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AFRPL-TR-76-92

Aerotherm TR-76-13

AEROTHERM GRAPHITE SURFACE KINETICS COMPUTER PROGRAM (GASKET2)

USER'S MANUAL

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December 1976

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Air Force Rocket Propulsion Laboratory
Director of Science and Technology
Air Force Systems Command
Edwards AFB, California 93523

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FOREWORD

This report was submitted by Acurex Corporation/ Aerotherm Division, 485 Clyde Avenue, Mountain View, CA 94042 under contract F04611-74-C-0023, Job Order No. 305909HU with the Air Force Rocket Propulsion Laboratory, Edwards AFB, California 93523.

Contract work was performed in the period 1 May 1974 to 31 July 1976 and was documented in this final report and in a second final report (AFRPL-TR-76-71) which is classified CONFIDENTIAL. In addition to the final reports and other written documentation, a 2-day seminar was conducted by Aerotherm at its Mountain View facility to present contract results to the rocket motor community in a timely fashion. The Aerotherm work was managed by Mr. Roger J. Bedard, Manager, Propulsion Systems, and the Air Force Technical Monitor was Mr. William F. Payne.

This report has been reviewed by the Information Office/DOZ and is releasable to the National Technical Information Service (NTIS). At NTIS it will be available to the general public, including foreign nations. This report is unclassified and suitable for general public release.

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REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: AFRPL-TR-76-92

2. GOVT ACCESSION NO.

3. RECIPIENT'S CATALOG NUMBER: Rept. for

4. TITLE (and Subtitle): AEROTHERM GRAPHITE SURFACE KINETICS COMPUTER PROGRAM (GASKET2) User's Manual.

5. TYPE OF REPORT & PERIOD COVERED: 1 May 1974 — 31 July 1976

6. PERFORMING ORG. REPORT NUMBER: TR-76-13 (7113)

7. AUTHOR(s): E. Chu and H. Tong

8. CONTRACT OR GRANT NUMBER(s): F04611-74-C-0023

9. PERFORMING ORGANIZATION NAME AND ADDRESS: Acurex Corporation/Aerotherm Division, 485 Clyde Avenue, Mountain View, California 94042

10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: JON 305909HU 62302F

11. CONTROLLING OFFICE NAME AND ADDRESS: Air Force Rocket Propulsion Laboratory/AFSC, Edwards Air Force Base, California 93523

12. REPORT DATE: December 1976

13. NUMBER OF PAGES: 175

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office): 172p.

15. SECURITY CLASS. (of this report): UNCLASSIFIED

15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report): 3059 09

Approved for Public Release; Distribution Unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report): Aerotherm-TR-76-13 (7113)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)
Rocket nozzle materials
Ablation
Graphite
Carbon/carbon

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Aerotherm GASKET code was modified. The modified code, entitled GASKET2, includes a generalized computational scheme for combined equilibrium - nonequilibrium systems, sublimation kinetics, and an expanded thermochemistry data bank including the Duff-Bauer hydrocarbon species. GASKET2 predicts higher ablation rates than GASKET at surface temperatures above 5500°R. Both codes predict virtually equal ablation rates at surface

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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temperatures below 5500°R. GASKET2 also accepts an increased number of surface kinetics - controlled reactions.

In addition to the modifications, surface kinetics for ATJ and G-90 bulk graphites, 15% silicon carbide modified pyrolytic graphite and Pyrocarb 901 and Carbitex 700 carbon/carbon materials were added to GASKET2. Also, improved surface kinetics for C plane pyrolytic graphite were included.

TABLE OF CONTENTS

SUMMARY

Recent studies at Aerotherm have shown that the accuracy and versatility of the GASKET code can be improved by some minor code modifications. These modifications were identified and incorporated into the GASKET code. The modified code, entitled GASKET2, includes a generalized computational scheme for combined equilibrium-nonequilibrium systems, sublimation kinetics, and an expanded thermochemistry data bank including the Duff-Bauer hydrocarbon species. With these modifications, GASKET2 predicts higher ablation rates than GASKET at surface temperatures above 5500°R. These rates reach the asymptotic diffusion controlled value at the high temperature limit. At surface temperatures below 5500°R, however, both codes predict results with insignificant discrepancies. In addition to the improved predictions, GASKET2 will also accept a larger number of surface kinetically controlled reactions than GASKET (limited to three). This will allow reactants other than the three currently used; namely, H_2O, CO_2 and H_2.

In addition to the above modifications, GASKET2 was updated to include the surface kinetics of the following graphitic materials:

- 15% SiC/PG
- ATJ bulk graphite
- G-90 bulk graphite
- Pyrocarb 901 carbon/carbon
- Carbitex 700 carbon/carbon
- C plane pyrolytic graphite (improved kinetics)

Kinetic reaction rates for these materials were obtained from arc plasma generator and rocket motor data.

This report was prepared in two parts. The first part describes the code modifications and updates to GASKET. The differences between GASKET and GASKET2 are illustrated in terms of computational scheme and surface ablation rate predictions. Also, a brief description of the GASKET2 output

is included, so that users can use this code more effectively. The second part of the report contains an updated user's manual, a partial listing of GASKET2 which shows the locations where FORTRAN changes were made to GASKET, and three sample problems. Finally, it should be noted that this report serves only as an addendum to the earlier published GASKET reports.

SECTION 1

CODE MODIFICATIONS AND UPDATES

The Graphite Surface Kinetics (GASKET) computer code, developed under USAF Contract F04611-69-C-0081, was designed to calculate graphite surface thermochemical ablation rates as a result of exposure to propellant gases. The mathematical model, employed by GASKET, accounts for such thermophysical phenomena as:

- Diffusion of the reactive species from the boundary layer edge to the gaseous region adjacent to the carbon surface
- Adsorption of the reactive species to an active site on the carbon surface
- Formation of reaction products at the carbon surface
- Desorption of reaction products from the carbon surface
- Diffusion of reaction products into the boundary layer

Among all possible heterogeneous reactions occurring at the surface, only the following three were considered to be important at the temperature range and environments of interest:

$$C^* + H_2O \rightleftarrows H_2 + CO$$

$$C^* + CO_2 \rightleftarrows 2CO$$

$$2C^* + H_2 \rightleftarrows C_2H_2$$

Also under the same contract, the surface kinetics of the following materials were correlated:

- A-b plane pyrolytic graphite
- C plane pyrolytic graphite
- Bulk graphite

These correlations were then implemented into GASKET.

GASKET has been used extensively in rocket motor applications. The surface temperature range for this type of application is normally between 3000°R and 6000°R. For these applications, GASKET predicts satisfactory results.

Recently, the trend of rocket nozzle design has been altered somewhat. Instead of burning the conventional propellant and fabricating rocket nozzles with pyrolytic graphite, higher enthalpy propellants and graphitic materials such as carbon/carbon composite and bulk graphite are used. The introduction of these new elements into the rocket technology necessitated the assessment of the prediction ability of GASKET in a temperature range exceeding 6000°R and the correlation of the ablation kinetics of these graphitic materials. Under USAF Contract F04611-74-C-0023, GASKET was modified to handle the high temperature calculations, and was updated to contain the surface kinetics of the graphitic materials that were correlated under the same contract.

1.1 GENERAL EQUILIBRIUM-NONEQUILIBRIUM COMPUTATIONAL SCHEME

As mentioned previously, the thermochemical ablation of graphite materials as a result of exposure to propellant gases is assumed to be controlled by the following heterogeneous reactions:

$$C^* + H_2O \rightleftarrows CO + H_2$$

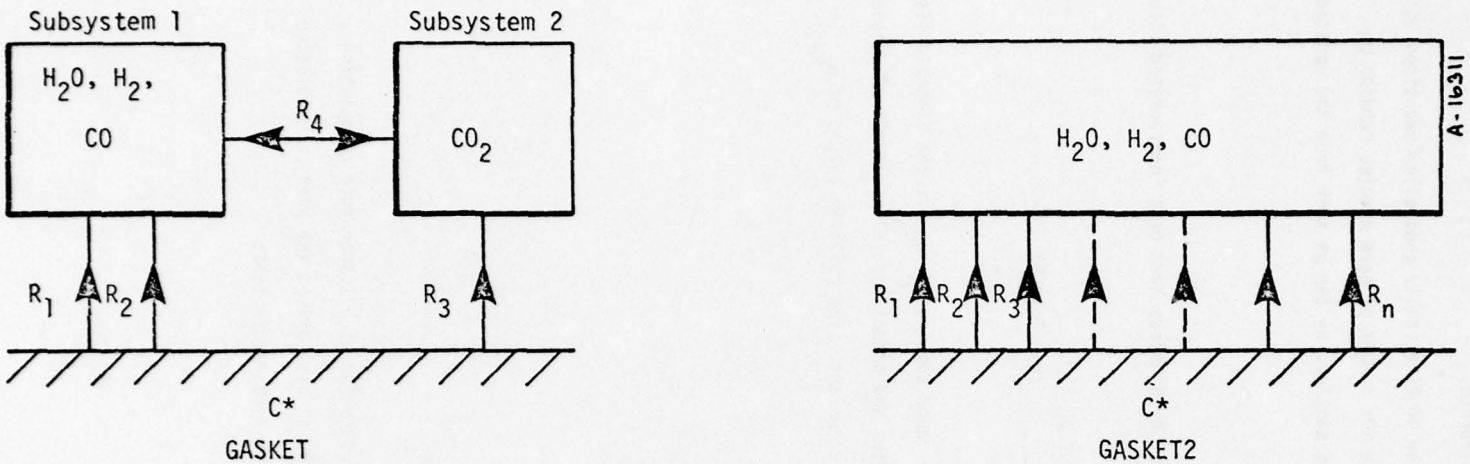
$$C^* + CO_2 \rightleftarrows 2CO$$

$$2C^* + H_2 \rightleftarrows C_2H_2$$

This kinetic model appears to be a viable assumption in the temperature range between 3000°R and 6000°R as satisfactory predictions have been obtained. However, as surface temperature exceeds 6000°R, other surface activities may become significant, e.g., sublimation. Due to the intrinsic weakness of the computational scheme used in GASKET, the inclusion of more than three surface reactions may encounter difficulties (see Reference 1 for detailed discussion). Since more surface reactions are required to be considered in high temperature predictions, it is necessary that such an intrinsic weakness be removed by using a more general computational scheme.

