.26926140-02	1.03824752-02	2.06501460-03	3.79036900-04	6.43970350-05
KAPPA(P)	1.29293420+03	4.30807760+02	1.29284570+02	3.12160680+01	7.13683930+00	1.63789370+00	4.64890300-01	2.44157440-01
KAPPA(R)	6.55875490+02	3.12254320+02	9.67730910+01	2.04568130+01	4.09897100+00	9.82309890-01	3.59292660-01	2.33259660-01

DENSITY	9.88953710-06	1.27928408-06	1.50048090-07	1.59340110-08	1.49958120-09
KAPPA(P)	2.00035040-01	2.00833110-01	2.00866320-01	2.00446880-01	2.00445870-01
KAPPA(R)	2.00353480-01	1.97298390-01	1.96829380-01	1.96801430-01	1.96792380-01

THETA = 499.9993 13 DENSITIES

DENSITY	1.27580269+01	2.42239490+00	4.68913060-01	9.23629820-02	1.83878710-02	3.66649550-03	6.71005680-04	1.13753478-04
KAPPA(P)	6.71293200+02	2.38731850+02	5.91345270+01	1.25441695+01	2.78108180+00	7.69264120-01	3.19857510-01	2.21958910-01
KAPPA(R)	2.97705440+02	1.49060450+02	4.08634460+01	8.55058750+00	1.85582137+00	5.50460650-01	2.72814550-01	2.12256890-01

DENSITY	1.74879230-05	2.27315930-06	2.67426800-07	2.84138250-08	2.67424170-09
KAPPA(P)	2.03706910-01	2.00838730-01	2.00491990-01	2.00454700-01	2.00453290-01
KAPPA(R)	1.99964080-01	1.97339650-01	1.96866390-01	1.96813830-01	1.96815600-01

THETA = 699.9976 13 DENSITIES

DENSITY	2.04958010+01	3.92787240+00	7.68449750-01	1.52052560-01	3.02333700-02	6.03036970-03	1.10768391-03	1.88277060-04
KAPPA(P)	5.67481410+02	1.06063286+02	2.41185910+01	5.65745410+00	1.45261268+00	4.67111540-01	2.09732230-01	2.08207690-01
KAPPA(R)	1.32371510+02	5.82853590+01	1.54742595+01	3.45994940+00	8.72590150-01	3.50164230-01	2.33311920-01	2.04471040-01

DENSITY	2.89647780-05	3.76542460-06	4.42989000-07	4.70676550-08	4.42989480-09
KAPPA(P)	2.01625450-01	2.00645820-01	2.00526670-01	2.00546320-01	2.00564920-01
KAPPA(R)	1.98128040-01	1.97097250-01	1.96975090-01	1.97033200-01	1.97032020-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 999.99+07 13 DENSITIES

DENSITY	3.39367+20+01	6.62266590+00	1.30109822+00	2.57944460-01	5.14685160-02	1.02883513-02	1.89103120-03	3.21468530-04
KAPPA(P)	1.59417+40+02	4.38387870+01	1.07510775+01	2.53460060+00	6.75604720-01	2.91645860-01	2.15538010-01	2.03185660-01
KAPPA(R)	5.33193+50+01	2.36006430+01	6.23402370+00	1.49742577+00	4.83995870-01	2.60867930-01	2.00320010-01	1.99210510-01
DENSITY	4.94505+70-05	6.42933200-06	7.56396610-07	8.03671830-08	7.56396830-09			
KAPPA(P)	2.01167+60-01	2.00865850-01	2.00978170-01	2.00973940-01	2.00973540-01			
KAPPA(R)	1.97777+20-01	1.97558010-01	1.97755660-01	1.97753090-01	1.97752700-01			

THETA = 1499.99+30 13 DENSITIES

DENSITY	6.14+110+20+01	1.20318701+01	2.37859710+00	4.73178820-01	9.45214950-02	1.88995530-07	3.47399880-03	5.90573770-04
KAPPA(P)	6.91500+10+01	1.75261833+01	4.08136290+00	9.70217800-01	3.45176980-01	2.20154790-01	2.06215200-01	2.02340570-01
KAPPA(R)	1.52312+55+01	6.15022080+00	1.63496400+00	4.91180400-01	2.60898460-01	2.11247890-01	2.00801980-01	1.98845520-01
DENSITY	9.08573+30-05	1.18114639-05	1.38957871-06	1.47642800-07	1.38957913-08			
KAPPA(P)	2.01691+90-01	2.01629380-01	2.01545520-01	2.01544110-01	2.01543910-01			
KAPPA(R)	1.98515+10-01	1.98491700-01	1.98420650-01	1.98420060-01	1.98419850-01			

THETA = 2249.99+70 13 DENSITIES

DENSITY	1.11191+10+02	2.19573510+01	4.35592930+00	8.69048540-01	1.73636710-01	3.47202550-02	6.38213250-03	1.08495250-03
KAPPA(P)	2.80608+70+01	6.82451300+00	1.51051671+00	4.45820310-01	2.48260920-01	2.09759210-01	2.02464640-01	2.01177030-01
KAPPA(R)	2.97898+00+00	1.03468593+00	3.91351320-01	2.48463820-01	2.11961210-01	2.00947420-01	1.98366090-01	1.97886430-01
DENSITY	1.60915+60-04	2.16990970-05	2.55282500-06	2.71237800-07	2.55282540-08			
KAPPA(P)	2.00956+60-01	2.00551740-01	2.00547520-01	2.00546930-01	2.00546930-01			
KAPPA(R)	1.97803530-01	1.97505070-01	1.97503490-01	1.97503490-01	1.97503290-01			

3 DIANE GROUT 1A/INT LMS/RP 7/27/66 MATERL = 1119 NK = 491

GREY ABSORPTION COEFFICIENTS 11 TEMPERATURES

THETA = 99.99985 13 DENSITIES

DENSITY	5.59728730-01	1.05251768-01	1.96044240-02	3.74651200-03	7.11460970-04	1.33381110-04	2.31074370-05	3.72404540-06
KAPPA(P)	1.16634790+04	5.0864405D+03	1.92253520+03	5.65839190+02	1.52071370+02	4.17208070+01	1.01568664+01	2.45091200+00
KAPPA(R)	3.74579640+03	2.3407342D+03	1.00106540+03	3.01638690+02	5.95543070+01	1.14564166+01	2.40986560+00	6.61633830-01
DENSITY	5.54338600-07	7.11055950-08	8.33752040-09	8.83703070-10	8.29569010-11			
KAPPA(P)	8.85210470-01	4.61447970-01	2.10190710-01	2.04544440-01	2.04417660-01			
KAPPA(R)	2.93696920-01	2.16607140-01	2.02497040-01	2.00767050-01	2.00773070-01			

THETA = 70.00033 13 DENSITIES

DENSITY	8.73518470-01	1.62987040-01	3.01349390-02	5.56150050-03	1.03312198-03	1.95408180-04	3.48973488-05	5.87055270-06
KAPPA(P)	9.04122530+03	4.2571702D+03	1.56794320+03	4.74840970+02	1.25112079+02	3.13257340+01	6.55868410+00	1.30520095+00
KAPPA(R)	3.54318600+03	2.0724773D+03	8.05927710+02	1.75856790+02	3.36075240+01	7.22473090+00	1.57506099+00	4.72023080-01
DENSITY	9.01054660-07	1.16789651-07	1.37091845-08	1.45465105-09	1.36854900-10			
KAPPA(P)	3.78001500-01	2.26722150-01	2.07480070-01	2.05378640-01	2.05214400-01			
KAPPA(R)	2.55186650-01	2.13535960-01	2.04593540-01	2.01878350-01	2.01501180-01			

THETA = 99.99998 13 DENSITIES

DENSITY	1.37804566+00	2.51991480-01	4.55174270-02	8.44399290-03	1.62647530-03	3.21134690-04	5.87276450-05	9.95435980-06
KAPPA(P)	8.64900640+03	4.2130926D+03	1.27321430+03	3.04327050+02	6.57631690+01	1.39650804+01	2.77691330+00	6.41534860-01
KAPPA(R)	3.66478930+03	1.9421870D+03	5.80372410+02	1.17974671+02	2.09657460+01	4.14076260+00	9.53308690-01	3.73599460-01
DENSITY	1.52768917-06	1.98356500-07	2.32212070-08	2.45239730-09	2.29458280-10			
KAPPA(P)	2.71500660-01	2.14477590-01	2.07725030-01	2.07874660-01	2.08964680-01			
KAPPA(R)	2.47696210-01	2.12105810-01	2.04295050-01	2.04123510-01	2.05158990-01			

THETA = 150.00069 13 DENSITIES

DENSITY	2.26027610+00	4.13829180-01	7.65462610-02	1.48340511-02	2.93522840-03	5.84280130-04	1.06927458-04	1.80692320-05
KAPPA(P)	5.64971650+03	2.0424185D+03	5.24539068+02	1.14969855+02	2.45632140+01	5.07537280+00	1.14686138+00	3.03343030-01
KAPPA(R)	2.17118640+03	1.0485672D+03	3.03894300+02	6.36233130+01	1.25080193+01	2.60692920+00	7.01936740-01	3.19004520-01
DENSITY	2.76325650-06	3.57940190-07	4.20797240-08	4.47034690-09	4.20742550-10			
KAPPA(P)	2.36503510-01	2.13580140-01	2.09852580-01	2.09395590-01	2.09347440-01			
KAPPA(R)	2.27762920-01	2.08764170-01	2.05993640-01	2.05610840-01	2.05536830-01			

THETA = 224.99990 13 DENSITIES

DENSITY	3.80781310+00	7.12234540-01	1.36762820-01	2.68580420-02	5.32102170-03	1.05697947-03	1.93523810-04	3.28585060-05
KAPPA(P)	2.53327460+03	6.7392579D+02	1.82142620+02	4.18449020+01	9.29763410+00	2.23392240+00	6.07339700-01	2.77121280-01
KAPPA(R)	7.64850480+02	3.1240485D+02	1.07917813+02	2.68584360+01	5.53216920+00	1.27351906+00	3.15624940-01	2.07332920-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 224.99990 CONTINUED

DENSITY	5.05415e50-06	6.57053740-07	7.72978370-08	8.2117e930-09	7.72491750-10
KAPPA(P)	2.19733e60-01	2.1067892[illegible]-01	2.09500320-01	2.09374660-01	2.09473090-01
KAPPA(R)	2.14602e20-01	2.07291340-01	2.05763050-01	2.05567670-01	2.05654030-01

THETA = 300.00148 13 DENSITIES

DENSITY	6.6e233e80+00	1.27644005+00	2.49561470-01	4.91597540-02	9.78132810-03	1.95354430-03	3.58977810-04	6.10138320-05
KAPPA(P)	9.8e488e40+02	2.91255240+02	7.60575250+01	1.73409370+01	3.76583640+00	9.12254480-01	3.38503790-01	2.31545240-01
KAPPA(R)	2.71407[illegible]20+02	1.42229210+02	4.29170840+01	9.02708910+00	1.92855301+00	5.74101540-01	2.95150460-01	2.25660090-01

DENSITY	9.38122e90-06	1.21787868-06	1.43074550-07	1.51889160-08	1.42927308-09
KAPPA(P)	2.13056e50-01	2.10337900-01	2.10184410-01	2.10281110-01	2.10300040-01
KAPPA(R)	2.09100e60-01	2.06439060-01	2.06335860-01	2.06447320-01	2.06467960-01

THETA = 500.00094 13 DENSITIES

DENSITY	1.14201e72+01	2.23876190+00	4.40447510-01	8.72855800-02	1.74174970-02	3.47931450-03	6.38665350-04	1.08425205-04
KAPPA(P)	4.75173470+02	1.33809870+02	3.29850430+01	6.73023450+00	1.55224360+00	5.02669690-01	2.71370560-01	2.21881900-01
KAPPA(R)	1.13523040+02	5.44367770+01	1.50530400+01	3.36817140+00	8.69276520-01	3.63713070-01	2.41412060-01	2.13747470-01

DENSITY	1.66683e10-05	2.16871140-06	2.54898600-07	2.70819100-08	2.54891050-09
KAPPA(P)	2.12264e60-01	2.10520970-01	2.10321070-01	2.10302140-01	2.10300040-01
KAPPA(R)	2.0e078e70-01	2.06734480-01	2.06480350-01	2.06455580-01	2.06453510-01

THETA = 699.99976 13 DENSITIES

DENSITY	1.8e569730+01	3.67892270+00	7.27161270-01	1.44301560-01	2.87789810-02	5.74704210-03	1.05576463-03	1.79452500-04
KAPPA(P)	1.67512e30+02	4.51644360+01	1.02456167+01	2.47069130+00	7.41380710-01	3.32047780-01	2.33753060-01	2.13739610-01
KAPPA(R)	4.34669e10+01	1.75162660+01	4.50676670+00	1.16444198+00	4.38372620-01	2.66972400-01	2.22070580-01	2.09506230-01

DENSITY	2.7e081e90-05	3.56877380-06	4.22236640-07	4.48608700-08	4.22224070-09
KAPPA(P)	2.10663e40-01	2.10283220-01	2.10232760-01	2.10226550-01	2.10226450-01
KAPPA(R)	2.08655e30-01	2.06296670-01	2.06257480-01	2.06253350-01	2.06253350-01

THETA = 1000.00468 13 DENSITIES

DENSITY	3.13539e70+01	6.25149100+00	1.23776456+00	2.45750120-01	4.90556460-02	9.80630230-03	1.80241113-03	3.06399730-04
KAPPA(P)	8.4e597e60+01	2.17103690+01	5.34809270+00	1.39063572+00	4.56713040-01	2.56265830-01	2.17591430-01	2.11003710-01
KAPPA(R)	2.08662e70+01	8.74629310+00	2.33279230+00	7.12486010-01	3.34951340-01	2.35260940-01	2.10512950-01	2.06179110-01

DENSITY	4.71285e30-05	6.12825830-06	7.20947180-07	7.65976200-08	7.20925820-09
KAPPA(P)	2.09955e30-01	2.09798020-01	2.09806410-01	2.09804320-01	2.09804320-01
KAPPA(R)	2.05e44e70-01	2.05349880-01	2.05302740-01	2.05302740-01	2.05300690-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 1499.99930 13 DENSITIES

DENSITY	5.75825730+01	1.14324977+01	2.26105608+00	4.51061760-01	9.00986590-02	1.80144690-02	3.31118220-03	5.62003570-04
KAPPA(P)	3.80434890+01	9.71975090+00	2.42873450+00	6.55228010-01	2.90065380-01	2.23201570-01	2.11130250-01	2.08732870-01
KAPPA(R)	6.03741070+00	3.05759900+00	9.59283330-01	3.62554670-01	2.34546830-01	2.09378850-01	2.04542080-01	2.03410330-01
DENSITY	8.65983570-05	1.12583567-05	1.32446773-06	1.40719120-07	1.32342817-08			
KAPPA(P)	2.08334070-01	2.08274160-01	2.08267910-01	2.08265830-01	2.08265830-01			
KAPPA(R)	2.03225310-01	2.03198890-01	2.03196860-01	2.03196860-01	2.03196860-01			

THETA = 2250.01010 13 DENSITIES

DENSITY	1.05286997+02	2.07862140+01	4.14959180+00	8.29512790-01	1.65515570-01	3.30944480-02	6.58304430-03	1.03418393-03
KAPPA(P)	1.65437760+01	4.02626840+00	9.74518660-01	3.46955060-01	2.31925290-01	2.10683140-01	2.06335660-01	2.05640950-01
KAPPA(R)	1.62745426+00	6.52964840-01	3.22994490-01	2.30505620-01	2.07351470-01	2.01936980-01	2.00540450-01	2.00337860-01
DENSITY	1.59891070-04	2.36829690-05	2.43320820-06	2.58518150-07	2.43313570-08			
KAPPA(P)	2.05403280-01	2.05380690-01	2.05378640-01	2.05378640-01	2.05378640-01			
KAPPA(R)	2.00293790-01	2.00287790-01	2.00285780-01	2.00285780-01	2.00285780-01			

47 DIANE/SCAT M-21A TEMP(1.-34.) INPUT TAPE 1505 8-9-67 C1/BEF MATERL = 1001 NX = 533

GREY ABSORPTION COEFFICIENTS 13 TEMPERATURES

THETA = 1.00000 13 DENSITIES

DENSITY	4.20519210+00	4.62270570-01	3.30261040-02	1.83258089-03	8.80959540-05	3.98788350-06	1.65226270-07	9.06450200-09
KAPPA(P)	4.52810940+05	2.87164340+05	2.31262770+05	1.09749951+05	3.01382370+04	9.72236290+03	4.23479800+03	1.70085940+03
KAPPA(R)	6.21207980+02	6.07605590+02	6.06969760+02	6.00828160+02	5.74649880+02	5.10586950+02	3.74853750+02	1.62830630+02
DENSITY	8.74752510-10	1.02914772-10	1.19393695-11	1.26641632-12	1.19170640-13			
KAPPA(P)	3.91622350+02	5.20129110+01	6.52359290+00	1.05386140+00	4.63631880-01			
KAPPA(R)	3.36720780+01	4.78511000+00	1.00152730+00	4.82587220-01	4.05304430-01			

THETA = 1.25000 13 DENSITIES

DENSITY	5.02813670-01	4.96381790-02	3.34264470-03	1.82448620-04	9.38798400-06	5.83944460-07	5.42056980-08	7.44815220-09
KAPPA(P)	1.29266940+05	8.95297270+05	7.28097270+05	2.91335250+05	9.47929080+04	3.13092820+04	7.91305240+03	1.49201360+03
KAPPA(R)	4.75843080+03	4.49798550+03	4.46568070+03	4.32260230+03	3.75305670+03	2.27756910+03	6.65123670+02	1.09825633+02
DENSITY	1.09776461-09	1.41711200-10	1.65563440-11	1.76954282-12	1.66543490-13			
KAPPA(P)	2.18057330+02	2.32094610+01	3.42633460+00	7.23059470-01	4.32092280-01			
KAPPA(R)	1.49333109+01	2.30461940+00	7.00162240-01	4.42825940-01	4.04888880-01			

THETA = 1.50000 13 DENSITIES

DENSITY	1.31655950-01	1.20988120-02	7.97815670-04	4.68942270-05	3.30144630-06	3.75532810-07	5.74546540-08	9.38437470-09
KAPPA(P)	2.33998970+06	1.69176000+06	1.47254090+06	7.71807110+05	1.83643180+05	3.41268580+04	5.42085580+03	8.18587020+02
KAPPA(R)	2.13749070+04	1.93007440+04	1.85744260+04	1.59063531+04	9.21645640+03	2.64806620+03	4.34439180+02	5.86136120+01
DENSITY	1.43355441-09	1.86119910-10	2.18930930-11	2.32609560-12	2.18926590-13			
KAPPA(P)	1.24908625+02	1.61777200+01	2.25307550+00	5.83648300-01	4.17612880-01			
KAPPA(R)	8.00424970+00	1.48995926+00	5.96079160-01	4.39264250-01	4.08111070-01			

THETA = 1.75000 13 DENSITIES

DENSITY	5.38572400-02	4.73022280-03	3.25955730-04	2.35425790-05	2.51869440-06	4.02589890-07	6.99251910-08	1.17528527-08
KAPPA(P)	3.25622760+06	2.40309740+06	1.94832370+06	7.27456820+05	1.42392110+05	2.18534470+04	3.39436490+03	5.22610780+02
KAPPA(R)	6.94089750+04	5.91498550+04	5.19279210+04	3.38166970+04	1.13438946+04	2.89471320+03	2.89802380+02	3.75611010+01
DENSITY	1.80459434-09	2.34508360-10	2.75080080-11	2.93122720-12	2.75880140-13			
KAPPA(P)	7.68111210+01	1.02279889+01	1.46391388+00	5.09177860-01	4.07585680-01			
KAPPA(R)	5.37781400+00	1.18014308+00	5.65845330-01	4.46634540-01	4.02995530-01			

THETA = 2.00000 13 DENSITIES

DENSITY	2.92211070-02	2.54046280-03	1.94690790-04	1.83118900-05	2.59984170-06	4.71451340-07	8.47186700-08	1.43383234-08
KAPPA(P)	3.82576660+06	2.79854430+06	2.04981470+06	6.99436290+05	9.98196120+04	1.42644524+04	2.16209490+03	3.43941990+02
KAPPA(R)	1.75750370+05	1.39896760+05	1.05214869+05	4.83141570+04	1.08749133+04	1.67821990+03	2.18555060+02	2.85171820+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 2.00000 CONTINUED

DENSITY	2.20618070-09	2.66506480-10	3.37061880-11	3.58128310-12	3.37081850-13
KAPPA(P)	4.80952350+01	5.83306490+00	1.12229150+00	4.67416100-01	4.08476150-01
KAPPA(R)	4.28340360+00	1.06283038+00	5.69209110-01	4.43025780-01	3.99167870-01

THETA = 4.25000 13 DENSITIES

DENSITY	1.92081010-02	1.70275628-03	1.50817070-04	1.77270300-05	2.91549790-06	5.54604830-07	1.00812859-07	1.71809850-08
KAPPA(P)	4.10341430+08	2.90510850+06	1.78364560+06	4.14540890+05	8.19584930+04	9.54434300+03	1.53360420+03	2.36988900+02
KAPPA(R)	3.49528340+05	2.63276440+05	1.63644200+05	5.56813200+04	1.01410818+04	1.45873360+03	1.84631290+02	2.48199300+01

DENSITY	2.62992040-09	3.41870230-10	4.02194720-11	4.27332070-12	4.02194800-13
KAPPA(P)	3.80437510+01	4.99512270+00	9.24109650-01	4.43070710-01	4.03794820-01
KAPPA(R)	3.80474750+00	1.05080200+00	5.84971760-01	4.29554650-01	3.98343730-01

THETA = 3.50000 13 DENSITIES

DENSITY	8.62846240-03	1.08172315-03	1.56280370-04	2.67780000-05	5.14014140-06	1.01855051-06	1.84881168-07	3.17543458-08
KAPPA(P)	3.12260260+06	1.41187610+06	5.11375740+05	1.83124260+05	1.45520181+04	2.41452280+03	4.11789378+02	8.58248810+01
KAPPA(R)	6.69709040+05	3.42494190+05	1.21212437+05	2.78319490+04	4.65443560+03	8.85989950+02	9.33682188+01	1.95811852+01

DENSITY	4.88498420-09	6.35042120-10	7.47105360-11	7.93799960-12	7.47105490-13
KAPPA(P)	1.01440973+01	1.59563854+00	4.99836060-01	4.07887040-01	4.02577280-01
KAPPA(R)	2.57804030+00	8.26132250-01	4.50005440-01	4.00647860-01	3.97641190-01

THETA = 5.00000 13 DENSITIES

DENSITY	9.00059070-03	1.45193959-03	2.51338900-04	4.64290610-05	9.10815910-06	1.81397515-08	3.33154340-07	5.66269970-08
KAPPA(P)	1.34816010+06	4.62175530+05	1.29633951+05	2.41471070+04	4.28559380+03	7.89706980+02	1.36226510+02	2.29048790+01
KAPPA(R)	1.86973070+05	7.20899860+04	2.10851010+04	5.10641530+03	1.07832800+03	2.14644670+02	3.85404360+01	8.00000000+00

DENSITY	8.71151010-09	1.13249801-09	1.33234550-10	1.41561807-11	1.33234576-12
KAPPA(P)	3.71014080+00	7.40273260-01	4.25747690-01	4.02617740-01	4.00591690-01
KAPPA(R)	1.25262191+00	5.04649530-01	4.05076460-01	3.96671700-01	3.95827250-01

THETA = 7.00000 13 DENSITIES

DENSITY	1.24311461-02	2.21496430-03	4.05637030-04	7.63611960-05	1.50643430-05	3.00389760-06	5.51038730-07	9.30018480-08
KAPPA(P)	5.66575790+05	1.72187620+05	4.35782990+04	8.67379720+03	1.63751960+03	3.09187210+02	5.53104410+01	9.57758020+00
KAPPA(R)	4.82079820+04	1.55632385+04	4.14688500+03	9.75597360+02	2.07877700+02	4.26250020+01	7.44519210+00	1.00043219+00

DENSITY	1.84306730-08	1.87598910-09	2.20703750-10	2.34497840-11	2.20703800-12
KAPPA(P)	1.65647922+00	5.13765570-01	4.06716170-01	3.97210590-01	3.96259810-01
KAPPA(R)	5.97828630-01	4.22759290-01	3.95772780-01	3.92647150-01	3.92316880-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 10.00000 13 DENSITIES

DENSITY	1.93791020-02	3.64600580-03	6.61445510-04	1.30025750-04	2.57046170-05	5.12833250-06	9.42217280-07	1.60162010-07
KAPPA(P)	2.81491580+05	0.39994570+04	1.59300236+04	3.24207760+03	6.29761380+02	1.23169195+02	2.25128890+01	3.93669670+00
KAPPA(R)	1.33650920+04	3.63040920+03	9.92149660+02	2.19279890+02	4.61948800+01	9.45733810+00	1.96166850+00	6.80377080-01
DENSITY	2.46398710-08	3.20314580-09	3.75943960-10	4.00396880-11	3.76844030-12			
KAPPA(P)	8.37021540-01	4.29758270-01	3.94084900-01	3.90041590-01	3.89669980-01			
KAPPA(R)	4.46392080-01	3.97849910-01	3.89807050-01	3.89602730-01	3.88499800-01			

THETA = 15.00000 13 DENSITIES

DENSITY	3.39140120-02	6.11246590-03	1.20820443-03	2.38488630-04	4.72049450-05	9.42061760-06	1.73095031-06	2.96237080-07
KAPPA(P)	4.50221520+04	1.26735951+04	2.90908520+03	6.28127990+02	1.30882230+02	2.66342770+01	5.02306830+00	1.07385204+00
KAPPA(R)	1.43600290+03	4.10422030+02	9.42079870+01	2.03423100+01	4.31517970+00	1.16250374+00	5.52051800-01	4.21055800-01
DENSITY	4.52604430-08	5.88464230-09	6.92308220-10	7.35577900-11	6.92308340-12			
KAPPA(P)	4.64499230-01	3.88525570-01	3.80326720-01	3.79453730-01	3.79359680-01			
KAPPA(R)	3.90385170-01	3.83508000-01	3.82310220-01	3.82201780-01	3.82189200-01			

THETA = 24.49999 13 DENSITIES

DENSITY	6.08430300-02	1.11385077-02	2.21335230-03	4.37759960-04	8.67044020-05	1.73059550-05	3.17993450-06	5.40543920-07
KAPPA(P)	2.31148350+04	6.09571270+03	1.35314380+03	2.87221290+02	5.93698750+01	1.20712307+01	2.37951470+00	6.66404720-01
KAPPA(R)	7.30660160+02	1.94795040+02	4.32411670+01	9.19405390+00	2.08986880+00	7.49941860-01	4.67942760-01	4.02153590-01
DENSITY	8.31599670-08	1.08106960-08	1.27185419-09	1.35134590-10	1.27185871-11			
KAPPA(P)	4.14955490-01	3.83562230-01	3.79940390-01	3.79541810-01	3.79498850-01			
KAPPA(R)	3.86350380-01	3.82901120-01	3.82320890-01	3.82270770-01	3.82265140-01			

THETA = 33.99999 13 DENSITIES

DENSITY	1.11618776-01	2.06011580-02	4.10509680-03	8.12807720-04	1.61041570-04	3.21464040-05	5.90689660-06	1.00409095-06
KAPPA(P)	1.11814623+04	2.80744190+03	6.97467050+02	1.27287071+02	2.61664210+01	5.37233150+00	1.19814351+00	4.93199710-01
KAPPA(R)	3.57170400+02	8.96795820+01	1.94056440+01	4.14766270+00	1.13931998+00	5.60382720-01	4.25632830-01	3.92262660-01
DENSITY	1.54474010-07	2.00815380-08	2.36256030-09	2.51019630-10	2.36256070-11			
KAPPA(P)	3.93980410-01	3.81223020-01	3.79699740-01	3.79525000-01	3.79506220-01			
KAPPA(R)	3.84208770-01	3.82528960-01	3.82303150-01	3.82280890-01	3.82278490-01			

9 DIANE/SCAT HMX/LO-HI/JP2 10 FREQ. TEMP.(1.-2250.) C1/JP 12-9-66 000003 MATERL = 1111 NM = 061

GREY ABSORPTION COEFFICIENTS 21 TEMPERATURES

THETA = 1.00000 13 DENSITIES

DENSITY	1.69822021+01	1.64869306+00	1.18181464-01	6.64550230-03	3.37288470-04	1.84147240-05	1.11767490-06	8.38909580-08
KAPPA(P)	1.6453398B+04	1.1802691E+04	9.9380974D+03	6.4297883D+03	3.1902734D+03	1.6072115D+03	7.6994183E+02	1.9981236E+02
KAPPA(R)	2.1440204D+02	2.0687043D+02	2.0412795D+02	1.9068407D+02	1.5765482D+02	1.0437225E+02	4.8365995D+01	1.5811017E+01
DENSITY	6.94268510-09	1.07571528-09	1.25120980-10	1.32180218-11	1.20118829-12			
KAPPA(P)	3.4700947D+01	4.4891662D+00	5.3953075D-01	9.1941021D-02	4.5737900D-02			
KAPPA(R)	3.1433603D+00	4.6095041D-01	9.4297868D-02	4.6237783D-02	4.0896124D-02			

THETA = 1.50000 13 DENSITIES

DENSITY	7.53941420-01	7.02061580-02	4.90733620-03	3.31886690-04	2.85875310-05	3.71474710-06	5.94681980-07	9.77814150-08
KAPPA(P)	9.8939118D+04	7.9348939D+04	6.3579456D+04	4.2169392D+04	1.4277267E+04	3.2690647D+03	5.4866375D+02	7.9995966D+01
KAPPA(R)	4.7035744D+03	4.2202552D+03	3.6711292D+03	2.4950461D+03	1.0022271E+03	2.6029222D+02	4.9066228D+01	8.9924822D+00
DENSITY	1.45992033-08	1.72686190-09	1.73072600-10	1.57624590-11	1.36111100-12			
KAPPA(P)	1.2332610D+01	2.1065833D+00	4.2871583D-01	1.1635301D-01	7.0885314D-02			
KAPPA(R)	1.9801205D+00	5.1196757D-01	1.4992277D-01	7.6878042D-02	6.6188337D-02			

THETA = 2.25000 13 DENSITIES

DENSITY	1.34837900-01	1.31027820-02	1.30856919-03	1.72869260-04	2.96200250-05	5.48896980-06	8.99199780-07	1.26212360-07
KAPPA(P)	2.1328400D+05	1.5787359D+05	9.3709973D+04	2.8834559D+04	6.2392166D+03	1.4092458D+03	3.6204262D+02	8.5167677D+01
KAPPA(R)	4.2676768D+04	3.2164218D+04	1.7053981D+04	5.6431404D+03	1.4303035D+03	4.0096812D+02	1.1248406D+02	2.5260375D+01
DENSITY	1.69428480-08	2.08975040-09	2.33331760-10	2.22466460-11	1.85215760-12			
KAPPA(P)	1.5081574D+01	2.0713162D+00	3.3972392D-01	1.1630758D-01	9.2592511D-02			
KAPPA(R)	4.3972172D+00	6.5296999D-01	1.3439871D-01	9.2475457D-02	8.8838693D-02			

THETA = 3.40000 13 DENSITIES

DENSITY	7.31456620-02	9.75065330-03	1.45337335-03	2.37729760-04	3.89613700-05	6.66707080-06	1.12310881-06	1.73979220-07
KAPPA(P)	2.0706353D+05	1.3076506D+05	5.7454573D+04	2.4786883D+04	7.6743354D+03	1.9379111D+03	3.6003743D+02	6.6699535D+01
KAPPA(R)	1.4103170D+05	7.9721926D+04	3.2658485D+04	1.0514346D+04	2.4546071D+03	6.5722608D+02	9.2262975D+01	2.1255124D+01
DENSITY	2.35544790-08	2.77412630-09	3.06075330-10	2.98994860-11	2.57785180-12			
KAPPA(P)	1.2696012D+01	2.0165582D+00	3.5415557D-01	1.4071988D-01	1.2070279D-01			
KAPPA(R)	4.1276778D+00	7.0682929D-01	1.8757866D-01	1.2027241D-01	1.1690168D-01			

THETA = 5.00000 13 DENSITIES

DENSITY	7.30967040-02	1.17433401-02	1.82855004-03	2.97516770-04	5.14861930-05	8.97255640-06	1.46882084-06	2.27982090-07
KAPPA(P)	1.5922841D+05	9.0425354D+04	5.4703281D+04	2.5171556D+04	7.3777272D+03	1.7302531D+03	3.3228378D+02	6.1888458D+01
KAPPA(R)	1.4171170D+05	8.2140779D+04	3.2601056D+04	8.5386729D+03	2.1609127D+03	4.8849535D+02	1.0480177D+02	2.0858618D+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00000 CONTINUED

DENSITY	3.17167020-03	3.81521060-09	4.22331790-10	4.14950050-11	3.77602290-12				
KAPPA(P)	1.07547057+01	1.61010773+00	3.23269190-01	1.62273350-01	1.44595360-01				
KAPPA(R)	3.40736660+00	5.79524330-01	2.02291610-01	1.44259820-01	1.31423550-01				

THETA = 7.00000 13 DENSITIES

DENSITY	5.60253730-02	1.41184477-02	2.29682850-03	3.81106380-04	6.55809040-05	1.16511002-05	1.92730100-06	3.03000190-07	
KAPPA(P)	1.34303450+03	6.45721160+04	5.13730990+04	2.56656190+04	7.21849610+03	1.41044130+03	2.55689790+02	4.46061660+01	
KAPPA(R)	1.09173090+03	6.94734540+04	2.97168630+04	8.46823380+03	2.01422740+03	4.76892440+02	9.87572110+01	1.65320930+01	
DENSITY	4.31918030-03	5.32592230-09	6.04215080-10	6.20531500-11	5.79335360-12				
KAPPA(P)	8.57975160+00	1.29233454+00	2.40559350-01	1.66922270-01	1.54567910-01				
KAPPA(R)	2.61795630+00	4.80564080-01	2.02507770-01	1.54690100-01	1.51934370-01				

THETA = 10.00000 13 DENSITIES

DENSITY	1.07881670-01	1.81434440-02	3.03273640-03	5.06973620-04	8.86442010-05	1.60881120-05	2.73819960-06	4.83374970-07	
KAPPA(P)	1.11385249+05	7.36183710+04	4.63413480+04	1.84070100+04	4.33124320+03	8.94170920+02	1.60000360+02	2.63862740+01	
KAPPA(R)	8.93443510+04	5.44604440+04	2.65042370+04	8.13874240+03	1.75382070+03	3.83372450+02	6.94020090+01	1.09908267+01	
DENSITY	8.57149630-08	8.42266110-09	9.88581720-10	1.05006378-10	9.88265640-12				
KAPPA(P)	4.13320650+00	6.80036710-01	2.14623060-01	1.59706590-01	1.54020430-01				
KAPPA(R)	1.57615186+00	3.59077510-01	1.84418630-01	1.56255780-01	1.51526000-01				

THETA = 15.00000 13 DENSITIES

DENSITY	1.63782663-01	2.52117780-02	4.31109670-03	7.46376820-04	1.35501070-04	2.56271050-05	4.58261060-06	7.72997360-07	
KAPPA(P)	8.35681580+04	5.58720750+04	3.10793820+04	9.60871950+03	2.01665590+03	3.76540160+02	5.99651030+01	8.99962360+00	
KAPPA(R)	5.16257470+04	2.86924700+04	1.78107940+04	5.96026930+03	1.26583720+03	2.18740900+02	3.26175650+01	4.83664820+00	
DENSITY	1.18782636-07	1.54321940-08	1.91505541-09	1.92443230-10	1.78794380-11				
KAPPA(P)	1.41518684+00	3.12400390-01	1.71793350-01	1.54731950-01	1.55909270-01				
KAPPA(R)	8.34739430-01	2.56309640-01	1.59266820-01	1.53654610-01	1.53216850-01				

THETA = 22.49999 13 DENSITIES

DENSITY	2.14801700-01	3.77296130-02	6.69973700-03	1.24933336-03	2.30923750-04	4.55431690-05	8.33956890-06	1.51271111-06	
KAPPA(P)	5.34985550+04	3.30107940+04	1.36927932+04	3.21285700+03	5.81013490+02	1.00893044+02	1.68195990+01	2.86178910+00	
KAPPA(R)	1.13737751+04	9.30420730+03	5.91963420+03	2.11379450+03	6.43797770+02	7.67153700+01	1.21540707+01	2.06811790+00	
DENSITY	2.14881520-07	2.74958700-08	3.20030810-09	3.29576140-10	2.96182680-11				
KAPPA(P)	6.05995410-01	2.25401950-01	1.59851480-01	1.66264903-01	1.72936980-01				
KAPPA(R)	8.61584730-01	2.03818570-01	1.63761200-01	1.62771640-01	1.69709010-01				

OMEGA ABSORPTION COEFFICIENTS CONTINUED

THETA = 33.99998 13 DENSITIES

DENSITY	3.40913420-01	6.13854780-02	1.13687301-02	2.19225430-03	4.20329340-04	8.25822330-05	1.49180306-05	2.68812970-06
KAPPA(P)	2.70462020+04	1.33809953+04	6.26391050+03	0.04921700+02	1.71811310+02	3.58642050+01	7.58226510+00	1.01652709+00
KAPPA(R)	4.62309390+03	2.69183650+03	1.13043170+03	3.22444440+02	7.24920150+01	1.50853500+01	2.99925510+00	7.30167070-01

DENSITY	3.63142000-07	6.57090860-08	5.12031440-09	5.17809540-10	6.76118310-11
KAPPA(P)	5.34158620-01	2.37057830-01	1.95713970-01	1.96563060-01	1.99808670-01
KAPPA(R)	2.84827750-01	1.93469500-01	1.85490900-01	1.92149990-01	1.96105010-01

THETA = 50.00030 13 DENSITIES

DENSITY	3.49650920-01	1.02945969-01	1.93163570-02	3.64057240-03	7.07029690-04	1.35027520-04	2.57210700-05	3.81565750-06
KAPPA(P)	1.33758056+04	5.37206630+03	1.52013370+03	4.19515940+02	1.15202300+02	3.36349250+01	8.08272100+00	2.29620000+00
KAPPA(R)	3.21319140+03	1.38968970+03	4.24660550+02	1.03356167+02	2.29432770+01	5.66996630+00	1.54570712+00	5.22681650-01

DENSITY	3.62769560-07	7.08614040-08	8.17643160-09	0.65851340-10	8.14175860-11
KAPPA(P)	5.04168460-01	2.74507140-01	2.17410110-01	2.09206600-01	2.08302900-01
KAPPA(R)	2.69022000-01	2.15842570-01	2.06857320-01	2.04994930-01	2.04535030-01

THETA = 69.99998 13 DENSITIES

DENSITY	3.61177710-01	1.60757540-01	3.01155390-02	5.60176830-03	1.05066393-03	1.90899700-04	3.50361590-05	5.79833410-06
KAPPA(P)	9.03597070+03	3.93360500+03	1.25642500+03	3.80291080+02	1.12144809+02	3.04397080+01	7.00516300+00	1.52708164+00
KAPPA(R)	3.63165030+03	1.26850840+03	3.25975740+02	7.61270340+01	1.60556910+01	4.21701270+00	1.10567204+00	4.01670500-01

DENSITY	8.83645430-07	1.19665122-07	1.38867268-08	1.43292221-09	1.34863230-10
KAPPA(P)	4.20109740-01	2.36091310-01	2.11419070-01	2.09500880-01	2.08225630-01
KAPPA(R)	2.59428410-01	2.17738250-01	2.07763260-01	2.04961310-01	2.04430110-01

THETA = 99.99998 13 DENSITIES

DENSITY	1.37575473+00	2.53172050-01	4.60020190-02	8.51811450-03	1.62124972-03	3.16346000-04	5.76880900-05	9.79810710-06
KAPPA(P)	8.38077720+03	3.70423930+03	1.14402830+03	3.01433970+02	7.25380270+01	1.57757109+01	3.06409410+00	6.91573670-01
KAPPA(R)	4.13264490+03	1.40164020+03	3.46507330+02	7.14370703+01	1.69006819+01	3.36491930+00	8.07265510-01	3.71278760-01

DENSITY	1.50571405-06	1.95733450-07	2.30274270-08	2.48666520-09	2.30274310-10
KAPPA(P)	2.81280160-01	2.16700920-01	2.09942320-01	2.08203350-01	2.08137570-01
KAPPA(R)	2.51233060-01	2.14598300-01	2.05265820-01	2.04299950-01	2.04211910-01

THETA = 149.99995 13 DENSITIES

DENSITY	2.27563300+00	4.14499790-01	7.62090540-02	1.44297964-02	2.88821180-03	5.75819100-04	1.05776636-04	1.79796510-05
KAPPA(P)	6.03539100+03	2.25329970+03	6.05065020+02	1.28387290+02	2.57367590+01	5.18401570+00	1.10952906+00	3.50760220-01
KAPPA(R)	2.73298570+03	1.17082970+03	3.17020020+02	6.10167710+01	1.15562102+01	2.50127260+00	7.07654920-01	3.12496500-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 149.99995 CONTINUED

DENSITY	4.7e505e70-06	3.59353320-07	4.23041780-08	4.49477690-09	4.23041860-10
KAPPA(P)	4.24900e20-01	2.09481460-01	2.07855740-01	2.07654010-01	2.07633870-01
KAPPA(R)	2.1e618520-01	2.04901270-01	2.03477000-01	2.03308850-01	2.03291370-01

THETA = 224.99990 13 DENSITIES

DENSITY	3.91028420+00	7.06114980-01	1.34917670-01	2.69560690-02	5.24036000-03	1.05720043-03	1.99301780-04	3.30301430-05
KAPPA(P)	2.94998670+03	8.55449870+02	1.91646380+02	3.79363200+01	7.68077910+00	1.65189132+00	4.33697500-01	2.35809500-01
KAPPA(R)	7.26662410+02	3.07034750+02	8.72576270+01	1.86261590+01	3.82985520+00	8.05570680-01	3.18916810-01	2.18383410-01

DENSITY	3.0e152400-06	6.60390260-07	7.77171480-08	8.24745040-09	7.77171600-10
KAPPA(P)	4.09663450-01	2.06495100-01	2.03085940-01	2.03038550-01	2.03033390-01
KAPPA(R)	2.03667230-01	2.01579380-01	2.01359580-01	2.01333200-01	2.01330390-01

THETA = 340.00012 13 DENSITIES

DENSITY	6.6e559e70+00	1.26953461+00	2.48415630-01	4.93157790-02	9.82265330-03	1.96363290-03	3.60922250-04	6.13554870-05
KAPPA(P)	1.02092e30+03	2.73183340+02	6.00816180+01	1.23185464+01	2.57586570+00	6.31570750-01	2.65695860-01	2.11868760-01
KAPPA(R)	1.2e358e79+02	4.06840030+01	1.09334728+01	2.43752430+00	6.47794990-01	2.99606900-01	2.19150950-01	2.01910250-01

DENSITY	9.e2928e30-06	1.22710847-06	1.44365150-07	1.53388060-08	1.44365195-09
KAPPA(P)	4.04108000-01	2.03001280-01	2.02856790-01	2.02839550-01	2.02837720-01
KAPPA(R)	1.99083430-01	1.98637050-01	1.98578060-01	1.98570910-01	1.98570320-01

THETA = 499.99993 13 DENSITIES

DENSITY	1.14360536+01	2.23336350+00	4.41979390-01	8.77167850-02	1.75149930-02	3.50175510-03	6.43647110-04	1.09418230-04
KAPPA(P)	3.91825e40+02	1.00073100+02	2.14960880+01	4.60275750+00	9.97101350-01	3.34215930-01	2.20190540-01	2.02381650-01
KAPPA(R)	4.6e347e40+01	7.97470980+00	1.89369091+00	5.54148710-01	2.82376490-01	2.18563210-01	2.01184900-01	1.96919160-01

DENSITY	1.6e336e40-07	2.18835600-08	2.57452670-07	2.73543610-08	2.57452750-09
KAPPA(P)	1.99732360-01	1.99322530-01	1.99283720-01	1.99262340-01	1.99261550-01
KAPPA(R)	1.96165e30-01	1.96041290-01	1.96026810-01	1.96022650-01	1.96022660-01

THETA = 699.99976 13 DENSITIES

DENSITY	1.85806360+01	3.68673030+00	7.31249760-01	1.45269450-01	2.90121660-02	5.80060540-03	1.06620146-03	1.81291510-04
KAPPA(P)	1.51792330+02	3.48633790+01	7.47943380+00	1.60894823+00	4.43863720-01	2.37603010-01	2.02820880-01	1.97802670-01
KAPPA(R)	7.47149400+00	1.89667128+00	5.67432190-01	2.85042780-01	2.17848810-01	2.00189870-01	1.95378610-01	1.94220690-01

DENSITY	2.7e847e70-05	3.62502270-06	4.26471640-07	4.53126360-08	4.26471760-09
KAPPA(P)	1.98048690-01	1.95888430-01	1.95668250-01	1.95865910-01	1.95865710-01
KAPPA(R)	1.94023680-01	1.93989930-01	1.93985470-01	1.93984890-01	1.93984890-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 999.99967 13 DENSITIES

DENSITY	3.15622560+01	6.28214810+00	1.24676761+00	2.48009800-01	4.95359310-02	9.90429200-03	1.82030300-03	3.09881290-04
KAPPA(P)	3.37560060+01	1.11742710+01	2.46431480+00	6.17570700-01	2.65158910-01	1.93490670-01	1.80978500-01	1.80319270-01
KAPPA(R)	1.72310207+00	5.34448920-01	2.77966410-01	2.14835000-01	1.97887220-01	1.92515810-01	1.91299310-01	1.91014900-01
DENSITY	4.76123090-05	8.18960110-06	7.28165510-07	7.73467820-08	7.28192930-09			
KAPPA(P)	1.86227080-01	1.88214120-01	1.88212430-01	1.88212240-01	1.88212260-01			
KAPPA(R)	1.90983540-01	1.90978580-01	1.90978010-01	1.90977810-01	1.90977810-01			

THETA = 1499.99930 13 DENSITIES

DENSITY	5.77996660+01	1.15042490+01	2.28563320+00	4.55583890-01	9.10016190-02	1.81952630-02	3.34447680-03	5.68553010-04
KAPPA(P)	1.58780232+01	5.53180870+00	8.22453170-01	2.69871660-01	2.02296470-01	1.90239080-01	1.88534170-01	1.88257220-01
KAPPA(R)	8.95786680-01	3.58775650-01	2.35416020-01	2.03087780-01	1.94102090-01	1.91789320-01	1.91123010-01	1.90994240-01
DENSITY	8.74695410-05	1.13716490-05	1.33776540-06	1.42137630-07	1.33776567-08			
KAPPA(P)	1.88219200-01	1.88213180-01	1.88212430-01	1.88212430-01	1.88212430-01			
KAPPA(R)	1.90980080-01	1.90978580-01	1.90978200-01	1.90978200-01	1.90978200-01			

THETA = 2249.99870 13 DENSITIES

DENSITY	1.06000333+02	2.10390660+01	4.19817950+00	8.36919320-01	1.67178690-01	3.34267770-02	6.14419280-03	1.00449092-03
KAPPA(P)	7.36598150+00	1.65489023+00	4.44823180-01	2.26814080-01	1.93402450-01	1.89038420-01	1.88337260-01	1.88233140-01
KAPPA(R)	5.23640460-01	2.75746860-01	2.13918750-01	1.97142000-01	1.92498290-01	1.91319970-01	1.91026710-01	1.90985040-01
DENSITY	1.60691850-04	2.88900000-05	2.45763760-06	2.61120140-07	2.45763690-08			
KAPPA(P)	1.88216190-01	1.88213560-01	1.88213183-01	1.88213180-01	1.88213180-01			
KAPPA(R)	1.90979730-01	1.90978770-01	1.90978580-01	1.90978580-01	1.90978580-01			

18 DIANE/SCAT LIM/XTRAMI-10A 10 FREQ. TEMP(50.-22500.) CI/WL 1/1000000 MATERL = 1108 NK = 697

GREY ABSORPTION COEFFICIENTS 17 TEMPERATURES

THETA = 50.00000 13 DENSITIES

DENSITY	4.0[illegible]79[illegible]90-01	7.54340890-02	1.45355048-02	2.80802338-03	5.65189210-04	1.12878789-04	2.87036688-05	3.52623458-06
KAPPA(P)	1.79188[illegible]90+04	3.37482340+03	1.10783820+03	2.19085690+02	4.17538638+01	8.36898288+00	1.62937742+00	4.81541218-01
KAPPA(R)	2.14[illegible]75[illegible]90+03	7.39362268+02	1.94022863+02	4.33621898+01	9.00972008+00	1.87468391+00	4.95144818-01	2.50963868-01
DENSITY	5.82493390-07	7.05281978-08	8.29693283-09	8.81589698-10	8.29693438-11			
KAPPA(P)	2.23[illegible]90-01	2.03984148-01	2.01845853-01	2.01612248-01	2.01587888-01			
KAPPA(R)	2.03[illegible]90-01	1.98767798-01	1.97978913-01	1.97892768-01	1.97884058-01			

THETA = 69.99998 13 DENSITIES

DENSITY	6.27932[illegible]-01	1.22397828-01	2.38373178-02	4.69788578-03	9.35952368-04	1.88972338-04	3.43618328-05	5.88122578-06
KAPPA(P)	7.83[illegible]70+03	2.13737538+03	6.34009318+02	8.78981278+01	1.73951688+01	3.53196368+00	7.41913688-01	2.09543638-01
KAPPA(R)	5.7[illegible]10+02	1.69242728+02	6.02964368+01	9.06335258+00	1.93028918+00	5.42918978-01	2.78478578-01	2.10849228-01
DENSITY	8.96643888-07	1.16822528-07	1.37439188-08	1.46829147-09	1.37439128-10			
KAPPA(P)	2.07298728-01	1.99616358-01	1.98658338-01	1.98539588-01	1.98527238-01			
KAPPA(R)	1.98188388-01	1.96879128-01	1.95782488-01	1.95745888-01	1.95741968-01			

THETA = 99.99998 13 DENSITIES

DENSITY	1.04[illegible]41[illegible]00	2.07128988-01	4.05958618-02	8.01597398-03	1.59787765-03	3.19238838-04	5.86718488-05	9.97369828-06
KAPPA(P)	3.23[illegible]70+03	7.99422038+02	1.72383388+02	3.51252758+01	7.06822228+00	1.47597788+00	3.91859798-01	2.21562488-01
KAPPA(R)	1.67072[illegible]02	6.31356158+01	1.00948987+01	2.25998698+00	6.05953038-01	2.09471918-01	2.16699648-01	1.98766208-01
DENSITY	1.53[illegible]76-06	1.99472618-07	2.38672538-08	2.89339678-09	2.34672588-10			
KAPPA(P)	1.78[illegible]20-01	1.95397838-01	1.95588288-01	1.95457388-01	1.95452288-01			
KAPPA(R)	1.94[illegible]70-01	1.93978998-01	1.93877458-01	1.93865638-01	1.93864278-01			

THETA = 149.99995 13 DENSITIES

DENSITY	1.90309[illegible]00	3.78639278-01	7.44726758-02	1.47208121-02	2.93524618-03	5.86478638-04	1.[illegible]5238-04	1.83228818-05
KAPPA(P)	5.12[illegible]10+02	1.17377588+02	2.56999888+01	5.63896488+00	1.16486768+00	3.[illegible]5788978-01	2.[illegible]7843868-01	1.98383658-01
KAPPA(R)	2.53[illegible]40+01	5.80995098+00	1.34232917+00	4.00096448-01	2.52578388-01	2.07348988-01	1.98929568-01	1.91762628-01
DENSITY	2.81888[illegible]-06	3.66451388-07	4.31122018-08	4.58867338-09	4.31122088-10			
KAPPA(P)	1.88[illegible]50-01	1.88158288-01	1.88126258-01	1.88123058-01	1.88122878-01			
KAPPA(R)	1.91082588-01	1.90971138-01	1.90960828-01	1.90959688-01	1.90959298-01			

THETA = 224.99990 13 DENSITIES

DENSITY	3.07[illegible]90+00	6.94036888-01	1.35575588-01	2.70388868-02	5.39218518-03	1.07748498-03	1.98813768-04	3.36618258-05
KAPPA(P)	2.[illegible]3[illegible]50+02	5.38928498+01	1.17837208+01	2.45788658+00	5.85888698-01	2.47278888-01	1.95[illegible]1688-01	1.89827268-01
KAPPA(R)	1.20[illegible]11+01	2.69134188+00	7.14388668-01	3.11981828-01	2.22431878-01	1.99358428-01	1.[illegible]3153-01	1.91328968-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 224.99990 CONTINUED

DENSITY	5.17857e30-06	6.73215730-07	7.92023430-08	8.41525250-09	7.92023560-10
KAPPA(P)	1.83230370-01	1.88136790-01	1.88124370-01	1.88122860-01	1.88122670-01
KAPPA(R)	1.90998460-01	1.90964560-01	1.90959860-01	1.90959290-01	1.90959290-01

THETA = 360.00012 13 DENSITIES

DENSITY	0.43074e90+00	1.25437776+00	2.51742883-01	5.02199950-02	1.00160044-02	2.00130060-03	3.67823650-04	6.25277590-05
KAPPA(P)	1.1.990.55+02	2.50817620+01	5.23529340+00	1.12880131+00	3.40346100-01	2.09267688-01	1.90760230-01	1.88992510-01
KAPPA(R)	3.54317450+00	1.31593963+00	4.31765740-01	2.50861570-01	2.06959950-01	1.95890640-01	1.91864080-01	1.91123010-01

DENSITY	9.61956e50-06	1.25056648-06	1.47122530-07	1.56317780-08	1.47122579-09
KAPPA(P)	1.90170e90-01	1.88128880-01	1.88123430-01	1.88122670-01	1.88122670-01
KAPPA(R)	1.90976e60-01	1.90961590-01	1.90959480-01	1.90959290-01	1.90959290-01

THETA = 499.99993 13 DENSITIES

DENSITY	1.14e72e66e01	2.25440130+00	4.68849160-01	8.95539540-02	1.78617630-02	3.56907790-03	6.55957890-04	1.11500917-04
KAPPA(P)	5.30293770+01	1.18051512+01	2.46648180+00	5.87690910-01	2.49022200-01	1.96203280-01	1.89208020-01	1.88268530-01
KAPPA(R)	2.67857e90+00	7.15230360-01	3.12349350-01	2.22583050-01	1.99422420-01	1.93003410-01	1.91385600-01	1.91013530-01

DENSITY	1.74551e70-05	2.23015490-06	2.62372660-07	2.78771100-08	2.62372740-09
KAPPA(P)	1.88144530-01	1.88125490-01	1.88123050-01	1.88122670-01	1.88122670-01
KAPPA(R)	1.90967500-01	1.90960240-01	1.90959290-01	1.90959290-01	1.90959290-01

THETA = 699.99976 13 DENSITIES

DENSITY	1.89462780+01	3.71485990+00	7.43431750-01	1.48340940-01	2.95878050-02	5.91217020-03	1.08659537-03	1.84714730-04
KAPPA(P)	2.80253e40+01	6.11519090+00	1.30362871+00	3.71766280-01	2.14100870-01	1.91647980-01	1.88653930-01	1.88195380-01
KAPPA(R)	1.45312739+00	4.09337710-01	2.59325820-01	2.09177730-01	1.95766630-01	1.92082170-01	1.91192400-01	1.90905840-01

DENSITY	2.84173710-05	3.69426120-06	4.34621680-07	4.61785730-08	4.34621740-09
KAPPA(P)	1.98133770-01	1.88124150-01	1.88122860-01	1.88122670-01	1.88122670-01
KAPPA(R)	1.90963e30-01	1.90959670-01	1.90959290-01	1.90959290-01	1.90959290-01

THETA = 999.99967 13 DENSITIES

DENSITY	3.2326e7790+01	6.34166900+00	1.26924988+00	2.53280170-01	5.05199400-02	1.00940491-02	1.85532765-03	3.15304620-04
KAPPA(P)	1.90147e70+01	3.04660230+00	6.97819780-01	2.66210480-01	1.98735790-01	1.89602980-01	1.88350910-01	1.88158230-01
KAPPA(R)	3.12723e60-01	3.37731530-01	2.28743720-01	2.01061790-01	1.93528590-01	1.91521730-01	1.91059760-01	1.90972660-01

DENSITY	4.85219e40-05	6.30782290-06	7.42101420-07	7.88483200-08	7.42101640-09
KAPPA(P)	1.88128130-01	1.88123230-01	1.88122670-01	1.88122490-01	1.88122490-01
KAPPA(R)	1.90961e00-01	1.90959460-01	1.90959100-01	1.90959100-01	1.90959100-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 1499.99930 13 DENSITIES

DENSITY	5.9c9d2c00+01	1.16436229+01	2.33162550+00	4.64925080-01	9.27772320-02	1.85458090-02	3.40845220-03	5.79417880-04
KAPPA(P)	8.3d136b00+00	1.40559175+00	3.89551690-01	2.16768790-01	1.92038770-01	1.88759420-01	1.88215440-01	1.88138400-01
KAPPA(R)	4.79870e50-01	2.64169590-01	2.10367330-01	1.94067560-01	1.92191300-01	1.91234280-01	1.90993090-01	1.90965210-01
DENSITY	8.91405750-05	1.15882386-05	1.36333048-06	1.44853920-07	1.36333073-08			
KAPPA(P)	1.3d125a20-01	1.88122860-01	1.88122670-01	1.88122670-01	1.88122670-01			
KAPPA(R)	1.90960e40-01	1.90959480-01	1.90959290-01	1.90959290-01	1.90959290-01			

THETA = 2249.99a70 13 DENSITIES

DENSITY	1.0e8448e53+02	2.139790+0+01	4.28328390+00	9.58112040-01	1.70442210-01	3.40700690-02	8.26172860-03	1.08445648-03
KAPPA(P)	2.970d7240+00	6.69148330-01	2.64501330-01	1.94486340-01	1.89614150-01	1.88378890-01	1.88163690-01	1.88129450-01
KAPPA(R)	3.34462e00-01	2.282620e0-01	2.00926520-01	1.93480600-01	1.91511390-01	1.91069090-01	1.90974570-01	1.90961960-01
DENSITY	1.63781580-04	2.12890020-05	2.50457900-06	2.66111630-07	2.50457940-08			
KAPPA(P)	1.8d1d3e10-01	1.88122670-01	1.88122490-01	1.88122490-01	1.88122490-01			
KAPPA(R)	1.90959a70-01	1.90959290-01	1.90959290-01	1.90959290-01	1.90959290-01			

THETA = 3400.00e50 13 DENSITIES

DENSITY	1.97977b10+02	3.97957830+01	7.96633050+00	1.58855706+00	3.17005870-01	8.33671310-02	1.16462272-02	1.97979100-03
KAPPA(P)	1.3b901965+00	5.62456360-01	2.15565600-01	1.91856C30-01	1.88730350-01	1.88214500-01	1.88135090-01	1.88120220-01
KAPPA(R)	2.61940c10-01	2.09873770-01	1.95937800-01	1.92143840-01	1.91224910-01	1.90994050-01	1.90965400-01	1.90959670-01
DENSITY	3.08581470-04	3.959570e0-05	4.65829980-06	4.96944630-07	4.65830180-08			
KAPPA(P)	1.8816778d-01	1.88117220-01	1.88117220-01	1.88117220-01	1.88117220-01			
KAPPA(R)	1.90958720-01	1.90958520-01	1.90958520-01	1.90958520-01	1.90958520-01			

THETA = 4999.99a70 13 DENSITIES

DENSITY	3.5306d3d10+02	7.0967e2e0+01	1.41510239+01	2.82791580+00	5.65331940-01	1.13065702-01	2.07693070-02	3.53066170-03
KAPPA(P)	1.0e2913e49+00	3.34766e30-01	2.16181520-01	1.94099370-01	1.90651710-01	1.90080990-01	1.89874070-01	1.89851320-01
KAPPA(R)	4.28569e30-01	2.01143840-01	1.93782750-01	1.91744600-01	1.91278840-01	1.91177870-01	1.91162770-01	1.91159710-01
DENSITY	5.63175e60-04	7.0e127e40-05	8.30734920-06	8.82656330-07	8.30735070-08			
KAPPA(P)	1.89e87e40-01	1.89866580-01	1.89866580-01	1.89866580-01	1.89866580-01			
KAPPA(R)	1.91159e30-01	1.91159140-01	1.91159140-01	1.91159140-01	1.91159140-01			

THETA = 6999.99a90 13 DENSITIES

DENSITY	5.8485e310+02	1.17555e46+02	2.34810550+01	4.68883340+00	9.36472990-01	1.87194140-01	3.44863940-02	5.84894710-03
KAPPA(P)	5.96949590-01	2.58161740-01	2.01455450-01	1.91977320-01	1.90239210-01	1.89925190-01	1.89861390-01	1.89849430-01
KAPPA(R)	2.1d723e40-01	1.96893950-01	1.92597640-01	1.91488410-01	1.91205590-01	1.91169080-01	1.91161240-01	1.91159710-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 6999.99690 CONTINUED

DENSITY	8.99771650-04	1.16970127-04	1.37611670-05	1.46212461-06	1.37611690-07
KAPPA(P)	1.89867.40-01	1.89847150-01	1.89846960-01	1.89846960-01	1.89846960-01
KAPPA(R)	1.91159520-01	1.91159520-01	1.91159520-01	1.91159520-01	1.91159520-01

THETA = 9999.99520 13 DENSITIES

DENSITY	9.9661450+02	2.00720010+02	4.00247080+01	7.99851570+00	1.59899833+00	3.19628960-01	5.87444860-02	9.98821150-03
KAPPA(P)	1.699240.70-01	2.19290490-01	1.94877520-01	1.90684120-01	1.89896780-01	1.89752250-01	1.89723030-01	1.89717720-01
KAPPA(R)	2.03169430-01	1.99216260-01	1.91839150-01	1.91245560-01	1.91118780-01	1.91092440-01	1.91088620-01	1.91087050-01
DENSITY	1.53633.23-03	1.99723050-04	2.34967150-05	2.44652780-06	2.34967190-07			
KAPPA(P)	1.89716760-01	1.89716560-01	1.89716580-01	1.89716580-01	1.89716580-01			
KAPPA(R)	1.91087660-01	1.91087660-01	1.91087660-01	1.91087660-01	1.91087660-01			

THETA = 14999.99140 13 DENSITIES

DENSITY	1.83657100+03	3.68792640+02	7.34565410+01	1.46992016+01	2.93754730+00	5.87194590-01	1.07920430-01	1.83930000-02
KAPPA(P)	2.63783560-01	2.02060720-01	1.92030510-01	1.90177280-01	1.89844110-01	1.89788330-01	1.89767610-01	1.89765300-01
KAPPA(R)	1.97279460-01	1.92652540-01	1.91464860-01	1.91155890-01	1.91115360-01	1.91107150-01	1.91105430-01	1.91105200-01
DENSITY	2.82242170-03	3.66914390-04	4.31663210-05	4.58642410-06	4.31663280-07			
KAPPA(P)	1.89784960-01	1.89784780-01	1.89784780-01	1.89784780-01	1.89784780-01			
KAPPA(R)	1.91105050-01	1.91105050-01	1.91105050-01	1.91105050-01	1.91105050-01			

THETA = 22499.98500 13 DENSITIES

DENSITY	3.37032030+03	6.77020330+02	1.34948850+02	2.69999270+01	5.39661540+00	1.07870529+00	1.98862570-01	3.37834870-02
KAPPA(P)	2.20389450-01	1.95100200-01	1.90865320-01	1.90025450-01	1.89878820-01	1.89843980-01	1.89833380-01	1.89832000-01
KAPPA(R)	1.94257440-01	1.91683280-01	1.91306080-01	1.91172140-01	1.91153790-01	1.91150340-01	1.91149770-01	1.91149580-01
DENSITY	5.18512150-03	6.74065020-04	7.93017010-05	8.42501630-06	7.93010000-07			
KAPPA(P)	1.89982210-01	1.89842210-01	1.89842210-01	1.89842210-01	1.89842210-01			
KAPPA(R)	1.91149580-01	1.91149580-01	1.91149580-01	1.91149580-01	1.91149580-01			

111 DIANE L1M/HI 50. EV - 2250. EV 11 FREQ. CRD/GAL 9/30/66 000000 MATERL = 210A NX = 515

GREY ABSORPTION COEFFICIENTS 13 TEMPERATURES

THETA = 50.00000 13 DENSITIES

DENSITY	[illegible]	7.54340490-02	1.45355048-02	2.84002330-03	5.65189210-04	1.12878780-04	2.07436600-05	3.52623450-06
KAPPA(P)	1.79168[illegible]+04	5.37492340+03	1.10788930+03	2.19085910+02	4.17539050+01	8.36091600+00	1.62453609+00	3.64110100-01
KAPPA(R)	2.14475[illegible]+03	7.39361490+02	1.94022860+02	4.33621090+01	9.[illegible]910730+00	1.83601248+00	3.96190900-01	7.60620960-02
DENSITY	5.[illegible]493390-07	7.05201970-08	8.29693280-09	8.81549490-10	8.29693630-11			
KAPPA(P)	1.44162560-01	1.09295178-01	1.04710173-01	1.04163968-01	1.04105132-01			
KAPPA(R)	2.59363650-02	1.78567640-02	1.67981590-02	1.66706930-02	1.66569780-02			

THETA = 69.99998 13 DENSITIES

DENSITY	9.27932440-01	1.22597924-01	2.38373170-02	4.60786670-03	9.35952740-04	1.86972330-04	3.63616320-05	5.84122570-06
KAPPA(P)	7.85432470+03	2.13737760+03	4.34009720+02	8.78941270+01	1.73950900+01	3.52745970+00	7.04397050-01	1.76012050-01
KAPPA(R)	5.78567360+02	1.69242720+02	4.02964340+01	9.04254790+00	1.88514792+00	3.88924750-01	7.75744630-02	1.88447100-02
DENSITY	9.96643600-07	1.16822526-07	1.37439106-08	1.46029147-09	1.37439120-10			
KAPPA(P)	8.54773600-02	7.07581900-02	6.88407100-02	6.66121260-02	6.85874990-02			
KAPPA(R)	8.61316690-03	6.99062030-03	6.77653360-03	6.75096830-03	6.74823730-03			

THETA = 99.99998 13 DENSITIES

DENSITY	1.04891619+00	2.0712[illegible]80-01	4.05954610-02	8.01597390-03	1.59787765-03	3.19239830-04	5.86710640-05	9.97369020-06
KAPPA(P)	3.23123370+03	7.99422810+02	1.72363550+02	3.51252750+01	7.06492210+00	1.44487915+00	3.01178540-01	8.68459870-02
KAPPA(R)	1.67072350+02	6.31956150+01	1.00935840+01	2.21934620+00	4.59505300-01	9.51636720-02	1.99717000-02	5.76808390-03
DENSITY	1.53480174-06	1.99472810-07	2.34672530-08	2.48339670-09	2.34672580-10			
KAPPA(P)	4.98805390-02	4.37871900-02	4.30092540-02	4.29165390-02	4.29065410-02			
KAPPA(R)	3.29959030-03	2.90855470-03	2.85697470-03	2.85082450-03	2.85016330-03			

THETA = 149.99995 13 DENSITIES

DENSITY	1 [illegible]9655+00	3.78639270-01	7.44726750-02	1.47208121-02	2.93524610-03	5.86470630-04	1.07785230-04	1.83228010-05
KAPPA(P)	[illegible] 39530+02	1.17377588+02	2.56497030+01	5.42245130+00	1.11502320+00	2.33638320-01	5.21407230-02	1.88005770-02
KAPPA(R)	2.5[illegible]85+[illegible]+01	5.80506020+00	1.26883212+00	2.68042150-01	5.50074320-02	1.14162331-02	2.63973220-03	7.55161460-04
DENSITY	2.8[illegible]88260-06	3.65451380-07	4.31122010-08	4.58067330-09	4.31122080-10			
KAPPA(P)	1.21660[illegible]9-02	1.12321509-02	1.11087189-02	1.10940095-02	1.10924232-02			
KAPPA(R)	4.6[illegible]31310-04	4.16442990-04	4.10338150-04	4.09610850-04	4.09532220-04			

THETA = 224.99990 13 DENSITIES

DENSITY	3.47802190+00	8.94036A00-01	1.35575580-01	2.70384860-02	5.39214510-03	1.07700490-03	1.98013760-04	3.36610250-05
KAPPA(P)	2.43393850+02	5.38920490+01	1.17816939+01	2.43303730+00	5.03314830-01	1.10144294-01	2.93471740-02	8.81909257-02
KAPPA(R)	1.20375022+01	2.66522900+00	5.82554690-01	1.20213253-01	2.47539060-02	5.30849980-03	1.31239043-03	5.63179030-04

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 224.99990 CONTINUED

DENSITY	5.17857e30-06	6.73215730-07	7.92023430-08	8.41525250-09	7.92023560-10
KAPPA(P)	1.15704637-02	1.11544249-02	1.10995694-02	1.10930335-02	1.10923233-02
KAPPA(R)	4.3.170320-04	4.12599170-04	4.09985000-04	4.09562510-04	4.09527700-04

THETA = 360.00312 13 DENSITIES

DENSITY	6.43074160+00	1.20487776+00	2.51742050-01	5.02199960-02	1.00160044-02	2.00134060-03	3.67823650-04	6.25277900-05
KAPPA(P)	1.11990163+02	2.50814860+01	5.22627610+00	1.07763950+00	2.27171510-01	5.45163050-02	1.90901640-02	1.29529030-02
KAPPA(R)	5.53861140+00	1.24037802+00	2.58339930-01	5.31588060-02	1.10965172-02	2.59725220-03	8.05099260-04	4.76029000-04
DENSITY	9.64958150-06	1.25056648-06	1.67122530-07	1.56317780-08	1.67122579-09			
KAPPA(P)	1.15016178-02	1.11194771-02	1.10954518-02	1.10925897-02	1.10922902-02			
KAPPA(R)	4.19481320-04	4.10870700-04	4.09482530-04	4.09561230-04	4.09525670-04			

THETA = 499.99193 13 DENSITIES

DENSITY	1.10472166+01	2.25460180+00	4.48449160-01	8.95539540-02	1.78617630-02	3.56907790-03	6.55057090-04	1.11508917-04
KAPPA(P)	5.36307660+01	1.18036277+01	2.48221440+00	5.06110120-01	1.11172303-01	3.11861250-02	1.67917312-02	1.17217170-02
KAPPA(R)	2.65223310+00	5.83615150-01	1.20604508-01	2.44918960-02	5.35933710-03	1.40334023-03	5.92408550-04	4.00647210-04
DENSITY	1.71551170-05	2.23015400-06	2.62372660-07	2.78771100-08	2.62372740-09			
KAPPA(P)	1.11892111-02	1.11050426-02	1.10939320-02	1.10926117-02	1.10924670-02			
KAPPA(R)	4.14913150-04	4.10146980-04	4.09597350-04	4.09531800-04	4.09524040-04			

THETA = 699.99376 13 DENSITIES

DENSITY	1.89442760+01	3.71495990+00	7.43431750-01	1.48340960-01	2.95870050-02	5.91217820-03	1.00659537-03	1.84710730-04
KAPPA(P)	2.80278130+01	6.10572650+00	1.25833937+00	2.66284260-01	6.22091000-02	2.13495210-02	1.29007217-02	1.14100072-02
KAPPA(R)	1.38591860+00	3.01955380-01	6.20903310-02	1.29311010-02	2.93757450-03	9.16704630-04	5.02805020-04	4.29403200-04
DENSITY	2.84173710-05	3.69426120-06	4.36621680-07	4.81785730-08	4.36621740-09			
KAPPA(P)	1.11424.82-02	1.10994358-02	1.10937766-02	1.10931003-02	1.10930223-02			
KAPPA(R)	4.11967150-04	4.09841950-04	4.09581700-04	4.09526110-04	4.09524030-04			

THETA = 899.99867 13 DENSITIES

DENSITY	3.23267790+01	6.34166900+00	1.24924988+00	2.53280170-01	5.05199680-02	1.00968491-02	1.85932783-03	3.15399480-04
KAPPA(P)	4.09386150+01	8.51965990+00	1.79965170-01	1.99358360-01	5.00878410-02	2.01401050-02	1.40194787-02	1.28789130-02
KAPPA(R)	1.92949150-01	1.49503320-01	3.07703330-02	6.59716900-03	1.64919330-03	6.58139270-04	4.90270660-04	4.17304460-04
DENSITY	4.85219140-05	6.30782290-06	7.42101020-07	7.84683900-08	7.42101640-09			
KAPPA(P)	1.26736402-02	1.26421728-02	1.26380269-02	1.26375342-02	1.26374837-02			
KAPPA(R)	4.10721390-04	4.09680100-04	4.09542860-04	4.09526480-04	4.09524040-04			

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 1499.9 K 30 13 DENSITIES

DENSITY	5.9298 E 00+01	1.1546622 9+01	2.3316255 0+00	4.6492508 0-01	9.2777232 0-02	1.8545409 0-02	3.7084522 0-03	5.7991786 0-04
KAPPA(P)	6.8470 E 10+00	1.8037814 4+00	3.7627651 0-01	8.5727382 0-02	2.6959919 0-02	1.5107862 0-02	1.2684290 7-02	1.2230836 3-02
KAPPA(R)	3.1415 E 90-01	6.7275172 0-02	1.3954420 2-02	3.1469455 0-03	9.6089252 0-04	5.2000715 0-04	4.2984969 0-04	4.1298059 0-04
DENSITY	8.9148 E 50-05	1.1538238 6-05	1.3633304 8-06	1.4485392 0-07	1.3633307 3-08			
KAPPA(P)	1.2152 E 23-02	1.2139775 3-02	1.2138137 2-02	1.2137942 4-02	1.2137918 8-02			
KAPPA(R)	4.1005 E 30-04	4.0959325 0-04	4.0953222 0-04	4.0952526 0-04	4.0952443 0-04			

THETA = 1399.9 K 00 10 DENSITIES

DENSITY	4.5508 E 60+01	1.6418569 0+01	1.2025531 2+01	8.0256607 0+00	4.0212909 0+00	1.8030405 1+00	8.0882031 0-01	4.2392120 0-01
KAPPA(P)	2.7949 E 50+00	1.0522642 8+00	7.7886994 0-01	5.2561961 0-01	2.6849473 0-01	1.2884347 0-01	6.4772056 0-02	4.0095427 0-02
KAPPA(R)	9.2506 E 00-02	3.4822275 0-02	2.5772635 0-02	1.7389808 0-02	8.8787454 0-03	4.2561086 0-03	2.1352725 0-03	1.3184361 4-03
DENSITY	8.0735 E 60-02	8.5632837 0-03						
KAPPA(P)	1.7270 E 70-02	1.3192194 4-02						
KAPPA(R)	5.8275 E 20-04	4.2788849 0-04						

THETA = 2249.9 K 70 13 DENSITIES

DENSITY	1.0044 E 53+02	2.1397904 0+01	4.2432839 0+00	9.5611204 0-01	1.7044221 0-01	3.4070069 0-02	6.2617286 0-03	1.0644564 6-03
KAPPA(P)	4.2424 E 50+00	8.8239931 0-01	1.8802431 0-01	4.7482734 0-02	1.9551231 0-02	1.3850788 9-02	1.2686016 1-02	1.2462129 8-02
KAPPA(R)	1.4591 E 20-01	3.0313625 0-02	6.4456619 0-03	1.6270755 9-03	6.5454777 0-04	4.5858954 0-04	4.1854968 0-04	4.1105934 0-04
DENSITY	1.6376 E 60-04	2.1289002 0-05	2.5045790 0-06	2.6611163 0-07	2.5045794 0-08			
KAPPA(P)	1.2430 E 04-02	1.2426362 8-02	1.2423580 1-02	1.2423493 4-02	1.2423480 8-02			
KAPPA(R)	4.0976 E 10-04	4.0955516 0-04	4.0952811 0-04	4.0952484 0-04	4.0952443 0-04			

THETA = 2499.9 K 90 10 DENSITIES

DENSITY	6.3590 E 00+01	2.2944791 0+01	1.6805897 0+01	1.1191191 3+01	5.6198333 0+00	2.5198578 0+00	1.1303544 7+00	5.9244525 8-01
KAPPA(P)	1.8828 E 35+00	6.3545603 0-01	4.7140876 0-01	3.1901902 0-01	1.6546177 0-01	8.1037803 0-02	4.3496186 0-02	2.8737913 0-02
KAPPA(R)	5.9620 E 80-02	2.2495590 0-02	1.6681132 0-02	1.1308201 9-02	5.8366225 0-03	2.8732773 0-03	1.5142303 5-03	9.9117950 0-04
DENSITY	1.1268 E 31 08-01	1.1967556 0-02						
KAPPA(P)	1.5450 E 40-02	1.2659251 8-02						
KAPPA(R)	5.2018 E 60-04	4.2122436 0-04						

J8 DIANE/SCAT LIMESTONE-18 5-25-67 TEMP(50-1,E4) AK/RW INPUT TAPE(3971) MATERL = 1131 NK = 815

GREY ABSORPTION COEFFICIENTS 15 TEMPERATURES

THETA = 50.0000 13 DENSITIES

DENSITY	6.64581[illegible]0-01	1.22943939-01	2.27085220-02	4.30135600-03	8.24563050-04	1.58656190-04	2.00295050-05	4.51881790-06
KAPPA(P)	1.4919[illegible]25+04	7.19195260+03	2.75613310+03	6.68022750+02	1.49249080+02	3.72036520+01	8.45773150+00	2.02362710+00
KAPPA(R)	5.8590[illegible]53+03	3.31411510+03	1.49886720+03	4.25901870+02	9.12233560+01	1.98629650+01	4.21866250+00	9.31710180-01
DENSITY	8.5979[illegible]60-07	8.11554190-08	9.15734160-09	9.50094320-10	8.80452800-11			
KAPPA(P)	5.3590[illegible]30-01	2.41396610-01	1.96245200-01	1.90656670-01	1.92642140-01			
KAPPA(R)	5.1529[illegible]30-01	2.02787630-01	1.86449650-01	1.86743170-01	1.89100190-01			

THETA = 69.9999 13 DENSITIES

DENSITY	1.0179[illegible]53+00	1.88077900-01	3.50156210-02	6.59491120-03	1.23736542-03	2.32303940-04	4.03610908-05	6.52591340-06
KAPPA(P)	1.2008[illegible]23+04	5.55776270+03	1.76756810+03	4.4905076[illegible]+02	1.23124244+02	3.25162510+01	8.09541610+00	1.77426223+00
KAPPA(R)	5.9650[illegible]90+03	2.66292910+03	9.06334050+02	2.24299660+02	5.72939450+01	1.36475004+01	2.96978920+00	6.94210400-01
DENSITY	9.75361790-07	1.24230150-07	1.65057618-08	1.53783562-09	1.44228850-10			
KAPPA(P)	4.7177[illegible]50-01	2.30678430-01	1.98318090-01	1.96508780-01	1.96737460-01			
KAPPA(R)	2.8625[illegible]10-01	2.05268580-01	1.93030700-01	1.91098930-01	1.91243070-01			

THETA = 99.9999 13 DENSITIES

DENSITY	1.5901[illegible]12+00	2.94104650-01	5.38531710-02	9.90203510-03	1.84759780-03	3.52171950-04	6.29463420-05	1.09563020-05
KAPPA(P)	9.6212[illegible]60+03	4.4049[illegible]310+03	1.35727050+03	3.23771160+02	8.99307510+01	2.23121640+01	4.58916950+00	9.29510180-01
KAPPA(R)	5.1054[illegible]80+03	2.19377910+03	6.55962350+02	1.45922590+02	3.58370030+01	7.98012320+00	1.60631364+00	3.36330610-01
DENSITY	1.6147[illegible]25-06	2.09004610-07	2.44939450-08	2.50637450-09	2.44261960-10			
KAPPA(P)	5.0741[illegible]60-01	2.10571290-01	1.97566110-01	1.96396440-01	1.96304940-01			
KAPPA(R)	2.9130[illegible]50-01	2.04900490-01	1.94827060-01	1.92972030-01	1.92745810-01			

THETA = 149.9999 13 DENSITIES

DENSITY	2.6104[illegible]00+00	4.74696650-01	8.69216640-02	1.62679240-02	3.14074580-03	6.10568883-04	1.12099903-04	1.91134100-05
KAPPA(P)	6.4140[illegible]80+03	2.47787430+03	6.71912390+02	1.96596020+02	4.32336000+01	8.55991240+00	1.73420846+00	4.57270290-01
KAPPA(R)	3.2153[illegible]50+03	1.22973090+03	3.67778530+02	9.74726620+01	1.79779180+01	3.56980390+00	8.45109050-01	3.09311900-01
DENSITY	2.9352[illegible]60-06	3.61433270-07	4.48720980-08	4.76761390-09	4.68716490-10			
KAPPA(P)	2.3626[illegible]30-01	2.01486180-01	1.96897690-01	1.96357950-01	1.96302970-01			
KAPPA(R)	2.2969[illegible]10-01	1.99087070-01	1.93637970-01	1.92820610-01	1.92731540-01			

THETA = 220.0000 13 DENSITIES

DENSITY	4.2499[illegible]20+00	7.67088660-01	1.44205120+01	2.66508650-02	5.64478850-03	1.12311863-03	0.86189790-04	3.88368068-04
KAPPA(P)	3.2376[illegible]70+03	1.00296830+03	2.82283510+02	6.57902730+01	1.34522060+01	2.83722080+00	6.72611620-01	8.76831300-01
KAPPA(R)	1.2110[illegible]50+03	5.78872670+02	1.93637040+02	4.43806180+01	8.66187300+00	1.80665307+00	5.45385990-01	8.66000490-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 224.9 M90 CONTINUED