GASKET was modified to accommodate more surface reactions. This capability was made possible by allowing reactants and products to be base as well as nonbase species (see Reference 2). Through internal bookkeeping, the net generation rate for each base species is calculated without the complication of introducing a fictitious base species (as was done in the previous version of GASKET).

A comparison of the computational procedures for the two versions of GASKET is demonstrated schematically in Figure 1. A (H, O) composition edge-gas reaction with a carbon surface was taken as an illustrative example. As can be seen, a fictitious base species (in this case, CO_2) was created in order to accommodate the three kinetically controlled reactions in the previous version of GASKET.



$$C^* + H_2O \xrightarrow{R_1} CO + H_2$$

$$2C^* + H_2 \xrightarrow{R_2} C_2H_2 \rightleftharpoons 2CO + 3H_2 - 2H_2O$$

$$C^* + CO_2 \xrightarrow{R_3} 2CO$$

$$H_2O + CO \xrightarrow{R_4} CO_2 + H_2$$

Figure 1. Comparison of computational schemes between the previous and modified versions of GASKET.

If more kinetically controlled reactions are required more fictitious base species should be created accordingly. In addition, since gas phase species are in equilibrium, an artificial infinite rate reaction is required to allow subsystems 1 and 2 to equilibrate.

In contrast, GASKET2 is more versatile. The number of kinetically controlled reactions that can be input to the program is virtually unlimited, while the number of base species remains unchanged. Furthermore, the input procedure for GASKET2 is simpler, as can be seen from the updated input instructions.

1.2 SUBLIMATION KINETICS

The Knudsen-Langmuir (Reference 3) carbon vaporization kinetics have been incorporated into GASKET2. The expression is:

$$m_{C_n} = \alpha_{C_n} \frac{(P_{C_{n_{eq}}} - P_{C_n})}{\sqrt{2\pi RT/M_{C_n}}} \qquad (n = 1 \text{ to } 5)$$

where m_{C_n} is the mass flux in lbm/ft^2-sec for the carbon vapor species C_n, α_{C_n} is the dimensionless vaporization coefficient, $P_{C_{n_{eq}}}$ and P_{C_n} are the equilibrium and actual partial pressures of species C_n, T is the surface temperature, and M_{C_n} is the molecular weight. The built-in values of α_{C_n} in GASKET2 are as follows:

$$\alpha_{C_1} = .125$$

$$\alpha_{C_2} = .261$$

$$\alpha_{C_3} = .012$$

$$\alpha_{C_4} = .130$$

$$\alpha_{C_5} = .00096$$

The incorporation of sublimation kinetics is necessary for high temperature calculations. It not only predicts the ablation rate due to sublimation, it also drives the predicted ablation rates to the correct asymptotic ablation value at the high temperature limit.

1.3 THERMOCHEMICAL EQUILIBRIUM DATA

The determination of a thermodynamic state of a chemical reacting system requires the input of thermochemical equilibrium data describing the formation of each species. In a particular temperature and pressure range of interest, some species can be neglected without affecting the accuracy of the calculation significantly. However, it does not guarantee the same accuracy can be maintained when the range has been surpassed. Therefore, a screening study was initiated to evaluate the built-in thermochemical equilibrium data in GASKET for high temperature calculations.

The results of the evaluation show that the Duff-Bauer hydrocarbon species, formed favorably at temperatures above 6000°R but not below, should be included in the built-in data bank. With the inclusion of the Duff-Bauer hydrocarbon species, GASKET2 predicts higher ablation rates at or above 5500°R. The reason for the increase in the predicted ablation rate is due to a significant increase in the formation of C_3H at temperatures above 5500°R. Carbon molecules which ablate to the gas phase through surface reactions are quickly reacted to form C_3H. Therefore, a larger carbon sink exists in the gas phase with C_3H species than the one without. Furthermore, the existence of C_3H species can alter the reactive species concentration at the carbon surface, and hence the ablation rates.

1.4 COMPARISONS OF GASKET AND GASKET2 PREDICTIONS

A sample problem was run to compare the predictions from GASKET and GASKET2. The selected problem considers the thermochemical ablation at the exit cone location of the rocket nozzle when exposed to PEG/FEFO propellant. The surface material was assumed to be bulk graphite. The comparison of the two solutions in terms of B' versus T_w is shown in Figure 2. Also shown in this figure is the surface equilibrium solution which serves as the baseline solution. As can be seen, both GASKET and GASKET2 solutions predicted B' values below the surface equilibrium value at surface temperatures below 5500°R. This indicates that the surface reactions are kinetically controlled. Also, note that both solutions agree with each other with less than 10 percent discrepancy. As the surface temperature exceeds 5500°R, the B' predicted by GASKET2 gradually approaches the surface equilibrium value, whereas the GASKET B' is still markedly below and has no trend of approaching the surface equilibrium B'.

From the results of this comparison, the following conclusions can be drawn:

- Both GASKET and GASKET2 predict similar results at or below 5500°R
- At the upper temperature limit, GASKET2 has the correct asymptotic functional behavior

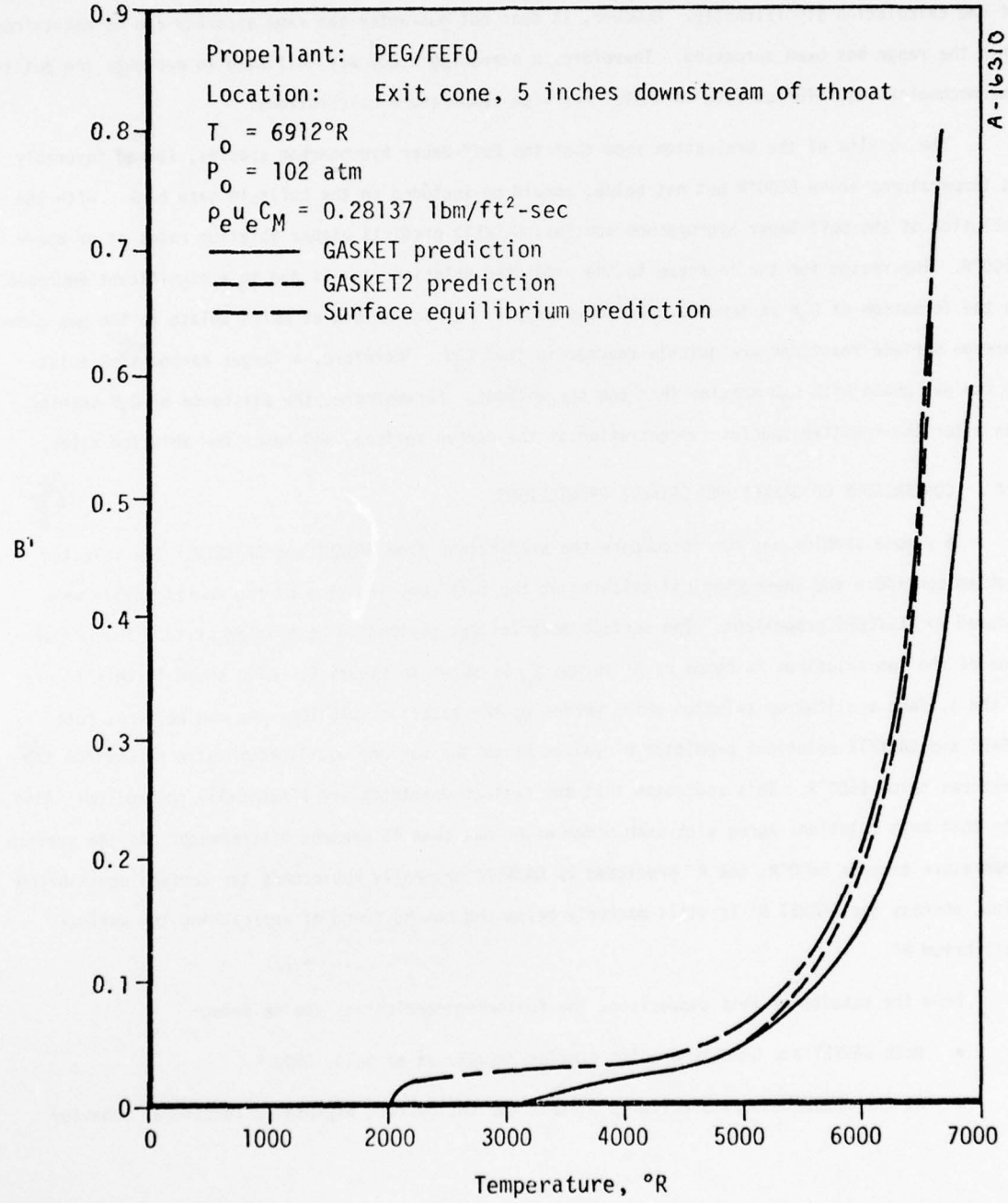


Figure 2. Comparison of GASKET and GASKET2 predictions.

1.5 DESCRIPTION OF GASKET2 OUTPUT ON TRANSPORT PROPERTIES AND SURFACE KINETICS INFORMATION

There are concerns by the users of whether GASKET2 computes transport properties based on both gas and condensed phase species, or on gas phase species alone. It is the purpose of this section to clarify that these properties are computed based on gas phase species only. The reason for neglecting condensed species is due to the common belief within the rocket community that condensed species have a small influence on boundary layer events.* For those users who also use ACE (Aerotherm Chemical Equilibrium code) to perform their inviscid flow field calculations, it should be noted that those transport properties are calculated including both gas and condensed phase species. Therefore, the user should evaluate the implications if those transport properties are being used.

For those users who are interested in obtaining information on how each individual heterogeneous reaction contributes to the total ablation rate, this information is also contained in the GASKET2 output. As an illustration, part of the GASKET2 output was extracted and presented in Figures 3 and 4. Figure 3 shows the printout of the built-in or input surface kinetic constants for each surface reaction. Note that the preexponential factor is normalized by the mass transfer coefficient ($\rho_e u_e C_M$). Shown at the bottom of Figure 4 for each surface reaction are the ablation rate and the ratio of the forward rate and the backward rate indicating how close the reaction is to being in equilibrium. By summing the net rates of all the surface reactions according to the following equation, the sum should be equal to B'.

$$B' = MW_{c*} \sum_{i=1}^{N} \nu_{c*i} \left[\text{Net Rate}\right]_i$$

N is the total number of surface reactions, and ν_{c*i} is the stoichmetric coefficient of carbon for reaction i which can be obtained from the printout for surface kinetics information (see Figure 3).

---

*This is probably a valid assumption for regions near the nozzle throat; however, the nosecap and exit cone regions must be evaluated more carefully.

```
TRANSFER COEFFICIENT RHOF*UE*CM=    .94900+00

KINETIC
REACTION---       1

      1.00H2O +1.00C*  -->1.00CO  +1.00H2

     INHIBITION TERMS

       252.67H2O
      5418.31CO2
          .05CO
          .00H2

     POISONING TERMS


PRE-EXPONENT FACTOR    .726+06    ACTIVATION ENERGY    .102+06    T EXPONENT    .433+00      8      8      0
            •
            •
            •
REACTION---       8

      5.00C*  -->1.00C5

PRE-EXPONENT FACTOR    .101-02    ACTIVATION ENERGY    .000       T EXPONENT   -.500+00     99      8      0
```

Figure 3. Typical GASKET2 output.

```
OPEN SYSTEM CHEMICAL KINETICS SOLUTION OUTPUT

 SURFACE IS PC 901
 MASS TRANSFER COEFFICIENT ROUCM =     .94900+00
 RHO V WALL/RHOE UE CM =     .13546+00    BPRIME =     .13546+00

 STATE ADJACENT TO THE SURFACE . . . .
  TEMP =  6119.9999 DEG R =  3400.0000 DEG K      PRESS =      31.47837 ATM

                                   GAS              CONDENSED        COMPOSITE
  ENTHALPY - BTU/LBM               .90329+03          .00000           .90329+03
  ENTROPY - BTU/LBM DEG R          .28345+01          .00000           .00000
  DENSITY - LBM/FT3                .15112+00                           .15112+00
  MOLECULAR WEIGHT                 21.4580              .0000          21.4580


 NET FORWARD RATE OF KINETICALLY CONTROLLED REACTIONS
  (MOLES OF REACTION / UNIT SURFACE AREA / TIME / RHOE UE CM). . . .
  1=    .65142-03  2=    .13623-02  3=    .44967-02  4=    .37470-04  5=    .71843-04
  6=    .28152-04  7=    .13738-05  8=    .21875-07

RATIO OF FORWARD TO REVERSE KINETICALLY CONTROLLED PRODUCTION RATES
 1=    .14383+01  2=    .14383+01  3=    .20688+01  4=    .14383+01  5=    .20688+01
 6=    .29756+01  7=    .42798+01  8=    .61557+01
```

Figure 4. Typical GASKET2 output.

SECTION 2

INPUT INSTRUCTION MANUAL

2.1 GASKET2 INPUT

This section defines the format and significance of each field of the input data card deck for the modified Aerotherm Graphite Surface Kinetics (GASKET2) program. In the most general case, the input consists of eight card sets. These are:

1. CONTROL CARD
2. FROZEN-EDGE TEMPERATURE ARRAY
3. SURFACE TEMPERATURE ARRAY
4. ELEMENTAL COMPOSITION
5. DIFFUSION FACTOR DATA
6. SPECIES THERMOCHEMICAL EQUILIBRIUM DATA
7. OBLIQUE OR NORMAL SHOCK DATA
8. REACTION RATE DATA

Card Set 1 is a control card which contains a 10-element array, KRK(I). This array controls most of the program options and tells the program what to expect from the remaining card sets. Few problems require all card sets since, in most cases, the user will wish to utilize the data built into the GASKET program to replace card sets 2, 3, 5, 6, and 8. The card sets are described in detail in this section.

CARD SET 1 — CONTROL CARD (2 Cards)

CARD 1

FIELD 1 (Columns 1-10, Format 10I1) the variable array KRK(10) which is used to control the various program options.

COLUMN 1 -- EDGE THERMODYNAMIC STATE

0	Input
1	Static state behind shock, upstream conditions input (card set 7)
2	Same as 1, except stagnation state behind shock
3	Isentropic expansion from input chamber conditions
4	Static state behind shock, upstream conditions calculated via isentropic expansion from input chamber conditions (card set 7)
5	Same as 4, except stagnation state behind shock

COLUMN 2 -- STATE OPTION (pertains to Z, cols. 11-20 of this card)

0	Assigned temperature
2	Assigned enthalpy
3	Assigned entropy

COLUMN 3 -- SPECIES THERMOCHEMICAL DATA

0 9	Use built-in thermochemistry data
0	Use built-in diffusion factor data
12	Read from cards new thermochemistry data, and if provided, diffusion factor data
2	Print out thermochemistry data for allowable species
9	Update diffusion factor data

COLUMN 4 -- CARBON SURFACE SPECIFICATION

1	Layer-oriented PG
2	Edge-oriented PG
3	General Bulk Graphite
4	G-90 Bulk Graphite
5	ATJ Bulk Graphite
6	*Carbitex 700 Carbon/Carbon*
7	PC-901 Carbon/Carbon
8	SiC/PG

COLUMN 5 -- FROZEN – EDGE TEMPERATURE ARRAY

0	Bypass this calculation
1	Use built-in temperature array
2	Read the temperature array from cards (card set 2)

COLUMN 6 -- SURFACE TEMPERATURE ARRAY

0	Bypass this calculation
1	Use built-in temperature array
2	Read the temperature array from cards (card set 3)

NOTE: When KRK(6) $\geq$ 1, GASKET2 automatically provides two equilibrium surface calculations, for 500°K and 1000°K, with the restriction of zero ablation; this is done in order to provide tables for CMA and/or ASTHMA which facilitate smooth interpolation.

COLUMN 7 -- KINETIC CONSTANTS

0	Use built-in Arrhenius/Langmuir model
1 3	Read from cards the pre-exponential factor, B'_m (lb mole reaction/ft^{2}sec), activation energy, E_m (cal/gm mole), and temperature exponent, ϕ_m for both reaction and sublimation kinetics
23	Read from cards the partial pressure multiplicative factors, ψ_{jm} and F_{jm} (atm^{-1}) for reaction kinetics only

COLUMN 8 -- EDGE GAS ELEMENTAL COMPOSITION

1	e.g. does not contain H or O (Kinetically inert surface)
2	e.g. does not contain H (reaction 2. only)
3	e.g. does not contain O (reaction 3. only)
4	e.g. contains both H and O (reactions 1., 2., and 3.)

COLUMN 9 -- PUNCHED CARD OUTPUT

0	No punched card output
1 3	Punch a card appropriate to CMA input for each convergent frozen edge or surface solution
23	Punch a card appropriate to ASTHMA input for each convergent frozen edge or surface solution

COLUMN 10 -- DIAGNOSTIC OUTPUT CONTROL

0	No diagnostic output
1	Output a single line of diagnostic information per iteration
j	(Where j is a digit greater than one) output full diagnostic information for 5(j-1) iterations and output a single line of diagnostic information for subsequent iterations.