DENSITY	5.3e97e-70-06	7.00402960-07	8.21477340-08	8.65161510-09	8.04830130-10
KAPPA(P)	2.0838e.10-01	1.97966390-01	1.97102770-01	1.9876203e-01	2.01060790-01
KAPPA(R)	2.0e98e750-01	1.94e19090-01	1.93519500-01	1.95129960-01	1.97393120-01

THETA = 340.00012 13 DENSITIES

DENSITY	7.3538e630+00	1.381e2433+00	2.67340810-01	5.25375040-02	1.04338707-02	2.08226090-03	3.81791850-04	6.44819360-05
KAPPA(P)	1.3e14e490+03	4.12234330+02	1.04152582+02	2.10854230+01	4.46653080+00	1.06258927+00	3.68620950-01	2.39202360-01
KAPPA(R)	3.33e03e30+02	1.60235870+02	5.55214250+01	1.33796510+01	3.00144840+00	7.82527590-01	3.11887110-01	2.17020160-01

DENSITY	9.80753e30-06	1.26435315-06	1.48409580-07	1.57636370-08	1.48357668-09
KAPPA(P)	2.09470e0e-01	2.03790050-01	2.02730530-01	2.02618990-01	2.02606420-01
KAPPA(R)	2.00609400-01	1.99026550-01	1.98971630-01	1.98941590-01	1.98914140-01

THETA = 499.9 M93 13 DENSITIES

DENSITY	1.25107e36+01	2.39769500+00	4.70779570-01	9.31353950-02	1.84256230-02	3.64440930-03	6.64184240-04	1.12538060-04
KAPPA(P)	5.25715e70+02	1.58519030+02	3.56991530+01	8.51604450+00	2.48847050+00	8.73902470-01	3.61988080-01	2.32099060-01
KAPPA(R)	1.1e795e95+02	4.88152100+01	1.31677803+01	3.12033380+00	8.79195580-01	3.77222450-01	2.41295000-01	2.09035120-01

DENSITY	1.73014e60-05	2.24892110-06	2.64575300-07	2.81108550-08	2.64572690-09
KAPPA(P)	2.0704e920-01	2.03051020-01	2.02647750-01	2.02617350-01	2.02614720-01
KAPPA(R)	2.0210147e-01	1.99551280-01	1.98978000-01	1.98940400-01	1.98937610-01

THETA = 699.9 M76 13 DENSITIES

DENSITY	2.01010e80+01	3.92813950+00	7.70052630-01	1.51552370-01	2.99634190-02	5.96810400-03	1.09594093-03	1.88271550-04
KAPPA(P)	2.9450e320+02	8.40237890+01	2.33962310+01	6.82716820+00	1.84104415+00	5.51094650-01	2.66810930-01	2.11993080-01
KAPPA(R)	8.0961e950+01	2.66055300+01	6.55742500+00	1.55552309+00	5.33135800-01	2.98178490-01	2.32650020-01	2.07818338-01

DENSITY	4.e856e200-05	5.72527490-06	6.38265910-07	6.65657850-08	6.38265990-09
KAPPA(P)	2.0364e980-01	2.02788440-01	2.02697060-01	2.02687270-01	2.02686260-01
KAPPA(R)	2.00817e60-01	1.99173690-01	1.99096230-01	1.99089070-01	1.99088260-01

THETA = 999.9 M67 13 DENSITIES

DENSITY	5.3e57e690+01	6.59316710+00	1.29282699+00	2.55757900-01	5.09863580-02	1.01797279-02	1.87090314-03	3.18041730-04
KAPPA(P)	1.51466750+02	4.79719310+01	1.33943054+01	3.19120620+00	8.20392160-01	3.17026470-01	2.17427020-01	2.04652260-01
KAPPA(R)	5.4796e9e0+01	1.77958260+01	4.23239060+00	1.04856766+00	4.27136180-01	2.63802910-01	2.09475180-01	2.00827030-01

DENSITY	4.89291e40-05	6.36077750-06	7.48323920-07	7.95094510-08	7.48324050-09
KAPPA(P)	2.0307e920-01	2.02856380-01	2.02827180-01	2.02823730-01	2.02823330-01
KAPPA(R)	1.99462960-01	1.99319340-01	1.99303190-01	1.99301210-01	1.99301000-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 4999.9[illegible]30 13 DENSITIES

DENSITY	6.0[illegible]50+01	1.19131390+01	2.35684100+00	4.68015390-01	9.35468420-02	1.86993590-02	3.43788180-03	5.00277000-04
KAPPA(P)	7.5[illegible]90+01	2.08575490+01	4.74704010+00	1.11234609+00	3.61721030-01	2.27112230-01	2.06573000-01	2.03958750-01
KAPPA(R)	2.1[illegible]60+01	7.89357740+00	1.93661962+00	5.34990030-01	2.60444730-01	2.10175370-01	2.00913260-01	1.99325340-01
DENSITY	6.9[illegible]50-05	1.16355211-05	1.37476198-06	1.46068520-07	1.37476238-08			
KAPPA(P)	2.0[illegible]10-01	2.02860240-01	2.02049280-01	2.02048070-01	2.02047870-01			
KAPPA(R)	1.9[illegible]30-01	1.99258750-01	1.99253980-01	1.99253370-01	1.99253370-01			

THETA = 2249.94[illegible]70 13 DENSITIES

DENSITY	1.1[illegible]25+02	2.17[illegible]30+01	4.31[illegible]00	8.60152310-01	1.71840940-01	3.43522760-02	6.31415180-03	1.07330617-03
KAPPA(P)	3.2[illegible]90+01	7.74577[illegible]0+00	1.73185223+00	4.64839300-01	2.43887310-01	2.08310600-01	2.02121760-01	2.01200060-01
KAPPA(R)	9.2[illegible]30+00	1.33031705+00	4.63638090-01	2.57093640-01	2.09729430-01	1.99052440-01	1.97906810-01	1.97703660-01
DENSITY	1.6[illegible]60-04	2.14677250-05	2.52560480-06	2.68345650-07	2.52560530-08			
KAPPA(P)	2.0[illegible]40-01	2.01059580-01	2.01055560-01	2.01055150-01	2.01055150-01			
KAPPA(R)	1.9[illegible]00-01	1.97531720-01	1.97530520-01	1.97530330-01	1.97530330-01			

THETA = 3000.00[illegible]50 13 DENSITIES

DENSITY	2.0[illegible]20+02	4.01710260+01	8.00934380+00	1.59757681+00	3.19196300-01	6.38112360-02	1.17289516-02	1.99388760-03
KAPPA(P)	1.2[illegible]00+01	2.92994600+00	7.00741860-01	2.81187170-01	2.11553150-01	1.99776510-01	1.98212010-01	1.97771890-01
KAPPA(R)	9.6[illegible]40-01	3.99940300-01	2.49763200-01	2.09157020-01	1.98273470-01	1.95666810-01	1.95427850-01	1.95385350-01
DENSITY	3.0[illegible]80-04	3.95774340-05	4.69149190-06	4.98471230-07	4.69149280-08			
KAPPA(P)	1.9[illegible]70-01	1.97692310-01	1.97680730-01	1.97680530-01	1.97680530-01			
KAPPA(R)	1.9[illegible]70-01	1.95280360-01	1.95279970-01	1.95279780-01	1.95279700-01			

THETA = 4999.99[illegible]70 13 DENSITIES

DENSITY	3.6[illegible]70+02	7.15702820+01	1.42781720+01	2.84087720+00	5.69231420-01	1.13797469-01	2.09168130-02	3.55579730-03
KAPPA(P)	5.2[illegible]70+00	1.19379319+00	3.73228770-01	2.25332990-01	1.99675250-01	1.95020030-01	1.94090060-01	1.93917970-01
KAPPA(R)	4.2[illegible]50-01	2.53306260-01	2.10462240-01	1.97807620-01	1.94276670-01	1.93699570-01	1.93148680-01	1.93105620-01
DENSITY	5.6[illegible]30-04	7.11157330-05	8.36654110-06	8.88995480-07	8.36654360-08			
KAPPA(P)	1.9[illegible]10-01	1.93883270-01	1.93802690-01	1.93802690-01	1.93802690-01			
KAPPA(R)	1.9[illegible]30-01	1.93096930-01	1.93096730-01	1.93096730-01	1.93096730-01			

THETA = 6999.99[illegible]90 13 DENSITIES

DENSITY	5.9[illegible]20+02	1.18293990+02	2.36180660+01	4.71890110+00	9.42926820-01	1.88505520-01	3.66887370-02	5.89819040-03
KAPPA(P)	1.3[illegible]10+00	3.93999960-01	2.19236110-01	1.92918390-01	1.89203520-01	1.88191540-01	1.88103490-01	1.88086930-01
KAPPA(R)	2.6[illegible]80-01	2.10747820-01	1.96412940-01	1.92424190-01	1.91408190-01	1.90990610-01	1.90958520-01	1.90952230-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 6999.99696 CONTINUED

DENSITY	9.06179650-04	1.17803344-04	1.3459218e-05	1.47254262-06	1.38592210-07
KAPPA(P)	1.88084210-01	1.9808374D-01	1.88083540-01	1.88083540-01	1.88083540-01
KAPPA(R)	1.90951080-01	1.90951080-01	1.90950890-01	1.90950890-01	1.90950890-01

THETA = 9999.99520 13 DENSITIES

DENSITY	1.01465401+03	2.01857290+02	4.03245290+01	8.05577290+00	1.61001145+00	3.21867280-01	5.91616350-02	1.00573153-02
KAPPA(P)	7.34512020-01	2.77115460-01	2.03551340-01	1.89878660-01	1.88386600-01	1.88136220-01	1.88093330-01	1.88085240-01
KAPPA(R)	2.30694490-01	2.02041730-01	1.93850700-01	1.91612150-01	1.91083070-01	1.90970940-01	1.90954710-01	1.90951650-01

DENSITY	1.54727300-03	2.01145720-04	2.3664135D-05	2.51431540-06	2.36641390-07
KAPPA(P)	1.88083920-01	1.88083540-01	1.88083540-01	1.88083540-01	1.88083540-01
KAPPA(R)	1.90951080-01	1.90950890-01	1.90950890-01	1.90950890-01	1.90950890-01

53 DIANE/SCAT NE-1A TEMP(1.5-1.E4) 11-6-67 SADY INPUT TAPES(3986.3963) MATERL = 1016 NX = 900

GREY ABSORPTION COEFFICIENTS 24 TEMPERATURES

THETA = 1.50000 13 DENSITIES

DENSITY	4.39699870+01	3.99579970+00	2.55028520-01	1.35693437-02	6.37276490-04	3.20312050-05	2.00830440-06	2.13109440-07
KAPPA(P)	2.38612730+04	1.79368920+04	1.25450679+04	4.16519320+03	1.37095790+03	5.70430850+02	2.16790230+02	9.30003730+01
KAPPA(R)	3.34213650+02	3.22006610+01	3.20896560+01	3.14972106+01	2.96102610+01	2.93712210+01	1.20082020+01	3.28022060+00

DENSITY	2.93011440-08	3.73630020-09	4.37821490-10	4.58930540-11	3.64967670-12
KAPPA(P)	8.49268700+00	1.10754670+00	1.48010360-01	3.46995760-02	2.07731220-02
KAPPA(R)	5.43701470-01	9.58615820-02	3.16570000-02	2.19059370-02	2.28367000-02

THETA = 2.25000 13 DENSITIES

DENSITY	1.00690442+00	8.31536600-02	5.81920630-03	4.92271110-04	6.44786130-05	1.13663303-05	2.01009610-06	3.30311020-07
KAPPA(P)	2.04783300+05	1.61273990+05	1.13939169+05	3.15998670+04	4.69096520+03	7.26766620+02	1.17599190+02	2.10669160+01
KAPPA(R)	1.03329600+03	1.04035560+03	8.65125620+02	4.96565790+02	1.60750730+02	3.64332910+01	7.50549930+00	2.11936200+00

DENSITY	4.36829570-08	4.13096490-09	4.14636110-10	4.26720980-11	3.97640560-12
KAPPA(P)	4.71256220+00	1.18370055+00	2.11016410-01	5.91736470-02	4.29470830-02
KAPPA(R)	7.25350650-01	2.33438170-01	7.57035670-02	4.41932160-02	4.04317050-02

THETA = 3.40000 13 DENSITIES

DENSITY	1.66926940-01	2.06573930-02	2.94602340-03	5.11604850-04	9.09231440-05	1.45056837-05	2.09950260-06	3.23822020-07
KAPPA(P)	3.75183470+05	1.99490110+05	8.00182960+04	1.60269367+04	3.24655910+03	8.43301040+02	1.92616670+02	3.99891130+01
KAPPA(R)	1.38230840+04	7.60022900+03	3.49705440+03	1.29490490+03	4.27223350+02	1.81531280+02	3.72707780+01	8.09980640+00

DENSITY	6.70220340-08	5.65032930-09	5.32371310-10	5.39290540-11	4.98046510-12
KAPPA(P)	5.36487040+00	9.80773420-01	1.45924830-01	7.62996000-02	6.29270610-02
KAPPA(R)	1.05309430+00	4.57259320-01	9.60609110-02	6.46661110-02	6.07866590-02

THETA = 5.00000 13 DENSITIES

DENSITY	1.43735660-01	2.35140710-02	3.67045370-03	5.67815330-04	9.58313930-05	1.72136150-05	2.72051320-06	3.99609650-07
KAPPA(P)	3.12088710+05	1.93765340+05	9.48223050+04	2.19507590+04	3.89472720+03	7.39567160+02	1.66853730+02	3.95091990+01
KAPPA(R)	7.65527970+04	3.77046970+04	1.27844889+04	2.99803890+03	5.24462000+02	1.19007317+02	3.31857306+01	7.87004300+00

DENSITY	5.79650130-08	6.62086270-09	7.00203610-10	7.05020150-11	6.15436240-12
KAPPA(P)	5.24749.10+00	8.89709460-01	2.10820550-01	9.70378650-02	8.98830640-02
KAPPA(R)	1.04368830+00	3.04500060-01	1.18471363-01	8.61987160-02	8.66054950-02

THETA = 7.00000 13 DENSITIES

DENSITY	1.54699170-01	2.51271640-02	4.18709560-03	6.99817070-04	1.16172990-04	2.04478920-05	3.38671560-06	5.66212150-07
KAPPA(P)	2.87015450+05	1.98320550+05	8.56930750+04	2.02509650+04	4.19542090+03	8.06954260+02	1.58622990+02	2.99970780+01
KAPPA(R)	1.73857470+05	5.80143410+04	1.22256929+04	2.86827040+03	6.99726810+02	1.59284196+02	3.64688040+01	8.00082090+00

BAND ABSORPTION COEFFICIENTS CONTINUED

THETA = 7.66600 CONTINUED

DENSITY	7.1[illegible]	6.43159300+09	6.99366980-10	8.98866870-11	7.61809580-12				
KAPPA(P)	9.1[illegible]	9.68131420-01	2.10100800-01	1.10007082-01	1.10314480-01				
KAPPA(R)	1.9[illegible]	3.39959130-01	1.40894980-01	1.1[illegible]-01	1.19084777-01				

THETA = 10.00000 13 DENSITIES

DENSITY	1.6[illegible]	[illegible]	5.19859120-03	9.66765600-04	1.47869120-04	2.00000550-05	4.28787180-06	[illegible]	
KAPPA(P)	2.9[illegible]	1.58267190+05	7.82942910+04	1.81118180+04	3.66483470+03	7.23000340+02	1.40291970+02	[illegible]	
KAPPA(R)	1.5[illegible]	[illegible]	1.58784275+04	[illegible]	7.56719740+02	1.91070300+02	3.98000480+01	[illegible]	

DENSITY	9.1[illegible]	[illegible]	[illegible]	1.14000080-10	[illegible]				
KAPPA(P)	4.5[illegible]	6.10407460-01	2.22241820-01	1.02574040-01	[illegible]				
KAPPA(R)	4.5[illegible]	3.38653100-01	1.67958050-01	1.44910780-01	1.49246790-01				

THETA = 15.00000 13 DENSITIES

DENSITY	2.3[illegible]	4.02724790-02	6.77372610-03	1.19275791-03	1.98035150-04	3.50810330-05	8.70000020-06	8.93061870-07	
KAPPA(P)	1.7[illegible]	1.13496786+05	4.99171098+04	1.13734035+04	2.39362280+03	4.88590480+02	1.00111140+02	1.97038060+01	
KAPPA(R)	1.0[illegible]	5.14952130+04	1.48504976+04	3.32896020+03	7.48091620+02	1.80710480+02	3.70693310+01	8.69678730+00	

DENSITY	1.2[illegible]	1.52261740-06	1.74128949-09	1.84210880-10	1.73291720-11				
KAPPA(P)	3.5[illegible]	6.57740570-01	2.20104870-01	1.67019620-01	1.61340380-01				
KAPPA(R)	1.1[illegible]	3.14189860-01	1.81787290-01	1.60901160-01	1.58215540-01				

THETA = 22.49999 13 DENSITIES

DENSITY	3.1[illegible]	5.42009420-02	9.23026990-03	1.57813423-03	2.74939920-04	4.94341560-05	8.37093370-06	1.36984108-06	
KAPPA(P)	1.0[illegible]	7.40667310+04	3.39153270+04	7.61940750+03	1.52223800+03	2.99209180+02	5.78668930+01	9.23849790+00	
KAPPA(R)	4.6[illegible]	3.34263560+04	1.27539201+04	3.11949970+03	7.07611310+02	1.35054040+02	2.11128830+01	3.07820300+00	

DENSITY	2.0[illegible]	2.70659330-08	3.18351480-09	3.38238500-10	3.18342040-11				
KAPPA(P)	1.4[illegible]	3.23255900-01	1.79482210-01	1.62732750-01	1.60932220-01				
KAPPA(R)	5.7[illegible]	2.20904020-01	1.69501750-01	1.60436670-01	1.58178200-01				

THETA = 33.99998 13 DENSITIES

DENSITY	4.4[illegible]	7.81565040-02	1.32490295-02	2.32812050-03	4.23991140-04	8.15292270-05	1.48241940-05	2.51041610-06	
KAPPA(P)	5.8[illegible]	3.94036210+04	1.38720032+04	3.01768400+03	5.76867700+02	1.01847131+02	1.78609620+01	2.83103280+00	
KAPPA(R)	1.6[illegible]	1.36583167+04	7.54352580+03	1.96281900+03	3.08502510+02	4.39293940+01	6.21313700+00	1.09272956+00	

DENSITY	3.8[illegible]	5.02643400-08	5.91342930-09	6.28295840-10	5.91331180-11				
KAPPA(P)	5.5[illegible]	2.10572130-01	1.66554120-01	1.61357640-01	1.60806740-01				
KAPPA(R)	3.3[illegible]	1.96901040-01	1.64819390-01	1.58644250-01	1.57912690-01				

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 50.00000 13 DENSITIES

DENSITY	0.895037[illegible]-01	1.14984[illegible]-01	2.02269790-02	3.76980590-03	7.27362950-04	1.43875580-04	2.63801160-05	9.88287020-06
KAPPA(P)	3.1[illegible]7410+04	1.65222830+04	5.26377630+03	9.71940860+02	1.69299860+02	3.05483280+01	5.43276920+00	1.01569019+00
KAPPA(R)	9.[illegible]21610+03	3.66185040+03	1.75616890+03	9.88801260+02	9.32510150+01	1.50119172+01	2.73185569+00	6.87900660-01
DENSITY	8.89648470-07	6.05463100-08	1.04598701-08	1.04694123-09	9.44151170-11			
KAPPA(P)	2.8[illegible]22650-01	1.77677710-01	1.56986990-01	1.69328100-01	1.79634690-01			
KAPPA(R)	2.51[illegible]46310-01	1.72934730-01	1.61048450-01	1.66002900-01	1.76311310-01			

THETA = 69.99998 13 DENSITIES

DENSITY	9.40360[illegible]0-01	1.71528130-01	3.15861990-02	6.04687180-03	1.19802008-03	2.37875780-04	4.35461100-05	7.30157640-06
KAPPA(P)	1.[illegible]3[illegible]+04	8.92433240+03	1.89061780+03	3.80139380+02	6.22325370+01	1.12169227+01	2.18772190+00	6.01361630-01
KAPPA(R)	1.5[illegible]90[illegible]+03	8.98768030+02	3.38899190+02	8.90073520+01	1.94027140+01	4.22666800+00	1.01212391+00	3.60461100-01
DENSITY	1.07284[illegible]7-06	1.31417040-07	1.65617169-08	1.69452185-09	1.39841730-10			
KAPPA(P)	2.9[illegible]30[illegible]+01	2.13376730-01	2.00614530-01	2.00754590-01	2.00906630-01			
KAPPA(R)	2.1461576[illegible]-01	1.86804813-01	1.90643710-01	1.96169150-01	1.97158960-01			

THETA = 99.99998 13 DENSITIES

DENSITY	1.[illegible]0005162+00	2.76056140-01	5.27099000-02	1.02736596-02	2.00388600-03	3.82931280-04	6.63370500-05	1.06428618-05
KAPPA(P)	5.8[illegible]39820+03	2.16521080+03	5.29705970+02	1.14236739+02	3.17591850+01	1.15922871+01	3.72820360+00	1.09868013+00
KAPPA(R)	8.73601[illegible]00+02	2.67[illegible]7140+02	8.65583010+01	2.04988970+01	5.51920590+00	1.78672170+00	6.70607060-01	3.21849130-01
DENSITY	1.57781[illegible]8-06	2.03152280-07	2.38607990-08	2.53581160-09	2.38622130-10			
KAPPA(P)	3.73665960-01	2.24432110-01	2.03683290-01	2.01198560-01	2.00981790-01			
KAPPA(R)	2.23015[illegible]6-01	2.01297770-01	1.98088180-01	1.97583100-01	1.97300170-01			

THETA = 149.99995 13 DENSITIES

DENSITY	2.53958[illegible]0+00	4.83531360-01	9.13027830-02	1.70728970-02	3.19187100-03	6.09743010-04	1.18131497-04	1.86870990-05
KAPPA(P)	4.0[illegible]10[illegible]+03	1.50842290+03	4.57760660+02	1.47191830+02	4.36063960+01	1.12061001+01	2.83427690+00	9.92779960-01
KAPPA(R)	8.936[illegible]20+02	2.11716680+02	5.92108610+01	1.66996380+01	4.66866710+00	1.17901363+00	4.34039760-01	2.56979230-01
DENSITY	2.[illegible]0[illegible]97[illegible]0-06	3.72826250-07	4.38377820-08	4.89771970-09	4.38373510-10			
KAPPA(P)	2.[illegible]0[illegible]15000-01	2.07200860-01	2.01382580-01	2.01009920-01	2.00985200-01			
KAPPA(R)	2.13[illegible]0[illegible]90-01	2.03121080-01	1.99742050-01	1.97935170-01	1.97811680-01			

THETA = 224.99990 13 DENSITIES

DENSITY	4.3[illegible]57[illegible]0+00	8.11347730-01	1.44536710-01	2.87163610-02	5.51883980-03	1.09609903-03	2.61304580-04	3.88280000-05
KAPPA(P)	3.5[illegible]0[illegible]30+03	1.28004980+03	3.58480000+02	8.81973300+01	1.81166600+01	3.85019570+00	6.78373590-01	3.07760310-01
KAPPA(R)	8.3[illegible]0[illegible]0+02	2.[illegible]0[illegible]80+02	7.50134890+01	1.80184960+01	3.71036650+00	7.32749630-01	3.60130490-01	2.84300980-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 224.99990 CONTINUED

DENSITY	5.2057[illegible]-06	8.8434[illegible]-07	8.0534[illegible]-08	8.5567[illegible]-09	8.0534[illegible]-10
KAPPA(P)	2.1271[illegible]-01	2.0242[illegible]-01	2.0147[illegible]-01	2.0139[illegible]-01	2.0139[illegible]-01
KAPPA(R)	2.0762[illegible]-01	1.9803[illegible]-01	1.9816[illegible]-01	1.9811[illegible]-01	1.9810[illegible]-01

THETA = 340.00012 13 DENSITIES

DENSITY	7.4[illegible]-00	1.5[illegible]-00	2.6[illegible]-01	5.1[illegible]-02	1.0[illegible]-02	2.0[illegible]-03	3.7[illegible]-04	6.3[illegible]-05
KAPPA(P)	2.0[illegible]+03	6.9[illegible]+02	1.4[illegible]+02	2.8[illegible]+01	5.7[illegible]+00	1.2[illegible]+00	3.7[illegible]-01	2.2[illegible]-01
KAPPA(R)	6.0[illegible]+02	2.4[illegible]+02	5.4[illegible]+01	1.0[illegible]+01	2.0[illegible]+00	6.0[illegible]-01	2.8[illegible]-01	2.0[illegible]-01

DENSITY	9.7[illegible]-06	1.2[illegible]-06	1.4[illegible]-07	1.5[illegible]-08	1.4[illegible]-09
KAPPA(P)	2.0[illegible]-01	2.0[illegible]-01	2.0[illegible]-01	2.0[illegible]-01	2.0[illegible]-01
KAPPA(R)	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01

THETA = 499.99993 13 DENSITIES

DENSITY	1.2[illegible]+01	2.3[illegible]+00	4.6[illegible]-01	9.1[illegible]-02	1.8[illegible]-02	3.6[illegible]-03	6.6[illegible]-04	1.1[illegible]-04
KAPPA(P)	8.3[illegible]+02	2.0[illegible]+02	4.0[illegible]+01	8.8[illegible]+00	1.9[illegible]+00	4.9[illegible]-01	2.4[illegible]-01	2.0[illegible]-01
KAPPA(R)	1.8[illegible]+02	4.6[illegible]+01	1.1[illegible]+01	2.4[illegible]+00	6.3[illegible]-01	2.8[illegible]-01	2.1[illegible]-01	1.9[illegible]-01

DENSITY	1.7[illegible]-05	2.2[illegible]-06	2.6[illegible]-07	2.8[illegible]-08	2.6[illegible]-09
KAPPA(P)	2.0[illegible]-01	2.0[illegible]-01	2.0[illegible]-01	2.0[illegible]-01	2.0[illegible]-01
KAPPA(R)	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01

THETA = 699.99975 13 DENSITIES

DENSITY	6.0[illegible]+01	3.6[illegible]+00	7.6[illegible]-01	1.5[illegible]-01	3.0[illegible]-02	6.0[illegible]-03	1.1[illegible]-03	1.8[illegible]-04
KAPPA(P)	3.5[illegible]+02	8.5[illegible]+01	1.7[illegible]+01	3.6[illegible]+00	8.5[illegible]-01	3.0[illegible]-01	2.1[illegible]-01	2.0[illegible]-01
KAPPA(R)	3.4[illegible]+01	1.0[illegible]+01	2.3[illegible]+00	6.4[illegible]-01	3.0[illegible]-01	2.1[illegible]-01	2.0[illegible]-01	1.9[illegible]-01

DENSITY	2.9[illegible]-05	3.7[illegible]-06	4.4[illegible]-07	4.6[illegible]-08	4.4[illegible]-09
KAPPA(P)	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01
KAPPA(R)	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01

THETA = 999.99967 13 DENSITIES

DENSITY	3.3[illegible]+01	6.5[illegible]+00	1.2[illegible]+00	2.5[illegible]-01	5.1[illegible]-02	1.0[illegible]-02	1.8[illegible]-03	3.2[illegible]-04
KAPPA(P)	1.2[illegible]+03	3.4[illegible]+02	7.3[illegible]+01	1.5[illegible]+01	4.3[illegible]-01	2.3[illegible]-01	2.0[illegible]-01	1.9[illegible]-01
KAPPA(R)	7.5[illegible]+02	2.4[illegible]+02	6.7[illegible]+01	3.0[illegible]-01	2.2[illegible]-01	2.0[illegible]-01	1.9[illegible]-01	1.9[illegible]-01

DENSITY	9.9[illegible]-05	6.6[illegible]-06	7.5[illegible]-07	8.0[illegible]-08	7.5[illegible]-09
KAPPA(P)	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01
KAPPA(R)	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01	1.9[illegible]-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 1999.99990 13 DENSITIES

DENSITY	5.99540420+02	1.19287640+01	2.37130550+00	4.72553830-01	9.43545300-02	1.88567940-02	3.46570280-03	5.89165750-04
KAPPA(P)	2.05316070+02	6.85477850+00	1.54820561+00	4.39951690-01	2.39118670-01	1.90940570-01	1.88481010-01	1.88187290-01
KAPPA(R)	1.10635640+00	4.09691810-01	2.48443700-01	2.07105280-01	1.95764470-01	1.91914750-01	1.91134290-01	1.90966350-01
DENSITY	9.00000000-05	1.17832690-05	1.38626156-06	1.47290350-07	1.38626179-08			
KAPPA(P)	1.88050280-01	1.88046310-01	1.88045180-01	1.88045000-01	1.88045000-01			
KAPPA(R)	1.90946000-01	1.90943060-01	1.90942670-01	1.90942670-01	1.90942670-01			

THETA = 2249.99970 13 DENSITIES

DENSITY	1.09750431+02	2.18657120+01	4.35871420+00	8.68047710-01	1.73335850-01	3.46419470-02	6.36704410-03	1.00236591-03
KAPPA(P)	9.59660000+00	3.18200630+00	5.52427200-01	2.43891940-01	1.95675220-01	1.89177040-01	1.88207160-01	1.88072640-01
KAPPA(R)	6.23251480-02	2.99718170-01	2.20550850-01	1.99040090-01	1.92988050-01	1.91385800-01	1.91001500-01	1.90953370-01
DENSITY	1.60517030-04	2.10472980-05	2.54673090-06	2.70590310-07	2.54673170-08			
KAPPA(P)	1.88049280-01	1.88045560-01	1.88045180-01	1.88045000-01	1.88045000-01			
KAPPA(R)	1.90944600-02	1.90942670-01	1.90942670-01	1.90942670-01	1.90942670-01			

THETA = 3000.00050 13 DENSITIES

DENSITY	2.03473560+02	4.06250180+01	8.08717920+00	1.61236234+00	3.21978020-01	6.43995070-02	1.18272040-02	2.01856810-03
KAPPA(P)	4.96884260+00	1.02893936+00	3.29041300-01	2.09108430-01	1.90838450-01	1.88508530-01	1.88116090-01	1.88057030-01
KAPPA(R)	3.98603490-02	2.46593260-01	2.06099130-01	1.94966400-01	1.91890760-01	1.91146520-01	1.90969600-01	1.90947260-01
DENSITY	3.09316080-04	4.02110000-05	4.73073520-06	5.02640840-07	4.73073670-08			
KAPPA(P)	1.88046670-01	1.88045370-01	1.88045000-01	1.88045000-01	1.88045000-01			
KAPPA(R)	1.90943650-02	1.90942670-01	1.90942670-01	1.90942670-01	1.90942670-01			

THETA = 4999.99970 13 DENSITIES

DENSITY	3.62499360+02	7.18045930+01	1.43727776+01	2.87530560+00	5.74194260-01	1.14757509-01	2.10920300-02	3.58594780-03
KAPPA(P)	2.10624440+00	5.55605310-01	2.44449320-01	1.95729630-01	1.89189980-01	1.88228050-01	1.88077720-01	1.88058640-01
KAPPA(R)	2.98993630-01	2.20744360-01	1.99090450-01	1.92999440-01	1.91388470-01	1.91012380-01	1.90955280-01	1.90947780-01
DENSITY	5.51620690-04	7.17105330-05	8.43652640-06	8.96341310-07	8.43652890-08			
KAPPA(P)	1.88049530-01	1.88045180-01	1.88045000-01	1.88045000-01	1.88045000-01			
KAPPA(R)	1.90942670-01	1.90942670-01	1.90942670-01	1.90942670-01	1.90942670-01			

THETA = 6999.99690 13 DENSITIES

DENSITY	6.00146060+02	1.19059096+02	2.38072450+01	4.75697980+00	9.51149190-01	1.90095020-01	3.49389850-02	5.93966460-03
KAPPA(P)	1.17305670+00	3.58717900-01	2.12611860-01	1.91402640-01	1.88597150-01	1.88135470-01	1.88061730-01	1.88057810-01
KAPPA(R)	2.52999690-02	2.08261040-01	1.95584450-01	1.92019750-01	1.91184570-01	1.90976670-01	1.90949170-01	1.90943650-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 6999.99690 CONTINUED

DENSITY	9.1375934D-04	1.1878743D-04	1.39751482-05	1.6A486010-06	1.39751500-07
KAPPA(P)	1.88045560-01	1.88045180-01	1.88045000-01	1.88045006-01	1.88045000-01
KAPPA(R)	1.9J942670-01	1.90942670-01	1.90942670-01	1.90942670-01	1.90942670-01

THETA = 9999.99620 13 DENSITIES

DENSITY	1.0243bA70+03	2.0326A940+02	4.0548624D+01	8.12230520+00	1.62405253+00	3.24582350-01	5.96572070-02	1.81410631-02
KAPPA(P)	6.4476C793-01	2.6130A910-01	1.98102440-01	1.89488490-01	1.88284150-01	1.88089000-01	1.88053080-01	1.88046500-01
KAPPA(R)	2.25818060-01	2.00663680-01	1.93409220-01	1.91477300-01	1.91062180-01	1.90959670-01	1.90945730-01	1.90943060-01

DENSITY	1.5b021760-03	2.02928060-04	2.38620800-05	2.53534710-06	2.38620840-07
KAPPA(P)	1.8d045160-01	1.88045000-01	1.88045000-01	1.88045000-01	1.88045000-01
KAPPA(R)	1.90942670-01	1.90942670-01	1.90942670-01	1.90942670-01	1.90942670-01

57 DIAMETRICAL PHENOLIC-1A TEMP(.041667-30.)EV. SADT INPUT TAPE 1250 11-8-67 MATERL = 1107 MK = 451

EARLY ADSORPTION COEFFICIENTS 11 TEMPERATURES

THETA = .66667 13 DENSITIES

DENSITY	1.77606960+01	2.11536390+00	1.58998520-01	9.06119770-03	4.46668440-04	2.12069850-05	1.02816805-06	7.22965180-08
KAPPA(P)	1.71485260+05	1.04576066+05	8.59385530+04	4.11864350+04	1.85688840+04	3.67116370+03	1.33209210+03	3.69276230+02
KAPPA(R)	1.62489020+05	1.51567470+03	1.20449650+03	7.54908060+02	4.56198790+02	2.73303780+02	1.38409530+02	4.48853480+01
DENSITY	6.57402490-09	8.37342870-10	7.03709950-11	7.41237770-12	6.94919850-13			
KAPPA(P)	7.64307080+01	1.18049855+01	1.45231696+00	2.01147260-01	6.09425300-02			
KAPPA(R)	9.36231870+00	1.47018346+00	2.33564350-01	7.75314200-02	5.73230790-02			

THETA = 1.00000 13 DENSITIES

DENSITY	4.52620100+00	4.98241490-01	3.57631590-02	2.02132110-03	1.04852707-04	6.25249480-06	4.95201290-07	5.04355330-08
KAPPA(P)	3.24665460+05	2.09944980+05	1.76074040+05	8.52096520+04	2.61336740+04	7.68544790+03	1.88771680+03	3.98978830+02
KAPPA(R)	6.02418570+03	5.30234690+03	3.90999620+03	2.49792820+03	1.50326350+03	7.32681410+02	2.21972150+02	4.67786530+01
DENSITY	6.06639510-09	7.47542620-10	8.71099640-11	9.12293150-12	7.76603860-13			
KAPPA(P)	6.66707660+01	9.43614030+00	1.08173965+00	1.60218940-01	7.60891940-02			
KAPPA(R)	7.56226260+00	9.93080130-01	1.72254370-01	7.28126930-02	6.52883290-02			

THETA = 1.50000 13 DENSITIES

DENSITY	3.24187960-01	3.05991510-02	2.23899360-03	1.71073890-04	1.75724200-05	2.50899050-06	4.11482260-07	6.74063870-08
KAPPA(P)	9.05923550+05	6.46203230+05	5.18179640+05	2.11508400+05	4.40187050+04	7.36735390+03	1.11130000+03	1.63976880+02
KAPPA(R)	1.13214541+05	7.96916350+04	6.54482660+04	2.68194380+04	5.28713050+03	9.78123530+02	1.52416010+02	2.51894690+01
DENSITY	9.74189670-09	1.06731472-09	1.11934213-10	1.13704887-11	1.04093687-12			
KAPPA(P)	2.69996790+04	3.12775010+03	8.11342900-01	1.68818050-01	9.34822240-02			
KAPPA(R)	5.37650750+03	1.25174379+00	2.59057970-01	1.04767032-01	8.72703950-02			

THETA = 2.25000 13 DENSITIES

DENSITY	7.96662350-02	8.19579580-03	8.70722710-04	1.18656951-04	2.03440930-05	3.67230900-06	5.78296030-07	8.78990810-08
KAPPA(P)	1.16228550+06	7.49559700+05	4.24555320+05	1.12150831+05	1.97716800+04	3.99151400+03	8.89979000+02	1.59961240+02
KAPPA(R)	5.89342450+03	3.62713360+05	1.41919430+05	3.50608330+04	6.46006670+03	1.31839780+03	2.72203780+02	4.32967290+01
DENSITY	1.26422691-08	1.58193060-09	1.68155030-10	1.59671140-11	1.43373267-12			
KAPPA(P)	2.44693720+04	3.10513120+03	5.47287610-01	1.71040860-01	1.20001140-01			
KAPPA(R)	6.23240990+03	9.20613620-01	2.31890500-01	1.33268680-01	1.14890519-01			

THETA = 3.40000 13 DENSITIES

DENSITY	5.01155470-02	6.74503920-03	1.00160759-03	1.61059950-04	2.71029690-05	4.90605710-06	8.29203780-07	1.25436020-07
KAPPA(P)	9.26231910+05	5.43127800+05	3.20661050+05	1.02094401+05	1.93844770+04	3.36280580+03	6.30236910+02	1.20120011+02
KAPPA(R)	6.97403680+03	4.21026030+05	1.58450090+05	3.63572850+04	6.19497020+03	1.02751430+03	1.98652610+02	3.76546910+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.40000 CONTINUED

DENSITY	1.77?21000-03	2.15356900-09	2.29615430-10	2.24808720-11	2.09677640-12
KAPPA(P)	1.H4722933+01	2.65098350+00	5.04513140-01	1.85388250-01	1.48094600-01
KAPPA(R)	5.70?55310+00	9.09534260-01	2.57452770-01	1.59890180-01	1.43640730-01

THETA = 5.80000 13 DENSITIES

DENSITY	5.1593?720-02	5.21544810-03	1.30235365-03	2.18425460-04	3.79538560-05	6.75059450-06	1.13262799-06	1.74545560-07
KAPPA(P)	8.5?567?70+03	4.28931890+05	2.47520800+05	7.52691560+04	1.61860321+04	2.82692260+03	4.58005380+02	7.68568020+01
KAPPA(R)	3.9?50?530+03	3.02298410+05	1.21694596+05	2.89003770+04	5.51728930+03	9.52821870+02	1.69021680+02	2.85856820+01

DENSITY	2.50?08710-03	3.16504040-09	3.68470700-10	3.85236050-11	3.57731070-12
KAPPA(P)	1.23?48721+01	1.73948726+00	3.31460050-01	1.6A1I5340-01	1.51863370-01
KAPPA(R)	4.02102950+00	6.32497890-01	2.19601750-01	1.55536630-01	1.49046040-01

THETA = 7.00000 13 DENSITIES

DENSITY	6.2?40?090-02	1.03700755-02	1.711?7512-03	2.92490620-04	5.11919630-05	9.19601890-06	1.57707302-06	2.60589380-07
KAPPA(P)	4.50093?70+05	3.00216?40+05	1.69859630+05	4.81655780+04	9.13228260+03	1.58113450+03	2.57267130+02	3.84339260+01
KAPPA(R)	1.91?84950+05	1.70447040+05	8.90354530+04	2.27490400+04	4.18767500+03	7.49353580+02	1.03403724+02	1.36510027+01

DENSITY	3.93570?60-03	5.03622100-09	5.83801640-10	6.11060660-11	5.73037670-12
KAPPA(P)	5.A?66?010+00	8.78495670-01	2.38703770-01	1.64225140-01	1.55863750-01
KAPPA(R)	2.1?444?70+00	4.30457320-01	1.93526660-01	1.60727480-01	1.53242450-01

THETA = 10.00000 13 DENSITIES

DENSITY	8.191?4?10-02	1.37719963-02	2.38632920-03	4.15147790-04	7.47214790-05	1.42224341-05	2.50726590-06	4.25428060-07
KAPPA(P)	2.699?4?50+05	1.85663120+05	9.23900890+04	2.40132240+04	4.19524040+03	6.52759630+02	1.03190103+02	1.65131810+01
KAPPA(R)	7.61597?70+04	7.26522730+04	4.71099700+04	1.49907387+04	2.54893260+03	3.40972890+02	4.84977770+01	7.1010169?+00

DENSITY	6.44?59?60-08	8.32310930-09	9.78167800-10	1.03916470-10	9.78031090-12
KAPPA(P)	2.64595?60+00	4.75736620-01	1.92403990-01	1.5A894950-01	1.55378530-01
KAPPA(R)	1.10?24?60+00	3.06208810-01	1.79110200-01	1.55948720-01	1.52728260-01

THETA = 15.00000 13 DENSITIES

DENSITY	1.19240000-01	2.03006300-02	3.67293210-03	6.75252420-04	1.28166940-04	2.48811540-05	4.51258730-06	7.64273610-07
KAPPA(P)	1.3660?636+05	8.03526150+04	3.52045250+04	7.68314230+03	1.30808950+03	2.16550750+02	3.37693630+01	5.36877620+00
KAPPA(R)	2.31236?20+04	2.04449450+04	1.44534578+04	5.62681560+03	1.03666380+03	1.53875210+02	2.05532480+01	2.96312050+00

DENSITY	1.17493?33-07	1.52703930-08	1.79457072-09	1.88868540-10	1.67963620-11
KAPPA(P)	9.15520?40-01	2.52209300-01	1.66542950-01	1.58083640-01	1.66081610-01
KAPPA(R)	5.77989?80-01	2.22735570-01	1.63961930-01	1.55358330-01	1.63007830-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 22.49999 13 DENSITIES

DENSITY	1.9e415e30-01	3.3638e040-02	6.21952350-03	1.17871554-03	2.28207010-04	4.50381830-05	0.23341270-06	1.38096208-06
KAPPA(P)	5.5e088e50+04	3.1443261e+04	1.089e6799+04	2.2198e390+03	3.69536290+02	6.29e02110+01	1.11333262+01	2.35179250+00
KAPPA(R)	7.6e237510+03	5.4182593e+02	3.17989170+03	1.20796260+03	2.42422240+02	4.026765e0+01	6.66189760+00	1.39952333+00
DENSITY	2.0e2e0.60-07	2.45337150-08	2.800e1790-09	2.79399080-10	2.51498320-11			
KAPPA(P)	7.44042e80-01	2.96379370-01	2.00356290-01	1.97359170-01	2.037[illegible]780-01			
KAPPA(R)	4.10220e83-01	2.14895590-01	1.55265190-01	1.91916670-01	1.99862230-01			

THETA = 33.99999 13 DENSITIES

DENSITY	3.1e435770-01	5.80777300-02	1.09601342-02	2.11620980-03	4.07304700-04	7.84211620-05	1.32766999-05	2.14354e10-06
KAPPA(P)	2.52e81470+04	1.06747870+04	3.22049670+03	6.65340520+02	1.75052330+02	5.44237690+01	1.38137032+01	3.44167090+00
KAPPA(R)	3.73275470+03	1.83859320+03	7.14680780+02	1.90918750+02	4.61866110+01	1.11592637+01	2.96690700+00	7.44005720-01
DENSITY	3.11340.10-07	5.95089020-08	4.59544610-09	4.02239620-10	4.50147930-11			
KAPPA(P)	8.9e015e90-01	3.02288630-01	2.18985660-01	2.10036150-01	2.11305990-01			
KAPPA(R)	3.1e412e90-01	2.20852320-01	2.05773960-01	2.06129220-01	2.07484220-01			

4 DIANE/SCAT OPLYCA 19 FREQ. TEMP.(1.-2250.) CI/RTW-AFWL 11-25-66 MATERL = 1124 NK = 861

GREY ABSORPTION COEFFICIENTS 21 TEMPERATURES

THETA = 1.00000 13 DENSITIES

DENSITY	1.30501667+00	1.49244840-01	1.15042933-02	8.81026850-04	8.08818590-05	1.05153971-05	1.20121102-06	1.11056005-07
KAPPA(P)	1.59264921+04	1.34946320+04	1.18644520+04	8.13792060+03	3.72017870+03	1.30150420+03	5.87557980+02	1.35666130+02
KAPPA(R)	5.78510630+02	5.16334310+02	7.55315830+02	5.01047490+02	3.33126400+02	1.36855130+02	4.52808390+01	1.39873306+01
DENSITY	1.21499395-08	1.35750149-09	1.49093140-10	1.66204580-11	1.45390231-12			
KAPPA(P)	4.34917090+01	3.75957150+00	5.21863460-01	8.51987100-02	3.81389580-02			
KAPPA(R)	5.14706090+00	5.66841010-01	1.11048859-01	4.57875980-02	3.47644840-02			

THETA = 1.50000 13 DENSITIES

DENSITY	2.40284010-01	3.21040530-02	3.19117840-03	3.38833760-04	3.71090410-05	4.96215760-06	7.52375760-07	1.17639617-07
KAPPA(P)	6.96340030+04	5.41195070+04	4.39169670+04	2.44211150+04	8.88007150+03	2.23792840+03	5.01924130+02	7.94470640+01
KAPPA(R)	9.60326960+03	8.18327720+03	5.31227780+03	3.99926510+03	1.32996100+03	6.06760390+02	1.42039320+02	2.33559708+01
DENSITY	1.75478090-08	2.21713530-09	2.41465540-10	2.07521790-11	1.67965973-12			
KAPPA(P)	1.14772003+01	1.58089610+00	2.70973840-01	8.90747830-02	5.78442050-02			
KAPPA(R)	3.23103690+00	4.93436150-01	1.10140772-01	5.97566370-02	5.45383040-02			

THETA = 2.25000 13 DENSITIES

DENSITY	1.26935005-01	1.45098744-02	1.63295668-03	2.21673500-04	3.67504530-05	6.75802670-06	1.14955003-06	1.66560058-07
KAPPA(P)	1.37522030+05	9.87256330+04	6.09550380+04	2.22834580+04	5.89721140+03	1.23999910+03	2.68957650+02	6.50013458+01
KAPPA(R)	6.49706050+04	4.45054710+04	2.56103000+04	9.84776010+03	2.61639570+03	5.77751560+02	1.26164667+02	2.57296748+01
DENSITY	2.14578000-08	2.55692660-09	2.84223600-10	2.80453020-11	2.35870140-12			
KAPPA(P)	1.31537774+01	1.87229109+00	2.96768760-01	9.30664990-02	7.26406920-02			
KAPPA(R)	4.42058090+00	6.54493960-01	1.44193370-01	7.59003040-02	7.02163560-02			

THETA = 3.40000 13 DENSITIES

DENSITY	6.45902490-02	1.19221295-02	1.42126313-03	3.01840300-04	5.00730860-05	8.36821480-06	1.38658524-06	2.15984348-07
KAPPA(P)	1.35970620+05	7.60373690+04	3.86727270+04	1.79643390+04	5.88136940+03	1.73858870+03	3.26949800+02	5.62568588+01
KAPPA(R)	1.15454620+05	6.96041920+04	3.13920486+04	1.11107005+04	3.03993040+03	6.84550900+02	1.25344999+02	2.32482528+01
DENSITY	2.97371490-08	3.49756090-09	3.95440880-10	4.04732490-11	3.47307790-12			
KAPPA(P)	9.54596900+00	1.47636486+00	2.50408930-01	9.96783270-02	8.89530130-02			
KAPPA(R)	3.91136720+00	6.18517560-01	1.51934150-01	8.94363570-02	8.69506990-02			

THETA = 5.00000 13 DENSITIES

DENSITY	8.83956960-02	1.47373829-02	2.32112330-03	3.74702580-04	6.45283480-05	1.13270150-05	1.86374990-06	2.97646298-07
KAPPA(P)	1.06360016+05	6.35991660+04	3.54004530+04	1.79687950+04	5.11410090+03	1.14028210+03	2.18015070+02	3.69985960+01
KAPPA(R)	9.38037340+04	5.43978500+04	2.47784570+04	9.53229590+03	2.62134540+03	5.59604890+02	1.01468464+02	1.78353228+01

GHEY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00000 CONTINUED

DENSITY	4.27092730-05	5.12866770-09	5.79659660-10	5.73688370-11	5.10000390-12
KAPPA(P)	6.41133450+00	1.03158520+00	2.14595590-01	1.19531852-01	1.06582280-01
KAPPA(R)	2.75346720+00	4.57788820-01	1.47840250-01	1.07031601-01	1.04613040-01

THETA = 7.00000 13 DENSITIES

DENSITY	1.05345000-01	1.77948160-02	2.91023340-03	4.85673500-04	8.42024180-05	1.53422530-05	2.56000300-06	4.10044930-07
KAPPA(P)	9.10347040+04	5.45691860+04	3.48925960+04	1.68229353+04	3.74361110+03	7.89335120+02	1.51498630+02	2.79999060+01
KAPPA(R)	7.35492050+04	4.63737990+04	2.46859600+04	8.32180090+03	1.78027120+03	3.66863160+02	6.88101980+01	1.26079731+01

DENSITY	5.89091470-08	7.16555770-09	7.48097110-10	7.75082980-11	7.08791530-12
KAPPA(P)	6.16067480+00	9.60861600-01	2.14394020-01	1.36514940-01	1.26035590-01
KAPPA(R)	2.03275.10+00	3.69227420-01	1.56532440-01	1.28110440-01	1.23961777-01

THETA = 10.00000 13 DENSITIES

DENSITY	1.35570040-01	2.33092730-02	3.91254980-03	6.66331020-04	1.10177000-04	2.16492460-05	3.66240720-06	5.74300050-07
KAPPA(P)	7.77288640+04	4.85213890+04	2.86996430+04	1.14496104+04	2.69229410+03	5.67000300+02	1.11654570+02	2.11763920+01
KAPPA(R)	5.44201020+04	3.48181010+04	1.79915580+04	5.46169210+03	1.18307110+03	2.50285670+02	4.91420810+01	8.88727410+00

DENSITY	8.15819740-05	1.02331440-08	1.17372915-09	1.22726850-10	1.13112872-11
KAPPA(P)	3.72409000+00	8.35824010-01	1.92419230-01	1.37355480-01	1.34177600-01
KAPPA(R)	1.39057731+00	2.99467750-01	1.55247110-01	1.32997760-01	1.32429080-01

THETA = 15.00000 13 DENSITIES

DENSITY	1.75410670-04	3.29581730-05	5.66872190-06	9.82044440-07	1.74266870-07	3.18383210-08	5.51504920-09	9.07983160-10
KAPPA(P)	5.92416000+04	3.95926940+04	2.24999850+04	7.82302410+03	1.78530210+03	3.54962980+02	6.17499490+01	1.08315904+01
KAPPA(R)	3.77458630+04	2.80284240+04	1.41776627+04	4.19774770+03	8.47173170+02	1.65852190+02	2.82956870+01	4.16990850+00

DENSITY	1.30478030-07	1.73509280-08	1.99460460-09	2.07371340-10	1.89892180-11
KAPPA(P)	1.63579603+00	3.42466460-01	1.65241700-01	1.45709840-01	1.46504810-01
KAPPA(R)	7.73452430-01	2.34267880-01	1.55535850-01	1.43915780-01	1.44468320-01

THETA = 22.49999 13 DENSITIES

DENSITY	2.71946420-01	4.80613480-02	8.37752330-03	1.46822650-03	2.71487910-04	5.20833160-05	9.29682470-06	1.93770854-06
KAPPA(P)	4.33780960+04	3.03338620+04	1.42851093+04	4.34336590+03	8.67107480+02	1.45174850+02	2.58270390+01	4.54379690+00
KAPPA(R)	2.62300430+04	2.06850390+04	1.01731976+04	2.73377570+03	4.47310480+02	7.72246690+01	1.38339535+01	2.20162950+00

DENSITY	2.29771030-07	2.89571180-08	3.31009160-09	3.41371450-10	3.12960310-11
KAPPA(P)	8.77336340-01	2.59862660-01	1.69273760-01	1.60595420-01	1.63093760-01
KAPPA(R)	4.76.36060-01	2.10597830-01	1.63369960-01	1.58016620-01	1.60726520-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 30.99998 13 DENSITIES

DENSITY	4.1[illegible]E-01	7.38290960-02	1.31817500-02	2.41520770-03	4.59270140-04	8.84287870-05	1.56999980-05	2.50310100-06
KAPPA(P)	2.7[illegible]E+04	1.64521900+04	6.21733080+03	1.59884210+03	3.30976350+02	7.06444780+01	1.54402539+01	3.37712910+00
KAPPA(R)	1.43993[illegible]E+04	1.02413420+04	4.49976720+03	1.11990250+03	2.11300010+02	3.74480630+01	6.65502350+00	1.36638050+00
DENSITY	3.85297[illegible]E-07	4.88051540-08	5.55487460-09	5.65755110-10	5.17876270-11			
KAPPA(P)	6.8[illegible]E-01	2.38773230-01	1.80744990-01	1.79186530-01	1.82929760-01			
KAPPA(R)	3.6[illegible]E-01	1.98007570-01	1.73174070-01	1.76061830-01	1.80401920-01			

THETA = 50.00000 13 DENSITIES

DENSITY	6.5[illegible]E-01	1.17[illegible]E-01	2.15309250-02	4.02732870-03	7.70140940-04	1.48284770-04	2.61712280-05	4.23448020-06
KAPPA(P)	1.4[illegible]E+04	6.79272400+03	2.83708080+03	7.94759820+02	1.83019910+02	4.09152950+01	8.89771920+00	2.06552760+00
KAPPA(R)	7.17190[illegible]E+03	4.33811180+03	2.08919210+03	5.22598230+02	1.05760170+02	1.93391200+01	3.69923840+00	7.96437430-01
DENSITY	6.2[illegible]E-07	7.76[illegible]E-08	8.84733140-09	9.29950400-10	8.70846920-11			
KAPPA(P)	3.3[illegible]E-01	2.45031730-01	1.99876610-01	1.93809990-01	1.93889080-01			
KAPPA(R)	2.9[illegible]E-01	2.04978940-01	1.93257840-01	1.90932920-01	1.91203300-01			

THETA = 69.99998 13 DENSITIES

DENSITY	9.7[illegible]E-01	1.78541350-01	3.29577780-02	6.17696040-03	1.16045051-03	2.19507760-04	3.84977800-05	6.29303480-06
KAPPA(P)	9.1[illegible]E+03	4.58223960+03	1.77126970+03	4.98506680+02	1.19476175+02	2.96021200+01	6.92461860+00	1.53990989+00
KAPPA(R)	5.2[illegible]E+03	3.14314740+03	1.28836710+03	2.84475140+02	5.25757480+01	1.04012188+01	2.23195830+00	5.73292200-01
DENSITY	9.5[illegible]E-07	1.22722510-07	1.44025607-08	1.52963000-09	1.43957930-10			
KAPPA(P)	4.1[illegible]E-01	2.23755130-01	1.97764960-01	1.94621620-01	1.94277250-01			
KAPPA(R)	2.6[illegible]E-01	2.04760560-01	1.94052020-01	1.92135080-01	1.91611770-01			

THETA = 99.99998 13 DENSITIES

DENSITY	1.5[illegible]E+00	2.79502510-01	5.08376020-02	9.38180600-03	1.77123194-03	3.41958570-04	6.18966180-05	1.04649397-05
KAPPA(P)	7.0[illegible]E+03	3.51243530+03	1.21546610+03	3.04939960+02	7.50756990+01	1.74908340+01	3.48386040+00	7.51622400-01
KAPPA(R)	4.1[illegible]E+03	2.35740310+03	8.32196840+02	1.66803750+02	3.25279260+01	6.39127630+00	1.25621494+00	3.79972080-01
DENSITY	1.60782[illegible]E-06	2.08916770-07	2.45574650-08	2.59458360-09	2.40986590-10			
KAPPA(P)	2.7[illegible]E-01	2.05152840-01	1.95767220-01	1.95729630-01	1.98199530-01			
KAPPA(R)	2.3[illegible]E-01	2.02635790-01	1.93824340-01	1.93028770-01	1.95370410-01			

THETA = 149.99995 13 DENSITIES

DENSITY	2.5[illegible]E+04	4.55813070-01	8.32097310-02	1.57980620-02	3.09571000-03	6.15194560-04	1.12792581-04	1.90798170-05
KAPPA(P)	5.1[illegible]E+03	2.25032280+03	6.45520490+02	1.44535610+02	3.00510240+01	6.11919150+00	1.29765670+00	3.95337000-01
KAPPA(R)	2.5[illegible]E+03	1.35349840+03	4.26239310+02	8.48790210+01	1.55376479+01	2.00184290+00	7.28694570-01	3.24750880-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 199.99995 CONTINUED

DENSITY	2.9e182700-06	3.72090040-07	4.33703500-08	4.59866400-09	4.32707200-10
KAPPA(P)	2.3e7e2e10-01	2.06560590-01	2.03130550-01	2.02807500-01	2.02774650-01
KAPPA(R)	2.2e3e42e0e-01	2.02281490-01	2.00016380-01	1.99891410-01	1.99879420-01

THETA = 249.99990 13 DENSITIES

DENSITY	4.1e0e96e0+00	7.69543580-01	1.449e7900-01	2.63918440-02	5.60404860-03	1.10677269-03	2.00820330-04	3.30720810-05
KAPPA(P)	2.7e2e7e80+03	8.97313210+02	2.24e61890+02	9.84282460+01	1.13122928+01	2.98073220+00	8.45337890-01	3.24591120-01
KAPPA(R)	1.0e3e2690+03	4.77633630+02	1.44592710+02	3.07509210+01	6.39728690+00	1.50260457+00	4.71914000-01	2.56234300-01

DENSITY	5.1997e4e0-06	6.75636960-07	7.94228290-08	8.41575810-09	7.89359090-10
KAPPA(P)	2.21400e30-01	2.05179300-01	2.03159470-01	2.02944710-01	2.04111880-01
KAPPA(R)	2.10221e10-01	2.02149240-01	2.00565780-01	2.00665480-01	2.01295350-01

THETA = 340.00012 13 DENSITIES

DENSITY	7.1e726700+00	1.3e179706+00	2.6226e890-01	5.12241030-02	1.01101541-02	2.01125980-03	3.68977840-04	6.25795560-05
KAPPA(P)	1.21215e30+03	3.73539730+02	1.0556e641+02	2.61643280+01	6.14978420+00	1.43867750+00	4.32484970-01	2.45213010-01
KAPPA(R)	4.6e3e2e30+02	1.86137360+02	5.24941620+01	1.0e717313+01	2.28126270+00	6.53648790-01	3.07057570-01	2.30507010-01

DENSITY	9.5946e180-06	1.24447105-06	1.46309750-07	1.55436620-08	1.46295140-09
KAPPA(P)	2.1e391e30-01	2.05056360-01	2.04714480-01	2.04612770-01	2.04603560-01
KAPPA(R)	2.0e635e30-01	2.02412170-01	2.01940540-01	2.01797610-01	2.01777840-01

THETA = 499.99993 13 DENSITIES

DENSITY	1.2e5e9e30+01	2.34343050+00	4.56074540-01	8.94891520-02	1.78780060-02	3.56217480-03	6.53059710-04	1.10908200-04
KAPPA(P)	5.6790e230+02	1.98202840+02	5.03218900+01	1.1098e891+01	2.61167060+00	7.49083410-01	3.14769390-01	2.24005870-01
KAPPA(R)	2.4708e000+02	1.13550499+02	2.69623910+01	5.11519220+00	1.22392681+00	4.74571540-01	2.72970650-01	2.17794350-01

DENSITY	1.7e592e60-05	2.21761120-06	2.60894460-07	2.77200480-08	2.60894500-09
KAPPA(P)	2.07612e70-01	2.05130690-01	2.04856190-01	2.04826300-01	2.04823020-01
KAPPA(R)	2.0e960e10-01	2.02084570-01	2.01746760-01	2.01712680-01	2.01708840-01

THETA = 599.99976 13 DENSITIES

DENSITY	1.9e7e9720+01	3.81127200+00	7.47174360-01	1.47849560-01	2.94430610-02	5.88016780-03	1.08052097-03	1.83673490-04
KAPPA(P)	5.17677e30+02	9.40282200+01	2.26599250+01	5.3e456410+00	1.32304619+00	4.33335640-01	2.44905960-01	2.18560130-01
KAPPA(R)	1.2373e6e1+02	5.63523480+01	1.45694953+01	3.18928e90+00	8.33783920-01	3.55322660-01	2.36450590-01	2.07245780-01

DENSITY	2.9257e000-05	3.67344740-06	4.32172970-07	4.59183970-08	4.32173040-09
KAPPA(P)	2.05397730-01	2.04662040-01	2.04567350-01	2.04556100-01	2.04554870-01
KAPPA(R)	2.02e05530-01	2.01754970-01	2.01676770-01	2.01687090-01	2.01666080-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 999.99987 13 DENSITIES

DENSITY	3.27545e00+01	6.43212510+00	1.26681742+00	2.51496240-01	5.02046820-02	1.00368695-02	1.84483581-03	3.13616728-04
KAPPA(P)	1.39124e20+02	5.96609460+01	9.35703970+00	2.14615700+00	5.96551700-01	2.76624850-01	2.15729920-01	2.06322040-01
KAPPA(R)	4.17976e30+01	2.03445490+01	5.99140680+00	1.30970611+00	4.43071160-01	2.08063380-01	2.08406450-01	2.02317100-01
DENSITY	4.82465e20-05	6.27228390-06	7.37920340-07	7.84040790-08	7.37920560-09			
KAPPA(P)	2.04e02e30-01	2.04569400-01	2.04539720-01	2.04535240-01	2.04534830-01			
KAPPA(R)	2.01304e10-01	2.01219890-01	2.01200970-01	2.01198760-01	2.01198560-01			

THETA = 1499.99930 13 DENSITIES

DENSITY	5.94094e10+01	1.17214956+01	2.32000920+00	4.61618070-01	9.22142160-02	1.84381380-02	3.38915730-03	5.76149728-04
KAPPA(P)	6.07671e50+01	1.46656641+01	3.39751290+00	8.24851670-01	3.16281700-01	2.25211120-01	2.07842020-01	2.04790930-01
KAPPA(R)	9.95130e70+00	3.64322760+00	1.08032645+00	3.93217900-01	2.41783880-01	2.09125030-01	2.01908020-01	2.00548730-01
DENSITY	8.60362e20-05	1.15229491-05	1.35564933-06	1.44037910-07	1.35564990-08			
KAPPA(P)	2.04264e50-01	2.04161480-01	2.04130460-01	2.04129230-01	2.04129030-01			
KAPPA(R)	2.00311e20-01	2.00273970-01	2.00268960-01	2.00268360-01	2.00268360-01			

THETA = 2249.99870 13 DENSITIES

DENSITY	1.08361e34+02	2.14178350+01	4.24878050+00	8.47876240-01	1.69401100-01	3.38727310-02	6.22626930-03	1.05845496-03
KAPPA(P)	2.50513e10+01	5.99899920+00	1.35020427+00	4.10701910-01	2.40258460-01	2.09219980-01	2.03176950-01	2.02313460-01
KAPPA(R)	2.04367770+00	7.16327220-01	3.31848410-01	2.34062750-01	2.07552280-01	2.00151640-01	1.98338920-01	1.98128390-01
DENSITY	1.62138e30-04	2.11690570-05	2.49046790-06	2.64612320-07	2.49046830-08			
KAPPA(P)	2.02118e30-01	2.02088210-01	2.02084160-01	2.02083760-01	2.02083560-01			
KAPPA(R)	1.98068e00-01	1.98054700-01	1.98053520-01	1.98053320-01	1.98053320-01			

6 DIANE/SCAT DPLYFE 19 FREQ. TEMP.(1.-2250.) CI/RTW-AFWL 11-20-6800000 MATERL = 1125 NX = 061

GREY ABSORPTION COEFFICIENTS 21 TEMPERATURES

THETA = 1.00000 13 DENSITIES

DENSITY	1.30061087+00	1.40244440-01	1.15042933-02	8.41026850-04	8.08818590-05	1.05153971-05	1.20121142-06	1.11056005-07
KAPPA(P)	1.59224421+04	1.34845320+04	1.18644520+04	8.13792060+03	3.72017470+03	1.30150420+03	5.07557900+02	1.35666130+02
KAPPA(R)	5.76510030+02	8.16334310+02	7.55315830+02	6.01047490+02	3.33126400+02	1.36855130+02	4.52000390+01	1.39073306+01
DENSITY	1.21499595-08	1.35750149-09	1.49093140-10	1.56204540-11	1.45390231-12			
KAPPA(P)	2.34917040+01	3.75957150+00	5.21863460-01	8.51987100-02	3.81389580-02			
KAPPA(R)	3.14708490+00	5.66841010-01	1.11048859-01	4.57875980-02	3.47644840-02			

THETA = 1.50000 13 DENSITIES

DENSITY	2.90284610-01	3.21040530-02	3.19117840-03	3.38833760-04	3.71090410-05	4.96215760-06	7.52375760-07	1.17639617-07
KAPPA(P)	8.90320330+04	5.41195070+04	4.30169670+04	2.48211150+04	8.88007150+03	2.23792840+03	5.01924130+02	7.98470640+01
KAPPA(R)	9.60326760+03	8.18327720+03	6.31227760+03	3.99926510+03	1.82996100+03	6.06760390+02	1.42039320+02	2.33399700+01
DENSITY	1.73878090-08	2.21713530-09	2.41425540-10	2.07521790-11	1.67965973-12			
KAPPA(P)	1.14772663+01	1.59089618+00	2.70973840-01	8.90747930-02	5.78442050-02			
KAPPA(R)	3.20103490+00	4.83496150-01	1.10140772-01	5.97566370-02	5.45383040-02			

THETA = 2.25000 13 DENSITIES

DENSITY	1.22335455-01	1.45696744-02	1.63295668-03	2.21673500-04	3.67504530-05	6.75802470-06	1.14955003-06	1.66560058-07
KAPPA(P)	1.37622330+05	9.87256330+04	6.08550380+04	2.22834580+04	5.89721140+03	1.23999910+03	2.60957650+02	6.50013450+01
KAPPA(R)	6.46706060+04	4.45064710+04	2.56103000+04	9.88776010+03	2.61639570+03	5.77751560+02	1.26164667+02	2.57296740+01
DENSITY	2.12678340-08	2.55692660-09	2.84223600-10	2.80453020-11	2.35870140-12			
KAPPA(P)	1.31537774+01	1.87229169+00	2.96708760-01	9.30664990-02	7.26406920-02			
KAPPA(R)	4.42088090+00	6.54483960-01	1.48193370-01	7.52003040-02	7.02163560-02			

THETA = 3.40000 13 DENSITIES

DENSITY	8.45602490-02	1.19221295-02	1.62126313-03	3.01800300-04	5.00730860-05	8.36821480-06	1.38458524-06	2.15984348-07
KAPPA(P)	1.35976020+05	7.60373490+04	3.86727270+04	1.79643390+04	5.88136940+03	1.73858870+03	3.36949000+02	5.62568500+01
KAPPA(R)	1.13054454+05	6.96041920+04	3.13920480+04	1.11107005+04	3.03993040+03	6.84550900+02	1.25344999+02	2.32482520+01
DENSITY	2.97871490-08	3.49756030-09	3.95440880-10	4.04732490-11	3.47307790-12			
KAPPA(P)	9.54596960+00	1.47636486+00	2.50403930-01	9.96783270-02	8.89530130-02			
KAPPA(R)	3.91136720+00	6.18517560-01	1.51934150-01	8.94363570-02	8.69506990-02			

THETA = 5.00000 13 DENSITIES

DENSITY	8.83956960-02	1.47373829-02	2.32112330-03	3.76702580-04	6.45283480-05	1.13270150-05	1.86374990-06	2.97846290-07
KAPPA(P)	1.06360610+05	6.35981660+04	3.54004530+04	1.79687950+04	5.11410090+03	1.14028210+03	2.18815070+02	3.69989960+01
KAPPA(R)	9.36037540+04	5.43978500+04	2.47764570+04	9.53229590+03	2.62134540+03	5.59604890+02	1.01448464+02	1.70353220+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00000 CONTINUED

DENSITY	4.27062730-08	5.12466770-09	5.79659660-10	5.73688370-11	5.10000390-12
KAPPA(P)	6.41133460+00	1.03158520+00	2.14595590-01	1.15531952-01	1.06582287-01
KAPPA(R)	2.75326920+00	4.57748820-01	1.47840250-01	1.07031401-01	1.04613046-01

THETA = 7.00000 13 DENSITIES

DENSITY	1.03345080-01	1.77948180-02	2.91023340-03	4.85673500-04	8.42024180-05	1.53422530-05	2.58080300-06	4.10844930-07
KAPPA(P)	9.16397690+04	5.48699860+04	3.48925960+04	1.48229353+04	3.74361110+03	7.89335120+02	1.51498830+02	2.79099060+01
KAPPA(R)	7.35492650+04	4.63737990+04	2.46859600+04	8.32180090+03	1.78027120+03	3.66863160+02	6.88101980+01	1.26479731+01

DENSITY	5.89091470-08	7.16555770-09	7.88097110-10	7.73082980-11	7.08791530-12
KAPPA(P)	6.16867460+00	9.60961600-01	2.14394820-01	1.34514940-01	1.26035590-01
KAPPA(R)	2.85275410+00	3.69227420-01	1.56532440-01	1.24113840-01	1.23961777-01

THETA = 10.00000 13 DENSITIES

DENSITY	1.35670020-01	2.33092730-02	3.91254980-03	6.66331020-04	1.18177008-04	2.16492460-05	3.66240720-06	5.74308050-07
KAPPA(P)	7.77248600+04	4.85213890+04	2.86996430+04	1.14496104+04	2.69229410+03	5.67000380+02	1.11654570+02	2.11763920+01
KAPPA(R)	5.44201520+04	3.84141010+04	1.79915580+04	5.46169210+03	1.18307110+03	2.30285670+02	4.91428810+01	8.80727410+00

DENSITY	8.16519740-08	1.02331848-08	1.17372915-09	1.22726850-10	1.13112872-11
KAPPA(P)	3.72409640+00	6.35824810-01	1.92419230-01	1.37355480-01	1.34177600-01
KAPPA(R)	1.36057731+00	2.99947750-01	1.55227110-01	1.32997760-01	1.32429080-01

THETA = 15.00000 13 DENSITIES

DENSITY	1.85810670-01	3.29581730-02	5.66572190-03	9.82044440-04	1.74266820-04	3.18383210-05	5.51504920-06	9.07983160-07
KAPPA(P)	5.92416060+04	3.95926940+04	2.24999850+04	7.62302810+03	1.78530210+03	3.54942900+02	6.17489490+01	1.00319584+01
KAPPA(R)	3.77458450+04	2.86228290+04	1.41776627+04	4.19776770+03	9.47173170+02	1.65852190+02	2.62956870+01	4.16594858+00

DENSITY	1.30476230-07	1.73509280-08	1.99460460-09	2.07371340-10	1.89892180-11
KAPPA(P)	1.63574003+00	3.42446440-01	1.65241700-01	1.45709880-01	1.46504810-01
KAPPA(R)	7.75652230-01	2.34267880-01	1.55535850-01	1.43915780-01	1.44468320-01

THETA = 22.49999 13 DENSITIES

DENSITY	2.71446420-01	4.80613480-02	8.37752330-03	1.46822658-03	2.71487910-04	5.20833160-05	9.21852478-06	1.53779654-06
KAPPA(P)	4.35780980+04	3.03338620+04	1.42851093+04	4.36336590+03	8.67107480+02	1.45174850+02	2.51270390+01	4.34379698+00
KAPPA(R)	2.62300230+04	2.06850390+04	1.01731976+04	2.73377570+03	4.47310480+02	7.72246690+01	1.38339535+01	2.20102958+00

DENSITY	2.29771630-07	2.89571180-08	3.31009160-09	3.41371450-10	3.12960310-11
KAPPA(P)	8.77336040-01	2.59862660-01	1.69273760-01	1.60595420-01	1.63093760-01
KAPPA(R)	4.71636080-01	2.10597830-01	1.63369460-01	1.58016620-01	1.60726520-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 39.99998 13 DENSITIES

DENSITY	4.12249090-01	7.34290960-02	1.31817500-02	2.41520770-03	4.59270140-04	8.88287870-05	1.56999980-05	2.58310180-06
KAPPA(P)	2.70830060+04	1.64521800+04	6.21733080+03	1.59894210+03	3.30976350+02	7.06444780+01	1.54025390+01	3.37712910+00
KAPPA(R)	1.43693440+04	1.02413420+04	4.49976720+03	1.11990250+03	2.11300010+02	3.74480630+01	6.65502350+00	1.36430050+00
DENSITY	3.89297550-07	4.88051560-08	5.55487660-09	5.65755110-10	5.17876270-11			
KAPPA(P)	8.85200610-01	2.38773230-01	1.80743990-01	1.79148530-01	1.82929760-01			
KAPPA(R)	3.68021610-01	1.98007570-01	1.73174070-01	1.76061830-01	1.80401920-01			

THETA = 59.00000 13 DENSITIES

DENSITY	6.58358640-01	1.13680649-01	2.18037340-02	4.07427290-03	7.79101700-04	1.50078170-04	2.65317100-05	4.31102220-06
KAPPA(P)	1.42354523+04	6.78707180+03	2.73957790+03	7.47250100+02	1.81025300+02	4.51977350+01	9.32443120+00	2.00540370+00
KAPPA(R)	7.01162040+03	4.22490030+03	1.97611080+03	4.76729360+02	1.04914417+02	2.25295100+01	4.83261080+00	8.23950020-01
DENSITY	6.39358630-07	7.98964200-08	9.15203120-09	9.65920260-10	9.05136900-11			
KAPPA(P)	3.20777440-01	2.36371360-01	1.92947720-01	1.86552420-01	1.86540100-01			
KAPPA(R)	2.93293270-01	2.00381740-01	1.86987590-01	1.83751130-01	1.83963110-01			

THETA = 69.99998 13 DENSITIES

DENSITY	9.93051260-01	1.80109010-01	3.33443810-02	6.26994950-03	1.18121820-03	2.24401430-04	3.95687090-05	6.50018490-06
KAPPA(P)	8.55504610+03	4.33158550+03	1.69805360+03	5.08054620+02	1.23972152+02	2.91449300+01	6.55547780+00	1.44885933+00
KAPPA(R)	4.62627510+03	2.83193630+03	1.23979820+03	3.36092000+02	6.53009760+01	1.15535527+01	2.21884630+00	5.60803210-01
DENSITY	9.85319400-07	1.27227380-07	1.48777379-08	1.56932543-09	1.46685530-10			
KAPPA(P)	3.96159510-01	2.14671570-01	1.91299500-01	1.89691350-01	1.90665630-01			
KAPPA(R)	2.59733000-01	1.98834990-01	1.87959260-01	1.87248810-01	1.88036530-01			

THETA = 99.99998 13 DENSITIES

DENSITY	1.53763157+00	2.83662540-01	5.18656720-02	9.61501940-03	1.82335881-03	3.53153420-04	6.39862110-05	1.07866644-05
KAPPA(P)	6.62080010+03	3.38016190+03	1.22594950+03	3.10298580+02	7.36572030+01	1.62057150+01	3.32121930+00	7.02561710-01
KAPPA(R)	3.76240490+03	2.24714980+03	8.82426930+02	1.89818420+02	3.55267510+01	6.16559090+00	1.20570334+00	3.02972040-01
DENSITY	1.64648443-06	2.12441710-07	2.48514430-08	2.61749000-09	2.42961050-10			
KAPPA(P)	2.74523060-01	2.02862060-01	1.93610470-01	1.94001930-01	1.96590570-01			
KAPPA(R)	2.30392650-01	1.99341860-01	1.91348280-01	1.91320550-01	1.93782670-01			

THETA = 149.99995 13 DENSITIES

DENSITY	2.56539440+00	4.67112520-01	8.55448920-02	1.62702660-02	3.18329360-03	6.29263790-04	1.14643988-04	1.93018430-05
KAPPA(P)	4.86863660+03	2.17118840+03	6.45870480+02	1.44851190+02	3.06179670+01	6.91233840+00	1.45590593+00	4.32626200-01
KAPPA(R)	2.42920650+03	1.34511380+03	4.35396860+02	8.65395690+01	1.48120786+01	2.92459790+00	7.72173350-01	3.24042690-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 149.99995 CONTINUED

DENSITY	2.92814950-06	3.75270830-07	4.37862480-08	4.63860170-09	4.36475020-10
KAPPA(P)	2.39438760-01	2.05741280-01	2.01491510-01	2.01069430-01	2.01025600-01
KAPPA(R)	2.22590230-01	2.00975750-01	1.98517700-01	1.98206690-01	1.98157720-01

THETA = 224.99990 13 DENSITIES

DENSITY	4.25847030+00	7.97753150-01	1.48538360-01	2.64864690-02	5.68134670-03	1.11822913-03	2.02622090-04	3.61683770-05
KAPPA(P)	2.04537490+03	8.68838760+02	2.20088100+02	5.65657660+01	1.35543021+01	3.43564260+00	9.16252610-01	3.36362440-01
KAPPA(R)	1.10844630+03	5.49605140+02	1.69967790+02	3.87632240+01	7.91930120+00	1.70490256+00	4.90903500-01	2.03023210-01

DENSITY	5.24513520-06	6.91601940-07	8.01841550-08	8.51957000-09	8.01841680-10
KAPPA(P)	2.03296900-01	2.03728910-01	2.01247050-01	2.00963690-01	2.00933150-01
KAPPA(R)	2.16815040-01	2.01176430-01	1.98726060-01	1.98226300-01	1.98161880-01

THETA = 300.00012 13 DENSITIES

DENSITY	7.33000350+00	1.38681797+00	2.65946000-01	5.17795140-02	1.02038721-02	2.02330940-03	3.72498330-04	8.33062200-05
KAPPA(P)	1.18867400+03	3.80568790+02	1.18977089+02	2.91850310+01	6.73007290+00	1.54971337+00	4.46963470-01	2.42803930-01
KAPPA(R)	5.22276090+02	2.50951120+02	9.08237630+01	1.87365460+01	3.54126850+00	8.38100370-01	3.40563050-01	2.33955020-01

DENSITY	9.73892650-06	1.26003588-06	1.48934340-07	1.58152710-08	1.48482368-09
KAPPA(P)	2.07284090-01	2.01775420-01	2.01071840-01	2.01101200-01	2.01588650-01
KAPPA(R)	2.00086570-01	1.99351240-01	1.98339710-01	1.98328200-01	1.98804560-01

THETA = 499.99993 13 DENSITIES

DENSITY	1.24345273+01	2.37230270+00	4.60771140-01	9.07822040-02	1.80833800-02	3.61331750-03	6.64022180-04	1.12828353-04
KAPPA(P)	5.90279140+02	2.25008200+02	5.60926030+01	1.19246130+01	2.58080190+00	6.71929340-01	2.86774520-01	2.10146690-01
KAPPA(R)	2.33457450+02	1.26189906+02	3.64859750+01	7.55095440+00	1.65124092+00	5.17047050-01	2.69822490-01	2.12219920-01

DENSITY	1.73275980-05	2.24575230-06	2.63492760-07	2.79717760-08	2.63234710-09
KAPPA(P)	2.04284420-01	2.02699640-01	2.02873630-01	2.02989300-01	2.03005540-01
KAPPA(R)	2.00362530-01	1.99512770-01	1.99783500-01	1.99915800-01	1.99929190-01

THETA = 699.99976 13 DENSITIES

DENSITY	1.90149450+01	3.85248800+00	7.55855080-01	1.49983310-01	2.99207520-02	5.97370480-03	1.09509046-03	1.85648680-04
KAPPA(P)	3.23903520+02	9.90352620+01	2.18877460+01	4.89078940+00	1.12740269+00	4.15565720-01	2.52563690-01	2.13006200-01
KAPPA(R)	9.30938530+01	4.03256190+01	1.07933463+01	2.51621470+00	7.15876500-01	3.22304540-01	2.26485130-01	2.05324220-01

DENSITY	2.83209970-05	3.70654650-06	4.36045180-07	4.63298310-08	4.36045240-09
KAPPA(P)	2.04509060-01	2.02993970-01	2.02791880-01	2.02776480-01	2.02775050-01
KAPPA(R)	2.04217070-01	2.00279580-01	1.99997180-01	1.99974580-01	1.99972980-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 999.99967 13 DENSITIES

DENSITY	3.321344[illegible]0+01	6.515669[illegible]0+00	1.28557217+00	2.55170070-01	5.08236240-02	1.01387251-02	1.86185684-03	3.16961888-04
KAPPA(P)	1.355400[illegible]0+02	3.68643510+01	8.25907820+00	2.14147910+00	7.10699060-01	3.27254870-01	2.25577010-01	2.06335250-01
KAPPA(R)	3.641746[illegible]0+01	1.29266685+01	3.21580910+00	9.06098810-01	3.87179210-01	2.53599760-01	2.14738340-01	2.03206290-01
DENSITY	6.[illegible]812[illegible]0-05	6.32834680-06	7.44532000-07	7.91065680-08	7.44532220-09			
KAPPA(P)	2.03399[illegible]0-01	2.03059350-01	2.03020770-01	2.03016300-01	2.03015690-01			
KAPPA(R)	2.00310[illegible]0-01	1.99986980-01	1.99957180-01	1.99953590-01	1.99953180-01			