FIELD 2 (Columns 11-20, Format F10.5) Thermodynamic State Variable, Z

1) a) If KRK(2) = 0, Z is assigned to temperature, °K
   b) If KRK(2) = 2, Z is assigned to enthalpy, cal/gm
   c) If KRK(2) = 3, Z is assigned to entropy, cal/gm°K

2) a) If KRK(1) = 0, Z pertains to the edge state
   b) If KRK(1) = 1 or 2, Z pertains to the thermodynamic state upstream of a shock wave
   c) If KRK(1) $\geq$ 3, Z pertains to the chamber thermodynamic state
      i) If PC = 0, Z pertains to the actual chamber state
      ii) If PC $\neq$ 0, Z pertains to the ideal chamber state (see PC, Cols. 41-50 of this card)

FIELD 3 (Columns 21-30, Format F10.5) Pressure, PR atm

1) If KRK(1) = 0, PR pertains to the edge thermodynamic state
2) If KRK(1) $\neq$ 0, PR pertains to the actual chamber thermodynamic state or to the thermodynamic state upstream of a shock wave

FIELD 4 (Columns 31-40, Format F10.5) Edge or Shock Upstream Thermodynamic State, ZE

1) If KRK (1) $\leq$ 2, this field is ignored

2) a) If ZE > 0, it is assigned as the pressure, atm, at either the edge (KRK (1) = 3), or the upstream side of a shock wave (KRK(1) = 4 or 5)
   b) If ZE < 0, it is assigned as the Mach number at either the edge (KRK (1) = 3) or the upstream side of a shock wave (KRK(1) = 4 or 5)

FIELD 5 (Columns 41-50, Format F10.5) Ideal Chamber Pressure, PC atm

FIELD 6 (Columns 51-60, Format F10.5) Mass Transfer Coefficient, ROUCM lbm/ft^{2}sec

FIELD 7 (Columns 61-70, Format F10.5) Diffusion Coefficient Exponent for Unequal Diffusion Coefficient Model, GAMER

1) If GAMER = 0.0, it is automatically set to 2/3 (this value is appropriate for most calculations)

2) If GAMER = 10^{-5}, the diffusion model reduces to equal diffusion coefficients

FIELD 8 (Columns 71-80, Format 2A4,A4) Job Title, TILE (3)

CARD 2 If KRK(4) $\neq$ 8, skip this card

FIELD 1 (Columns 1-10, Format F10.0) Mass fraction of SiC in SiC/PG

CARD SET 2 — FROZEN-EDGE TEMPERATURE ARRAY TFA(I) (number of cards = no. of temperatures + 1)

1) If KRK(5) = 0 or 1, skip this card set

2) If KRK(5) = 2, read in an array of no more than eight temperatures, TFA(I) °K

CARD(S) 1,2,... (Columns 1-10, Format F10.5) one temperature per card

FINAL CARD blank

NOTE: The TFA(I) array built into GASKET2 contains temperatures from 500 to 4000°K in 500°K increments

CARD SET 3 — SURFACE TEMPERATURE ARRAY TSA(I) (number of cards = no. of temperatures + 1)

1) IF KRK(6) = 0 or 1, skip this card set

2) If KRK(6) = 2, read in an array of no more than fifteen temperatures, TSA(I) °K

CARD(S) 1,2.... (Columns 1-10, Format F10.5) one temperature per card

FINAL CARD blank

NOTE: The TSA(I) array built into GASKET2 contains temperatures from 1200 to 4000°K in 2000°K increments. Also, whenever KRK(6) $\geq$ 1 two surface equilibrium, zero-ablation calculations are performed for surface temperatures of 500 and 1000°K.

CARD SET 4 — ELEMENTAL COMPOSITION (number of cards = no. of elements +1)

CARD 1 (Columns 1-3, Format I3) the number of elements in the system

CARD 2,3,4 . . . *(one card for each element)*

FIELD 1 (Columns 1-3, Format I3) the atomic number of the element

FIELD 2 (Columns 4-15, Format 3A4) the name of the element (for output identification only)

FIELD 3 (Columns 16-25, Format F10.5) the atomic weight of the element

FIELD 4 (Columns 26-35, Format F10.5) the relative amount of the element in the edge gas (this is the same as the relative amount of the element in the chamber or at the upstream side of a shock wave, since elements are conserved)

1) Positive values are in relative gram-atomic-weights (or moles)

2) Negative values are in relative masses

FIELD 5 (Columns 46-55, Format F10.5) the relative amount of the element in the surface material (the present version of GASKET2 allows the surface to be comprised of carbon only; hence, the quantity 1.0 must be entered in this field for the element carbon)

CARD SET 5 — DIFFUSION FACTOR DATA (number of cards = 1/4 x (7 + no. of data items, e.g., diffusion factors, reference molecular weight, diffusion exponent)

1) If KRK(3) = 0, this card set must be skipped

2) If KRK(3) = 1,2,3, or 4, this card set may be skipped

3) If KRK(3) = 9, this card set must not be skipped

CARD 1 (Columns 1-3, Format I3) the total number of data items (e.g., diffusion factors, reference molecular weight, diffusion exponent) to be entered

Diffusion factors may be specified for any or all species individually and/or diffusion factors may be calculated via

$$\text{Diffusion Factor} = \left(\frac{\text{Molec.Wt.}}{\text{REFM}}\right)^{\text{FFA}}$$

where REFM and FFA may be specified here. For species for which diffusion factors are not specified individually, diffusion factors will be calculated via the above correlation, and if REFM and FFA are not specified, diffusion factors will be calculated from the above with REFM = 23.4 and FFA = 0.431.

CARD(S) 2,3,. . .

FIELDS 1,3,5,7 (Columns 1-8, 21-28, 41-48, 61-68, each Format 2A4)

The "name" of the species for which data is to be provided, exactly as it appears in columns 73-80 of the first card of the 3 thermochemical data cards (card set 6) for that species. To specify values of REFM or FFA in the next field, enter the alpha characters "REFM" or "FFA" respectively here.

FIELDS 2,4,6,8 (Columns 9-20, 29-40, 49-60, 69-80, each Format E12.4)

1) If the name of a chemical species was entered in the preceding field, this number is presumed to be a diffusion factor.

2) If the name REFM or FFA was entered in the preceding field, enter the desired values of REFM or FFA respectively in this field.

The diffusion factors introduced into the solution in this manner replace either the values set automatically (see card 1 above) if the species thermochemical data are read from cards or tape, or the values built into the GASKET2 program (see Volume II).

NOTE: If KRK(3) = 9 and KRK(1) = 1,2,4 or 5, this card set must follow the OBLIQUE OR NORMAL SHOCK DATA card set; if KRK(3) = 1,2,3, or 4 this card set, if used, precedes the SPECIES THERMOCHEMICAL EQUILIBRIUM DATA card set.

CARD SET 6 — SPECIES THERMOCHEMICAL EQUILIBRIUM DATA (number of cards = 1 + 3 x no. of species)

1) If KRK(3) = 0 or 9, skip this card set

2) If KRK(3) = 1,2,3, or 4, read in this card set; there are three of these cards for each molecular, atomic, or condensed species; the end of this card set is signaled by a blank card

CARDS 1,4,7 . . . Describe the elemental composition of the species and establish its name designation

FIELDS 1,3,5,. . ., 13 (one for each element in the species)
(Columns 1-3, 7-9, 13-15,. . ., 37-39, each format F3.0)

The number of atoms (of atomic number given in the following field) in a molecule of this species

(If field 1 is zero, this card is presumed to represent the end of card set 6)

FIELDS 2,4,6,. . ., 14. (one for each element in the species)
(Columns 4-6, 10-12, 16-18,. . ., 40-42, each format I3)

The atomic numbers of the elements in the molecule (the number of atoms of which was given in the previous field)

(If field 2 is zero, this card is presumed to be the first card of card set 5)

FIELD 15 (Columns 42-72, Format 7A4A2) the source and date of the thermochemical data for this specie. Used for output only

FIELD 16 (Columns 73-80, Format 2A4) the name designation of this species (e.g., AL2O3). This variable is used for output and as a means of identifying data entered in card set 5

CARDS 2,5,8. . . Lower temperature range thermochemical data

FIELDS 1,2,3,4,5 and 6 (Columns 1-54, Format 6E9.6) Input the 5 constants (F1,F2, F3,F4,F5,F6) appropriate to the lower temperature range of the thermodynamic data for this species. These constants are defined as follows, where T is in °K:

F1 = the heat of formation of the species at 298°K from the JANNAF base state (elements in most natural form at 298°K) in cal/mole

F2 = the enthalpy change of the species from 298°K to 3000°K in cal/mole

F3,F4 and F5 are defined by a curve fit to the heat capacity at constant pressure of the form:

$$C_p = F3 + F4\ T + \frac{F5}{T^2} \text{ in cal/mole °K}$$

F6 = the entropy of the species at 3000°K in cal/mole °K

FIELD 7 (Columns 61-66, Format F6.0) the upper limit of the lower temperature range in °K

FIELD 8 (Column 67, Format I1) the phase specification:

1 signifies gaseous species
2 signifies solid species
3 signifies liquid species

The only phase combination allowed in one three card set is solid-liquid in which case a 2 and 3 would appear in fields 8 of cards 2 and 3, respectively.

CARDS 3,6,9. . . Upper temperature range thermochemical data

These cards are the same as cards 2,5,8. . . except use constants for the upper temperature range and field 7 is ignored

LAST CARD OF CARD SET 6 MUST BE BLANK

The end of the species thermochemical data is signified by a blank card. Hence, the last card of card set 6 must be a blank card.

NOTE: If this data is read in on cards, the atomic number of C* must be 106, rather than than the actual value of 6. Finally, all condensed phase species (except C*) must follow the gas phase species.

CARD SET 7 — OBLIQUE OR NORMAL SHOCK DATA (1 card)

1) If KRK(1) = 0 or 3, skip this card set

2) If KRK(1) = 1,2,4, or 5, this card set must be read in

FIELD 1 (Column 1, Format I1) Input the variable KVH which determines how the velocity ahead of the shock, the static enthalpy ahead of the shock, and the total enthalpy are calculated (since total enthalpy = static enthalpy + 1/2 velocity^2)

If KVH = 1, velocity is calculated from specified total and static enthalpy

If KVH = 2, total enthalpy is calculated from specified static enthalpy and velocity

If KVH = 3, static enthalpy is calculated from specified total enthalpy and velocity

FIELD 2 (Columns 2-10, Format F9.4) The velocity variable, UR (this field is ignored if KVH = 1)

If UR ≠ -9999, then UR is assigned to SVL, the velocity upstream of the shock in ft/sec

If UR = -9999, the velocity calculated in the prior solution is assigned to SVL

FIELD 3 (Columns 11-20, Format F10.4) The total enthalpy variable, HTR (this field is ignored if KVH = 2)

If HTR ≠ 0, then HTR is assigned to HCH, the total enthalpy of the system in BTU/lbm

If HTR = 0, HCH is unchanged

FIELD 4 (Columns 21-30, Format F10.4) the static enthalpy variable, HSR (This field is ignored if KVH = 3)

If HSR ≠ -9999, then HSR is assigned to SH1, the static enthalpy upstream of the shock in BTU/lbm

If HSR = -9999., the static enthalpy calculated in the prior solution is assigned to SH1

FIELD 5 (Columns 41-50, Format F10.4) the shock angle (0.0 for a normal shock) in degrees

CARD SET 8 — REACTION RATE DATA (number of cards = 3 x MT -10 at maximum)

1) If KRK(7) = 0, skip this card set

2) If KRK(7) = 1 or 3, the first subset of this card set must be read in

3) If KRK(7) = 2 or 3, the second subset of this card set must be read in

First Subset: MT cards

CARDS 1,2, . . ., MT

FIELD 1 (Columns 1-10, Format E10.4), FKF(M) the preexponential factor for the Mth reaction, lb mole/ft^{2}sec atm

FIELD 2 (Columns 11-20, Format E10.4), EAK(M), the activation energy for the Mth forward reaction, cal/gm mole

FIELD 3 (Columns 21-30, Format E10.4), EXK(M), the temperature exponent for the Mth reaction

Second Subset: 2 x MT -10 cards

CARDS MT + 1, MT + 3, MT + 5;. . . 3 x MT -13, 3 x MT -11;

FIELDS 1-6 (Columns 1-10 x 6, Format 8F10.6, inhibiting specie partial pressure coefficient, PSI (J,M), J = 1, 6 atm^{-1}

CARDS MT + 2, MT + 4; MT + 6, 7, . . . 3 x MT - 12, 3 x MT -10

FIELDS 1-6 (Columns 1-10 x 6, Format 8F10.6, inhibiting specie partial pressure coefficient FKK(J,M), J = 1, 6, atm^{-1}

NOTE: MT = no. of reactions

1) IF KRK(8) = 1, MT = 0, kinetics ignored

2) If KRK(8) = 2, MT = 1 + 5 sublimation kinetics reactions

M = 1 $C^* + CO_2 \rightleftarrows 2CO$

J = 1 CO_2

J = 2 CO

3) If KRK(8) = 3, MT = 1 + 5 sublimation kinetics reactions

M = 1 $2C^* + H_2 \rightleftarrows C_2H_2$

J = 1 H_2

4) If KRK(8) = 4, MT = 3 + 5 sublimation kinetics reactions

M = 1 $C^* + H_2O \rightleftarrows CO + H_2$

M = 2 $C^* + CO_2 \rightleftarrows 2CO$

M = 3 $2C^* + H_2 \rightleftarrows C_2H_2$

J = 1 H_2O

J = 2 CO_2

J = 3 CO

J = 4 H_2

J = 5 CLH

J = 6 FH

TO TERMINATE A JOB

KRK(1) = 8 on final card

MULTIPLE JOBS

1) Several jobs may be loaded back to back, with a control card signifying the start of each new job:

CONTROL CARD #1

⋮

ELEMENTAL COMPOSITION #1

⋮

additional data as required for job #1

⋮

```
CONTROL CARD #2
   :
ELEMENTAL COMPOSITION #2
   :
additional data as required for job #2
   :
KRK(1) = 8
```

2) If jobs following the first job have the same elemental composition as the first job, Card Set #4 (ELEMENTAL COMPOSITION) may be replaced by a single blank card for all jobs after the first:

```
CONTROL CARD #1
   :
ELEMENTAL COMPOSITION #1
   :
additional data as required for job #1
   :
CONTROL CARD #2
   :
blank card
   :
additional data as required for job #2
   :
KRK(1) = 8
```

2.2 NEW FORTRAN VARIABLE NAMES USED IN GASKET2

This section describes the names and definitions of the newly introduced FORTRAN variables resulting from the computer code modification. Since this is an addendum to Reference 1, similar format and abbreviations are adopted here.

LIST OF NEW FORTRAN VARIABLES APPEARING IN COMMON STATEMENTS, GASKET2

Variable Name	Description	Routine(s) in Which Variable is Utilized
CPER	Mass fraction of carbon in SiC/PG	KN,IM
FKKS(M)	Same definition as FFX(M)	T,KT
INP(M)	Chemical reaction index (8 = oxidation, 99 = sublimation)	T,KT
NMP(N,M)	Index used to locate the reactants in the thermochemical equilibrium data	T,KT
NMR(N,M)	Index used to locate the products in the thermochemical equilibrium data	T,KT
NPF(N,M)	Index used to locate the poisoning species in the thermochemical equilibrium data	T,KT
NPP(N,M)	Index used to locate the inhibiting species in the thermochemical equilibrium data	T,KT
PERCT	Mass fraction of SiC in SiC/PG	KN,IM
SIPER	Mass fraction of Si in SiC/PG	KN,IM

LIST OF NEW FORTRAN VARIABLES APPEARING IN SUBROUTINE KINET, GASKET2

Variable Name	Description
DBDP	Locally defined variable
VLNI	(-H/RT + S/R) of reactant
VLNII	(-H/RT + S/R) of product
VNNMR	Local variable for VNU(I,J) of reactants
VNNMP	Local variable for VNU(I,J) of products
VNNPP	Local variable for VNU(I,J) of inhibiting species
VNNPF	Local variable for VNU(I,J) of poisoning species
XX(M)	Saved value of preexponential constant

LIST OF NEW FORTRAN VARIABLES APPEARING IN SUBROUTINE THERM GASKET2

Variable Name	
FKKD(I,J,K)	Built-in values for poisoning species
FNAM(I,IZ)	Temporary variable for the chemical symbol of the species involved in the chemical reaction ($IZ \leq 4$ reactants, $5 \leq IZ \leq 8$ products, $9 \leq IZ \leq 16$ inhibiting species, $17 \leq IZ \leq 24$ poisoning species)
FSS(I)	Sublimation constants built-in value
IIZ	Index to define total number of species involved in the chemical reactions
INHB(I)	First four alphanumeric characters for the chemical symbol of the inhibiting species
IRX	Flag indicating type of surface reaction (1 = reactions involved H,O species, 2 = reaction involved O species only, 3 = reaction involved H species only)
MS	Total number of sublimation kinetic reactions
POIS(I,J)	First four alphanumeric characters for the chemical symbol of the poisoning species
PRSP(I,J)	First four alphanumeric characters for the chemical symbol of products
PSID(I,J,K)	Built-in values for inhibiting coefficients
RXSP(I,J)	First four alphanumeric characters for the chemical symbol of reactants
RUCM	Same as ROUCM
SUBC	Locally defined variable

2.3 LISTING OF THE MODIFIED SUBROUTINES

The listing of the following subroutines are given in this section:

- IMELM
- INPUT
- KINET
- OUTPUT
- THERM
- KININ
- ZIPIN
- AFMAT
- ALPST
- BELCH
- CRECT
- GASKET
- MAT 1
- MAT 2
- MAT 3
- PROPS
- SCALE