THETA = 1499.99930 13 DENSITIES

DENSITY	6.02192420+01	1.18800555+01	2.34794990+00	4.66298120-01	9.30678010-02	1.86045150-02	3.41956480-03	5.81313710-04
KAPPA(P)	6.[illegible]0[illegible]0+01	1.60556520+01	4.34015460+00	1.18402160+00	4.08346710-01	2.30945450-01	2.08557810-01	2.04179530-01
KAPPA(R)	1.81094[illegible]0+01	6.55853320+00	1.79834790+00	5.99453350-01	3.08679420-01	2.24003190-01	2.03336310-01	2.00489580-01
DENSITY	8.94325[illegible]0-05	1.16226930-05	1.36779592-06	1.45328370-07	1.36779633-08			
KAPPA(P)	2.03499[illegible]0-01	2.03395830-01	2.03382260-01	2.03380630-01	2.03380430-01			
KAPPA(R)	2.00093[illegible]0-01	2.00035390-01	2.00027790-01	2.00026980-01	2.00026780-01			

THETA = 2249.99670 13 DENSITIES

DENSITY	1.09659[illegible]91+02	2.16501910+01	4.29967510+00	8.55600770-01	1.70921480-01	3.41761920-02	6.28206850-03	1.06793971-03
KAPPA(P)	2.86200[illegible]0+01	8.27057440+00	1.98637782+00	5.41203130-01	2.60958210-01	2.13040090-01	2.05502930-01	2.03988820-01
KAPPA(R)	6.35608[illegible]0+00	2.80311130+00	8.46869730-01	3.30420230-01	2.23791380-01	2.04209670-01	2.00608700-01	1.99930080-01
DENSITY	1.64298[illegible]0-04	2.13587320-05	2.51278210-06	2.66983250-07	2.51278260-08			
KAPPA(P)	2.03733[illegible]0-01	2.03693870-01	2.03688790-01	2.03688170-01	2.03687970-01			
KAPPA(R)	1.99[illegible]19060-01	1.99802880-01	1.99800680-01	1.99800480-01	1.99800480-01			

1 DIANE/SCAT STUFF 19 FREQ(.001-1.E6) TEMP(1.-2250.) C1/LMS 11/7/66 MATERL = 1105 NK = 061

GREY ABSORPTION COEFFICIENTS 21 TEMPERATURES

THETA = 1.00000 13 DENSITIES

DENSITY	1.24860900E+00	1.38810380-01	1.07608473-02	7.90100850-04	7.72271900-05	1.04391232-05	1.20359225-06	1.06833979-07
KAPPA(P)	1.90979930+04	1.55466260+04	1.35591645+04	8.81836690+03	3.74912570+03	1.25534030+03	5.92094930+02	1.61204850+02
KAPPA(R)	3.68147420+02	8.29520410+02	7.64129260+02	5.99179350+02	3.19355190+02	1.23745986+02	4.35999480+01	1.51200847+01
DENSITY	1.13620382-08	1.26091081-09	1.38375540-10	1.45129488-11	1.36374047-12			
KAPPA(P)	2.53792260+01	5.10600680+00	5.69762990-01	9.22919830-02	4.05586180-02			
KAPPA(R)	3.52470930+00	8.30539160-01	1.21820323-01	8.89626750-02	3.68510560-02			

THETA = 1.50000 13 DENSITIES

DENSITY	2.66869370-01	3.07710800-02	3.09477840-03	3.31509870-04	3.55507250-05	4.65155050-06	6.99877890-07	1.09334936-07
KAPPA(P)	8.49363600+04	6.41956020+04	5.17251770+04	2.90997320+04	9.85941270+03	2.45116080+03	5.49087600+02	8.61890350+01
KAPPA(R)	9.96661420+03	8.47070460+03	6.55867530+03	4.17231360+03	1.89738310+03	6.13206030+02	1.43559120+02	2.41098610+01
DENSITY	1.64309350-08	2.10790800-09	2.32435170-10	2.00566590-11	1.62809617-12			
KAPPA(P)	1.26053610+01	1.58964812+00	2.69823720-01	9.04628560-02	5.95936880-02			
KAPPA(R)	3.29552530+00	4.65237380-01	1.08836121-01	6.12281850-02	5.63161190-02			

THETA = 2.25000 13 DENSITIES

DENSITY	1.17767621-01	1.40043118-02	1.55275119-03	2.07803230-04	3.42741210-05	6.33240830-06	1.09336556-06	1.60467360-07
KAPPA(P)	1.36243770+05	1.16611127+05	7.25126890+04	2.50244830+04	6.27736230+03	1.26814680+03	2.63893590+02	6.39889840+01
KAPPA(R)	7.01590420+04	6.81911120+04	2.76920300+04	1.02153000+04	2.64820130+03	5.68249160+02	1.26468208+02	2.55122810+01
DENSITY	2.05965980-08	2.48344320-09	2.77980550-10	2.78396450-11	2.33149850-12			
KAPPA(P)	1.31511796+01	1.87441839+00	2.94254560-01	9.31367430-02	7.33472690-02			
KAPPA(R)	4.41469473+00	6.55000360-01	1.45865250-01	7.61393550-02	7.10285060-02			

THETA = 3.40000 13 DENSITIES

DENSITY	8.04671870-02	1.12586475-02	1.71574142-03	2.86084600-04	4.80970380-05	8.[illegible]56250-06	1.34914435-06	2.12152620-07
KAPPA(P)	1.52884660+05	8.35839650+04	4.03787890+04	1.76629040+04	5.75150530+03	1.43768000+03	2.85130220+02	5.12661640+01
KAPPA(R)	1.23563405+05	7.47444230+04	3.28911650+04	1.12129531+04	3.03002150+03	6.85144320+02	1.28514910+02	2.32666280+01
DENSITY	2.94194450-08	3.47035180-09	3.95761280-10	4.07025720-11	3.49321040-12			
KAPPA(P)	6.98580660+00	1.41133274+00	2.39006860-01	9.77973310-02	8.83217480-02			
KAPPA(R)	3.85980640+00	6.09467350-01	1.49845500-01	8.85005970-02	8.64155200-02			

THETA = 5.00000 13 DENSITIES

DENSITY	8.42377620-02	1.40670377-02	2.23562600-03	3.63835040-04	6.32018520-05	1.11761339-05	1.84976869-06	2.97664180-07
KAPPA(P)	1.13070557+05	6.40282650+04	3.52855890+04	1.70069090+04	6.83722690+03	1.87621540+03	2.01473920+02	3.41252640+01
KAPPA(R)	9.63984510+04	5.39455180+04	2.63[illegible]+04	9.29715690+03	2.63512510+03	5.57729450+02	9.80901490+01	1.61990780+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00000 CONTINUED

DENSITY	4.29121700-08	5.15695350-09	5.82798390-10	5.76546740-11	5.12372230-12
KAPPA(P)	5.95266480+00	9.76941550-01	2.08535280-01	1.18877269-01	1.06065920-01
KAPPA(R)	2.62308450+00	4.44582130-01	1.45697310-01	1.06029492-01	1.04020955-01

THETA = 7.00000 13 DENSITIES

DENSITY	1.01566+50-01	1.72919180-02	2.84303260-03	4.78939150-04	0.36454200-05	1.53485030-05	2.54215760-06	4.12906900-07
KAPPA(P)	9.15293420+04	5.49522530+04	3.37325900+04	1.44375532+04	3.41530090+03	7.24775510+02	1.02035200+02	2.66932960+01
KAPPA(R)	7.21356510+04	4.63603560+04	2.99436060+04	7.76679580+03	1.60041930+03	3.36003630+02	8.53089480+01	1.20205770+01
DENSITY	5.92025280-08	7.19794680-09	7.90868190-10	7.78096270-11	7.00912040-12			
KAPPA(P)	5.99398610+00	9.42275040-01	2.12240760-01	1.34230790-01	1.26006340-01			
KAPPA(R)	1.93420080+00	3.03190540-01	1.58258310-01	1.27789360-01	1.23915790-01			

THETA = 10.00000 13 DENSITIES

DENSITY	1.36705210-01	2.29130840-02	3.87853410-03	6.65302320-04	1.10554110-04	2.17479740-05	3.67763750-06	5.75797390-07
KAPPA(P)	7.63537440+04	4.79071230+04	2.91299440+04	1.68007724+04	2.55549940+03	5.47223850+02	1.09650340+02	2.00663950+01
KAPPA(R)	5.30425060+04	3.69406450+04	1.64288930+04	4.01451160+03	1.05444510+03	2.24266920+02	4.64215110+01	8.55944080+00
DENSITY	9.17167670-08	1.02279675-08	1.17102092-09	1.22287060-10	1.12519463-11			
KAPPA(P)	3.69624650+00	8.34262790-01	1.92890910-01	1.37056500-01	1.34890360-01			
KAPPA(R)	1.37302451+00	2.98973900-01	1.55309560-01	1.33665250-01	1.33127630-01			

THETA = 15.00000 13 DENSITIES

DENSITY	1.84137750-01	3.27728790-02	5.66499610-03	9.84352900-04	1.79544650-04	3.18401600-05	5.59643260-06	9.65037000-07
KAPPA(P)	5.74683700+04	3.84567660+04	2.16752240+04	7.44650200+03	1.76044330+03	3.53771770+02	6.19062130+01	1.01176454+01
KAPPA(R)	3.72586670+04	2.72527560+04	1.27721452+04	3.84940590+03	8.96002050+02	1.61306280+02	2.59893930+01	4.17765830+00
DENSITY	1.33604420-07	1.72355820-08	1.97795970-09	2.05429150-10	1.00403550-11			
KAPPA(P)	1.65444451+00	3.47219990-01	1.67072400-01	1.47156150-01	1.47670030-01			
KAPPA(R)	7.80519760-01	2.35906910-01	1.54919080-01	1.45307220-01	1.45610070-01			

THETA = 22.49999 13 DENSITIES

DENSITY	2.70594040-01	4.79403380-02	8.36476530-03	1.46512010-03	2.70507150-04	5.18014740-05	9.22964520-06	1.52691790-06
KAPPA(P)	4.28456750+04	3.01319370+04	1.44642582+04	4.65620300+03	0.91445230+02	1.48772450+02	2.65831000+01	4.67393140+00
KAPPA(R)	2.67786430+04	2.07246270+04	1.02965656+04	2.72201570+03	4.49047630+02	7.03853650+01	1.40993786+01	2.22586490+00
DENSITY	2.28063510-07	2.87965530-08	3.29193670-09	3.42161700-10	3.12172620-11			
KAPPA(P)	8.89143690-01	2.61035990-01	1.70169030-01	1.61139790-01	1.63503400-01			
KAPPA(R)	4.70958920-01	2.11609860-01	1.64469190-01	1.58622200-01	1.61130030-01			

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 33.99998 13 DENSITIES

DENSITY	4.10050560-04	7.31026250-02	1.31100913-02	2.39828600-03	4.55897300-04	8.78759850-05	1.56177890-05	2.57261750-06
KAPPA(P)	2.77216790+04	1.67130460+04	6.36526360+03	1.65989720+03	3.41521960+02	7.20767800+01	1.50512049+01	3.40295780+00
KAPPA(R)	1.42529757+04	1.03524443+04	4.59113420+03	1.14936730+03	2.16910740+02	3.91392950+01	6.73102190+00	1.37056345+00
DENSITY	3.84247420-07	6.66686910-08	5.53840120-09	5.64105420-10	5.16392060-11			
KAPPA(P)	8.81976480-04	2.38604960-01	1.81184020-01	1.79660730-01	1.83455160-01			
KAPPA(R)	3.70025+10-04	1.99129980-01	1.73812520-01	1.76569400-01	1.80918070-01			

THETA = 50.00000 13 DENSITIES

DENSITY	8.29716210-04	1.16219574-01	2.12494683-02	3.97237950-03	7.59021860-04	1.46229690-04	2.58280370-05	4.18556060-06
KAPPA(P)	1.47167663+04	7.03494360+03	2.97156860+03	9.35561530+02	1.88883220+02	4.22161550+01	9.05481930+00	2.08482070+00
KAPPA(R)	8.67774710+03	4.37513430+03	2.11456410+03	5.36281060+02	1.06603775+02	2.06606300+01	3.80483630+00	7.84736170-01
DENSITY	6.16413760-07	7.71319200-08	8.81659650-09	9.29466960-10	8.72180480-11			
KAPPA(P)	3.35701470-01	2.45447050-01	2.00167850-01	1.93841000-01	1.93589750-01			
KAPPA(R)	2.88173650-01	2.05157560-01	1.93693740-01	1.90889220-01	1.90911940-01			

THETA = 69.99998 13 DENSITIES

DENSITY	9.54503770-01	1.76212610-01	3.25215930-02	6.10164430-03	1.14758335-03	2.17442520-04	3.82368860-05	6.26833420-06
KAPPA(P)	9.14690770+03	4.75833920+03	1.86425160+03	5.0330077e+02	1.22036109+02	2.93273640+01	6.82641730+00	1.50862162+00
KAPPA(R)	4.54835450+03	3.04432310+03	1.33265290+03	3.98316490+02	5.3756896e+01	1.00732754+01	2.05910450+00	5.50227580-01
DENSITY	9.49661740-07	1.22830550-07	1.44221606-08	1.53100733-09	1.43998270-10			
KAPPA(P)	4.09441760-01	2.22065490-01	1.97245130-01	1.94417570-01	1.94220730-01			
KAPPA(R)	2.64116360-01	2.04815440-01	1.93739350-01	1.91939320-01	1.91569880-01			

THETA = 99.99998 13 DENSITIES

DENSITY	1.49721085+00	2.70332340-01	5.03505360-02	9.30932220-03	1.76172825-03	3.41006170-04	6.18721780-05	1.04732105-05
KAPPA(P)	6.90235590+03	3.59772480+03	1.22343640+03	3.03648960+02	7.27699400+01	1.64420810+01	3.28793590+00	7.25407870-01
KAPPA(R)	3.72541270+03	2.26870930+03	8.40266590+02	1.66541230+02	3.02507500+01	5.69129590+00	1.17403589+00	3.79938110-01
DENSITY	1.50969072-05	2.04929290-07	2.45392980-08	2.58828600-09	2.39666380-10			
KAPPA(P)	2.74341060-01	2.04724310-01	1.95877560-01	1.94207400-01	1.99274300-01			
KAPPA(R)	2.33647070-01	2.02394020-01	1.93835970-01	1.93681570-01	1.96427870-01			

THETA = 149.99995 13 DENSITIES

DENSITY	2.48903130+00	4.52381670-01	8.20145090-02	1.57605700-02	3.09438530-03	6.15293610-04	1.12751644-04	1.90438010-05
KAPPA(P)	5.23207840+03	2.30057770+03	6.41022110+02	1.36096870+02	2.85226350+01	5.85675670+00	1.25738313+00	3.95845860-01
KAPPA(R)	2.46864360+03	1.36242150+03	4.19426780+02	7.89891060+01	1.66925107+01	2.86747310+00	7.21255020-01	3.22432970-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 199.99995 CONTINUED

DENSITY	2.8[illegible]07[illegible]+00	3.49210120-07	4.29499690-08	4.55213270-09	4.28307430-10
KAPPA(P)	2.3d3[illegible]+01	2.09082160-01	2.05225680-01	2.04891230-01	2.04859270-01
KAPPA(R)	2.2[illegible]+01	2.04232750-01	2.02802540-01	2.01937500-01	2.01934270-01

THETA = 224.99990 13 DENSITIES

DENSITY	4.13[illegible]+00	7.66180400-01	1.44782590-01	2.83168850-02	5.59138090-03	1.10116121-03	1.99222360-04	3.35468330-05
KAPPA(P)	2.7[illegible]+03	6.88921520+02	2.06081160+02	9.65279850+01	1.14206139+01	3.14944730+00	9.03193910-01	3.39304280-01
KAPPA(R)	1.03[illegible]+03	4.76940110+02	1.37555700+02	3.11778200+01	6.74596800+00	1.57580962+00	4.85896080-01	2.59158460-01

DENSITY	5.14[illegible]+06	6.68013910-07	7.66545910-08	8.34744950-09	7.84511570-10
KAPPA(P)	2.2[illegible]+01	2.07528620-01	2.05169050-01	2.05108740-01	2.05371860-01
KAPPA(R)	2.12[illegible]+01	2.04292800-01	2.02583120-01	2.02317100-01	2.02539770-01

THETA = 340.00012 13 DENSITIES

DENSITY	7.15[illegible]+00	1.35443145+00	2.61357520-01	5.09003240-02	1.00212243-02	1.99167150-03	3.65417890-04	6.20467790-05
KAPPA(P)	1.22111[illegible]+03	3.55387930+02	1.02320286+02	2.74677050+01	6.62967290+00	1.56762979+00	4.56342020-01	2.48230080-01
KAPPA(R)	4.92553[illegible]+02	1.90011570+02	5.49035480+01	1.26927247+01	2.61316520+00	7.00817690-01	3.14234730-01	2.32785930-01

DENSITY	9.53[illegible]+00	1.23790529-06	1.45593110-07	1.54680390-08	1.45540766-09
KAPPA(P)	2.1[illegible]+01	2.06480560-01	2.05720920-01	2.05617220-01	2.05663070-01
KAPPA(R)	2.10511[illegible]+01	2.04015360-01	2.02928010-01	2.02787420-01	2.02823730-01

THETA = 499.99993 13 DENSITIES

DENSITY	1.2[illegible]+01	2.33022160+00	4.52399880-01	8.90693490-02	1.77260140-02	3.53748600-03	6.49447230-04	1.10391590-04
KAPPA(P)	6.04094700+02	2.08378880+02	5.45903970+01	1.21910852+01	2.72307290+00	7.37367400-01	3.11508700-01	2.25351020-01
KAPPA(R)	2.57[illegible]+02	1.18308635+02	2.95500070+01	5.79485400+00	1.32915538+00	4.09817060-01	2.62555010-01	2.21338290-01

DENSITY	1.69[illegible]+05	2.20544790-06	2.59375250-07	2.75558790-08	2.59346790-09
KAPPA(P)	2.0[illegible]+01	2.06323490-01	2.06071720-01	2.06051320-01	2.06049460-01
KAPPA(R)	2.0[illegible]+01	2.03301530-01	2.02966770-01	2.02930850-01	2.02926580-01

THETA = 699.99976 13 DENSITIES

DENSITY	1.94[illegible]+01	3.78134580+00	7.41135800-01	1.46818810-01	2.92768840-02	5.84953590-03	1.07468682-03	1.82822570-04
KAPPA(P)	3.37[illegible]+02	9.85435880+01	2.26853870+01	5.10286410+00	1.23057210+00	4.10064140-01	2.46529090-01	2.13083320-01
KAPPA(R)	1.14[illegible]+02	5.27262790+01	1.45981415+01	3.27722810+00	8.61261240-01	3.61867550-01	2.39677740-01	2.10289930-01

DENSITY	2.80907[illegible]+05	3.65169190-06	4.29604890-07	4.56455380-08	4.29604960-09
KAPPA(P)	2.0[illegible]+01	2.05990700-01	2.05825810-01	2.05812440-01	2.05811000-01
KAPPA(R)	2.04152[illegible]+01	2.03103620-01	2.02976510-01	2.02962300-01	2.02960680-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 999.99967 13 DENSITIES

DENSITY	3.25683470+01	6.34550130+00	1.25909623+00	2.50091600-01	4.99241710-02	9.97858480-03	1.83396296-03	3.11757080-04
KAPPA(P)	1.81205740+02	3.79543900+01	8.64674530+00	2.00372290+00	5.87362320-01	2.08477840-01	2.22237960-01	2.08539280-01
KAPPA(R)	3.60157080+01	1.69903410+01	5.40603000+00	1.40241366+00	4.70211350-01	2.65910890-01	2.15806310-01	2.04850670-01
DENSITY	4.79523450-05	8.23507480-06	7.33542760-07	7.79399610-08	7.33542990-09			
KAPPA(P)	2.06554440-01	2.06060160-01	2.06021440-01	2.06016700-01	2.06016290-01			
KAPPA(R)	2.03095080-01	2.02870190-01	2.02838740-01	2.02835080-01	2.02834680-01			

THETA = 1499.99930 13 DENSITIES

DENSITY	3.90681920+01	1.16551946+01	2.90671640+00	8.58908880-01	9.16695510-02	1.83289040-02	3.36905160-03	5.72731240-04
KAPPA(P)	3.94981760+01	1.40312217+01	3.36435740+00	8.54692960-01	3.34856570-01	2.31839950-01	2.11619700-01	2.07059930-01
KAPPA(R)	9.70547530+00	4.31681550+00	1.54786054+00	5.21303850-01	2.69275300-01	2.16380900-01	2.05264680-01	2.02908930-01
DENSITY	8.81235090-05	1.14545914-05	1.34759370-06	1.43181910-07	1.34759390-08			
KAPPA(P)	2.06234670-01	2.06126540-01	2.06112940-01	2.06111290-01	2.06111080-01			
KAPPA(R)	2.02445010-01	2.02383480-01	2.02375980-01	2.02374970-01	2.02374970-01			

THETA = 2249.99870 13 DENSITIES

DENSITY	1.07733662+02	2.12884340+01	4.22371040+00	8.42826550-01	1.68396660-01	3.36718880-02	6.18932650-03	1.05217370-03
KAPPA(P)	2.41625680+01	5.95011760+00	1.39931612+00	4.39218480-01	2.51193170-01	2.14533150-01	2.07214290-01	2.05033440-01
KAPPA(R)	2.36989360+00	9.45741600-01	4.14630630-01	2.60536080-01	2.16663240-01	2.04571440-01	2.01732040-01	2.01158720-01
DENSITY	1.61372590-04	2.10438760-05	2.47569370-06	2.69042560-07	2.47569410-08			
KAPPA(P)	2.05796000-01	2.05556770-01	2.05551840-01	2.05551220-01	2.05551220-01			
KAPPA(R)	2.01405870-01	2.01062630-01	2.01060880-01	2.01060680-01	2.01060680-01			

56 DIANE/SCAT REF-DA TEMP(1.5-2250.)EV. SADY INPUT TAPES(1819,1818) 11-8-67 MATERL = 1104 NK = 000

GREY ABSORPTION COEFFICIENTS 19 TEMPERATURES

THETA = 1.50000 10 DENSITIES

DENSITY	2.5557[illegible]-01	2.8[illegible]-02	2.763[illegible]-03	2.881[illegible]-04	3.28775680-05	4.52479220-06	6.89179480-07	1.00112092-07
KAPPA(P)	9.3[illegible]+04	7.45[illegible]+04	5.493[illegible]+04	3.3029[illegible]+04	1.05145251+04	2.53081060+03	5.26541390+02	8.99006310+01
KAPPA(R)	7.53117210+03	6.[illegible]+03	5.662[illegible]+03	3.9608[illegible]+03	2.03626990+03	7.12473690+02	1.47609350+02	2.91956080+01
DENSITY	1.5[illegible]-08	1.8879[illegible]-09						
KAPPA(P)	1.[illegible]+01	2.46[illegible]+00						
KAPPA(R)	4.70717990+00	9.7[illegible]-01						

THETA = 2.25000 10 DENSITIES

DENSITY	1.10200[illegible]-01	1.29823312-02	1.47059528-03	2.01019030-04	3.38262140-05	6.03846940-06	9.93390150-07	1.42704470-07
KAPPA(P)	1.7[illegible]+05	1.22809539+05	7.49719970+04	2.6[illegible]+04	6.88877050+03	1.57643300+03	3.58050170+02	8.03122330+01
KAPPA(R)	6.61[illegible]+04	4.77598190+04	2.69509960+04	1.1[illegible]+04	3.28069960+03	7.98182260+02	1.66121420+02	3.26072930+01
DENSITY	2.91213[illegible]-08	2.33699500-09						
KAPPA(P)	1.51099[illegible]+01	2.23126750+00						
KAPPA(R)	5.[illegible]+00	9.6[illegible]-01						

THETA = 3.00000 10 DENSITIES

DENSITY	7.73629[illegible]-02	1.03481147-02	1.64050696-03	2.6[illegible]-04	4.39297010-05	7.51507190-06	1.24747391-06	1.90767590-07
KAPPA(P)	1.67[illegible]+05	9.[illegible]+04	5.15445650+04	2.35266700+04	7.34416140+03	1.72933900+03	3.36209320+02	6.53996530+01
KAPPA(R)	1.31607[illegible]+05	8.0669960+04	3.[illegible]+04	1.35[illegible]+04	3.55816040+03	7.69920270+02	1.[illegible]+02	2.76647400+01
DENSITY	2.64338[illegible]-08	3.15313110-09						
KAPPA(P)	1.17257[illegible]+01	1.90[illegible]+00						
KAPPA(R)	4.82691710+00	8.[illegible]-01						

THETA = 5.00000 10 DENSITIES

DENSITY	8.00[illegible]-02	1.31[illegible]-02	2.06774010-03	3.36276130-04	5.76320370-05	1.01066195-05	1.67367306-06	2.63727300-07
KAPPA(P)	1.3[illegible]+05	7.78[illegible]+04	4.58110180+04	2.17696670+04	6.67144030+03	1.38780410+03	2.63643530+02	4.57798000+01
KAPPA(R)	1.0[illegible]+05	6.79569670+04	3.68715390+04	1.[illegible]+04	5.10220360+03	6.11864580+02	1.16812251+02	2.02843970+01
DENSITY	3.79016970-08	4.[illegible]-09						
KAPPA(P)	7.83[illegible]+00	1.27267181+00						
KAPPA(R)	3.3[illegible]+00	6.68547070-01						

THETA = 7.00000 10 DENSITIES

DENSITY	9.51103[illegible]-02	1.59[illegible]-02	2.61166330-03	4.3[illegible]-04	7.60109630-05	1.37415023-05	2.32979580-06	3.76548110-07
KAPPA(P)	1.12762[illegible]+05	7.0503[illegible]+04	4.3299656[illegible]+04	1.7[illegible]+04	6.2434[illegible]+03	8.84246590+02	1.70099740+02	2.97076820+01
KAPPA(R)	8.34568[illegible]+04	5.[illegible]+04	3.11973970+04	9.71939740+03	2.09604170+03	4.37129720+02	7.76105190+01	1.34756005+01

GHET ABSORPTION COEFFICIENTS CONTINUED

THETA = 7.00000 CONTINUED

DENSITY	5.51146770-08	6.83458710-09
KAPPA(P)	5.98226530+00	9.91113620-01
KAPPA(R)	2.30950720+00	5.07406610-01

THETA = 10.00000 10 DENSITIES

DENSITY	1.22749017-01	2.09450916-02	3.53963360-03	6.11921510-04	1.08858112-04	2.01579000-05	3.47025650-06	5.56532600-07
KAPPA(P)	9.20619780+04	5.91954460+04	3.45699460+04	1.16686256+04	2.64110310+03	5.42904260+02	1.02931627+02	1.94300120+01
KAPPA(R)	5.50877000+04	4.51610340+04	2.34593180+04	6.05175350+03	1.32267560+03	2.74032010+02	5.16829520+01	8.97533230+00

DENSITY	8.08235620-08	1.01665257-08
KAPPA(P)	3.40373570+00	6.50698620-01
KAPPA(R)	1.49351960+00	3.93192720-01

THETA = 15.00000 10 DENSITIES

DENSITY	1.71073000-01	3.02693900-02	5.23686100-03	9.32869650-04	1.69602170-04	3.14038520-05	5.49133050-06	9.00319200-07
KAPPA(P)	8.55002930+04	4.09226900+04	2.05521100+04	6.28897900+03	1.66844000+03	2.99738760+02	5.23032220+01	8.59892320+00
KAPPA(R)	3.42759740+04	2.81527390+04	1.46590532+04	4.14191270+03	8.76403560+02	1.57700200+02	2.52156770+01	4.10621620+00

DENSITY	1.36951470-07	1.74570900-08
KAPPA(P)	1.51822683+00	3.40052510-01
KAPPA(R)	8.63642560-01	3.12065560-01

THETA = 22.49599 10 DENSITIES

DENSITY	4.50655040-01	4.55490640-02	8.07933270-03	1.45784354-03	2.73748440-04	5.25295800-05	9.36622980-06	1.54765340-06
KAPPA(P)	4.23563.10+04	2.65920210+04	1.10281784+04	2.95199080+03	5.82275640+02	1.15165701+02	2.22239150+01	4.23629060+00
KAPPA(R)	2.31583530+04	1.79429850+04	8.68410010+03	2.30443290+03	3.94904270+02	6.73275100+01	1.30794320+01	2.32737160+00

DENSITY	2.28800620-07	2.88192250-08
KAPPA(P)	9.56704260-01	3.31352010-01
KAPPA(R)	5.75240250-01	2.73759030-01

THETA = 33.99998 6 DENSITIES

DENSITY	4.00630400-01	7.19622200-02	1.30041597-02	2.44322350-03	4.63335120-04	8.00016570-05
KAPPA(P)	2.59505290+04	1.41003793+04	5.16567940+03	1.21991190+03	2.8433295D+02	6.76069840+01
KAPPA(R)	1.43112456+04	9.14221440+03	3.66493880+03	8.37968900+02	1.60718910+02	3.23828020+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 50.00000 6 DENSITIES

DENSITY	3.25005770-01	1.15045909-01	2.10313950-02	3.90716980-03	7.35396350-04	1.39403220-04		
KAPPA(P)	1.60331655+04	7.85550570+03	2.93244240+03	7.47049670+02	1.96726400+02	4.93470990+01		
KAPPA(R)	9.87895439+03	5.31613570+03	1.84233340+03	3.71285360+02	8.50663000+01	1.78388370+01		

THETA = 69.99998 8 DENSITIES

DENSITY	9.41921250-01	1.71647040-01	9.42372650-01	1.71647040-01	3.14898510-02	5.86485220-03	1.10237205-03	2.10031180-04
KAPPA(P)	1.16334252+04	5.54508890+03	1.12424378+04	5.54508890+03	2.03233560+03	5.07152610+02	1.24422615+02	2.86831500+01
KAPPA(R)	7.20091520+03	3.82681410+03	7.20581730+03	3.82681410+03	1.28074720+03	2.51228020+02	6.56582810+01	8.25967000+00

THETA = 99.99998 6 DENSITIES

DENSITY	1.45311086+03	2.66020480-01	4.85045980-02	9.07775850-03	1.73467540-03	3.38225750-04	
KAPPA(P)	8.29144660+03	3.72990440+03	1.13980100+03	2.92209480+02	6.60140070+01	1.44307591+01	
KAPPA(R)	5.10505200+03	2.75961920+03	8.35176390+02	1.66217960+02	2.67248800+01	4.81952790+00	

THETA = 149.99995 6 DENSITIES

DENSITY	2.41555000+00	4.39018330-01	8.17255180-02	1.56988160-02	3.09241180-03	6.15056780-04	
KAPPA(P)	5.30953170+03	2.16105740+03	5.65213170+02	1.19335269+02	2.33511670+01	4.72830120+00	
KAPPA(R)	2.40341020+03	1.32765420+03	4.11992420+02	9.07568620+01	1.39698436+01	2.75671840+00	

THETA = 224.99990 6 DENSITIES

DENSITY	4.08126670+00	7.52623190-01	1.44410540-01	2.83964820-02	5.60845510-03	1.10514913-03	
KAPPA(P)	2.55600040+03	8.29176460+02	1.55267910+02	3.83868500+01	9.37077660+00	2.67084340+00	
KAPPA(R)	8.50786300+02	3.88044500+02	1.09540566+02	2.30759730+01	4.94337340+00	1.21543835+00	

THETA = 340.00012 6 DENSITIES

DENSITY	7.03257050+00	1.34833729+00	2.62309280-01	5.12064400-02	1.00915585-02	2.00396810-03	
KAPPA(P)	1.05741550+03	2.97223960+02	8.30023530+01	2.32028700+01	5.71743330+00	1.43152511+00	
KAPPA(R)	3.92061990+02	1.39339720+02	3.71714870+01	7.94790190+00	1.70293901+00	5.49663610-01	

THETA = 499.99993 6 DENSITIES

DENSITY	1.20989084+01	2.32996230+00	4.54980740-01	8.98303860-02	1.78702670-02	3.56679100-03	
KAPPA(P)	5.24704650+02	1.74823860+02	4.39692250+01	9.80541700+00	2.15437640+00	5.96505150-01	
KAPPA(R)	2.06673650+02	9.07869940+01	2.13972620+01	3.94982380+00	9.70266830-01	4.00709360-01	

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA =	699.9975		DENSITIES	
DENSITY	1.9407875D+01	3.7924035D+00	7.4695009D-01	1.4829679D-01
KAPPA(P)	2.9026537D+02	5.3211283D+01	1.7566171D+01	3.9646793D+00
KAPPA(R)	7.7774562D+01	3.1802634D+01	7.6287498D+00	1.7705363D+00
THETA =	999.9967		DENSITIES	
DENSITY	3.2609706D+01	6.4211355D+00	1.2688732D+00	2.5278600D-01
KAPPA(P)	4.3533971D+02	5.4144857D+01	7.2490758D+00	1.5536396D+00
KAPPA(R)	1.8122101D+02	5.8885511D+00	1.5070915D+00	8.7796207D-01
THETA =	1249.9970		DENSITIES	
DENSITY	1.0851501D+02	2.1436069D+01	4.2426072D+00	8.5193930D-01
KAPPA(P)	1.5469856D+02	5.5534536D+00	8.4009291D-01	3.0199176D-01
KAPPA(R)	9.1561280D-01	3.8143127D-01	2.4960534D-01	2.0718298D-01

30 DIANE/SCAT SEA WATER-1A TEMP(1.-1.E6 EV) 1 FREQ. CI/JM 10-9-67 MATERL = 1138 NX = 900

WHEY ABSORPTION COEFFICIENTS 24 TEMPERATURES

THETA = 1.50000 13 DENSITIES

DENSITY	2.87789E0-01	3.95744730-02	3.71357240-03	2.58594010-04	1.93929700-05	2.25739290-06	3.47924630-07	5.69176730-08
KAPPA(P)	5.20466070+03	3.70771010+05	3.17603950+05	1.65912820+05	4.11821400+04	7.52110920+03	1.26036520+03	1.73073090+02
KAPPA(R)	6.69335450+03	4.55394450+03	3.53294650+03	2.60483480+03	1.43226300+03	4.09942520+02	6.87674130+01	9.52971650+00
DENSITY	8.69219660-09	1.12477816-09	1.28793600-10	1.21264766-11	1.02156028-12			
KAPPA(P)	2.40222e10+01	3.07999190+00	4.63894750-01	1.40718050-01	9.47818840-02			
KAPPA(R)	1.31815311+00	2.68636260-01	1.10227411-01	9.07933700-02	8.86698810-02			

THETA = 2.25000 13 DENSITIES

DENSITY	9.36006760-02	9.13465400-03	8.53926040-04	1.05010844-04	1.75611770-05	3.34183680-06	5.95389540-07	9.33108190-08
KAPPA(P)	1.04566067+06	7.07476650+05	4.32012580+05	1.13241726+05	1.58438697+04	2.82598270+03	4.31394930+02	8.80125110+01
KAPPA(R)	7.16e25e340+04	4.95020810+04	2.93080170+04	9.64824780+03	1.82159720+03	3.06799040+02	5.92850950+01	1.04355300+01
DENSITY	1.27305e60-06	1.57411932-09	1.82944190-10	1.89611320-11	1.60709968-12			
KAPPA(P)	1.73500950+01	2.44646270+00	3.71573160-01	1.25397200-01	1.06123687-01			
KAPPA(R)	3.87638490+00	6.44494100-01	1.70400620-01	1.03750428-01	1.01824860-01			

THETA = 3.40000 13 DENSITIES

DENSITY	9.72600010-02	6.13795300-03	9.04739040-04	1.58821920-04	2.76977340-05	4.96756900-06	8.61560990-07	1.41560300-07
KAPPA(P)	6.68e2e250+05	4.43742580+05	2.03483460+05	5.47312420+04	1.10413761+04	2.14931380+03	3.78959010+02	6.31407870+01
KAPPA(R)	5.1e201450+05	1.6534430+05	6.37586340+04	1.53353197+04	3.34644850+03	6.51219700+02	1.07236747+02	1.79612550+01
DENSITY	2.01651e30-06	2.38752160-09	2.71986130-10	2.79031930-11	2.38815510-12			
KAPPA(P)	1.10328367+01	1.64507769+00	3.30104840-01	1.42066500-01	1.29829790-01			
KAPPA(R)	3.61339940+00	5.92631010-01	1.95347350-01	1.25255450-01	1.25899790-01			

THETA = 5.00000 13 DENSITIES

DENSITY	9.87811460-02	7.91814780-03	1.29993896-03	2.23133140-04	4.09131120-05	7.53659630-06	1.26712509-06	2.04233900-07
KAPPA(P)	5.75042940+05	3.32940790+05	1.73759930+05	4.74617740+04	8.90243370+03	1.72383870+03	3.05739350+02	5.00257050+01
KAPPA(R)	4.54339450+05	2.38403510+05	7.26835190+04	1.51791477+04	2.78177910+03	5.48750940+02	1.0121774+02	1.63176320+01
DENSITY	2.93797e60-06	3.52135540-09	3.97009990-10	3.91829260-11	3.47589190-12			
KAPPA(P)	9.34770e20+00	1.57245327+00	3.16713090-01	1.70458400-01	1.57092570-01			
KAPPA(R)	2.99000+60+00	5.67416940-01	2.03149520-01	1.54907820-01	1.53218690-01			

THETA = 7.00000 13 DENSITIES

DENSITY	9.21838460-02	1.05343177-02	1.79555327-03	3.16854460-04	5.68695790-05	1.05003717-05	1.77129899-06	2.81475650-07
KAPPA(P)	4.20348450+05	2.73292100+05	1.45670120+05	3.97923490+04	7.66269450+03	1.38000300+03	2.44381600+02	4.23279230+01
KAPPA(R)	3.03443e70+05	1.82026940+05	5.79234690+04	1.32174468+04	2.28833080+03	4.20135380+02	8.77271970+01	1.56032927+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 7.00000 CONTINUED

DENSITY	4.0[illegible]	4.83933290-09	5.40725160-10	5.41263520-11	5.02116070-12
KAPPA(P)	7.8[illegible]	1.28757322+00	3.13701390-01	1.92015150-01	1.78560820-01
KAPPA(R)	2.6[illegible]	5.04681560-01	2.22577930-01	1.81401950-01	1.74829640-01

THETA = 10.00000 13 DENSITIES

DENSITY	3.45[illegible]	1.45114254-02	2.[illegible]8760-03	4.53881230-04	9.09949310-05	1.48287898-05	2.51212890-06	3.99642850-07
KAPPA(P)	2.9[illegible]	2.04979410+05	1.1[illegible]7236+05	2.9559779[illegible]+04	5.67835000+03	1.04397830+03	1.80681530+02	3.14202620+01
KAPPA(R)	1.5[illegible]	1.11335109+05	4.1[illegible]29780+04	9.55203850+03	2.00343190+03	3.90491800+02	6.66772600+01	1.13251505+01
DENSITY	5.7[illegible]	7.30673070-09	8.55735480-10	9.04128950-11	8.54179520-12			
KAPPA(P)	[illegible]	8.75263850-01	2.5[illegible]84270-01	1.8583222[illegible]-01	1.78261800-01			
KAPPA(R)	4.7[illegible]	3.91806840-01	2.06729900-01	1.7454[illegible]040-01	1.75128380-01			

THETA = 15.00000 13 DENSITIES

DENSITY	1.23[illegible]	2.15954950-02	3.32353760-03	6.81201110-04	1.22593810-04	2.26797070-05	3.99063600-06	6.69509830-07
KAPPA(P)	1.7956[illegible]	1.30044241+05	6.29716530+04	1.54238391+04	2.87778440+03	4.81127820+02	7.33614050+01	1.14072939+01
KAPPA(R)	5.7920[illegible]	5.11737980+04	2.7500246[illegible]+04	8.36947670+03	1.55245990+03	2.33772630+02	2.99299900+01	4.11267630+00
DENSITY	1.06[illegible]	1.33310505-08	1.56567564-09	1.84239790-10	1.56343630-11			
KAPPA(P)	1.8[illegible]	3.24952900-01	2.01545320-01	1.80553160-01	1.78394120-01			
KAPPA(R)	7.29[illegible]	2.61258220-01	1.92674890-01	1.7[illegible]94270-01	1.75301480-01			

THETA = 22.49999 13 DENSITIES

DENSITY	1.87697[illegible]	3.30969880-02	5.92587460-03	1.07384027-03	2.01947880-04	3.94798560-05	7.20993950-06	1.22267447-06
KAPPA(P)	9.5[illegible]	6.53053920+04	2.6023401[illegible]+04	5.28442920+03	9.37711660+02	1.35492320+02	2.21975290+01	3.65778950+00
KAPPA(R)	1.8[illegible]	1.6794[illegible]+04	1.0[illegible]2818+04	3.44356310+03	5.71247720+02	7.14760150+01	9.93137530+00	1.65925563+00
DENSITY	1.87[illegible]	2.43942120-08	2.86745810-09	3.04414810-10	2.86221560-11			
KAPPA(P)	8.9[illegible]	2.43944630-01	1.8[illegible]87410-01	1.79420510-01	1.78860340-01			
KAPPA(R)	4.44[illegible]	2.29788260-01	1.8[illegible]6630-01	1.7[illegible]8820-01	1.75625210-01			

THETA = 30.99998 13 DENSITIES

DENSITY	2.99[illegible]	5.41832210-02	9.90339150-03	1.84557210-03	3.67335130-04	7.27374640-05	1.33283139-05	2.26227830-06
KAPPA(P)	4.1[illegible]	2.30714190+04	7.5731542[illegible]+03	1.32306190+03	2.24924090+02	4.01185560+01	6.85717120+00	1.27281183+00
KAPPA(R)	5.80[illegible]	4.50267490+03	2.39275550+03	7.45600530+02	1.54452090+02	2.61789530+01	4.25007650+00	8.59701620-01
DENSITY	3.47[illegible]	4.47860200-08	5.07017750-09	5.04665850-10	4.60883980-11			
KAPPA(P)	3.50[illegible]	2.08347480-01	1.93601400-01	1.99668650-01	2.06381470-01			
KAPPA(R)	3.01[illegible]	1.97808080-01	1.87296380-01	1.95390760-01	2.02532280-01			

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 50.00000 13 DENSITIES

DENSITY	4.70498410-01	8.95330910-02	1.69165810-02	3.29838100-03	6.50053440-04	1.28459350-04	2.30957960-05	3.73553310-06
KAPPA(P)	1.64206670+00	7.29183450+03	2.05910380+03	4.19523040+02	8.30293350+01	1.78927560+01	4.03467580+00	1.62832710+00
KAPPA(R)	2.43572610+03	1.63322440+03	8.28711430+02	2.35066620+02	4.51650690+01	8.12657050+00	1.80226479+00	5.97780670-01

DENSITY	3.47365010-07	6.74135390-08	7.65299580-09	8.07425920-10	7.59276670-11	
KAPPA(P)	3.20462590-01	2.76137040-01	2.30701410-01	2.24066590-01	2.23349610-01	
KAPPA(R)	2.75081960-01	2.23950560-01	2.19590460-01	2.19254310-01	2.19229970-01	

THETA = 89.99999 13 DENSITIES

DENSITY	7.44158690-01	1.42571560-01	2.75477330-02	5.32398600-03	1.01959075-03	1.92550140-04	3.35692550-05	5.45569790-06
KAPPA(P)	9.70177020+03	5.54944270+03	9.79734820+02	2.56974530+02	7.87912510+01	2.52895680+01	6.75908130+00	1.62254449+00
KAPPA(R)	1.95503610+03	1.05550740+03	4.34700790+02	1.06056074+02	1.94677250+01	4.27458060+00	1.15510319+00	4.26626780-01

DENSITY	8.23396260-07	1.06940959-07	1.25701630-08	1.33494597-09	1.25562190-10
KAPPA(P)	4.50475570-01	2.54114330-01	2.27066810-01	2.23903980-01	2.23670120-01
KAPPA(R)	2.59090470-01	2.26199620-01	2.21085440-01	2.20050330-01	2.19852620-01

THETA = 99.99999 13 DENSITIES

DENSITY	1.22462053+00	2.34470140-01	4.34941530-02	8.19752540-03	1.54203400-03	2.96904220-04	5.38604070-05	9.12611920-06
KAPPA(P)	7.83792760+03	3.20804060+03	1.05867390+03	2.87714570+02	7.68158490+01	1.76844890+01	3.52871920+00	7.96273270-01
KAPPA(R)	2.07250110+03	9.23341960+02	2.90250670+02	8.03426980+01	1.11163498+01	2.23187330+00	6.28653710-01	3.15695230-01

DENSITY	1.40256208-06	1.82225670-07	2.14341600-08	2.27733490-09	2.14335200-10
KAPPA(P)	3.09599470-01	2.35299810-01	2.25038900-01	2.23826970-01	2.23706110-01
KAPPA(R)	2.47689330-01	2.30440730-01	2.21939360-01	2.19896670-01	2.19639460-01

THETA = 149.99995 13 DENSITIES

DENSITY	2.10891300+00	3.91911190-01	7.24461310-02	1.37496350-02	2.69756180-03	5.36594440-04	9.84885780-05	1.67363180-05
KAPPA(P)	5.47974610+03	2.78933350+03	7.04213800+02	1.44219900+02	3.94636990+01	9.94250040+00	1.27827714+00	4.01268680-01
KAPPA(R)	2.28739260+03	8.84560910+02	2.24121410+02	6.22084770+01	6.28263190+00	1.29056432+00	4.96974730-01	3.10186690-01

DENSITY	2.57481040-06	3.34693740-07	3.93744020-08	4.18244490-09	3.93389870-10
KAPPA(P)	4.71195370-01	2.27223310-01	2.24110730-01	2.23881230-01	2.23905540-01
KAPPA(R)	2.48174770-01	2.23437490-01	2.20191930-01	2.19794180-01	2.19824690-01

THETA = 200.00000 13 DENSITIES

DENSITY	3.56133990+00	6.66490160-01	1.24869500-01	2.47996020-02	4.92788220-03	9.84214180-04	1.80890110-04	3.07358780-05
KAPPA(P)	3.50038970+03	1.88420130+03	2.19784930+02	4.35094430+01	8.62571610+00	1.87444984+00	5.87187480-01	8.75849180-01
KAPPA(R)	9.99445620+02	4.09460900+02	1.08963960+02	1.81813070+01	3.34079230+00	9.20147260-01	4.88788180-01	8.64567880-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 224.99990 CONTINUED

DENSITY	4.726000670-00	6.139643750-07	7.22033090-08	7.67091530-09	7.21946630-10				
KAPPA(P)	2.360960E0-01	2.25147940-01	2.24245090-01	2.24143680-01	2.24136960-01				
KAPPA(R)	2.276(2850-01	2.21023550-01	2.20166100-01	2.20062210-01	2.20051210-01				

THETA = 340.00012 13 DENSITIES

DENSITY	0.226096590+00	1.1863948?+00	2.8235?3350-01	4.5A707330-02	9.14303430-03	1.82622916-03	3.35432110-04	5.70026590-05	
KAPPA(P)	1.3u-60000+03	3.0002?3890+02	6.71065300+01	1.41867464+01	3.02966480+00	7.97416060-01	3.33034220-01	2.42973960-01	
KAPPA(R)	2.20784?00+02	7.95340310+01	2.25525240+01	5.50A09940+00	1.39014741+00	5.02175310-01	2.86207560-01	2.33800050-01	
DENSITY	2.7957102?0-00	1.13990005-06	1.34105380-07	1.42487043-08	1.34105418-09				
KAPPA(P)	2.270305?0-01	2.24512A00-01	2.24181560-01	2.2414234u-01	2.24138300-01				
KAPPA(R)	2.2?E35?F0-01	2.20+17A90-01	2.20090370-01	2.20050980-01	2.20046800-01				

THETA = 499.99993 13 DENSITIES

DENSITY	1.07?56?07+01	2.07479630+00	4.10766150-01	8.16479970-02	1.62811870-02	3.25355190-03	5.97927520-04	1.01642380-04	
KAPPA(P)	4.4?7?0650+02	1.19404968+02	2.54767600+01	5.50297030+00	1.33576?40+00	4.46178440-01	2.64681780-01	2.31318900-01	
KAPPA(R)	5.6?922940+01	2.06?55300+01	7.79761760+00	1.95705?60+00	6.40058430-01	3.32262160-01	2.46239160-01	2.24995920-01	
DENSITY	1.5?3710?0-00	2.03?33340-06	2.39155960-07	2.54103360-08	2.39156040-09				
KAPPA(P)	2.2?163?30-01	2.24118380-01	2.2407A460-01	2.24064340-01	2.24062780-01				
KAPPA(R)	2.2?5967?0-02	2.19?38870-01	2.19801590-01	2.19791260-01	2.19790160-01				

THETA = 699.99976 13 DENSITIES

DENSITY	1.72491770+01	3.42053900+00	6.79072960-01	1.35116490-01	2.[illegible]9601350-02	5.38897030-03	9.90445260-04	1.69370110-04	
KAPPA(P)	4.16?80?50+02	9.15?77070+01	1.?4114357+01	2.50292750+00	6.[illegible]8453730-01	3.13884880-01	2.39960250-01	2.26225950-01	
KAPPA(R)	2.333359?0+01	1.01752059+01	3.29405070+00	9.42951540-01	3.[illegible]0551350-01	2.60941770-01	2.26977360-01	2.19724010-01	
DENSITY	2.590?0470-00	3.3?734510-0?	3.96163050-07	4.20923480-08	3.[illegible]6163170-09				
KAPPA(P)	2.2?[illegible]7?0-01	2.23459300-01	2.23409470-01	2.23403460-01	2.[illegible]3402990-01				
KAPPA(R)	2.16?90?[illegible]0-01	2.19176920-01	2.18148990-01	2.18145720-01	2.18145280-01				

THETA = 999.99967 13 DENSITIES

DENSITY	2.9??75?50+01	5.82470930+00	1.15929811+00	2.30634290-01	4.60300890-02	9.20135070-03	1.69114917-03	2.87486690-04	
KAPPA(P)	5.5?62250+02	1.31?43442+01	3.00317770+00	7.90925?80-01	3.38486520-01	2.44286880-01	2.24969350-01	2.21381240-01	
KAPPA(R)	3.1?[illegible]5?0+00	2.06137150+00	7.16?47?0-01	3.4?024290-01	2.48266380-01	2.21610260-01	2.14965660-01	2.13630150-01	
DENSITY	4.?285550-00	3.7?971650-0?	6.76434670-07	7.19712300-08	6.76434790-09				
KAPPA(P)	2.207?4?30-01	2.20?66230-01	2.20653430-01	2.20651890-01	2.20651660-01				
KAPPA(R)	2.13392?30-01	2.13354970-01	2.13350060-01	2.13349420-01	2.13349420-01				

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 3499.99990 13 DENSITIES

DENSITY	5.3[illegible]	1.0[illegible]	2.12[illegible]	4.23646570-01	8.45601660-02	1.69038080-02	3.10683740-03	5.28166960-04
KAPPA(P)	2.5[illegible]	5.[illegible]	1.3[illegible]	4.51626260-01	2.62570670-01	2.24665640-01	2.16827750-01	2.15359960-01
KAPPA(R)	1.4[illegible]	5.69[illegible]	3.15880350-01	2.42538700-01	2.16975900-01	2.09240280-01	2.07159340-01	2.06731170-01

DENSITY	8.12[illegible]	1.05029234-05	1.24209284-06	1.32036160-07	1.24269303-08
KAPPA(P)	2.15[illegible]	2.15050050-01	2.15054670-01	2.15054020-01	2.15054020-01
KAPPA(R)	2.06[illegible]	2.06643130-01	2.06641670-01	2.06641470-01	2.06641470-01

THETA = 4249.99970 13 DENSITIES

DENSITY	9.82259[illegible]	1.96017130+01	3.90591080+00	7.7823677[illegible]	1.55344510-01	3.10542380-02	5.70762090-03	9.70267260-04
KAPPA(P)	1.15[illegible]	2.63055640+00	6.92610770-01	3.09762440-01	2.27061130-01	2.11528820-01	2.08345000-01	2.08147770-01
KAPPA(R)	6.3[illegible]	3.[illegible]	2.35057370-01	2.12680990-01	2.04228560-01	2.01441950-01	2.00733920-01	2.00823870-01

DENSITY	3.69271[illegible]	1.94051900-05	2.28297770-06	2.42566690-07	2.28297840-08
KAPPA(P)	2.08[illegible]	2.08027710-01	2.08025630-01	2.08025210-01	2.08025210-01
KAPPA(R)	2.00[illegible]	2.00795160-01	2.00794560-01	2.00794560-01	2.00794560-01

THETA = 4500.00030 13 DENSITIES

DENSITY	1.86[illegible]	3.61[illegible]	7.22549680+00	1.44554901+00	2.88560350-01	5.76952360-02	1.06022821-02	1.80233721-03
KAPPA(P)	5.19[illegible]	1.21[illegible]	3.[illegible]	2.38296660-01	2.08056620-01	2.02001940-01	2.01628570-01	2.01395430-01
KAPPA(R)	3.7[illegible]	2.[illegible]	2.10626890-01	2.00684350-01	1.97427270-01	1.96447310-01	1.96595680-01	1.96550670-01

DENSITY	2.772[illegible]	3.60465310-05	4.24075180-06	4.50580130-07	4.24075250-08
KAPPA(P)	2.01[illegible]	2.01348510-01	2.01347700-01	2.01347700-01	2.01347700-01
KAPPA(R)	1.96[illegible]	1.96541440-01	1.96541230-01	1.96541230-01	1.96541230-01

THETA = 4999.99670 13 DENSITIES

DENSITY	5.24[illegible]	6.44379360+01	1.28847828+01	2.5747691[illegible]	5.14601480-01	1.02872902-01	1.89075870-02	3.21919930-03
KAPPA(P)	2.45[illegible]	6.35743740-01	2.76254970-01	2.11107040-01	1.98812320-01	1.96402530-01	1.95909080-01	1.95816550-01
KAPPA(P)	2.80[illegible]	2.17115680-01	2.00197080-01	1.95874180-01	1.94082680-01	1.93732100-01	1.93651910-01	1.93636920-01

DENSITY	4.94[illegible]	6.42036030-05	7.56279330-06	8.03547130-07	7.56279450-08
KAPPA(P)	1.95[illegible]	1.95797950-01	1.95797560-01	1.95797560-01	1.88594890-01
KAPPA(R)	1.93[illegible]	1.93633320-01	1.93633320-01	1.93633320-01	1.91066060-01

THETA = 6999.99690 13 DENSITIES

DENSITY	5.37745[illegible]	1.06730499+02	2.13411870+01	4.26506740+00	8.52329840-01	1.70399430-01	3.13209510-02	5.32432680-03
KAPPA(P)	9.44087[illegible]	3.16119170-01	2.07547620-01	1.91167240-01	1.89061110-01	1.88688260-01	1.88612050-01	1.88597720-01
KAPPA(R)	2.41706470-01	2.05131770-01	1.94883760-01	1.91923770-01	1.91269660-01	1.91112120-01	1.91074860-01	1.91067680-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 6999.99000 CONTINUED

DENSITY	5.19123270-04	1.06485907-04	1.25278048-05	1.33107993-06	1.25278070-07
KAPPA(P)	1.88595270-01	1.88594890-01	1.88594890-01	1.88594890-01	1.88594890-01
KAPPA(R)	1.91066260-01	1.91065060-01	1.91066060-01	1.91066060-01	1.91066060-01

THETA = 9999.99020 13 DENSITIES

DENSITY	9.17984960+02	1.82214740+02	3.64384290+01	7.2924183J+00	1.4553242J+00	2.90951700-01	5.34787450-02	9.09112160-03	
KAPPA(P)	5.35719960-01	2.42369700-01	1.96079120-01	1.89732130-01	1.88821900-01	1.88640150-01	1.88603190-01	1.88596200-01	
KAPPA(R)	2.19407260-01	1.98864020-01	1.93026840-01	1.91479410-01	1.91173290-01	1.91088800-01	1.91070270-01	1.91066030-01	

DENSITY	1.39862737-03	1.81821530-04	2.13907940-05	2.27277280-06	2.13907980-07
KAPPA(P)	1.88595960-01	1.88594890-01	1.88594890-01	1.88594890-01	1.88594890-01
KAPPA(R)	1.91066260-01	1.91066060-01	1.91066060-01	1.91066060-01	1.91066060-01

58 DIANC/SCAT S-1A TEMP(50.-10000.)EV. STDY INPUT TAPE 3327 11-8-67 MATERL = 101A NK = 615

GREY ABSORPTION COEFFICIENTS 15 TEMPERATURES

THETA = 50.00000 13 DENSITIES

DENSITY	9.08495450-01	1.62767900-01	2.89210380-02	5.13478150-03	9.16709450-04	1.66886950-04	2.81351740-05	4.43377140-06
KAPPA(P)	4.86754900+04	3.11862130+04	1.91920445+04	3.65752480+03	5.60796430+02	9.98783490+01	1.96103390+01	3.75749300+00
KAPPA(R)	1.70577300+04	7.23472920+03	2.59778630+03	9.16736850+02	2.13172340+02	4.28152760+01	7.58985860+00	1.42049527+00
DENSITY	6.44565440-07	8.17851630-08	9.57950440-09	1.01726332-09	9.57366540-11			
KAPPA(P)	7.85407260-01	2.00049050-01	1.87183280-01	1.78087550-01	1.77156810-01			
KAPPA(R)	3.90988020-01	2.08840390-01	1.79032480-01	1.74665940-01	1.74013390-01			

THETA = 69.99998 13 DENSITIES

DENSITY	1.20211485+00	2.23607050-01	3.05451580-02	7.03163550-03	1.26216471-03	2.32668020-04	4.06143140-05	6.77351840-06
KAPPA(P)	5.78089030+04	2.41357630+04	9.27599230+03	2.17197680+03	5.41143080+02	5.93495730+01	1.06962367+01	1.88354359+00
KAPPA(R)	1.25243058+04	7.40673440+03	2.90800030+03	8.19117030+02	1.58297460+02	2.46458420+01	3.92060110+00	7.36195130-01
DENSITY	1.03774056-06	1.34212630-07	1.58589220-08	1.69498368-09	1.58586660-10			
KAPPA(P)	4.36202160-01	2.08953820-01	1.80725670-01	1.77847230-01	1.77102250-01			
KAPPA(R)	2.70435440-01	1.91759740-01	1.78064220-01	1.74518760-01	1.73918060-01			

THETA = 99.99998 13 DENSITIES

DENSITY	1.81084012+00	3.13959550-01	5.66370850-02	1.02450564-02	1.90963532-03	3.71633660-04	6.78182680-05	1.15118923-05
KAPPA(P)	2.36042700+04	1.36994226+04	4.62491330+03	8.73862460+02	1.32165500+02	2.33503970+01	3.89798590+00	7.62189320-01
KAPPA(R)	5.35586750+03	4.12983190+03	2.04882550+03	4.73783010+02	6.21765500+01	8.94487740+00	1.48729418+00	4.19163260-01
DENSITY	1.77058098-06	2.30164960-07	2.70781200-08	2.87702260-09	2.70748700-10			
KAPPA(P)	2.64521960-01	1.88240100-01	1.78472810-01	1.77207480-01	1.77101550-01			
KAPPA(R)	2.32104400-01	1.86290310-01	1.75659640-01	1.74039330-01	1.73889540-01			

THETA = 149.99995 13 DENSITIES

DENSITY	2.83097450+00	5.01260330-01	9.17977040-02	1.74666840-02	3.41163240-03	6.77792090-04	1.24405280-04	2.11402890-05
KAPPA(P)	2.04958054+04	5.29010810+03	1.29075930+03	1.98732720+02	3.35256890+01	6.48186960+00	1.20281745+00	3.53340810-01
KAPPA(R)	2.07344420+03	9.86492750+02	4.32137550+02	1.02159874+02	1.85198280+01	3.33811400+00	7.71158380-01	3.63598550-01
DENSITY	3.24979060-06	4.20206350-07	4.81256810-08	4.84850180-09	4.41510240-10			
KAPPA(P)	2.06643950-01	1.82594760-01	1.84026230-01	1.91657750-01	1.99533520-01			
KAPPA(R)	1.99137250-01	1.78389660-01	1.80160710-01	1.84019420-01	1.95872570-01			

THETA = 224.99990 13 DENSITIES

DENSITY	4.63216790+00	8.47709560-01	1.61569320-01	3.15666850-02	6.23664470-03	1.23752605-03	2.23491990-04	3.65777670-05
KAPPA(P)	3.66315030+03	1.35842330+03	2.87432180+02	5.24723810+01	1.02884918+01	2.44293010+00	8.51529440-01	4.21639840-01
KAPPA(R)	3.89595060+02	1.89305090+02	5.97253140+01	1.48983874+01	3.46601310+00	9.57381010-01	3.80407390-01	2.35162150-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 224.99990 CONTINUED

DENSITY	5.39315000-06	6.83627600-07	8.00263430-08	8.49702280-09	7.99655740-10
KAPPA(P)	2.62402420-01	2.12610380-01	2.03615670-01	2.02887320-01	2.02366070-01
KAPPA(R)	2.03256410-01	1.99158560-01	1.98836580-01	1.98796470-01	1.98694460-01

THETA = 340.00012 13 DENSITIES

DENSITY	7.99965500+00	1.51720599+00	2.92844060-01	5.68937960-02	1.09008231-02	2.08999420-03	3.74742290-04	6.32378240-05
KAPPA(P)	1.19963410+03	4.46329710+02	1.05825018+02	3.05106550+01	1.08871583+01	3.41250280+00	9.28766970-01	3.33269430-01
KAPPA(R)	1.74738910+02	6.45037260+01	1.79317330+01	4.73888080+00	1.42633409+00	5.48126050-01	2.93376590-01	2.21898320-01

DENSITY	9.71489790-06	1.26263473-06	1.48541720-07	1.57824100-08	1.48540259-09
KAPPA(P)	2.22404160-01	2.04637740-01	2.02526410-01	2.02343670-01	2.02373760-01
KAPPA(R)	2.05901050-01	2.01221500-01	1.98944170-01	1.98726850-01	1.98714130-01

THETA = 499.99993 13 DENSITIES

DENSITY	1.34373073+01	2.57738130+00	4.99804130-01	9.53236230-02	1.81914250-02	3.61054710-03	6.62525850-04	1.12590536-04
KAPPA(P)	8.17931440+02	2.79906310+02	9.28384560+01	2.69560820+01	6.58723040+00	1.54592740+00	4.50000760-01	2.37396870-01
KAPPA(R)	1.99802960+02	6.86330030+01	1.54476204+01	3.54056740+00	9.20082550-01	3.98579500-01	2.68691610-01	2.22968220-01

DENSITY	1.73204970-05	2.23164380-06	2.64900920-07	2.61457350-08	2.64900970-09
KAPPA(P)	2.03643210-01	2.02740180-01	2.02506560-01	2.02481050-01	2.02478410-01
KAPPA(R)	2.02320960-01	1.99141630-01	1.98944970-01	1.98924880-01	1.98922690-01

THETA = 699.99976 13 DENSITIES

DENSITY	2.13749980+01	4.04132250+00	7.71962270-01	1.50609630-01	2.99019370-02	5.97040210-03	1.09710763-03	1.86995600-04
KAPPA(P)	8.03569270+02	2.14785090+02	5.35194410+01	1.24117919+01	2.75789580+00	7.09430030-01	2.77183640-01	2.10826240-01
KAPPA(R)	2.05414690+02	7.04629430+01	1.50889995+01	2.96150320+00	8.22774670-01	3.90783260-01	2.45894180-01	2.05113050-01

DENSITY	3.80912050-05	5.72985970-06	4.38405310-07	4.66230950-08	4.38805390-09
KAPPA(P)	2.03513470-01	2.02764710-01	2.02472270-01	2.02661340-01	2.02660110-01
KAPPA(R)	1.99715460-01	1.99247800-01	1.99193610-01	1.99187030-01	1.99186440-01

THETA = 999.99967 13 DENSITIES

DENSITY	3.47367140+01	6.53370180+00	1.29251857+00	2.55910120-01	5.09992680-02	1.01918697-02	1.87319462-03	3.18433170-04
KAPPA(P)	1.34387930+02	9.35875130+01	2.08269900+01	4.30626790+00	1.03499760+00	3.29763240-01	2.17665730-01	2.04207630-01
KAPPA(R)	9.92167010+01	3.44644370+01	7.50556690+00	1.57728481+00	4.83241270-01	2.53733440-01	2.06243660-01	1.99681830-01

DENSITY	4.89496510-05	6.36860610-06	7.49252350-07	7.96081040-08	7.49252570-09
KAPPA(P)	2.02660720-01	2.02432250-01	2.02402090-01	2.02398650-01	2.02398040-01
KAPPA(R)	1.98994120-01	1.98899220-01	1.98886490-01	1.98885100-01	1.98884900-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 1095.99930 13 DENSITIES

DENSITY	0.17132700+01	1.19859483+01	2.36249290+00	0.69572630-01	9.36655650-02	1.87226170-02	3.44124490-03	5.84998090-04
KAPPA(P)	1.34283e60+02	3.25122510+01	7.01529580+00	1.50845692+00	0.24896490-01	2.34024140-01	2.05374320-01	2.01196750-01
KAPPA(R)	1.94075e60+01	5.82924200+00	1.43578407+00	0.52933120-01	2.53428890-01	2.08144440-01	1.98973820-01	1.97484930-01
DENSITY	3.74993e60-05	1.16999033-05	1.37645396-06	1.44248300-07	1.37645438-08			
KAPPA(P)	2.00535e90-01	2.00431240-01	2.00417810-01	2.00415810-01	2.00415610-01			
KAPPA(R)	1.97251e50-01	1.97213370-01	1.97208440-01	1.97207850-01	1.97207660-01			

THETA = 2249.99e70 13 DENSITIES

DENSITY	1.11613e64+02	2.18710530+01	0.33293860+00	8.62335640-01	1.72061730-01	3.43950020-02	6.32194740-03	1.07470937-03
KAPPA(P)	0.9e336670+01	1.05760232+01	2.44033630+00	6.14193210-01	2.65004890-01	2.08325820-01	1.98999290-01	1.97413650-01
KAPPA(R)	3.85841760+00	9.90187150-01	3.95614310-01	2.47333910-01	2.08170040-01	1.97839930-01	1.95468700-01	1.95017880-01
DENSITY	1.6e23e630-04	2.14941460-05	2.52871320-06	2.68675920-07	2.52871360-08			
KAPPA(P)	1.97138e40-01	1.97095080-01	1.97089370-01	1.97088780-01	1.97088580-01			
KAPPA(R)	1.94935e20-01	1.94921760-01	1.94920010-01	1.94919820-01	1.94919820-01			

THETA = 3400.00e50 13 DENSITIES

DENSITY	2.04e62e90+02	4.02539430+01	8.01739830+00	1.60158295+00	3.19603850-01	6.38905390-02	1.17e34227-02	1.99634950-03
KAPPA(P)	1.57919e03+01	4.05e65200+00	9.56128820-01	3.22807210-01	2.15184380-01	1.97754090-01	1.94590090-01	1.94032620-01
KAPPA(R)	3.62e06e40-01	3.94254870-01	2.47e06110-01	2.07624110-01	1.96751650-01	1.93877840-01	1.93177070-01	1.93051750-01
DENSITY	3.07128940-04	3.99269130-05	4.69726610-06	4.99094730-07	4.69726690-08			
KAPPA(P)	1.93935e20-01	1.93920490-01	1.93918360-01	1.93918170-01	1.93918170-01			
KAPPA(R)	1.93029e60-01	1.93025490-01	1.93025100-01	1.93025100-01	1.93025100-01			

THETA = 4999.99e70 13 DENSITIES

DENSITY	3.59e22e70+02	7.17181810+01	1.42937442+01	2.85263170+00	5.69955040-01	1.13938664-01	2.09e26190-02	3.96018060-03
KAPPA(P)	3.24138e50+00	7.84326410-01	2.85862320-01	2.01851090-01	1.90059330-01	1.88412410-01	1.88130760-01	1.88086930-01
KAPPA(R)	3.4e170e10-01	2.33359280-01	2.02744040-01	1.94046590-01	1.91671560-01	1.91096070-01	1.90969790-01	1.90953180-01
DENSITY	3.47719e50-04	7.12034040-05	8.37683938-06	8.90039560-07	8.37684090-08			
KAPPA(P)	1.88074e10-01	1.88074040-01	1.88077900-01	1.88077900-01	1.88077900-01			
KAPPA(R)	1.90950e10-01	1.90949740-01	1.90949740-01	1.90949740-01	1.90949740-01			

THETA = 6999.99e90 13 DENSITIES

DENSITY	3.94579e20+02	1.18735809+02	2.36742270+01	4.72520520+00	9.44122190-01	1.88739220-01	3.46914850-02	5.89745140-03
KAPPA(P)	1.74563e19+00	4.71963740-01	2.31469300-01	1.94044460-01	1.89007230-01	1.88223910-01	1.88104800-01	1.88082920-01
KAPPA(R)	2.79966e30-01	2.15705190-01	1.97773860-01	1.92628650-01	1.91329160-01	1.91002640-01	1.90960050-01	1.90951460-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 0999.99090 CONTINUED

DENSITY	9.07296780-04	1.17449555-04	1.38762761-05	1.67435496-06	1.38762780-07
KAPPA(P)	1.88078060-01	1.88077900-01	1.88077900-01	1.88077900-01	1.88077900-01
KAPPA(R)	1.90950430-01	1.90949740-01	1.90949740-01	1.90949740-01	1.90949740-01

THETA = 9999.99000 13 DENSITIES

DENSITY	1.0443506[illegible]+03	6.02673830+02	4.04163530+01	8.06793830+00	1.61204876+00	3.22265990-01	5.92346270-02	1.00697130-02
KAPPA(P)	9.30004780-01	3.13078230-01	2.06051730-01	1.90628830-01	1.88505890-01	1.88149200-01	1.88091070-01	1.88080160-01
KAPPA(R)	6.40965670-01	2.04928730-01	1.94692670-01	1.91835120-01	1.91139060-01	1.90976670-01	1.90954890-01	1.90950700-01
DENSITY	1.54919637-03	2.01393690-04	2.36932600-05	2.51740990-06	2.36932640-07			
KAPPA(P)	1.88078480-01	1.88077900-01	1.88077900-01	1.88077900-01	1.88077900-01			
KAPPA(R)	1.90949930-01	1.90949740-01	1.90949740-01	1.90949740-01	1.90949740-01			

54 DIANE/SCAT SHALE-1B INPUT TAPES(4428,2408,6027) 11-7-67 CI/LN MATERL = 1129 NX = 904

GREY ABSORPTION COEFFICIENTS 24 TEMPERATURES

THETA = 1.50000 13 DENSITIES

DENSITY	2.44458940-01	2.86242790-02	2.98521350-03	3.50395170-04	4.21557290-05	5.80814110-06	8.66174010-07	1.32838730-07
KAPPA(P)	5.04700640+05	3.33439250+05	2.39979780+05	9.13405340+04	2.15130710+04	4.40292310+03	8.39385390+02	1.20408417+02
KAPPA(R)	1.74356460+05	1.27623523+05	6.51566660+04	2.41218000+04	4.82528430+03	1.06956680+03	2.02152820+02	2.85459470+01
DENSITY	1.98389670-08	2.53591870-09	2.75137570-10	2.29138000-11	1.83671980-12			
KAPPA(P)	1.70081750+01	2.15451170+00	3.39324980-01	9.90225200-02	5.54097890-02			
KAPPA(R)	3.59659490+00	4.93044370-01	1.13379782-01	5.70573140-02	5.05974050-02			

THETA = 2.25000 13 DENSITIES

DENSITY	1.24366463-01	1.55035693-02	1.93347353-03	2.54861070-04	4.18754860-05	7.64866070-06	1.30323633-06	1.86087300-07
KAPPA(P)	6.52600360+05	4.33600980+05	2.35449360+05	9.76749010+04	1.73955890+04	2.73652170+03	4.66142300+02	9.56755600+01
KAPPA(R)	3.04866540+05	2.57276360+05	1.24927636+05	3.56330900+04	7.33129160+03	1.20812920+03	1.91161950+02	3.41043510+01
DENSITY	2.33506750-08	2.79330620-09	3.09197800-10	3.03653240-11	2.54986700-12			
KAPPA(P)	1.75603610+01	2.41219540+00	3.55839240-01	9.59233600-02	6.84922960-02			
KAPPA(R)	5.26428490+00	7.31892440-01	1.51137840-01	7.13141870-02	6.54473690-02			

THETA = 3.40000 13 DENSITIES

DENSITY	9.20501450-02	1.33655741-02	2.06699590-03	3.41315600-04	5.59582320-05	9.21719320-06	1.51370546-06	2.34870880-07
KAPPA(P)	5.41890660+05	3.29713690+05	1.95743400+05	7.80475770+04	1.59479242+04	2.86834350+03	4.63444170+02	7.50125140+01
KAPPA(R)	4.04845300+05	2.61199570+05	1.23981778+05	3.48399480+04	6.90776150+03	1.21096150+03	1.89630980+02	2.87829720+01
DENSITY	3.22596660-08	3.79523330-09	4.32672540-10	4.44809580-11	3.81362870-12			
KAPPA(P)	1.18660638+01	1.67911059+00	2.61969810-01	9.47232300-02	8.18185750-02			
KAPPA(R)	4.32458420+00	6.47107530-01	1.47200740-01	8.26755810-02	7.95591900-02			

THETA = 5.00000 13 DENSITIES

DENSITY	9.77504970-02	1.65019460-02	2.58958410-03	4.13626580-04	7.06272920-05	1.23226687-05	2.02619690-06	3.25468560-07
KAPPA(P)	4.04109640+05	2.74679400+05	1.67167220+05	5.41379100+04	1.08395844+04	1.83939690+03	2.78383020+02	4.18612240+01
KAPPA(R)	3.34629610+05	2.20173220+05	1.03801937+05	2.99879300+04	5.41887750+03	8.39132760+02	1.25161635+02	1.82408570+01
DENSITY	4.68760070-08	5.62858520-09	6.35874480-10	6.24651000-11	5.58369820-12			
KAPPA(P)	7.10362470+00	1.14666140+00	2.15206120-01	1.07942026-01	9.79355190-02			
KAPPA(R)	2.86411690+00	4.74487830-01	1.41883920-01	9.86413250-02	9.56097950-02			

THETA = 7.00000 13 DENSITIES

DENSITY	1.15516491-01	1.96681040-02	3.20123380-03	5.34163810-04	9.22752220-05	1.68106150-05	2.83162630-06	4.50652210-07
KAPPA(P)	2.98674580+05	2.08931120+05	1.18932327+05	3.30180590+04	6.03000960+03	1.01278978+03	1.70380470+02	2.90315730+01
KAPPA(R)	2.05050160+05	1.52855740+05	7.29055600+04	1.87024380+04	2.79025410+03	4.58598430+02	8.10912420+01	1.31238470+01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 7.00000 CONTINUED

DENSITY	6.45536010-08	7.94146760-09	8.59371330-10	8.35981320-11	7.63056060-12
KAPPA(P)	5.25194440+00	8.49100600-01	2.02970220-01	1.25757220-01	1.17671552-01
KAPPA(R)	2.06359210+00	3.66668340-01	1.47163660-01	1.18715427-01	1.15207202-01

THETA = 10.00000 13 DENSITIES

DENSITY	1.48506740-01	2.56901920-02	4.28213740-03	7.39079590-04	1.30389560-04	2.37568420-05	4.00378660-06	6.23922350-07	
KAPPA(P)	2.09563640+05	1.44014590+05	7.59643880+04	2.01113570+04	3.77061340+03	6.90668480+02	1.22046358+02	2.21494120+01	
KAPPA(R)	1.19483661+05	9.03213740+04	3.85079490+04	9.05647170+03	1.65372070+03	2.97003800+02	5.08378410+01	8.75399940+00	
DENSITY	5.60791650-08	1.09663161-08	1.25117857-09	1.30167390-10	1.19177781-11				
KAPPA(P)	5.96410450+00	6.57459540-01	1.90163640-01	1.30997770-01	1.27961480-01				
KAPPA(R)	1.44730511+00	3.02493480-01	1.48622900-01	1.25732960-01	1.25668350-01				

THETA = 15.00000 13 DENSITIES

DENSITY	2.04654440-01	3.61504630-02	6.19205670-03	1.08067658-03	1.89837900-04	3.43036090-05	5.89780730-06	9.64341830-07	
KAPPA(P)	1.34543410+05	9.42865540+04	4.39136240+04	1.12355472+04	2.09956600+03	3.74907730+02	6.28362380+01	1.06266815+01	
KAPPA(R)	5.42353030+04	5.71514460+04	2.43196490+04	6.33703920+03	1.15976530+03	1.89870630+02	2.82651330+01	4.81146560+00	
DENSITY	1.43974450-07	1.81744360-08	2.07429370-09	2.14457420-10	1.95731990-11				
KAPPA(P)	1.79269409+00	3.62242650-01	1.64539270-01	1.41739980-01	1.42742210-01				
KAPPA(R)	8.28079920-01	2.36837990-01	1.51921700-01	1.39072340-01	1.40161070-01				

THETA = 22.49999 13 DENSITIES

DENSITY	2.94172760-01	5.21173170-02	9.00765990-03	1.54587969-03	2.89478370-04	5.49043520-05	9.71344110-06	1.59523410-06	
KAPPA(P)	9.36294490+04	6.37540330+04	2.48365080+04	5.64185900+03	1.04628280+03	1.86982670+02	3.33954270+01	6.10936590+00	
KAPPA(R)	6.04218460+04	4.08748370+04	1.70970620+04	3.79058620+03	5.89845700+02	9.65523150+01	1.66357990+01	2.75435420+00	
DENSITY	2.37274060-07	2.98059870-08	3.39971550-09	3.44532410-10	3.18466160-11				
KAPPA(P)	1.12084458+00	2.98707840-01	1.69947620-01	1.58327120-01	1.60943960-01				
KAPPA(R)	5.57961450-01	2.20413930-01	1.61846810-01	1.55075830-01	1.57982650-01				

THETA = 33.99998 13 DENSITIES

DENSITY	4.46152630-01	7.81939510-02	1.39251883-02	2.55549080-03	4.79592410-04	9.14801180-05	1.61869900-05	2.64362370-06	
KAPPA(P)	5.97270320+04	3.79505130+04	1.43363122+04	3.45523890+03	5.77427540+02	1.04815529+02	1.93761740+01	3.69709720+00	
KAPPA(R)	2.99478440+04	2.13533500+04	8.92407450+03	1.92170280+03	3.29313750+02	5.87321860+01	9.22807980+00	1.75662990+00	
DENSITY	3.94963450-07	4.96091820-08	5.64836350-09	5.76543740-10	5.28554760-11				
KAPPA(P)	7.66193440-01	2.49997340-01	1.80188270-01	1.76725420-01	1.80004570-01				
KAPPA(R)	4.28804790-01	2.02259450-01	1.71317620-01	1.72827210-01	1.76720310-01				

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 50.00000 13 DENSITIES

DENSITY	6.73458470-01	1.23152212-01	2.27009150-02	4.25194630-03	4.02475680-04	1.53078470-04	2.69442680-05	4.37716230-06
KAPPA(P)	2.86132450+04	1.13340540+04	3.92020760+03	9.43049660+02	2.30642510+02	5.60816100+01	1.12092123+01	2.28991090+00
KAPPA(R)	1.04413260+04	6.24751440+03	2.45219040+03	5.95133690+02	1.26520957+02	2.68708740+01	4.87063830+00	9.40940290-01
DENSITY	6.49911610-07	8.13715640-08	9.33439440-09	9.85492100-10	9.23680580-11			
KAPPA(P)	5.47674710-01	2.36591320-01	1.49504640-01	1.83642560-01	1.83604370-01			
KAPPA(R)	3.01442600-01	1.93200230-01	1.83035990-01	1.80012070-01	1.80263610-01			

THETA = 69.99995 13 DENSITIES

DENSITY	1.01401151+00	1.95597200-01	3.44533970-02	6.45364650-03	1.20707044-03	2.28326250-04	4.02818340-05	6.62712220-06
KAPPA(P)	1.23268957+04	6.11324470+03	2.09334680+03	5.37814640+02	1.38991520+02	3.26335520+01	6.97327510+00	1.46885235+00
KAPPA(R)	6.04261960+03	3.65334120+03	1.43375750+03	3.49741740+02	7.02716160+01	1.28736808+01	2.40605190+00	5.84419280-01
DENSITY	1.00525435-06	1.29345530-07	1.51981550-08	1.80264600-09	1.49849470-10			
KAPPA(P)	3.96541220-01	2.12213680-01	1.34360760-01	1.86550740-01	1.87425840-01			
KAPPA(R)	2.61449010-01	1.96174930-01	1.34446460-01	1.83364560-01	1.84050150-01			

THETA = 94.99998 13 DENSITIES

DENSITY	1.58666453+00	2.90940060-01	5.32373660-02	9.85998150-03	1.86215661-03	3.60368650-04	6.53053890-05	1.10124956-05
KAPPA(P)	8.70655910+03	4.20011830+03	1.35036870+03	3.27930260+02	7.68164620+01	1.68397810+01	3.44114400+00	7.43761690-01
KAPPA(R)	4.85139990+03	2.61549580+03	9.21519620+02	1.98111330+02	3.60037800+01	6.56388690+00	1.30914793+00	4.07831410-01
DENSITY	1.68155775-06	2.17075640-07	2.53477300-08	2.86927250-09	2.46682310-10			
KAPPA(P)	4.73691970-01	1.99539050-01	1.93471440-01	1.91040660-01	1.94384140-01			
KAPPA(R)	2.33371420-01	1.95996980-01	1.87896710-01	1.87604730-01	1.90844560-01			

THETA = 149.99995 13 DENSITIES.

DENSITY	2.63004080+00	4.77118330-01	8.40153840-02	1.66915610-02	3.25555350-03	6.42889320-04	1.17087747-04	1.96854660-05
KAPPA(P)	5.93779600+03	2.50782970+03	6.65045850+02	1.50458580+02	3.21842420+01	6.96029590+00	1.50405469+00	4.43384270-01
KAPPA(R)	2.66266090+03	1.47229100+03	4.52468410+02	9.17273910+01	1.62851070+01	3.48989970+00	8.72082720-01	3.36072960-01
DENSITY	2.97528740-06	3.79602950-07	4.41174710-08	4.67498530-09	4.39857640-10			
KAPPA(P)	2.42707360-01	2.05331630-01	2.00741550-01	2.00304210-01	2.00259950-01			
KAPPA(R)	2.21581640-01	1.98860980-01	1.96845130-01	1.96646810-01	1.96617310-01			

THETA = 224.99990 13 DENSITIES

DENSITY	4.39543680+00	8.05370950-01	1.52691610-01	2.95127570-02	5.79840730-03	1.13559222-03	2.04881050-04	3.44621160-05
KAPPA(P)	2.96852930+03	9.42824340+02	2.23476650+02	5.51553080+01	1.41115692+01	3.83090470+00	1.03729887+00	3.97295090-01
KAPPA(R)	1.23988130+03	5.76699280+02	1.68681270+02	3.84956380+01	8.43035580+00	1.86514106+00	5.20306510-01	2.02832580-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 22?.99?90 CONTINUED

DENSITY	?.?06695?0-??	6.86891150-07	8.05047620-08	8.54550960-09	8.08047760-10
KAPPA(P)	?.?4853??0-?1	?.??736980-01	2.00528360-01	2.00294400-01	2.00259150-01
KAPPA(R)	?.10374500-?1	1.99503590-01	1.97253610-01	1.9469008?-01	1.96614360-01

THETA = 340.00?12 13 DENSITIES

DENSITY	7.4?180???0+??	1.41??4278+00	2.72360150-01	5.24120030-02	1.03098763-02	2.04634100-03	3.75427190-04	6.37975350-05
KAPPA(P)	?.37?10??0+?3	?.04239570+02	1.13108527+02	3.2377701?+01	7.71601450+00	1.76475627+00	?.86139130-01	2.68858950-01
KAPPA(R)	?.99?68???+??	2.41?31520+02	7.91738430+01	1.80725810+01	3.51334650+00	?.47000750-01	3.40630150-01	2.33728520-01

DENSITY	?.6??30?70-??	1.27583472-06	1.50???8510-07	1.59383160-08	1.49660024-09
KAPPA(P)	?.07?63770-?1	2.01213450-01	2.00382950-01	2.00390950-01	2.00844960-01
KAPPA(R)	?.0??536?0-?1	1.98002160-01	1.96790810-01	1.94745160-01	1.97184940-01

THETA = 499.99?63 13 DENSITIES

DENSITY	1.2?537?76+?1	?.41146750+00	4.?7220530-01	9.17929310-02	1.82378350-02	3.64188460-03	6.69185690-04	1.13706052-04
KAPPA(P)	?.81932?90+?2	?.48932290+02	6.52?02120+01	1.42186003+01	2.95894560+00	7.43687470-01	2.99588770-01	2.17681120-01
KAPPA(R)	?.?0202?30+?2	1.36572690+02	3.93523220+01	7.99083280+00	1.70858766+00	5.35350610-01	2.77076680-01	2.13362800-01

DENSITY	1.74641?60-??	?.26385840-06	?.65659610-07	?.82034980-08	?.65418040-09
KAPPA(P)	?.03?c1?70-?1	?.01740110-01	?.01847460-01	?.01948610-01	?.01963150-01
KAPPA(R)	?.99?29?60-?1	1.97972920-01	1.98156530-01	1.99270?90-01	1.98282200-01

THETA = 699.99?76 13 DENSITIES

DENSITY	?.01277?00+?1	?.90075060+00	7.64304120-01	1.51509940-01	3.01714850-02	6.02130670-03	1.10389039-03	1.87167990-04
KAPPA(P)	3.?4?0?050+?2	1.?3293049+02	2.51767260+01	5.22172590+00	1.24830195+00	?.35494770-01	2.53845110-01	2.12607400-01
KAPPA(R)	1.15149?21+?2	?.35499190+01	1.2935?967+01	2.8429094?+00	7.80212860-01	3.34599160-01	2.27626080-01	2.04313040-01

DENSITY	?.87569?10-??	3.73728950-06	?.39661830-07	?.67136320-08	?.39657500-09
KAPPA(P)	?.03750?20-?1	?.02173100-01	?.01984160-01	?.01968000-01	?.01966580-01
KAPPA(R)	1.99629720-?1	1.98571500-01	1.98311350-01	1.98290530-01	1.98288940-01

THETA = 999.99?67 13 DENSITIES

DENSITY	3.?0?03?70+?1	?.58229940+00	1.29916375+00	2.57749790-01	5.12554160-02	1.02227571-02	1.87728628-03	3.19064920-04
KAPPA(P)	1.?c?70c20+?2	?.12311060+01	9.27570930+00	2.32109810+00	7.46063690-01	3.33418770-01	2.25842370-01	2.05508680-01
KAPPA(R)	?.30412?60+?1	1.55728950+01	3.94315430+00	1.0288312?+00	?.12964350-01	2.59791470-01	2.14386030-01	2.01748380-01

DENSITY	?.90?88?60-??	6.38097320-06	7.50707310-07	7.97620960-08	7.50700020-09
KAPPA(P)	?.0?417?60-?1	?.02048200-01	2.02004560-01	2.01999310-01	2.01998700-01
KAPPA(R)	1.98735?90-?1	1.98409530-01	1.98376210-01	1.98372240-01	1.98371840-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 1099.99970 13 DENSITIES

DENSITY	9.0667[illegible]0E+01	1.1[illegible]E+01	2.37159910E+00	8.70923080E-01	9.38701340E-02	1.87599120E-02	3.44709580E-03	5.86130090E-04
KAPPA(P)	8.87771[illegible]E+01	1.72041730E+01	4.64912810E+00	1.29086760E+00	4.17520840E-01	2.39967290E-01	2.07844930E-01	2.03007980E-01
KAPPA(R)	1.93280030E+01	7.21769920E+00	2.00063000E+00	6.39385080E-01	3.15379690E-01	2.23529920E-01	2.02297900E-01	1.99294770E-01
DENSITY	9.01740[illegible]E-05	1.17[illegible]E-05	1.37912690E-06	1.44532300E-07	1.37912730E-08			
KAPPA(P)	2.02351700E-01	2.02239590E-01	2.02721220E-01	2.02219610E-01	2.02219800E-01			
KAPPA(R)	1.98039000E-01	1.98774750E-01	1.98706200E-01	1.98765200E-01	1.98765200E-01			

THETA = 2289.99970 13 DENSITIES

DENSITY	1.10769446E+02	2.19426610E+01	4.32697630E+00	8.69830900E-01	1.72397920E-01	3.44618630E-02	6.33021750E-03	1.07879525E-03
KAPPA(P)	3.00[illegible]E+01	8.35519700E+00	2.03959960E+00	5.58532920E-01	2.63076080E-01	2.13309410E-01	2.04412950E-01	2.02809940E-01
KAPPA(R)	8.29797560E+00	2.72157020E+00	8.42769120E-01	3.31171140E-01	2.23904200E-01	2.03763140E-01	1.99929390E-01	1.99212540E-01
DENSITY	1.65660[illegible]E-04	2.15358360E-05	2.53362370E-06	2.89197670E-07	2.53362620E-08			
KAPPA(P)	2.02580790E-01	2.02498260E-01	2.02892590E-01	2.02491980E-01	2.02491980E-01			
KAPPA(R)	1.99696630E-01	1.99078510E-01	1.99076120E-01	1.99075720E-01	1.99075720E-01			

THETA = 3800.00050 13 DENSITIES

DENSITY	2.05154220E+02	4.02712150E+01	8.03060610E+00	1.60352173E+00	3.20224490E-01	6.40145430E-02	1.17662154E-02	2.09021020E-03
KAPPA(P)	1.07041462E+01	2.70113430E+00	6.87323160E-01	2.88308260E-01	2.18262670E-01	2.04729200E-01	2.01897320E-01	2.01423820E-01
KAPPA(R)	1.31484287E+00	5.46700970E-01	2.90546390E-01	2.19539300E-01	2.03004520E-01	1.99102806E-01	1.98145230E-01	1.97989750E-01
DENSITY	3.07765210E-04	4.00040470E-05	4.70638710E-06	5.00053900E-07	4.70636850E-08			
KAPPA(P)	2.01576960E-01	2.01563660E-01	2.01562050E-01	2.01561850E-01	2.01561850E-01			
KAPPA(R)	1.98120470E-01	1.98115500E-01	1.98115910E-01	1.98115910E-01	1.98115910E-01			

THETA = 4999.99970 13 DENSITIES

DENSITY	3.61377660E+02	7.17499360E+01	1.43173912E+01	2.85800580E+00	5.71062910E-01	1.14159920E-01	2.09832670E-02	3.56709050E-03
KAPPA(P)	4.99263670E+00	1.21425496E+00	3.88285900E-01	2.32631180E-01	2.05011340E-01	1.99849640E-01	1.98799200E-01	1.98520880E-01
KAPPA(R)	4.73150010E-01	2.78184970E-01	2.20132540E-01	2.02574210E-01	1.97462610E-01	1.96228390E-01	1.95947210E-01	1.95927420E-01
DENSITY	4.98741070E-04	7.13915330E-05	8.39110540E-06	8.41767210E-07	8.39110780E-08			
KAPPA(P)	2.02487220E-01	2.02392770E-01	2.02921770E-01	2.02491970E-01	2.02491970E-01			
KAPPA(R)	1.99518600E-01	1.99917250E-01	1.99917030E-01	1.99917030E-01	1.99917030E-01			

THETA = 6999.99690 13 DENSITIES

DENSITY	5.97917610E+02	1.18798401E+02	2.37139610E+01	4.73[illegible]4420E+00	9.45959560E-01	1.89105910E-01	3.47588170E-02	5.98889160E-03
KAPPA(P)	2.87299280E+00	6.22176540E-01	2.73390260E-01	2.10891980E-01	1.98709560E-01	1.96419700E-01	1.95902890E-01	1.95854580E-01
KAPPA(R)	3.04488340E-01	2.24583660E-01	2.03070920E-01	1.96685930E-01	1.94767840E-01	1.94298040E-01	1.94192180E-01	1.94171980E-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 6999.99690 CONTINUED

DENSITY	9.09057740-04	1.18177360-04	1.39032225-05	1.47721801-06	1.39032240-07
KAPPA(P)	1.95339670-01	1.95336720-01	1.95836330-01	1.95836330-01	1.95836330-01
KAPPA(R)	1.94168290-01	1.94157710-01	1.94167710-01	1.94167710-01	1.94167710-01

THETA = 9999.99620 13 DENSITIES

DENSITY	1.02019693+03	2.02799340+02	4.04513480+01	8.08324170+00	1.61518903+00	3.22892120-01	5.93496530-02	1.00892579-02
KAPPA(P)	1.00306998+00	3.51272950-01	2.19352770-01	1.96481300-01	1.88379640-01	1.88123050-01	1.88078840-01	1.88070570-01
KAPPA(R)	2.31739620-01	2.02720930-01	1.94603320-01	1.92371670-01	1.91083070-01	1.90968850-01	1.90951650-01	1.90948400-01

DENSITY	1.50218756-03	2.01784360-04	2.37392690-05	2.52229850-06	2.37392730-07
KAPPA(P)	1.88069670-01	1.88068380-01	1.88068880-01	1.88068880-01	1.88068880-01
KAPPA(R)	1.90947630-01	1.90947830-01	1.90947830-01	1.90947830-01	1.90947830-01

18 STAND/12FREQUENCIES CN/RS 3/3/67 TAPE 1809 THETA(1.-10.)EV/W/FROMSD2 MATERL = 1074 NK = 207

GREY ABSORPTION COEFFICIENTS 7 TEMPERATURES

THETA = 1.00000 13 DENSITIES

DENSITY	3.23923750-01	6.65172490-02	7.13826190-03	9.31453760-04	1.56433600-04	2.90498880-05	4.70243570-06	6.06531040-07
KAPPA(P)	2.35790710+03	1.02305240+05	1.13453677+05	4.51001120+04	8.64829920+03	1.60997180+03	3.08542610+02	5.66463740+01
KAPPA(R)	3.30295600+03	4.99613950+04	2.95414570+04	8.75670870+03	1.39511330+03	1.72127750+02	2.73968760+01	5.19629080+00
DENSITY	7.47206060-01	9.33373420-09	8.04596830-10	7.85897430-11	7.30925470-12			
KAPPA(P)	8.43831790+01	9.03402420-01	7.37494850-02	1.29591137-02	7.20975710-03			
KAPPA(R)	7.60525060-01	8.87726210-02	1.63434190-02	7.76815180-03	6.68188620-03			

THETA = 1.50000 13 DENSITIES

DENSITY	3.35660490-01	4.83259310-02	7.32974910-03	1.19507420-03	1.86115530-04	2.93449540-05	4.48887140-06	6.35788050-07
KAPPA(P)	2.02148810+03	1.96054390+05	1.34128990+05	6.51143330+04	1.36389629+04	1.93168700+03	2.28772930+02	2.36360880+01
KAPPA(R)	4.00212072+03	5.56579820+04	4.12439600+04	9.60929730+03	1.60895790+03	2.56146550+02	3.21044920+01	3.40099480+00
DENSITY	9.90296330-01	1.14283216-03	1.33610141-09	1.07703960-10	1.13222661-11			
KAPPA(P)	2.10797450+01	2.14178610-01	3.11387270-02	1.19671163-02	9.45594190-03			
KAPPA(R)	3.25339030-04	4.05947910-02	1.16719070-02	7.76742950-03	7.97392870-03			

THETA = 2.25000 13 DENSITIES

DENSITY	3.44074020-01	5.31168010-02	6.06575460-03	1.25894404-03	2.05472780-04	3.58448770-05	6.22224410-06	1.02188666-06
KAPPA(P)	1.66147600+03	1.32301020+05	1.02560751+05	4.24223210+04	9.66724440+03	7.64736210+02	8.80755480+01	1.37525601+01
KAPPA(R)	5.75419130+03	5.67519630+04	3.39787270+04	8.86875700+03	1.21941550+03	1.56461970+02	1.80346870+01	2.66219610+00
DENSITY	1.49725000-01	1.54143500-03	1.60452242-09	1.70337410-10	1.38388699-11			
KAPPA(P)	3.03535360+01	3.71946770-01	8.07779700-02	1.89594840-02	1.25598758-02			
KAPPA(R)	3.35386430-04	4.39100380-02	2.24175530-02	1.27940820-02	1.19417096-02			

THETA = 3.40000 13 DENSITIES

DENSITY	3.75099660-01	5.03705140-02	9.79621730-03	1.67976397-03	3.05368280-04	5.51435980-05	8.96896740-06	1.35640875-06
KAPPA(P)	2.14700460+01	5.25835350+04	5.47184430+04	2.10168330+04	4.41954020+03	7.89693560+02	1.24366140+02	1.85486300+01
KAPPA(R)	3.11599040+04	3.38661050+04	2.31760120+04	6.29760780+03	1.17494060+03	1.97150020+02	3.25272090+01	5.20956310+00
DENSITY	1.71095650-01	1.98687060-08	2.29411240-09	2.43192000-10	2.28813250-11			
KAPPA(P)	1.95755919+01	1.22146039-01	2.21899230-02	1.41342133-02	1.33348016-02			
KAPPA(R)	3.19153060-01	4.49600318D-02	1.58559100-02	1.33444860-02	1.30382621-02			

THETA = 5.00000 13 DENSITIES

DENSITY	4.80991010-01	8.17372040-02	1.39693315-02	2.41206760-03	4.08073610-04	6.43383350-05	1.04467869-05	1.74080976-06
KAPPA(P)	5.76722530+04	5.16450670+04	3.62723100+04	1.19144825+04	2.48750610+03	2.73618270+02	1.79637340+01	2.00088160+00
KAPPA(R)	6.01467260+04	4.95798300+04	1.53552226+04	5.70043030+03	1.21613120+03	1.26791243+02	7.24665510+00	5.08669030-01

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00000 CONTINUED

DENSITY	2.65793750-07	3.45236950-09	3.74902560-09	3.85966760-10	3.36058850-11
KAPPA(P)	2.77591960-01	4.81651760-02	1.92366110-02	1.59396110-02	1.62289110-02
KAPPA(R)	6.56203120-02	2.10574470-02	1.49939752-02	1.49127912-02	1.58379550-02

THETA = 7.00000 13 DENSITIES

DENSITY	6.49952580-01	1.10705911-01	1.80259120-02	2.68856150-03	4.70626880-04	9.20671820-05	1.67138970-05	2.73289260-06	
KAPPA(P)	3.79703450+04	2.70340410+04	1.63266500+04	3.89723340+03	3.75310230+02	5.18338640+01	9.11898030+00	1.79340957+00	
KAPPA(R)	1.30021497+04	1.30518591+04	1.00255180+04	2.25076380+03	1.61978720+02	1.25491756+01	1.71458487+00	3.08663990-01	
DENSITY	5.87670250-07	4.60140160-06	4.97679380-09	4.89444580-10	4.33042700-11				
KAPPA(P)	3.66967460-01	7.64299990-02	2.78072360-02	2.10712230-02	2.09401060-02				
KAPPA(R)	7.20103750-02	2.92307200-02	2.03961520-02	1.97276680-02	2.04396020-02				

THETA = 10.00000 13 DENSITIES

DENSITY	3.51998940-01	1.33740750-01	2.10226680-02	3.90092340-03	7.44608500-04	1.37959690-04	2.30897920-05	3.58788740-06	
KAPPA(P)	2.34203530+04	1.95319140+04	1.01281005+04	2.53142310+03	5.10956760+02	9.60175480+01	1.70132580+01	3.06829180+00	
KAPPA(R)	9.46405590+03	1.04389257+04	3.19822380+03	4.49582730+02	6.86636510+01	1.36658084+01	2.82117370+00	5.89031150-01	
DENSITY	5.10053610-07	3.99772160-06	5.07190260-09	4.57081320-10	4.10947840-11				
KAPPA(P)	5.48939630-01	1.49253910-01	1.96527280-01	3.75921500-02	3.71679670-02				
KAPPA(R)	1.38553520-01	5.18202130-02	3.47513100-02	3.55080090-02	3.65878520-02				

33 DIANE/SCAT XE-12A TEMP(1-10) 12 FREQ CI/RS 9-2-67 INPUT TAPE(5239) MATERL = 1054 NX = 287

GREY ABSORPTION COEFFICIENTS 7 TEMPERATURES

THETA = 1.00000 13 DENSITIES

DENSITY	1.32019467-02	2.64300330-03	5.29191080-04	1.05713178-04	2.11225370-05	4.22280940-06	7.76157870-07	1.31943770-07
KAPPA(P)	1.2010778D+05	2.4230436D+05	5.0495626D+04	1.8886505D+04	6.6826104D+03	1.8699201D+03	4.2056412D+02	8.0136862D+01
KAPPA(R)	1.0931102D+05	2.5022431D+04	5.2240179D+03	1.6465656D+03	5.0952402D+02	1.3033459D+02	2.7753083D+01	5.1667713D+00
DENSITY	2.02388640-03	2.63885710-09	3.10452600-10	3.29856020-11	3.10452650-12			
KAPPA(P)	1.3196036+01	1.7674760+00	2.2406749D-01	3.7755052D-02	1.7583699D-02			
KAPPA(R)	8.5073259D-01	1.1556013D-01	3.4327929D-02	1.8753610D-02	1.5742220D-02			

THETA = 1.50000 13 DENSITIES

DENSITY	2.42530180-02	4.8547340D-03	9.7106607D-04	1.9408488D-04	3.8798195D-05	7.7571936D-06	1.4258677E-06	2.4239432E-07
KAPPA(P)	5.7519846D+05	1.3199743D+05	3.9219129D+04	1.1338325E+04	2.9393182D+03	6.9594310D+02	1.4276429D+02	2.5908435D+01
KAPPA(R)	1.1003867D+05	3.3934997D+04	7.2895196D+03	1.6058750D+03	4.1833476D+02	9.6087378D+01	1.9137848D+01	3.4306852D+00
DENSITY	3.76915220-03	4.8479013D-09	5.7033921D-10	6.0590567D-11	5.7033931D-12			
KAPPA(P)	4.1426472D+00	5.6690496D-01	8.6077171D-02	2.9267241D-02	2.2961663D-02			
KAPPA(R)	3.5959802D-01	9.1919232D-02	2.6091369D-02	1.7284654D-02	1.5559436D-02			

THETA = 2.25000 13 DENSITIES

DENSITY	9.4600827D0-02	8.9270347D-03	1.7841842D-03	3.5648015D-04	7.1263024D-05	1.4250480E-05	2.6194664D-06	4.4530788D-07
KAPPA(P)	3.0432860D+05	9.8921310D+04	5.1248824D+04	2.4221110D+04	5.6587534D+03	1.1751674D+03	2.2536785D+02	4.3344463D+01
KAPPA(R)	5.6748259D+04	3.4984134D+04	1.0749526D+04	2.3497917D+03	5.3625186D+02	1.1350436D+02	2.1541966D+01	3.7444247D+00
DENSITY	3.8339049D-03	8.9060965D-09	1.0877923D-09	1.1132694E-10	1.0477407D-11			
KAPPA(P)	9.0677663D+00	3.0902005D+00	2.1908750D+00	2.1302088D+00	1.9436555D+00			
KAPPA(R)	5.9971670D-02	9.7730948D-02	2.6460818D-02	1.7020249D-02	1.5879664D-02			

THETA = 3.40000 13 DENSITIES

DENSITY	8.3033068D-02	1.6607747D-02	3.3154166D-03	6.6221585D-04	1.3237576D-04	2.6471286D-05	4.8658460D-06	8.2717865D-07
KAPPA(P)	1.5666106D+05	7.2246659D+04	4.7401539D+04	1.9393291D+04	4.8232048D+03	1.1215511D+03	2.9857226D+02	1.2826935D+02
KAPPA(R)	2.4635804D+04	1.7786765D+04	1.0786664D+04	3.7881435D+03	8.9651963D+02	1.8715572D+02	3.4911174D+01	6.0081807D+00
DENSITY	1.2720869D-07	1.6190941D-08	1.4747756D-09	1.4793417D-10	1.3902397E-11			
KAPPA(P)	7.8326934D+01	5.9646120D+01	1.1971417D+01	1.9381735D-01	2.3289329D-02			
KAPPA(R)	9.4978351D-01	1.4278589D-01	3.2486781D-02	2.3281668D-02	2.2167988D-02			

THETA = 5.00000 13 DENSITIES

DENSITY	1.4991653D-01	2.9734866D-02	5.9212127D-03	1.1813906E-03	2.3602166D-04	4.7025104D-05	8.1066167D-06	1.0964532D-06
KAPPA(P)	8.7990153D+04	4.5187239D+04	3.3007166D+04	1.9670965D+04	5.9804189D+03	1.7756289D+03	6.1031668D+02	6.7003037D+01
KAPPA(R)	1.3456192D+04	1.0757311E+04	6.5680087D+03	3.8793965D+03	1.5144838D+03	3.7717866D+02	6.3620833D+01	3.1268872D+00

GREY ABSORPTION COEFFICIENTS CONTINUED

THETA = 5.00000 CONTINUED

DENSITY	1.62317760-07	2.10718050-08	2.47637530-09	2.80734120-10	2.32878360-11
KAPPA(P)	1.96550792+00	9.83989660-02	2.49688830-02	2.31952910-02	2.34835290-02
KAPPA(R)	1.61594818-01	4.19498670-02	2.53967230-02	2.21628460-02	2.29400720-02

THETA = 7.00000 13 DENSITIES

DENSITY	2.56589280-01	9.96440340-02	9.80193010-03	1.90709532-03	3.28802940-04	5.69607590-05	1.02784618-05	1.78182011-06
KAPPA(P)	5.29784370+04	3.07242390+04	2.04015870+04	9.36667920+03	2.02458040+03	1.44827580+02	1.21989879+01	1.95471790+00
KAPPA(R)	1.83624950+04	9.19167040+03	4.59427790+03	2.56460810+03	9.52339830+02	7.49085430+01	5.08320000+00	5.85307650-01

DENSITY	2.66059900-07	3.28688690-08	3.65229580-09	3.80403040-10	3.44555900-11
KAPPA(P)	4.97974830-01	1.73000810-01	5.38558630-02	2.82708240-02	2.61475700-02
KAPPA(R)	1.63932410-01	7.45017990-02	3.68417340-02	2.66722390-02	2.56706490-02

THETA = 10.00000 13 DENSITIES

DENSITY	4.29705310-01	8.04141610-02	1.38029775-02	2.45468210-03	4.77805410-04	9.43714540-05	1.67938140-05	2.68862690-06
KAPPA(P)	3.10563810+04	1.04565600+04	8.73465470+03	1.70934570+03	3.45794250+02	8.61810210+01	2.35453170+01	6.32694100+00
KAPPA(R)	1.24384495+04	6.27886270+03	3.62149750+03	6.48684820+02	1.11813797+02	2.83951390+01	9.20270040+00	2.59689990+00

DENSITY	3.90671040-07	4.70215450-08	5.08337810-09	4.96479060-10	4.31236380-11
KAPPA(P)	1.11924634+00	1.86100940-01	5.27993710-02	3.53704690-02	3.53712830-02
KAPPA(R)	4.81035740-01	9.31768570-02	4.08769070-02	3.41019060-02	3.48934200-02

TAPE EDITING IS SUCCESSFUL
THE NUMBER OF GREY SETS EDITED IS 31 THE NUMBER OF GREY SETS REQUESTED IS -0

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CARD INPUT USED WITH

GREYS

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DIANE GREY TAPE 11/11/67 A.KNOPP  MATERIALS ARE AIR,WET ALLUVIUM,AL,BE,
C,CF2,CH2,C-PHENOLOC,FE,GINA-IRONIC,GRANITE,GROUT,H,H-M-X,LIM,LIMESTONE,
NE,PHENOLIC,PLYCA,PLYFE,WET TUFF,REFRASIL,SEAWATER,S,SHALE,W,XE
    1081201
 DIANE AIR-12A ,12 FREQUENCIES DECEMBER 21,1965 COMBINED WITH AIR-11F
 0.120000+02 0.742000+03
     1102.   0.230000+02
 0.256501+00 0.800000+01 0.677237+01 0.924061+01 0.434821+01 0.613962+01  23  40
 0.914742+01 0.665079+01 0.563093+01 0.872546+01 0.895338+01 0.501413+01  23  41
 0.799319+01 0.112560+02 0.374186+01 0.658701+01 0.135585+02 0.169848+01  23  42
 0.450265+01 0.158611+02-0.446188+00 0.218908+01 0.181637+02-0.204224+01  23  43
-0.685781-01 0.204663+02 0.405465+00 0.100000+02 0.689550+01 0.102140+02  23  44
-0.208363+00 0.677235+01 0.101662+02 0.217646+01 0.674567+01 0.100627+02  23  45
 0.487587+01 0.655066+01 0.983923+01 0.764838+01 0.594792+01 0.904098+01  23  46
 0.101614+02 0.475467+01 0.765827+01 0.121977+02 0.314731+01 0.592050+01  23  47
 0.140188+02 0.149875+01 0.403196+01 0.158198+02 0.192841+00 0.216075+01  23  48
 0.177106+02-0.634672+00 0.511204+00 0.198432+02 0.615186+00 0.100000+02  23  49
 0.840781+01 0.110527+02 0.967186+00 0.818188+01 0.109449+02 0.338272+01  23  50
 0.798034+01 0.106822+02 0.595402+01 0.735410+01 0.100375+02 0.832856+01  23  51
 0.620401+01 0.873409+01 0.102979+02 0.476710+01 0.708984+01 0.120157+02  23  52
 0.339192+01 0.534701+01 0.137490+02 0.231999+01 0.379999+01 0.155999+02  23  53
 0.132568+01 0.258392+01 0.177068+02-0.611176-01 0.105607+01 0.199993+02  23  54
 0.810930+00 0.100000+02 0.943287+01 0.115112+02 0.172770+01 0.922199+01  13   1
 0.112665+02 0.405747+01 0.874546+01 0.107284+02 0.636263+01 0.783562+01  13   2
 0.975916+01 0.836361+01 0.654533+01 0.836716+01 0.101129+02 0.546547+01  13   3
 0.691535+01 0.117972+02 0.445660+01 0.563859+01 0.136535+02 0.313045+01  13   4
 0.437877+01 0.156926+02 0.131816+01 0.270894+01 0.177276+02-0.407684+00  13   5
 0.760632+00 0.198171+02 0.101160+01 0.100000+02 0.104598+02 0.117046+02  13   6
 0.216940+01 0.100103+02 0.112669+02 0.433946+01 0.934230+01 0.105915+02  13   7
 0.637895+01 0.842795+01 0.964324+01 0.819682+01 0.736564+01 0.849002+01  13   8
 0.994456+01 0.613663+01 0.733572+01 0.117761+02 0.445134+01 0.592302+01  13   9
 0.137050+02 0.259037+01 0.418178+01 0.155836+02 0.104437+01 0.234458+01  13  10
 0.175057+02-0.260652+00 0.677329+00 0.196712+02 0.122378+01 0.100000+02  13  11
 0.111393+02 0.117270+02 0.234874+01 0.105745+02 0.112197+02 0.435141+01  13  12
 0.982372+01 0.100687+02 0.624494+01 0.879924+01 0.996039+01 0.807307+01  13  13
 0.734851+01 0.878575+01 0.993804+01 0.561925+01 0.731333+01 0.117394+02  13  14
 0.410667+01 0.564420+01 0.135253+02 0.286733+01 0.408699+01 0.154026+02  13  15
 0.142332+01 0.254677+01 0.174443+02-0.225558+00 0.768713+00 0.195869+02  13  16
 0.160944+01 0.100000+02 0.114442+02 0.117443+02 0.237513+01 0.107682+02  13  17
 0.113455+02 0.420567+01 0.962378+01 0.108493+02 0.609454+01 0.841519+01  13  18
 0.993068+01 0.793930+01 0.731582+01 0.864760+01 0.971447+01 0.603192+01  13  19
 0.729674+01 0.114913+02 0.447808+01 0.573506+01 0.133161+02 0.289057+01  13  20
 0.414372+01 0.151868+02 0.123997+01 0.246292+01 0.171861+02-0.322681+00  13  21
 0.604122+00 0.193174+02 0.194591+01 0.100000+02 0.114265+02 0.117610+02  13  22
 0.225997+01  .108168+02 0.113624+02 0.407680+01 0.999578+01 0.109368+02  13  23
 0.591591+01 0.884792+01 0.100398+02 0.773457+01 0.743606+01 0.879815+01  13  24
 0.951794+0. 0.604747+01 0.726482+01 0.112662+02 0.453477+01 0.556947+01  13  25
 0.130862+02 0.284065+01 0.387948+01 0.149585+02 0.104261+01 0.222946+01  13  26
 0.169330+02-0.544507+00 0.377063+00 0.190262+02 0.230259+01 0.100000+02  13  27
 0.111417+02 0.116599+02 0.207538+01 0.108107+02 0.112301+02 0.386350+01  13  28
 0.100369+02 0.107940+02 0.568642+01 0.884808+01 0.980386+01 0.748254+01  13  29
 0.751438+01 0.839085+01 0.925347+01 0.592354+01 0.682130+01 0.109896+02  13  30
 0.410475+01 0.513426+01 0.127769+02 0.231054+01 0.329559+01 0.145938+02  13  31
 0.505972+00 0.142208+01 0.164908+02-0.912063+00-0.342011+00 0.185400+02  13  32
 0.270805+01 0.100000+02 0.103499+02 0.113701+02 0.182409+01 0.102216+02  13  33
 0.109903+02 0.350757+01 0.978238+01 0.104193+02 0.537736+01 0.864876+01  13  34
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 0.913123+01 0.713833+01 0.705805+01 0.757811+01 0.885435+01 0.522097+01  13  35
 0.588422+01 0.105227+02 0.330792+01 0.402849+01 0.122415+02 0.144472+01  13  36
 0.215378+01 0.140199+02-0.188504+00 0.357146+00 0.158930+02-0.116481+01  13  37
-0.103982+01 0.179334+02 0.311352+01 0.100000+02 0.922718+01 0.109396+02  13  38
 0.146986+01 0.898218+01 0.104330+02 0.321387+01 0.849665+01 0.952396+01  13  39
 0.495518+01 0.745352+01 0.799485+01 0.666029+01 0.590100+01 0.626493+01  13  40
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     1013. .2500000E+02
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0.178148+01	0.284187+01	0.174274+02	0.	0.110000+02	0.912861+01	13	80
0.108095+02	0.176672+01	0.885818+01	0.106592+02	0.391134+01	0.864614+01	13	81
0.104399+02	0.633046+01	0.804194+01	0.985268+01	0.863581+01	0.691048+01	13	82
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0.255294+01	0.103602+02	0.108590+02	0.402561+01	0.978546+01	0.102489+02	13	87
0.664435+01	0.887308+01	0.944754+01	0.845796+01	0.774492+01	0.849814+01	13	88
0.101768+02	0.665325+01	0.743676+01	0.119596+02	0.535273+01	0.614373+01	13	89
0.139210+02	0.363740+01	0.453302+01	0.158482+02	0.175134+01	0.265441+01	13	90
0.177734+02	-0.102039+00	0.875008+00	0.199077+02	-0.173683+01	-0.717144+00	13	91
0.222401+02	0.810930+00	0.110000+02	0.107741+02	0.112408+02	0.261864+01	13	92
0.104250+02	0.108004+02	0.453377+01	0.992670+01	0.104424+02	0.638693+01	13	93
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0.327955+01	0.150670+02	0.881908+00	0.131857+01	0.169407+02	-0.107382+01	13	102
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0.110000+02	0.953771+01	0.100423+02	0.218[illegible]	0.437209+01	0.104508+02	13	104
0.402104+01	0.701427+01	0.100.94+02	0.587[illegible]	0.820133+01	0.[illegible]0447+01	13	105
0.747373+01	0.[illegible]	0.7[illegible]	0.937720+01	0.[illegible]	0.[illegible]	13	106
0.110161+02	0.355170+01	0.482[illegible]	0.127171+02	0.178[illegible]	0.[illegible]	13	107
0.144[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	-0.[illegible]	-0.[illegible]	13	108
0.184102+02	-0.270[illegible]	-0.2[illegible]	0.2[illegible]	0.[illegible]	0.110000+02	13	109
0.837[illegible]	0.[illegible]	0.[illegible]	0.7[illegible]	0.[illegible]	0.[illegible]	13	110
0.733[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	13	111
0.501[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	0.[illegible]	13	112
0.238793+01	0.315705+01	0.122370+02	0.166782+01	0.174746+01	0.140034+02	13	113
-0.124437+00	0.335593+00	0.160800+02	-0.104355+01	-0.128335+01	0.181880+02	13	114
-0.243992+01	-0.220522+01	0.204021+02	0.230259+01	0.110000+02	0.746489+01	13	115
0.984173+01	0.144440+01	0.688248+01	0.910323+01	0.323944+01	0.617743+01	13	116
0.844622+01	0.502012+01	0.543992+01	0.747719+01	0.675618+01	0.472589+01	13	117
0.630416+01	0.847524+01	0.381706+01	0.517973+01	0.102024+02	0.261352+01	13	118
0.363932+01	0.119816+02	0.126672+01	0.203326+01	0.138488+02	-0.281246+00	13	119
0.431166+00	0.158149+02	-0.163719+01	-0.111158+01	0.179327+02	-0.223259+01	13	120
-0.207555+01	0.201675+02	0.270805+01	0.110000+02	0.738402+01	0.947679+01	13	121
0.101805+01	0.679233+01	0.910744+01	0.283834+01	0.645534+01	0.869083+01	13	122
0.463410+01	0.593615+01	0.767083+01	0.641086+01	0.507267+01	0.645823+01	13	123
0.816397+01	0.399293+01	0.514314+01	0.988682+01	0.273016+01	0.369022+01	13	124
0.110629+02	0.125042+01	0.210038+01	0.135458+02	-0.346491+00	0.483422+00	13	125
0.155069+02	-0.153978+01	-0.102302+01	0.176295+02	-0.199106+01	-0.183983+01	13	126
0.198539+02	0.311352+01	0.110000+02	0.821171+01	0.958877+01	0.759898+00	13	127
0.749622+01	0.911737+01	0.252660+01	0.684812+01	0.866268+01	0.429702+01	13	128
0.610949+01	0.775589+01	0.607646+01	0.523751+01	0.659806+01	0.783781+01	13	129
0.412076+01	0.519228+01	0.956704+01	0.271060+01	0.373437+01	0.113633+02	13	130
0.115136+01	0.231579+01	0.132279+02	-0.309112+00	0.641066+00	0.151861+02	13	131
-0.142400+01	-0.954696+00	0.173082+02	-0.178874+01	-0.166901+01	0.195197+02	13	132
.3526360+01	.1000000+02	.9527388+01	.1009831+02	.5437730-00	.8784053+01	1	1
.9621524+01	.2267134+01	.7835257+01	.8975160+01	.4031710+01	.6702759+01	1	2
.7787571+01	.5776938+01	.5453345+01	.6463332+01	.7507806+01	.4071800+01	1	3
.9049347+01	.9231748+01	.2443169+01	.3418635+01	.1100860+02	.7459965-00	1	4
.1807118+01	.1285621+02-.	.7569452-00	.1273043-00	.1477228+02-	.1568049+01	1	5
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-.1602892+01-.1464684+01 .1211844+02-.1632457+01-.1610881+01 .1415907+02  1  32
 .655108 +01  4.          .24476 +01  .347242+01  .234174      .865025
 .19149  +01 .185275 +01 -.474324      .414307      .346653+01 -.128128+01
-.89636       .507721 +01
        52
DIANE/SCAT  AL=108  TEMP(1.=7000.EV) 10 FREQ.  C1/WBL  10-26-67
 .1000000+02 .9430000+03
   3013.     .2300000+02                                                    1   0
 .0000000    .1300000+02 .1195794+02 .1354466+02 .1777143+01 .1174710+02  1   1
 .1366326+02 .3919002+01 .1128722+02 .1313726+02 .6338482+01 .1023696+02  1   2
 .1174988+02 .6643357+01 .8563120+01 .9919029+01 .1059967+02 .6477006+01  1   3
 .7918035+01 .1231677+02 .4301137+01 .6016570+01 .1404002+02 .2404366+01  1   4
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-.1625090+01 .7408888+01-.1637062+01-.1627587+01 .9280695+01-.1637189+01   1 128
-.1627962+01 .1132092+02-.1637206+01-.1628035+01 .1346098+02-.1637208+01   1 129
-.1628041+01 .1570294+02-.1637208+01-.1628042+01 .1806315+02 .7710685+01   1 130
 .1300000+02 .4938759-00 .3487134+01-.4727138+01-.6315942-00 .1977021+01   1 131
-.3112765+01-.1264069+01 .4949023-00-.1498269+01-.1530327+01-.8122249-00   1 132
```

```
 .1120147+00-.1613584+01-.1449221+01 .1724790+01-.1638131+01-.1606485+01   1 133
 .3334811+01-.1644244+01-.1635909+01 .5028711+01-.1645442+01-.1641119+01   1 134
 .6800691+01-.1645665+01-.1642028+01 .8672497+01-.1645701+01-.1642172+01   1 135
 .1071272+02-.1645706+01-.1642191+01 .1285278+02-.1645707+01-.1642193+01   1 136
 .1509475+02-.1645707+01-.1642193+01 .1745795+02 .6131531+01 .1300000+02   1 137
-.8229633-00 .1647494+01-.5342919+01-.1301177+01 .2308724-00-.3730753+01   1 138
-.1564692+01-.9640102-00-.2117172+01-.1630516+01-.1536394+01-.5051186-00   1 139
-.1644858+01-.1651549+01 .1105547+01-.1654604+01-.1667972+01 .2715549+01   1 140
-.1655745+01-.1670677+01 .4409445+01-.1655899+01-.1671090+01 .6181424+01   1 141
-.1655927+01-.1671162+01 .8053230+01-.1655932+01-.1671173+01 .1009345+02   1 142
-.1655932+01-.1671174+01 .1223352+02-.1655932+01-.1671175+01 .1447548+02   1 143
-.1655932+01-.1671175+01 .1668869+02 .8517193+01 .1300000+02-.1139984+01   1 144
 .9756247-00-.5919689+01-.1686517+01-.4238484-00-.4308613+01-.1606031+01   1 145
-.1336203+01-.2695462+01-.1642962+01-.1618121+01-.1083562+01-.1653135+01   1 146
-.1663578+01 .5270667-00-.1655472+01-.1670107+01 .2137058+01-.1655844+01   1 147
-.1671131+01 .3830952+01-.1655917+01-.1671319+01 .5602930+01-.1655930+01   1 148
-.1671352+01 .7474736+01-.1655932+01-.1671357+01 .9514957+01-.1655932+01   1 149
-.1671358+01 .1165502+02-.1655932+01-.1671358+01 .1384698+02-.1655932+01   1 150
-.1671358+01 .1626019+02 .6853665+01 .1300000+02-.1328309+01 .3564635-00   1 151
-.6428510+01-.1553601+01-.8995925-00-.4812993+01-.1626865+01-.1510764+01   1 152
-.3197502+01-.1648750+01-.1647092+01-.1588243+01-.1654363+01-.1667712+01   1 153
 .2236576-01-.1655696+01-.1670847+01 .1632351+01-.1655887+01-.1671355+01   1 154
 .3326244+01-.1655925+01-.1671450+01 .5098222+01-.1655931+01-.1671466+01   1 155
 .6970028+01-.1655932+01-.1671469+01 .9010249+01-.1655932+01-.1671469+01   1 156
 .1115032+02-.1655932+01-.1671469+01 .1339228+02-.1655932+01-.1671469+01   1 157
 .1575549+02 .0000000    .0000000    .0000000    .0000000    .0000000      1 158
       7
DIANE/SCAT  BE(HI/LO)=2 10 FREQ. TEMP(1.-2250.)  CI/JP  12-9-66  000000
 .1000000+02 .8610000+03
      1004. .2100000E+02
 .6000000    .1300000+02 .1120797+02 .1225239+02 .1817634+01 .1110633+02   1   1
 .1216590+02 .3993325+01 .1094825+02 .1199585+02 .6547831+01 .1052811+02   1   2
 .1165585+02 .9155944+01 .9569431+01 .1060220+02 .1145886+02 .7943660+01   1   3
 .8855362+01 .1334956+02 .5979154+01 .6997883+01 .1512141+02 .4015629+01   1   4
 .5201925+01 .1691895+02 .2354369+01 .3501411+01 .1885130+02 .9470235-00   1   5
 .2228171+01 .2113898+02-.6417287-00 .6746542-00 .2356899+02-.1886346+01   1   6
-.1171910+01 .2586707+02-.2331033+01-.2200430+01 .2825969+02 .4054651-00   1   7
 .1300000+02 .1268564+02 .1303914+02 .3304670+01 .1241557+02 .1273884+02   1   8
 .9381821+01 .1163673+02 .1233191+02 .7561255+01 .1074342+02 .1163475+02   1   9
 .9490022+01 .9380473+01 .1031799+02 .1182901+02 .7981574+01 .8902133+01   1  10
 .1295905+02 .6484169+01 .7424938+01 .1490002+02 .4706212+01 .5752500+01   1  11
 .1690217+02 .2671414+01 .3856456+01 .1885055+02 .5484357-00 .1780483+01   1  12
 .2090504+02-.1259626+01-.2827398-00 .2304705+02-.2158867+01-.1849065+01   1  13
 .2526925+02-.2376245+01-.2361553+01 .2765248+02 .6109302-00 .1300800+02   1  14
 .1251767+02 .1315402+02 .3603679+01 .1239196+02 .1278393+02 .5438854+01   1  15
 .1194456+02 .1257183+02 .7362686+01 .1095152+02 .1187088+02 .9220243+01   1  16
 .9479225+01 .1040993+02 .1108709+02 .7647003+01 .8520614+01 .1285512+02   1  17
 .5647541+01 .6529721+01 .1460113+02 .3617277+01 .4598206+01 .1638455+02   1  18
 .1973679+01 .2650190+01 .1825844+02-.3755846-00 .5765313-00 .2029900+02   1  19
-.1719596+01-.1289627+01 .2245911+02-.2241056+01-.2213466+01 .2468108+02   1  20
-.2399278+01-.2387669+01 .2704429+02 .1223775+01 .1300000+02 .1142509+02   1  21
 .1288465+02 .3418578+01 .1128845+02 .1256276+02 .5272824+01 .1074543+02   1  22
 .1190148+02 .7122534+01 .9781961+01 .1076499+02 .8991153+01 .8290559+01   1  23
 .8998869+01 .1065715+02 .6578982+01 .7128569+01 .1229403+02 .4730859+01   1  24
 .5242396+01 .1399425+02 .2808336+01 .3365830+01 .1276749+02 .8670880-00   1  25
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.1437230+01	.1763952+02	-.9129302-00	-.5093937-00	.1967978+02	-.1994287+01	1	26
-.1905233+01	.2181985+02	-.2362246+01	-.2341091+01	.2406181+02	-.2420126+01	1	27
-.2401655+01	.2642502+02	.1609438+01	.1300000+02	.1009802+02	.1227335+02	1	28
.3142451+01	.9586459+01	.1167571+02	.4965120+01	.8755885+01	.1078577+02	1	29
.6739154+01	.7556899+01	.9403846+01	.8449571+01	.6134104+01	.7676116+01	1	30
.1010089+02	.4586082+01	.5877897+01	.1172067+02	.2918190+01	.4049461+01	1	31
.1341676+02	.1195363+01	.2211847+01	.1518917+02	-.4370335-00	.3592745-00	1	32
.1706105+02	-.1704313+01	-.1345231+01	.1910129+02	-.2282687+01	-.2202374+01	1	33
.2124139+02	-.2409045+01	-.2384154+01	.2348366+02	-.2421131+01	-.2402032+01	1	34
.2585018+02	.1945910+01	.1300000+02	.8962691+01	.1154172+02	.2086789+01	1	35
.6123342+01	.1062299+02	.4570132+01	.7091598+01	.9556583+01	.6290296+01	1	36
.5788412+01	.8095816+01	.7963156+01	.4335203+01	.6439996+01	.9600912+01	1	37
.2802656+01	.4747963+01	.1121704+02	.1206059+01	.2992756+01	.1291236+02	1	38
-.2689678-00	.1217446+01	.1466508+02	-.1366610+01	-.4612911-00	.1656004+02	1	39
-.2013568+01	-.1573060+01	.1862523+02	-.2160202+01	.1902212+01	.2088788+02	1	40
-.2061069+01	-.1983516+01	.2332230+02	-.2025011+01	.2000063+01	.2574097+02	1	41
.2302505+01	.1300000+02	.8012773+01	.1089769+02	.2422371+01	.7003243+01	1	42
.9858483+01	.4088954+01	.5848217+01	.8568297+01	.5779189+01	.4498615+01	1	43
.7111149+01	.7436405+01	.5100603+01	.5596709+01	.9070758+01	.1869371+01	1	44
.4174138+01	.1069575+02	.1017652+01	.3051035+01	.1243880+02	.2634995-00	1	45
.2175162+01	.1435544+02	-.7806009-00	.8724764-00	.1637442+02	-.1620614+01	1	46
-.7165070-00	.1846501+02	-.1898668+01	-.1610816+01	.2064876+02	-.1827719+01	1	47
-.1744798+01	.2302719+02	-.1747106+01	-.1720694+01	.2548419+02	.2708050+01	1	48
.1300000+02	.7568834+01	.1005923+02	.1858524+01	.6422863+01	.9460926+01	1	49
.3570504+01	.5383211+01	.8485695+01	.5234721+01	.4565944+01	.7440086+01	1	50
.6917149+01	.3786768+01	.6437063+01	.8682122+01	.2635593+01	.5188409+01	1	51
.1042438+02	.1365566+01	.3727079+01	.1218825+02	.3419087-00	.2378167+01	1	52
.1405095+02	-.7075832-00	.1017491+01	.1604569+02	-.1450052+01	-.5547144-00	1	53
.1813685+02	-.1691659+01	-.1480065+01	.2028541+02	-.1727797+01	-.1687253+01	1	54
.2252842+02	-.1731848+01	-.1712302+01	.2489174+02	.3113515+01	.1300000+02	1	55
.8310048+01	.1061430+02	.1410869+01	.7504452+01	.1015099+02	.3105112+01	1	56
.6621957+01	.9082373+01	.4868752+01	.5499829+01	.7763178+01	.6624582+01	1	57
.4267336+01	.6454096+01	.8347537+01	.2927645+01	.5148838+01	.1007386+02	1	58
.1347382+01	.3614620+01	.1183302+02	-.2582419-00	.1907479+01	.1362240+02	1	59
-.1245434+01	.1208727+00	.1549749+02	-.1610924+01	-.1195359+01	.1753824+02	1	60
-.1699535+01	-.1440000+01	.1907838+02	-.1723044+01	-.1708478+01	.2192035+02	1	61
-.1731[illegible]	-.1711[illegible]	.2[illegible]	.[illegible]	.1[illegible]	.[illegible]	1	62
.1[illegible]	.2[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1	63
.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	.[illegible]	1	64
.5[illegible]	.7[illegible]	.2[illegible]	.4[illegible]	.[illegible]	.[illegible]	1	65
.2925382+01	.1123415+02	-.8270934-00	.7220613-00	.1300007+02	-.1333415+01	1	66
-.7052350-00	.1407801+02	-.1606200+01	-.1551015+01	.1691905+02	-.1701602+01	1	67
-.1692639+01	.1905912+02	-.1706514+01	-.1699670+01	.2130108+02	-.1706781+01	1	68
-.1700206+01	.2366429+02	.3912023+01	.1300000+02	.9115052+01	.1024072+02	1	69
.6065458-00	.8389852+01	.9364286+01	.2337080+01	.7125858+01	.8037130+01	1	70
.4063329+01	.5366178+01	.6412067+01	.5725783+01	.3478264+01	.4731306+01	1	71
.7344453+01	.1702169+01	.3071482+01	.8961991+01	.1717367-00	.1391040+01	1	72
.1065643+02	-.8067868-00	-.2198786-00	.1242851+02	-.1487678+01	-.1348741+01	1	73
.1430033+02	-.1655019+01	-.1645107+01	.1634056+02	-.1668715+01	-.1668839+01	1	74
.1848063+02	-.1671596+01	-.1672592+01	.2072259+02	-.1671699+01	-.1672808+01	1	75
.2308580+02	.4248895+01	.1300000+02	.7815535+01	.9523183+01	.2202117-00	1	76
.7094317+01	.8482553+01	.1928862+01	.5740937+01	.6916580+01	.3595562+01	1	77
.4182816+01	.5264006+01	.5231267+01	.2533360+01	.3652411+01	.6896983+01	1	78
.9044832-00	.2000058+01	.8457789+01	-.5435062-00	.3796611-00	.1015181+02	1	79
-.1365640+01	-.1007297+01	.1192382+02	-.1611417+01	-.1568466+01	.1379563+02	1	80

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-.1644338+01-.1641033+01 .1583585+02-.1647292+01-.1647920+01 .1797592+02   1  81
-.1647550+01-.1648612+01 .2021768+02-.1647574+01-.1648682+01 .2258109+02   1  82
 .4605170+01 .1300000+02 .6301667+01 .6590840+01-.2599055-00 .5373403+01   1  83
 .7456036+01 .1431346+01 .3992837+01 .5891890+01 .3072415+01 .2483575+01   1  84
 .4275959+01 .4699180+01 .9283376-00 .2678337+01 .6312595+01-.4333193-00   1  85
 .1100968+01 .7922866+01-.1259205+01-.4853311-00 .9616819+01-.1563802+01   1  86
-.1409663+01 .1138681+02-.1630126+01-.1611795+01 .1326062+02-.1639158+01   1  87
-.1636561+01 .1530084+02-.1640254+01-.1639525+01 .1744090+02-.1639974+01   1  88
-.1639265+01 .1968266+02-.1639988+01-.1639303+01 .2204608+02 .5010635+01   1  89
 .1300000+02 .4980758+01 .7741457+01-.7930319-00 .3685565+01 .6374490+01   1  90
 .8395990-00 .2217061+01 .4793556+01 .2469221+01 .7299957-00 .3227999+01   1  91
 .4092137+01-.5534607-00 .1630960+01 .5704644+01-.1261025+01 .9134291-01   1  92
 .7314720+01-.1538346+01-.1121541+01 .9048631+01-.1620594+01-.1558103+01   1  93
 .1078001+02-.1638911+01-.1635307+01 .1265242+02-.1642050+01-.1640564+01   1  94
 .1469264+02-.1642435+01-.1641638+01 .1683271+02-.1642812+01-.1643106+01   1  95
 .1907467+02-.1642818+01-.1643123+01 .2143788+02 .5416100+01 .1300000+02   1  96
 .2057163+01 .5663006+01-.1383448+01 .1238225+01 .4240272+01 .2394243-00   1  97
-.1249268+00 .3125829+01 .1862965+01-.1045002+01 .1591037+01 .3484431+01   1  98
-.1457778+01 .8543853-01 .5096552+01-.1599457+01-.1285696+01 .6706544+01   1  99
-.1642563+01-.1616498+01 .8400438+01-.1653800+01-.1667178+01 .1017242+02   1 100
-.1656040+01-.1672810+01 .1204422+02-.1656349+01-.1673525+01 .1408444+02   1 101
-.1656394+01-.1673618+01 .1622451+02-.1656399+01-.1673630+01 .1846647+02   1 102
-.1656400+01-.1673631+01 .2082968+02 .5028946+01 .1300000+02 .1921166+01   1 103
 .4927491+01-.1993847+01 .4900692-00 .3461669+01-.3764745-00-.6793498-00   1 104
 .1945088+01 .1244649+01-.1310023+01 .4225815-00 .2865423+01-.1551595+01   1 105
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-.1673631+01 .2021041+02 .6214608+01 .1300000+02 .1217859+01 .4219604+01   1 110
-.2567936+01-.1175628+00 .2755439+01-.9356738-00-.1046258+01 .1211116+01   1 111
 .6799794-00-.1459035+01-.2659074-00 .2287060+01-.1599041+01-.1281994+01   1 112
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 .1502675+02-.1656400+01-.1673631+01 .1726871+02-.1656400+01-.1673631+01   1 116
 .1963192+02 .6551060+01 .1300000+02 .6107720-00 .3590575+01-.3070379+01   1 117
-.5888048-00 .2106207+01-.1439723+01-.1270268+01 .5671553-00 .1705083-00   1 118
-.1537823+01-.7808958-00 .1782422+01-.1623298+01-.1484073+01 .3394183+01   1 119
-.1648166+01-.1646599+01 .5004095+01-.1654809+01-.1669968+01 .6697972+01   1 120
-.1656152+01-.1673088+01 .6469947+01-.1656360+01-.1673547+01 .1034175+02   1 121
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-.1656400+01-.1673631+01 .1676400+02-.1656400+01-.1673631+01 .1912721+02   1 123
 .6907755+01 .1300000+02 .1144339-01 .2914892+01-.3603923+01-.9568424-00   1 124
 .1015971+01-.1974295+01-.1425373+01-.8322386-01-.3643437-00-.1588543+01   1 125
-.1489783+01 .1247458+01-.1638246+01-.1592237+01 .2859182+01-.1652206+01   1 126
-.1664263+01 .4469085+01-.1655753+01-.1672060+01 .6162960+01-.1656275+01   1 127
-.1673364+01 .7934935+01-.1656360+01-.1673590+01 .9806740+01-.1656397+01   1 128
-.1673626+01 .1184696+02-.1656399+01-.1673630+01 .1398703+02-.1656400+01   1 129
-.1673631+01 .1622899+02-.1656400+01-.1673631+01 .1859220+02 .7313220+01   1 130
 .1300000+02-.5602227-00 .2138561+01-.4211143+01-.1249109+01 .6391202-00   1 131
-.2582184+01-.1530788+01-.7278077-00-.9784276-00-.1620877+01-.1466121+01   1 132
 .6392954-00-.1647582+01-.1643705+01 .2250992+01-.1654488+01-.1669174+01   1 133
 .3000889+01-.1656085+01-.1672932+01 .5594762+01-.1656342+01-.1673511+01   1 134
 .7386737+01-.1656389+01-.1673612+01 .9198542+01-.1656397+01-.1673628+01   1 135
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 .1123876+02-.1656398+01-.1673630+01 .1337883+02-.1656398+01-.1673630+01   1 136
 .1562079+02-.1656398+01-.1673630+01 .1798400+02 .7718685+01 .1300000+02   1 137
-.9830670-00 .1558213+01-.4816798+01-.1428523+01-.1000251+00-.3190194+01   1 138
-.1589464+01-.1198634+01-.1580531+01-.1638578+01-.1594099+01 .3112217-01   1 139
-.1652269+01-.1662461+01 .1642800+01-.1655709+01-.1671941+01 .3252693+01   1 140
-.1656251+01-.1673316+01 .4996565+01-.1656371+01-.1673574+01 .6718539+01   1 141
-.1656392+01-.1673614+01 .8590344+01-.1656396+01-.1673625+01 .1063057+02   1 142
-.1656396+01-.1673626+01 .1277063+02-.1656396+01-.1673626+01 .1501259+02   1 143
-.1656396+01-.1673626+01 .1737580+02 .0000000     .0000000     .0000000     1 144
     1060000
C-4A,14 FREQ, TEMP(.12925-10),2-3-66  REMADE 3-28-67, 4 DENSITIES DELETED
 .1400000+04 .7860000+03
  1000.      .2100000+02
-.2045970+01 .1200000+02 .6257760+01 .1197990+02 .1334230+01 .6257920+01   1   1
 .1198010+02 .2432970+01 .6258000+01 .1198020+02 .3637130+01 .6258130+01   1   2
 .1198030+02 .4735950+01 .6258230+01 .1198040+02 .5940220+01 .6258280+01   1   3
 .1198040+02 .7039180+01 .6258390+01 .1198050+02 .8243650+01 .6258530+01   1   4
 .1198050+02 .9342840+01 .6258670+01 .1198060+02 .1054760+02 .6259370+01   1   5
 .1198060+02 .1164720+02 .6260370+01 .1198060+02 .1285260+02 .6262020+01   1   6
 .1198070+02 .1395300+02-.1756290+01 .1200000+02 .7148200+01 .1177020+02   1   7
 .1625190+01 .7149140+01 .1177090+02 .2725100+01 .7150500+01 .1177170+02   1   8
 .3930900+01 .7152110+01 .1177220+02 .5031760+01 .7155070+01 .1177270+02   1   9
 .6238860+01 .7159600+01 .1177300+02 .7341440+01 .7167390+01 .1177310+02   1  10
 .8551450+01 .7176520+01 .1177260+02 .9657950+01 .7186140+01 .1177120+02   1  11
 .1087480+02 .7190980+01 .1176800+02 .1199160+02 .7188570+01 .1175980+02   1  12
 .1322780+02 .7175010+01 .1174310+02 .1437570+02-.1535150+01 .1200000+02   1  13
 .7727940+01 .1139530+02 .1860800+01 .7733510+01 .1139740+02 .2965470+01   1  14
 .7742800+01 .1139900+02 .4176770+01 .7753630+01 .1139940+02 .5289770+01   1  15
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 .7777780+01 .1137760+02 .8900200+01 .7794480+01 .1134530+02 .1008040+02   1  17
 .7677840+01 .1126060+02 .1143250+02 .7505160+01 .1107800+02 .1273390+02   1  18
 .7095360+01 .1064330+02 .1418760+02 .6520550+01 .1001560+02 .1544130+02   1  19
-.1552620+01 .1200000+02 .8216230+01 .1102230+02 .2077400+01 .8230050+01   1  20
 .1102430+02 .3198560+01 .8245760+01 .1102130+02 .4441330+01 .8252660+01   1  21
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 .8195400+01 .9816410+01 .1324670+02 .7850550+01 .9423800+01 .1459490+02   1  37
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 .2324790+01 .1094970+02 .1186000+02 .3609170+01 .1079640+02 .1172900+02   1 101
 .4595250+01 .1049070+02 .1137170+02 .6100000+01 .9732300+01 .1076500+02   1 102
 .7594280+01 .8944720+01 .1006780+02 .8830370+01 .8033860+01 .9022990+01   1 103
 .1012010+02 .7227090+01 .8152920+01 .1130420+02 .6291170+01 .7281500+01   1 104
 .1206430+02 .4050510+01 .5399160+01 .1529670+02 .1700250+01 .3101850+01   1 105
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 .1609440+01 .1200000+02 .1160650+02 .1189920+02 .2435770+01 .1145150+02   1 113
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 .7691350+01 .8164670+01 .9177020+01 .6371760+01 .6932190+01 .1031950+02   1 129
 .4870660+01 .5605220+01 .1154330+02 .2238430+01 .3159010+01 .1385470+02   1 130
-.1538510-02 .8333960-00 .1615820+02-.1358980+01-.1070520+01 .1846090+02   1 131
          54
DIANE/SCAT  C-1A  TEMP(1-2250 EV) 11-7-67  SADT INPUT TAPES(1303,1159)
 .1000000+01 .8610000+03
    3000.    .2100000+02                                                   1   0
 .0000000    .1300000+02 .6606878+01 .9820556+01-.1296147+01 .6764705+01   1   1
 .9795294+01 .9102065-00 .6756538+01 .9579939+01 .3544070+01 .6698247+01   1   2
 .9587894+01 .6415692+01 .6499031+01 .9101728+01 .9367875+01 .5979535+01   1   3
 .8421956+01 .1215713+02 .4857572+01 .6961544+01 .1456576+02 .3188336+01   1   4
 .5266941+01 .1656805+02 .1273977+01 .3354430+01 .1848699+02-.7362190-00   1   5
 .1264200+01 .2053533+02-.2373932+01-.6353852-00 .2267964+02-.3100166+01   1   6
-.2481413+01 .2495091+02-.3083827+01-.2947838+01 .2751901+02 .4054651-00   1   7
 .1300000+02 .9533645+01 .1151485+02 .1218917+01 .9381120+01 .1143385+02   1   8
 .9573113+01 .9202302+01 .1121304+02 .6102297+01 .8646091+01 .1070680+02   1   9
 .8051143+01 .7466477+01 .9487384+01 .1073897+02 .5902082+01 .7743084+01   1  10
 .1250431+02 .4203384+01 .5952477+01 .1424021+02 .2636864+01 .4173534+01   1  11
 .1609387+02 .1402289+01 .2673865+01 .1804059+02 .1580685-00 .1382059+01   1  12
 .2039951+02-.1407179+01-.3627992-00 .2272434+02-.2417229+01-.1987483+01   1  13
 .2499904+02-.2675778+01-.2600041+01 .2736700+02 .8109302-00 .1300000+02   1  14
 .1114380+02 .1210130+02 .2434420+01 .1083171+02 .1176498+02 .4638560+01   1  15
 .1813848+02 .1114215+02 .6762769+01 .9114142+01 .1015099+02 .8638609+01   1  16
 .7864337+01 .8841002+01 .1036561+02 .6650536+01 .7612686+01 .1213198+02   1  17
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.1458859+01	.2841439+01	.1796932+02-.	.2668597-00	.9061521-00	.2005444+02	1	19
-.1577982+01-.	.6883283-00	.2235510+02-.	.2109404+01-.	.1833993+01	.2476142+02	1	20
-.2273112+01-.	.2227664+01	.2716408+02	.1223775+01	.1300000+02	.1183807+02	1	21
.1219252+02	.2693651+01	.1131986+02	.1172617+02	.4647583+01	.1045933+02	1	22
.1135997+02	.6536379+01	.9204761+01	.1064858+02	.8420349+01	.7749817+01	1	23
.9294581+01	.1027071+02	.6333694+01	.7679511+01	.1200990+02	.4984353+01	1	24
.6133920+01	.1382079+02	.3469849+01	.4631637+01	.1576545+02	.1667311+01	1	25
.2872528+01	.1774285+02-.	.1370937-00	.9843153-00	.1985577+02-.	.1406124+01	1	26
-.6364230-00	.2213738+01-.	.1876029+01-.	.1696893+01	.2445557+02-.	.2000143+01	1	27
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.2667112+01	.1137215+02	.1184401+02	.4514546+01	.1054995+02	.1146572+02	1	29
.6400813+01	.9605425+01	.1061400+02	.8225306+01	.8274195+01	.9277375+01	1	30
.1002754+02	.6659671+01	.7693746+01	.1179019+02	.5007292+01	.5989510+01	1	31
.1359338+02	.3310538+01	.4351566+01	.1549396+02	.1379474+01	.2566205+01	1	32
.1744552+02-.	.5084473-00	.5659538-00	.1950505+02-.	.1617564+01-.	.1137194+01	1	33
.2164789+02-.	.1948238+01-.	.1864787+01	.2389018+02-.	.2004897+01-.	.1986544+01	1	34
.2625343+02	.1945910+01	.1300000+02	.1142945+02	.1211812+02	.2539882+01	1	35
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.9611972+01	.1040180+02	.8015253+01	.8127835+01	.8928677+01	.9784286+01	1	37
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.2409745+01	.3611940+01	.1508663+02	.4438287-00	.1629638+01	.1696250+02	1	39
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.7209719+01	.5769000+01	.6588700+01	.8859835+01	.4109399+01	.4851636+01	1	51
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.6417102+01	.8593470+01	.4963512+01	.5139524+01	.7055435+01	.6625885+01	1	57
.3687101+01	.5383447+01	.8258150+01	.2178084+01	.3713048+01	.9873744+01	1	58
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.5055593+01	.7693094+01	.1785726+01	.4036041+01	.9389228+01	.6226522-00	1	65
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-.1622537+01-.1601185+01 .1210345+02-.1625628+01-.1609807+01 .1420367+02   1 101
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-.1692795+01-.1618139+01 .5123554+01-.1653149+01-.1663843+01 .6817204+01   1 120
-.1655360+01-.1669880+01 .8589174+01-.1655681+01-.1670707+01 .1046098+02   1 121
-.1655727+01-.1670830+01 .1250120+02-.1655733+01-.1670846+01 .1464127+02   1 122
-.1655734+01-.1670848+01 .1688323+02-.1655734+01-.1670848+01 .1924644+02   1 123
 .6907755+01 .1300000+02 .4137381-00 .3377297+01-.3479990+01-.7188094-00   1 124
 .1877365+01-.1866084+01-.1321200+01 .3798146-00-.2437243-00-.1554106+01   1 125
-.9059913-00 .1367537+01-.1627621+01-.1517426+01 .2978579+01-.1648850+01   1 126
-.1648515+01 .4588346+01-.1654325+01-.1607547+01 .6282192+01-.1655570+01   1 127
```

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-.1670398+01 .8054162+01-.1655700+01-.1670779+01 .9925965+01-.1655731+01   1 128
-.1670839+01 .1196619+02-.1655734+01-.1670847+01 .1410625+02-.1655734+01   1 129
-.1670848+01 .1634821+02-.1655734+01-.1670848+01 .1871142+02 .7513220+01   1 130
 .1300000+02-.2260034-00 .2615656+01-.4085608+01-.2 82614+01 .1121463+01   1 131
-.2401720+01-.1470533+01-.3318500-00-.6517030-00-.1802024+01-.1306573+01   1 132
 .7554038-00-.1641669+01-.1612391+01 .2370396+01-.1652604+01-.1622283+01   1 133
 .3980151+01-.1655186+01-.1669532+01 .5673995+01-.1655659+01-.1670648+01   1 134
 .7445964+01-.1655722+01-.1670818+01 .9317769+01-.1655733+01-.1670844+01   1 135
 .1135799+02-.1655734+01-.1670848+01 .1349806+02-.1655734+01-.1670848+01   1 136
 .1574002+02-.1655734+01-.1670848+01 .1810323+02 .7718685+01 .1300000+02   1 137
-.7373354-00 .1844760+01-.4692567+01-.1326724+01 .3565200-00-.3969563+01   1 138
-.1555657+01-.9180342-00-.1459772+01-.1628085+01-.1520655+01 .1512447-00   1 139
-.1648948+01-.1648909+01 .1782207+01-.1654226+01-.1667286+01 .3371955+01   1 140
-.1655544+01-.1670325+01 .5065796+01-.1655700+01-.1670759+01 .6837767+01   1 141
-.1655749+01-.1670835+01 .8709571+01-.1655733+01-.1670847+01 .1074979+02   1 142
-.1655734+01-.1670848+01 .1288986+02-.1655734+01-.1670848+01 .1513182+02   1 143
-.1655734+01-.1670848+01 .1749503+02 .0000000     .0000000     .0000000     1 144
          10
DIANE/SCAT  CF2-10A  C1/JT. REDO OF RUN 1-6-67. TEMP(1-2250), TAPE 1432
 .1000000+02 .8550000+03
 1103.       .2100000+02
 .0000000    .1300000+02 .7547093+01 .1106047+02-.2711039+01 .7504877+01   1   1
 .1147181+02-.5046785-00 .7329407+01 .1134207+02 .2129211+01 .6911944+01   1   2
 .1061840+02 .5000953+01 .6286152+01 .9277879+01 .7953599+01 .5447278+01   1   3
 .7833045+01 .1074504+02 .4128678+01 .6245991+01 .1317273+02 .2422501+01   1   4
 .4524271+01 .1527754+02 .7572899-00 .2857816+01 .1756259+02-.9123004-00   1   5
 .1204010+01 .2005305+02-.2598435+01-.7835944-00 .2232766+02-.3462862+01   1   6
-.2620579+01 .2459823+02-.3586981+01-.3427494+01 .2703830+02 .4054651-00   1   7
 .1300000+02 .1050219+02 .1263291+02-.1209925+00 .1039524+02 .1243032+02   1   8
 .2236599+01 .9966466+01 .1220121+02 .4837487+01 .9037897+01 .1107862+02   1   9
 .7379847+01 .7589954+01 .9578130+01 .9645451+01 .5983739+01 .7496177+01   1  10
 .1176509+02 .4244195+01 .6358602+01 .1378998+02 .2440801+01 .4578801+01   1  11
 .1567305+02 .7927934-00 .2729488+01 .1760940+02-.7711164-00 .4925357-00   1  12
 .1970405+02-.2347.66+01-.1030345+01 .2202462+02-.3108067+01-.2568168+01   1  13
 .2437796+02-.3091077+01-.2992274+01 .2695623+02 .8109302-00 .1300000+02   1  14
 .1232213+02 .1317855+02 .1400495+01 .1196697+02 .1274353+02 .3705175+01   1  15
 .1112058+02 .1259827+02 .6022170+01 .9629633+01 .1134526+02 .8123408+01   1  16
 .7814211+01 .9646713+01 .9952561+01 .6085647+01 .7932220+01 .1167164+02   1  17
 .4436394+01 .8139171+01 .1350222+02 .2654719+01 .4301271+01 .1542464+02   1  18
 .1016477+01 .2584551+01 .1749012+02-.7465219-00 .7321004-00 .1966886+02   1  19
-.2149399+01-.1109638+01 .2189289+02-.2723852+01-.2408266+01 .2420650+02   1  20
-.2833695+01-.2779773+01 .2661304+02 .1223775+01 .1300000+02 .1291690+02   1  21
 .1335762+02 .2144234+01 .1251562+02 .1304898+02 .4172065+01 .1115468+02   1  22
 .1242677+02 .6097090+01 .9483633+01 .1102205+02 .7913693+01 .7632586+01   1  23
 .9426291+01 .9732046+01 .6027615+01 .7760642+01 .1154806+02 .4455503+01   1  24
 .6012017+01 .1338005+02 .2781280+01 .4215401+01 .1525876+02 .1035288+01   1  25
 .2360239+01 .1721463+02-.6006330-00 .5641446-00 .1939441+02-.1842721+01   1  26
-.1122354+01 .2166547+02-.2302978+01-.2208255+01 .2395715+02-.2460043+01   1  27
-.2428957+01 .2637137+02 .1609438+01 .1300000+02 .1290064+02 .1326608+02   1  28
 .2193189+01 .1225688+02 .1296462+02 .4046000+01 .1103537+02 .1228752+02   1  29
 .5934284+01 .9419351+01 .1095172+02 .7781876+01 .7884035+01 .9330686+01   1  30
 .9556388+01 .6275537+01 .7649596+01 .1129968+02 .4679412+01 .5854646+01   1  31
 .1313830+02 .2893466+01 .4009520+01 .1503058+02 .1008895+01 .2154151+01   1  32
 .1697772+02-.7484303-00 .3158765-00 .1911014+02-.1868075+01-.1333371+01   1  33
 .2131135+02-.2227604+01-.2122992+01 .2359088+02-.2219911+01-.2198324+01   1  34
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 .2603675+02 .1945910+01 .1300000+02 .1208217+02 .1310988+02 .2111182+01   1  35
 .1222513+02 .1305626+02 .3923891+01 .1111941+02 .1224815+02 .5755051+01   1  36
 .9593127+01 .1081031+02 .7559865+01 .7917677+01 .9032160+01 .9346267+01   1  37
 .6133008+01 .7183294+01 .1108371+02 .9240368+01 .5405548+01 .1288384+01   1  38
 .2521637+01 .3643440+01 .1473961+02 .7933640-00 .1819631+01 .1667003+02   1  39
-.6476808-00 .2424725-01 .1678966+02-.1798565+01-.1435198+01 .2098289+02   1  40
-.2038617+01-.1971696+01 .2329495+02-.2046148+01-.2028262+01 .2571173+02   1  41
 .2302565+01 .1300000+02 .1207132+02 .1291625+02 .1932369+01 .1174678+02   1  42
 .1275636+02 .3726653+01 .1085233+02 .1169052+02 .5514187+01 .9250095+01   1  43
 .1001772+02 .7305630+01 .7366324+01 .6280637+01 .9064077+01 .5666555+01   1  44
 .6572273+01 .1077247+02 .4040449+01 .4904632+01 .1255145+02 .2283293+01   1  45
 .3218711+01 .1439523+02 .4576852-00 .1479561+01 .1634014+02-.1058264+01   1  46
-.3001990-00 .1844397+02-.1726168+01-.1491579+01 .2064953+02-.1906957+01   1  47
-.1873771+01 .2292215+02-.1938641+01-.1923261+01 .2528998+02 .2708050+01   1  48
 .1300000+02 .1120083+02 .1239450+02 .1655040+01 .1099385+02 .1185127+02   1  49
 .3420870+01 .1019670+02 .1070806+02 .5199428+01 .8639491+01 .9180380+01   1  50
 .6949265+01 .6944064+01 .7666684+01 .8678281+01 .5291292+01 .6097164+01   1  51
 .1037990+02 .3594073+01 .4413232+01 .1214997+02 .1737241+01 .2688730+01   1  52
 .1398579+02-.5518045-01 .8726654-00 .1588879+02-.1377007+01-.8520809-00   1  53
 .1793598+02-.1844236+01-.1732904+01 .2007740+02-.1920666+01-.1902284+01   1  54
 .2232276+02-.1915054+01-.1902533+01 .2470601+02 .3113515+01 .1300000+02   1  55
 .1018901+02 .1151825+02 .1308266+01 .1004031+02 .1083787+02 .3060165+01   1  56
 .9407133+01 .9873286+01 .4806803+01 .8005715+01 .8457803+01 .6544097+01   1  57
 .6365100+01 .8896816+01 .8251274+01 .4446723+01 .5184160+01 .9921783+01   1  58
 .2478079+01 .3376966+01 .1163937+02 .5979061-00 .1586047+01 .1342115+02   1  59
-.8255054-00-.7279111-01 .1531133+02-.1574990+01-.1321072+01 .1737558+02   1  60
-.1805924+01-.1775184+01 .1952669+02-.1847625+01-.1832462+01 .2179513+02   1  61
-.1839301+01-.1824817+01 .2417628+02 .3526360+01 .1100000+02 .9335017+01   1  62
 .1061510+02 .9011609-00 .9037718+01 .9990143+01 .2622758+01 .8337021+01   1  63
 .8941933+01 .4360086+01 .7026176+01 .7396654+01 .6053299+01 .5225624+01   1  64
 .5708013+01 .7715132+01 .3386409+01 .4107867+01 .9359222+01 .1661548+01   1  65
 .2493217+01 .1107681+02 .1076416+00 .8789439-00 .1286910+02-.1083063+01   1  66
-.5807231-00 .1476572+02-.1670591+01-.1538320+01 .1681319+02-.1813069+01   1  67
-.1784197+01 .1095489+02 .3912023+01 .1300000+02 .8806815+01 .9867212+01   1  68
 .4626488-00 .8272968+01 .9181931+01 .2169827+01 .7298558+01 .7990686+01   1  69
 .3877198+01 .5045310+01 .5466525+01 .5550705+01 .4168806+01 .4904684+01   1  70
 .7199860+01 .4533027+01 .3401136+01 .8430521+01 .8340384-00 .1747673+01   1  71
 .1054775+02-.6534982-00 .1021398+00 .1232555+02-.1457158+01-.1124961+01   1  72
 .1420803+02-.1698337+01-.1603699+01 .1628721+02-.1722890+01-.1697550+01   1  73
 .1847190+02-.1693911+01-.1677565+01 .2075899+02-.1661205+01-.1647003+01   1  74
 .2315724+02 .4246495+01 .1300000+02-.1435773+02 .9303107+01 .6326289-01   1  75
-.7162723+01 .8449997+01 .1754968+01 .6556547+01 .7197189+01 .3435111+01   1  76
 .4953545+01 .5683273+01 .5095320+01 .5244823+01 .4163405+01 .6734417+01   1  77
 .1584277+01 .2719970+01 .8364866+01 .2376625-00 .1447175+01 .1009368+02   1  78
-.8088574-00 .2272944-00 .1911111+02-.1399604+01-.8357070-00 .1382809+02   1  79
-.1604005+01-.1446905+01 .1590387+02-.1648169+01-.1614080+01 .1805279+02   1  80
-.1653900+01-.1637373+01 .2029594+02-.1654676+01-.1639923+01 .2265928+02   1  81
 .4605170+01 .1300000+02 .8119366+01 .8862914+01-.3970450-00 .7247980+01   1  82
 .7824622+01 .1286051+01 .5884590+01 .6498597+01 .2951666+01 .4316667+01   1  83
 .5221321+01 .4615778+01 .2811858+01 .4016592+01 .6277778+01 .1435186+01   1  84
 .2784499+01 .7937137+01 .5530385-01 .1375180+01 .9672264+01-.1028285+01   1  85
-.1083551+00 .1146220+02-.1512191+01-.1190198+01 .1333804+02-.1624243+01   1  86
-.1569919+01 .1537894+02-.1645872+01-.1632871+01 .1751910+02-.1653722+01   1  87
-.1639939+01 .1976107+02-.1654305+01-.1640335+01 .2212428+02 .5018635+01   1  88
 .1300000+02 .7760547+01 .8485655+01-.9311653-00 .6768803+01 .7510131+01   1  89
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 .7556330-00 .5439967+01 .6305374+01 .2441574+01 .3874823+01 .4968027+01  1  90
 .4110986+01 .2178506+01 .3548358+01 .5765703+01 .5685394-00 .1987636+01  1  91
 .7368869+01-.6988479-00 .4066073-00 .9046055+01-.1312591+01-.8798327-00  1  92
 .1085868+02-.1543321+01-.1493124+01 .1273060+02-.1636498+01-.1624145+01  1  93
 .1477084+02-.1647931+01-.1635237+01 .1691091+02-.1648622+01-.1636056+01  1  94
 .1915287+02-.1648667+01-.1636127+01 .2151608+02 .5416100+01 .1300000+02  1  95
 .7120055+01 .8037009+01-.1450449+01 .6313749+01 .7017744+01 .2419597-00  1  96
 .4933084+01 .5607610+01 .1912892+01 .3163228+01 .4009760+01 .3552805+01  1  97
 .1404750+01 .2440166+01 .5172494+01-.1627668-01 .8591304-00 .6784272+01  1  98
-.9651690-00-.5900486-00 .8476551+01-.1481712+01-.1395612+01 .1025060+02  1  99
-.1619917+01-.1600575+01 .1212342+02-.1634515+01-.1622565+01 .1416265+02  1 100
-.1639885+01-.1624897+01 .1630271+02-.1636002+01-.1625136+01 .1854467+02  1 101
-.1636015+01-.1625161+01 .2090708+02 .5828946+01 .1300000+02 .5725977+01  1 102
 .7259279+01-.1990605+01 .4751830+01 .5962737+01-.3243730-00 .3390836+01  1 103
 .4416763+01 .1317130+01 .1806731+01 .2793429+01 .2939995+01 .2691323-00  1 104
 .1235008+01 .4556728+01-.8977662-00-.2043952-00 .6165321+01-.1459938+01  1 105
-.1254400+01 .7859343+01-.1602571+01-.1563955+01 .9631346+01-.1623154+01  1 106
-.1607824+01 .1150316+02-.1626097+01-.1614039+01 .1354338+02-.1626399+01  1 107
-.1614755+01 .1568344+02-.1626435+01-.1614640+01 .1792540+02-.1626439+01  1 108
-.1614849+01 .2028801+02 .6214006+01 .1300000+02 .4057697+01 .6248505+01  1 109
-.2529247+01 .2773237+01 .4772417+01-.8832670-00 .1417284+01 .3292304+01  1 110
 .7442772-00 .2020700+01 .1729817+01 .2362794+01-.9830103-00 .2041534-00  1 111
 .3976527+01-.1447619+01-.1000768+01 .5566848+01-.1595959+01-.1505806+01  1 112
 .7280861+01-.1624926+01-.1599109+01 .9052854+01-.1629619+01-.1613482+01  1 113
 .1092466+02-.1629617+01-.1614527+01 .1296488+02-.1629722+01-.1614830+01  1 114
 .1510495+02-.1629734+01-.1614866+01 .1734691+02-.1629736+01-.1614870+01  1 115
 .1971012+02 .6551080+01 .1300000+02 .2584855+01 .5334399+01-.3009144+01  1 116
 .1472504+01 .4029131+01-.1573597+01 .8471458-01 .2487007+01 .2455057-00  1 117
-.9390023-00 .9161208-00 .1868514+01-.1400829+01-.4843538-00 .3471916+01  1 118
-.1574501+01-.1559873+01 .5082201+01-.1623919+01-.1577061+01 .6776157+01  1 119
-.1635095+01-.1618833+01 .8594147+01-.1630919+01-.1607961+01 .1041[illegible]  1 120
-.1637209+01-.1626012+01 .1246016+02-.1637247+01-.1626147+01 .1460024+02  1 121
-.1637252+01-.1626165+01 .1684220+02-.1637252+01-.1626165+01 .1920541+02  1 122
 .6907755+01 .1300000+02 .1556373+01 .4597723+01-.3521748+01 .2468443-00  1 123
 .3138595+01-.1905587+01-.8179976-00 .1581661+01-.2872753-00-.1367381+01  1 124
 .6276681-01 .1323720+01-.1563401+01-.1073711+01 .2936957+01-.1623856+01  1 125
-.1523437+01 .4547200+01-.1640931+01-.1620270+01 .6241146+01-.1644790+01  1 126
-.1637182+01 .8013135+01-.1645443+01-.1639969+01 .9884942+01-.1643979+01  1 127
-.1637020+01 .1192516+02-.1643994+01-.1637090+01 .1406523+02-.1643996+01  1 128
-.1637097+01 .1630719+02-.1643996+01-.1637098+01 .1867040+02 .7313220+01  1 129
 .1300000+02-.4690366-01 .2879129+01-.4125333+01-.9856999-00 .1384846+01  1 130
-.2509146+01-.1430950+01-.8222301-01-.8949870-00-.1508993+01-.1173460+01  1 131
 .7177332-00-.1637383+01-.1570857+01 .2328793+01-.1651786+01-.1656784+01  1 132
 .3939010+01-.1655261+01-.1667004+01 .5632950+01-.1655847+01-.1669425+01  1 133
 .7404937+01-.1655937+01-.1669684+01 .9276745+01-.1655952+01-.1669725+01  1 134
 .1131697+02-.1655954+01-.1669730+01 .1345703+02-.1655954+01-.1669731+01  1 135
 .1569699+02-.1655954+01-.1669731+01 .1806220+02 .7718685+01 .1300000+02  1 136
-.5954105-00 .2106951+01-.4731108+01-.1264618+01 .6096913-00-.3116473+01  1 137
-.1533416+01-.7286329-00-.1502891+01-.1621173+01-.1458784+01 .1096082+00  1 138
-.1647333+01-.1636542+01 .1720615+01-.1654041+01-.1665385+01 .3330816+01  1 139
-.1655687+01-.1669653+01 .5024753+01-.1655906+01-.1670285+01 .6796740+01  1 140
-.1655946+01-.1670395+01 .8668547+01-.1655953+01-.1670413+01 .1070877+02  1 141
-.1655954+01-.1670415+01 .1284883+02-.1655954+01-.1670415+01 .1509080+02  1 142
-.1655954+01-.1670415+01 .1745400+02 .0000000     .0000000     .0000000     1 143
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DIAM&/SCAT  CM2-10A  TEMP(1.5-1.E4)  4-14-67  INPUT TAPES(1832.1980)
 .1600000+02 .9M40000+03
   1101.     .2400000+02
 .4054051-00 .1300000+02 .9764729+01 .1295500+02 .1383869+01 .9633694+01   1   1
 .1268730+02 .3747165+01 .9461782+01 .1253182+02 .6374426+01 .9025431+01   1   2
 .1193056+02 .8982454+01 .8074976+01 .1056852+02 .1132741+02 .6702258+01   1   3
 .8883696+01 .1332805+02 .5036621+01 .7031163+01 .1515488+02 .3339664+01   1   4
 .5187087+01 .1696407+02 .1875346+01 .3409634+01 .1888487+02 .4295530-00   1   5
-.1600052+01 .2554003+02-.2130750+01-.2087766+01 .2790562+02 .8109302-00   1   6
 .1300000+02 .1179480+02 .1352039+02 .2848452+01 .1145070+02 .1317842+02   1   7
 .5155553+01 .1062956+02 .1266605+02 .7435519+01 .9793998+01 .1132775+02   1   8
 .9469496+01 .8403467+01 .9629896+01 .1124630+02 .7031560+01 .8068446+01   1   9
 .1294499+02 .5547364+01 .6584786+01 .1475643+02 .3748257+01 .4889369+01   1  10
 .1661204+02 .1823063+01 .2990150+01 .1850991+02-.5597503-01 .1039643+01   1  11
 .2057283+02-.1304719+01-.5739027-00 .2274808+02-.1770353+01-.1595438+01   1  12
 .2513383+02-.1922749+01-.1890176+01 .2752053+02 .1283775+01 .1300000+02   1  13
 .1250998+02 .1330856+02 .3379311+01 .1204608+02 .1263440+02 .5404924+01   1  14
 .1127470+02 .1188338+02 .7321353+01 .1010157+02 .1085163+02 .9133578+01   1  15
 .8525089+01 .9363499+01 .1087310+02 .6750596+01 .7698874+01 .1255041+02   1  16
 .5191487+01 .6126981+01 .1430529+02 .3524366+01 .4586608+01 .1617237+02   1  17
 .1700609+01 .2818544+01 .1810590+02-.5646175-01 .9325317-00 .2019011+02   1  18
-.1219556+01-.6277126-00 .2241938+02-.1648142+01-.1526216+01 .2471129+02   1  19
-.1753719+01-.1726286+01 .2708238+02 .1604438+01 .1300000+02 .1212276+02   1  20
 .1277869+02 .3340534+01 .1186912+02 .1214373+02 .5178144+01 .1115179+02   1  21
 .1148338+02 .6782643+01 .9950003+01 .1055727+02 .8747786+01 .8384635+01   1  22
 .9195020+01 .1046854+02 .6692988+01 .7610708+01 .1216743+02 .5026033+01   1  23
 .5902808+01 .1392742+02 .3334480+01 .4252479+01 .1578040+02 .1417726+01   1  24
 .2464057+01 .1770436+02-.4282409-00 .4911579-00 .1975741+02-.1442680+01   1  25
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-.1623576+01-.1334692+01-.5174340+01-.1643334+01-.1893920+01-.3868851+01   1 159
-.1652250+01-.1644907+01-.1955514+01-.1653520+01-.1654418+01-.3430021-00   1 160
-.1653844+01-.1656343+01 .1265861+01-.1653913+01-.1656730+01 .2959706+01   1 161
-.1653926+01-.1656809+01 .4731688+01-.1653929+01-.1656821+01 .6603495+01   1 162
```