The modifications made to the subroutines are shown in the right hand side column. The notation "**-n" means that n lines of FORTRAN statements have been deleted preceeding the line where "**-n" appeared. "*COR" indicates the location where new FORTRAN statements are inserted.

```
      SUBROUTINE I4ELM                                                  IMEL0001
C                                                                       IMEL0002
      REAL NFIA(1),NFIB(1),FFIN(1),TAU(10,10)                           IMEL0003
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (FFIN(1),A(101)),    IMEL0004
     1(TAU(1),A(151))                                                   IMEL0005
      DIMENSION TF(180),CIJ(180,1)                                      IMEL0006
      DIMENSION X(1),VLAM(180,1)                                        IMEL0007
C                                                                       IMEL0008
      COMMON          FAMDA(180),FAMDR(180),RB(180,2),RC(180,2),        IMEL0009
     1                RD(180,2),RE(180,2),RF(180,2),TU(180,2),VM(180),  IMEL0010
     2                Y(180),WTM(180),VNU(180,10),FF(180),IFC(180),     IMEL0011
     3                IP(180),CP(180),H(180),SR(180),TC(180),VLNK(180), IMEL0012
     4                E(180),LAMT(180),GAMK(1,1)                        IMEL0013
C                                                                       IMEL0014
      COMMON /PARAM1/ KIN,KOUT,JAN,NOL,NAP,IDC,N,KKX(3),KR(10),TILE(3), IMEL0015
     1                TTMIN,TTMAX,VISC,PR(1)                            IMEL0016
C                                                                       IMEL0017
      COMMON /PARAM2/ KM,SCH,RHO,VEL,B1,NEE,FFA,IS,ISP,P,T,SIP,HIP,     IMEL0018
     1                EL,ENL,FLIQ,NO,TFL,TSPQ,KRALP,CPF,IPF,IEK,AA,TTS, IMEL0019
     2                IN,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMM,    IMEL0020
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUNC,NXC,SA1,      IMEL0021
     4                VMACH,KPZZ,SP1,GAM,THT,MX,DMCHT,HCH,NCV,IRT,      IMEL0022
     5                IFPZ,NOAT,SR1,IXG,SV1,KKJ,IXC,MXG,SH1,NOATO,      IMEL0023
     6                SA2,FFF,WS,RV,CMF,VA,HOS,DUM1,DUM2,EP,IFCJC,      IMEL0024
     7                ISP2,WTG,VMU2,WTL                                 IMEL0025
C                                                                       IMEL0026
      COMMON /ARRAYS/ A(16,16),B(16),U(3),XC(50),XG(50),ZKF(10),        IMEL0027
     1                TLO(10),DMCLO(10),WALJP(10),EB(10),ALP(10),       IMEL0028
     2                GAMH(10),GAMF(10),TO(10,3),TK(10,3),WAT(10),      IMEL0029
     3                IP(10),IOAT(10),KAT(10),UP(10,10),FPL(10)         IMEL0030
      EQUIVALENCE (TU(181),TF(1)), (VNU(1),CIJ(1))                      IMEL0031
C                                                                       IMEL0032
      COMMON /KINCTX/ MT,FKF(50),EAK(50),FYK(50),PNU(10,50),RNU(10,50), IMEL0033
     1                PMR(50),PKKK(50)                                                          *COR
C                                                                       IMEL0035                **-1
      EQUIVALENCE (B(1),X(1)), (GAMK(1),VLAM(1))                        IMEL0036
C                                                                       IMEL0037
      COMMON /DIFFER/ IC(11),ALPT(10),C(10),SORCE(6),RA(2),IM(10),      IMEL0038
     1                II,KK,J,VINT,YINT,JAT(10),LIM(10,10),FAMA(10),    IMEL0039
     2                FAMB(10),KPRA(2)                                  IMEL0040
C                                                                       IMEL0041
      DIMENSION ATA(10),ATB(10),ATC(10)                                 IMEL0042
      EQUIVALENCE (TO(1),ATA(1)), (TO(11),ATB(1)), (TO(21),ATC(1))      IMEL0043
C                                                                       IMEL0044
      COMMON/CARKIN/ KRK(10),RGUCM,NCC                                  IMEL0046                **-1
      COMMON/STOPG/ PERCT,SIPER,CPER                                                            *COR
      DATA DC,EG,FG/4H SIL,4HICON,4H    /                                                       *COR
      DATA AG,BG,CG/4H GRA,4HPHIT,4HE   /                               IMEL0048                **-1
      IF (NCC-1) 70,5,70                                                                        *COR
    5 READ (KIN,135) IS                                                 IMEL0050                **-1
      IF (IS-10) 10,10,130                                              IMEL0051
   10 IF (IS) 25,15,25                                                  IMEL0052
   15 IS=ISS                                                            IMEL0053
      GO TO 70                                                                                  *COR
```

```
   25    READ (KIN,140) (KAT(J),ATA(J),ATB(J),ATC(J),WAT(J),TK(J,1),TK(J,2)IMEL0059                    **-5
        1,TK(J,3),I=1,IS)                                                IMEL0060
         DO 37 I=1,IS                                                                                  *COR
         IF (KAT(I)-14) 37,38,37                                                                       *COR
      37 IF (KRK(4) .LT. 8) GO TO 36                                                                   *COR
         IS=IS+1                                                                                       *COR
         KAT(IS)=14                                                                                    *COR
         ATA(IS)=DG                                                                                    *COR
         ATB(IS)=EG                                                                                    *COR
         ATC(IS)=FG                                                                                    *COR
         WAT(IS)=20.09                                                                                 *COR
         TK(IS,1)=0.0                                                                                  *COR
         TK(IS,2)=0.0                                                                                  *COR
         TK(IS,3)=-SIPER                                                                               *COR
         GO TO 36                                                                                      *COR
      38 IF (KRK(4) .EQ. 8) TK(I,3)=-SIPER                                                             *COR
      36 DO 45 I=1,IS                                                                                  *COR
         IF (KAT(I)-6) 45,30,45                                                                        *COR
   30    ICAR=I                                                           IMEL0063                    **-2
   45    CONTINUE                                                         IMEL0067                    **-3
         IS=IS+1                                                          IMEL0068
         ISS=IS                                                           IMEL0069
         KAT(IS)=106                                                      IMEL0070
         ATA(IS)=AG                                                       IMEL0071
         ATB(IS)=BG                                                       IMEL0072
         ATC(IS)=CG                                                       IMEL0073
         WAT(IS)=12.011                                                   IMEL0074
         TK(IS,1)=0.0                                                     IMEL0075
         TK(IS,2)=0.0                                                     IMEL0076
         TK(IS,3)=TK(ICAR,3)                                              IMEL0077
         IF (KRK(4) .EQ. 8) TK(IS,3)=-CPER                                                             *COR
         TK(ICAR,2)=1.0                                                                                *COR
         TK(ICAR,3)=1.0E-19                                               IMEL0078
   70    DO 105 K=1,3                                                     IMEL0100                    *-21
         VA=0.                                                            IMEL0101
         DO 90 J=1,IS                                                     IMEL0102
         IF (KAT(J) - 99) 75,85,75                                        IMEL0103
   75    IF (TK(J,K)) 80,90,85                                            IMEL0104
   80    VA=VA-TK(J,K)                                                    IMEL0105
         TK(J,K)=-TK(J,K)/WAT(J)                                          IMEL0106
         GO TO 90                                                         IMEL0107
   85    VA=VA+TK(J,K)*WAT(J)                                             IMEL0108
   90    CONTINUE                                                         IMEL0109
         IF (VA) 95,105,95                                                IMEL0110
   95    DO 100 J=1,IS                                                    IMEL0111
  100    TK(J,K)=TK(J,K)/VA                                               IMEL0112
  105    CONTINUE                                                         IMEL0113
         WRITE (KOUT,145) (KAT(J),ATA(J),ATB(J),ATC(J),WAT(J),TK(J,1),    IMEL0114
        1   TK(J,3),J=1,IS)                                               IMEL0115
         ISP=IS+1                                                         IMEL0116
         IF (KR(3)) 115,115,110                                           IMEL0117