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-.1653929E+01-.1656823E+01 .6043717E+01-.1653929E+01-.1656824E+01 .1078378E+02   1 163
-.1653929E+01-.1656824E+01 .1302574E+02-.1653929E+01-.1656824E+01 .1538895E+02   1 164
          1
DIAME/NOSCT CM2 TEMP(100.-2250.) 11 FREQ. CI/MT 11/18/66          000000
 .1100000E+02 .3690000E+03
      2101. .9000000E+01
 .4605170E+01 .1300000E+02 .8141120E+01 .9255235E+01-.9223911E-01 .7217855E+01   1   1
 .8312240E+01 .1599646E+01 .5900038E+01 .6963847E+01 .3295202E+01 .4145062E+01   1   2
 .5366708E+01 .4942250E+01 .2279475E+01 .3749296E+01 .6562787E+01 .6607235E-00   1   3
 .2121640E+01 .8175089E+01-.4258620E-00 .5260170E-00 .9869477E+01-.1116107E+01   1   4
-.7796006E-00 .1164155E+02-.1756427E+01-.1409819E+01 .1351337E+02-.2093079E+01   1   5
-.1561425E+01 .1555360E+02-.2158862E+01-.1586339E+01 .1769366E+02-.2167216E+01   1   6
-.1586023E+01 .1993562E+02-.2166122E+01-.1586301E+01 .2229883E+02 .5010635E+01   1   7
 .1300000E+02 .6937513E+01 .6493206E+01-.6103621E-00 .5972797E+01 .7209183E+01   1   8
 .1004223E+01 .4706512E+01 .5759658E+01 .2719270E+01 .3101703E+01 .4141502E+01   1   9
 .4303397E+01 .1446633E+01 .2530654E+01 .5956716E+01-.5008338E-01 .9776243E-00   1  10
 .7567337E+01-.1386410E+01-.4763514E-00 .9201363E+01-.2498025E+01-.1436071E+01   1  11
 .1103337E+02-.3030607E+01-.1775142E+01 .1290518E+02-.3153392E+01-.1839578E+01   1  12
 .1494540E+02-.3170838E+01-.1847691E+01 .1708546E+02-.3172939E+01-.1848876E+01   1  13
 .1932763E+02-.3173165E+01-.1848982E+01 .2189063E+02 .5416100E+01 .1300000E+02   1  14
 .5190699E+01 .7488610E+01-.1161984E+01 .4178742E+01 .6186241E+01 .4888317E-00   1  15
 .2770430E+01 .4625946E+01 .2118743E+01 .1249668E+01 .3038255E+01 .3737041E+01   1  16
-.3092250E-00 .1469217E+01 .5348916E+01-.1828863E+01-.9629561E-01 .6959222E+01   1  17
-.3190589E+01-.1382552E+01 .8653181E+01-.3996636E+01-.2056854E+01 .1042517E+02   1  18
-.4241100E+01-.2243291E+01 .1229698E+02-.4286029E+01-.2276156E+01 .1433720E+02   1  19
-.4261203E+01-.2265251E+01 .1647727E+02-.4261908E+01-.2265765E+01 .1871923E+02   1  20
-.4261984E+01-.2265820E+01 .2108244E+02 .5028946E+01 .1300000E+02 .3794797E+01   1  21
 .6574512E+01-.1738434E+01 .2463812E+01 .5120320E+01-.1166717E+00 .9935804E-00   1  22
 .3556932E+01 .1501984E+01-.5446449E-00 .1970396E+01 .3118362E+01-.2092635E+01   1  23
 .4042366E-00 .4729775E+01-.3546841E+01-.1041697E+01 .6339981E+01-.4693628E+01   1  24
-.2167995E+01 .8033918E+01-.5210018E+01-.2669362E+01 .9805904E+01-.5335049E+01   1  25
-.2780580E+01 .1167771E+02-.5356370E+01-.2808796E+01 .1371793E+02-.5359217E+01   1  26
-.2811490E+01 .1585600E+02-.5359557E+01-.2811812E+01 .1809996E+02-.5359594E+01   1  27
-.2811847E+01 .2046317E+02 .6214608E+01 .1300000E+02 .1590488E+01 .4597159E+01   1  28
-.2307926E+01 .1213330E+00 .3507639E+01-.6916947E-00-.1398863E+01 .1987185E+01   1  29
 .9244886E-00-.2943817E+01 .4400450E-00 .2540904E+01-.4464832E+01-.1090981E+01   1  30
 .4151692E+01-.5953677E+01-.2888080E+01 .5761498E+01-.7060874E+01-.3A85480E+01   1  31
 .7455426E+01-.7539738E+01-.4273222E+01 .9227411E+01-.7652541E+01-.4359060E+01   1  32
 .1109922E+02-.7671627E+01-.4373352E+01 .1313944E+02-.7674172E+01-.4379252E+01   1  33
 .1527951E+02-.7674675E+01-.4375479E+01 .1752147E+02-.7674508E+01-.4375503E+01   1  34
 .1980468E+02 .6551080E+01 .1300000E+02 .9732505E-00 .3479962E+01-.2A08457E+01   1  35
-.5218776E-00 .2485029E+01-.1196845E+01-.2056997E+01 .9509176E-00 .4282404E-00   1  36
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-.6467034E+01-.3363734E+01 .5256795E+01-.7315094E+01-.4045726E+01 .6950719E+01   1  3A
-.7603467E+01-.4322001E+01 .8722703E+01-.7663241E+01-.4367080E+01 .1059451E+02   1  39
-.7673039E+01-.4374406E+01 .1263473E+02-.7674338E+01-.4375376E+01 .1477480E+02   1  40
-.7674493E+01-.4375491E+01 .1701676E+02-.7674510E+01-.4375504E+01 .1937997E+02   1  41
 .6907755E+01 .1300000E+02 .3076184E-00 .3314401E+01-.3340930E+01-.1208680E+01   1  42
 .1798509E+01-.1726527E+01-.2754114E+01 .2550062E-00-.1144337E+00-.4300100E+01   1  43
-.1281902E+01 .1501368E+01-.5769447E+01-.2713524E+01 .3112012E+01-.6908825E+01   1  44
-.3755579E+01 .4721785E+01-.7482219E+01-.4228566E+01 .6415707E+01-.7639063E+01   1  45
-.4348910E+01 .8187690E+01-.7668973E+01-.4371351E+01 .1005950E+02-.7673790E+01   1  46
-.4374949E+01 .1209972E+02-.7674427E+01-.4375424E+01 .1423979E+02-.7674503E+01   1  47
-.4375481E+01 .1648175E+02-.7674511E+01-.4375487E+01 .1884495E+02 .7313220E+01   1  48
 .1300000E+02-.4606728E-00 .2546276E+01-.3947473E+01-.1995470E+01 .1012377E+01   1  49
```

```
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 .4113590+01-.7584432+01-.4307470+01 .5407510+01-.7658601+01-.4363562+01   1  52
 .7579493+01-.7672046+01-.4373621+01 .9451300+01-.7674101+01-.4375222+01   1  53
 .1149152+02-.7674474+01-.4375434+01 .1363159+02-.7674507+01-.4375459+01   1  54
 .1587355+02-.7674511+01-.4375461+01 .1823676+02 .7718685+01 .1300000+02   1  55
-.1237993+01 .2132551+01-.4554730+01-.2704603+01 .6059857-00-.2935001+01   1  56
-.4316760+01-.9468254-00-.1326373+01-.5784079+01-.2407186+01 .2450520-00   1  57
-.6916376+01-.3526004+01 .1895635+01-.7469484+01-.4004777+01 .3605394+01   1  58
-.7033473+01-.4222778+01 .5199312+01-.7667410+01-.4255354+01 .6971295+01   1  59
-.7673415+01-.4261113+01 .6843102+01-.7674368+01-.4262027+01 .1088332+02   1  60
-.7674474+01-.4262148+01 .1302339+02-.7674509+01-.4262162+01 .1526535+02   1  61
-.7674511+01-.4262164+01 .1762656+02 .0000000     .0000000     .0000000     1  62
     1100302
 DIANE CANDON PHENOLIC 30 -- 12 FREQUENCIES -- JANUARY 21, 1966
 0.1200000+02 0.6740000+03
      1115.  .2300000E+02
-0.2045947+01 0.1200000+02-0.1386575+02-0.1139468+02 0.2199088+01-0.1334966+02  13   1
-0.1093459+02 0.3299005+01-0.1278087+02-0.1043094+02 0.4503614+01-0.1227188+02  13   2
-0.9971483+01 0.5602274+01-0.1169866+02-0.9469174+01 0.6807294+01-0.1116085+02  13   3
-0.9014040+01 0.7900645+01-0.1085798+02-0.8507988+01 0.9111074+01-0.1003254+02  13   4
-0.8044850+01 0.1021033+02-0.9423662+01-0.7543033+01 0.1141514+02-0.8859094+01  13   5
-0.7078764+01 0.1251466+02-0.8231694+01-0.6565533+01 0.1371984+02-0.7652274+01  13   6
-0.6088934+01 0.1481947+02-0.1758294+01 0.1200000+02-0.6071324+01-0.4422564+01  13   7
 0.2449037+01-0.5539485+01-0.3973034+01 0.3509984+01-0.4963034+01-0.3470774+01  13   8
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 0.9407994+01-0.2350594+01-0.9294644+00 0.1050974+02-0.1782864+01-0.3589734+00  13  11
 0.1171024+02-0.1361654+01 0.1681694+00 0.1282234+02-0.8583494+00 0.7489874+00  13  12
 0.1403434+02-0.4071174+00 0.1277054+01 0.1514284+02-0.1533154+01 0.1200004+02  13  13
-0.1818044+01 0.3530354+00 0.2718424+01-0.1350794+01 0.8060724+00 0.3819804+01  13  14
-0.8430814+00 0.1309774+01 0.5027094+01-0.3833244+00 0.1773524+01 0.6129684+01  13  15
 0.1162944+00 0.2282824+01 0.7339514+01 0.5680554+00 0.2743814+01 0.8445354+01  13  16
 0.1057894+01 0.3241774+01 0.9660074+01 0.1498504+01 0.3687584+01 0.1077194+02  13  17
 0.1973234+01 0.4171884+01 0.1199574+02 0.2398114+01 0.4621094+01 0.1311954+02  13  18
 0.2855904+01 0.5140104+01 0.1436424+02 0.3267054+01 0.5652624+01 0.1552024+02  13  19
-0.1352824+01 0.1200004+02 0.9713564+00 0.3307604+01 0.2910644+01 0.1424254+01  13  20
 0.3749154+01 0.4014894+01 0.1916564+01 0.4228484+01 0.5227304+01 0.2358324+01  13  21
 0.4656374+01 0.6336484+01 0.2835124+01 0.5115734+01 0.7556494+01 0.3264654+01  13  22
 0.5531224+01 0.8675614+01 0.3734124+01 0.5995864+01 0.9912204+01 0.4167384+01  13  23
 0.6443364+01 0.1105564+02 0.4653674+01 0.6972954+01 0.1233674+02 0.5107614+01  13  24
 0.7489074+01 0.1355434+02 0.5597304+01 0.8060704+01 0.1490674+02 0.5991974+01  13  25
 0.8524874+01 0.1616614+02-0.1190674+01 0.1200004+02 0.3102124+01 0.5271684+01  13  26
 0.3081034+01 0.3541974+01 0.5688704+01 0.4191674+01 0.4018114+01 0.6137514+01  13  27
 0.5414334+01 0.4449764+01 0.6594194+01 0.6533764+01 0.4928794+01 0.6999824+01  13  28
 0.7782184+01 0.5379454+01 0.7436954+01 0.8938334+01 0.5893974+01 0.7946924+01  13  29
 0.1024214+02 0.6373434+01 0.8428574+01 0.1147904+02 0.6864284+01 0.8920944+01  13  30
 0.1288484+02 0.7199044+01 0.9249024+01 0.1411824+02 0.7352974+01 0.9387304+01  13  31
 0.1560324+02 0.7183974+01 0.9204794+01 0.1689974+02-0.1065144+01 0.1200004+02  13  32
 0.4761754+01 0.6652524+01 0.3243734+01 0.5194404+01 0.7058134+01 0.4363424+01  13  33
 0.5883954+01 0.7508474+01 0.5607534+01 0.6139034+01 0.7932104+01 0.6763704+01  13  34
 0.6658124+01 0.8418384+01 0.8069514+01 0.7143154+01 0.8873314+01 0.9314994+01  13  35
 0.7635074+01 0.9327044+01 0.1074804+02 0.7936564+01 0.9584324+01 0.1208604+02  13  36
 0.7947644+01 0.9541294+01 0.1353494+02 0.7538894+01 0.9095404+01 0.1480614+02  13  37
 0.6638564+01 0.8188034+01 0.1610314+02 0.5605234+01 0.7172924+01 0.1723014+02  13  38
```

-0.947359E+00	0.120000E+02	0.609380E+01	0.771608E+01	0.340067E+01	0.654483E+01	13	39
0.813224E+01	0.654713E+01	0.705861E+01	0.860658E+01	0.583656E+01	0.754024E+01	13	40
0.905061E+01	0.706323E+01	0.805312E+01	0.951778E+01	0.898686E+01	0.840709E+01	13	41
0.982229E+01	0.986741E+01	0.846369E+01	0.981991E+01	0.113257E+02	0.807964E+01	13	42
0.939621E+01	0.126046E+02	0.721229E+01	0.852134E+01	0.139094E+02	0.620557E+01	13	43
0.752549E+01	0.150417E+02	0.502751E+01	0.635772E+01	0.162580E+02	0.393519E+01	13	44
0.527116E+01	0.173604E+02	-0.841998E+00	0.120000E+02	0.719666E+01	0.861668E+01	13	45
0.357480E+01	0.786722E+01	0.905553E+01	0.476625E+01	0.819388E+01	0.954587E+01	13	46
0.814010E+01	0.863231E+01	0.994847E+01	0.747760E+01	0.889539E+01	0.101692E+02	13	47
0.899383E+01	0.872982E+01	0.997211E+01	0.103225E+02	0.805695E+01	0.929136E+01	13	48
0.116730E+02	0.714357E+01	0.858486E+01	0.128294E+02	0.600760E+01	0.725670E+01	13	49
0.140502E+02	0.449241E+01	0.616110E+01	0.151620E+02	0.373360E+01	0.499878E+01	13	50
0.163701E+02	0.284240E+01	0.393828E+01	0.174734E+02	-0.746688E+00	0.120000E+02	13	51
0.812818E+01	0.982456E+01	0.377999E+01	0.860317E+01	0.987715E+01	0.504591E+01	13	52
0.906072E+01	0.103108E+02	0.653147E+01	0.923659E+01	0.104683E+02	0.792563E+01	13	53
0.893739E+01	0.101630E+02	0.936999E+01	0.824224E+01	0.947802E+01	0.105772E+02	13	54
0.721473E+01	0.845795E+01	0.118336E+02	0.617394E+01	0.742056E+01	0.129496E+02	13	55
0.599425E+01	0.625188E+01	0.141816E+02	0.390906E+01	0.519598E+01	0.152664E+02	13	56
0.472252E+01	0.407929E+01	0.164814E+02	0.164210E+01	0.308084E+01	0.175940E+02	13	57
-0.659677E+00	0.120000E+02	0.891675E+01	0.101486E+02	0.803121E+01	0.933447E+01	13	58
0.105593E+02	0.538873E+01	0.952906E+01	0.107467E+02	0.642328E+01	0.925170E+01	13	59
0.104738E+02	0.824007E+01	0.889163E+01	0.974009E+01	0.956845E+01	0.756207E+01	13	60
0.881772E+01	0.107152E+02	0.693161E+01	0.769074E+01	0.119396E+02	0.536339E+01	13	61
0.663789E+01	0.130475E+02	0.418399E+01	0.550705E+01	0.142626E+02	0.310807E+01	13	62
0.450050E+01	0.153751E+02	0.192634E+01	0.338038E+01	0.165965E+02	0.853707E+00	13	63
0.233319E+01	0.177054E+02	-0.579634E+00	0.120000E+02	0.955711E+01	0.107494E+02	13	64
0.932740E+01	0.979184E+01	0.109863E+02	0.973466E+01	0.957177E+01	0.107830E+02	13	65
0.720078E+01	0.892950E+01	0.101698E+02	0.892688E+01	0.794615E+01	0.920020E+01	13	66
0.969314E+01	0.693547E+01	0.819012E+01	0.108167E+02	0.578279E+01	0.705384E+01	13	67
0.120326E+02	0.471776E+01	0.603317E+01	0.131446E+02	0.354728E+01	0.492091E+01	13	68
0.143653E+02	0.248523E+01	0.388744E+01	0.154774E+02	0.136516E+01	0.277584E+01	13	69
0.166961E+02	0.437576E+00	0.188549E+01	0.178134E+02	-0.505526E+00	0.120000E+02	13	70
0.100096E+02	0.111643E+02	0.463195E+01	0.994416E+01	0.111139E+02	0.600249E+01	13	71
0.935571E+01	0.105654E+02	0.737706E+01	0.851075E+01	0.974791E+01	0.854964E+01	13	72
0.744403E+01	0.867786E+01	0.978814E+01	0.691673E+01	0.765509E+01	0.109038E+02	13	73
0.526743E+01	0.653940E+01	0.121253E+02	0.421427E+01	0.551819E+01	0.132397E+02	13	74
0.308447E+01	0.439779E+01	0.144587E+02	0.212439E+01	0.344902E+01	0.155726E+02	13	75
0.121187E+01	0.264019E+01	0.168019E+02	0.558886E+00	0.219066E+01	0.179383E+02	13	76
-0.436533E+00	0.120000E+02	0.102458E+02	0.113584E+02	0.488868E+01	0.986854E+01	13	77
0.110192E+02	0.618539E+01	0.903754E+01	0.102446E+02	0.750002E+01	0.811375E+01	13	78
0.932218E+01	0.864426E+01	0.702943E+01	0.822335E+01	0.987402E+01	0.600634E+01	13	79
0.720788E+01	0.109913E+02	0.487529E+01	0.608819E+01	0.122133E+02	0.387652E+01	13	80
0.508027E+01	0.133262E+02	0.287980E+01	0.412318E+01	0.145487E+02	0.211229E+01	13	81
0.350066E+01	0.156734E+02	0.147945E+01	0.311336E+01	0.169243E+02	0.108469E+01	13	82
0.288733E+01	0.180908E+02	-0.371995E+00	0.120000E+02	0.102861E+02	0.113649E+02	13	83
0.507683E+01	0.906523E+01	0.108173E+02	0.631540E+01	0.872091E+01	0.990947E+01	13	84
0.754539E+01	0.778304E+01	0.894292E+01	0.872806E+01	0.670423E+01	0.783835E+01	13	85
0.995684E+01	0.569835E+01	0.682010E+01	0.110731E+02	0.463379E+01	0.574291E+01	13	86
0.122933E+02	0.375692E+01	0.490892E+01	0.134093E+02	0.295645E+01	0.429604E+01	13	87
0.146427E+02	0.241458E+01	0.298962E+01	0.157851E+02	0.200534E+01	0.375944E+01	13	88
0.170652E+02	0.167726E+01	0.349967E+01	0.182627E+02	-0.148500E+00	0.120000E+02	13	89
0.555427E+01	0.880027E+01	-0.263918E+01	0.553090E+01	0.879468E+01	-0.149959E+01	13	90
0.553065E+01	0.878049E+01	-0.511140E+00	0.592922E+01	0.870426E+01	0.122115E+01	13	91
0.552201E+01	0.880326E+01	0.328766E+01	0.549786E+01	0.856047E+01	0.527719E+01	13	92
0.842127E+01	0.816745E+01	0.752870E+01	0.528034E+01	0.772306E+01	0.961150E+01	13	93

```
0.503290+01 0.726757+01 0.116645+02 0.400151+01 0.615549+01 0.156419+02  13  94
0.199910+01 0.406483+01 0.103651+02-0.276166+00 0.174470+01 0.207466+02  13  95
0.955102-01 0.120000+02 0.752983+01 0.103258+02-0.579213+00 0.747233+01  13  96
0.103093+02 0.645128+00 0.746909+01 0.102991+02 0.167849+01 0.748908+01  13  97
0.102271+02 0.345944+01 0.742093+01 0.101596+02 0.554757+01 0.732211+01  13  98
0.100366+02 0.751395+01 0.707340+01 0.958422+01 0.904288+01 0.662276+01  13  99
0.091099+01 0.114413+02 0.561037+01 0.796576+01 0.131351+02 0.362624+01  13 100
0.570070+01 0.157307+02 0.125512+01 0.329579+01 0.100791+02-0.918092+00  13 101
0.963714+00 0.203091+02 0.322063+00 0.120000+02 0.963201+01 0.112477+02  13 102
0.809068+00 0.892990+01 0.112100+02 0.200734+01 0.841400+01 0.111925+02  13 103
0.314734+01 0.686060+01 0.111005+02 0.493313+01 0.870093+01 0.109374+02  13 104
0.699449+01 0.835600+01 0.106061+02 0.870777+01 0.764150+01 0.970419+01  13 105
0.104244+02 0.678577+01 0.977001+01 0.117000+02 0.961607+01 0.799070+01  13 106
0.150033+02 0.315490+01 0.901270+01 0.154505+02 0.113776+01 0.273157+01  13 107
0.177770+02-0.235560+00 0.109330+01 0.202010+02 0.600965+00 0.120000+02  13 108
0.955957+01 0.110000+02 0.130330+01 0.939000+01 0.114953+02 0.990617+01  13 109
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0.983194+01 0.110472+02 0.760268+01 0.859373+01 0.106102+02 0.890249+01  13 111
0.760376+01 0.970300+01 0.104000+02 0.699081+01 0.859520+01 0.117102+02  13 112
0.541052+01 0.722921+01 0.129043+02 0.319642+01 0.884242+01 0.153273+02  13 113
0.155560+01 0.284336+01 0.177419+02 0.158127+00 0.137564+01 0.203920+02  13 114
0.810930+00 0.120000+02 0.111764+02 0.120240+02 0.232479+01 0.109697+02  13 115
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0.917702+01 0.637180+01 0.693233+01 0.103195+02 0.487068+01 0.560538+01  13 144
0.115433+02 0.223845+01 0.315921+01 0.138547+02-0.152030-02 0.833605+00  13 145
0.161582+02-0.135894+01-0.107036+01 0.184609+02 0.          0.           13 146
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DIANE/SCAT  FE-10A  THETA(50-100001  10 FREQ  CI/FCT  9-24-67  TRT 2
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 .3912020+01 .5852200+01 .5852200+01 .4605170+01 .4605170+01 .7000000+01   1   8
 .8038510+01 .8038510+01-.2302590+01 .7956480+01 .7956480+01-.6931470-00   1   9
 .7736310+01 .7736310+01-.0000000    .7247790+01 .7247790+01 .1609440+01   1  10
 .6963190+01 .6963190+01 .2302590+01 .5923450+01 .5923450+01 .3912020+01   1  11
 .5283200+01 .5283200+01 .4605170+01 .5010640+01 .7000000+01 .7868250+01   1  12
 .7868250+01-.2302590+01 .7557470+01 .7557470+01-.6931470-00 .7347300+01   1  13
 .7347300+01-.0000000    .6547500+01 .6547500+01 .1609440+01 .6176080 01   1  14
 .6176080+01 .2302590+01 .5010640+01 .5010640+01 .3912020+01 .4347690+01   1  15
 .4347690+01 .4605170+01 .5298320+01 .7000000+01 .7658700+01 .7658700+01   1  16
-.2302590+01 .7370230+01 .7370230+01-.6931470-00 .7156180+01 .7156180+01   1  17
-.0000000    .6215610+01 .6215610+01 .1609440+01 .5648620+01 .5648620+01   1  18
 .2302590+01 .4484920+01 .4484920+01 .3912020+01 .3663560+01 .3663560+01   1  19
 .4605170+01 .5703780+01 .7000000+01 .6851080+01 .6851080+01-.2302590+01   1  20
 .6637260+01 .6637260+01-.6931470-00 .6439350+01 .6439350+01-.0000000      1  21
 .5349010+01 .5349010+01 .1609440+01 .4677490+01 .4677490+01 .2302590+01   1  22
 .2927450+01 .2927450+01 .3912020+01 .2093100+01 .2093100+01 .4605170+01   1  23
 .5991460+01 .7000000+01 .5997200+01 .5997200+01-.2302590+01 .5555670+01   1  24
 .5555670+01-.6931470-00 .5135800+01 .5135800+01-.0000000    .3895890+01   1  25
 .3895890+01 .1609440+01 .3242590+01 .3242590+01 .2302590+01 .1660130+01   1  26
 .1660130+01 .3912020+01 .9895410-00 .9895410-00 .4605170+01 .6214610+01   1  27
 .7000000+01 .5181220+01 .5181220+01-.2302590+01 .4587720+01 .4587720+01   1  28
-.6931470-00 .4154180+01 .4154180+01-.0000000    .2844910+01 .2844910+01   1  29
 .1609440+01 .2236450+01 .2236450+01 .2302590+01 .7929930-00 .7929930-00   1  30
 .3912020+01 .1906200-00 .1906200-00 .4605170+01 .6551080+01 .7000000+01   1  31
 .3867030+01 .3867030+01-.2302590+01 .2898120+01 .2898120+01-.6931470-00   1  32
 .2317470+01 .2317470+01-.0000000    .1000630+01 .1000630+01 .1609440+01   1  33
 .6574250-00 .4574250-00 .2302590+01-.6143360-00-.6143360-00 .3912020+01   1  34
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 .3441380+01-.2302590+01 .2348510+01 .2348510+01-.6931470-00 .1766440+01   1  36
 .1766440+01-.0000000    .4946960-00 .4946960-00 .1609440+01 .1093990-01   1  37
 .1093990-01 .2302590+01-.8964880-00-.8964880-00 .3912020+01-.1127010+01   1  38
-.1127010+01 .4605170+01 .6907760+01 .7000000+01 .2857620+01 .2857620+01   1  39
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-.2302590+01 .1624130+01 .1624130+01-.6931470-00 .1064710+01 .1064710+01   1  40
-.0000000   -.8773690-01-.8773690-01 .1609440+01-.4796500-00-.4796500-00   1  41
 .2302590+01-.1171180+01-.1171180+01 .3912020+01-.1339410+01-.1339410+01   1  42
 .4605170+01 .7313220+01 .7000000+01 .2302200+01 .2302200+01-.2302590+01   1  43
 .6544150-00 .8544150-00-.6931470-00 .3293040-00 .3293040-00-.0000000      1  44
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-.1398370+01-.1398370+01 .3912020+01-.1518680+01-.1518680+01 .4605170+01   1  46
 .7600900+01 .7000000+01 .2018900+01 .2018900+01-.2302590+01 .5341510-00   1  47
 .5341510-00-.6931470-00 .1980260-01 .1980260-01-.0000000   -.8770700-00   1  48
-.8770700-00 .1609440+01-.1136310+01-.1136310+01 .2302590+01-.1514130+01   1  49
-.1514130+01 .3912020+01-.1609440+01-.1609440+01 .4605170+01 .7824050+01   1  50
 .7000000+01 .1172480+01 .1172480+01-.2302590+01-.1444480-00-.1444480-00   1  51
-.6931470-00-.5516480-00-.5516480-00-.0000000   -.1180910+01-.1180910+01   1  52
 .1609440+01-.1328030+01-.1328030+01 .2302590+01-.1629640+01-.1629640+01   1  53
 .3912020+01-.1672910+01-.1672910+01 .4605170+01 .8160520+01 .7000000+01   1  54
-.1404120-00-.1404120-00-.2302590+01-.9675840-00-.9675840-00-.6931470-00   1  55
-.1224160+01-.1224160+01-.0000000   -.1604450+01-.1604450+01 .1609440+01   1  56
-.1660730+01-.1660730+01 .2302590+01-.1714800+01-.1714800+01 .3912020+01   1  57
-.1723170+01-.1723170+01 .4605170+01 .8517190+01 .7000000+01-.1207310+01   1  58
-.1207310+01-.2302590+01-.1589640+01-.1589640+01-.6931470-00-.1650260+01   1  59
-.1650260+01-.0000000   -.1742970+01-.1742970+01 .1609440+01-.1754460+01   1  60
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-.1757360+01 .4605170+01 .8922660+01 .7000000+01-.1645070+01-.1645070+01   1  62
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-.0000000   -.1771960+01-.1771960+01 .1609440+01-.1771960+01-.1771960+01   1  64
 .2302590+01-.1773130+01-.1773130+01 .3912020+01-.1773130+01-.1773130+01   1  65
 .4605170+01 .9210340+01 .7000000+01-.1783790+01-.1783790+01-.2302590+01   1  66
-.1826350+01-.1826350+01-.6931470-00-.1838850+01-.1838850+01-.0000000      1  67
-.1845160+01-.1845160+01 .1609440+01-.1845160+01-.1845160+01 .2302590+01   1  68
-.1842630+01-.1842630+01 .3912020+01-.1842630+01-.1842630+01 .4605170+01   1  69
          16
DIANE/SCAT  WOHANITL-1A  TEMP(1-2250)  1 FREQ  C1/KDP  2-16-67
 .1000000+01 .6010000+03
       1126. .2100000+02
 .0000000    .1300000+02 .6513620+01 .9403546+01 .3787374-01 .6918841+01   1   1
 .9383596+01 .2212227+01 .6833137+01 .9292392+01 .4766373+01 .6577467+01   1   2
 .8997217+01 .7374314+01 .5884078+01 .8224692+01 .9684505+01 .4776727+01   1   3
 .6890391+01 .1162386+02 .3380773+01 .5513859+01 .1359640+02 .2076541+01   1   4
 .4253548+01 .1579495+02 .6876317-00 .2759852+01 .1796888+02-.7810312-00   1   5
 .1142955+01 .2020867+02-.2328005+01-.7396810-00 .2245339+02-.3226117+01   1   6
-.2571975+01 .2471543+02-.3520975+01-.3433227+01 .2708111+02 .4054651-00   1   7
 .1300000+02 .9248431+01 .1063106+02 .1493642+01 .9091214+01 .1039440+02   1   8
 .3634363+01 .8816710+01 .1003615+02 .5879242+01 .8297439+01 .9482962+01   1   9
 .7977748+01 .7410354+01 .8639601+01 .1003126+02 .6284574+01 .7610722+01   1  10
 .1196139+02 .4382476+01 .6066872+01 .1389072+02 .3114451+01 .4295802+01   1  11
 .1577764+02 .1109069+01 .2372769+01 .1766300+02-.8520485-00 .3449206-00   1  12
 .1974175+02-.2290292+01-.1396182+01 .2196855+02-.2926097+01-.2492993+01   1  13
 .2446125+02-.3031407+01-.2964081+01 .2698356+02 .8109302-00 .1300000+02   1  14
 .1081603+02 .1127061+02 .2125871+01 .1043311+02 .1092698+02 .4158320+01   1  15
 .9894502+01 .1048800+02 .6255945+01 .8994347+01 .9760501+01 .8209307+01   1  16
 .7826120+01 .6597733+01 .1001982+02 .6466033+01 .7093483+01 .1172712+02   1  17
 .4895732+01 .5561121+01 .1350190+02 .3302292+01 .4178371+01 .1545487+02   1  18
 .1509122+01 .2574934+01 .1753305+02-.4383967-00 .6161041-00 .1965780+02   1  19
-.1998829+01-.1294514+01 .2186565+02-.2684467+01-.2447268+01 .2419263+02   1  20
-.2701897+01-.2725429+01 .2666489+02 .1223775+01 .1300000+02 .1118321+02   1  21
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 .1140052+02 .2344926+01 .1072803+02 .1092465+02 .4265121+01 .1010077+02   1  22
 .1034711+02 .6123947+01 .9236083+01 .9724367+01 .7930385+01 .8031412+01   1  23
 .6734171+01 .9765451+01 .6559835+01 .7338132+01 .1155372+02 .4883688+01   1  24
 .5700958+01 .1336461+02 .3154596+01 .4016574+01 .1523432+02 .1316202+01   1  25
 .2236735+01 .1722006+02-.5408437-00 .3324853-00 .1935585+02-.1977503+01   1  26
-.1482876+01 .2152580+02-.2536409+01-.2430729+01 .2379889+02-.2576140+01   1  27
-.2551541+01 .2625035+02 .1609438+01 .1300000+02 .1118015+02 .1135201+02   1  28
 .2283024+01 .1065940+02 .1085639+02 .4055462+01 .1003116+02 .1041223+02   1  29
 .5909860+01 .9147712+01 .9748118+01 .7749649+01 .7929924+01 .8509815+01   1  30
 .9523836+01 .6361976+01 .6997127+01 .1127277+02 .4593325+01 .5298036+01   1  31
 .1307381+02 .2760511+01 .3527035+01 .1490215+02 .9143084-00 .1772436+01   1  32
 .1683643+02-.8784557-00-.4747559-01 .1895192+02-.2032458+01-.1673070+01   1  33
 .2113094+02-.2374784+01-.2247001+01 .2344120+02-.2400002+01-.2377201+01   1  34
 .2585979+02 .1465910+01 .1300000+02 .1103869+02 .1128431+02 .8120569+01   1  35
 .1065994+02 .1082559+02 .3885541+01 .1007326+02 .1036233+02 .5703913+01   1  36
 .8983105+01 .9525362+01 .7504749+01 .7391939+01 .8056819+01 .9259812+01   1  37
 .5813416+01 .6487555+01 .1095693+02 .4162610+01 .4869974+01 .1273307+02   1  38
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-.2180498+01-.2128034+01 .2315597+02-.2208191+01-.2187549+01 .2555217+02   1  41
 .2302585+01 .1300000+02 .1075051+02 .1114258+02 .1867030+01 .1042463+02   1  42
 .1065211+02 .3619119+01 .9867554+01 .1013437+02 .5412575+01 .8455161+01   1  43
 .9166084+01 .7181888+01 .6913274+01 .7725006+01 .8908000+01 .5337100+01   1  44
 .6180181+01 .1060253+02 .3761093+01 .4572299+01 .1237943+02 .2067462+01   1  45
 .2921227+01 .1423868+02 .2620770-00 .1202723+01 .1619820+02-.1282984+01   1  46
-.5539767-00 .1828176+02-.1955246+01-.1736103+01 .2045891+02-.2111411+01   1  47
-.2074921+01 .2272516+02-.2106856+01-.2089102+01 .2512017+02 .2708050+01   1  48
 .1300000+02 .1042645+02 .1087254+02 .1555453+01 .1012282+02 .1045413+02   1  49
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 .1023754+02 .3222437+01 .4069650+01 .1149962+02 .1429640+01 .2278927+01   1  52
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 .6060494+01 .6831161+01 .8116133+01 .4399240+01 .5044372+01 .9779069+01   1  58
 .2715164+01 .3346092+01 .1151484+02 .8545856-00 .1627389+01 .1332583+02   1  59
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 .2925776+01 .1102161+02 .3927310-00 .1401156+01 .1283562+02-.9621902-00   1  66
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-.1717644+01 .1898904+02-.1761829+01-.1739670+01 .2126784+02-.1741500+01   1  68
-.1723130+01 .2365515+02 .3912023+01 .1300000+02 .8781689+01 .9540137+01   1  69
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 .3785374+01 .6631651+01 .6907469+01 .5471911+01 .5003031+01 .5394688+01   1  71
 .7132158+01 .3316938+01 .3824401+01 .8777334+01 .1562761+01 .2208941+01   1  72
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 .2796084+01 .7922685+01 .3004476-00 .1221970+01 .9632374+01-.9355072-00   1  86
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 .7169671+01 .7845158+01-.1478467+01 .6398048+01 .6777655+01 .2103261-00   1  97
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-.1560303+01-.1512211+01 .1214074+02-.1620557+01-.1603690+01 .1418134+02   1 101
-.1633224+01-.1616215+01 .1632146+02-.1635775+01-.1617575+01 .1856360+02   1 102
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 .6907755+01 .1300000+02 .3976300+01 .5071525+01-.3524498+01 .3161274+01   1 124
 .3780519+01-.1890496+01 .1830022+01 .2375006+01-.2632087-00 .4037475-00   1 125
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-.1232215+01 .4576743+01-.1568676+01-.1534618+01 .6270633+01-.1613353+01   1 127
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 .1300000+02 .2726625+01 .4236279+01-.4114327+01 .1816488+01 .2863696+01   1 131
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 .3966017+01-.1605436+01-.1578835+01 .5662449+01-.1615227+01-.1597803+01   1 134
 .7434416+01-.1616886+01-.1601016+01 .9306220+01-.1617008+01-.1601324+01   1 135
 .1134644+02-.1617366+01-.1601740+01 .1348651+02-.1617369+01-.1601747+01   1 136
 .1572847+02-.1617370+01-.1601748+01 .1809168+02 .7718685+01 .1300009+02   1 137
 .1091561+01 .3334376+01-.4711255+01 .3409795-01 .1920521+01-.3089102+01   1 138
-.9381496-00 .4126518-00-.1471538+01-.1392458+01-.8078393-00 .1403563-00   1 139
-.1551352+01-.1393275+01 .1750790+01-.1604712+01-.1561795+01 .3360432+01   1 140
-.1617041+01-.1597190+01 .5054253+01-.1620062+01-.1603570+01 .6826219+01   1 141
-.1620482+01-.1604668+01 .8698022+01-.1621991+01-.1606683+01 .1073824+02   1 142
-.1621999+01-.1606704+01 .1287831+02-.1621999+01-.1606707+01 .1512027+02   1 143
-.1623000+01-.1606707+01 .1748348+02 .0000000     .0000000     .0000000     1 144
          3
  DIANE GROUT 1A/1NT   LMS/RP    7/27/66
 0.100000+01 0.451000+03
      1119. .1100000E+02
 0.391202+01 0.130000+02 0.822839+01 0.938122+01 0.580303+00 0.775822+01   2   1
 0.851888+01 0.225140+01 0.699491+01 0.756140+01 0.393200+01 0.570923+01   2   2
 0.633831+01 0.558693+01 0.408669+01 0.502435+01 0.724819+01 0.243855+01   2   3
 0.373100+01 0.892230+01 0.879571+00 0.231815+01 0.106719+02-0.413043+00   2   4
 0.899719+00 0.125007+02-0.122521+01-0.438179+00 0.144082+02-0.152967+01   2   5
-0.134152+01 0.164591+02-0.159703+01-0.135974+01 0.186025+02-0.160561+01   2   6
-0.158697+01 0.208409+02-0.160558+01-0.158759+01 0.232127+02 0.424850+01   2   7
 0.130000+02 0.817270+01 0.910955+01 0.135226+00 0.763650+01 0.835636+01   2   8
 0.101433+01 0.669187+01 0.735752+01 0.350207+01 0.516967+01 0.616298+01   2   9
 0.519549+01 0.351475+01 0.402921+01 0.687517+01 0.197751+01 0.344444+01   2  10
 0.854042+01 0.454294+00 0.186079+01 0.102631+02-0.749034+00 0.266418+00   2  11
 0.120442+02-0.136576+01-0.983496+00 0.139197+02-0.154395+01-0.148403+01   2  12
 0.159629+02-0.158673+01-0.157272+01 0.181052+02-0.160009+01-0.158290+01   2  13
 0.203405+02-0.160196+01-0.158370+01 0.227121+02 0.460517+01 0.130000+02   2  14
 0.821224+01 0.906520+01-0.320665+00 0.757157+01 0.834595+01 0.137836+01   2  15
 0.636367+01 0.714930+01 0.308906+01 0.477047+01 0.571876+01 0.477430+01   2  16
 0.304269+01 0.418606+01 0.642134+01 0.142088+01 0.263656+01 0.804365+01   2  17
-0.478165-01 0.102134+01 0.974260+01-0.984571+00-0.443893+00 0.115175+02   2  18
-0.139636+01-0.133379+01 0.133911+02-0.155067+01-0.153955+01 0.154332+02   2  19
-0.158819+01-0.157154+01 0.175762+02-0.158903+01-0.157082+01 0.198262+02   2  20
-0.158397+01-0.156559+01 0.221953+02 0.501064+01 0.130000+02 0.768303+01   2  21
 0.863936+01-0.815487+00 0.695516+01 0.762189+01 0.882302+00 0.571668+01   2  22
 0.620252+01 0.256980+01 0.415298+01 0.474467+01 0.421083+01 0.252637+01   2  23
 0.320125+01 0.583097+01 0.956173+00 0.162440+01 0.744513+01-0.353912+00   2  24
 0.137029+00 0.914336+01-0.114255+01-0.958824+00 0.109213+02-0.147945+01   2  25
-0.143337+01 0.127991+02-0.156055+01-0.154468+01 0.148429+02-0.157991+01   2  26
-0.156135+01 0.169637+02-0.158177+01-0.156353+01 0.192258+02-0.158213+01   2  27
-0.156376+01 0.215890+02 0.541610+01 0.130000+02 0.663968+01 0.783727+01   2  28
-0.133695+01 0.574430+01 0.651312+01 0.339348+00 0.468137+01 0.520479+01   2  29
 0.198951+01 0.329050+01 0.373397+01 0.361719+01 0.171058+01 0.222976+01   2  30
 0.523609+01 0.241784+00 0.803759+00 0.685234+01-0.877972+00-0.498667+00   2  31
 0.855011+01-0.139702+01-0.126330+01 0.103233+02-0.153897+01-0.151534+01   2  32
 0.121953+02-0.157363+01-0.155742+01 0.142355+02-0.158103+01-0.156303+01   2  33
 0.163736+02-0.158198+01-0.156363+01 0.186177+02-0.158156+01-0.156316+01   2  34
 0.209814+02 0.582695+01 0.130000+02 0.560362+01 0.684958+01-0.189647+01   2  35
 0.495744+01 0.567420+01-0.244075+00 0.375927+01 0.433149+01 0.138005+01   2  36
 0.220023+01 0.285307+01 0.301268+01 0.656770+00 0.132597+01 0.462728+01   2  37
-0.554949+00-0.918363-01 0.623811+01-0.122027+01-0.108322+01 0.793225+01   2  38
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-0.157775+01-0.155904+01 0.136184+02-0.157825+01-0.155977+01 0.157599+02   2  40
-0.157773+01-0.155931+01 0.180027+02-0.157761+01-0.155922+01 0.203661+02   2  41
 0.621461+01 0.150000+02 0.474947+01 0.616368+01-0.243538+01 0.399704+01   2  42
 0.489642+01-0.605925+00 0.271158+01 0.346639+01 0.819964+00 0.121437+01   2  43
 0.190061+01 0.243857+01-0.140094+00 0.434701+00 0.405028+01-0.101139+01   2  44
-0.687822+00 0.566092+01-0.142125+01-0.130427+01 0.735613+01-0.154296+01   2  45
-0.150561+01 0.912965+01-0.156884+01-0.154992+01 0.110020+02-0.157632+01   2  46
-0.155617+01 0.130423+02-0.157755+01-0.155912+01 0.151824+02-0.157767+01   2  47
-0.155921+01 0.174244+02-0.157768+01-0.155922+01 0.197876+02 0.655108+01   2  48
 0.150000+02 0.377200+01 0.512106+01-0.242622+01 0.286313+01 0.381031+01   2  49
-0.130262+01 0.150550+01 0.232685+01 0.318607+00 0.152242+00 0.404498+00   2  50
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 0.515907+01-0.150470+01-0.145349+01 0.685349+01-0.156262+01-0.154895+01   2  52
 0.862560+01-0.157670+01-0.155740+01 0.104974+02-0.157844+01-0.155930+01   2  53
 0.125377+02-0.157863+01-0.155954+01 0.146777+02-0.157865+01-0.155956+01   2  54
 0.169197+02-0.157865+01-0.155957+01 0.192629+02 0.690776+01 0.150000+02   2  55
 0.303909+01 0.443664+01-0.345170+01 0.216863+01 0.307779+01-0.183282+01   2  56
 0.847066+00 0.267674+01-0.213507+00-0.338995+00 0.329761+00 0.140344+01   2  57
-0.109377+01-0.783700+00 0.301480+01-0.144706+01-0.136154+01 0.462473+01   2  58
-0.155621+01-0.152532+01 0.631063+01-0.157901+01-0.155569+01 0.809062+01   2  59
-0.156256+01-0.156086+01 0.996242+01-0.158304+01-0.156161+01 0.120026+02   2  60
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 0.303673+01-0.405322+01 0.111763+01 0.247416+01-0.243646+01-0.415688-01   2  63
 0.884074+00-0.815632+00-0.101458+01-0.422772+00 0.796151+00-0.145010+01   2  64
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-0.156894+01 0.181397+02 0.771869+01 0.150000+02 0.487017+00 0.280601+01   2  69
-0.465669+01-0.426232+00 0.139204+01-0.303429+01-0.113012+01-0.258116-01   2  70
-0.142301+01-0.146748+01-0.105856+01 0.188123+00-0.157334+01-0.146134+01   2  71
 0.179069+01-0.159980+01-0.155740+01 0.340039+01-0.160649+01-0.157825+01   2  72
 0.510225+01-0.160775+01-0.158211+01 0.687422+01-0.160797+01-0.158278+01   2  73
 0.874003+01-0.160800+01-0.158269+01 0.107862+02-0.160801+01-0.158290+01   2  74
 0.129263+02-0.160801+01-0.158290+01 0.151683+02-0.160801+01-0.158290+01   2  75
 0.175315+02 0.          0.          0.          0.                        2  76
       47
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   1001.     .1300000+02                                                   1   0
 .0000000    .1300000+02 .6431066+01 .1302323+02-.1436320+01 .6409526+01   1   1
 .1256781+02 .7716049-00 .6408479+01 .1235131+02 .3410457+01 .6398309+01   1   2
 .1160596+02 .6302030+01 .6353701+01 .1031355+02 .9337084+01 .6235561+01   1   3
 .9182164+01 .1243225+02 .5926536+01 .6351091+01 .1561595+02 .5092761+01   1   4
 .7438869+01 .1851890+02 .3516669+01 .5970298+01 .2085708+02 .1565718+01   1   5
 .3951492+01 .2299712+02 .1526155-02 .1875272+01 .2515118+02-.7285936-00   1   6
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 .1499600+02 .2921419+01 .1098783+02 .1469102+02 .5353783+01 .1085761+02  1  22
 .1448248+02 .8028749+01 .1042871+02 .1349731+02 .1065670+02 .9336435+01  1  23
 .1180634+02 .1284917+02 .7647172+01 .9992114+01 .1472535+02 .5669199+01  1  24
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 .4672740-00 .2117733+02-.7984956-00-.6934751-00 .2331740+02-.9146724-00  1  47
-.8967050-00 .2555936+02-.9222052-00-.9098682-00 .2792257+02 .1609438+01  1  48
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 .1321999+02 .3651708+01 .4914319+01 .1491406+02 .1869347+01 .3131350+01  1  52
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 .8330113+01 .1068231+02 .7810545+01 .6883050+01 .9068062+01 .9479774+01  1  57
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 .2072567+01 .4021961+01 .1441301+02 .4702737-00 .2259425+01 .1618209+02  1  59
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-.9269130-00-.8996397-00 .2223420+02-.9348439-00-.9232786-00 .2447616+02  1  61
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 .6445341+01 .1056884+02 .2246791+01 .4813559+01 .1218073+02 .6737954-00  1  65
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 .6716620+01 .3012703+01 .6442744+01 .8341189+01 .1462139+01 .4874298+01   1  71
 .9961012+01 .1505761-00 .3292194+01 .1157261+02-.5941134-00 .1614041+01   1  72
 .1320004+02-.6649699-00 .7125223-01 .1503888+02-.9406214-00-.7659346-00   1  73
 .1691070+02-.9583948-00-.9453963-00 .1845092+02-.9615229-00-.9667246-00   1  74
 .2109099+02-.9618066-00-.9690226-00 .2333295+02-.9618395-00-.9692705-00   1  75
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 .2273557+01 .5660253+01 .7733817+01 .7371013-00 .4083787+01 .9353006+01   1  78
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 .4640445+01 .7115016+01 .1304316-00 .3264477+01 .8733848+01-.5791353-00   1  85
 .1881202+01 .1034521+02-.6541782-00 .1807733-00 .1203939+02-.9358236-00   1  86
-.7068411-00 .1361142+02-.9565092-00-.9314541-00 .1568324+02-.9609509-00   1  87
-.9643707-00 .1772346+02-.9615414-00-.9683745-00 .1986352+02-.9615996-00   1  88
-.9666348-00 .2210549+02-.9616059-00-.9686843-00 .2446869+02 .0000000      1  89
          9
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     1111. .2100000E+02
 .0000000    .1300000+02 .5567853+01 .9683676+01-.2706865+01 .5332093+01   1   1
 .9370063+01-.4999829-00 .5318747+01 .9204131+01 .2135534+01 .5250618+01   1   2
 .6766697+01 .5013815+01 .5004408+01 .8067862+01 .7944572+01 .4847964+01   1   3
 .7362256+01 .1090230+02 .3878747+01 .6646315+01 .1370426+02 .2760707+01   1   4
 .5293367+01 .1630333+02 .1145294+01 .3546767+01 .1853243+02-.7744648-00   1   5
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 .6010717+01 .6909980+01 .9566424+01 .1046254+02 .5561805+01 .8092504+01   1  10
 .1250320+02 .3893171+01 .6305466+01 .1433524+02 .2190811+01 .4381346+01   1  11
 .1614135+02 .6631618-00 .2512247+01 .1804298+02-.6694940-00 .7450074-00   1  12
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 .1066141+02 .1227036+02 .2003662+01 .1037861+02 .1196955+02 .4330362+01   1  15
 .9744139+01 .1144796+02 .6638821+01 .8638196+01 .1026933+02 .8662975+01   1  16
 .7265642+01 .8736610+01 .1042706+02 .5993882+01 .7250810+01 .1211277+02   1  17
 .4722056+01 .5849762+01 .1393162+02 .3229237+01 .4444622+01 .1588530+02   1  18
 .1481314+01 .2710816+01 .1789342+02-.4262241-00 .7281843-00 .1998670+02   1  19
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 .1095875+02 .6533866+01 .9260496+01 .1011607+02 .8344376+01 .7805722+01   1  23
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 .2615972+01 .1131619+02 .1141228+02 .4444469+01 .1039210+02 .1091041+02   1  29
 .6304232+01 .9052361+01 .1013347+02 .8120040+01 .7678286+01 .8906221+01   1  30
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 .1403832+02-.1592202+01-.1579911+01 .1697838+02-.1593029+01-.1571882+01   1  95
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-.1655342+01-.1669521+01 .5092248+01-.1655556+01-.1670074+01 .6864218+01   1 141
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-.1655594+01-.1670180+01 .1291631+02-.1655594+01-.1670180+01 .1515827+02   1 143
-.1655594+01-.1670180+01 .1752148+02 .0000000     .0000000     .0000000     1 144
          14
DIANE/SLAT  LIM/XTRAM1-10A  30 FREQ.  TEMP(50.-22500.)  CI/WL  1/1000000
 .1000000+02 .6970300+03
      1108. .1700000+02
 .3912023+01 .1300000+02 .7670779+01 .9793608+01 .9026840-00 .6605788+01   1   1
 .8589481+01 .2566496+01 .5267976+01 .7010211+01 .4231161+01 .3769586+01   1   2
 .5389453+01 .5863943+01 .2198304+01 .3731792+01 .7478350+01 .6283974-00   1   3
 .2123576+01 .9089196+01-.7029054-00 .4881980-00 .1078327+02-.1382526+01   1   4
-.9124451-00 .1255526+02-.1582575+01-.1497894+01 .1442709+02-.1615618+01   1   5
-.1589713+01 .1646731+02-.1619015+01-.1600251+01 .1860738+02-.1620030+01   1   6
-.1601409+01 .2088434+02-.1620074+01-.1601534+01 .2321255+02 .4248495+01   1   7
 .1300000+02 .6360556+01 .6966270+01 .4653230-00 .5131334+01 .7667334+01   1   8
 .2098646+01 .3696263+01 .6073066+01 .3736503+01 .2202030+01 .4476133+01   1   9
 .5360647+01 .6576491-00 .2856192+01 .6973946+01-.6107952-00 .1261854+01   1  10
 .8584550+01-.1307592+01-.2985224-00 .1027857+02-.1556612+01-.1311025+01   1  11
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 .1596261+02-.1630751+01-.1616189+01 .1810267+02-.1630938+01-.1616767+01   1  13
 .2034463+02-.1630958+01-.1616829+01 .2270784+02 .4605170+01 .1300000+02   1  14
 .5118427+01 .6080620+01-.4775553-01 .3765739+01 .6683284+01 .1574416+01   1  15
 .2311951+01 .5197721+01 .3204099+01 .8131442-00 .3558421+01 .4026319+01   1  16
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-.1636333+01-.1614584+01 .1338737+02-.1640026+01-.1630162+01 .1542754+02   1  19
-.1640524+01-.1632173+01 .1756766+02-.1640590+01-.1632413+01 .1980962+02   1  20
-.1640597+01-.1632439+01 .2217283+02 .5010635+01 .1300000+02 .3233510+01   1  21
 .6240157+01-.6434634-00 .1759400+01 .4765396+01 .9711713-00 .2944063-00   1  22
 .3244543+01 .2597323+01-.8207614-00 .1692116+01 .4218493+01-.1376034+01   1  23
 .1526075-00 .5830964+01-.1573391+01-.1061996+01 .7441388+01-.1635117+01   1  24
-.1570972+01 .9135370+01-.1651497+01-.1658714+01 .1090736+02-.1655050+01   1  25
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-.1245313+01 .9900396-00 .3986983+01 .3652303-00-.3364513-00 .2466719+01   1  29
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 .1635126+02-.1655695+01-.1670660+01 .1859322+02-.1655695+01-.1670661+01   1  34
 .2095643+02 .5628946+01 .1300000+02 .1712567+01 .4718411+01-.1861091+01   1  35
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-.1655663+01-.1670620+01 .1359193+02-.1655694+01-.1670657+01 .1573200+02   1  40
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 .8214608+01 .1300000+02 .9852841-00 .3982097+01-.2437751+01-.3351506-00   1  42
 .2460536+01-.8126647-00-.1163633+01 .9027928-00 .8010684-00-.1502455+01   1  43
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-.1628604+01 .5635448+01-.1653465+01-.1664904+01 .7329414+01-.1655411+01   1  45
-.1669888+01 .9101406+01-.1655652+01-.1670545+01 .1097321+02-.1655690+01   1  46
-.1670646+01 .1301344+02-.1655695+01-.1670659+01 .1515350+02-.1655695+01   1  47
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-.1670661+01 .1739546+02-.1655695+01-.1670661+01 .1975867+02 .6551080+01   1  48
 .1300000+02 .3737182-00 .3333110+01-.2041502+01-.7564327-00 .1810776+01   1  49
-.1312341+01-.1349670+01 .2651517-00 .2464763-00-.1564571+01-.9894899-00   1  50
 .1908242+01-.1630632+01-.1541308+01 .3520393+01-.1649832+01-.1652095+01   1  51
 .5130741+01-.1655475+01-.1667841+01 .6824706+01-.1655556+01-.1670275+01   1  52
 .6596690+01-.1655673+01-.1670602+01 .1046851+02-.1655693+01-.1670653+01   1  53
 .1250873+02-.1655695+01-.1670660+01 .1404879+02-.1655695+01-.1670661+01   1  54
 .1689075+02-.1655695+01-.1670661+01 .1925396+02 .6907755+01 .1300000+02   1  55
-.2073641-00 .2640113+01-.3475896+01-.1085504+01 .1114027+01-.1897142+01   1  56
-.1475153+01-.3597944-00-.2384261-00-.1604147+01-.1323468+01 .1373259+01   1  57
-.1642330+01-.1615774+01 .2985367+01-.1652754+01-.1662612+01 .4595730+01   1  58
-.1655169+01-.1669406+01 .6289694+01-.1655626+01-.1670472+01 .8061686+01   1  59
-.1655685+01-.1670632+01 .9933494+01-.1655694+01-.1670658+01 .1197372+02   1  60
-.1655696+01-.1670661+01 .1411378+02-.1655696+01-.1670662+01 .1635574+02   1  61
-.1655696+01-.1670662+01 .1871895+02 .7313220+01 .1300000+02-.7342393-00   1  62
 .1850243+01-.4082580+01-.1331164+01 .3409584-00-.2455188+01-.1558805+01   1  63
-.9427587-00-.8465657-00-.1629296+01-.1528924+01 .7658790-00-.1649264+01   1  64
-.1650058+01 .2377554+01-.1654256+01-.1667282+01 .3987533+01-.1655518+01   1  65
-.1670168+01 .5661497+01-.1655564+01-.1670577+01 .7953488+01-.1655690+01   1  66
-.1670648+01 .9525296+01-.1655694+01-.1670660+01 .1136552+02-.1655695+01   1  67
-.1670661+01 .1350558+02-.1655695+01-.1670661+01 .1574754+02-.1655695+01   1  68
-.1670661+01 .1811075+02 .7718065+01 .1300000+02-.1095232+01 .1088755+01   1  69
-.4667628+01-.1477261+01-.3722407-00-.3063293+01-.1604816+01-.1329909+01   1  70
-.1454720+01-.1642578+01-.1617035+01 .1576 29-00-.1652808+01-.1662764+01   1  71
 .1769559+01-.1655116+01-.1669300+01 .3379336+01-.1655615+01-.1670443+01   1  72
 .5073299+01-.1655681+01-.1670625+01 .6845291+01-.1655693+01-.1670656+01   1  73
 .8717099+01-.1655695+01-.1670661+01 .1075732+02-.1655695+01-.1670662+01   1  74
 .1284739+02-.1655695+01-.1670662+01 .1513935+02-.1655695+01-.1670662+01   1  75
 .1750256+02 .8131531+01 .1300000+02-.1339639+01 .3067636-00-.5288154+01   1  76
-.1561249+01-.9611407-00-.3683781+01-.1629958+01-.1534490+01-.2075224+01   1  77
-.1649511+01-.1651010+01-.4626261-00-.1654305+01-.1667436+01 .1148835+01   1  78
-.1655513+01-.1670173+01 .2758410+01-.1655663+01-.1670595+01 .4452773+01   1  79
-.1655693+01-.1670674+01 .6224704+01-.1655696+01-.1670687+01 .8096572+01   1  80
-.1655699+01-.1670690+01 .1013679+02-.1655699+01-.1670690+01 .1227686+02   1  81
-.1655699+01-.1670690+01 .1451002+02-.1655699+01-.1670690+01 .1688203+02   1  82
 .8517193+01 .1300000+02-.1476004+01 .2071814+01-.5866648+01-.1603735+01   1  83
-.1094321+01-.4262221+01-.1641224+01-.1541305+01-.2649787+01-.1651591+01   1  84
-.1639365+01-.1659540+01-.1654023+01-.1657307+01 .5703422-00-.1654551+01   1  85
-.1660726+01 .2180317+01-.1654630+01-.1661390+01 .3874279+01-.1654646+01   1  86
-.1661514+01 .5646270+01-.1654648+01-.1661535+01 .7518078+01-.1654649+01   1  87
-.1661539+01 .9558300+01-.1654649+01-.1661539+01 .1169837+02-.1654649+01   1  88
-.1661539+01 .1394033+02-.1654649+01-.1661539+01 .1630354+02 .0853665+01   1  89
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 .1675609+01-.1654638+01-.1661461+01 .3369571+01-.1654646+01-.1661524+01   1  93
 .5141562+01-.1654647+01-.1661535+01 .7013378+01-.1654647+01-.1661536+01   1  94
 .9053592+01-.1654647+01-.1661537+01 .1119366+02-.1654647+01-.1661537+01   1  95
 .1343562+02-.1654647+01-.1661537+01 .1579883+02 .9210340+01 .1300000+02   1  96
-.1593715+01-.9944575-00-.6906369+01-.1658783+01-.1517358+01-.5301911+01   1  97
-.1651098+01-.1635384+01-.3689497+01-.1654197+01-.1657137+01-.2079256+01   1  98
-.1654902+01-.1651275+01-.4693774-00-.1654998+01-.1662036+01 .1140596+01   1  99
-.1655018+01-.1662190+01 .2834558+01-.1655022+01-.1662218+01 .4606550+01   1 100
-.1655023+01-.1662223+01 .6476358+01-.1655023+01-.1662224+01 .8518579+01   1 101
-.1655023+01-.1662224+01 .1065865+02-.1655023+01-.1662224+01 .1290061+02   1 102
```

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-.1655023*01-.1662224*01 .1526302*02 .9615885*01 .1300000*02-.1623135*01   1 103
-.1332778*01-.7914500*01-.1000007*01-.1599147*01-.5910099*01-.1655051*01   1 104
-.1650101*01-.4[illegible]                                                 1 105
-.1001[illegible]                                                          1 106
-.1661955*01 .2220301*01-.1659931*01-.1661967*01 .3[illegible]             1 107
-.1661969*01 .5670100*01-.1659932*01-.1661970*01 .7910302*01-.1659932*01   1 108
-.1661970*01 .1005045*02-.1659932*01-.1661970*01 .1229241*02-.1659932*01   1 109
-.1661970*01 .1405502*02 .1007147*02 .1300000*02-.1638572*01-.1612300*01   1 110
-.8122764*01-.1650004*01-.1634242*01-.1618202*01-.1653881*01-.1656242*01   1 111
-.4904670*01-.1659561*01-.1660592*01-.3295649*01-.1[illegible]             1 112
-.1665772*01-.1659695*01-.1661524*01-.7579801*01-.1659698*01-.1661550*01   1 113
 .1610103*01-.1659699*01-.1661561*01 .3390156*01-.1659699*01-.1661562*01   1 114
 .5261782*01-.1659699*01-.1661562*01 .7302184*01-.1659699*01-.1661562*01   1 115
 .9942251*01-.1659699*01-.1661562*01 .1104421*02-.1659699*01-.1661562*01   1 116
 .1404742*02 .0000000    .0000000    .0000000    .0000000    .0000000      1 117
        111
  DIAMC  LIN/MI  50. CV - 2250. CV  11 PMLQ.  CMD/GAL  9/30/66  030000
 .1100000*02 .5150000*03
      2108. .1300000E+02
 .3912023*01 .1300000*02 .7670779*01 .9793608*01 .9026840-00 .6605787*01   1   1
 .8589481*01 .2584496*01 .5267976*01 .7010212*01 .4231161*01 .3769586*01   1   2
 .5389464*01 .5863943*01 .2198236*01 .3731793*01 .7478350*01 .6075961-00   1   3
 .2123568*01 .9089196*01-.1032266*01 .4052223-00 .1078327*02-.2576200*01   1   4
-.1010268*01 .1255526*02-.3652110*01-.1936675*01 .1442704*02-.4024813*01   1   5
-.2213703*01 .1646731*02-.4086486*01-.2256559*01 .1860738*02-.4094103*01   1   6
-.2261789*01 .2084934*02-.4094926*01-.2282354*01 .2321255*02 .4248495*01   1   7
 .1300000*02 .6300555*01 .8966270*01 .4653230-00 .5131334*01 .7667335*01   1   8
 .2096846*01 .3690263*01 .6073007*01 .3736503*01 .2201941*01 .4476133*01   1   9
 .5360647*01 .6340063-00 .2856188*01 .6973946*01-.9443694-00 .1260578*01   1  10
 .8584550*01-.2956517*01-.3504131-00 .1027057*02-.3471523*01-.1732668*01   1  11
 .1205057*02-.4754463*01-.2461867*01 .1392238*02-.4963186*01-.2648407*01   1  12
 .1596261*02-.4996294*01-.2675960*01 .1810267*02-.4998067*01-.2679286*01   1  13
 .2034463*02-.4998474*01-.2679645*01 .2270784*02 .4605170*01 .1300000*02   1  14
 .5118427*01 .8080620*01-.4775553-01 .3765739*01 .6683890*01 .1574416*01   1  15
 .2311900*01 .5149722*01 .3204099*01 .7972127-00 .3558921*01 .4826319*01   1  16
-.7770348-00 .1955142*01 .6439079*01-.2352157*01 .3680257-00 .8049568*01   1  17
-.3913435*01-.1200052*01 .9743564*01-.5135346*01-.2443619*01 .1151556*02   1  18
-.5713957*01-.3002142*01 .1338737*02-.5840099*01-.3128414*01 .1542759*02   1  19
-.5857992*01-.3146340*01 .1756766*02-.5860147*01-.3148498*01 .1980962*02   1  20
-.5860379*01-.3148731*01 .2217263*02 .5010635*01 .1300000*02 .3233510*01   1  21
 .6240158*01-.6434834-00 .1758730*01 .4765396*01 .9711713-00 .2377816-00   1  22
 .3244532*01 .2597323*01-.1316611*01 .1690548*01 .4218403*01-.2900287*01   1  23
 .1088753-00 .5830964*01-.4472719*01-.1453981*01 .7441388*01-.6015867*01   1  24
-.2953809*01 .9135370*01-.7186579*01-.4012917*01 .1090736*02-.7678364*01   1  25
-.4408943*01 .1277917*02-.7783761*01-.4488975*01 .1481940*02-.7748529*01   1  26
-.4500025*01 .1695946*02-.7800303*01-.4501350*01 .1920142*02-.7800495*01   1  27
-.4501493*01 .2156463*02 .5416100*01 .1300000*02 .2488027*01 .5496681*01   1  28
-.1295313*01 .9802900-00 .3986983*01 .3652303-00-.5403322-00 .2466547*01   1  29
 .1998226*01-.2118488*01 .8893048-00 .3610494*01 .3698772*01-.6865394-00   1  30
 .5222812*01-.5238446*01-.2205964*01 .6833200*01-.6635899*01-.3528559*01   1  31
 .8527174*01-.7481913*01-.4254589*01 .1029917*02-.7744371*01-.4459304*01   1  32
 .1217098*02-.7793034*01-.4495919*01 .1421120*02-.7799632*01-.4500849*01   1  33
 .1635126*02-.7800421*01-.4501438*01 .1859322*02-.7800506*01-.4501502*01   1  34
 .2095643*02 .5828946*01 .1300000*02 .1711744*01 .4718412*01-.1861091*01   1  35
 .2153759-00 .3222130*01-.2349755-00-.1353479*01 .1653699*01 .1379347*01   1  36
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-.2934470+01 .7477301-01 .2991342+01-.4501124+01-.1482050+01 .4603571+01   1  37
-.5968822+01-.2909254+01 .6213938+01-.7124545+01-.3958582+01 .7907907+01   1  38
-.7640359+01-.4385795+01 .9679400+01-.7775538+01-.4482805+01 .1155171+02   1  39
-.7797232+01-.4499057+01 .1359193+02-.7800128+01-.4501220+01 .1573200+02   1  40
-.7800473+01-.4501478+01 .1797396+02-.7800511+01-.4501505+01 .2033717+02   1  41
 .6214008+01 .1300000+02 .9754031-00 .3982122+01-.2437751+01-.5385135-00   1  42
 .2468390+01-.6128847-00-.2114907+01 .8929052-00 .8010684-00-.3693213+01   1  43
-.6610010-00 .2412914+01-.5228915+01-.2196674+01 .4025093+01-.6568900+01   1  44
-.3467782+01 .5635448+01-.7431179+01-.4213687+01 .7329414+01-.7727266+01   1  45
-.4446312+01 .9101406+01-.7780868+01-.4492799+01 .1097321+02-.7798995+01   1  46
-.4500356+01 .1301344+02-.7800336+01-.4501357+01 .1515350+02-.7800496+01   1  47
-.4501476+01 .1739546+02-.7800513+01-.4501489+01 .1975867+02 .6551080+01   1  48
 .1300000+02 .3263619-00 .3333197+01-.2941502+01-.1197476+01 .1809718+01   1  49
-.1312341+01-.2779165+01 .2297929-00 .2964783-00-.4348113+01-.1330730+01   1  50
 .1908242+01-.5830171+01-.2777254+01 .3520393+01-.6994638+01-.3846726+01   1  51
 .5130741+01-.7595149+01-.4344290+01 .6824706+01-.7762473+01-.4472907+01   1  52
 .8596698+01-.7794566+01-.4496996+01 .1046851+02-.7799739+01-.4500861+01   1  53
 .1250873+02-.7800423+01-.4501371+01 .1464879+02-.7800505+01-.4501432+01   1  54
 .1689075+02-.7800514+01-.4501439+01 .1925396+02 .6907755+01 .1300000+02   1  55
-.3667475-00 .3041405+01-.3475096+01-.1899768+01 .1508481+01-.1847142+01   1  56
-.3481108+01-.7271568+01-.2364231-00-.5027200+01-.1617680+01 .1373259+01   1  57
-.6407469+01-.2993977+01 .2985387+01-.7326094+01-.3904645+01 .4595730+01   1  58
-.7694618+01-.4267308+01 .6289694+01-.7781694+01-.4352661+01 .8061686+01   1  59
-.7797595+01-.4368231+01 .9933494+01-.7801134+01-.4370717+01 .1197372+02   1  60
-.7800469+01-.4371045+01 .1411378+02-.7800509+01-.4371084+01 .1635574+02   1  61
-.7800513+01-.4371088+01 .1871895+02 .7313220+01 .1300000+02-.1157865+01   1  62
 .2133816+01-.4082580+01-.2696964+01 .5932061-00-.2455188+01-.4271959+01   1  63
-.9774310-00-.6465657-00-.5761323+01-.2456583+01 .7658730-00-.6947648+01   1  64
-.3613404+01 .2377554+01-.7561668+01-.4192540+01 .3987533+01-.7752075+01   1  65
-.4367391+01 .5681497+01-.7792110+01-.4403795+01 .7453488+01-.7799217+01   1  66
-.4410244+01 .9325296+01-.7800346+01-.4411268+01 .1136552+02-.7800495+01   1  67
-.4411403+01 .1350558+02-.7800512+01-.4411419+01 .1574754+02-.7800514+01   1  68
-.4411421+01 .1811075+02 .7800902+01 .1000000+02-.2380474+01 .1027813+01   1  22
-.3817820+01-.3357498+01 .5074431-01-.2770413+01-.3650442+01-.2409112-00   1  23
-.2487032+01-.4051871+01-.6431775-00-.2082644+01-.4724095+01-.1314924+01   1  24
-.1391003+01-.5459400+01-.2049157+01-.5844966-00-.6149161+01-.2736881+01   1  25
 .2121785-00-.6631307+01-.3216493+01 .8582077-00-.7447748+01-.4024612+01   1  26
 .2516571+01-.7750048+01-.4328113 +01.4760271 +01 .7718685+01 .13      +02
-.192545 +01 .1445146+01-.4667028+01-.3496158+01-.1251106   -.3063293+01
-.5044348+01-.1671184+01-.145472 +01-.6420971+01-.3039836+01 .1576929
-.7331566+01-.3934717+01 .1769359+01-.7687355+01-.4279416+01 .3379336+01
-.7778715+01-.4367255+01 .5073299+01-.7796773+01-.4384458 +01 .6845291+01
-.7799937+01-.4387615+01 .8717099+01-.7800439+01-.4388096+01 .1075732+02
-.7800505+01-.4388159+01 .1289739+02-.7800513+01-.4388166+01 .1513935+02
-.7800514+01-.4388167+01 .1750256+02 .7824046+01 .1       +02-.2819758+01
 .5205092   -.4152466+01-.3794436+01-.4534123   -.3133091+01-.4093477+01
-.7520297   -.2821718+01-.4482227+01-.114     +01-.2415127+01-.5143603+01
-.1799136+01-.1726302+01-.5852302+01-.2503016+01-.9242025   -.6492848+01
-.3135128+01-.1225313   -.6911662 +01-.3599538+01 .5234968   -.7551325+01
-.4170124+01 .7181857+01-.7772345+01-.4369367+01 .4425556+01
        36
DIANE/SCAT  LIMESTONE-1B  5-25-67  TEMP(50-1.E4)  AK/Rw INPUT TAPE(3971)
 .1000000+01 .6150000+03
   1131.     .1500000+02
 .3912023+01 .1300000+02 .8675739+01 .9610432+01 .4085977-00 .8105946+01   1   1
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 .6880718+01 .2095978+01 .7312465+01 .7961584+01 .3785015+01 .6054209+01   1   2
 .6534984+01 .5446025+01 .4513311+01 .5005622+01 .7100656+01 .2988657+01   1   3
 .3618555+01 .0748771+01 .1437620+01 .2135081+01 .1048225+02-.7073347-01   1   4
 .7047927-00 .1230788+02-.1154282+01-.6237974-00 .1423141+02-.1495596+01   1   5
-.1421314+01 .1632690+02-.1079594+01-.1638634+01 .1850871+02-.1678021+01   1   6
-.1657261+01 .2077446+02-.1885436+01-.1646921+01 .2315317+02 .4248495+01   1   7
 .1300000+02 .6693770+01 .9393347+01-.1733738-01 .7887182+01 .8622951+01   1   8
 .1870899+01 .6809408+01 .7477360+01 .3351961+01 .5412963+01 .6107136+01   1   9
 .5021457+01 .4048195+01 .4813194+01 .6697687+01 .2613557+01 .3481740+01   1  10
 .8367404+01 .1068491+01 .2091290+01 .1011814+02-.3649802-00 .5733847-00   1  11
 .1193973+02-.1264002+01-.7512494-00 .1384251+02-.1583436+01-.1465864+01   1  12
 .1590113+02-.1644906+01-.1617063+01 .1800872+02-.1654964+01-.1637278+01   1  13
 .2029289+02-.1654210+01-.1636103+01 .2265962+02 .4605170+01 .1300000+02   1  14
 .6549745+01 .9171733+01-.4638297-00 .7893381+01 .8390482+01 .1223806+01   1  15
 .6485951+01 .7213231+01 .2921494+01 .4979644+01 .5780037+01 .4615015+01   1  16
 .3578981+01 .4499040+01 .6293869+01 .2077455+01 .3105132+01 .7951391+01   1  17
 .4739419-00 .1566113+01 .9673228+01-.8293367-00-.7304373-01 .1145878+02   1  18
-.1421709+01-.1179559+01 .1333636+02-.1587674+01-.1557931+01 .1538090+02   1  19
-.1635843+01-.1621662+01 .1752464+02-.1695210+01-.1627620+01 .1976915+02   1  20
-.1648363+01-.1628006+01 .2213278+02 .5010635+01 .1300000+02 .8075697+01   1  21
 .8760250+01-.9595196-00 .7114554+01 .7730998+01 .7450793-00 .5907481+01   1  22
 .6510128+01 .2442744+01 .4579572+01 .5281151+01 .4118560+01 .2689122+01   1  23
 .3766616+01 .5763295+01 .1271412+01 .2146038+01 .7388102+01-.1682896-00   1  24
 .5505511-00 .9069009+01-.1083307+01-.7824806-00 .1086512+02-.1471228+01   1  25
-.1442730+01 .1273673+02-.1614013+01-.1602233+01 .1477933+02-.1641765+01   1  26
-.1625071+01 .1691945+02-.1845996+01-.1627616+01 .1916142+02-.1646457+01   1  27
-.1626096+01 .2152463+02 .5416100+01 .1300000+02 .7099279+01 .8082603+01   1  28
-.1455217+01 .8360391+01 .6910717+01 .2394144-00 .5267021+01 .5642912+01   1  29
 .1909158+01 .3792983+01 .4186472+01 .3552572+01 .2158931+01 .2599163+01   1  30
 .5177024+01 .6346964-00 .1042625+01 .6791646+01-.6100469-00-.3965872-00   1  31
 .6488859+01-.1321650+01-.1287241+01 .1025912+02-.1579958+01-.1568377+01   1  32
 .1213102+02-.1636711+01-.1619658+01 .1417161+02-.1642377+01-.1624030+01   1  33
 .1631426+02-.1634090+01-.1615047+01 .1856552+02-.1622558+01-.1604148+01   1  34
 .2094039+02 .5628948+01 .1300000+02 .5610553+01 .7208937+01-.1995222+01   1  35
 .5076647+01 .6021592+01-.3232599-00 .4016769+01 .4645857+01 .1319231+01   1  36
 .2593735+01 .3048582+01 .2946228+01 .1099095+01 .1496612+01 .4962698+01   1  37
-.2452261-00 .6070865-01 .6174301+01-.1165114+01-.9979864-00 .7470635+01   1  38
-.1527765+01-.1447309+01 .9649746+01-.1606402+01-.1563173+01 .1153236+02   1  39
-.1614317+01-.1590665+01 .1350095+02-.1614593+01-.1595779+01 .1572329+02   1  40
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 .2141952+01 .2373701+01-.1267479-00 .9116683-00 .3994013+01-.9749202-00   1  44
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-.1594290+01 .1300506+02-.1614561+01-.1596286+01 .1514514+02-.1614750+01   1  47
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 .1300000+02 .4393973+01 .5685308+01-.3000773+01 .3281121+01 .4431100+01   1  49
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-.4700577+01 .2659173-00 .2047148+01-.3080228+01-.7686510-00 .5491915-00   1  70
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-.1655719+01-.1670817+01 .2827482+01-.1655735+01-.1670860+01 .4599455+01   1 100
-.1655738+01-.1670867+01 .6471260+01-.1655739+01-.1670869+01 .8511481+01   1 101
-.1655739+01-.1670869+01 .1065155+02-.1655739+01-.1670869+01 .1289351+02   1 102
-.1655739+01-.1670869+01 .1525672+02 .0000000     .0000000     .0000000     1 103
          53
DIANE/SCAT  NL-1A  TEMP11.5-1.E4)  11-6-67  SADY INPUT TAPES(3956.39631
 .1000000+01 .9840000+03
    1010.    .2400000+02
 .4054651-00 .1300000+02 .3509196+01 .1008005+02-.3783041+01 .3471987+01   1   1
 .9794615+01-.1385241+01 .3468540+01 .9437083+01 .1364030+01 .3449899+01   1   2
 .8334518+01 .4314791+01 .3388121+01 .7223265+01 .7356307+01 .3193403+01   1   3
 .6346392+01 .1034880+02 .2557088+01 .5388150+01 .1311818+02 .1190349+01   1   4
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.3970299+01	.1536146+02	-.6092882-00	.2139229+01	.1734564+02	-.2344850+01	1	5
.1021474+00	.1940517+02	-.3452796+01	-.1910473+01	.2154921+02	-.3825573+01	1	6
-.3379644+01	.2380469+02	-.3779386+01	-.3647996+01	.2628294+02	.8109302-00	1	7
.1300000+02	.6943509+01	.1222961+02	-.6876729-02	.6947318+01	.1199086+02	1	8
.2487041+01	.6762675+01	.1164342+02	.5147451+01	.6207716+01	.1036075+02	1	9
.7610481+01	.5074855+01	.8495145+01	.9649177+01	.3595483+01	.6586633+01	1	10
.1138644+02	.2015636+01	.4766742+01	.1311536+02	.7511151-00	.3066513+01	1	11
.1492323+02	-.3210947-00	.1550232+01	.1694174+02	-.1454838+01	.1686794-00	1	12
.1930475+02	-.2580930+01	-.1552480+01	.2180362+02	-.3119184+01	-.2627279+01	1	13
.2387260+02	-.5208141+01	-.3157144+01	.2625014+02	.1223775+01	.1300000+02	1	14
.9534134+01	.1283570+02	.1740199+01	.8935943+01	.1220352+02	.3679682+01	1	15
.8148286+01	.1129001+02	.5827299+01	.7121502+01	.9882005+01	.7577958+01	1	16
.6057307+01	.6085351+01	.9305496+01	.5020792+01	.6737324+01	.1114097+02	1	17
.3618451+01	.5260672+01	.1307381+02	.1773936+01	.3524904+01	.1494307+02	1	18
.5170245-01	.1672990+01	.1685997+02	-.1357694+01	-.1045013+00	.1902759+02	1	19
-.2342778+01	-.1630014+01	.2135368+02	-.2738518+01	-.2573140+01	.2365454+02	1	20
-.2800385+01	-.2765779+01	.2604006+02	.1609438+01	.1300000+02	.1124312+02	1	21
.1205103+02	.1939778+01	.1053754+02	.1217430+02	.3750118+01	.9455988+01	1	22
.1145978+02	.5607440+01	.7957491+01	.9996557+01	.7474419+01	.6262373+01	1	23
.6267379+01	.9257103+01	.4779185+01	.6606038+01	.1096981+02	.3502120+01	1	24
.5112191+01	.1281469+02	.2037901+01	.3511820+01	.1473259+02	.3673397-00	1	25
.1053893+01	.1666983+02	-.1189088+01	-.1225017+00	.1880328+02	-.2133084+01	1	26
-.1556748+01	.2107965+02	-.2451100+01	-.2332654+01	.2337538+02	-.2446392+01	1	27
-.2491806+01	.2581386+02	.1995910+01	.1300000+02	.1206599+02	.1256729+02	1	28
.1805336+01	.1096848+02	.1219764+02	.3683805+01	.9411291+01	.1135856+02	1	29
.5475748+01	.7960069+01	.9916333+01	.7267267+01	.6550690+01	.8341749+01	1	30
.9066431+01	.5070514+01	.6693267+01	.1079767+02	.3596442+01	.5014780+01	1	31
.1259565+02	.2080595+01	.3401100+01	.1449631+02	.4357301-00	.1646202+01	1	32
.1045245+02	-.1090748+01	-.7995[illegible]-01	.1859128+02	-.1961161+01	-.1560146+01	1	33
.2082933+02	-.2198676+01	-.2129746+01	.2313738+02	-.2157405+01	-.2134409+01	1	34
.2560102+02	.2302585+01	.1300000+02	.1142066+02	.1238920+02	.1703687+01	1	35
.1097220+02	.1197204+02	.3477480+01	.9621047+01	.1126823+02	.5259408+01	1	36
.8121883+01	.9804320+01	.7050742+01	.6628993+01	.8206484+01	.8819183+01	1	37
.5252689+01	.6583501+01	.1055480+02	.3673767+01	.4943723+01	.1235972+02	1	38
.2059323+01	.3263079+01	.1423419+02	.4191138-00	.1508998+01	.1620215+02	1	39
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.1350140+02	-.5595050-00	.3712281-00	.1538307+02	-.1510027+01	-.1129311+01	1	53
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.6566604+01	.3900738+01	.6191456+01	.6878801+01	.5582059+01	.4535295+01	1 64
.5131669+01	.7226085+01	.2760726+01	.3419310+01	.8846562+01	.1004981+01	1 65
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-.1179158+01 .4410866-00 .1355734+01-.1498209+01-.8410872-00 .2988845+01   1 119
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-.1655782+01-.1671074+01 .8503152+01-.1655782+01-.1671074+01 .1064322+02   1 163
-.1655782+01-.1671074+01 .1288518+02-.1655782+01-.1671074+01 .1524839+02   1 164
          57
DIANE/SCAT PHENOLIC-1A TEMP(.861667-3#.)EV. SADY INPUT TAPE 1250 11-8-67
 .1000000+01 .4510000+03
    1107.    .1100000+02                                                   1   0
-.1488864-00 .1300000+02 .7396268+01 .1205435+02-.2876988+01 .7323616+01   1   1
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.5911545+01	.1044249+02	.2236093+01	.4335992+01	.1084014+02	.3853600-00	1 5
.2468522+01	.2117293+02	-.1454546+01	.3731602-00	.2337724+02	-.2557072+01	1 6
-.1603718+01	.2562787+02	-.2659038+01	-.2674482+01	.2799498+02	.0000000	1 7
.1300000+02	.8704367+01	.1269055+02	-.1509883+01	.8575912+01	.1225431+02	1 8
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.2101423+02	-.1750783+01	.1737945-02	.2316385+02	-.2619865+01	-.1831214+01	1 13
.2542023+02	-.2726942+01	-.2575849+01	.2788385+02	.4054651-00	.1300000+02	1 14
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.1682039+01	.3295718+01	.1844663+02	.2084309-00	.1634667+01	.2065812+02	1 19
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-.2436744+01	-.2369984+01	.2759190+02	.8109302-00	.1300000+02	.1328778+02	1 21
.1396296+02	.2527477+01	.1280136+02	.1352724+02	.4804134+01	.1186231+02	1 22
.1295880+02	.7046187+01	.1046484+02	.1162760+02	.9039274+01	.8773395+01	1 23
.9892006+01	.1080272+02	.7184165+01	.6291926+01	.1251469+02	.5606551+01	1 24
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.1051292+02	.6934698+01	.8120531+01	.1222504+02	.5250453+01	.6446039+01	1 31
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.1704045+02	-.9482201-01	.9749307-00	.1995614+02	-.1356919+01	-.6041614-00	1 33
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.1078240+02	.8137074+01	.8339901+01	.9119571+01	.9079928+01	.6619211+01	1 44
.7365048+01	.1159674+02	.4638641+01	.5550115+01	.1335904+02	.2.13813+01	1 45
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.4285118+01	.1076024+02	.1143384+02	.6037999+01	.9615188+01	.1008636+02	1 50
.7786876+01	.7843430+01	.8341706+01	.9501743+01	.5831803+01	.6481209+01	1 51
.1116069+02	.3881518+01	.4636573+01	.1288049+02	.1960238+01	.2804159+01	1 52
.1467017+02	.1036813+00	.9730338-00	.1655775+02	-.1183488+01	-.7428909-00	1 53
.1860423+02	-.1719754+01	-.1648158+01	.2074534+02	-.1858228+01	-.1839512+01	1 54
.2298743+02	-.1879095+01	-.1861891+01	.2535065+02	.2708050+01	.1300000+02	1 55
.1004861+02	.1177993+02	.2126617+01	.9925491+01	.1129418+02	.3872772+01	1 56

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 .9578609+01 .1046693+02 .5606765+01 .8635299+01 .9946784+01 .7300424+01   1  57
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 .1094286+02 .1669106+01 .8597530+01 .1035594+02 .3392075+01 .8064288+01   1  63
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 .5912249+01 .8384907+01 .3695548+01 .4142503+01 .1000800+02 .1925984+01   1  65
 .2409993+01 .1170731+02 .3361317-00 .8551778-00 .1349273+02-.8910610-00   1  66
-.2956566-00 .1541381+02-.1537603+01-.1216115+01 .1751915+02-.1685967+01   1  67
-.1607668+01 .1969364+02-.1650694+01-.1642730+01 .2199838+02-.1610127+01   1  68
-.1590681+01 .2440617+02 .3526360+01 .1300000+02 .8224901+01 .1013809+02   1  69
 .1150635+01 .7516756+01 .9275640+01 .2845973+01 .8571836+01 .8077291+01   1  70
 .4513468+01 .5251848+01 .6500299+01 .6158129+01 .3832690+01 .5165085+01   1  71
 .7805949+01 .2412270+01 .3996801+01 .9479251+01 .9427020-00 .2625664+01   1  72
 .1122450+02-.2930220-00 .1235699+01 .1305305+02-.1150707+01-.1075674+00   1  73
 .1498238+02-.1510261+01-.1196373+01 .1704674+02-.1580977+01-.1518749+01   1  74
 .1919820+02-.1579252+01-.1556674+01 .2145258+02-.1572700+01-.1554448+01   1  75
 .2382403+02 .0000000     .0000000     .0000000     .0000000     .0000000   1  76
 4
DIANL/SCAT GPLTCA    19 PNLO. TEMP.(1.-2250.) C1/RTW-AFWL 11-25-66
 .1900000+02 .8610000+03
     1124. .2100000E+02
 .0000000    .1300000+02 .6366457+01 .9675488+01-.2662175-00 .6704824+01   1   1
 .9509306+01 .1908890+01 .6627136+01 .9381302+01 .4465035+01 .6398674+01   1   2
 .9004290+01 .7080887+01 .5808522+01 .8221526+01 .9422521+01 .4918923+01   1   3
 .7171276+01 .1146267+02 .3812884+01 .6375975+01 .1363218+02 .2638152+01   1   4
 .4910197+01 .1600605+02 .1146469+01 .3156651+01 .1822594+02-.5676764-00   1   5
 .1324305+01 .2041782+02-.2197785+01-.6503493-00 .2262645+02-.3083742+01   1   6
-.2462769+01 .2488244+02-.3359159+01-.3266519+01 .2725677+02 .4054651-00   1   7
 .1300000+02 .9169859+01 .1115098+02 .1271949+01 .9009848+01 .1089895+02   1   8
 .3438773+01 .8750252+01 .1006735+02 .5747365+01 .8293466+01 .1011945+02   1   9
 .7990001+01 .7512050+01 .9091565+01 .1020165+02 .6408134+01 .7713306+01   1  10
 .1221367+02 .4956104+01 .6218449+01 .1410003+02 .3149996+01 .4375091+01   1  11
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 .1108015+02 .1183227+02 .2100490+01 .1070339+02 .1150010+02 .4228613+01   1  15
 .1015075+02 .1101625+02 .6417363+01 .9194053+01 .1001160+02 .8414305+01   1  16
 .7869553+01 .8682235+01 .1021136+02 .6359144+01 .7122866+01 .1190478+02   1  17
 .4837588+01 .5594554+01 .1367614+02 .3247645+01 .4174408+01 .1560791+02   1  18
 .1486339+01 .2576709+01 .1766607+02-.4239082-00 .6271632-00 .1978446+02   1  19
-.1936000+01-.1214802+01 .2198126+02-.2587600+01-.2374441+01 .2429720+02   1  20
-.2656174+01-.2622230+01 .2677291+02 .1223775+01 .1300000+02 .1166009+02   1  21
 .1181946+02 .2470291+01 .1115058+02 .1123898+02 .4429359+01 .1035431+02   1  22
 .1056289+02 .6308225+01 .9315664+01 .9796144+01 .8105480+01 .8019590+01   1  23
 .8679545+01 .9902027+01 .6528763+01 .7460829+01 .1169107+02 .4831070+01   1  24
 .5819934+01 .1349011+02 .3146230+01 .4029928+01 .1534806+02 .1363887+01   1  25
 .2256119+01 .1732919+02-.4804297-00 .3895829-00 .1947120+02-.1884308+01   1  26
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-.2419647+01 .2638598+02 .1609438+01 .1300000+02 .1144896+02 .1159322+02   1  28
 .2425932+01 .1090408+02 .1106034+02 .4217368+01 .1011773+02 .1047448+02   1  29
 .6065704+01 .9162441+01 .9796392+01 .7889378+01 .7871443+01 .8539757+01   1  30
 .9648406+01 .6327231+01 .7039031+01 .1138832+02 .4619551+01 .5388227+01   1  31
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 .1319292+02 .2035284+01 .3610860+01 .1502736+02 .1012789+01 .1858067+01  1  32
 .1696892+02-.7813473-00 .3109666-01 .1908842+02-.1911623+01-.1539000+01  1  33
 .2120658+02-.2234633+01-.2158249+01 .2358152+02-.2257487+01-.2238838+01  1  34
 .2600176+02 .1945910+01 .1300000+02 .1120571+02 .1142562+02 .2250511+01  1  35
 .1074449+02 .1091272+02 .4026848+01 .1011399+02 .1046003+02 .5839522+01  1  36
 .9026034+01 .9603931+01 .7629774+01 .7484521+01 .8227806+01 .9382287+01  1  37
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 .1017466+02 .1067771+02 .1302516+01 .9937166+01 .1032002+02 .3035277+01  1  56
 .9227512+01 .9566973+01 .4782203+01 .7913439+01 .8376405+01 .6523700+01  1  57
 .6103253+01 .6765163+01 .6211593+01 .4346719+01 .4977934+01 .9062066+01  1  58
 .2627126+01 .3251422+01 .1156597+02 .7889234-00 .1513763+01 .1338516+02  1  59
-.7515476-00-.1308645-00 .1526016+02-.1557805+01-.1347602+01 .1735745+02  1  60
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-.1626051+01-.1813430+01 .2418753+02 .3526360+01 .1300000+02 .9574938+01  1  62
 .1022508+02 .6061268-00 .9234184+01 .9706997+01 .2611435+01 .8411781+01  1  63
 .8735096+01 .4328922+01 .7020797+01 .7377035+01 .6025970+01 .5353279+01  1  64
 .5802047+01 .7665672+01 .3022455+01 .4257660+01 .9333313+01 .1495372+01  1  65
 .2736978+01 .1106185+02 .3121712-00 .1217026+01 .1286652+02-.9996136-00  1  66
-.3780445-00 .1476925+02-.1619450+01-.1432241+01 .1683543+02-.1753458+01  1  67
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 .2341923+01 .3387646+01 .8424123+01 .8028794-00 .1935083+01 .1016491+02  1  79
-.5563596-00 .4317234-00 .1197594+02-.1329903+01-.8756332-00 .1386592+02  1  80
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 .5720115+01 .4668983+01 .3482099+01 .4318497+01 .6336080+01 .1854934+01  1  85
 .2861677+01 .7980821+01 .2281032-00 .1248141+01 .9690045+01-.9676575-00  1  86
```

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-.1631021+01	.1476984+02	-.1632358+01	-.1618481+01	.2214628+02	.5010635+01	1	89
.1300000+02	.7845614+01	.8555217+01	-.9216486-00	.7210448+01	.7718824+01	1	90
.7856725-00	.6055001+01	.8470057+01	.2496391+01	.4441227+01	.4973526+01	1	91
.4147868+01	.2743266+01	.3429170+01	.5777738+01	.1058430+01	.1811430+01	1	92
.7395372+01	-.3165006-00	.2605601-00	.9089960+01	-.1124699+01	-.9280157-00	1	93
.1086089+02	-.1491466+01	-.1449183+01	.1275017+02	-.1598095+01	-.1577161+01	1	94
.1480413+02	-.1604356+01	-.1593867+01	.1695349+02	-.1609981+01	-.1595498+01	1	95
.1919750+02	-.1610041+01	-.1595660+01	.2156076+02	.5416100+01	.1300000+02	1	96
.6958761+01	.7923956+01	-.1425681+01	.6168844+01	.6799405+01	.2632580-00	1	97
.4973421+01	.5413706+01	.1931105+01	.3425920+01	.3888309+01	.3563416+01	1	98
.1855874+01	.2425690+01	.5184266+01	.4072000-00	.1092169+01	.6806307+01	1	99
-.7509585-00	-.1680198-00	.6513100+01	-.1361663+01	-.1125184+01	.1029291+02	1	100
-.1557593+01	-.1505526+01	.1216690+02	-.1598749+01	-.1583871+01	.1420761+02	1	101
-.1600613+01	-.1593704+01	.1634848+02	-.1606116+01	-.1592361+01	.1859316+02	1	102
-.1602982+01	-.1589087+01	.2095980+02	.5828946+01	.1300000+02	.6149165+01	1	103
.7100158+01	-.1972311+01	.5226485+01	.5936321+01	-.3088052-00	.3960702+01	1	104
.4659494+01	.1336385+01	.2306166+01	.3264397+01	.2971467+01	.8247291-00	1	105
.1816417+01	.4594215+01	-.4251051-00	.3637243-00	.6208994+01	.1180720+01	1	106
-.6382677-00	.7904774+01	-.1467474+01	-.1405628+01	.9679072+01	-.1568125+01	1	107
-.1554281+01	.1155410+02	-.1595475+01	-.1582035+01	.1359680+02	-.1599782+01	1	108
-.1586139+01	.1573754+02	-.1600490+01	-.1586636+01	.1797960+02	-.1600588+01	1	109
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.7333842+01	-.1524204+01	-.1496083+01	.9106807+01	-.1584936+01	-.1572084+01	1	114
.1097882+02	-.1599069+01	-.1584108+01	.1301908+02	-.1600742+01	-.1585447+01	1	115
.1515915+02	-.1600911+01	-.1585593+01	.1740111+02	-.1600930+01	-.1585609+01	1	116
.1976432+02	.6551080+01	.1300000+02	.4818133+01	.5761036+01	-.2974354+01	1	117
.4031269+01	.4543595+01	-.1337963+01	.2678930+01	.3120598+01	.2914567-00	1	118
.1159798+01	.1676080+01	.1911560+01	-.1817810-00	.2799368-00	.3525297+01	1	119
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-.1573850+01	-.1557984+01	.8602340+01	-.1597482+01	-.1582807+01	.1047416+02	1	121
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-.1601137+01	-.1586913+01	.1689640+02	-.1601142+01	-.1586919+01	.1925961+02	1	123
.6907755+01	.1300000+02	.3732440+01	.4935368+01	-.3489041+01	.3012815+01	1	124
.3680367+01	-.1861305+01	.1771796+01	.2236129+01	-.2365078-00	.3362623-00	1	125
.7636768-00	.1380367+01	-.8140249-00	-.5199476-00	.2991647+01	-.1394071+01	1	126
-.1285093+01	.4601492+01	-.1568265+01	-.1533728+01	.6295365+01	-.1597919+01	1	127
-.1578317+01	.8067339+01	-.1602639+01	-.1585710+01	.9939144+01	-.1603357+01	1	128
-.1586048+01	.1197937+02	-.1603451+01	-.1586998+01	.1411943+02	-.1603462+01	1	129
-.1587015+01	.1636139+02	-.1603463+01	-.1587017+01	.1872460+02	.7313220+01	1	130
.1300000+02	.2297704+01	.4107050+01	-.4084454+01	.1292870+01	.2685509+01	1	131
-.2461421+01	.7726327-01	.1220096+01	-.8415712-00	-.9333929-00	-.1925517-00	1	132
.7730174-00	-.1419711+01	-.1151122+01	.2343641+01	-.1564823+01	-.1490717+01	1	133
.3993334+01	-.1599943+01	-.1570977+01	.5687174+01	-.1606698+01	-.1585961+01	1	134
.7459143+01	-.1607881+01	-.1588535+01	.9330947+01	-.1608069+01	-.1588942+01	1	135
.1137117+02	-.1608094+01	-.1588996+01	.1351123+02	-.1608097+01	-.1589002+01	1	136
.1575319+02	-.1608097+01	-.1589003+01	.1811640+02	.7718685+01	.1300000+02	1	137
.7389222-00	.3220927+01	-.4685476+01	-.3336182-00	.1791591+01	-.3064224+01	1	138
-.1103077+01	.3002559-00	-.1446632+01	-.1452166+01	-.8898876-00	.1650206-00	1	139
-.1572372+01	-.1426040+01	.1775486+01	-.1608680+01	-.1564369+01	.3385145+01	1	140
-.1617778+01	-.1593678+01	.5078978+01	-.1618040+01	-.1597937+01	.6850945+01	1	141

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-.1619161+01-.1598699+01 .8722749+01-.1619212+01-.1599051+01 .1076297+02   1 142
-.1619218+01-.1599071+01 .1290304+02-.1619219+01-.1599073+01 .1514500+02   1 143
-.1619219+01-.1599074+01 .1750821+02 .0000000     .0000000     .0000000     1 144

DIAM/SCAT OPLTFE    19 FREQ. TEMP.( 1.-2250.) C1/RT=-AFWL 11-28-6000000
 .1900000+02 .8610000+03
      1125. .2100000E+02
 .0000000     .1300000+02 .6360457+01 .9675488+01-.2662175-00 .6704824+01   1   1
 .9509306+01 .1968890+01 .6627136+01 .9381302+01 .4465035+01 .6398674+01   1   2
 .9004290+01 .7080687+01 .5808522+01 .8221526+01 .9422521+01 .4918923+01   1   3
 .7171276+01 .1146267+02 .3812084+01 .6375975+01 .1363218+02 .2638152+01   1   4
 .4910197+01 .1600605+02 .1146469+01 .3156651+01 .1822594+02-.5676764-00   1   5
 .1329309+01 .2041762+02-.2197785+01-.6503493-00 .2262645+02-.3083742+01   1   6
-.2462769+01 .2488244+02-.3359159+01-.3266519+01 .2725677+02 .4054651-00   1   7
 .1300000+02 .9169859+01 .1115098+02 .1271949+01 .9009848+01 .1089895+02   1   8
 .3438773+01 .8750252+01 .1066935+02 .5747365+01 .8293866+01 .1011945+02   1   9
 .7990001+01 .7512050+01 .9091565+01 .1020165+02 .6408134+01 .7713306+01   1  10
 .1221367+02 .4956104+01 .6218449+01 .1410003+02 .3149996+01 .4375091+01   1  11
 .1595364+02 .1182044+01 .2440370+01 .1785606+02-.7267326-00 .4579919-00   1  12
 .1992705+02-.2205996+01-.1305733+01 .2214446+02-.2817475+01-.2418279+01   1  13
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 .1100015+02 .1183227+02 .2100990+01 .1070339+02 .1150010+02 .4228813+01   1  15
 .1015075+02 .1101625+02 .6417363+01 .9199053+01 .1001160+02 .8414305+01   1  16
 .7809553+01 .8682235+01 .1021136+02 .6359144+01 .7122866+01 .1190478+02   1  17
 .4637588+01 .5594554+01 .1367614+02 .3247645+01 .4174408+01 .1560791+02   1  18
 .1486339+01 .2576709+01 .1766607+02-.4239082-00 .6271632-00 .1978446+02   1  19
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 .1181946+02 .2470291+01 .1115058+02 .1123898+02 .4429359+01 .1035431+02   1  22
 .1056269+02 .6308225+01 .9315604+01 .9796144+01 .8105480+01 .8019590+01   1  23
 .8679545+01 .9902027+01 .6528763+01 .7460829+01 .1169157+02 .4831070+01   1  24
 .5819934+01 .1349011+02 .5146250+01 .4029928+01 .1534806+02 .1363887+01   1  25
 .2256119+01 .1732919+02-.4804297-00 .3895829-00 .1947120+02-.1884308+01   1  26
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 .2425932+01 .1090408+02 .1106834+02 .4217368+01 .1011773+02 .1047448+02   1  29
 .6065704+01 .9162441+01 .9796392+01 .7884937+01 .7871443+01 .8539757+01   1  30
 .9048406+01 .6527231+01 .7039031+01 .1138832+02 .4619551+01 .5386227+01   1  31
 .1319292+02 .2835289+01 .3610880+01 .1502736+02 .1012789+01 .1858067+01   1  32
 .1696892+02-.7813473-00 .3109066-01 .1908842+02-.1911623+01-.1539000+01   1  33
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 .3052887+01 .1437010+02 .3297190-00 .1314824+01 .1632080+02-.1204147+01   1  46
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-.1985183+01 .2282106+02-.2021708+01-.2008591+01 .2520522+02 .2708050+01   1  48
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 .1300000+02 .1053863+02 .1096938+02 .1683027+01 .1026196+02 .1058640+02  1  49
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 .4776931+01 .1324462+01 .2936476+01 .3373656+01 .2960780+01 .1264485+01   1 105
 .1900580+01 .4584900+01-.1766174-00 .4380700-00 .6200040+01-.1077155+01   1 106
-.0052764-00 .7895278+01-.1452623+01-.1415501+01 .9667527+01-.1579654+01   1 107
-.1573665+01 .1155938+02-.1612687+01-.1600595+01 .1357962+02-.1617774+01   1 108
-.1604093+01 .1571976+02-.1617832+01-.1603947+01 .1796229+02-.1615433+01   1 109
-.1601526+01 .2032797+02 .6214608+01 .1300000+02 .5461529+01 .6380765+01   1 110
-.2520461+01 .4837788+01 .5419686+01-.0638611-00 .3596928+01 .4027004+01   1 111
 .7748530-00 .2021674+01 .2478940+01 .2399292+01 .5015271-00 .9481002-00   1 112
 .4012762+01-.6596214-00-.3976021-00 .5623129+01-.1309991+01-.1249059+01   1 113
 .7317195+01-.1550151+01-.1531798+01 .9089643+01-.1605133+01-.1588242+01   1 114
 .1096321+02-.1611677+01-.1596030+01 .1300647+02-.1610521+01-.1595172+01   1 115
 .1514924+02-.1609859+01-.1594002+01 .1739207+02-.1609792+01-.1594522+01   1 116
 .1975539+02 .6551080+01 .1300000+02 .4533608+01 .5784759+01-.2986436+01   1 117
 .3696987+01 .4595476+01-.1348823+01 .2375217+01 .3065927+01 .2799056-00   1 118
 .9227557-00 .1537037+01 .1097498+01-.3342476-00 .1199165+00 .3509203+01   1 119
-.1131973+01-.6781145-00 .5120388+01-.1485076+01-.1376092+01 .6816911+01   1 120
-.1583165+01-.1546434+01 .8591655+01-.1603367+01-.1587143+01 .1046487+02   1 121
-.1608041+01-.1594579+01 .1250541+02-.1609452+01-.1595575+01 .1464552+02   1 122
-.1609565+01-.1595651+01 .1688748+02-.1609573+01-.1595658+01 .1925069+02   1 123
 .6907755+01 .1300000+02 .3595047+01 .4909267+01-.3503015+01 .2559291+01   1 124
 .3607245+01-.1874210+01 .1168079+01 .2111313+01-.2512039-00-.9860691-01   1 125
 .7014990-00 .1365023+01-.9488078-00-.3415002-00 .2979394+01-.1371998+01   1 126
-.1117016+01 .4991373+01-.1538335+01-.1489005+01 .6286181+01-.1593140+01   1 127
-.1570253+01 .8050371+01-.1087006+01-.1592581+01 .9930210+01-.1609503+01   1 128
-.1594257+01 .1197044+02-.1609652+01-.1594447+01 .1411051+02-.1609670+01   1 129
-.1594469+01 .1635247+02-.1609672+01-.1594472+01 .1871568+02 .7313220+01   1 130
 .1300000+02 .2896433+01 .4108721+01-.4097992+01 .1888767+01 .2776061+01   1 131
-.2474861+01 .5072020-00 .1467910+01-.8535426-00-.5134067-00 .1689168-00   1 132
 .7029301-00-.1175452+01-.8956387-00 .2374427+01-.1496095+01-.1431520+01   1 133
 .3984351+01-.1592894+01-.1567539+01 .5078242+01-.1606993+01-.1588   +01   1 134
 .7450220+01-.1608971+01-.1592094+01 .9322026+01-.1609261+01-.1592601+01   1 135
 .1136225+02-.1609299+01-.1592668+01 .1350231+02-.1609303+01-.1592676+01   1 136
 .1574427+02-.1609304+01-.1592677+01 .1810748+02 .7718685+01 .1300000+02   1 137
 .1849413+01 .3361072+01-.4697381+01 .1050730+01 .2112704+01-.3075012+01   1 138
-.1662084-00 .6863128-00-.1456211+01-.1107390+01-.6139606-00 .1559514-00   1 139
-.1497041+01-.1343395+01 .1766551+01-.1508600+01-.1542523+01 .3376226+01   1 140
-.1606399+01-.1582295+01 .5070056+01-.1609788+01-.1589694+01 .6842024+01   1 141
-.1610340+01-.1590941+01 .8713628+01-.1610424+01-.1591137+01 .1075405+02   1 142
-.1610435+01-.1591162+01 .1289912+02-.1610436+01-.1591165+01 .1513808+02   1 143
-.1610436+01-.1591166+01 .1749929+02 .0000000     .0000000     .0000000     1 144
      1
DIANE/SCAT GROUP  19 PHLO(.001-1.66) TEMP(1.-2250.) C1/LMS 11/7/66
 .1900000+02 .8610000+03
     1105. .2100000E+02
 .0000000     .1300000+02 .6342381+01 .9857336+01-.1978742-00 .6720848+01   1   1
 .9651599+01 .1976810+01 .6638737+01 .9514818+01 .4531841+01 .6395561+01   1   2
 .9084592+01 .7143350+01  5796304+01 .8229278+01 .9468759+01 .4818231+01   1   3
 .7135162+01 .1146995+02 .3.  5056+01 .6383667+01 .1363020+02 .2716024+01   1   4
 .4950495+01 .1605199+02 .1259798+01 .3233931+01 .1829475+02-.4611800-00   1   5
 .1412451+01 .2049140+02-.2108497+01-.5625348-00 .2270105+02-.3016697+01   1   6
-.2382798+01 .2495598+02-.3300871+01-.3205007+01 .2732079+02 .4054651-00   1   7
 .1900000+02 .9200978+01 .1134496+02 .1320996+01 .9044369+01 .1106969+02   1   8
 .3491180+01 .8786544+01 .1085370+02 .5778039+01 .8336226+01 .1027845+02   1   9
 .8011853+01 .7548231+01 .9196182+01 .1024455+02 .6418701+01 .7804317+01   1  10
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 .1227831+02 .4966747+01 .6308258+01 .1417236+02 .3182621+01 .4456543+01  1  11
 .1802885+02 .1192565+01 .2501877+01 .1792410+02-.7652075-00 .4635127-0(  1  12
 .1997757+02-.2217912+01-.1311470+01 .2218241+02-.2793213+01-.2398404+01  1  13
 .2463246+02-.2876610+01-.2021045+01 .2714361+02 .8109302-00 .1300000+02  1  14
 .1115852+02 .1200300+02 .2135047+01 .1078293+02 .1166660+02 .4268390+01  1  15
 .1022690+02 .1119151+02 .6467727+01 .9231642+01 .1012761+02 .8478919+01  1  16
 .7881636+01 .8744702+01 .1028112+02 .6342500+01 .7145312+01 .1196983+02  1  17
 .4839991+01 .9575546+01 .1372025+02 .3239160+01 .4158711+01 .1964530+02  1  18
 .1484984+01 .2576513+01 .1769814+02-.4231195-00 .6242987-00 .1981362+02  1  19
-.1925072+01-.1223310+01 .2200347+02-.2575190+01-.2373708+01 .2431177+02  1  20
-.2644674+01-.2612550+01 .2078491+02 .1223775+01 .1300000+02 .1172467+02  1  21
 .1194396+02 .2522395+01 .1122103+02 .1133357+02 .4486601+01 .1040096+02  1  22
 .1060006+02 .6367910+01 .9324026+01 .9779222+01 .8159223+01 .8016325+01  1  23
 .8657417+01 .9942290+01 .6631088+01 .7270786+01 .1172298+02 .4056045+01  1  24
 .5652946+01 .1351604+02 .3140934+01 .3937031+01 .1536596+02 .1350616+01  1  25
 .2195980+01 .1734161+02-.4951099-00 .3445649-00 .1947901+02-.1900489+01  1  26
-.1431012+01 .2165021+02-.2424746+01-.2324858+01 .2392473+02-.2448588+01  1  27
-.2426769+01 .2638020+02 .1609438+01 .1300000+02 .1145528+02 .1163577+02  1  28
 .2474112+01 .1089573+02 .1106708+02 .4263921+01 .1010072+02 .1047123+02  1  29
 .6103234+01 .9137464+01 .9741375+01 .7918810+01 .7876686+01 .8484097+01  1  30
 .9669177+01 .6323674+01 .6981206+01 .1140173+02 .4585887+01 .5305660+01  1  31
 .1320045+02 .2781603+01 .3530038+01 .1502730+02 .9643433-00 .1703839+01  1  32
 .1696411+02-.8107105-00-.2332845-01 .1908242+02-.1926224+01-.1567647+01  1  33
 .2126318+02-.2244034+01-.2167379+01 .2357655+02-.2263086+01-.2243883+01  1  34
 .2599714+02 .1945910+01 .1300000+02 .1118672+02 .1142436+02 .2287042+01  1  35
 .1078420+02 .1091422+02 .4057516+01 .1008346+02 .1042622+02 .5462884+01  1  36
 .8957613+01 .9577568+01 .7643937+01 .7378021+01 .8136021+01 .9388924+01  1  37
 .5817122+01 .6585862+01 .1108449+02 .4179129+01 .4956075+01 .1286302+02  1  38
 .2486620+01 .3284411+01 .1469965+02 .6596984-00 .1790757+01 .1664230+02  1  39
-.1021122+01-.5945602-01 .1874947+02-.1802665+01-.1550034+01 .2095789+02  1  40
-.2057372+01-.2006135+01 .2328191+02-.2088153+01-.2071423+01 .2567246+02  1  41
 .2302565+01 .1300000+02 .1088449+02 .1124287+02 .2019622+01 .1051815+02  1  42
 .1076657+02 .9776047+01 .9718897+01 .1024459+02 .5553317+01 .8479390+01  1  43
 .9287373+01 .7315269+01 .6960770+01 .7846003+01 .9040141+01 .5412837+01  1  44
 .6304856+01 .1073599+02 .3637763+01 .4695471+01 .1251324+02 .2147082+01  1  45
 .3036140+01 .1436751+02 .3170138-00 .1306775+01 .1632008+02-.1207399+01  1  46
-.4552919-00 .1859014+02-.1862335+01-.1645589+01 .2056539+02-.2014064+01  1  47
-.1981542+01 .2282465+02-.2016447+01-.2003293+01 .2521048+02 .2708050+01  1  48
 .1300000+02 .1052564+02 .1095899+02 .1692070+01 .1021291+02 .1055729+02  1  49
 .3418154+01 .9455022+01 .9993110+01 .5173465+01 .8255674+01 .8918182+01  1  50
 .6923526+01 .6798032+01 .7473321+01 .6653330+01 .5083305+01 .5668652+01  1  51
 .1035476+02 .3257667+01 .4126912+01 .1210959+02 .1429703+01 .2314281+01  1  52
 .1391529+02-.2477952-00 .5046958-00 .1581205+02-.1444318+01-.1057797+01  1  53
 .1787629+02-.1852025+01-.1789328+01 .2004120+02-.1928905+01-.1916261+01  1  54
 .2230592+02-.1926768+01-.1912775+01 .2469502+02 .3113515+01 .1300000+02  1  55
 .1019536+02 .1066536+02 .1306765+01 .9939078+01 .1031334+02 .3037798+01  1  56
 .9239760+01 .9579436+01 .4793727+01 .7909128+01 .8404294+01 .6525818+01  1  57
 .6107129+01 .6792844+01 .8215212+01 .4361637+01 .5002418+01 .9868092+01  1  58
 .2645847+01 .3280276+01 .1359309+02 .7997861-00 .1541915+01 .1339357+02  1  59
-.7529844-00-.1174962+00 .1529364+02-.1552633+01-.1343097+01 .1736301+02  1  60
-.1805032+01-.1770963+01 .1953179+02-.1841230+01-.1825483+01 .2180160+02  1  61
-.1825489+01-.1810921+01 .2419005+02 .3526360+01 .1300000+02 .9564721+01  1  62
 .1022961+02 .8902562-00 .9244978+01 .9723945+01 .2615891+01 .8429702+01  1  63
 .8758611+01 .4334373+01 .7046967+01 .7414270+01 .6033001+01 .5379486+01  1  64
 .5833412+01 .7693243+01 .3667127+01 .4277732+01 .9339584+01 .1906727+01  1  65
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 .2737087+01 .1106710+02 .3181302-00 .1224645+01 .1287082+02-.9941890-00   1  66
-.3827604-00 .1477198+02-.1613803+01-.1432946+01 .1603823+02-.1749778+01   1  67
-.1706220+01 .1901156+02-.1734039+01-.1716685+01 .2129578+02-.1709711+01   1  68
-.1695785+01 .2368674+02 .3912023+01 .1300000+02 .8806536+01 .9596336+01   1  69
 .4624849-00 .8383704+01 .8858645+01 .2152274+01 .7656604+01 .7996778+01   1  70
 .3651414+01 .8282792+01 .8728104+01 .5528390+01 .4669119+01 .5241129+01   1  71
 .7183480+01 .3028230+01 .8742803+01 .8830332+01 .1336273+01 .2203253+01   1  72
 .1056405+02-.4424077-00 .7344910-00 .1238307+02-.1244192+01-.6279192-00   1  73
 .1429530+02-.1583977+01-.1404074+01 .1657775+02-.1641477+01-.1408801+01   1  74
 .1854663+02-.1656002+01-.1640717+01 .2079641+02-.1655943+01-.1642014+01   1  75
 .2316201+02 .4248495+01 .1300000+02 .8922081+01 .9120515+01 .4059822-01   1  76
 .8021034+01 .6467654+01 .1736064+01 .7194927+01 .7530615+01 .3425851+01   1  77
 .5734365+01 .8221188+01 .5099197+01 .3984431+01 .4804317+01 .6770057+01   1  78
 .2309886+01 .3378521+01 .6433576+01 .7222712-00 .1920800+01 .1017171+02   1  79
-.5974233-00 .4110637-00 .1198000+02-.1331365+01-.8929606-00 .1386716+02   1  80
-.1585046+01-.1504783+01 .1591246+02-.1641239+01-.1623308+01 .1805450+02   1  81
-.1650578+01-.1637747+01 .2029734+02-.1652607+01-.1638760+01 .2266122+02   1  82
 .4605170+01 .1300000+02 .8222933+01 .8848271+01-.4036073-00 .7726966+01   1  83
 .8188057+01 .1286151+01 .6733717+01 .7109419+01 .2988746+01 .5115243+01   1  84
 .5715672+01 .4078739+01 .3409521+01 .4287303+01 .6341460+01 .1738938+01   1  85
 .2799644+01 .7983610+01 .1604473-00 .1190260+01 .9690440+01-.9677469-00   1  86
-.3210212-00 .1140069+02-.1453941+01-.1293381+01 .1334009+02-.1597529+01   1  87
-.1586091+01 .1538127+02-.1640743+01-.1630265+01 .1752299+02-.1642573+01   1  88
-.1628583+01 .1977227+02-.1627460+01-.1613073+01 .2215169+02 .5010635+01   1  89
 .1300000+02 .7811425+01 .8562564+01-.9118936-00 .7217019+01 .7741046+01   1  90
 .7921244-00 .6038084+01 .6463064+01 .2491152+01 .4369310+01 .4913367+01   1  91
 .4150244+01 .2083929+01 .3350698+01 .5778166+01 .1046432+01 .1767596+01   1  92
 .7393411+01-.3267625-00 .2290327-00 .9090323+01-.1131860+01-.9267319-00   1  93
 .1088079+02-.1487066+01-.1434056+01 .1275492+02-.1588495+01-.1565028+01   1  94
 .1481190+02-.1599475+01-.1583065+01 .1696323+02-.1599797+01-.1585276+01   1  95
 .1920767+02-.1599613+01-.1585932+01 .2157118+02 .5416100+01 .1300000+02   1  96
 .6962006+01 .7915497+01-.1420208+01 .6187391+01 .6700009+01 .2663371-00   1  97
 .4924029+01 .5328076+01 .1355[illegible]+01 .3497787+01 .3980098+01 .3662407+01   1  98
 .1908745+01 .2[illegible]+01 .5[illegible]+01 .4597[illegible]-00 .1147327+01 .[illegible]+01   1  99
-.7217005-00-.1010180+00 .6[illegible]+01-.1350331+01-.1000[illegible]+01 .1050[illegible]+02   1 100
-.1549052+01-.1407745+01 .1217703+02-.1588201+01-.1572486+01 .1421776+02   1 101
-.1590005+01-.1583921+01 .1635820+02-.1597919+01-.1584215+01 .1460131+02   1 102
-.1590819+01-.1582933+01 .2090596+02 .5628946+01 .1300000+02 .6179604+01   1 103
 .7107523+01-.1968280+01 .5247085+01 .5873210+01-.3063307-00 .4005578+01   1 104
 .4628108+01 .1341066+01 .2541029+01 .3313011+01 .2777886+01 .9805622-00   1 105
 .1690801+01 .4603050+01-.3555075-00 .4495643-00 .6218781+01-.1157615+01   1 106
-.7845127-00 .7914469+01-.1457636+01-.1393367+01 .9687622+01-.1558217+01   1 107
-.1549953+01 .1150082+02-.1589560+01-.1577549+01 .1360209+02-.1594904+01   1 108
-.1561332+01 .1574245+02-.1595597+01-.1581739+01 .1798449+02-.1595418+01   1 109
-.1581516+01 .2034798+02 .6214608+01 .1300000+02 .5551060+01 .6403731+01   1 110
-.2501228+01 .4773263+01 .5339358+01-.8459634-00 .3386084+01 .3999858+01   1 111
 .7931888-00 .1756971+01 .2500705+01 .2418340+01 .2845437-00 .1001761+01   1 112
 .4032722+01-.7137233-00-.3046690-00 .5644339+01-.1263882+01-.1166328+01   1 113
 .7339389+01-.1508063+01-.1490096+01 .9111839+01-.1579410+01-.1566460+01   1 114
 .1098393+02-.1593065+01-.1578310+01 .1302458+02-.1594713+01-.1579531+01   1 115
 .1510499+02-.1594890+01-.1579630+01 .1740705+02-.1594911+01-.1579639+01   1 116
 .1977027+02 .6551080+01 .1300000+02 .4737535+01 .5822462+01-.2967587+01   1 117
 .3965114+01 .4590499+01-.1330060+01 .2680289+01 .3121721+01 .2995714-00   1 118
 .1186998+01 .1629802+01 .1918556+01-.1493574-00 .2074792-00 .3530957+01   1 119
-.1016477+01-.8721204-00 .5141393+01-.1428460+01-.1400272+01 .6835726+01   1 120
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-.1559268+01-.1546072+01 .0608069+01-.1588890+01-.1575626+01 .1048007+02   1 121
-.1594039+01-.1580167+01 .1252032+02-.1594665+01-.1580725+01 .1406040+02   1 122
-.1594735+01-.1580790+01 .1690236+02-.1594743+01-.1580797+01 .1926557+02   1 123
 .6907755+01 .1300000+02 .3583963+01 .4950218+01-.3482726+01 .2032645+01   1 124
 .3636401+01-.1854030+01 .1687515+01 .2157183+01-.2303942-00 .3381948-00   1 125
 .6950069-00 .1385926+01-.7545730-00-.5321134-00 .2997250+01-.1324594+01   1 126
-.1243137+01 .4607314+01-.1533374+01-.1504007+01 .6301287+01-.1585474+01   1 127
-.1567629+01 .6073285+01-.1594075+01-.1578160+01 .9945095+01-.1595189+01   1 128
-.1579587+01 .1198532+02-.1595344+01-.1579775+01 .1412538+02-.1595362+01   1 129
-.1579798+01 .1636734+02-.1595364+01-.1579800+01 .1873055+02 .7313220+01   1 130
 .1300000+02 .2272690+01 .4085744+01-.4078354+01 .1462514+01 .2641285+01   1 131
-.2455752+01 .4366737-00 .1213237+01-.8358251-00-.6514222-00-.1523555-00   1 132
 .7789036-00-.1312021+01-.1094047+01 .2389565+01-.1530715+01-.1461708+01   1 133
 .3999276+01-.1583455+01-.1553910+01 .5693124+01-.1594498+01-.1574747+01   1 134
 .7465094+01-.1597283+01-.1578742+01 .9336898+01-.1597589+01-.1579265+01   1 135
 .1137712+02-.1597628+01-.1579331+01 .1351719+02-.1597633+01-.1579339+01   1 136
 .1575915+02-.1597633+01-.1579340+01 .1812236+02 .7718685+01 .1300000+02   1 137
 .6450226-00 .3183975+01-.4679064+01-.5578589-01 .1783411+01-.3058164+01   1 138
-.8803672-00 .3359822-00-.1440714+01-.1345014+01-.8227584-00 .1709941-00   1 139
-.1529411+01-.1381533+01 .1781433+01-.1586838+01-.1539291+01 .3391092+01   1 140
-.1600815+01-.1574002+01 .5004929+01-.1603661+01-.1580688+01 .6856897+01   1 141
-.1604158+01-.1581649+01 .8726701+01-.1604237+01-.1582033+01 .1076892+02   1 142
-.1604247+01-.1582057+01 .1290899+02-.1604248+01-.1582060+01 .1515095+02   1 143
-.1604249+01-.1582060+01 .1751416+02 .0000000     .0000000     .0000000     1 144
        56
DIANE/SCAT REF-1A TEMP(1.5-2250.)EV. SADT INPUT TAPES(1819,1818) 11-8-67
 .1000000+01 .4640000+03
   1106.     .1900000+02                                                     1   0
 .4054651-00 .1000000+02 .8926806+01 .1145091+02 .1352577+01 .8808878+01   1   1
 .1121985+02 .3541557+01 .8041533+01 .1100100+02 .5891142+01 .8244119+01   1   2
 .1043205+02 .8186900+01 .7618075+01 .9206513+01 .1032272+02 .6568743+01   1   3
 .7036295+01 .1230595+02 .5121e36+01 .6206330+01 .1418777+02 .3372307+01   1   4
 .4498705+01 .1604009+02 .1549009+01 .2670440+01 .1796065+02-.2555276-01   1   5
 .9021196-00 .2009843+02 .8109302-00 .1000000+02 .1109926+02 .1205968+02   1   6
 .2205454+01 .1077394+02 .1171839+02 .4344166+01 .1027336+02 .1122487+02   1   7
 .6522086+01 .9381773+01 .1019728+02 .8512111+01 .8095812+01 .8837648+01   1   8
 .1030023+02 .6082337+01 .7362920+01 .1201736+02 .5112719+01 .5882905+01   1   9
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 .3823843+01 .1514635+02 .1214892+01 .2059039+01 .1708827+02-.4330207-00   1  21
 .2411165-00 .1910601+02 .1965910+01 .1000000+02 .1133208+02 .1143304+02   1  22
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 .1267920+01-.3065075+01-.1412205+01-.1671261-00-.1449881+01-.1574346+01  1  77
-.1197488+01 .1602400-00 .0000000    .0000000    .0000000    .0000000     1  78
         50
DIANE/SCAT  SEA WATER-1A  TEMP(1.-1.E4 EV)  1 FREQ.  CI/JM  10-9-67
 .1000000+01 .9840000+03
   1138.     .2400000+02                                                  1  0
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.8925489+01	.1300130+02	.4230730+01	.7139141+01	.1487128+02	.2254415+01	1 4
.5158328+01	.1600166+02	.2702316-00	.3178981+01	.1858084+02	-.1314397+01	1 5
.1124927+01	.2000568+02	-.2164564+01	-.8130693-00	.2277281+02	-.2399169+01	1 6
-.1960997+01	.2513563+02	-.2422035+01	-.2356177+01	.2760984+02	.8109302-00	1 7
.1300000+02	.1117920+02	.1300014+02	.2366583+01	.1000977+02	.1346966+02	1 8
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 .1056115+02-.1522449+01-.1498526+01 .1260138+02-.1522577+01-.1498749+01  1 115
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 .1934661+02 .6907755+01 .1300000+02 .1631211+01 .4010279+01-.3377161+01  1 117
 .7233717-00 .2577512+01-.1761989+01-.3340405-00 .1049671+01-.1469518-00  1 118
-.1055483+01-.2232362-00 .1466922+01-.1393253+01-.1083271+01 .3078460+01  1 119
-.1500835+01-.1409412+01 .4688405+01-.1537277+01-.1491680+01 .6382347+01  1 120
-.1543504+01-.1507669+01 .6154334+01-.1544621+01-.1510661+01 .1002614+02  1 121
-.1544798+01-.1511104+01 .1206036+02-.1544821+01-.1511162+01 .1420643+02  1 122
-.1544824+01-.1511167+01 .1644834+02-.1544824+01-.1511170+01 .1681160+02  1 123
 .7313220+01 .1300000+02 .3978394-00 .3243195+01-.3981335+01-.5624651-00  1 124
 .1773927+01-.2368871+01-.1149231+01 .3289695-00-.7545609-00-.1416594+01  1 125
-.7949003-00 .8586555-00-.1527969+01-.1337235+01 .2470292+01-.1564272+01  1 126
-.1493142+01 .4080214+01-.1574267+01-.1528652+01 .5774150+01-.1576336+01  1 127
-.1535463+01 .7546130+01-.1576703+01-.1536650+01 .9417944+01-.1576762+01  1 128
-.1536038+01 .1145617+02-.1576769+01-.1536863+01 .1359823+02-.1576770+01  1 129
-.1536666+01 .1564019+02-.1576770+01-.1536866+01 .1820340+02 .7718695+01  1 130
 .1300000+02-.4571105-00 .2450783+01-.4567270+01-.1154422+01 .9672334-00  1 131
-.2975017+01-.1444528+01-.3673e7.-00-.1362491+01-.1548150+01-.1191508+01  1 132
 .2507219-00-.1568515+01-.1482536+01 .1862110+01-.1602254+01-.1553394+01  1 133
 .3472020+01-.1605775+01-.1568558+01 .5165953+01-.1605327+01-.1569507+01  1 134
 .6937934+01-.1605491+01-.1570005+01 .8809746+01-.1605470+01-.1570084+01  1 135
 .1084997+02-.1605473+01-.1570094+01 .1299003+02-.1605473+01-.1570096+01  1 136
 .1523199+02-.1605473+01-.1570096+01 .1759520+02 .6131531+01 .1300000+02  1 137
-.9706250-00 .1648153+01-.5205390+01-.1407890+01 .1967824-00-.3587496+01  1 138
-.1557667+01-.9756651-00-.1977016+01-.1606022+01-.1434234+01-.3684892-00  1 139
-.1622365+01-.1569945+01 .1242851+01-.1627361+01-.1599478+01 .2852754+01  1 140
-.1626006+01-.1601328+01 .4546636+01-.1626835+01-.1602485+01 .6318671+01  1 141
-.1626075+01-.1602660+01 .8190478+01-.1626882+01-.1602718+01 .1023070+02  1 142
-.1626083+01-.1602722+01 .1237077+02-.1626883+01-.1602722+01 .1461273+02  1 143
-.1626083+01-.1602722+01 .1697594+02 .8517193+01 .1300000+02-.1270196+01  1 144
 .6976649-00-.5783218+01-.1527325+01-.4528968-00-.4165701+01-.1608453+01  1 145
-.1286831+01-.2556047+01-.1632327+01-.1555390+01-.9457599-00-.1639471+01  1 146
-.1615394+01 .6643625-00-.1641279+01-.1627589+01 .2274261+01-.1641693+01  1 147
-.1630105+01 .3968192+01-.1641773+01-.1630577+01 .5740177+01-.1641787+01  1 148
-.1630659+01 .7611984+01-.1641789+01-.1630672+01 .9652206+01-.1641789+01  1 149
-.1630674+01 .1179227+02-.1641789+01-.1630674+01 .1403423+02-.1655136+01  1 150
-.1666154+01 .1639744+02 .8853665+01 .1300000+02-.1419783+01-.5753673-01  1 151
-.6207365+01-.1583659+01-.1151636+01-.4670307+01-.1635352+01-.1572539+01  1 152
-.3060637+01-.1650057+01-.1654502+01-.1450458+01-.1654071+01-.1665685+01  1 153
 .1597817-00-.1654695+01-.1667659+01 .1769610+01-.1655090+01-.1668063+01  1 154
 .3463484+01-.1655129+01-.1668134+01 .5235469+01-.1655135+01-.1668152+01  1 155
 .7107276+01-.1655136+01-.1668154+01 .9147498+01-.1655136+01-.1668154+01  1 156
 .1128756+02-.1655136+01-.1668154+01 .1352952+02-.1655136+01-.1668154+01  1 157
 .1589273+02 .9210340+01 .1300000+02-.1516826+01-.6278840-00-.6822181+01  1 158
-.1615134+01-.1417291+01-.5205186+01-.1644926+01-.1629237+01-.3595624+01  1 159
-.1652975+01-.1662142+01-.1985463+01-.1654575+01-.1666951+01-.3752287-00  1 160
-.1655017+01-.1667914+01 .1234598+01-.1655114+01-.1668110+01 .2928471+01  1 161
-.1655132+01-.1668147+01 .4700457+01-.1655135+01-.1668153+01 .6572264+01  1 162
-.1655136+01-.1668154+01 .8612485+01-.1655136+01-.1668154+01 .1075255+02  1 163
-.1655136+01-.1668154+01 .1299451+02-.1655136+01-.1668154+01 .1535772+02  1 164
          58
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DIANE/SCAT S-1A TEMP(50.-10000.)EV. BODY INPUT TAPE 3527 11-8-67
 .1000000+01 .6150000+03
    1010.    .1500000+02                                                                    1   0
 .3912023+01 .1300000+02 .9744360+01 .1079293+02 .1003783+00 .8887201+01                    1   1
 .1034709+02 .1815430+01 .7802415+01 .9403572+01 .3543186+01 .6705317+01                    1   2
 .8204542+01 .5271718+01 .5362101+01 .6324358+01 .6904720+01 .3756895+01                    1   3
 .4603953+01 .6698197+01 .2026313+01 .2978057+01 .1047849+02 .3510056-00                    1   4
 .1323752+01 .1232020+02- 4390775-00-.2415521-00 .1425469+02-.1566184+01                    1   5
-.1340085+01 .1631917+02- 1720188+01-.1675667+01 .1446364+02-.1744880+01                    1   6
-.1723480+01 .2077615+02-.1748023+01-.1730720+01 .2306942+02 .4248495+01                    1   7
 .1300000+02 .9435433+01 .1054030+02-.2327864-00 .6010145+01 .1009145+02                    1   8
 .1497665+01 .7975221+01 .9135135+01 .3230312+01 .6703227+01 .7688347+01                    1   9
 .4957336+01 .5064476+01 .5832302+01 .6674927+01 .3204592+01 .4083445+01                    1  10
 .8365898+01 .1366245+01 .2369492+01 .1011139+02-.3063144-00 .6331549-00                    1  11
 .1190249+02-.1307723+01-.8435068-00 .1577846+02-.1651512+01-.1565642+01                    1  12
 .1561938+02-.1725611+01-.1710775+01 .1795954+02-.1745723+01-.1729082+01                    1  13
 .2020151+02-.1749171+01-.1731028+01 .2256472+02 .4605170+01 .1300000+02                    1  14
 .8585948+01 .1004604+02-.5937309-00 .8325992+01 .9525036+01 .1142691+01                    1  15
 .7625022+01 .8459213+01 .2871092+01 .6173334+01 .6772923+01 .4580960+01                    1  16
 .4129978+01 .4884055+01 .6260843+01 .2145332+01 .3150614+01 .7897602+01                    1  17
 .3969585-00 .1300460+02 .9598679+01-.8694948-00-.2715603-00 .1137213+02                    1  18
-.1460568+01-.1329831+01 .1324420+02-.1680449+01-.1670037+01 .1528447+02                    1  19
-.1739207+01-.1723319+01 .1742454+02-.1748474+01-.1730434+01 .1966651+02                    1  20
-.1749335+01-.1731032+01 .2202983+02 .5010635+01 .1300000+02 .7295358+01                    1  21
 .9256739+01-.1040621+01 .6894156+01 .8573594+01 .6906297-00 .6068744+01                    1  22
 .7162986+01 .2348164+01 .4626539+01 .5271628+01 .4047460+01 .2918842+01                    1  23
 .3512312+01 .5680023+01 .1205406+01 .1859009+01 .7296670+01-.2598615-00                    1  24
 .2490588-00 .6991966+01-.1192049+01-.1012414+01 .1076433+02-.1613761+01                    1  25
-.1576758+01 .1263692+02-.1723785+01-.1700486+01 .1468252+02-.1713906+01                    1  26
-.1692677+01 .1684945+02-.1671210+01-.1652044+01 .1913638+02-.1630291+01                    1  27
-.1611773+01 .2154062+02 .5416100+01 .1300000+02 .5965108+01 .8211526+01                    1  28
-.1533025+01 .5243360+01 .7214080+01 .1652172-00 .4089756+01 .5660987+01                    1  29
 .1826621+01 .2701253+01 .3960287+01 .3455653+01 .1243005+01 .2331026+01                    1  30
 .5077313+01-.4355383-01 .8931982-00 .6694641+01-.9665125-00-.1607212-00                    1  31
 .8406135+01-.1447460+01-.8636038-00 .1021607+02-.1593287+01-.1337876+01                    1  32
 .1213038+02-.1613654+01-.1548294+01 .1419556+02-.1615272+01-.1591521+01                    1  33
 .1634091+02-.1615524+01-.1597078+01 .1858355+02-.1615987+01-.1597677+01                    1  34
 .2094084+02 .5826946+01 .1300000+02 .5165293+01 .7089772+01-.2079423+01                    1  35
 .4167188+01 .6101058+01-.4166705-00 .2886572+01 .4661787+01 .1228115+01                    1  36
 .1555001+01 .3418076+01 .2866569+01 .3551076-00 .2387584+01 .4518917+01                    1  37
-.6016500-00 .1227446+01 .6170594+01-.1226305+01-.7389741-01 .7889272+01                    1  38
-.1505536+01-.1098807+01 .9666608+01-.1580357+01-.1503259+01 .1154185+02                    1  39
-.1603349+01-.1586514+01 .1558231+02-.1614731+01-.1596885+01 .1572240+02                    1  40
-.1615824+01-.1597590+01 .1796437+02-.1615688+01-.1597639+01 .2032758+02                    1  41
 .6214608+01 .1300000+02 .5297632+01 .6706289+01-.2598035+01 .4074703+01                    1  42
 .5634455+01-.9467739-00 .2737455+01 .4530861+01 .7115879-00 .1264287+01                    1  43
 .3294209+01 .2371662+01-.8329108-01 .1885133+01 .4006805+01-.9198483-00                    1  44
 .4356240-00 .5623696+01-.1314191+01-.7985060-00 .7319451+01-.1500726+01                    1  45
-.1438022+01 .9091753+01-.1597900+01-.1580640+01 .1096362+02-.1613739+01                    1  46
-.1595830+01 .1300385+02-.1614727+01-.1596983+01 .1514391+02-.1614828+01                    1  47
-.1597109+01 .1736587+02-.1614039+01-.1597122+01 .1974908+02 .6551080+01                    1  48
 .1300000+02 .5325026+01 .6402861+01-.3062222+01 .4255087+01 .5369638+01                    1  49
-.1396572+01 .2713966+01 .3980045+01 .2588196-00 .1085697+01 .2518647+01                    1  50
 .1893064+01-.1950729-00 .1014468+01 .3509832+01-.9396022-00-.3432934-00                    1  51
 .5120941+01-.1402854+01-.1283075+01 .6815078+01-.1584194+01-.1556721+01                    1  52
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 .8587103+01-.1610663+01-.1592000+01 .1045892+02-.1613206+01-.1595709+01   1  53
 .1249914+02-.1613478+01-.1596165+01 .1463921+02-.1613511+01-.1596219+01   1  54
 .1688117+02-.1613514+01-.1596225+01 .1924438+02 .6907755+01 .1300000+02   1  55
 .6597307+01 .5833017+01-.3548718+01 .3539928+01 .4538897+01-.1892163+01   1  56
 .2015645+01 .3036245+01-.2565927-00 .4557049-00 .1480756+01 .1362929+01   1  57
-.7272392-00 .3439916-01 .2975944+01-.1371471+01-.1109441+01 .4586165+01   1  58
-.1578697+01-.1525714+01 .6280110+01-.1611030+01-.1588618+01 .8052098+01   1  59
-.1614480+01-.1598222+01 .9923906+01-.1614957+01-.1597350+01 .1196413+02   1  60
-.1615021+01-.1597499+01 .1410419+02-.1615028+01-.1597517+01 .1634615+02   1  61
-.1615029+01-.1597519+01 .1870936+02 .7313220+01 .1300000+02 .2965662+01   1  62
 .4899956+01-.4122499+01 .1762887+01 .3481617+01-.2483735+01 .3617111-00   1  63
 .1948234+01-.8597174-00-.7920108-00 .4110869-00 .7559329-00-.1372672+01   1  64
-.8559097-00 .2368014+01-.1569523+01-.1452331+01 .3978023+01-.1614584+01   1  65
-.1582921+01 .5671922+01-.1622093+01-.1603472+01 .7443902+01-.1623277+01   1  66
-.1606761+01 .9315706+01-.1623469+01-.1607284+01 .1135593+02-.1623494+01   1  67
-.1607353+01 .1349600+02-.1623497+01-.1607361+01 .1573796+02-.1623498+01   1  68
-.1607362+01 .1810117+02 .7718685+01 .1300000+02 .1350257+01 .3904669+01   1  69
-.4715043+01-.9861305-02 .2358590+01-.3085164+01-.9273155-00 .8921359-00   1  70
-.1466246+01-.1397016+01-.4874620-00 .1481107-00-.1569400+01-.1328007+01   1  71
 .1759902+01-.1620297+01-.1568652+01 .3369844+01-.1632355+01-.1614454+01   1  72
 .5063728+01-.1634664+01-.1622454+01 .6835705+01-.1635089+01-.1623848+01   1  73
 .8707510+01-.1635157+01-.1624069+01 .1074773+02-.1635166+01-.1624098+01   1  74
 .1288780+02-.1635167+01-.1624101+01 .1512976+02-.1635167+01-.1624102+01   1  75
 .1749297+02 .8131531+01 .1300000+02-.1474949-00 .2759501+01-.5321459+01   1  76
-.9307577-00 .1400356+01-.3695208+01-.1395593+01-.4486262-01-.2081614+01   1  77
-.1572026+01-.1130700+01-.4709925-00-.1625813+01-.1536260+01 .1140673+01   1  78
-.1640527+01-.1620731+01 .2750584+01-.1644148+01-.1636860+01 .4444462+01   1  79
-.1644797+01-.1639724+01 .6216437+01-.1644914+01-.1640228+01 .8088243+01   1  80
-.1644933+01-.1640307+01 .1012846+02-.1644935+01-.1640318+01 .1226853+02   1  81
-.1644935+01-.1640319+01 .1451049+02-.1644935+01-.1640319+01 .1687370+02   1  82
 .8517193+01 .1300000+02-.1060825+01 .1176001+01-.5884498+01-.1455176+01   1  83
-.2429300-00-.4272688+01-.1595811+01-.1252175+01-.2659822+01-.1639657+01   1  84
-.1600225+01-.1048242+01-.1651972+01-.1600419+01 .5621978-00-.1654979+01   1  85
-.1669122+01 .2172095+01-.1655640+01-.1670618+01 .3865969+01-.1655727+01   1  86
-.1670851+01 .5637944+01-.1655742+01-.1670892+01 .7509749+01-.1655745+01   1  87
-.1670898+01 .9549970+01-.1655745+01-.1670899+01 .1169004+02-.1655745+01   1  88
-.1670899+01 .1393200+02-.1655745+01-.1670899+01 .1629521+02 .8853665+01   1  89
 .1300000+02-.1273087+01 .5571208-00-.6387855+01-.1533838+01-.7508531-00   1  90
-.4776901+01-.1620631+01-.1463308+01-.3164387+01-.1646991+01-.1639668+01   1  91
-.1552911+01-.1653760+01-.1665970+01 .5749968-01-.1655468+01-.1670123+01   1  92
 .1667389+01-.1655691+01-.1670756+01 .3301261+01-.1655736+01-.1670875+01   1  93
 .5133235+01-.1655743+01-.1670895+01 .7005041+01-.1655745+01-.1670899+01   1  94
 .9045262+01-.1655745+01-.1670899+01 .1118533+02-.1655745+01-.1670899+01   1  95
 .1342729+02-.1655745+01-.1670899+01 .1579050+02 .9210340+01 .1300000+02   1  96
-.1423349+01-.7256554-01-.6922004+01-.1585093+01-.1161302+01-.5311598+01   1  97
-.1636333+01-.1579628+01-.3699284+01-.1651119+01-.1657427+01-.2087898+01   1  98
-.1664754+01-.1668626+01-.4775059-00-.1655604+01-.1670520+01 .1132378+01   1  99
-.1655718+01-.1670829+01 .2826249+01-.1655740+01-.1670887+01 .4590223+01   1 100
-.1655744+01-.1670897+01 .6470028+01-.1655745+01-.1670899+01 .8510249+01   1 101
-.1655745+01-.1670899+01 .1065032+02-.1655745+01-.1670899+01 .1289228+02   1 102
-.1655745+01-.1670899+01 .1525549+02 .0000000     .0000000     .0000000     1 103
        54
DIANE/SCAT  SHALE-18  INPUT TAPES(4028,2408,4027)  11-7-67  CI/LN
 .1800800+01 .9840000+03
  1129.      .2400000+02                                                    1  0
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.4054651-00	.1300000+02	.1209713+02	.1313172+02	.1407073+01	.1179684+02	1 1
.1273210+02	.3553500+01	.1104455+02	.1238631+02	.5814084+01	.9958061+01	1 2
.1142235+02	.7956449+01	.8481625+01	.9976416+01	.1007414+02	.6975009+01	1 3
.8390024+01	.1205625+02	.5309024+01	.6732670+01	.1395918+02	.3351515+01	1 4
.4820672+01	.1383413+02	.1279987+01	.2033694+01	.1773562+02-.7071961-00		1 5
.7675641-00	.1979271+02-.2177021+01-.1080797+01			.2201375+02-.2863699+01		1 6
-.2312408+01	.2449928+02-.2983355+01-.2892999+01			.2702304+02 .8109302-00		1 7
.1300000+02	.1312812+02	.1338820+02	.2100572+01	.1256820+02	.1297988+02	1 8
.4166685+01	.1173549+02	.1256182+02	.6301543+01	.1048103+02	.1148940+02	1 9
.8274792+01	.8899907+01	.9763972+01	.1008081+02	.7093512+01	.7914443+01	1 10
.1178098+02	.5253121+01	.6144491+01	.1355066+02	.3529429+01	.4560963+01	1 11
.1549705+02	.1[illegible]494+01	.2865041+01	.1757264+02-.3121217-00		.8805373-00	1 12
.1969604+02-.1889563+01-.1053220+01			.2189704+02-.2640660+01-.2351930+01			1 13
.2421772+02-.2726509+01-.2681034+01			.2669498+02	.1223775+01	.1300000+02	1 14
.1304946+02	.1320282+02	.2382168+01	.1254682+02	.1270598+02	.4315073+01	1 15
.1172789+02	.1218450+02	.6181659+01	.1045852+02	.1115693+02	.7982703+01	1 16
.8840401+01	.9677084+01	.9790965+01	.7099170+01	.7961490+01	.1159444+02	1 17
.5249508+01	.6138686+01	.1340095+02	.3359784+01	.4317655+01	.1526423+02	1 18
.1404316+01	.2456853+01	.1724945+02-.4352428-00		.5158792-00	.1938952+02	1 19
-.1915958+01-.1339526+01		.2156104+02-.2492831+01-.2356796+01			.2383596+02	1 20
-.2531254+01-.2503251+01		.2629244+02	.1609438+01	.1300000+02	.1272018+02	1 21
.1290964+02	.2325337+01	.1230217+02	.1252336+02	.4104277+01	.1155024+02	1 22
.1202675+02	.5956258+01	.1050521+02	.1089929+02	.7790547+01	.8597644+01	1 23
.9290960+01	.9558094+01	.6732369+01	.7517192+01	.1130407+02	.4829606+01	1 24
.5628998+01	.1310935+02	.2903664+01	.3794360+01	.1493800+02	.1052258+01	1 25
.1971748+01	.1688756+02-.7455193-00		.1368546-00	.1899539+02-.1952746+01		1 26
-.1536159+01	.2117602+02-.2316265+01-.2226161+01			.2349003+02-.2347480+01		1 27
-.2323446+01	.2991117+02	.1945910+01	.1300000+02	.1223101+02	.1260711+02	1 28
.2158342+01	.1193725+02	.1224976+02	.3928757+01	.1119692+02	.1168631+02	1 29
.5744219+01	.9836409+01	.1040481+02	.7534808+01	.7933888+01	.8704504+01	1 30
.9290735+01	.6128175+01	.6920404+01	.1099350+02	.4395575+01	.5138034+01	1 31
.1277473+02	.2574431+01	.3368384+01	.1461257+02	.7244482-00	.1658427+01	1 32
.1695577+02-.1005297+01-.1635776-00			.1866384+02-.1916176+01-.1594696+01			1 33
.2087482+02-.2131026+01-.2073402+01			.2320500+02-.2161023+01-.2139858+01			1 34
.2599886+02	.2302585+01	.1300000+02	.1169093+02	.1225259+02	.1906721+01	1 35
.1141669+02	.1187767+02	.3061646+01	.1059862+02	.1123802+02	.5453303+01	1 36
.9111235+01	.9909040+01	.7210105+01	.7410783+01	.8234993+01	.8944984+01	1 37
.5693745+01	.6537660+01	.1064704+02	.3920641+01	.4804401+01	.1242827+02	1 38
.2169505+01	.3097811+01	.1428724+02	.3697033-00	.1377280+01	.1624503+02	1 39
-.1195079+01-.4193719-00		.1832657+02-.1906343+01-.1659844+01			.2049918+02	1 40
-.2073595+01-.2032575+01		.2276220+02-.2074109+01-.2056026+01			.2515299+02	1 41
.2708050+01	.1300000+02	.1134137+02	.1180964+02	.1596253+01	.1095346+02	1 42
.1145385+02	.3319236+01	.1009904+02	.1068998+02	.5084488+01	.6754167+01	1 43
.9326838+01	.6830164+01	.7055973+01	.7649486+01	.8569340+01	.9246343+01	1 44
.5926080+01	.1028026+02	.3341629+01	.4140532+01	.1204093+02	.1484207+01	1 45
.2363368+01	.1385182+02-.1886456-00		.5837179-00	.1575363+02-.1440379+01		1 46
-.1015441+01	.1782325+02-.1884390+01-.1804606+01			.1999365+02-.1972761+01		1 47
-.1953761+01	.2226291+02-.1964963+01-.1946715+01			.2465686+02 .3113515+01		1 48
.1300000+02	.1100579+02	.1144710+02	.1223588+01	.1061827+02	.1106285+02	1 49
.2956258+01	.9746662+01	.1012007+02	.4709680+01	.8240276+01	.8637969+01	1 50
.6440616+01	.6379861+01	.6952999+01	.8147430+01	.4570085+01	.5231016+01	1 51
.9809918+01	.2811597+01	.3508419+01	.1154200+02	.1013183+01	.1809823+01	1 52
.1334849+02-.5834654-00		.1137229+00	.1525405+02-.1512248+01-.1243340+01			1 53
.1732856+02-.1821105+01-.1772265+01			.1950252+02-.1863841+01-.1843092+01			1 54
.2177729+02-.1845270+01-.1826699+01			.2417009+02 .3526360+01 .1300000+02			1 55