  110    IF (KR(3) - 9) 125,115,125                                       IMEL0118
  115    CONTINUE                                                         IMEL0119
         DO 120 L=1,3                                                     IMEL0120
         DO 120 I=1,IS                                                    IMEL0121
         TC(I,L)=0.                                                       IMEL0122
         DO 120 K=1,IS                                                    IMEL0123
```

```
      120   TG(I,L)=TG(I,L)+UM(I,K)*TK(K,L)                                  IMEL0124
      125   RETURN                                                           IMEL0125
      130   WRITE (KOUT,150)                                                 IMEL0126
            STOP                                                             IMEL0127
      C                                                                      IMEL0128
      135   FORMAT  (I3)                                                     IMEL0129
      140   FORMAT (I3,3A4,4F10.5)                                           IMEL0130
      145   FORMAT (54H0RELATIVE ELEMENTAL COMPOSITIONS, ATOMIC WTS/UNIT MASS IMEL0131
            1 /6X6HAT.NO.3X7HELEMENT4X9HATOMIC WTS3X21HEDGE GAS      SURFACE/(7XIMEL0132
            2I3,3X3A4,F10.5,2F13.7))                                         IMEL0133
      150   FORMAT (/////40X,31HPROGRAM LIMITED TO 10 ELEMENTS  )            IMEL0134
            END                                                              IMEL0135
```

```
      SUBROUTINE  INPUT                                                 INPU0001
      COMMON/ACC1/GAMMX,REEM,PCH,ACHSQ,SQMAK,SXF                        INPU0003                                  **-1
C                                                                       INPU0004
      REAL NFIA(1),NFIB(1),FFIB(1),TAU(10,10)                           INPU0005
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (FFIB(1),A(101)),    INPU0006
     1(TAU(1),A(151))                                                   INPU0007
      DIMENSION TF(180),CIJ(180,1)                                      INPU0008
      DIMENSION X(1),VLAM(180,1)                                        INPU0009
C                                                                       INPU0010
      COMMON            FAMDA(180),FAMDB(180),RH(180,2),RC(180,2),      INPU0011
     1                  RD(180,2),RE(180,2),RF(180,2),TU(180,2),VS(180),INPU0012
     2                  Y(180),WTM(180),VMU(180,10),FF(180),IFC(180),   INPU0013
     3                  IP(180),CP(180),H(180),SH(180),TC(180),VLDK(180),INPU0014
     4                  F(180),LAMT(180),GAMK(1,1)                      INPU0015
C                                                                       INPU0016
      COMMON /PARAM1/ KIN,KOUT,JAN,NOL,NAF,IDC,N,KKX(3),KR(10),TILF(3), INPU0017
     1                TTRIN,TTMAX,VISC,PR(1)                            INPU0018
C                                                                       INPU0019
      COMMON /PARAM2/ RH,SCH,RHO,VEL,R1,REF,FFA,TS,ISP,P,T,STF,HTP,     INPU0020
     1                EL,FNL,FLIO,NC,IFL,ISPG,KPALP,CPF,IRF,IFK,AA,TTS, INPU0021
     2                IN,II,TT,MODE,HFELT,SXELT,IXAX,TMIN,REELT,SUXN,   INPU0022
     3                SUPL,JC,HG,CPG,SVA,SVP,SVC,SVD,SUEC,NXC,SA1,      INPU0023
     4                VMACH,KRZZ,SP1,GAM,THT,MX,DPCHT,HCP,NCV,TMT,      INPU0024
     5                IFRZ,NOAT,SR1,IXG,SV1,KKJ,IXC,NXG,SH1,NOATO,      INPU0025
     6                SA2,FFF,WS,RV,CMF,VA,HGS,RUN1,RUN2,FP,IFCJC,      INPU0026
     7                ISP2,WTG,VMU2,WTL                                 INPU0027
C                                                                       INPU0028
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKE(10),        INPU0029
     1                TLO(10),DHCLO(10),WALJP(10),FR(10),ALP(10),       INPU0030
     2                GAMS(10),GAME(10),TC(10,3),TK(10,5),WAT(10),      INPU0031
     3                IR(10),IGAT(10),KAT(10),UP(10,10),FRL(10)         INPU0032
      EQUIVALENCE (IR(161),TF(1)), (VMU(1),CIJ(1))                      INPU0033
C                                                                       INPU0034
      COMMON /KINETX/ N1,FKE(50),FAK(50),FXK(50),PFU(10,50),RKU(10,50), INPU0035
     1                PIP(50),PKKK(50)                                                                            *COR
C                                                                       INPU0037                                  **-1
      EQUIVALENCE (B(1),X(1)), (GAMK(1),VLAM(1))                        INPU0038
C                                                                       INPU0039
      COMMON /DIFFER/ IC(11),ALPT(10),C(10),SORCE(8),RA(2),TM(10),      INPU0040
     1                II,KK,J,VIMT,YINT,JAT(10),LIM(10,10),FAMA(10),    INPU0041
     2                FAMB(10),KPHA(2)                                  INPU0042
C                                                                       INPU0043
      DIMENSION ATA(10),ATB(10),ATC(10)                                 INPU0044
      EQUIVALENCE (TM(1),ATA(1)), (TM(11),ATB(1)), (TM(21),ATC(1))      INPU0045
C                                                                       INPU0046
      COMMON /CARRIE/ KPK(10),RDUCM,NCC                                 INPU0047
      DIMENSION ALPTD(7,345),JATD(7,345),SORCD(8,345),ARDAD(345),                                               *COR
     *ARCBD(345),SAD(2,345),RDF(2,345),RCF(2,345),RDD(2,345),RED(2,345),                                        *COR
     *REF(2,345),TUD(2,345),KPHAD(2,345)                                                                        *COR
      DIMENSION ALPTX(2415),JATX(2415),SORCX(2760),RAX(690),RBX(690),                                           *COR
     *RCX(690),RDX(690),RFX(690),RFX(690),TUX(690),KPHAX(690)                                                   *COR
C                                                                       INPU0055                                  **-7
      EQUIVALENCE  (ALPTX,ALPTD),  (JATX,JATD),  (SORCX,SORCD),         INPU0056
     1             (RAX,RAD),      (RBX,RBD),    (RCX,RCD),             INPU0057
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      2              (REX,RE0),        (REX,RE0),      (REX,RE0),                INPU0058
      3              (TUX,TU0),        (KPHAX,KPHA0)                             INPU0059
C                                                                                 INPU0060
      DATA (ALPTX(I),I=1,139)/                                                                    *COR
     * 1., 2., 0., 0., 0., 0., 0., 2., 0., 0., 0., 0., 0., 0., 2., 1.,  INPU0062                  *COR
     * 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 0., 0., 0.,  INPU0063                  *COR
     * 0., 0., 0., 2., 2., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0.,  INPU0064                  *COR
     * 0., 1., 1., 0., 0., 0., 0., 0., 1., 0., 0., 0., 0., 0., 0., 2.,  INPU0065                  *COR
     * 0., 0., 0., 0., 0., 0., 3., 0., 0., 0., 0., 0., 0., 4., 0., 0.,  INPU0066                  *COR
     * 0., 0., 0., 0., 5., 0., 0., 0., 0., 0., 0.,                                                *COR
     * 1., 0., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 1.,  INPU0068                  *COR
     * 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 0., 1., 1., 2., 0.,  INPU0069                  *COR
     * 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 1., 2., 0., 0., 0., 0./  INPU0070                  *COR
      DATA (ALPTX(I),I=140,283)/                                                                  *COR
     * 0., 1., 2., 1., 0., 0., 0., 0., 1., 3., 0., 0., 0., 0., 0., 1.,  INPU0073                  *COR
     * 1., 0., 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 1., 2., 0.,  INPU0074                  *COR
     * 0., 0., 0., 0., 1., 3., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0.,  INPU0075                  *COR
     * 0., 0., 1., 1., 1., 0., 0., 0., 0., 1., 1., 2., 0., 0., 0., 0.,  INPU0076                  *COR
     * 1., 1., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 2., 6.,  INPU0077                  *COR
     * 0., 0., 0., 0., 0., 2., 1., 0., 0., 0., 0., 0., 2., 2., 0., 0.,  INPU0078                  *COR
     * 0., 0., 0., 1., 0., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0.,  INPU0079                  *COR
     * 0., 1., 1., 1., 0., 0., 0., 0., 1., 1., 2., 0., 0., 0., 0., 1.,  INPU0080                  *COR
     * 1., 1., 0., 0., 0., 0., 1., 2., 0., 0., 0., 0., 0., 1., 2., 1./  INPU0081                  *COR
      DATA (ALPTX(I),I=284,043)/                                                                  *COR
     * 0., 0., 0., 0., 1., 3., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0.,  INPU0083                  *COR
     * 0., 0., 1., 1., 1., 0., 0., 0., 0., 1., 2., 0., 0., 0., 0., 0.,  INPU0084                  *COR
     * 1., 3., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 1.,  INPU0085                  *COR
     * 1., 0., 3., 0., 0., 1., 1., 2., 0., 0., 0., 0., 1., 2., 0., 0.,  INPU0086                  *COR
     * 0., 0., 0., 1., 2., 2., 0., 0., 0., 0., 1., 3., 0., 0., 0., 0.,  INPU0087                  *COR
     * 0., 1., 2., 3., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1.,  INPU0088                  *COR
     * 1., 0., 0., 0., 0., 0., 2., 0., 0., 0., 0., 0., 0., 2., 4., 0.,  INPU0089                  *COR
     * 0., 0., 0., 0., 2., 4., 0., 0., 0., 0., 0., 2., 2., 0., 0., 0.,  INPU0090                  *COR