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 .1027325+02 .1099754+02 .8206351-00 .9968992+01 .1054140+02 .2548563+01   1  56
 .9096508+01 .9570551+01 .4274056+01 .7560967+01 .8147647+01 .5969511+01   1  57
 .5797011+01 .6358583+01 .7642574+01 .4002452+01 .4652202+01 .9299389+01   1  58
 .2222251+01 .2963941+01 .1103378+02 .5633972-00 .1307548+01 .1284336+02   1  59
-.8467535-00-.2637137-00 .1474955+02-.1598204+01-.1386305+01 .1681909+02   1  60
-.1764236+01-.1713753+01 .1899190+02-.1755463+01-.1733158+01 .2127397+02   1  61
-.1733187+01-.1714773+01 .2366346+02 .3912023+01 .1300000+02 .9229295+01   1  62
 .1011104+02 .3953294-00 .8734939+01 .9335920+01 .2094253+01 .7804737+01   1  63
 .8273900+01 .3765350+01 .6319209+01 .6849119+01 .5460402+01 .4840408+01   1  64
 .5440869+01 .7127809+01 .3291043+01 .4026808+01 .8784586+01 .1583225+01   1  65
 .2416736+01 .1052174+02-.6087559-01 .8285147-00 .1233911+02-.1199175+01   1  66
-.6031699-00 .1424043+02-.1618432+01-.1441421+01 .1632424+02-.1698067+01   1  67
-.1663025+01 .1848956+02-.1714126+01-.1694764+01 .2073788+02-.1713335+01   1  68
-.1694972+01 .2310524+02 .4248495+01 .1300000+02 .8706593+01 .9435793+01   1  69
-.1391998-01 .8202576+01 .8718213+01 .1678803+01 .7268054+01 .7641731+01   1  70
 .3368132+01 .5837094+01 .6287514+01 .5043110+01 .4252368+01 .4934413+01   1  71
 .8719559+01 .2555185+01 .3485341+01 .8384735+01 .8779872-00 .1942085+01   1  72
 .1011961+02-.5371366-00 .3844814-00 .1192434+02-.1341516+01-.9351904-00   1  73
 .1381027+02-.1628749+01-.1550138+01 .1585692+02-.1690396+01-.1669290+01   1  74
 .1800275+02-.1696279+01-.1679052+01 .2025161+02-.1692547+01-.1674372+01   1  75
 .2262139+02 .4605170+01 .1300000+02 .8400974+01 .9071832+01-.4617582-00   1  76
 .7869209+01 .6342668+01 .1234038+01 .6826023+01 .7208133+01 .2932991+01   1  77
 .5237034+01 .5742801+01 .4019271+01 .3583624+01 .4341419+01 .6286020+01   1  78
 .1881542+01 .2823744+01 .7926383+01 .2693765-00 .1235804+01 .9636436+01   1  79
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-.1673418+01-.1655269+01 .1974146+02-.1656296+01-.1637919+01 .2212292+02   1  82
 .5010635+01 .1300000+02 .7871947+01 .8672108+01-.9670005-00 .7294575+01   1  83
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 .5013661+01 .4092652+01 .2790251+01 .3471477+01 .5727393+01 .1249873+01   1  85
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 .3519550+01 .2131439+01 .2048995+01 .5150172+01 .6233367-00 .1343101+01   1  92
 .6780601+01-.6533372-00 .3662010-01 .8493081+01-.1336238+01-.1029191+01   1  93
-.1027565+02-.1598666+01-.1492307+01 .1215036+02-.1611923+01-.1592399+01   1  94
 .1419109+02-.1623265+01-.1606301+01 .1633123+02-.1626126+01-.1607967+01   1  95
 .1857319+02-.1626511+01-.1608143+01 .2093640+02 .5828946+01 .1300000+02   1  96
 .6395910+01 .7222644+01-.2012474+01 .5487414+01 .6002008+01-.3475837-00   1  97
 .4571646+01 .4771604+01 .1300630+01 .2894396+01 .3477470+01 .2944811+01   1  98
 .1256569+01 .2043294+01 .4574653+01-.1660537-00 .5680126-00 .6191702+01   1  99
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-.1600243+01 .1514105+02-.1618121+01-.1599742+01 .1738382+02-.1618064+01   1 109
-.1599670+01 .1974713+02 .6551080+01 .1300000+02 .4746235+01 .5952726+01   1 110
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-.3002100+01 .3885470+01 .4684841+01-.1361169+01 .2560068+01 .3225920+01   1 111
 .2687895-00 .1058800+01 .1652028+01 .1887104+01-.2481885-00 .2217842-00   1 112
-.3500458+01-.1094022+01-.6312725-00 .5112451+01-.1480051+01-.1371031+01   1 113
 .6006911+01-.1588098+01-.1546368+01 .8583504+01-.1611291+01-.1590857+01   1 114
 .1045863+02-.1616606+01-.1590631+01 .1249715+02-.1617917+01-.1599566+01   1 115
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 .1924244+02 .6907755+01 .1300000+02 .3762158+01 .5091725+01-.3515428+01   1 117
 .2745532+01 .3719193+01-.1834384+01 .1371981+01 .2227399+01-.2617208-00   1 118
 .2842349-01 .8420404-00 .1355766+01-.8843940-00-.2929443-00 .2970934+01   1 119
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 .1300000+02 .1840228+01 .3403931+01-.4707451+01 .1001201+01 .2122884+01   1 131
-.3083065+01-.1710305-00 .7127535-00-.1464869+01-.1105120+01-.5896291-00   1 132
 .1460414-00-.1490537+01-.1335312+01 .1757950+01-.1590797+01-.1545035+01   1 133
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-.1615460+01 .5064030+01-.1630011+01-.1616061+01 .5636005+01-.1630056+01   1 148
-.1617027+01 .7507611+01-.1630063+01-.1617053+01 .9548032+01-.1630064+01   1 149
-.1617056+01 .1168810+02-.1630064+01-.1617057+01 .1393006+02-.1630064+01   1 150
-.1617057+01 .1629327+02 .6053605+01 .1300000+02-.1107809+01 .9054291-00   1 151
-.6393452+01-.1493507+01-.4745314-00-.4777428+01-.1594200+01-.1296855+01   1 152
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 .5555545-01-.1638362+01-.1627527+01 .1665448+01-.1638907+01-.1629932+01   1 154
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 .7003102+01-.1639033+01-.1630474+01 .9043324+01-.1639033+01-.1630476+01   1 156
 .1118339+02-.1639033+01-.1630476+01 .1342535+02-.1639033+01-.1630476+01   1 157
 .1578856+02 .9210340+01 .1300000+02-.1481882+01 .6115247-01-.6927750+01   1 158
-.1595925+01-.1046192+01-.5312217+01-.1636792+01-.1517074+01-.3700100+01   1 159
-.1648326+01-.1627186+01-.2089793+01-.1655047+01-.1669296+01-.4794520-00   1 160
-.1655047+01-.1670659+01 .1130437+01-.1655735+01-.1670894+01 .2824309+01   1 161
-.1655752+01-.1670938+01 .4596284+01-.1655755+01-.1670946+01 .6468090+01   1 162
-.1655755+01-.1670947+01 .8508311+01-.1655755+01-.1670947+01 .1064838+02   1 163
-.1655755+01-.1670947+01 .1289034+02-.1655755+01-.1670947+01 .1525355+02   1 164
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DIANE/12FREQUENCIES LN/RS 3/8/67 TAPE 1809 THETA(1.-10.)EV/W/FROMSD2
 .1200000+02 .2870000+03
   1074.     .7000000+01
 .0000000    .1300000+02 .1105136+02 .1237070+02 .6369110-00 .1081900+02   1   1
 .1200031+02 .2710294+01 .1029355+02 .1163915+02 .4942286+01 .9077580+01   1   2
 .1071664+02 .6973764+01 .7240731+01 .9065118+01 .8762879+01 .5148237+01   1   3
 .7383972+01 .1044651+02 .3310429+01 .5731860+01 .1226743+02 .1647945+01   1   4
 .4036828+01 .1431551+02-.2737463-00 .2132783+01 .1640951+02-.2421677+01   1   5
-.1011445+00 .1859625+02-.4113930+01-.2528865+01 .2044068+02-.4857723+01   1   6
-.4345956+01 .2326678+02-.5008355+01-.4932320+01 .2564188+02 .4054651-00   1   7
 .1300000+02 .1151505+02 .1221676+02 .1092252+01 .1135814+02 .1195796+02   1   8
 .3029787+01 .1062726+02 .1180652+02 .4915814+01 .9191086+01 .1108390+02   1   9
 .6729547+01 .7383342+01 .9520686+01 .8589143+01 .5545742+01 .7566149+01   1  10
 .1043639+02 .3468996+01 .5432730+01 .1231489+02 .1224068+01 .3162790+01   1  11
 .1426640+02-.1121048+01 .7457261-00 .1622758+02-.3204017+01-.1541412+01   1  12
 .1828718+02-.4450579+01-.3469303+01 .2043351+02-.4857816+01-.4433984+01   1  13
 .2270592+02-.4831578+01-.4661112+01 .2520425+02 .8109302-00 .1300000+02   1  14
 .1096027+02 .1202863+02 .1066897+01 .1098108+02 .1179736+02 .2935262+01   1  15
 .1043349+02 .1153938+02 .4820128+01 .9090290+01 .1065543+02 .6677482+01   1  16
 .7106127+01 .8804962+01 .6490197+01 .5052013+01 .6639531+01 .1023631+02   1  17
 .2892297+01 .4478195+01 .1198738+02 .9791514-00 .2621225+01 .1379386+02   1  18
-.6275727-00 .1110330+01 .1575536+02-.2365418+01-.5592340-00 .1792511+02   1  19
-.3797911+01-.2516051+01 .2013297+02-.4358460+01-.3965451+01 .2249324+02   1  20
-.4427718+01-.4377248+01 .2500354+02 .1223775+01 .1300000+02 .1034689+02   1  21
 .1161729+02 .9779043-00 .1043017+02 .1132056+02 .2803947+01 .1004915+02   1  22
 .1098051+02 .4625759+01 .8746336+01 .9953079+01 .6389102+01 .7068973+01   1  23
 .8393791+01 .8093992+01 .5283965+01 .6671645+01 .9805570+01 .3482077+01   1  24
 .4823230+01 .1162174+02 .1650496+01 .2920396+01 .1351067+02-.4794018-00   1  25
 .6716984-00 .1558104+02-.3101975+01-.2102533+01 .1773412+02-.4144213+01   1  26
-.3808117+01 .1989292+02-.4316652+01-.4259157+01 .2213717+02-.4339867+01   1  27
-.4317378+01 .2450070+02 .1609438+01 .1300000+02 .9910896+01 .1111680+02   1  28
 .7319067-00 .9897461+01 .1085215+02 .2504246+01 .9639211+01 .1049881+02   1  29
 .4270891+01 .8648297+01 .9385510+01 .8027271+01 .7103430+01 .7819036+01   1  30
 .7804063+01 .4842542+01 .5611734+01 .9651355+01 .1980540+01 .2888355+01   1  31
 .1146922+02-.6918092-00 .6933880-00 .1326139+02-.2723870+01-.1281633+01   1  32
 .1513679+02-.3860501+01-.3033119+01 .1718162+02-.4200774+01-.3950940+01   1  33
 .1935005+02-.4205536+01-.4136948+01 .2167527+02-.4145346+01-.4120961+01   1  34
 .2411632+02 .1945910+01 .1300000+02 .9472870+01 .1054456+02 .4370293-00   1  35
 .9476686+01 .1020670+02 .2200869+01 .9212809+01 .9845432+01 .4015945+01   1  36
 .7719025+01 .8265453+01 .5918749+01 .5087465+01 .5927753+01 .7661445+01   1  37
 .2529655+01 .3948036+01 .9292992+01 .5391710-00 .2210358+01 .1099927+02   1  38
-.1175502+01 .5841186-00 .1281015+02-.2630945+01-.9974273-00 .1476311+02   1  39
-.3565575+01-.2571380+01 .1689432+02-.3892409+01-.3582459+01 .1911848+02   1  40
-.3925723+01-.3859647+01 .2143775+02-.3890281+01-.3866089+01 .2386277+02   1  41
 .2302585+01 .1300000+02 .9155679+01 .1008136+02 .1601700-00 .9253297+01   1  42
 .9802362+01 .2011652+01 .8070351+01 .9289900+01 .3862154+01 .6108320+01   1  43
 .7836537+01 .5546542+01 .4229220+01 .6236285+01 .7202652+01 .2614897+01   1  44
 .4564531+01 .8888549+01 .1037153+01 .2833993+01 .1067612+02-.5292762-00   1  45
 .1121121+01 .1253817+02-.1976500+01-.5997668-00 .1448875+02-.2959975+01   1  46
-.1902107+01 .1663097+02-.3359538+01-.1626954+01 .1909955+02-.3337997+01   1  47
-.3280960+01 .2150616+02-.3308039+01-.3292308+01 .2391514+02 .0000000      1  48
          33
DIANE/SCAT  XE-12A  TEMP(1-10)  12 FREQ  CI/RS  5-2-67  INPUT TAPE(5230)
 .1200800+02 .2870000+03
   1884.     .7000000+01
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 .00x0000    .1300000+02 .1160196+02 .1399873+02 .4327391+01 .1012753+02   1   1
 .1239795+02 .5935083+01 .8561137+01 .1082944+02 .7544161+01 .7406447+01   1   2
 .9846203+01 .9154761+01 .6233477+01 .6807264+01 .1076517+02 .4870105+01   1   3
 .7533691+01 .1237501+02 .5323347+01 .6041597+01 .1406891+02 .1642248+01   1   4
 .4383736+01 .1584089+02-.1522976-00 .2573075+01 .1771270+02-.1998340+01   1   5
 .5695526-00 .1975292+02-.5371796+01-.1495808+01 .2189299+02-.3076369+01   1   6
-.3270036+01 .2413495+02-.4151409+01-.4040763+01 .2649816+02 .4054651-00   1   7
 .1300000+02 .1160628+02 .1326247+02 .3718802+01 .1043232+02 .1178978+02   1   8
 .5326967+01 .8894193+01 .1057692+02 .6936766+01 .7381175+01 .9335944+01   1   9
 .8547215+01 .6036282+01 .7985933+01 .1015724+02 .4565258+01 .6544693+01   1  10
 .1176689+02 .2951668+01 .4961195+01 .1346073+02 .1232760+01 .3254415+01   1  11
 .1523270+02-.5805355-00 .1421335+01 .1710450+02-.2386845+01-.5677402-00   1  12
 .1914472+02-.3614939+01-.2443260+01 .2128479+02-.4059094+01-.3531970+01   1  13
 .2352675+02-.4163088+01-.3773938+01 .2588996+02 .8109302-00 .1300000+02   1  14
 .1094638+02 .1203957+02 .5109836+01 .1046265+02 .1150208+02 .4718447+01   1  15
 .9282617+01 .1084437+02 .6328794+01 .7762082+01 .1009498+02 .7939232+01   1  16
 .6284604+01 .8640959+01 .9549153+01 .4751859+01 .7069166+01 .1115872+02   1  17
 .3070003+01 .5417734+01 .1285254+02 .1320268+01 .3769179+01 .1462450+02   1  18
-.5112979-00 .2204726+01 .1649630+02-.2325537+01 .1120236+01 .1853653+02   1  19
-.3559241+01 .7643010-00 .2067659+02-.4021824+01 .7562200-00 .2291855+02   1  20
-.4142716+01 .6645705-00 .2528180+02 .1223775+01 .1300000+02 .1011194+02   1  21
 .1202252+02 .2488516+01 .9786210+01 .1118637+02 .4097886+01 .9286066+01   1  22
 .1076641+02 .5709172+01 .8229016+01 .9872682+01 .7319919+01 .6798520+01   1  23
 .8481194+01 .8929866+01 .5231941+01 .7022468+01 .1053945+02 .3552807+01   1  24
 .5699012+01 .1223527+02 .1793122+01 .4854134+01 .1400525+02-.5152120-01   1  25
 .4363442+01 .1587744+02-.1946409+01 .4087733+01 .1793832+02-.3426922+01   1  26
 .2482522+01 .2033476+02-.3760069+01-.1640039+01 .2263493+02-.3809106+01   1  27
-.3759760+01 .2499696+02 .1609438+01 .1300000+02 .9823697+01 .1138498+02   1  28
 .1903698+01 .9283341+01 .1071857+02 .3515435+01 .8789966+01 .1040448+02   1  29
 .5129214+01 .6263435+01 .9868899+01 .6741063+01 .7322830+01 .8696246+01   1  30
 .8351587+01 .5932719+01 .7481910+01 .9964829+01 .4152941+01 .6413978+01   1  31
 .1172263+02 .1140038+01 .4204736+01 .1372343+02-.1822663+01 .6863783-00   1  32
 .1563371+02-.3171280+01-.2318725+01 .1767533+02-.3729838+01-.3541533+01   1  33
 .1981647+02-.3809338+01-.3763806+01 .2206752+02-.3774870+01-.3751456+01   1  34
 .2448309+02 .1945910+01 .1300000+02 .9819154+01 .1087764+02 .1383940+01   1  35
 .9126053+01 .1033297+02 .3002869+01 .8432567+01 .9923368+01 .4625176+01   1  36
 .7849561+01 .9144914+01 .6262174+01 .6858922+01 .7613118+01 .8020052+01   1  37
 .4316208+01 .4975544+01 .9773148+01 .1625941+01 .2501353+01 .1148546+02   1  38
-.5356180-00 .6702459-00 .1326058+02-.1808301+01-.6972058-00 .1514331+02   1  39
-.2596932+01-.1754459+01 .1723074+02-.3301124+01-.2921444+01 .1942791+02   1  40
-.3624132+01-.3565925+01 .2168979+02-.3662407+01-.3643999+01 .2409135+02   1  41
 .2302585+01 .1300000+02 .9428387+01 .1036301+02 .8446533-00 .9021461+01   1  42
 .9928059+01 .2520585+01 .8194643+01 .9081217+01 .4282871+01 .6476947+01   1  43
 .7443866+01 .6009758+01 .4716835+01 .5845844+01 .7646307+01 .3348218+01   1  44
 .4456450+01 .9268272+01 .2228162+01 .3158927+01 .1099450+02 .9543184-00   1  45
 .1844817+01 .1282648+02-.7318137-00 .1117635+00 .1475540+02-.2373256+01   1  46
-.1681466+01 .1687266+02-.3197190+01-.2941256+01 .1909729+02-.3378402+01   1  47
-.3341878+01 .2142348+02-.3355457+01-.3341855+01 .2386695+02 .0000000     1  48
       7
THIS IS THE END OF THE DIANE OPACITY TAPE - A. KNOPP  11/11/67
```

•3983

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APPENDIX III

EQUATION-OF-STATE AND RELATED PROGRAMS

Results of running HELAS and HELIKE were used as card input to MARIER. MARIER uses a polynomial fit among ionization potentials to obtain all unknown ionization potentials. The results of MARIER are used in the block data program MARI, which is used by GOLEM when GOLEM is used to run EIONX. TEDIUS computes number fractions for a given compound and these are used in DATA statements in EIONX. Input and format specifications for each code are given with the description of the code. The flow of information (dotted lines) and control (solid lines) is summarized in figure 1.

OPACITY PROGRAMS

AUGEAS creates an input data tape for DIAPHANOUS, which makes an input data tape for DIANE. DENSER condenses the DIAPHANOUS tape onto a new tape, which is edited by DASE. ANDIMX makes an opacity data tape from an 1100 binary tape converted from a LASL binary data tape. COMBO can combine DIAPHANOUS, ANDIMX, or DENSER tapes to produce a DENSER-like tape or an ANDIMX-like tape to be used by DIANE. IMESI is a calling program for DIANE, DIANTC, and DIANCT. DIANE uses a DENSER tape, an ANDIMX tape, or a DIAPHANOUS tape and creates a DIANE tape. DIANTC punches data cards or writes a DIANE BCD tape, or both, from a DIANE binary tape. DIANCT writes a DIANE binary tape from data cards punched by DIANCT or from a DIANE BCD tape.

IMES2 is a calling routine for GREYS, GREY, and REDGRE. Cards punched by DIANTC are used as input for GREYS, which makes a data tape

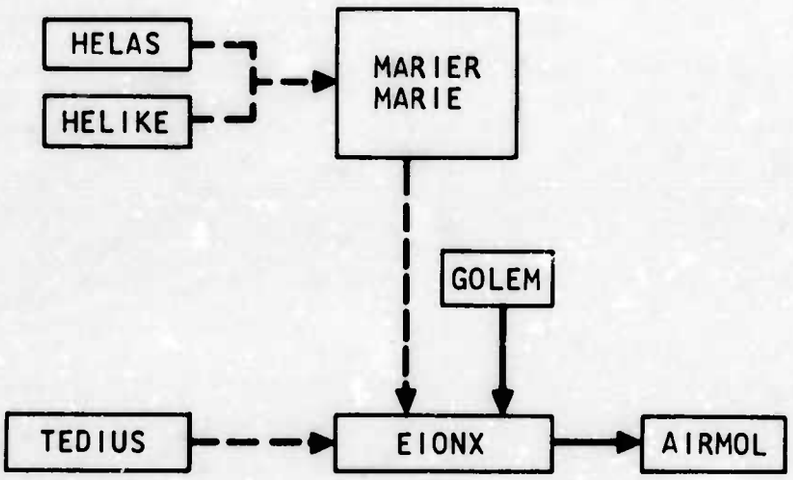

Figure 1. Equation-of-State and Related Programs General Flow

that is edited by EGREY. REDGRE condenses data from the GREY tape onto another data tape or punches cards in the form of DATA statements. Flow of information and control are summarized in figure 2.

PROCEDURE FOR CREATING A DIANE TAPE

AUGEAS is run to obtain an input data tape for DIAPHANOUS. This input tape must be mounted on unit 12. The card input and its formats are listed in reference 1b. AUGEAS can also be run with subroutines LEVELS and MARI as indicated in the LEVELS section of this report. To run DIAPHANOUS, the AUGEAS data tape must be mounted on unit 12 and the output tape written by DIAPHANOUS must be mounted on unit 15. The formats for the card input are listed in reference 1b. However, DIAPHANOUS has been modified slightly for use with another program. This modification necessitates that the first input card, a heading card, must not have columns 1 through 6 entirely blank for DIAPHANOUS to run in its normal mode.

LASL data tapes must be converted to 6600 binary tapes. These binary tapes are input to the ANDIMX code and must be mounted on unit 14. ANDIMX writes an output tape that must be mounted on unit 12. The card input and formats are listed in the ANDIMX section of this report.

A DIANE run is made by using a DASIAC DIAPHANOUS or SILVIA data tape, or a DIAPHANOUS tape, or an ANDIMX tape as input. If a DASIAC tape is used, the tape must be read in even parity at 556 BPI. The following routines are necessary to make a DIANE run:

IMESI is the main program and uses the following subroutines:

ALUET0, DIANTC, DIANE, DIANCT, DINNEW, DOLDIN, DYPDIN, EDIANE, PLNKUT, SILVIA, ZSA ZSU, MERR, DIVCHK, and DVCKON.

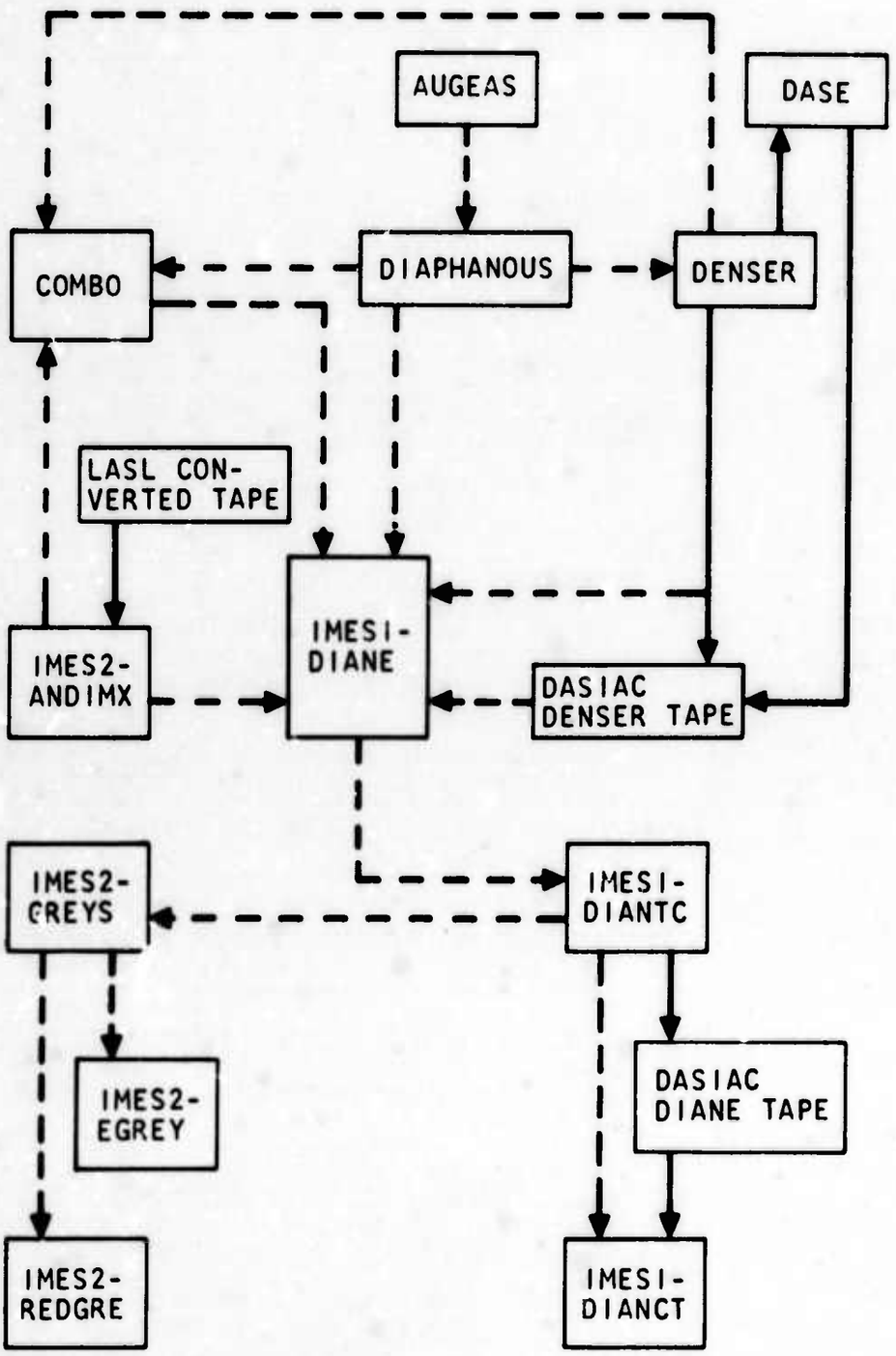

Figure 2. Opacity Programs General Flow

Now, SILVIA, ZSAZSU, MERR, DIVCHK, ALUET0, and DVCKON are dummy subroutines; MERR, DIVCHK, and DVCKON are system subroutines for the UNIVAC 1108, which may be dummied on the 6600.

Further information on DIANE may be found in the comments at the beginning of the listing. A flow summary is given in figure 3.

INPUT TO IMESI is two cards containing the following information:

CARD	COLUMNS	FORMAT	VAR. NAME	MEANING
1	1-72	12A6	ID(12)	72 columns of Hollerith title information
2	1	I1	IBIN0	Used to indicate tape identification type for DINNEW, DIANCT, DIANTC, EDIANE runs. 0 if binary ID 1 if BCD ID If > 1, used by DIANTC or DIANCT to determine output tape unit for writing a BCD-formatted DIANE tape
2	2	I1	IRUN	Determines run type: *0 if "normal" run; IBIN0 is set to zero and routines DIANE (0, IBCD0), DINNEW (0), EDIANE (10, 0), and DIANTC (10, 0) are called 1 for all other runs

*To obtain a usable "new format" (Grey absorption coefficients first), DIANE tape, and punched output data cards, set IRUN to zero. The DIANE subprogram produces an "intermediate format" (Grey coefficients last) data tape; the DINNEW subprogram produces a "new format" DIANE tape; the EDIANE subprogram edits the "new format" tape; the DIANTC subprogram punches output cards from the "new format" tape.

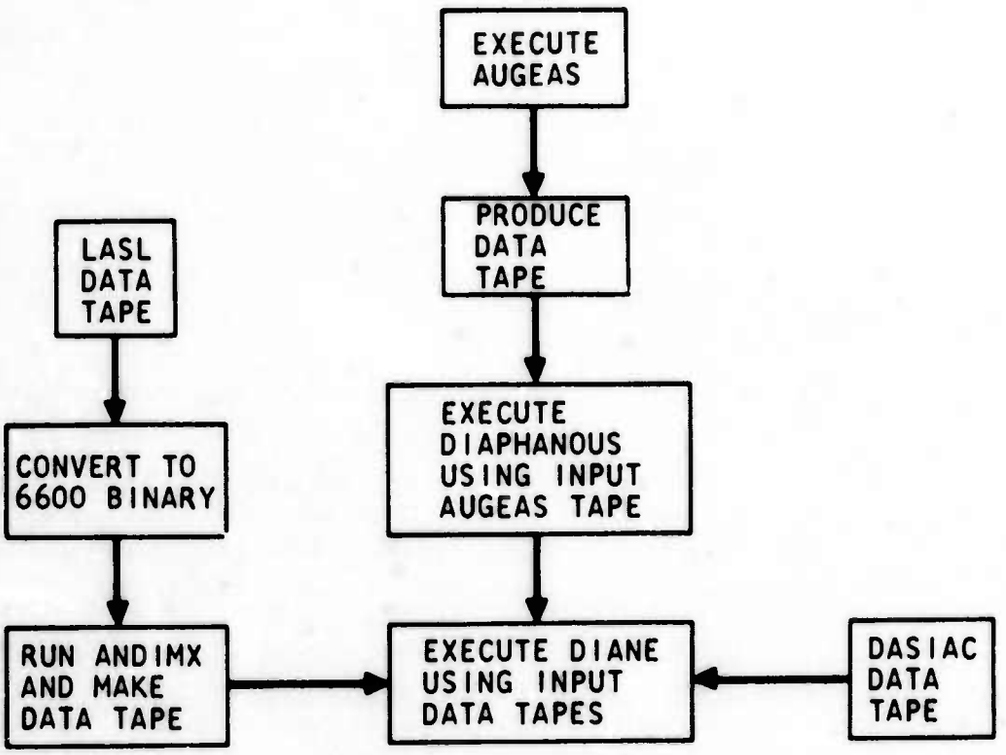

Figure 3. Procedure for Creating a DIANE Tape

CARD	COLUMNS	FORMAT	VAR. NAME	MEANING
2	3-23	20A1	IPATH(J)	Array used to determine subroutines (and order of subroutines) called: D DIANE (SCAT, IBCD0) W DINNEW (IBIN0) E EDIANE (TAPE 10, IBIN0) C DIANTC (Tape 10, IBIN0) T DIANCT (Tape 10, IBIN0) Y DYPDIN P EDIANE (Tape 11, IBIN0) Q DIANTC (Tape 11, IBIN0) R DIANCT (Tape 11, IBIN0) N DOLDIN (IBIN0) O ALUET0 A SILVIA U ZSAZSU Z calls EXIT
2	25	I1	SCAT	Used to indicate scattering limit in DIANE: 0 if limit of 0.2 1 if limit of 1.E-10 2 if limit of 0.3977
2	26	I1	IBCD0	Used to indicate type of input DIAPHANOUS tape used by DIANE: 0 if compressed BCD input tape 1 if noncompressed binary input tape

REFERENCES CODES

Throughout this volume numerous references are made to writeups of the codes shown below. The writeups can be found in reports listed by each code.

CODE	REFERENCE
1. DIAPHANOUS	a. Stewart, J. C., and K. D. Pyatt, Jr., "A Theoretical Study of Optical Properties," Air Force Special Weapons Center Report AFSWC-TR-61-71, v. I, September 1961.
	b. Walsh, R. T., "DIAPHANOUS II," General Dynamics, General Atomic Division Informal Report GAMD-5549, 1964 (AD 453-351L)
2. DIANE	a. Lindley, W. B., "DIANE-A Computer Program to Provide Multi-Frequency Absorption Coefficients by Local Rosseland Averaging," General Dynamics, General Atomic Division Informal Report GAMD-5501, July 1964.
	b. Freeman, B. E., and C. G. Davis, "Fireball Phenomenology and Code Development," v. V, "Material Properties," Air Force Weapons Laboratory Report AFWL-TR-65-143, August 1965.
3. ZSAZSA	a. Lindley, W. B., "ZSAZSA-A Data Processor for Low-Temperature Air Absorption Coefficients," General Dynamics, General Atomic Division Informal Report GAMD-5496, July 1964.
	b. Freeman, B. E., and C. G. Davis, "Fireball Phenomenology and Code Development," v. V, "Material Properties," Air Force Weapons Laboratory Report AFWL-TR-65-143, August 1965.
4. SYLVIA	Smith, P. R., W. G. Vulliet, and W. B. Lindley, "Predictions of Thermal Damage in Nuclear Fireballs," v. II, "Material Properties," Air Force Flight Dynamics Laboratory Report AFFDL TR-66-45, February 1966.
5. EIONX CMOL	Pyatt, K. D., "Nuclear Explosion Interaction Studies," v. II, "Methods of Analysis of Thermal Phenomena," Air Force Weapons Laboratory Report AFWL-TR-66-108, May 1967.

CODE	REFERENCE
6. SPUTTER	a. "Optical Interactions. The SPUTTER Program," RTD TDR-63-3128, v. 2, General Dynamics, General Atomic Division, 1964. (AD 440-287).
	b. Pyatt, K. D., "Nuclear Explosion Interaction Studies," v. II, Methods of Analysis of Thermal Phenomena," Air Force Weapons Laboratory Report AFWL-TR-66-108, May 1967.

Applications of codes listed herein are given in reference 1. The contract that generated reference 1 runs concurrent with the contract for which this report is supplied; the contract for this report specifies that codes will be developed. The codes developed were supported by both of these contracts plus others.

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APPENDIX IV

EQUATION-OF-STATE INVERSION TECHNIQUES- MODIFICATION TO THE GEST AND LIBEX PROGRAMS

Introduction

GEST is a Fortran IV computer program which generates equation-of-state tables. These tables are designed to be used in other programs which require thermodynamic quantities (e.g., pressure (P) and temperature (θ)) as functions of the internal energy (E) and specific volume (τ). For each material of interest GEST requires an equation-of-state subroutine, EIONX, which uses temperature and specific volume as the two independent thermodynamic variables. The program then is essentially an inversion calculation, starting, for example, with the functions $P = P(\theta,\tau)$ and $E = E(\theta,\tau)$, and producing the tabular quantities $P_{ij} = P(E_i,\tau_j)$ and $\theta_{ij} = \theta(E_i,\tau_j)$ by an iterative process, for the given set of points E_i and τ_j.

LIBEX is a subprogram which provides the calling program with pressure, temperature, and other thermodynamic quantities as functions of E and τ. It is basically a table lookup program, using the output of GEST for the tabular data.

The GEST and LIBEX programs have been revised to make available a more flexible equation-of-state system in E-τ space. Basically, the method of calculation remains the same as that described in a previous report.* The changes have concentrated on two major areas: increasing the variety of thermodynamic variables available as data tables for the calculation of temperature and pressure; and providing a section specifically for equations of state which are applicable in both the molecular and atomic regimes. (The present version is limited to two-element compounds, but can easily be extended to compounds of an arbitrary number of elements.)

Revisions to the GEST Program

1. Choice of tabulated quantities

The table entries calculated in GEST are no longer limited to $\bar{Z}$, the mean number of free electrons per atom, and ℓn I, where I is the

*Reed, L. L., "Equation of State Inversion from Temperature-Density to Specific Energy-Density by Table Look-up", GAMD-7189-Rev., July 1966.

internal energy due to ionization and excitation. The user now has a choice of six variables: $\bar{Z}$; ℓn I; $\bar{N}$, the mean number of atoms per molecule; ℓn D, where D is the dissociation energy; $\bar{Z}_1$, the mean ionic charge of the first element of a compound; $\bar{Z}_2$, the mean ionic charge of the second element. Any or all of these variables may be selected by setting the appropriate flags (see Input section).

2. Extension to Molecular Regime

For a single-element material consisting of atoms, ions, and free electrons it has been found convenient to tabulate the quantities $\bar{Z}$, the mean number of free electrons per atom, and ℓn I, the logarithm of the ionization energy for a given set of points in E-τ space. By analogy, equations of state have been extended to the molecular regime simply by tabulating two additional quantities: $\bar{N}$, the mean number of atoms per molecule, and D, the dissociation energy. These two quantities are computed in a "molecular" subroutine written expressly for the desired material. Currently available subroutines are:

Name	Material
ESIIMS	Polyethylene
CMOL	Carbon
MESA	Air
ASTER	Polyethylene (improved)

The "molecular" subroutine is called by the EIONX subroutine, which acts as the master routine.

Molecular dissociation normally occurs at lower internal energies than does ionization, so that the range of internal energies for which $\bar{N}$ and D are changing is different from the range in which $\bar{Z}$ and I are changing. Consequently it was found desirable to tabulate $\bar{N}$ and D for one set of energy points (the E set) and to tabulate $\bar{Z}$ and ℓn I for a second set of energy points (the E' set). The two sets are related by

$$E = E' + D.$$

The reason for using two energy scales is the following: (1) The energy points are equally spaced on a logarithmic scale; (2) $\bar{Z}$ and I go to zero

as E' goes to zero; (3) thus for small values of E' (compared to D) one would get poorly resolved tables of $\bar{Z}$ and ℓn I if they were tabulated as functions of the total internal energy E. To give a numerical example, polyethylene has a total dissociation energy of 8.2×10^{11} erg/g. Using the GEST-generated data given in the listing of LIBEX at the end of this report, one finds that, at a specific volume of 10^5 cm^3/g, $\bar{Z}$ varies with E' as follows:

$\log_{10}$ E'	$\bar{Z}$
11.2125	$< 10^{-3}$
11.3792	9.4×10^{-3}
11.5459	3.66×10^{-2}
11.7125	8.45×10^{-2}

Note that there are four entries for $\bar{Z}$ varying between ~ 0 and 8.45×10^{-2}. In this energy range, and at this particular specific volume, the polyethylene is fully dissociated, or close to it, so that $E \simeq E' + 8.2 \times 10^{11}$ erg/g. If we evaluate log E at the four points we get

$\log_{10}$ E'	$\log_{10}$ E
11.2125	11.968
11.3792	12.017
11.5459	12.076
11.7125	12.134

The difference between the maximum and minimum values of log E' is 0.50; the corresponding difference for E is 0.166. Thus, the tabulated $\bar{Z}$ variation would be covered by only two points on the log E scale, as compared to four points on the log E' scale.

3. Selection of minimum energy

The criterion for choosing θ_o for the purpose of calculating a minimum E or E' has been changed since the previous report. θ_o is now selected so that $\bar{N}(\theta_o, \tau_{max})$ must be greater than or equal to EN, an estimate of the maximum value of $\bar{N}$, and $\bar{Z}(\theta_o, \tau_{max})$ must be less than or equal to EB, the minimum $\bar{Z}$. For purely atomic materials, $\bar{N}$ is always unity and the input number EN should be set to 1.

4. Restart procedure

To deal with the more time-consuming equations of state, a data dump has been added to GEST. For each energy point and all its corresponding values of τ, the temperature and the quantities selected for the data tables are written out on tape 10. Also, an edit is printed giving the number of the energy point, MS for E or LS for E', and the quantities which have been saved on the tape. The problem can then be restarted from any energy point by specifying in input the current value of MS or LS. If restarting from an E' point, MS must be set to its maximum.

The final dump tape has several uses. By setting both MS and LS (if E' is being used) to their maximum, the tape can be used to repunch the data deck or make a final data tape using NTRAN. This tape can also be used to increase the number of decades of E and E'. The following table gives a diagram of how to set the input variables to accomplish this procedure.

To increase decades of:	MS	LS	NDUMP	DM	DL
E (not using E')	max.	0.	-1	increased no. decades	0.
E (using E')	max.	0.	-1	increased no. decades	no. decades
E'	max.	max.	-1	no. decades	increased no. decades
E and E'	max.	max.	-1	increased no. decades	increased no. decades

5. Iteration Criterion

Because any irregularity in the variation of E with θ makes iteration difficult, a new procedure has been added to GEST. If after 20 iterations the relative error between the E calculated by GEST and the desired E is greater than .5% but less than 15%, the code will use the values calculated at the energy closest to the desired E point to make up the tables. This same procedure is used for the E' points.

6. Input for GEST

Cards 2 and 6 have an integer field width of 5 and cards 3, 4, and 5 have a floating point field width of 10.

Card	Cols.	Mnemonics	Information
1			Header card-any BCD information. Will be reproduced as first line of output.
2	1-5	MS	No. of E point to be picked up on a tape restart. At start of calculation, MS must be 0.
	6-10	LS	No. of E' point to be picked up on a tape restart. Must be 0 until all E points have been calculated.
	11-15	NOPNCH	Set to 1 if punched data deck is desired, otherwise 0.
	16-20	NDUMP	0 - no dump on tape 10. 1 - pick up existing dump tape. -1 - start of problem and want to dump on tape 10 (tape 10 must be assigned). Picking up an existing dump tape to increase the number of decades of E or E'.
	21-25	ND11	Set to 1 if a data tape made using NTRAN is desired for LIBEX.
	26-30	NED	Set to 1 if table of ℓn D is desired, otherwise 0 or blank.
	31-35	NEI	Set to 1 if table of ℓn I is desired, otherwise 0 or blank.
	36-40	NNB	Set to 1 if $\bar{N}$ table is desired, otherwise 0 or blank.
	41-45	NZB	Set to 1 if $\bar{Z}$ table is desired, otherwise 0 or blank.
	46-50	NZB1	Set to 1 if $\bar{Z}_1$ table is desired, otherwise 0 or blank.
	51-55	NZB2	Set to 1 if $\bar{Z}_2$ table is desired, otherwise 0 or blank.

Card	Cols.	Mnemonics	Information
3	1-10	Z	Atomic no. of material
	11-20	A	Atomic mass no.
	21-30	V1	First ionization potential.
	31-40	VZ	Last ionization potential.
	41-50	R	No. of points per decade of E'.
	51-60	S	No. of points per decade of τ.
	61-70	T	No. of points per decade of E.
4	1-10	DN	No. of decades of τ.
	11-20	DM	No. of decades of E.
	21-30	DL	No. of decades of E'
	31-40	TAUZ	Minimum value of τ.
	41-50	EZ	Minimum value of E. If 0, the code will choose a minimum value.
	51-60	EPRZ	Minimum value of E'. If 0 the code will choose a minimum value.
	61-70	EN	Estimate of the maximum value of $\bar{N}$. Used to compute the minimum values of E and E'.
5	1-10	EB	Choice of minimum $\bar{Z}$. Sets ZBRMIN in EIONX. Used to compute the minimum value of E and E'.
	11-20	E14	Sets EION(14) before the call to EIONX. If 1, calls the molecular equation of state. Should be 0 otherwise.
	21-30	WT1	Percent of first element in the compound.
	31-40	WT2	Percent of second element in the compound.
	41-50	PAN1	Atomic number of first element of the compound.
	51-60	PAN2	Atomic number of second element of the compound.
6	1-5	IS	1 - uses EIONX for equation of state. Generally for nonmolecular equations of state. All E' quantities should be set to 0.
			2 - Uses EIONX for equation of state. Particularly for equation of state where the molecular regime is of interest. All E' variables should be set.

Card	Cols.	Mnemonics	Information
6	6-45	I1 - I8	Table region flags. If a region of the table has been entered which has no tabulated values and the flag of that region has been set to zero, a calculation will proceed using the available analytic equations. At present regions 1, 7, and 8 have analytic equations or data. (see GAMD-7189 for a fuller discussion.)

Sample Data Cards

1) EXAMPLE OF CH2 DATA

2)

5	10	15	20	25	30	35	40	45	50	55
19	14	0	1	1	1	1	1	1	0	0

Pick up the 14th value of E' from tape 10 and continue the calculation.

Do not punch a data deck.

Make a final data tape using NTRAN (tape 11 must be assigned.)

Make up tables of the following quantities: ℓn D, ℓn I, $\bar{N}$, $\bar{Z}$.

3)

10	20	30	40	50	60	70
101.	4.6667	11.256	489.84	6.	3.	6.

Atomic number of CH2, atomic mass number, first and last ionization potentials.

6 points/decade of E'

3 points/decade of τ

6 points/decade of E

4)

10	20	30	40	50	60	70
9.	3.	3.	1.	0.	0.	4.

9 decades τ

3 decades E

3 decades E'

Minimum value of τ is 1.0 cm^3/g.

Zeros indicate that the code is to choose a minimum E and E'. Estimate of maximum $\bar{N}$ is 4.

5)

10	20	30	40	50	60	70
1.0 -03	1.0	0.0	0.0	0.0	0.0	0.0

Minimum $\bar{Z}$

EION(14) is set before each call to EIONX to call the molecular equation of state. Since the partial $\bar{Z}$'s are not being calculated, the quantities WT1, WT2, PAN1, PAN2 are unnecessary.

6)

2	0	1	1	1	1	1	0	0

Uses section of GEST for molecular equation of state.

The zeros indicate that the code is to use the analytic solutions provided in sections 1, 7, and 8.

6. Output

The GEST program has three forms of output: punched cards, a data tape, and printed tables.

The data tape is a new feature in GEST. The systems subroutine NTRAN is used to write out on tape 11 that portion of the data block containing all the variables necessary for LIBEX. This tape must be read in by NTRAN and a series of equivalences for the data variables must be set up with unused arrays in the calling program. This procedure has been developed especially for HECTIC as a space-saving device, but other programs could easily be adapted to use it.

The punched cards are in the form of data statements and are ready for immediate placement into LIBEX. However, for use on the 1108 all the data statements must be reproduced, placing an "E" in the data, e.g., 1.46E+10.

The printed output in the form of data tables can be used to check the punched data statements. Also a table of the Θ's corresponding to each (E,τ) and (E',τ) point is printed so that the temperature range can be checked.

Revisions to the LIBEX Program

The revisions to the LIBEX program follow the same general scheme as those in GEST. The method of calculation remains the same as that described in GAMD-7189. The major changes have been made to deal with the increased number of thermodynamic variables and the E' energy term.

The flags, set in the GEST input to determine the series of tables, are transmitted to LIBEX in the data statements to determine which quantities are to be used to calculate Θ and P.

The value of IS is also transmitted to LIBEX. If IS was set equal to 2 in GEST, the variables $\bar{Z}$, $\bar{Z}_1$, $\bar{Z}_2$, and ℓn I are calculated from the data tables as a function E' and τ. Otherwise all the variables are calculated as a function of E and τ. The E' term is calculated in LIBEX by subtracting the dissociation energy, previously calculated from the tables as a function of E and τ, from E. The equations for the calculation of Θ and P have also been adapted for the molecular equation of state:

$$\Theta = (E - \phi I - D)/[1.5\ \phi(1./\bar{N} + \bar{Z})]$$
$$P = \phi(1./\bar{N} + \bar{Z})\Theta/\tau$$

A new function subroutine, EIONIZ, is now being used with LIBEX. This subroutine calculates the ionization energy given $\bar{Z}$ and the atomic number. This subroutine is used when tables of $\bar{Z}$ and $\bar{Z}_1$, or $\bar{Z}_1$ and $\bar{Z}_2$, or $\bar{Z}$ and $\bar{Z}_2$ are needed, to eliminate the need for an extra table containing the ionization energy.

If a region outside the limits of the table has been entered and no analytic solution is available, an S1 flag will be set and control returned to the calling program. Thus the subroutine ERR, or a comparable error routine should always be used with LIBEX.

GEST Mnemonics

Mnemonic	Definition
A	*
AIN	!
ALGE	!
ALGEPR	Log_{10} E'
ALGT	!
ALIN	!
D	Dissociation energy
DLGE	!
DLGEPR	Log_{10} E'/E'_o
DLGT	!
DLLEPR	ΔE' above position K in the table.
DMLE	!
DNLT	!
DP	Dissociation energy
E	!
E'	Specific internal energy-dissociation energy
EB	*
EDIS	ℓn D
EDLN	Array of ℓn D used in LIBEX
EDLNID	Array of ℓn D used in GEST
EILN	Array of ℓn I used in LIBEX
EILNID	!
EL	!
EM	!
EMAX	!
EMIN	!
EN	*
EPR	E'
EPRIME	Current value of EPR
EPRL	Log_{10} E'

! - see GAMD-7180-Rev.
* - see input for GEST, pp. 5-7.

Mnemonic	Definition
EPRM	Maximum value of E' in table
EPRZ	*
EZ	*
E14	*
GAND	Current value of E
I	!
IS	*
I1-I8	*
K	Index for table entries (K=(M-1)NN+N)
LL	Total number of E' points
LS	*
MM	Total number of E points
MS	*
NB	$\bar{N}$ array used in LIBEX
NBAR	Number of atoms per molecule
NBID	$\bar{N}$ array used in GEST
NBMAX	Maximum $\bar{N}$
NDUMP	*
NED	*
NEI	*
NN	Total number of τ points
NOPNCH	*
NZB	*
NZB1	*
NZB2	*
P	Pressure
PAN1	*
PAN2	*
PHI	!
STORTM	Stores closest value of Θ below that desired
STORTX	Stores closest value of Θ above that desired
T	!
τ	!
TAUL	!

Mnemonic	Definition
TAUM	!
TAUZ	!
TH	Array of temperature in ev for E' points
THETA	!
THMAX	!
THMIN	!
TH1MAX	Θ_{max} used in interpolation, E' points
TH1MIN	Θ_{min} used in interpolation, E' points
V1	*
V2	*
WT1	*
WT2	*
Z	*
ZB	$\bar{Z}$ array used in LIBEX
ZBAR	!
ZBAR1	Mean ionic charge for first element of a compound
ZBAR2	Mean ionic charge of second element
ZB1	Array of $\bar{Z}_1$ used in LIBEX
ZB2	Array of $\bar{Z}_2$ used in LIBEX
ZB1D	Array of $\bar{Z}$ in GEST
ZB11D	Array of $\bar{Z}_1$ in GEST
ZB21D	Array of $\bar{Z}_2$ in GEST
ZPART	Stores values of $\bar{Z}_1$ and $\bar{Z}_2$ in LIBEX

```
C      GENERATE EQUATION OF STATE TABLES                                    EST   10
C                                                                           EST   20
       DIMENSION    THETA(50,50),CARD(14),TH(50,50)                         EST   30
       DIMENSION TAU(50),TAUL(50),E(50),EL(50),EPR(50),EPRL(50)             EST   40
       DIMENSION IT(1),NED(1),NEI(1),NNB(1),NZB(1),NZB1(1),NZB2(1),TAUM(1EST   50
      1),EM(1),EPRM(1),TAUZ(1),EZ(1),EPRZ(1),TAULZ(1),ELZ(1),EPRLZ(1),R(1EST   60
      2),S(1),T(1),V1(1),VZ(1),FHI(1),NBMAX(1),NX(1),MX(1),LZ(1),I1(1),I2EST   70
      3(1),I3(1),I4(1),I5(1),I61(1),I7(1),I8(1),WT1(1),WT2(1),PAN1(1),
      4 PAN2(1)
       DIMENSION ZB1D(1594),EILN1D(1594),NB1D(1594),EDLN1D(1594),ZB11D(15EST   90
      193),ZB21D(1593)
       EQUIVALENCE  (EB,ZBRMIN), (ZBRMIN(1),EIONIN(29))                     EST  110
       EQUIVALENCE (EION(5),PHI), (EION(8),GAND), (EPRIME,EION(14))         EST  120
       EQUIVALENCE (TLMSB(14),DIS),(EION(17),NBAR)                          EST  130
       COMMON/LMSC/M1(51)                                                   EST  140
       EQUIVALENCE (ZBAR1,M1(5)),(ZBAR2,M1(15))                             EST  150
       COMMON/LMSG/CARBNZ(10)                                               EST  160
       COMMON/LMSD/         TLMS(16)                                        EST  170
       COMMON/LMSESN/TLMSB(15)                                              EST  180
       COMMON/EOSIN/EIONIN(30)                                              EST  190
       DIMENSION ZBRMIN(1)                                                  EST  200
       COMMON/LMS/ EION(20)                                                 EST  210
       EQUIVALENCE (ZBAR, EION(3)), (PHI,EION(5))                           EST  220
       REAL NB1D                                                            EST  230
       REAL NBAR                                                            EST  240
       REAL NBMAX                                                           EST  250
       EXPT(Q)=EXP(2.3026*Q)                                                EST  260
       READ (5,1860) (CARD(I),I=1,12)                                       EST  270
       WRITE (6,1860) (CARD(I),I=1,12)                                      EST  280
C         READ AND STORE INPUT                                              EST  290
       READ (5,1850) MS,LS,NOPNCH,NDUMP,ND11,NED,NEI,NNB,NZB,NZB1,NZB2      EST  300
       WRITE (6,1850) MS,LS,NOPNCH,NDUMP,ND11,NED,NEI,NNB,NZB,NZB1,NZB2     EST  310
       READ (5,1840) Z,A,V1,VZ,R,S,T,DN,DM,DL,TAUZ,EZ,EPRZ,EN,EB,E14,       EST  320
      1 WT1,WT2,PAN1,PAN2
       WRITE (6,2380) Z,A,V1,VZ,R,S,T,DN,DM,DL,TAUZ,EZ,EPRZ,EN,EB,E14,      EST  330
      1 WT1,WT2,PAN1,PAN2
       READ (5,1850) IS,I1,I2,I3,I4,I5,I6,I7,I8                             EST  340
       WRITE (6,1850) IS,I1,I2,I3,I4,I5,I6,I7,I8                            EST  350
       IF (NNB.NE.1) NBAR=1.0                                               EST  360
       IF (NDUMP) 50,50,10                                                  EST  370
   10  J=Z                                                                  EST  380
C      READ DUMP TAPE
       READ (10) TAUM,EM,EPRM,TAUZ,EZ,EPRZ,TAUL(1),EL(1),EPRL(1),PHI,NN,MEST  390
      1M,LL                                                                 EST  400
       READ (10) (TAU(N),N=1,NN)                                            EST  410
       READ (10) (E(M),M=1,MM)                                              EST  420
       IF (IS.EQ.2) READ (10) (EPR(L),L=1,LL)                               EST  430
       DO 20 M=1,MS                                                         EST  440
       READ (10) (THETA(N,M),N=1,NN)                                        EST  450
       KMN=(M-1)*NN+1                                                       EST  460
       KMX=KMN+NN-1                                                         EST  470
       IF (NED.EQ.1) READ (10) (EDLN1D(K),K=KMN,KMX)                        EST  480
       IF (NNB.EQ.1) READ (10) (NB1D(K),K=KMN,KMX)                          EST  490
       IF (IS.EQ.2) GO TO 20                                                EST  500
       IF (NEI.EQ.1) READ (10) (EILN1D(K),K=KMN,KMX)                        EST  510
       IF (NZB.EQ.1) READ (10) (ZB1D(K),K=KMN,KMX)                          EST  520
       IF (NZB1.EQ.1) READ (10) (ZB11D(K),K=KMN,KMX)                        EST  530
       IF (NZB2.EQ.1) READ (10) (ZB21D(K),K=KMN,KMX)                        EST  540
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   20 CONTINUE                                                          EST  550
      IF (IS.NE.2.OR.LS.EQ.0.) GO TO 40                                 EST  560
      DO 30 L=1,LS                                                      EST  570
      READ (10) (TH(N,L),N=1,NN)                                        EST  580
      KMN=(L-1)*NN+1                                                    EST  590
      KMX=KMN+NN-1                                                      EST  600
      IF (NEI.EQ.1) READ (10) (EILN1D(K),K=KMN,KMX)                     EST  610
      IF (NZB.EQ.1) READ (10) (ZB1D(K),K=KMN,KMX)                       EST  620
      IF (NZB1.EQ.1) READ (10) (ZB11D(K),K=KMN,KMX)                     EST  630
      IF (NZB2.EQ.1) READ (10) (ZB21D(K),K=KMN,KMX)                     EST  640
   30 CONTINUE                                                          EST  650
   40 CONTINUE                                                          EST  660
      GO TO 160                                                         EST  670
C     MS = E POINT FOR TAPE RESTART
C     LS = EPRIME POINT FOR TAPE RESTART
C     NOPNCH = 1  -  PUNCH A DATA DECK
C     NDUMP = 0 - NO DUMP ON TAPE 10
C           = 1  -  PICKUP TAPE 10
C           = -1  -  START PROBLEM AND DUMP OF TAPE 10
C     ND11 = 1  -  MAKE AN NTRAN TAPE
C     NED = FLAG FOR EDIS TABLE
C     NEI = FLAG FOR EION TABLE
C     NNB = FLAG FOR NBAR TABLE
C     NZB = FLAG FOR ZBAR TABLE
C     NZB1 = FLAG FOR ZBAR1 TABLE
C     NZB2 = FLAG FOR ZBAR2 TABLE
C        Z = ATOMIC CHARGE NO.                                          EST  680
C        A = ATOMIC MASS NO.                                            EST  690
C       V1 = FIRST IONIZATION POTENTIAL                                 EST  700
C       VZ = LAST IONIZATION POTENTIAL                                  EST  710
C     R = NUMBER OF TABULAR POINTS/DECADE OF EPRIME
C        S = NO. OF TABULAR PTS/DECADE OF TAU                           EST  720
C        T = NO. OF TABULAR PTS/DECADE OF E                             EST  730
C       DN = NO. OF DECADES OF TAU                                      EST  740
C       DM = NO OF DECADES OF E                                         EST  750
C     DL = NUMBER OF DECADES OF EPRIME
C     TAUZ = MIN VALUE OF TAU IN TABLE                                  EST  760
C       EZ = MIN VALUE OF  E  IN TABLE                                  EST  770
C     EPRZ = MINIMUM VALUE OF EPRIME IN TABLE
C     EN = ESTIMATE OF MAX NBAR
C     EB = MIN ZBAR
C     E14 = 1. -  SETS EION(1J) BEFORE CALL TO EIONX
C                 TO CALL MOLECULAT EQUATION OF STATE
C     WT1 = PERCENT OF FIRST ELEMENT IN A COMPOUND
C     WT2 = PERCENT OF SECOND ELEMENT IN A COMPOUND
C     PAN1 = ATOMIC NUMBER OF FIRST ELEMENT IN A COMPOUND
C     PAN2 = ATOMIC NUMBER OF SECOND ELEMENT IN A COMPOUND
C     IS = SECTION USED TO GENERATE TABLE
C        = 1  -  FOR NON-MOLECULAR EQUATIONS OF STATE
C        = 2  -  FOR MOLECULAR EQUATIONS OF STATE
C       I1 THRU I8 FLAGS INDICATING TREATMENT AT BOUNDARIES OF TABLE    EST  800
C       IN = 1 STOP IF REGION IS ENTERED                                EST  810
C          = 0 CALCULATE WITH AVAILABLE ANALYTIC EQS                    EST  820
C        3 * 4 * 5                                                      EST  830
C        *********                                                      EST  840
C           *   *                                                       EST  850
C     E 2 *   * 6                                                      EST  860
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```
C           *   *                                                    EST  870
C         *********                                                  EST  880
C         1 * 8 * 7                                                  EST  890
C             TAU                                                    EST  900
   50 J=Z                                                            EST  910
      PHI=9.648679E11/A                                              EST  920
      AM=T*DM+1.0                                                    EST  930
      AN=S*DN+1.0                                                    EST  940
      AL=R*DL+1.0                                                    LST  950
      NN=AN                                                          EST  960
      MM=AM                                                          EST  970
      LL=AL                                                          EST  980
      TAUM=TAUZ*10.0**DN                                             EST  990
      TAUL(1)=ALOG10(TAUZ)                                           EST 1000
      DTAUL=1./S                                                     EST 1010
      TAU(1)=TAUZ                                                    EST 1020
      IF (EZ.NE.0.) GO TO 90                                         EST 1030
      THA=1.1                                                        EST 1040
      DO 60 I=1,10                                                   EST 1050
      THA=THA-.1                                                     EST 1060
      EION(14)=E14                                                   EST 1070
      CALL EIONX (THA,TAUM,J,0.)                                     EST 1080
      S1=EION(14)                                                    EST 1090
      IF (S1.NE.0.) CALL ERR (S1)                                    EST 1100
      IF ((EION(17).LT.EN).OR.(EION(3).GT.EB)) GO TO 60              EST 1110
      EZ=EION(8)                                                     EST 1120
      GO TO 70                                                       EST 1130
   60 CONTINUE                                                       EST 1140
      S1=10.20                                                       EST 1150
      CALL ERR (S1)                                                  EST 1160
   70 IF (EPRZ.NE.0.0.OR.IS.NE.2) GO TO 90                           EST 1170
      THA=1.1                                                        EST 1180
      DO 80 I=1,10                                                   EST 1190
      THA=THA-.1                                                     EST 1200
      EION(14)=E14                                                   EST 1210
      CALL EIONX (THA,TAUM,J,0.)                                     EST 1220
      S1=EION(14)                                                    EST 1230
      IF (S1.NE.0.) CALL ERR (S1)                                    EST 1240
      IF ((EION(17).LT.EN).OR.(EION(3).GT.EB)) GO TO 80              EST 1250
      EPRZ=EPRIME                                                    EST 1260
      GO TO 90                                                       EST 1270
   80 CONTINUE                                                       EST 1280
      S1=10.46                                                       EST 1290
      CALL ERR (S1)                                                  EST 1300
   90 CONTINUE                                                       EST 1310
C     PREPARE TABLES OF SPECIFIC VOLUME AND ENERGY
C        IN REAL SPACE AND IN LOG BASE 10.                           EST 1330
      DO 100 I=2,NN                                                  EST 1340
      TAUL(I)=TAUL(I-1)+DTAUL                                        EST 1350
      TAU(I)=EXPT(TAUL(I))                                           EST 1360
  100 CONTINUE                                                       EST 1370
      EM=EZ*10.0**DM                                                 EST 1380
      EL(1)=ALOG10(EZ)                                               EST 1390
      DEL=1./T                                                       EST 1400
      E(1)=EZ                                                        EST 1410
      DO 110 I=2,MM                                                  EST 1420
      EL(I)=EL(I-1)+DEL                                              EST 1430
```

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      E(I)=EXPT(EL(I))                                                  EST 1440
  110 CONTINUE                                                          EST 1450
      IF (IS.EQ.2) GO TO 120                                            EST 1460
      EPRM=0.0                                                          EST 1470
      EPRL(1)=0.0                                                       EST 1480
      GO TO 140                                                         EST 1490
  120 EPRM=EPRZ*10.0**DL                                                EST 1500
      EPRL(1)=ALOG10(EPRZ)                                              EST 1510
      EPR(1)=EPRZ                                                       EST 1520
      DO 130 I=2,LL                                                     EST 1530
      EPRL(I)=EPRL(I-1)+DEL                                             EST 1540
      EPR(I)=EXPT(EPRL(I))                                              EST 1550
  130 CONTINUE                                                          EST 1560
      WRITE (6,2340)                                                    EST 1570
      WRITE (6,2380) (EPRL(M),M=1,MM)                                   EST 1580
  140 WRITE (6,2350)                                                    EST 1590
      WRITE (6,2380) (TAUL(N),N=1,NN)                                   EST 1600
      WRITE (6,2330)                                                    EST 1610
      WRITE (6,2380) (EL(M1),M1=1,MM)                                   EST 1620
      IF (NDUMP.EQ.-1.AND.MS.NE.0) GO TO 160                            EST 1630
      IF (NDUMP) 150,160,160                                            EST 1640
  150 WRITE (10) TAUM,EM,EPRM,TAUZ,EZ,EPRZ,TAUL(1),EL(1),EPRL(1),PHI,NN,EST 1650
     1MM,LL                                                             EST 1660
      WRITE (10) (TAU(N),N=1,NN)                                        EST 1670
      WRITE (10) (E(M),M=1,MM)                                          EST 1680
      IF (IS.EQ.2) WRITE (10) (EPR(L),L=1,LL)                           EST 1690
C     DETERMINE SECTION USED TO CALCULATE DATA TABLES                   EST 1700
  160 GO TO (170,390,800,810), IS                                       EST 1710
  170 CONTINUE                                                          EST 1720
C
C     SINGLE ENERGY SCALE SECTION
C           (NO E-PRIME)
C
      IF (MS.EQ.MM) GO TO 820                                           EST 1730
      MS2=MS+1                                                          EST 1740
      DO 380 M=MS2,MM                                                   EST 1750
      DO 300 N=1,NN                                                     EST 1760
      STORTM=1.0E-10                                                    EST 1770
      STORTX=1.0E+10                                                    EST 1780
      AX=0.                                                             EST 1790
      AM=0.                                                             EST 1800
      K=(M-1)*NN+N                                                      EST 1810
C        INITIAL GUESS AT THE TEMPERATURE                               EST 1820
      THMIN=THETA(N,M-1)                                                EST 1830
      THMAX=THETA(N-1,M)                                                EST 1840
      IF (N.EQ.1) THMAX=E(M)/PHI                                        EST 1850
      IF ((N.EQ.1).AND.(M.GT.1)) THMAX=3.*THETA(N,M-1)                  EST 1860
      IF (M.EQ.1) THMIN=.2                                              EST 1870
      THETA(N,M)=THMIN                                                  EST 1880
      DO 230 I=1,20                                                     EST 1890
      EION(14)=E14                                                      EST 1900
      CALL EIONX (THMIN,TAU(N),J,0.)                                    EST 1910
      S1=EION(14)                                                       EST 1920
      IF (S1.NE.0.) CALL ERR (S1)                                       EST 1930
      EMIN=EION(8)                                                      EST 1940
      EION(14)=E14                                                      EST 1950
  180 CALL EIONX (THMAX,TAU(N),J,0.)                                    EST 1960
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      S1=EION(14)                                                          EST 1970
      IF (S1.NE.0.) CALL ERR (S1)                                          EST 1980
      EMAX=EION(8)                                                         EST 1990
      GAMMA=3.*E(M)                                                        EST 2000
      IF (EMAX.LT.GAMMA) GO TO 190                                         EST 2010
      THMAX=THMAX*.9                                                       EST 2020
      GO TO 180                                                            EST 2030
  190 EION(14)=E14                                                         EST 2040
      CALL EIONX (THETA(N,M),TAU(N),J,0.)                                  EST 2050
      WS=THETA(N,M)                                                        EST 2060
C        NEWTON'S INTERPOLATION                                            EST 2070
      THETA(N,M)=THETA(N,M)+(THMAX-THMIN)*(E(M)-EION(8))/(EMAX-EMIN)       EST 2080
      ZETA=ABS(EION(8)-E(M))/(E(M))                                        EST 2090
      IF (ZETA.LE..005) GO TO 290                                          EST 2100
      IF (ZETA.GT..15) GO TO 210                                           EST 2110
      IF (EION(8).GT.E(M)) GO TO 200                                       EST 2120
      STORTM=AMAX1(WS,STORTM)                                              EST 2130
      AM=1.                                                                EST 2140
      GO TO 210                                                            EST 2150
  200 STORTX=AMIN1(WS,STORTX)                                              EST 2160
      AX=1.                                                                EST 2170
  210 IF (EION(8).LT.E(M)) THMIN=THETA(N,M)                                EST 2180
      IF (EION(8).GT.E(M)) GO TO 220                                       EST 2190
      THMIN=THETA(N,M)                                                     EST 2200
      GO TO 230                                                            EST 2210
  220 THMAX=THETA(N,M)                                                     EST 2220
  230 CONTINUE                                                             EST 2230
      IF ((AX.EQ.1.).AND.(AM.EQ.1.)) GO TO 240                             EST 2240
      IF ((AX.EQ.1.).AND.(AM.EQ.0.)) GO TO 250                             EST 2250
      IF ((AX.EQ.0.).AND.(AM.EQ.1.)) GO TO 260                             EST 2260
      IF ((AX.EQ.0.).AND.(AM.EQ.0.)) GO TO 280                             EST 2270
  240 AVR=ABS((STORTX-STORTM)/2.)                                          EST 2280
      THETA(N,M)=STORTM+AVR                                                EST 2290
      GO TO 270                                                            EST 2300
  250 THETA(N,M)=STORTX                                                    EST 2310
      GO TO 270                                                            EST 2320
  260 THETA(N,M)=STORTM                                                    EST 2330
  270 EION(14)=E14                                                         EST 2340
      CALL EIONX (THETA(N,M),TAU(N),J,0.)                                  EST 2350
      S1=EION(14)                                                          EST 2360
      IF (S1.NE.0.) CALL ERR (S1)                                          EST 2370
      GO TO 290                                                            EST 2380
  280 S1=10.120                                                            EST 2390
      CALL ERR (S1)                                                        EST 2400
  290 CONTINUE                                                             EST 2410
C     ALL VARIABLES DETERMINED FROM EIONX USING E                          EST 2420
      ZB1D(K)=EION(3)                                                      EST 2430
      NB1D(K)=EION(17)                                                     EST 2440
      NBMAX=NB1D(1)                                                        EST 2450
      ZM11D(K)=M1(5)                                                       EST 2460
      ZM21D(K)=M1(15)                                                      EST 2470
      AEI=(EION(8)-1.5*EION(1)*PHI*(1./NBAR+ZBAR))/PHI                     EST 2480
      IF (AEI.LE.1.E-10) AEI=1.E-10                                        EST 2490
      EILN1D(K)=ALOG(AEI)                                                  EST 2500
      DP=CARBNZ(1)+DIS                                                     EST 2510
      IF (DP.LE.1.E-10) DP=1.E-10                                          EST 2520
      EDLN1D(K)=ALOG(DP)                                                   EST 2530
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C     END OF SPECIFIC VOLUME LOOP
  300 CONTINUE                                                          EST 2540
C     MAKE DUMP TAPE
      IF (NDUMP) 310,380,310                                            EST 2550
  310 MS=M                                                              EST 2560
      WRITE (10) (THETA(N,MS),N=1,NN)                                   EST 2570
      WRITE (6,2360)                                                    EST 2580
      WRITE (6,2380) (THETA(N,MS),N=1,NN)                               EST 2590
      KMN=(MS-1)*NN+1                                                   EST 2600
      KMX=KMN+NN-1                                                      EST 2610
      IF (NED.EQ.0) GO TO 320                                           EST 2620
      WRITE (10) (EDLN1D(K),K=KMN,KMX)                                  EST 2630
      WRITE (6,2270)                                                    EST 2640
      WRITE (6,2380) (EDLN1D(K),K=KMN,KMX)                              EST 2650
  320 IF (NEI.EQ.0) GO TO 330                                           EST 2660
      WRITE (10) (EILN1D(K),K=KMN,KMX)                                  EST 2670
      WRITE (6,2280)                                                    EST 2680
      WRITE (6,2380) (EILN1D(K),K=KMN,KMX)                              EST 2690
  330 IF (NNB.EQ.0) GO TO 340                                           EST 2700
      WRITE (10) (NB1D(K),K=KMN,KMX)                                    EST 2710
      WRITE (6,2290)                                                    EST 2720
      WRITE (6,2380) (NB1D(K),K=KMN,KMX)                                EST 2730
  340 IF (NZB.EQ.0) GO TO 350                                           EST 2740
      WRITE (10) (ZB1D(K),K=KMN,KMX)                                    EST 2750
      WRITE (6,2300)                                                    EST 2760
      WRITE (6,2380) (ZB1D(K),K=KMN,KMX)                                EST 2770
  350 IF (NZB1.EQ.0) GO TO 360                                          EST 2780
      WRITE (10) (ZB11D(K),K=KMN,KMX)                                   EST 2790
      WRITE (6,2310)                                                    EST 2800
      WRITE (6,2380) (ZB11D(K),K=KMN,KMX)                               EST 2810
  360 IF (NZB2.EQ.0) GO TO 370                                          EST 2820
      WRITE (10) (ZB11D(K),K=KMN,KMX)                                   EST 2830
      WRITE (6,2320)                                                    EST 2840
      WRITE (6,2380) (Zg21D(K),K=KMN,KMX)                               EST 2850
  370 WRITE (6,2390) MS                                                 EST 2860
C     END OF ENERGY LOOP
  380 CONTINUE                                                          EST 2870
      GO TO 820                                                         EST 2880
  390 CONTINUE                                                          EST 2890
C
C     THIS SECTION FOR MOLECULAR MATERIALS WHOSE DISSOCIATION ENERGY
C          IS CALCULATED.
C     TWO ENERGY SCALES ARE USED
C
      IF (MS.EQ.MM) GO TO 590                                           EST 2900
      MS2=MS+1                                                          EST 2910
      DO 580 M=MS2,MM                                                   EST 2920
      DO 540 N=1,NN                                                     EST 2930
      STORTM=1.0E-10                                                    EST 2940
      STORTX=1.0E+10                                                    EST 2950
      AX=0.                                                             EST 2960
      AM=0.                                                             EST 2970
      K=(M-1)*NN+N                                                      EST 2980
C        INITIAL GUESS AT THE TEMPERATURE                               EST 2990
      THMIN=THETA(N,M-1)                                                EST 3000
      THMAX=THETA(N-1,M)                                                EST 3010
      IF (N.EQ.1) THMAX=EION(17)*E(M)*2.0/(3.0*EION(5))                 EST 3020
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      IF ((N.EQ.1).AND.(M.GT.1)) THMAX=2.*THETA(N,M-1)                    EST 3030
      IF (M.EQ.1) THMIN=3.0E-2                                            EST 3040
      THETA(N,M)=THMIN                                                    EST 3050
      DO 470 I=1,20                                                       EST 3060
      IF (I.EQ.1) THMIN1=THMIN                                            EST 3070
      EION(14)=E14                                                        EST 3080
      CALL EIONX (THMIN,TAU(N),J,0.)                                      EST 3090
      S1=EION(14)                                                         EST 3100
      IF (S1.NE.0.) CALL ERR (S1)                                         EST 3110
      EMIN=GAND                                                           EST 3120
      IF (I.EQ.1) EMIN1=EMIN                                              EST 3130
  400 EION(14)=E14                                                        EST 3140
      CALL EIONX (THMAX,TAU(N),J,0.)                                      EST 3150
      S1=EION(14)                                                         EST 3160
      IF (S1.NE.0.) CALL ERR (S1)                                         EST 3170
      EMAX=GAND                                                           EST 3180
      GAMMA=3.*E(M)                                                       EST 3190
      IF (EMAX.LT.GAMMA) GO TO 410                                        EST 3200
      THMAX=THMAX*.9                                                      EST 3210
      GO TO 400                                                           EST 3220
  410 EION(14)=E14                                                        EST 3230
      CALL EIONX (THETA(N,M),TAU(N),J,0.)                                 EST 3240
      WS=THETA(N,M)                                                       EST 3250
C        NEWTON'S INTERPOLATION                                           EST 3260
  420 THETA(N,M)=WS+(THMAX-THMIN)*(E(M)-GAND)/(EMAX-EMIN)                 EST 3270
      IF (THETA(N,M).GT.0.0) GO TO 430                                    EST 3280
      THMAX=WS                                                            EST 3290
      THMIN=THMIN1                                                        EST 3300
      EMAX=GAND                                                           EST 3310
      EMIN=EMIN1                                                          EST 3320
      GO TO 420                                                           EST 3330
  430 ZETA=ABS((GAND-E(M))/E(M))                                          EST 3340
      IF (ZETA.LE..005) GO TO 530                                         EST 3350
      IF (ZETA.GT..15) GO TO 450                                          EST 3360
      IF (GAND.GT.E(M)) GO TO 440                                         EST 3370
      STORTM=AMAX1(WS,STORTM)                                             EST 3380
      AM=1.                                                               EST 3390
      GO TO 450                                                           EST 3400
  440 STORTX=AMIN1(WS,STORTX)                                             EST 3410
      AX=1.                                                               EST 3420
  450 IF (GAND.GT.E(M)) GO TO 460                                         EST 3430
      IF ((WS+.01).GT.THETA(N,M)) THETA(N,M)=WS+.01                       EST 3440
      THMIN=THETA(N,M)                                                    EST 3450
      GO TO 470                                                           EST 3460
  460 THMAX=THETA(N,M)                                                    EST 3470
  470 CONTINUE                                                            EST 3480
      IF ((AX.EQ.1.).AND.(AM.EQ.1.)) GO TO 480                            EST 3490
      IF ((AX.EQ.1.).AND.(AM.EQ.0.)) GO TO 490                            EST 3500
      IF ((AX.EQ.0.).AND.(AM.EQ.1.)) GO TO 500                            EST 3510
      IF ((AX.EQ.0.).AND.(AM.EQ.0.)) GO TO 520                            EST 3520
  480 AVR=ABS((STORTX-STORTM)/2.)                                         EST 3530
      THETA(N,M)=STORTM+AVR                                               EST 3540
      GO TO 510                                                           EST 3550
  490 THETA(N,M)=STORTX                                                   EST 3560
      GO TO 510                                                           EST 3570
  500 THETA(N,M)=STORTM                                                   EST 3580
      GO TO 510                                                           EST 3590
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  510 EION(14)=E14                                                    EST 3600
      CALL EIONX (THETA(N,M),TAU(N),J,0.)                             EST 3610
      S1=EION(14)                                                     EST 3620
      IF (S1.NE.0.) CALL ERR (S1)                                     EST 3630
      GO TO 530                                                       EST 3640
  520 S1=10.120                                                       EST 3650
      CALL ERR (S1)                                                   EST 3660
  530 CONTINUE                                                        EST 3670
C       NBAR AND EDIS OBTAINED FROM EIONX USING E                     EST 3680
      NB1D(K)=EION(17)                                                EST 3690
      NBMAX=NB1D(1)                                                   EST 3700
      DP=CARBNZ(1)+DIS                                                EST 3710
      IF (DP.LE.1.E-10) DP=1.E-10                                     EST 3720
      EDLN1D(K)=ALOG(DP)                                              EST 3730
C     END OF SPECIFIC VOLUME LOOP
  540 CONTINUE                                                        EST 3740
C     MAKE DUMP TAPE
      IF (NDUMP) 550,580,550                                          EST 3750
  550 MS=M                                                            EST 3760
      WRITE (10) (THETA(N,MS),N=1,NN)                                 EST 3770
      WRITE (6,2360)                                                  EST 3780
      WRITE (6,2380) (THETA(N,MS),N=1,NN)                             EST 3790
      KMN=(MS-1)*NN+1                                                 EST 3800
      KMX=KMN+NN-1                                                    EST 3810
      IF (NED.EQ.0) GO TO 560                                         EST 3820
      WRITE (10) (EDLN1D(K),K=KMN,KMX)                                EST 3830
      WRITE (6,2270)                                                  EST 3840
      WRITE (6,2380) (EDLN1D(K),K=KMN,KMX)                            EST 3850
  560 IF (NNB.EQ.0) GO TO 570                                         EST 3860
      WRITE (10) (NB1D(K),K=KMN,KMX)                                  EST 3870
      WRITE (6,2290)                                                  EST 3880
      WRITE (6,2380) (NB1D(K),K=KMN,KMX)                              EST 3890
  570 WRITE (6,2390) MS                                               EST 3900
C     END OF ENERGY LOOP
  580 CONTINUE                                                        EST 3910
  590 IF (LS.EQ.LL) GO TO 820                                         EST 3920
      LS2=LS+1                                                        EST 3930
      DO 790 L=LS2,LL                                                 EST 3940
      DO 730 N=1,NN                                                   EST 3950
      STORM1=1.0E-10                                                  EST 3960
      STORX1=1.0E+10                                                  EST 3970
      AX1=0.                                                          EST 3980
      AM1=0.                                                          EST 3990
      K=(L-1)*NN+N                                                    EST 4000
C       INITIAL GUESS AT THE TEMPERATURE                              EST 4010
      TH1MIN=TH(N,L-1)                                                EST 4020
      TH1MAX=TH(N-1,L)                                                EST 4030
      IF (N.EQ.1) TH1MAX=EION(17)*EPR(L)*2.0/(3.0*EION(5))            EST 4040
      IF ((N.EQ.1).AND.(L.GT.1)) TH1MAX=3.*TH(N,L-1)                  EST 4050
      IF (L.EQ.1) TH1MIN=3.0E-2                                       EST 4060
      TH(N,L)=TH1MIN                                                  EST 4070
      DO 660 I=1,20                                                   EST 4080
      IF (I.EQ.1) THMIN2=TH1MIN                                       EST 4090
      EION(14)=E14                                                    EST 4100
      CALL EIONX (TH1MIN,TAU(N),J,0.)                                 EST 4110
      S1=EION(14)                                                     EST 4120
      IF (S1.NE.0.) CALL ERR (S1)                                     EST 4130
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      EMIN=EPRIME                                                          EST 4140
      IF (I.EQ.1) EMIN2=EMIN                                               EST 4150
  600 EION(14)=E14                                                         EST 4160
      CALL EIONX (TH1MAX,TAU(N),J,0.)                                      EST 4170
      S1=EION(14)                                                          EST 4180
      IF (S1.NE.0.) CALL ERR (S1)                                          EST 4190
      EMAX=EPRIME                                                          EST 4200
      GAMMA=3.*EPR(M)                                                      EST 4210
      IF (EMAX.LT.GAMMA) GO TO 610                                         EST 4220
      TH1MAX=TH1MAX*.9                                                     EST 4230
      GO TO 600                                                            EST 4240
  610 EION(14)=E14                                                         EST 4250
      CALL EIONX (TH(N,L),TAU(N),J,0.)                                     EST 4260
      DP=CARBNZ(1)+DIS                                                     EST 4270
      WS1=TH(N,L)                                                          EST 4280
C       NEWTONS INTERPOLATION                                              EST 4290
  620 TH(N,L)=WS1+(TH1MAX-TH1MIN)*(EPR(L)-EPRIME)/(EMAX-EMIN)              EST 4300
      IF (TH(N,L).GT.0.0) GO TO 630                                        EST 4310
      TH1MAX=WS1                                                           EST 4320
      TH1MIN=THMIN2                                                        EST 4330
      EMAX=EPRIME                                                          EST 4340
      EMIN=EMIN2                                                           EST 4350
      GO TO 620                                                            EST 4360
  630 ZETA1=ABS((EPRIME-EPR(L))/EPR(L))                                    EST 4370
      IF (ZETA1.LE..005) GO TO 720                                         EST 4380
      IF (ZETA1.GT..25) GO TO 650                                          EST 4390
      IF (EPRIME.GT.EPR(L)) GO TO 640                                      EST 4400
      STORM1=AMAX1(WS1,STORM1)                                             EST 4410
      AM1=1.                                                               EST 4420
      GO TO 650                                                            EST 4430
  640 STORX1=AMIN1(WS1,STORX1)                                             EST 4440
      AX1=1.                                                               EST 4450
  650 IF (EPRIME.LT.EPR(L)) TH1MIN=TH(N,L)                                 EST 4460
      IF (EPRIME.GT.EPR(L)) TH1MAX=TH(N,L)                                 EST 4470
  660 CONTINUE                                                             EST 4480
      IF ((AX1.EQ.1.).AND.(AM1.EQ.1.)) GO TO 670                           EST 4490
      IF ((AX1.EQ.1.).AND.(AM1.EQ.0.)) GO TO 680                           EST 4500
      IF ((AX1.EQ.0.).AND.(AM1.EQ.1.)) GO TO 690                           EST 4510
      IF ((AX1.EQ.0.).AND.(AM1.EQ.0.)) GO TO 710                           EST 4520
  670 AVR1=ABS((STORX1-STORM1)/2.)                                         EST 4530
      TH(N,M)=STORM1+AVR1                                                  EST 4540
      GO TO 700                                                            EST 4550
  680 TH(N,M)=STORX1                                                       EST 4560
      GO TO 700                                                            EST 4570
  690 TH(N,M)=STORM1                                                       EST 4580
      GO TO 700                                                            EST 4590
  700 EION(14)=E14                                                         EST 4600
      CALL EIONX (TH(N,L),TAU(N),J,0.)                                     EST 4610
      DP=CARBNZ(1)+DIS                                                     EST 4620
      S1=EION(14)                                                          EST 4630
      IF (S1.NE.0.) CALL ERR (S1)                                          EST 4640
      GO TO 720                                                            EST 4650
  710 S1=10.50                                                             EST 4660
      CALL ERR (S1)                                                        EST 4670
  720 CONTINUE                                                             EST 4680
C       ZBAR AND EION OBTAINED FROM EIONX USING EPRIME                     EST 4690
      ZB1D(K)=EION(3)                                                      EST 4700
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      ZB11D(K)=M1(5)                                                    EST 4710
      ZB21D(K)=M1(15)                                                   EST 4720
      AEI=(GAND-DP-1.5*EION(1)*TLMS(9))/EION(5)                         EST 4730
      IF (AEI.LE.1.E-10) AEI=1.E-10                                     EST 4740
      EILN1D(K)=ALOG(AEI)                                               EST 4750
C     END OF SPECIFIC VOLUME LOOP
  730 CONTINUE                                                          EST 4760
C     MAKE DUMP TAPE
      IF (NDUMP) 740,790,740                                            EST 4770
  740 LS=L                                                              EST 4780
      WRITE (10) (TH(N,LS),N=1,NN)                                      EST 4790
      WRITE (6,2360)                                                    EST 4800
      WRITE (6,2380) (TH(N,LS),N=1,NN)                                  EST 4810
      KMN=(LS-1)*NN+1                                                   EST 4820
      KMX=KMN+NN-1                                                      EST 4830
      IF (NEI.EQ.0) GO TO 750                                           EST 4840
      WRITE (10) (EILN1D(K),K=KMN,KMX)                                  EST 4850
      WRITE (6,2280)                                                    EST 4860
      WRITE (6,2380) (EILN1D(K),K=KMN,KMX)                              EST 4870
  750 IF (NZB.EQ.0) GO TO 760                                           EST 4880
      WRITE (10) (ZB1D(K),K=KMN,KMX)                                    EST 4890
      WRITE (6,2300)                                                    EST 4900
      WRITE (6,2380) (ZB1D(K),K=KMN,KMX)                                EST 4910
  760 IF (NZB1.EQ.0) GO TO 770                                          EST 4920
      WRITE (10) (ZB11D(K),K=KMN,KMX)                                   EST 4930
      WRITE (6,2310)                                                    EST 4940
      WRITE (6,2380) (ZB11D(K),K=KMN,KMX)                               EST 4950
  770 IF (NZB2.EQ.0) GO TO 780                                          EST 4960
      WRITE (10) (ZB21D(K),K=KMN,KMX)                                   EST 4970
      WRITE (6,2320)                                                    EST 4980
      WRITE (6,2380) (ZB21D(K),K=KMN,KMX)                               EST 4990
  780 WRITE (6,2400) LS                                                 EST 5000
C     END OF ENERGY LOOP
  790 CONTINUE                                                          EST 5010
      GO TO 820                                                         EST 5020
  800 CONTINUE                                                          EST 5030
  810 CONTINUE                                                          EST 5040
C                                                                       EST 5050
C        PUNCH DATA STATEMENTS FOR PROGRAM EST                          EST 5060
  820 CONTINUE                                                          EST 5070
      KM=NN*MM                                                          EST 5080
      IF (NOPNCH.EQ.0) GO TO 1610                                       EST 5090
      ID=1                                                              EST 5100
      PUNCH 2200                                                        EST 5110
      PUNCH 1950, ID,IS,NED,NEI,NNB,NZB,NZB1,NZB2                       EST 5120
      PUNCH 2160                                                        EST 5130
      PUNCH 1940, ID,TAUM,EM,EPRM,TAUZ,EZ,EPRZ                          EST 5140
      PUNCH 2170                                                        EST 5150
      PUNCH 1940, ID,TAUL(1),EL(1),EPRL(1),R,S,T                        EST 5160
      PUNCH 2180                                                        EST 5170
      PUNCH 1950, ID,V1,VZ,PHI,N8MAX                                    EST 5180
      PUNCH 2410
      PUNCH 1950, ID,WT1,WT2,PAN1,PAN2
      PUNCH 2190
      PUNCH 1970, ID,NN,MM,LL,I1,I2,I3,I4,I5,I6,I7,I8                   EST 5190
      IF (NNB.EQ.0) GO TO 830                                           EST 5200
      PUNCH 2040, NN,MM                                                 EST 5210
                                                                        EST 5220
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      PUNCH 2230                                                        EST 5230
  830 IF (NED.EQ.0) GO TO 840                                           EST 5240
      PUNCH 1980, NN,MM                                                 EST 5250
      PUNCH 2210                                                        EST 5260
  840 IF (IS.EQ.2) MM=LL                                                EST 5270
      IF (NZB.EQ.0) GO TO 850                                           EST 5280
      PUNCH 2070, NN,MM                                                 EST 5290
      PUNCH 2240                                                        EST 5300
  850 IF (NZB1.EQ.0) GO TO 860                                          EST 5310
      PUNCH 2100, NN,MM                                                 EST 5320
      PUNCH 2250                                                        EST 5330
  860 IF (NZB2.EQ.0) GO TO 870                                          EST 5340
      PUNCH 2130, NN,MM                                                 EST 5350
      PUNCH 2260                                                        EST 5360
  870 IF (NEI.EQ.0) GO TO 880                                           EST 5370
      PUNCH 2010, NN,MM                                                 EST 5380
      PUNCH 2220                                                        EST 5390
  880 IF (IS.EQ.2) KM=NN*LL                                             EST 5400
      IF (NZB.EQ.0) GO TO 1000                                          EST 5410
      NM=KM                                                             EST 5420
      IF (NN*MM.GT.54) NM=54                                            EST 5430
      PUNCH 2080, ID,NM                                                 EST 5440
      PUNCH 2090, ID                                                    EST 5450
      ICNT=0                                                            EST 5460
      DO 990 I=1,KM,6                                                   EST 5470
      I6=I+5                                                            EST 5480
      ICNT=ICNT+1                                                       EST 5490
      IP=I                                                              EST 5500
      IF ((I6.LT.KM).OR.(ICNT.EQ.10)) GO TO 950                         EST 5510
  890 I6=KM                                                             EST 5520
      KI=KM-I+1                                                         EST 5530
      GO TO (900,910,920,930,940), KI                                   EST 5540
  900 PUNCH 1880, ICNT,(ZB1D(K),K=IP,I6)                                EST 5550
      GO TO 980                                                         EST 5560
  910 PUNCH 1890, ICNT,(ZB1D(K),K=IP,I6)                                EST 5570
      GO TO 980                                                         EST 5580
  920 PUNCH 1900, ICNT,(ZB1D(K),K=IP,I6)                                EST 5590
      GO TO 980                                                         EST 5600
  930 PUNCH 1910, ICNT,(ZB1D(K),K=IP,I6)                                EST 5610
      GO TO 980                                                         EST 5620
  940 PUNCH 1920, ICNT,(ZB1D(K),K=IP,I6)                                EST 5630
      GO TO 980                                                         EST 5640
  950 IF (ICNT.LT.10) GO TO 960                                         EST 5650
      ID=ID+1                                                           EST 5660
      NM=54                                                             EST 5670
      IF ((ID)*54.GT.KM) NM=KM-(ID-1)*54                                EST 5680
      PUNCH 2080, ID,NM                                                 EST 5690
      PUNCH 2090, ID                                                    EST 5700
      ICNT=1                                                            EST 5710
      IF (I6.GT.KM) GO TO 890                                           EST 5720
      GO TO 970                                                         EST 5730
  960 IF (ICNT.NE.9) GO TO 970                                          EST 5740
      PUNCH 1930, ICNT,(ZB1D(K),K=I,I6)                                 EST 5750
      GO TO 980                                                         EST 5760
  970 PUNCH 1870, ICNT,(ZB1D(K),K=I,I6)                                 EST 5770
  980 CONTINUE                                                          EST 5780
  990 CONTINUE                                                          EST 5790
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1000 IF (NEI.EQ.0) GO TO 1120                                          EST 5800
     NM=KM                                                             EST 5810
     IF (NN*MM.GT.54) NM=54                                            EST 5820
     ID=1                                                              EST 5830
     PUNCH 2020, ID,NM                                                 EST 5840
     PUNCH 2030, ID                                                    EST 5850
     ICNT=0                                                            EST 5860
     DO 1110 I=1,KM,6                                                  EST 5870
     I6=I+5                                                            EST 5880
     ICNT=ICNT+1                                                       EST 5890
     IP=I                                                              EST 5900
     IF ((I6.LT.KM).OR.(ICNT.EQ.10)) GO TO 1070                        EST 5910
1010 I6=KM                                                             EST 5920
     KI=KM-I+1                                                         EST 5930
     GO TO (1020,1030,1040,1050,1060), KI                              EST 5940
1020 PUNCH 1880, ICNT,(EILN1D(K),K=IP,I6)                              EST 5950
     GO TO 1100                                                        EST 5960
1030 PUNCH 1890, ICNT,(EILN1D(K),K=IP,I6)                              EST 5970
     GO TO 1100                                                        EST 5980
1040 PUNCH 1900, ICNT,(EILN1D(K),K=IP,I6)                              EST 5990
     GO TO 1100                                                        EST 6000
1050 PUNCH 1910, ICNT,(EILN1D(K),K=IP,I6)                              EST 6010
     GO TO 1100                                                        EST 6020
1060 PUNCH 1920, ICNT,(EILN1D(K),K=IP,I6)                              EST 6030
     GO TO 1100                                                        EST 6040
1070 IF (ICNT.LT.10) GO TO 1080                                        EST 6050
     ID=ID+1                                                           EST 6060
     NM=54                                                             EST 6070
     IF ((ID)*54.GT.KM) NM=KM-(ID-1)*54                                EST 6080
     PUNCH 2020, ID,NM                                                 EST 6090
     PUNCH 2030, ID                                                    EST 6100
     ICNT=1                                                            EST 6110
     IF (I6.GT.KM) GO TO 1010                                          EST 6120
     GO TO 1090                                                        EST 6130
1080 IF (ICNT.NE.9) GO TO 1090                                         EST 6140
     PUNCH 1930, ICNT,(EILN1D(K),K=I,I6)                               EST 6150
     GO TO 1100                                                        EST 6160
1090 PUNCH 1870, ICNT,(EILN1D(K),K=I,I6)                               EST 6170
1100 CONTINUE                                                          EST 6180
1110 CONTINUE                                                          EST 6190
     KM=NN*MM                                                          EST 6200
1120 IF (NNB.EQ.0) GO TO 1240                                          EST 6210
     KM=NN*MM                                                          EST 6220
     NM=KM                                                             EST 6230
     IF (NN*MM.GT.54) NM=54                                            EST 6240
     ID=1                                                              EST 6250
     PUNCH 2050, ID,NM                                                 EST 6260
     PUNCH 2060, ID                                                    EST 6270
     ICNT=0                                                            EST 6280
     DO 1230 I=1,KM,6                                                  EST 6290
     I6=I+5                                                            EST 6300
     ICNT=ICNT+1                                                       EST 6310
     IP=I                                                              EST 6320
     IF ((I6.LT.KM).OR.(ICNT.EQ.10)) GO TO 1190                        EST 6330
1130 I6=KM                                                             EST 6340
     KI=KM-I+1                                                         EST 6350
     GO TO (1140,1150,1160,1170,1180), KI                              EST 6360
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1140 PUNCH 1880, ICNT,(NB1D(K),K=IP,I6)                                  EST 6370
     GO TO 1220                                                          EST 6380
1150 PUNCH 1890, ICNT,(NB1D(K),K=IP,I6)                                  EST 6390
     GO TO 1220                                                          EST 6400
1160 PUNCH 1900, ICNT,(NB1D(K),K=IP,I6)                                  EST 6410
     GO TO 1220                                                          EST 6420
1170 PUNCH 1910, ICNT,(NB1D(K),K=IP,I6)                                  EST 6430
     GO TO 1220                                                          EST 6440
1180 PUNCH 1920, ICNT,(NB1D(K),K=IP,I6)                                  EST 6450
     GO TO 1220                                                          EST 6460
1190 IF (ICNT.LT.10) GO TO 1200                                          EST 6470
     ID=ID+1                                                             EST 6480
     NM=54                                                               EST 6490
     IF ((ID)*54.GT.KM) NM=KM-(ID-1)*54                                  EST 6500
     PUNCH 2050, ID,NM                                                   EST 6510
     PUNCH 2060, ID                                                      EST 6520
     ICNT=1                                                              EST 6530
     IF (I6.GT.KM) GO TO 1130                                            EST 6540
     GO TO 1210                                                          EST 6550
1200 IF (ICNT.NE.9) GO TO 1210                                           EST 6560
     PUNCH 1930, ICNT,(NB1D(K),K=I,I6)                                   EST 6570
     GO TO 1220                                                          EST 6580
1210 PUNCH 1870, ICNT,(NB1D(K),K=I,I6)                                   EST 6590
1220 CONTINUE                                                            EST 6600
1230 CONTINUE                                                            EST 6610
1240 IF (NED.EQ.0) GO TO 1360                                            EST 6620
     NM=KM                                                               EST 6630
     IF (NN*MM.GT.54) NM=54                                              EST 6640
     ID=1                                                                EST 6650
     PUNCH 1990, ID,NM                                                   EST 6660
     PUNCH 2000, ID                                                      EST 6670
     ICNT=0                                                              EST 6680
     DO 1350 I=1,KM,6                                                    EST 6690
     I6=I+5                                                              EST 6700
     ICNT=ICNT+1                                                         EST 6710
     IP=I                                                                EST 6720
     IF ((I6.LT.KM).OR.(ICNT.EQ.10)) GO TO 1310                          EST 6730
1250 I6=KM                                                               EST 6740
     KI=KM-I+1                                                           EST 6750
     GO TO (1260,1270,1280,1290,1300), KI                                EST 6760
1260 PUNCH 1880, ICNT,(EDLN1D(K),K=IP,I6)                                EST 6770
     GO TO 1340                                                          EST 6780
1270 PUNCH 1890, ICNT,(EDLN1D(K),K=IP,I6)                                EST 6790
     GO TO 1340                                                          EST 6800
1280 PUNCH 1900, ICNT,(EDLN1D(K),K=IP,I6)                                EST 6810
     GO TO 1340                                                          EST 6820
1290 PUNCH 1910, ICNT,(EDLN1D(K),K=IP,I6)                                EST 6830
     GO TO 1340                                                          EST 6840
1300 PUNCH 1920, ICNT,(EDLN1D(K),K=IP,I6)                                EST 6850
     GO TO 1340                                                          EST 6860
1310 IF (ICNT.LT.10) GO TO 1320                                          EST 6870
     ID=ID+1                                                             EST 6880
     NM=54                                                               EST 6890
     IF ((ID)*54.GT.KM) NM=KM-(ID-1)*54                                  EST 6900
     PUNCH 1990, ID,NM                                                   EST 6910
     PUNCH 2000, ID                                                      EST 6920
     ICNT=1                                                              EST 6930
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      IF (I6.GT.KM) GO TO 1250                                          EST 6940
      GO TO 1330                                                        EST 6950
 1320 IF (ICNT.NE.9) GO TO 1330                                         EST 6960
      PUNCH 1930, ICNT,(EDLN1D(K),K=I,I6)                               EST 6970
      GO TO 1340                                                        EST 6980
 1330 PUNCH 1870,ICNT, (EDLN1D(K),K=I,I6)
 1340 CONTINUE                                                          EST 7000
 1350 CONTINUE                                                          EST 7010
      IF (IS.EQ.2) KM=NN*LL                                             EST 7020
 1360 IF (NZB1.EQ.0) GO TO 1480                                         EST 7030
      NM=KM                                                             EST 7040
      IF (NN*MM.GT.54) NM=54                                            EST 7050
      ID=1                                                              EST 7060
      PUNCH 2110, ID,NM                                                 EST 7070
      PUNCH 2120, ID                                                    EST 7080
      ICNT=0                                                            EST 7090
      DO 1470 I=1,KM,6                                                  EST 7100
      I6=I+5                                                            EST 7110
      ICNT=ICNT+1                                                       EST 7120
      IP=I                                                              EST 7130
      IF ((I6.LT.KM).OR.(ICNT.EQ.10)) GO TO 1430                        EST 7140
 1370 I6=KM                                                             EST 7150
      KI=KM-I+1                                                         EST 7160
      GO TO (1380,1390,1400,1410,1420), KI                              EST 7170
 1380 PUNCH 1880, ICNT,(ZB11D(K),K=IP,I6)                               EST 7180
      GO TO 1460                                                        EST 7190
 1390 PUNCH 1890, ICNT,(ZB11D(K),K=IP,I6)                               EST 7200
      GO TO 1460                                                        EST 7210
 1400 PUNCH 1900, ICNT,(ZB11D(K),K=IP,I6)                               EST 7220
      GO TO 1460                                                        EST 7230
 1410 PUNCH 1910, ICNT,(ZB11D(K),K=IP,I6)                               EST 7240
      GO TO 1460                                                        EST 7250
 1420 PUNCH 1920, ICNT,(ZB11D(K),K=IP,I6)                               EST 7260
      GO TO 1460                                                        EST 7270
 1430 IF (ICNT.LT.10) GO TO 1440                                        EST 7280
      ID=ID+1                                                           EST 7290
      NM=54                                                             EST 7300
      IF ((ID)*54.GT.KM) NM=KM-(ID-1)*54                                EST 7310
      PUNCH 2110, ID,NM                                                 EST 7320
      PUNCH 2120, ID                                                    EST 7330
      ICNT=1                                                            EST 7340
      IF (I6.GT.KM) GO TO 1370                                          EST 7350
      GO TO 1450                                                        EST 7360
 1440 IF (ICNT.NE.9) GO TO 1450                                         EST 7370
      PUNCH 1930, ICNT,(ZB11D(K),K=I,I6)                                EST 7380
      GO TO 1460                                                        EST 7390
 1450 PUNCH 1870, ICNT,(ZB11D(K),K=I,I6)                                EST 7400
 1460 CONTINUE                                                          EST 7410
 1470 CONTINUE                                                          EST 7420
 1480 IF (NZB2.EQ.0) GO TO 1600                                         EST 7430
      NM=KM                                                             EST 7440
      IF (NN*MM.GT.54) NM=54                                            EST 7450
      ID=1                                                              EST 7460
      PUNCH 2140, ID,NM                                                 EST 7470
      PUNCH 2150, ID                                                    EST 7480
      DO 1590 I=1,KM,6                                                  EST 7490
      I6=I+5                                                            EST 7500
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      ICNT=ICNT+1                                                        EST 7510
      IP=I                                                               EST 7520
      IF ((I6.LT.KM).OR.(ICNT.EQ.10)) GO TO 1550                         EST 7530
 1490 I6=KM                                                              EST 7540
      KI=KM-I+1                                                          EST 7550
      GO TO (1500,1510,1520,1530,1540), KI                               EST 7560
 1500 PUNCH 1880, ICNT,(ZB21D(K),K=IP,I6)                                EST 7570
      GO TO 1580                                                         EST 7580
 1510 PUNCH 1890, ICNT,(ZB21D(K),K=IP,I6)                                EST 7590
      GO TO 1580                                                         EST 7600
 1520 PUNCH 1900, ICNT,(ZB21D(K),K=IP,I6)                                EST 7610
      GO TO 1580                                                         EST 7620
 1530 PUNCH 1910, ICNT,(ZB21D(K),K=IP,I6)                                EST 7630
      GO TO 1580                                                         EST 7640
 1540 PUNCH 1920, ICNT,(ZB21D(K),K=IP,I6)                                EST 7650
      GO TO 1580                                                         EST 7660
 1550 IF (ICNT.LT.10) GO TO 1560                                         EST 7670
      ID=ID+1                                                            EST 7680
      NM=54                                                              EST 7690
      IF ((ID)*54.GT.KM) NM=KM-(ID-1)*54                                 EST 7700
      PUNCH 2140, ID,NM                                                  EST 7710
      PUNCH 2150, ID                                                     EST 7720
      ICNT=1                                                             EST 7730
      IF (I6.GT.KM) GO TO 1490                                           EST 7740
      GO TO 1570                                                         EST 7750
 1560 IF (ICNT.NE.9) GO TO 1570                                          EST 7760
      PUNCH 1930, ICNT,(ZB21D(K),K=I,I6)                                 EST 7770
      GO TO 1580                                                         EST 7780
 1570 PUNCH 1870, ICNT,(ZB21D(K),K=I,I6)                                 EST 7790
 1580 CONTINUE                                                           EST 7800
 1590 CONTINUE                                                           EST 7810
 1600 CONTINUE                                                           EST 7820
 1610 CONTINUE                                                           EST 7840
C     MAKE NTRAN TAPE
      IF (NED.EQ.1) GO TO 1630                                           EST 7850
      DO 1620 K=1,1594                                                   EST 7860
 1620 EDLN1D(K)=0.0                                                      EST 7870
 1630 IF (NEI.EQ.1) GO TO 1650                                           EST 7880
      DO 1640 K=1,1595                                                   EST 7890
 1640 EILN1D(K)=0.0                                                      EST 7900
 1650 IF (NNB.EQ.1) GO TO 1670                                           EST 7910
      DO 1660 K=1,1594                                                   EST 7920
 1660 NB1D(K)=0.0                                                        EST 7930
 1670 IF (NZB.EQ.1) GO TO 1690                                           EST 7940
      DO 1680 K=1,1595                                                   EST 7950
 1680 ZB1D(K)=0.0                                                        EST 7960
 1690 IF (NZB1.EQ.1) GO TO 1710                                          EST 7970
      DO 1700 K=1,1594                                                   EST 7980
 1700 ZB11D(K)=0.0                                                       EST 7990
 1710 IF (NZB2.EQ.1) GO TO 1730                                          EST 8000
      DO 1720 K=1,1594                                                   EST 8010
 1720 ZB21D(K)=0.0                                                       EST 8020
 1730 CONTINUE                                                           EST 8030
      IF (ND11.EQ.0) GO TO 1760                                          EST 8040
      LZ=LL                                                              EST 8050
      NX=NN                                                              EST 8060
      MX=MM                                                              EST 8070
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      PHI=PHI                                                          EST 8080
      IT=IS                                                            EST 8090
      TAULZ=TAUL(1)                                                    EST 8100
      ELZ=EL(1)                                                        EST 8110
      EPRLZ=EPRL(1)                                                    EST 8120
      I61=I6                                                           EST 8130
      CALL NTRAN (11,1,9600,IT,LX)                                     EST 8140
 1740 IF (LX.EQ.-1) GO TO 1740                                         EST 8150
      IF (LX.LT.0) GO TO 1750                                          EST 8160
      END FILE 11                                                      EST 8170
      REWIND 11                                                        EST 8180
      GO TO 1760                                                       EST 8190
 1750 S1=1.0655                                                        EST 8200
      CALL ERR (S1)                                                    EST 8210
 1760 CONTINUE                                                         EST 8220
C        EDIT PRINTS
      IF (NNB.EQ.0) GO TO 1770                                         EST 8230
      WRITE (6,2290)                                                   EST 8240
      WRITE (6,2380) (NB1D(K),K=1,KM)                                  EST 8250
 1770 IF (NED.EQ.0) GO TO 1780                                         EST 8260
      WRITE (6,2270)                                                   EST 8270
      WRITE (6,2380) (EDLN1D(K),K=1,KM)                                EST 8280
 1780 IF (IS.EQ.2) KM=NN*LL                                            EST 8290
      IF (NZB.EQ.0) GO TO 1790                                         EST 8300
      WRITE (6,2300)                                                   EST 8310
      WRITE (6,2380) (ZB1D(K),K=1,KM)                                  EST 8320
 1790 IF (NEI.EQ.0) GO TO 1800                                         EST 8330
      WRITE (6,2280)                                                   EST 8340
      WRITE (6,2380) (EILN1D(K),K=1,KM)                                EST 8350
 1800 IF (NZB1.EQ.0) GO TO 1810                                        EST 8360
      WRITE (6,2310)                                                   EST 8370
      WRITE (6,2380) (ZB11D(K),K=1,KM)                                 EST 8380
 1810 IF (NZB2.EQ.0) GO TO 1820                                        EST 8390
      WRITE (6,2380) (ZB21D(K),K=1,KM)                                 EST 8400
      WRITE (6,2320)                                                   EST 8410
 1820 WRITE (6,2360)                                                   EST 8420
      WRITE (6,2380) ((THETA(N,M),N=1,NN),M=1,MM)                      EST 8430
      IF (IS.NE.2) GO TO 1830                                          EST 8440
      WRITE (6,2370)                                                   EST 8450
      WRITE (6,2380) ((TH(N,L),N=1,NN),L=1,LL)                         EST 8460
 1830 CONTINUE                                                         EST 8470
      CALL EXIT                                                        EST 8480
C                                                                      EST 8490
 1840 FORMAT (7E10.4)                                                  EST 8500
 1850 FORMAT (14I5)                                                    EST 8510
 1860 FORMAT (12A6)                                                    EST 8520
 1870 FORMAT (5X11,6(1F10.6,1H,))                                      EST 8530
 1880 FORMAT (5X11,F10.6,1H/)                                          EST 8540
 1890 FORMAT (5X11,F10.6,1H,F10.6,1H/)                                 EST 8550
 1900 FORMAT (5X11,F10.6,2(1H,F10.6),1H/)                              EST 8560
 1910 FORMAT (5X11,F10.6,3(1H,F10.6),1H/)                              EST 8570
 1920 FORMAT (5X11,F10.6,4(1H,F10.6),1H/)                              EST 8580
 1930 FORMAT (5X11,F10.6,5(1H,F10.6),1H/)                              EST 8590
 1940 FORMAT (5X11,1PE10.4,5(1H,1PE10.4),1H/)                          EST 8600
 1950 FORMAT (5X11,1PE10.4,3(1H,1PE10.4),1H/)                          EST 8610
 1960 FORMAT (5X11,6(I3,1H,),I3,1H/)                                   EST 8620
 1970 FORMAT (5X11,10(I3,1H,)I3,1H/)                                   EST 8630
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1980 FORMAT (6X,14H DIMENSION ED(I2,1H,I2,1H))                          EST 8640
1990 FORMAT (6X,14H COMMON/EST/EDI2,1H(I2,1H))                          EST 8650
2000 FORMAT (6X,8H DATA EDI2,1H/)                                       EST 8660
2010 FORMAT (6X,14H DIMENSION EI(I2,1H,I2,1H))                          EST 8670
2020 FORMAT (6X,14H COMMON/EST/EII2,1H(I2,1H))                          EST 8680
2030 FORMAT (6X,8H DATA EII2,1H/)                                       EST 8690
2040 FORMAT (6X,14H DIMENSION NB(I2,1H,I2,1H))                          EST 8700
2050 FORMAT (6X,14H COMMON/EST/NBI2,1H(I2,1H))                          EST 8710
2060 FORMAT (6X,8H DATA NBI2,1H/)                                       EST 8720
2070 FORMAT (6X,14H DIMENSION ZB(I2,1H,I2,1H))                          EST 8730
2080 FORMAT (6X,14H COMMON/EST/ZBI2,1H(I2,1H))                          EST 8740
2090 FORMAT (6X,8H DATA ZBI2,1H/)                                       EST 8750
2100 FORMAT (6X,15H DIMENSION ZB1(I2,1H,I2,1H))                         EST 8760
2110 FORMAT (6X,15H COMMON/EST/ZB1I2,1H(I2,1H))                         EST 8770
2120 FORMAT (6X,9H DATA ZB1I2,1H/)                                      EST 8780
2130 FORMAT (6X,15H DIMENSION ZB2(I2,1H,I2,1H))                         EST 8790
2140 FORMAT (6X,15H COMMON/EST/ZB2I2,1H(I2,1H))                         EST 8800
2150 FORMAT (6X,9H DATA ZB2I2,1H/)                                      EST 8810
2160 FORMAT (6X,32H DATA TAUM,EM,EPRM,TAUZ,EZ,EPRZ/)                    EST 8820
2170 FORMAT (6X,28H DATA TAULZ,ELZ,EPRLZ,R,S,T/)                        EST 8830
2180 FORMAT (6X,22H DATA V1,VZ,PHI,NBMAX/)                              EST 8840
2190 FORMAT (6X,39H DATA NN,MM,LL,I1,I2,I3,I4,I5,I6,I7,I8/)             EST 8850
2200 FORMAT (6X,35H DATA IS,NED,NEI,NNB,NZB,NZB1,NZB2/)                 EST 8860
2210 FORMAT (6X,21H EQUIVALENCE (ED,ED1))                               EST 8870
2220 FORMAT (6X,21H EQUIVALENCE (EI,EI1))                               EST 8880
2230 FORMAT (6X,21H EQUIVALENCE (NB,NB1))                               EST 8890
2240 FORMAT (6X,21H EQUIVALENCE (ZB,ZB1))                               EST 8900
2250 FORMAT (6X,23H EQUIVALENCE (ZB1,ZB11))                             EST 8910
2260 FORMAT (6X,23H EQUIVALENCE (ZB2,ZB12))                             EST 8920
2270 FORMAT (6H  EDLN)                                                  EST 8930
2280 FORMAT (6H  EILN)                                                  EST 8940
2290 FORMAT (6H  NBAR)                                                  EST 8950
2300 FORMAT (6H  ZBAR)                                                  EST 8960
2310 FORMAT (7H  ZBAR1)                                                 EST 8970
2320 FORMAT (7H  ZBAR2)                                                 EST 8980
2330 FORMAT (4H  EL)                                                    EST 8990
2340 FORMAT (6H  EPRL)                                                  EST 9000
2350 FORMAT (6H  TAUL)                                                  EST 9010
2360 FORMAT (9H  E THETA)                                               EST 9020
2370 FORMAT (14H  EPRIME THETA)                                         EST 9030
2380 FORMAT (1X,1P6E12.5)                                               EST 9040
2390 FORMAT (1H0,27H TAPE 10 DUMP  VALUE OF MS=I4)                      EST 9050
2400 FORMAT (1H0,27H TAPE 10 DUMP  VALUE OF LS=I4)                      EST 9060
2410 FORMAT (6X,24H DATA WT1,WT2,PAN1,PAN2/)
     END                                                                EST 9070
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C     THIS VERSION OF LIBEX FOR USE WITH DATA CARDS
C     DATA IS FOR CH2
      SUBROUTINE LIBEX(TAU, E, THA, P, ZBAR, GG, NBAR, SEDEI)                LIBE  10
      EQUIVALENCE (Z(131),S1)                                                LBX   20
      REAL NB                                                                LBX  130
      REAL NBMAX                                                             LBX  140
      REAL NBAR                                                              LBX  150
      COMMON  Z(10000)                                                       LBX  160
      COMMON/BOB/ZPART(1200,3)                                               LBX  170
       DATA IS,NED,NEI,NNB,NZB,NZB1,NZB2/
     1  2,  1,  1,  1,  1,  0,  0/
       DATA TAUM,EM,EPRM,TAUZ,EZ,EPRZ/
     1 1.0000+09, 5.1587+12, 5.1587+12, 1.0000+00, 5.1587+09, 5.1587+09/
       DATA TAULZ,ELZ,EPRLZ,R,S,T/
     1 0.0000   , 9.7125+00, 9.7125+00, 6.0000+00, 3.0000+00, 6.0000+00/
       DATA V1,VZ,PHI,NBMAX/
     1 1.1256+01, 4.8984+02, 2.0675+11, 6.0000+00/
       DATA NN,MM,LL,I1,I2,I3,I4,I5,I6,I7,I8/
     1 28, 19, 19,  0,  1,  1,  1,  1,  1,  0,  0/
       DIMENSION NB(28,19)
       EQUIVALENCE (NB,NB1)
       DIMENSION ED(28,19)
       EQUIVALENCE (ED,ED1)
       DIMENSION ZB(28,19)
       EQUIVALENCE (ZB,ZB1)
       DIMENSION EI(28,19)
       EQUIVALENCE (EI,EI1)
       COMMON/EST/ZB 1(54)
       DATA ZB 1/
     1   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     2   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     3   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     4   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     5   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     6   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     7   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     8   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     9   .000000,   .000000,   .000000,   .000000,   .000000,   .000000/
       COMMON/EST/ZB 2(54)
       DATA ZB 2/
     1   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     2   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     3   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     4   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     5   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     6   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     7   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     8   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     9   .000000,   .000000,   .000000,   .000000,   .000000,   .000000/
       COMMON/EST/ZB 3(54)
       DATA ZB 3/
     1   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     2   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     3   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     4   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     5   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     6   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
     7   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
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8   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
9   .000000,   .000000,   .000000,   .000000,   .000000,   .000000/
    COMMON/EST/ZB 4(54)
    DATA ZB 4/
1   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
2   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
3   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
4   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
5   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
6   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
7   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
8   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
9   .000000,   .000000,   .000000,   .000000,   .000000,   .000000/
    COMMON/EST/ZB 5(54)
    DATA ZB 5/
1   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
2   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
3   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
4   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
5   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
6   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
7   .001375,   .000000,   .000000,   .000000,   .000000,   .000000,
8   .000000,   .000000,   .000000,   .000000,   .000000,   .000000,
9   .000000,   .000000,   .000000,   .000000,   .000000,   .001025/
    COMMON/EST/ZB 6(54)
    DATA ZB 6/
1   .001386,   .001845,   .002392,   .003171,   .003972,   .004863,
2   .005825,   .006842,   .007898,   .008980,   .002165,   .001453,
3   .001018,   .000000,   .000000,   .000000,   .000000,   .001017,
4   .001416,   .001966,   .002683,   .003581,   .004660,   .006132,
5   .007678,   .009392,   .011240,   .013183,   .015182,   .017221,
6   .019279,   .021328,   .023356,   .025352,   .027308,   .029587,
7   .031466,   .033289,   .003305,   .002510,   .002125,   .003008,
8   .004120,   .005563,   .007379,   .009542,   .012376,   .015347,
9   .018590,   .022033,   .025610,   .029260,   .032925,   .036567/
    COMMON/EST/ZB 7(54)
    DATA ZB 7/
1   .040154,   .043662,   .047073,   .050376,   .053563,   .056637,
2   .059574,   .062393,   .065092,   .067673,   .070141,   .072497,
3   .006451,   .008939,   .011798,   .015438,   .020100,   .025151,
4   .030705,   .036627,   .042780,   .049041,   .055305,   .061488,
5   .067552,   .073404,   .079059,   .084488,   .089684,   .094644,
6   .099369,   .103865,   .108140,   .112192,   .116055,   .119713,
7   .123183,   .126476,   .129601,   .132567,   .022550,   .029372,
8   .037760,   .046765,   .056490,   .066674,   .077067,   .087457,
9   .097672,   .107592,   .117154,   .126278,   .134955,   .143179/
    COMMON/EST/ZB 8(54)
    DATA ZB 8/
1   .150955,   .158299,   .165227,   .171791,   .178403,   .184369,
2   .190535,   .194808,   .199512,   .203055,   .206890,   .208952,
3   .212317,   .214984,   .055995,   .070481,   .086022,   .102427,
4   .119235,   .136026,   .152489,   .168387,   .183538,   .197870,
5   .211345,   .223981,   .236104,   .247291,   .256832,   .265029,
6   .272522,   .279397,   .285713,   .291530,   .296898,   .301848,
7   .306537,   .310995,   .315162,   .319057,   .322715,   .326150,
8   .111426,   .136153,   .162043,   .188504,   .214795,   .240392,
9   .264893,   .288068,   .309845,   .329440,   .346662,   .362322/
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      COMMON/EST/ZB 9(54)
      DATA ZB 9/
     1    .376563,    .389536,    .401388,    .412261,    .422231,    .431389,
     2    .439821,    .447598,    .454789,    .461449,    .467631,    .473380,
     3    .478736,    .483736,    .488411,    .492790,    .191916,    .230571,
     4    .270380,    .310347,    .349491,    .387092,    .421993,    .451410,
     5    .480242,    .506713,    .531402,    .553976,    .574697,    .593697,
     6    .607744,    .622505,    .635983,    .648317,    .659616,    .669992,
     7    .679541,    .688345,    .696480,    .704010,    .710996,    .717488,
     8    .723533,    .729172,    .297996,    .353707,    .411865,    .471231,
     9    .527633,    .577922,    .626699,    .671599,    .709234,    .744693/
      COMMON/EST/ZB10(46)
      DATA ZB10/
     1    .776754,    .805720,    .831883,    .855520,    .876885,    .896205,
     2    .913679,    .929478,    .943750,    .956630,    .968233,    .978674,
     3    .988055,    .996493,   1.004091,   1.010952,   1.017173,   1.022840,
     4    .425780,    .510008,    .594169,    .672576,    .744677,    .808484,
     5    .868860,    .922703,    .970060,   1.011201,   1.046563,   1.076752,
     6   1.103657,   1.123317,   1.141089,   1.160070,   1.173028,   1.184398,
     7   1.194515,   1.205969,   1.213874,   1.221149,   1.227891,   1.234171,
     8   1.240043,   1.245551,   1.250730,   1.255609/
      COMMON/EST/EI 1(54)
      DATA EI 1/
    1-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    2-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    3-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    4-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    5-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    6-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    7-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    8-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    9-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850/
      COMMON/EST/EI 2(54)
      DATA EI 2/
    1-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    2-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    3-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    4-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    5-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    6-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    7-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    8-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    9-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850/
      COMMON/EST/EI 3(54)
      DATA EI 3/
    1-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    2-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    3-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    4-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    5-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    6-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    7-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    8-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
    9-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850/
      COMMON/EST/EI 4(54)
      DATA EI 4/
    1-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
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2-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
3-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
4-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
5-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
6-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
7-23.025850,-23.025850,-23.025850,-23.025850,-19.121368,-23.025850,
8-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
9-23.025850,-23.025850,-19.121368,-23.025850,-23.025850,-23.025850/
  COMMON/EST/EI 5(54)
  DATA EI 5/
1-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
2-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
3-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
4-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
5-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
6-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
7 -4.123382,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
8-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
9-23.025850,-23.025850,-23.025850,-23.025850,-23.025850, -4.457728/
  COMMON/EST/EI 6(54)
  DATA EI 6/
1 -4.156404, -3.870282, -3.610777, -3.328852, -3.103802, -2.901839,
2 -2.721497, -2.560797, -2.417514, -2.289392, -3.664721, -4.072567,
3 -4.435791,-23.025850,-23.025850,-18.428221,-23.025850,  -.912638,
4 -2.639282, -3.793462, -3.483021, -3.194972, -2.932156, -2.658109,
5 -2.433998, -2.233350, -2.054593, -1.896018, -1.755708, -1.630594,
6 -1.518587, -1.418454, -1.328422, -1.247146, -1.173510, -1.093992,
7 -1.033019,  -.977226, -3.236126, -3.519532,   .104213,  -.430702,
8 -1.580806, -2.732056, -2.450434, -2.194612, -1.935585, -1.721872,
9 -1.531787, -1.363589, -1.214971, -1.083603,  -.967472,  -.864430/
  COMMON/EST/EI 7(54)
  DATA EI 7/
1  -.772686,  -.690705,  -.617174,  -.550978,  -.491172,  -.436792,
2  -.387577,  -.342571,  -.301360,  -.263504,  -.228641,  -.196460,
3   .066419,  -.579267,  -.520131,  -.449692,  -.366256,  -.283425,
4  -.199950,  -.118360,  -.040473,   .032605,   .100362,   .162655,
5   .219855,   .271785,   .319244,   .362526,   .402032,   .438141,
6   .471202,   .501532,   .529415,   .555051,   .578817,   .600746,
7   .621071,   .639949,   .657516,   .673891,  -.316351,  -.208517,
8  -.090299,   .022297,   .130730,   .232470,   .326132,   .411246,
9   .487915,   .556665,   .618289,   .673331,   .722609,   .766817/
  COMMON/EST/EI 8(54)
  DATA EI 8/
1   .806570,   .842415,   .874831,   .904381,   .933264,   .958328,
2   .983668,  1.000055,  1.019479,  1.034641,  1.051086,  1.059490,
3  1.073742,  1.084852,   .137313,   .281975,   .416497,   .540818,
4   .653488,   .754180,   .843481,   .922304,   .991618,  1.052628,
5  1.106402,  1.153981,  1.197353,  1.235449,  1.267268,  1.295537,
6  1.320937,  1.343880,  1.364646,  1.383515,  1.400707,  1.416374,
7  1.431059,  1.444880,  1.457669,  1.469512,  1.480535,  1.490800,
8   .614286,   .768409,   .907450,  1.031708,  1.141222,  1.237120,
9  1.320736,  1.393595,  1.457297,  1.511792,  1.558882,  1.600401/
  COMMON/EST/EI 9(54)
  DATA EI 9/
1  1.637092,  1.669648,  1.698678,  1.724723,  1.748120,  1.769211,
2  1.788294,  1.805619,  1.821401,  1.835822,  1.849041,  1.861192,
3  1.872392,  1.882742,  1.892329,  1.901232,  1.055842,  1.212095,
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4  1.350815,  1.472947,  1.579541,  1.672155,  1.752300,  1.816542,
5  1.876708,  1.929510,  1.976725,  2.018240,  2.055015,  2.087660,
6  2.111153,  2.135276,  2.156811,  2.176118,  2.193482,  2.209162,
7  2.223371,  2.236290,  2.248074,  2.258856,  2.268749,  2.277853,
8  2.286251,  2.294019,  1.443107,  1.597401,  1.736608,  1.860831,
9  1.969935,  2.060713,  2.143033,  2.214076,  2.270280,  2.320675/
   COMMON/EST/EI10(46)
   DATA EI10/
1  2.364231,  2.402053,  2.435059,  2.464010,  2.489531,  2.512136,
2  2.532244,  2.550201,  2.566288,  2.580744,  2.593766,  2.605529,
3  2.616178,  2.625862,  2.634700,  2.642804,  2.650271,  2.657184,
4  1.771012,  1.937605,  2.089148,  2.219229,  2.329331,  2.419531,
5  2.499551,  2.567096,  2.624108,  2.672329,  2.713255,  2.748209,
6  2.779896,  2.803067,  2.824647,  2.848658,  2.865081,  2.880107,
7  2.893955,  2.910217,  2.921626,  2.932306,  2.942338,  2.951782,
8  2.960688,  2.969101,  2.977057,  2.984589/
   COMMON/EST/NB 1(54)
   DATA NB 1/
1  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,
2  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,
3  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,
4  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,
5  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,
6  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,
7  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,
8  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,
9  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  5.991147/
   COMMON/EST/NB 2(54)
   DATA NB 2/
1  5.980486,  5.969981,  6.000000,  6.000000,  6.000000,  6.000000,
2  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,
3  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,
4  6.000000,  6.000000,  5.983711,  5.965959,  5.949257,  5.931445,
5  5.917412,  5.902410,  5.889917,  5.877577,  5.865907,  5.855065,
6  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,
7  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,  6.000000,
8  5.977492,  5.948688,  5.918998,  5.891096,  5.865938,  5.843042,
9  5.820780,  5.801593,  5.784027,  5.767848,  5.752925,  5.739068/
   COMMON/EST/NB 3(54)
   DATA NB 3/
1  5.726187,  5.714162,  5.702917,  5.692377,  6.000000,  6.000000,
2  6.000000,  6.000000,  5.993184,  5.963240,  5.926456,  5.892512,
3  5.858166,  5.827527,  5.798051,  5.772375,  5.750608,  5.717156,
4  5.687274,  5.660236,  5.635739,  5.611224,  5.591197,  5.572837,
5  5.555954,  5.540375,  5.523215,  5.509963,  5.497633,  5.486130,
6  5.475372,  5.465287,  6.000000,  5.884723,  5.789128,  5.749161,
7  5.702450,  5.661340,  5.617487,  5.579817,  5.543010,  5.511750,
8  5.483185,  5.455402,  5.429414,  5.403113,  5.374787,  5.349291,
9  5.321200,  5.300475,  5.281584,  5.264278,  5.248366,  5.233685/
   COMMON/EST/NB 4(54)
   DATA NB 4/
1  5.220089,  5.207475,  5.195733,  5.184776,  5.174527,  5.164920,
2  5.774427,  5.509112,  5.400023,  5.350777,  5.300285,  5.252188,
3  5.206642,  5.170256,  5.135800,  5.102584,  5.071138,  5.048096,
4  5.023514,  5.001376,  4.968020,  4.944589,  4.923397,  4.904153,
5  4.886592,  4.870502,  4.855705,  4.842050,  4.829411,  4.817677,
6  4.806755,  4.796564,  4.787031,  4.778096,  5.266429,  5.013392,
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7  4.909512,  4.847803,  4.794539,  4.745758,  4.701477,  4.659396,
8  4.628836,  4.600563,  4.571672,  4.544541,  4.525727,  4.499321,
9  4.475782,  4.454619,  4.429255,  4.412327,  4.396876,  4.382717/
   COMMON/EST/NB 5(54)
   DATA NB 5/
1  4.369691,  4.357666,  4.346532,  4.336190,  4.326560,  4.317570,
2  4.309158,  4.301269,  4.647364,  4.422429,  4.316649,  4.257798,
3  4.204197,  4.156621,  4.114410,  4.076765,  4.040914,  4.015163,
4  3.993628,  3.969731,  3.947384,  3.924075,  3.903820,  3.885605,
5  3.869124,  3.854156,  3.840493,  3.827971,  3.816452,  3.805820,
6  3.795976,  3.786835,  3.778325,  3.770382,  3.762951,  3.755984,
7  3.961872,  3.771100,  3.675624,  3.613715,  3.561891,  3.517090,
8  3.478129,  3.443949,  3.413664,  3.385111,  3.366005,  3.347951,
9  3.329016,  3.309615,  3.292403,  3.276922,  3.262923,  3.250202/
   COMMON/EST/NB 6(54)
   DATA NB 6/
1  3.238593,  3.227954,  3.218169,  3.209140,  3.200782,  3.193022,
2  3.185799,  3.179059,  3.172754,  3.166845,  3.260791,  3.105434,
3  3.018090,  2.954007,  2.912544,  2.871745,  2.836886,  2.806756,
4  2.780412,  2.757115,  2.735633,  2.715104,  2.706939,  2.691247,
5  2.677219,  2.664603,  2.653195,  2.635510,  2.626666,  2.618545,
6  2.611059,  2.604136,  2.597715,  2.591743,  2.586174,  2.580969,
7  2.576092,  2.571515,  2.610354,  2.473933,  2.398627,  2.342306,
8  2.302062,  2.266039,  2.235741,  2.209899,  2.187573,  2.168051,
9  2.150787,  2.135353,  2.120403,  2.108415,  2.097903,  2.088431/
   COMMON/EST/NB 7(54)
   DATA NB 7/
1  2.079850,  2.072038,  2.064898,  2.058346,  2.052312,  2.046737,
2  2.041570,  2.036756,  2.032265,  2.028072,  2.024150,  2.020472,
3  2.022045,  1.914107,  1.850945,  1.800267,  1.761534,  1.734504,
4  1.708825,  1.687182,  1.668681,  1.652666,  1.638640,  1.626227,
5  1.615130,  1.605965,  1.597774,  1.590413,  1.583759,  1.577716,
6  1.572202,  1.567150,  1.562504,  1.558217,  1.554249,  1.550564,
7  1.547134,  1.543933,  1.540938,  1.538111,  1.528232,  1.452819,
8  1.396629,  1.353141,  1.320814,  1.293506,  1.276882,  1.255734,
9  1.240891,  1.228287,  1.217525,  1.208336,  1.200551,  1.192621/
   COMMON/EST/NB 8(54)
   DATA NB 8/
1  1.188851,  1.182839,  1.176976,  1.171536,  1.166144,  1.162256,
2  1.160911,  1.154866,  1.153557,  1.146557,  1.150168,  1.141086,
3  1.143772,  1.142307,  1.133658,  1.078449,  1.035555,  1.000000,
4  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
5  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
6  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
7  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
8  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
9  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000/
   COMMON/EST/NB 9(54)
   DATA NB 9/
1  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
2  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
3  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
4  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
5  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
6  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
7  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
8  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
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9  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000/
   COMMON/EST/NB10(46)
   DATA NB10/
1  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
2  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
3  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
4  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
5  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
6  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
7  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,  1.000000,
8  1.000000,  1.000000,  1.000000,  1.000000/
   COMMON/EST/ED 1(54)
   DATA ED 1/
1-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
2-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
3-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
4-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
5-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
6-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
7-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
8-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
9-23.025850,-23.025850,-23.025850,-23.025850,-23.025850, 1e.305801/
   COMMON/EST/ED 2(54)
   DATA ED 2/
1 20.097997, 20.530467,-23.025850,-23.025850,-23.025850,-23.025850,
2-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
3-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
4-23.025850,-23.025850, 19.916814, 20.656865, 21.058886, 21.362743,
5 21.551345, 21.720789, 21.843376, 21.951713, 22.044751, 22.124351,
6-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
7-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,-23.025850,
8 20.241250, 21.070132, 21.531683, 21.832401, 22.044519, 22.206105,
9 22.342554, 22.447567, 22.535428, 22.610470, 22.675360, 22.732338/
   COMMON/EST/ED 3(54)
   DATA ED 3/
1 22.782773, 22.827855, 22.868410, 22.905123,-23.025850,-23.025850,
2-23.025850,-23.025850, 19.044068, 20.734181, 21.433837, 21.819072,
3 22.102202, 22.303022, 22.465868, 22.589992, 22.685096, 22.816803,
4 22.922473, 23.010163, 23.084117, 23.153611, 23.207418, 23.254637,
5 23.296434, 23.333726, 23.373482, 23.403300, 23.430389, 23.455124,
6 23.477805, 23.498689,-23.025850, 21.890353, 22.510645, 22.691133,
7 22.870062, 23.006713, 23.136256, 23.236912, 23.327500, 23.399321,
8 23.461375, 23.518817, 23.570209, 23.620129, 23.671749, 23.716474,
9 23.764005, 23.797981, 23.828200, 23.855285, 23.879709, 23.901854/
   COMMON/EST/ED 4(54)
   DATA ED 4/
1 23.922042, 23.940506, 23.957470, 23.973113, 23.987585, 24.001014,
2 22.580582, 23.405189, 23.625866, 23.713911, 23.798289, 23.873883,
3 23.941716, 23.993572, 24.040944, 24.085149, 24.125771, 24.154830,
4 24.185207, 24.212041, 24.251589, 24.278768, 24.302944, 24.324577,
5 24.344062, 24.361708, 24.377766, 24.392445, 24.405915, 24.418321,
6 24.429785, 24.440413, 24.450292, 24.459500, 23.851949, 24.197536,
7 24.318583, 24.386276, 24.442516, 24.492412, 24.536482, 24.577367,
8 24.606486, 24.633023, 24.659757, 24.684526, 24.701519, 24.725123,
9 24.745932, 24.764461, 24.786451, 24.800999, 24.814191, 24.826211/
   COMMON/EST/ED 5(54)
   DATA ED 5/
```

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1 24.837209, 24.847313, 24.856628, 24.865246, 24.873240, 24.880678,
2 24.887616, 24.894103, 24.588887, 24.792328, 24.881439, 24.929529,
3 24.972501, 25.010030, 25.042877, 25.071836, 25.099140, 25.118591,
4 25.134759, 25.152602, 25.169194, 25.186408, 25.201293, 25.214621,
5 25.226637, 25.237513, 25.247411, 25.256459, 25.264762, 25.272409,
6 25.279475, 25.286025, 25.292113, 25.297786, 25.303086, 25.308049,
7 25.158447, 25.297273, 25.364861, 25.408134, 25.444063, 25.474929,
8 25.501639, 25.524976, 25.545588, 25.564967, 25.577907, 25.590116,
9 25.602902, 25.615984, 25.627576, 25.637990, 25.647399, 25.655942/
  COMMON/EST/ED 6(54)
  DATA ED 6/
1 25.663733, 25.670869, 25.677428, 25.683479, 25.689077, 25.694273,
2 25.699107, 25.703617, 25.707835, 25.711787, 25.648832, 25.752813,
3 25.811072, 25.853796, 25.881452, 25.908688, 25.931982, 25.952139,
4 25.969786, 25.985411, 25.999835, 26.013637, 26.019131, 26.029629,
5 26.039156, 26.047669, 26.055373, 26.067331, 26.073318, 26.078819,
6 26.083893, 26.088589, 26.092947, 26.097002, 26.100785, 26.104324,
7 26.107641, 26.110756, 26.084372, 26.177506, 26.229551, 26.268829,
8 26.297102, 26.322567, 26.344110, 26.362578, 26.378605, 26.392677,
9 26.405167, 26.416370, 26.427257, 26.436012, 26.443708, 26.450658/
  COMMON/EST/ED 7(54)
  DATA ED 7/
1 26.456966, 26.462720, 26.467988, 26.472829, 26.477295, 26.481427,
2 26.485260, 26.488836, 26.492177, 26.495296, 26.498221, 26.500964,
3 26.499791, 26.581421, 26.630316, 26.670218, 26.701148, 26.722969,
4 26.743887, 26.761664, 26.776970, 26.790305, 26.802049, 26.812495,
5 26.821876, 26.829655, 26.836631, 26.842920, 26.848619, 26.853810,
6 26.858557, 26.862916, 26.866932, 26.870645, 26.874088, 26.877290,
7 26.880275, 26.883066, 26.885679, 26.888131, 26.896804, 26.964134,
8 27.015860, 27.056895, 27.088007, 27.114718, 27.131180, 27.152348,
9 27.167362, 27.180217, 27.191270, 27.200766, 27.208852, 27.217130/
  COMMON/EST/ED 8(54)
  DATA ED 8/
1 27.221081, 27.227399, 27.233585, 27.239345, 27.245074, 27.249217,
2 27.250654, 27.257123, 27.258527, 27.266057, 27.262168, 27.271967,
3 27.269062, 27.270645, 27.280025, 27.341232, 27.390496, 27.432570,
4 27.088259, 27.113649, 27.134874, 27.152497, 27.167626, 27.180668,
5 27.192015, 27.201970, 27.210761, 27.218021, 27.224368, 27.230152,
6 27.235440, 27.240288, 27.244709, 27.248713, 27.252468, 27.255777,
7 27.259157, 27.261668, 27.264726, 27.266873, 27.269832, 27.272096,
8 27.283713, 27.341292, 27.391940, 27.432570, 27.432570, 27.432570,
9 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570/
  COMMON/EST/ED 9(54)
  DATA ED 9/
1 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
2 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
3 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
4 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
5 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
6 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
7 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
8 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
9 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570/
  COMMON/EST/ED10(46)
  DATA ED10/
1 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
2 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
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     3 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
     4 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
     5 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
     6 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
     7 27.432570, 27.432570, 27.432570, 27.432570, 27.432570, 27.432570,
     8 27.432570, 27.432570, 27.432570, 27.432570/
      MNZB = NZB1+NZB2
      IF (NZB.EQ.1.OR.MNZB.EQ.2) GO TO 5
      S1 = 10.005
      RETURN
   5  IF (NNB.NE.1) NBAR=1.0                                                  LBX  200
      IF (NNB.NE.1) NBMAX=1.                                                  LBX  210
      TAU1=TAU                                                                LBX  220
      K=NBAR                                                                  LBX  230
      E0=E                                                                    LBX  240
      ZBAR1=ZPART(K,1)                                                        LBX  250
      ZBAR2=ZPART(K,2)                                                        LBX  260
      IF (E.GT.0.) GO TO 30                                                   LBX  270
      IF (GG) 20,10,10                                                        LBX  280
  10  ZBAR=0.                                                                 LBX  290
      ZBAR1=0.                                                                LBX  300
      ZBAR2=0.                                                                LBX  310
      ZPART(K,1)=ZBAR1                                                        LBX  320
      ZPART(K,2)=ZBAR2                                                        LBX  330
      IF (GG.EQ.1.) RETURN                                                    LBX  340
  20  THA=1.E-3                                                               LBX  350
      NBAR=NBMAX                                                              LBX  360
      GO TO 400                                                               LBX  370
  30  CONTINUE                                                                LBX  380
      IF (GG) 120,40,40                                                       LBX  390
  40  ALGT=ALOG10(TAU)                                                        LBX  400
      ALGE=ALOG10(E)                                                          LBX  410
      DLGT=ALGT-TAULZ                                                         LBX  420
      DLGE=ALGE-ELZ                                                           LBX  430
      AN=DLGT*S+1.                                                            LBX  440
      AM=DLGE*T+1.                                                            LBX  450
      IF (DLGT.LT.0.) AN=0.                                                   LBX  460
      IF (DLGE.LT.0.) AM=0.                                                   LBX  470
      N=IFIX(AN)                                                              LBX  480
      M=IFIX(AM)                                                              LBX  490
      IN=0                                                                    LBX  500
      E0=E                                                                    LBX  510
      IF (N.LE.0) GO TO 180                                                   LBX  520
      IF (N.GE.NN) GO TO 190                                                  LBX  530
      IF (M.LE.0) GO TO 370                                                   LBX  540
      IF (M.GE.MM) GO TO 280                                                  LBX  550
  50  CONTINUE                                                                LBX  560
      DNLT=AN-AINT(AN)                                                        LBX  570
      DMLE=AM-AINT(AM)                                                        LBX  580
      K=(M-1)*NN+N                                                            LBX  590
      KN=K+1                                                                  LBX  600
      KM=M*NN+N                                                               LBX  610
      KNM=KM+1                                                                LBX  620
      IF (NNB.EQ.0) GO TO 60                                                  LBX  630
      NBAR=NB(K)+(NB(KN)-NB(K))*DNLT+(NB(KM)-NB(K))*DMLE+(NB(KNM)+NB(K)-LBX  640
     1NB(KN)-NB(KM))*DMLE*DNLT                                                LBX  650
  60  IF (NED.EQ.0) GO TO 70                                                  LBX  660
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      EDIS=EDLN(K)+(EDLN(KN)-EDLN(K))*DNLT+(EDLN(KM)-EDLN(K))*DMLE+(EDLNLBX  670
     1(KNM)+EDLN(K)-EDLN(KN)-EDLN(KM))*DMLE*DNLT                        LBX  680
   70 IF (IS.NE.2) GO TO 90                                             LBX  690
      EPR=E-EXP(EDIS)                                                   LBX  700
      ALGEPR=ALOG10(EPR)                                                LBX  710
      DLGEPR=ALGEPR-EPRLZ                                               LBX  720
      AL=DLGEPR*R+1                                                     LBX  730
      IF (DLGEPR.LT.0.) AL=0.                                           LBX  740
      L=IFIX(AL)                                                        LBX  750
      IN=0                                                              LBX  760
      EPR0=EPR                                                          LBX  770
      IF (N.LE.0) GO TO 200                                             LBX  780
      IF (N.GE.NN) GO TO 210                                            LBX  790
      IF (L.LT.0) GO TO 410                                             LBX  800
      IF (L.GE.LL) GO TO 280                                            LBX  810
   80 CONTINUE                                                          LBX  820
      DLLEPR=AL-AINT(AL)                                                LBX  830
      K=(L-1)*NN+N                                                      LBX  840
      KN=K+1                                                            LBX  850
      KM=L*NN+N                                                         LBX  860
      KNM=KM+1                                                          LBX  870
      DMLE=DLLEPR                                                       LBX  880
   90 IF (NZB.EQ.0) GO TO 110
      ZBAR=ZB(K)+(ZB(KN)-ZB(K))*DNLT+(ZB(KM)-ZB(K))*DMLE+(ZB(KNM)+ZB(K)-LBX  900
     1ZB(KN)-ZB(KM))*DNLT*DMLE                                          LBX  910
  110 IF (NZB1.EQ.0) GO TO 140                                          LBX  950
      ZBAR1=ZB1(K)+(ZB1(KN)-ZB1(K))*DNLT+(ZB1(KM)-ZB1(K))*DMLE+(ZB1(KNM)LBX  960
     1+ZB1(K)-ZB1(KN)-ZB1(KM))*DNLT*DMLE                                LBX  970
      IF (NZB2.EQ.1) GO TO 140
      ZBAR2 = (ZBAR-WT1*ZBAR1)/WT2
      ZPART(K,1)=ZBAR1
      ZPART(K,2)=ZBAR2
      IF (GG.EQ.1) RETURN
  140 IF (NZB2.EQ.0) GO TO 145
      ZBAR2=ZB2(K)+(ZB2(KN)-ZB2(K))*DNLT+(ZB2(KM)-ZB2(K))*DMLE+(ZB2(KNM)LBX 1100
     1+ZB2(K)-ZB2(KN)-ZB2(KM))*DNLT*DMLE                                LBX 1110
      IF (NZB1.EQ.1) GO TO 141
      ZBAR1 = (ZBAR-WT2*ZBAR2)/WT1
      GO TO 142
  141 ZBAR = WT1*ZBAR1+WT2*ZBAR2
  142 ZPART(K,1)=ZBAR1
      ZPART(K,2)=ZBAR2
      IF (GG.EQ.1) RETURN
  145 IF (NEI.EQ.0) GO TO 146
      ALIN=EILN(K)+(EILN(KN)-EILN(K))*DNLT+(EILN(KM)-EILN(K))*DMLE+(EILNLBX  930
     1(KNM)+EILN(K)-EILN(KN)-EILN(KM))*DNLT*DMLE                        LBX  940
      GO TO 150
  146 ALIN1 = EIONIZ(PAN1,0.0,ZBAR1)
      ALIN2 = EIONIZ(PAN2,0.0,ZBAR2)
      ALIN = WT1*ALIN1+WT2*ALIN2
      ALIN = ALOG(ALIN)
  150 IF (IS.EQ.2) GO TO 160                                            LBX 1120
      THA=(EO-PHI*EXP(ALIN))/(1.5*PHI*(1./NBAR+ZBAR))                   LBX 1130
      GO TO 148
  160 THA=(EO-PHI*EXP(ALIN)-EXP(EDIS))/(1.5*PHI*(1./NBAR+ZBAR))        LBX 1150
  148 IF (THA) 147,147,170
  147 THA = 1.E-3
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170 IF (IN.NE.0) GO TO (230,250,270,290,310,330,360,380), IN                    LBX 1160
    GO TO 400                                                                   LBX 1170
180 IF (M.LE.0) GO TO 220                                                       LBX 1180
    IF (M.GE.MM) GO TO 260                                                      LBX 1190
    GO TO 240                                                                   LBX 1200
190 IF (M.LE.0) GO TO 340                                                       LBX 1210
    IF (M.GE.MM) GO TO 300                                                      LBX 1220
    GO TO 320                                                                   LBX 1230
200 IF (L.LE.0) GO TO 220                                                       LBX 1240
    IF (L.GE.LL) GO TO 260                                                      LBX 1250
    GO TO 240                                                                   LBX 1260
210 IF (L.LE.0) GO TO 350                                                       LBX 1270
    IF (L.GE.LL) GO TO 300                                                      LBX 1280
220 CONTINUE                                                                    LBX 1290
    IF (I1.EQ.1) GO TO 420                                                      LBX 1300
    ZBAR=0.                                                                     LBX 1310
    NBAR=NBMAX                                                                  LBX 1320
    THA=1.E-3                                                                   LBX 1330
    GO TO 400                                                                   LBX 1340
230 CONTINUE                                                                    LBX 1350
    RETURN                                                                      LBX 1360
240 CONTINUE                                                                    LBX 1370
    IF (I2.EQ.1) GO TO 430                                                      LBX 1380
250 CONTINUE                                                                    LBX 1390
    RETURN                                                                      LBX 1400
260 CONTINUE                                                                    LBX 1410
    IF (I3.EQ.1) GO TO 440                                                      LBX 1420
270 CONTINUE                                                                    LBX 1430
    RETURN                                                                      LBX 1440
280 CONTINUE                                                                    LBX 1450
    IF (I4.EQ.1) GO TO 450                                                      LBX 1460
290 CONTINUE                                                                    LBX 1470
    RETURN                                                                      LBX 1480
300 CONTINUE                                                                    LBX 1490
    IF (I5.EQ.1) GO TO 460                                                      LBX 1500
310 CONTINUE                                                                    LBX 1510
    RETURN                                                                      LBX 1520
320 TAU=.999*TAUM                                                               LBX 1530
    GO TO 30                                                                    LBX 1540
330 CONTINUE                                                                    LBX 1550
    RETURN                                                                      LBX 1560
340 CONTINUE                                                                    LBX 1570
    IF (I7.EQ.1) GO TO 470                                                      LBX 1580
    IN=7                                                                        LBX 1590
    M=1                                                                         LBX 1600
    N=NN                                                                        LBX 1610
    E0=EZ                                                                       LBX 1620
    GO TO 50                                                                    LBX 1630
350 IF (I7.EQ.1) GO TO 470                                                      LBX 1640
    IN=7                                                                        LBX 1650
    L=1                                                                         LBX 1660
    N=NN                                                                        LBX 1670
    EPR0=EPRZ                                                                   LBX 1680
    GO TO 80                                                                    LBX 1690
360 THAP=E*THA/EZ                                                               LBX 1700
    ZBAR=ZBAR*(THAP/THA)**.75*SQRT(TAUM/TAU)*EXP(V1*(THAP-THA)/(THA*THLBX 1710
   1AP*2.))                                                                     LBX 1720
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      AIN=V1*ZBAR                                                          LBX 1730
      GO TO 390                                                            LBX 1740
  370 CONTINUE                                                             LBX 1750
      IF (I8.EQ.1) GO TO 480                                               LBX 1760
      IN=8                                                                 LBX 1770
      M=1                                                                  LBX 1780
      E0=EZ                                                                LBX 1790
      GO TO 50                                                             LBX 1800
  380 THAP=E*THA/EZ                                                        LBX 1810
      ZBAR=ZBAR*(THAP/THA)**.75*EXP(V1*(THAP-THA)/(THA*THAP*2.))           LBX 1820
      AIN=V1*ZBAR                                                          LBX 1830
  390 CONTINUE                                                             LBX 1840
      THA=(E/PHI-AIN)/(1.5*(1./NBAR+ZBAR))                                 LBX 1850
  400 P=PHI*(1./NBAR+ZBAR)*THA/TAU1                                        LBX 1860
C     SEDEI = SUM OF IONIZATION ENERGY AND DISSOCIATION ENERGY             LBX 1870
      SEDEI=EXP(EDIS)+PHI*EXP(ALIN)                                        LBX 1880
      RETURN                                                               LBX 1890
  410 CONTINUE                                                             LBX 1900
      IF (I8.EQ.1) GO TO 480                                               LBX 1910
      IN=8                                                                 LBX 1920
      L=1                                                                  LBX 1930
      EPR0=EPRZ                                                            LBX 1940
      GO TO 80                                                             LBX 1950
  420 S1=16.0100                                                           LBX 1960
      GO TO 490                                                            LBX 1970
  430 S1=16.0200                                                           LBX 1980
      GO TO 490                                                            LBX 1990
  440 S1=16.0300                                                           LBX 2000
      GO TO 490                                                            LBX 2010
  450 S1=16.0400                                                           LBX 2020
      GO TO 490                                                            LBX 2030
  460 S1=16.0500                                                           LBX 2040
      GO TO 490                                                            LBX 2050
      S1=16.0600                                                           LBX 2060
      GO TO 490                                                            LBX 2070
  470 S1=16.0700                                                           LBX 2080
      GO TO 490                                                            LBX 2090
  480 S1=16.0800                                                           LBX 2100
  490 RETURN                                                               LBX 2110
      END                                                                  LBX 2120
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C      THIS VERSION OF LIBEX ADAPTED FOR USE WITH AN NTRAN TAPE
C      EQUIVALENCES WERE SET UP SPECIFICALLY FOR HECTIC
       SUBROUTINE LIBEX(TAU, E, THA, P, ZBAR, GG, NBAR, SEDEI)                LIBE  10
       EQUIVALENCE (Z(131),S1)                                                LBX   20
       EQUIVALENCE (Z(5001),IS),(Z(5002),NED),(Z(5003),NEI),(Z(5004),NNB)LBX   30
      1,(Z(5005),NZB),(Z(5006),NZB1),(Z(5007),NZB2),(Z(5008),TAUM),(Z(500LBX   40
      29),EM),(Z(5010),EPRM),(Z(5011),TAUZ),(Z(5012),EZ),(Z(5013),EPRZ), LBX   50
      3(Z(5014),TAULZ),(Z(5015),ELZ),(Z(5016),EPRLZ),(Z(5017),R),(Z(5018)LBX   60
      4,S),(Z(5019),T),(Z(5020),V1),(Z(5021),VZ),(Z(5022),PHI),(Z(5023),NLBX   70
      5BMAX),(Z(5024),NN),(Z(5025),MM),(Z(5026),LL),(Z(5027),I1),(Z(5028)LBX   80
      6,I2),(Z(5029),I3),(Z(5030),I4),(Z(5031),I5),(Z(5032),I6),(Z(5033),LBX   90
      7I7),(Z(5034),I8),(Z(5035),WT1),(Z(5036),WT2),(Z(5037),PAN1),
      8 Z(5038),PAN2)
       EQUIVALENCE (Z(5039),ZB),(Z(6633),EILN),(Z(8227),NB),(Z(9821),EDLNLBX  110
      1),(Z(11415),ZB1),(Z(13008),ZB2)                                        LBX  120
       REAL NB                                                                LBX  130
       REAL NBMAX                                                             LBX  140
       REAL NBAR                                                              LBX  150
       COMMON  Z(10000)                                                       LBX  160
       COMMON/BOB/ZPART(1200,3)                                               LBX  170
       DIMENSION ZB1D(1594),EILN1D(1594),NB1D(1594),EDLN1D(1594),ZB11D(15EST   90
      193),ZB21D(1593)
       MNZB = NZB1+NZB2
       IF (NZB.EQ.1.OR.MNZB.EQ.2) GO TO 5
       S1 = 10.005
       RETURN
     5 IF (NNB.NE.1) NBAR=1.0                                                 LBX  200
       IF (NNB.NE.1) NBMAX=1.                                                 LBX  210
       TAU1=TAU                                                               LBX  220
       K=NBAR                                                                 LBX  230
       E0=E                                                                   LBX  240
       ZBAR1=ZPART(K,1)                                                       LBX  250
       ZBAR2=ZPART(K,2)                                                       LBX  260
       IF (E.GT.0.) GO TO 30                                                  LBX  270
       IF (GG) 20,10,10                                                       LBX  280
    10 ZBAR=0.                                                                LBX  290
       ZBAR1=0.                                                               LBX  300
       ZBAR2=0.                                                               LBX  310
       ZPART(K,1)=ZBAR1                                                       LBX  320
       ZPART(K,2)=ZBAR2                                                       LBX  330
       IF (GG.EQ.1.) RETURN                                                   LBX  340
    20 THA=1.E-3                                                              LBX  350
       NBAR=NBMAX                                                             LBX  360
       GO TO 400                                                              LBX  370
    30 CONTINUE                                                               LBX  380
       IF (GG) 120,40,40                                                      LBX  390
    40 ALGT=ALOG10(TAU)                                                       LBX  400
       ALGE=ALOG10(E)                                                         LBX  410
       DLGT=ALGT-TAULZ                                                        LBX  420
       DLGE=ALGE-ELZ                                                          LBX  430
       AN=DLGT*S+1.                                                           LBX  440
       AM=DLGE*T+1.                                                           LBX  450
       IF (DLGT.LT.0.) AN=0.                                                  LBX  460
       IF (DLGE.LT.0.) AM=0.                                                  LBX  470
       N=IFIX(AN)                                                             LBX  480
       M=IFIX(AM)                                                             LBX  490
       IN=0                                                                   LBX  500
       E0=E                                                                   LBX  510
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      IF (N.LE.0) GO TO 180                                                    LBX  520
      IF (N.GE.NN) GO TO 190                                                   LBX  530
      IF (M.LE.0) GO TO 370                                                    LBX  540
      IF (M.GE.MM) GO TO 280                                                   LBX  550
   50 CONTINUE                                                                 LBX  560
      DNLT=AN-AINT(AN)                                                         LBX  570
      DMLE=AM-AINT(AM)                                                         LBX  580
      K=(M-1)*NN+N                                                             LBX  590
      KN=K+1                                                                   LBX  600
      KM=M*NN+N                                                                LBX  610
      KNM=KM+1                                                                 LBX  620
      IF (NNB.EQ.0) GO TO 60                                                   LBX  630
      NBAR=NB(K)+(NB(KN)-NB(K))*DNLT+(NB(KM)-NB(K))*DMLE+(NB(KNM)+NB(K)-LBX  640
     1NB(KN)-NB(KM))*DMLE*DNLT                                                 LBX  650
   60 IF (NED.EQ.0) GO TO 70                                                   LBX  660
      EDIS=EDLN(K)+(EDLN(KN)-EDLN(K))*DNLT+(EDLN(KM)-EDLN(K))*DMLE+(EDLNLBX  670
     1(KNM)+EDLN(K)-EDLN(KN)-EDLN(KM))*DMLE*DNLT                               LBX  680
   70 IF (IS.NE.2) GO TO 90                                                    LBX  690
      EPR=E-EXP(EDIS)                                                          LBX  700
      ALGEPR=ALOG10(EPR)                                                       LBX  710
      DLGEPR=ALGEPR-EPRLZ                                                      LBX  720
      AL=DLGEPR*R+1                                                            LBX  730
      IF (DLGEPR.LT.0.) AL=0.                                                  LBX  740
      L=IFIX(AL)                                                               LBX  750
      IN=0                                                                     LBX  760
      EPR0=EPR                                                                 LBX  770
      IF (N.LE.0) GO TO 200                                                    LBX  780
      IF (N.GE.NN) GO TO 210                                                   LBX  790
      IF (L.LT.0) GO TO 410                                                    LBX  800
      IF (L.GE.LL) GO TO 280                                                   LBX  810
   80 CONTINUE                                                                 LBX  820
      DLLEPR=AL-AINT(AL)                                                       LBX  830
      K=(L-1)*NN+N                                                             LBX  840
      KN=K+1                                                                   LBX  850
      KM=L*NN+N                                                                LBX  860
      KNM=KM+1                                                                 LBX  870
      DMLE=DLLEPR                                                              LBX  880
   90 IF (NZB.EQ.0) GO TO 110                                                  LBX  890
      ZBAR=ZB(K)+(ZB(KN)-ZB(K))*DNLT+(ZB(KM)-ZB(K))*DMLE+(ZB(KNM)+ZB(K)-LBX  900
     1ZB(KN)-ZB(KM))*DNLT*DMLE                                                 LBX  910
  110 IF (NZB1.EQ.0) GO TO 140                                                 LBX  950
      ZBAR1=ZB1(K)+(ZB1(KN)-ZB1(K))*DNLT+(ZB1(KM)-ZB1(K))*DMLE+(ZB1(KNM)LBX  960
     1+ZB1(K)-ZB1(KN)-ZB1(KM))*DNLT*DMLE                                       LBX  970
      IF (NZB2.EQ.1) GO TO 140
      ZBAR2 = (ZBAR-WT1*ZBAR1)/WT2
      ZPART(K,1)=ZBAR1
      ZPART(K,2)=ZBAR2
      IF (GG.EQ.1) RETURN                                                      LBX 1010
  140 IF (NZB2.EQ.0) GO TO 145                                                 LBX 1090
      ZBAR2=ZB2(K)+(ZB2(KN)-ZB2(K))*DNLT+(ZB2(KM)-ZB2(K))*DMLE+(ZB2(KNM)LBX 1100
     1+ZB2(K)-ZB2(KN)-ZB2(KM))*DNLT*DMLE                                       LBX 1110
      IF (NZB1.EQ.1) GO TO 141
      ZBAR1 = (ZBAR-WT2*ZBAR2)/WT1
      GO TO 142
  141 ZBAR = WT1*ZBAR1+WT2*ZBAR2
  142 ZPART(K,1)=ZBAR1
      ZPART(K,2)=ZBAR2
```

```
      IF (GG.EQ.1) RETURN
  145 IF (NEI.EQ.0) GO TO 146
      ALIN=EILN(K)+(EILN(KN)-EILN(K))*DNLT+(EILN(KM)-EILN(K))*DMLE+(EILNLBX  930
     1(KNM)+EILN(K)-EILN(KN)-EILN(KM))*DNLT*DMLE                      LBX  940
      GO TO 150
  146 ALIN1 = EIONIZ(PAN1,0.0,ZBAR1)
      ALIN2 = EIONIZ(PAN2,0.0,ZBAR2)
      ALIN = WT1*ALIN1+WT2*ALIN2
      ALIN = ALOG(ALIN)
  150 IF (IS.EQ.2) GO TO 160                                           LBX 1120
      THA=(EO-PHI*EXP(ALIN))/(1.5*PHI*(1./NBAR+ZBAR))                  LBX 1130
      GO TO 148
  160 THA=(EO-PHI*EXP(ALIN)-EXP(EDIS))/(1.5*PHI*(1./NBAR+ZBAR))       LBX 1150
  148 IF (THA) 147,147,170
  147 THA = 1.E-3
  170 IF (IN.NE.0) GO TO (230,250,270,290,310,330,360,380), IN         LBX 1160
      GO TO 400                                                        LBX 1170
  180 IF (M.LE.0) GO TO 220                                            LBX 1180
      IF (M.GE.MM) GO TO 260                                           LBX 1190
      GO TO 240                                                        LBX 1200
  190 IF (M.LE.0) GO TO 340                                            LBX 1210
      IF (M.GE.MM) GO TO 300                                           LBX 1220
      GO TO 320                                                        LBX 1230
  200 IF (L.LE.0) GO TO 220                                            LBX 1240
      IF (L.GE.LL) GO TO 260                                           LBX 1250
      GO TO 240                                                        LBX 1260
  210 IF (L.LE.0) GO TO 350                                            LBX 1270
      IF (L.GE.LL) GO TO 300                                           LBX 1280
  220 CONTINUE                                                         LBX 1290
      IF (I1.EQ.1) GO TO 420                                           LBX 1300
      ZBAR=0.                                                          LBX 1310
      NBAR=NBMAX                                                       LBX 1320
      THA=1.E-3                                                        LBX 1330
      GO TO 400                                                        LBX 1340
  230 CONTINUE                                                         LBX 1350
      RETURN                                                           LBX 1360
  240 CONTINUE                                                         LBX 1370
      IF (I2.EQ.1) GO TO 430                                           LBX 1380
  250 CONTINUE                                                         LBX 1390
      RETURN                                                           LBX 1400
  260 CONTINUE                                                         LBX 1410
      IF (I3.EQ.1) GO TO 440                                           LBX 1420
  270 CONTINUE                                                         LBX 1430
      RETURN                                                           LBX 1440
  280 CONTINUE                                                         LBX 1450
      IF (I4.EQ.1) GO TO 450                                           LBX 1460
  290 CONTINUE                                                         LBX 1470
      RETURN                                                           LBX 1480
  300 CONTINUE                                                         LBX 1490
      IF (I5.EQ.1) GO TO 460                                           LBX 1500
  310 CONTINUE                                                         LBX 1510
      RETURN                                                           LBX 1520
  320 TAU=.999*TAUM                                                    LBX 1530
      GO TO 30                                                         LBX 1540
  330 CONTINUE                                                         LBX 1550
      RETURN                                                           LBX 1560
  340 CONTINUE                                                         LBX 1570
```

```
      IF (I7.EQ.1) GO TO 470                                                LBX 1580
      IN=7                                                                  LBX 1590
      M=1                                                                   LBX 1600
      N=NN                                                                  LBX 1610
      E0=EZ                                                                 LBX 1620
      GO TO 50                                                              LBX 1630
  350 IF (I7.EQ.1) GO TO 470                                                LBX 1640
      IN=7                                                                  LBX 1650
      L=1                                                                   LBX 1660
      N=NN                                                                  LBX 1670
      EPR0=EPRZ                                                             LBX 1680
      GO TO 80                                                              LBX 1690
  360 THAP=E*THA/EZ                                                         LBX 1700
      ZBAR=ZBAR*(THAP/THA)**.75*SQRT(TAUM/TAU)*EXP(V1*(THAP-THA)/(THA*THLBX 1710
     1AP*2.))                                                               LBX 1720
      AIN=V1*ZBAR                                                           LBX 1730
      GO TO 390                                                             LBX 1740
  370 CONTINUE                                                              LBX 1750
      IF (I8.EQ.1) GO TO 480                                                LBX 1760
      IN=8                                                                  LBX 1770
      M=1                                                                   LBX 1780
      E0=EZ                                                                 LBX 1790
      GO TO 50                                                              LBX 1800
  380 THAP=E*THA/EZ                                                         LBX 1810
      ZBAR=ZBAR*(THAP/THA)**.75*EXP(V1*(THAP-THA)/(THA*THAP*2.))            LBX 1820
      AIN=V1*ZBAR                                                           LBX 1830
  390 CONTINUE                                                              LBX 1840
      THA=(E/PHI-AIN)/(1.5*(1./NBAR+ZBAR))                                  LBX 1850
  400 P=PHI*(1./NBAR+ZBAR)*THA/TAU                                          LBX 1860
C     SEDEI = SUM OF IONIZATION ENERGY AND DISSOCIATION ENERGY              LBX 1870
      SEDEI=EXP(EDIS)+PHI*EXP(ALIN)                                         LBX 1880
      RETURN                                                                LBX 1890
  410 CONTINUE                                                              LBX 1900
      IF (I8.EQ.1) GO TO 480                                                LBX 1910
      IN=8                                                                  LBX 1920
      L=1                                                                   LBX 1930
      EPR0=EPRZ                                                             LBX 1940
      GO TO 80                                                              LBX 1950
  420 S1=16.0100                                                            LBX 1960
      GO TO 490                                                             LBX 1970
  430 S1=16.0200                                                            LBX 1980
      GO TO 490                                                             LBX 1990
  440 S1=16.0300                                                            LBX 2000
      GO TO 490                                                             LBX 2010
  450 S1=16.0400                                                            LBX 2020
      GO TO 490                                                             LBX 2030
  460 S1=16.0500                                                            LBX 2040
      GO TO 490                                                             LBX 2050
      S1=16.0600                                                            LBX 2060
      GO TO 490                                                             LBX 2070
  470 S1=16.0700                                                            LBX 2080
      GO TO 490                                                             LBX 2090
  480 S1=16.0800                                                            LBX 2100
  490 RETURN                                                                LBX 2110
      END                                                                   LBX 2120
```

```
      REAL FUNCTION EIONIZ(A, B, C)                                          EION  10
C                                                                            EION  20
C     FUNCTION TO COMPUTE IONIZATION ENERGY                                  EION  30
C     COMPILED MARCH 9, 1967, BY CHRIS IMES                                  EION  40
C     MODIFICATION OF CODING DONE BY GARY LANE ON MAY 6,1966, FOR EIONM5     EION  50
C       AND EIONF3                                                           EION  60
C                                                                            EION  70
      Z = A                                                                  EION  80
      PHI = B                                                                EION  90
      ZBAR = C                                                               EION 100
C                                                                            EION 110
C     OPTION TO INCLUDE PHI IN CALCULATIONS                                  EION 120
C       IF (PHI .EQ. 0.)   PHI IS SET TO 1.                                  EION 130
C       IF (PHI .NE. 0.)   PHI IS USED IN CALCULATIONS                       EION 140
C                                                                            EION 150
      IF (PHI .EQ. 0.)                                                       EION 160
     ' PHI = 1.                                                              EION 170
C                                                                            EION 180
      COMMON /LMSB/U(1)                                                      EION 190
      DATA MARIMX/11/                                                        EION 200
      DATA ERROR/0./                                                         EION 210
C                                                                            EION 220
      J1 = 1                                                                 EION 230
      IZK = IFIX(Z + .5)                                                     EION 240
C                                                                            EION 250
  400 CONTINUE                                                               EION 260
C     START SEARCHING THE MARI DECK TO FIND THE DESIRED Z                    EION 270
      IL = IFIX(U(J1) + .5)                                                  EION 280
      IF (IZK .EQ. IL)                                                       EION 290
     ' GO TO 401                                                             EION 300
      J1 = J1 + IL + 2                                                       EION 310
      IF (J1 .GT. MARIMX)                                                    EION 320
     ' GO TO 800                                                             EION 330
      GO TO 400                                                              EION 340
C                                                                            EION 350
  401 CONTINUE                                                               EION 360
C     ATOMIC NUMBER OF DESIRED ELEMENT HAS BEEN LOCATED IN MARI              EION 370
      IF (ZBAR .GT. (U(J1) - .5))                                            EION 380
     ' GO TO 410                                                             EION 390
      GL = ZBAR                                                              EION 400
      LAG = GL                                                               EION 410
      GAL = GL - FLOAT(LAG)                                                  EION 420
C                                                                            EION 430
C     J2 IS THE NUMBER OF IONIZATION POTENTIALS FOR THE ELEMENT               EION 440
      IF (GAL .GT. .5)                                                       EION 450
     ' J2 = LAG + 2                                                          EION 460
      IF (GAL .LE. .5)                                                       EION 470
     ' J2 = LAG + 1                                                          EION 480
      GO TO 420                                                              EION 490
C                                                                            EION 500
  410 CONTINUE                                                               EION 510
      J2 = IZK                                                               EION 520
C                                                                            EION 530
  420 CONTINUE                                                               EION 540
C     J3 DETERMINES THE LOCATION OF THE HIGHEST POTENTIAL FOR THE             EION 550
C     ELEMENT                                                                EION 560
      J3 = J1 + J2 + 1                                                       EION 570
      XI = PHI*(1. + ZBAR)                                                   EION 580
```

```
      IF (J2 .EQ. 1)                                                    EION 590
     ' GO TO 430                                                        EION 600
      IF (J2 .EQ. IZK)                                                  EION 610
     ' GO TO 440                                                        EION 620
C                                                                       EION 630
C     J2.NE.1 .AND. J2.NE.Z, MID-PATH                                   EION 640
      TLMS4 = J2                                                        EION 650
      TLMS13 = U(J3) - U(J3 - 1)                                        EION 660
      SIGMA = ((ZBAR - TLMS4 + 1.5)**2)*TLMS13/2.*PHI + U(J3 - 1)*(XI - EION 670
     ' TLMS4*PHI)                                                       EION 680
      GO TO 500                                                         EION 690
C                                                                       EION 700
  430 CONTINUE                                                          EION 710
C     J2.EQ.1  LOW PATH                                                 EION 720
      XBAR = ZBAR                                                       EION 730
      GO TO 450                                                         EION 740
C                                                                       EION 750
  440 CONTINUE                                                          EION 760
C     J2 .EQ. IZK, HIGH PATH                                            EION 770
      XBAR = ZBAR - U(J1) + 1.                                          EION 780
C                                                                       EION 790
  450 CONTINUE                                                          EION 800
C     COMPUTE SIGMA FOR LOW PATH AND HIGH PATH                          EION 810
      SIGMA = XBAR*U(J3)*PHI                                            EION 820
C                                                                       EION 830
  500 CONTINUE                                                          EION 840
C     SUM ALL LOWER POTENTIALS                                          EION 850
      TLMS14 = 0.                                                       EION 860
      IF (J2 .EQ. 1)                                                    EION 870
     ' GO TO 480                                                        EION 880
      J6 = J2 - 1                                                       EION 890
      DO 475 J4 = 1, J6                                                 EION 900
      J7 = J1 + J4 + 1                                                  EION 910
      TLMS14 = TLMS14 + U(J7)                                           EION 920
  475 CONTINUE                                                          EION 930
C                                                                       EION 940
  480 CONTINUE                                                          EION 950
C     DETERMINE TOTAL IONIZATION ENERGY                                 EION 960
      ENERGY = TLMS14*PHI                                               EION 970
C                                                                       EION 980
      EIONIZ = ENERGY + SIGMA                                           EION 990
      RETURN                                                            EION1000
C                                                                       EION1010
C                                                                       EION1020
  800 CONTINUE                                                          EION1030
C     ERROR IS SET IF A NEEDED ELEMENT HAS BEEN LEFT OUT OF THE         EION1040
C       MARI DECK                                                       EION1050
      ERROR = 18.0800                                                   EION1060
C     CALL DUMP                                                         EION1070
      RETURN                                                            EION1080
      CALL MARI                                                         EION1090
      RETURN                                                            EION1100
      END                                                               EION1110
      SUBROUTINE ERR(S1)
    3 FORMAT (6H S1 = F10.4)
      WRITE(6,3) S1
      CALL EXIT
```

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13 ABSTRACT

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The work covered by this volume falls into three parts: (1) opacity data generated by the DIAPHANOUS code; (2) equation-of-state data generated by the SPUTTER/HECTIC subroutines AIRMOL and CMOL and the MARIER, HELAS, and HELIKE ionization potential routines; (3) descriptions of codes used to transfer data between LASL, AFWL, Gulf General Atomic, and the DASA Analysis and Information Center (DASIAC).

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