     * 0., 0., 2., 3., 0., 0., 0., 0., 0., 3., 3., 3., 0., 0., 0., 0.,  INPU0091                  *COR
     * 3., 3., 3., 0., 0., 0., 0., 3., 3., 0., 0., 0., 0., 0., 3., 6./  INPU0092                  *COR
      DATA (ALPTX(I),I=044,087)/                                                                  *COR
     * 3., 0., 0., 0., 0., 5., 9., 0., 0., 0., 0., 0.,10.,14., 0., 0.,  INPU0094                  *COR
     * 0., 0., 0., 1., 0., 0., 0., 0., 0., 0., 2., 1., 0., 0., 0., 0.,  INPU0095                  *COR
     * 0., 1., 1., 0., 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 1.,  INPU0096                  *COR
     * 2., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 2., 0.,  INPU0097                  *COR
     * 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 1., 1., 0., 0.,  INPU0098                  *COR
     * 0., 0., 1., 2., 0., 0., 0., 0., 0., 1., 2., 2., 0., 0., 0., 0.,  INPU0099                  *COR
     * 1., 1., 0., 0., 0., 0., 0., 2., 4., 0., 0., 0., 0., 0., 2., 2.,  INPU0100                  *COR
     * 0., 0., 0., 0., 0., 3., 3., 0., 0., 0., 0., 0., 0., 0., 0., 0.,  INPU0101                  *COR
     * 0., 0., 0., 5., 5., 0., 0., 0., 0., 0., 6., 6., 0., 0., 0., 0./  INPU0102                  *COR
      DATA (ALPTX(I),I=088,747)/                                                                  *COR
     * 0., 1., 1., 0., 0., 0., 0., 0., 1., 1., 1., 1., 0., 0., 0., 1.,  INPU0104                  *COR
     * 1., 3., 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 1., 2., 1.,  INPU0105                  *COR
     * 0., 0., 0., 0., 1., 3., 1., 0., 0., 0., 0., 1., 3., 0., 0., 0.,  INPU0106                  *COR
     * 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0.,  INPU0107                  *COR
     * 1., 2., 0., 0., 0., 0., 0., 1., 2., 1., 0., 0., 0., 0., 1., 3.,  INPU0108                  *COR
     * 0., 0., 0., 0., 0., 1., 0., 0., 0., 0., 0., 0., 1., 1., 0., 0.,  INPU0109                  *COR
     * 0., 0., 0., 1., 1., 1., 2., 0., 0., 0., 1., 1., 2., 1., 0., 0.,  INPU0110                  *COR
     * 0., 1., 1., 3., 0., 0., 0., 0., 1., 1., 1., 1., 0., 0., 0., 1.,  INPU0111                  *COR
     * 1., 3., 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 1., 1., 1.,  INPU0112                  *COR
     * 1., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 1., 2., 0., 0., 0./  INPU0113                  *COR
      DATA (ALPTX(I),I=748,991)/                                                                  *COR
     * 0., 0., 1., 2., 1., 1., 0., 0., 0., 1., 2., 2., 0., 0., 0., 0.,  INPU0115                  *COR
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     * 1., 2., 2., 0., 0., 0., 0., 1., 2., 1., 0., 0., 0., 0., 1., 3.,  INPU0116                    *COR
     * 0., 0., 0., 0., 0., 1., 3., 1., 0., 0., 0., 1., 0., 1., 3., 3., 1.,  INPU0117                    *COR
     * 0., 0., 0., 1., 3., 1., 0., 0., 0., 0., 1., 3., 3., 1., 0., 0.,  INPU0118                    *COR
     * 0., 1., 4., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 2.,  INPU0119                    *COR
     * 2., 0., 0., 0., 0., 0., 2., 4., 0., 0., 0., 0., 0., 2., 4., 0.,  INPU0120                    *COR
     * 0., 0., 0., 0., 2., 4., 1., 0., 0., 0., 0., 2., 2., 0., 0., 0.,  INPU0121                    *COR
     * 0., 0., 3., 2., 0., 0., 0., 0., 0., 4.,12., 1., 0., 0., 0., 0.,  INPU0122                    *COR
     * 4., 2., 0., 0., 0., 0., 0., 1., 0., 0., 0., 0., 0., 0., 1., 1./  INPU0123                    *COR
      DATA (ALPTX(I),I=892,1051)/                                                                   *COR
     * 0., 0., 0., 0., 0., 1., 1., 2., 0., 0., 0., 0., 1., 1., 3., 0.,  INPU0125                    *COR
     * 0., 0., 0., 1., 3., 0., 0., 0., 0., 0., 1., 3., 1., 0., 0., 0.,  INPU0126                    *COR
     * 0., 1., 1., 1., 0., 0., 0., 0., 1., 3., 1., 0., 0., 0., 0., 1.,  INPU0127                    *COR
     * 1., 0., 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 1., 1., 1.,  INPU0128                    *COR
     * 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 2., 0., 0., 0.,  INPU0129                    *COR
     * 0., 0., 1., 1., 0., 0., 0., 0., 0., 2., 2., 1., 0., 0., 0., 0.,  INPU0130                    *COR
     * 2., 2., 0., 0., 0., 0., 0., 2., 1., 0., 0., 0., 0., 0., 2., 1.,  INPU0131                    *COR
     * 0., 0., 0., 0., 0., 3., 1., 1., 0., 0., 0., 0., 3., 1., 1., 0.,  INPU0132                    *COR
     * 0., 0., 0., 3., 3., 0., 0., 0., 0., 0., 4., 1., 0., 0., 0., 0.,  INPU0133                    *COR
     * 0., 1., 0., 0., 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 1./  INPU0134                    *COR
      DATA (ALPTX(I),I=1052,1195)/                                                                  *COR
     * 3., 1., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 1., 1.,  INPU0136                    *COR
     * 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 1., 1., 0., 0.,  INPU0137                    *COR
     * 0., 0., 4., 1., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0.,  INPU0138                    *COR
     * 1., 1., 0., 0., 0., 0., 0., 2., 2., 1., 0., 0., 0., 0., 2., 2.,  INPU0139                    *COR
     * 0., 0., 0., 0., 0., 2., 1., 0., 0., 0., 0., 0., 2., 1., 0., 0.,  INPU0140                    *COR
     * 0., 0., 0., 3., 1., 1., 0., 0., 0., 0., 3., 3., 0., 0., 0., 0.,  INPU0141                    *COR
     * 0., 3., 1., 0., 0., 0., 0., 0., 1., 0., 0., 0., 0., 0., 0., 1.,  INPU0142                    *COR
     * 1., 0., 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 1., 1., 0.,  INPU0143                    *COR
     * 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0./                              *COR
      DATA (ALPTX(I),I=1196,1355)/                                                                  *COR
     * 0., 0., 2., 2., 2., 0., 0., 0., 0., 2., 1., 0., 0., 0., 0., 0.,  INPU0145                    *COR
     * 2., 2., 0., 0., 0., 0., 0., 3., 1., 0., 0., 0., 0., 0., 4., 2.,  INPU0147                    *COR
     * 0., 0., 0., 0., 0., 4., 1., 0., 0., 0., 0., 0., 1., 0., 0., 0.,  INPU0148                    *COR
     * 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0.,  INPU0149                    *COR
     * 0., 2., 0., 0., 0., 0., 0., 0., 2., 1., 0., 0., 0., 0., 0., 1.,  INPU0150                    *COR
     * 0., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 2., 0.,  INPU0151                    *COR
     * 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 2., 1., 0., 0., 0.,  INPU0152                    *COR
     * 0., 0., 2., 3., 0., 0., 0., 0., 0., 2., 4., 0., 0., 0., 0., 0.,  INPU0153                    *COR
     * 2., 5., 0., 0., 0., 0., 0., 1., 0., 0., 0., 0., 0., 0., 1., 1.,  INPU0154                    *COR
     * 0., 0., 0., 0., 0., 2., 1., 0., 0., 0., 0., 0., 3., 0., 0., 0./  INPU0155                    *COR
      DATA (ALPTX(I),I=1356,1499)/                                                                  *COR
     * 0., 0., 0., 1., 0., 0., 0., 0., 0., 0., 2., 0., 0., 0., 0., 0.,  INPU0157                    *COR
     * 0., 3., 0., 0., 0., 0., 0., 0., 1., 2., 2., 0., 0., 0., 0., 1.,  INPU0158                    *COR
     * 2., 1., 0., 0., 0., 0., 1., 2., 1., 0., 0., 0., 0., 1., 1., 1.,  INPU0159                    *COR
     * 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 2., 6., 0., 0., 0.,  INPU0160                    *COR
     * 0., 0., 1., 1., 2., 0., 0., 0., 0., 1., 1., 2., 0., 0., 0., 0.,  INPU0161                    *COR
     * 1., 4., 1., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 2.,  INPU0162                    *COR
     * 1., 1., 0., 0., 0., 2., 1., 4., 0., 0., 0., 0., 1., 3., 1., 0.,  INPU0163                    *COR
     * 0., 0., 0., 1., 1., 2., 0., 0., 0., 0., 2., 1., 0., 0., 0., 0.,  INPU0164                    *COR
     * 0., 3., 1., 2., 3., 0., 0., 0., 3., 2., 1., 3., 0., 0., 0., 3./  INPU0165                    *COR
      DATA (ALPTX(I),I=1500,1659)/                                                                  *COR
     * 3., 3., 0., 0., 0., 0., 1., 1., 3., 0., 0., 0., 0., 1., 1., 1.,  INPU0167                    *COR
     * 0., 0., 0., 0., 1., 2., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0.,  INPU0168                    *COR
     * 0., 0., 1., 1., 2., 0., 0., 0., 0., 1., 1., 2., 0., 0., 0., 0.,  INPU0169                    *COR
     * 1., 1., 3., 0., 0., 0., 0., 2., 1., 0., 0., 0., 0., 0., 2., 1.,  INPU0170                    *COR
     * 1., 0., 0., 0., 0., 3., 1., 0., 0., 0., 0., 0., 1., 1., 1., 0.,  INPU0171                    *COR
     * 0., 0., 0., 4., 2., 0., 0., 0., 0., 0., 1., 2., 0., 0., 0., 0.,  INPU0172                    *COR
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 * 0., 2., 2., 0., 0., 0., 0., 0., 2., 4., 0., 0., 0., 0., 0., 1.,  INPU0173                    *COR
 * 3., 0., 0., 0., 0., 0., 1., 4., 1., 0., 0., 0., 0., 1., 2., 0.,  INPU0174                    *COR
 * 0., 0., 0., 0., 1., 3., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0.,  INPU0175                    *COR
 * 0., 0., 2., 2., 0., 0., 0., 0., 0., 2., 2., 0., 0., 0., 0., 0./  INPU0176                    *COR
  DATA (ALPTX(I),I=1660,1803)/                                                                  *COR
 * 1., 2., 1., 0., 0., 0., 0., 2., 4., 4., 0., 0., 0., 0., 1., 1.,  INPU0178                    *COR
 * 2., 0., 0., 0., 0., 1., 1., 2., 0., 0., 0., 0., 2., 1., 0., 0.,  INPU0179                    *COR
 * 0., 0., 0., 2., 2., 1., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0.,  INPU0180                    *COR
 * 0., 1., 2., 0., 0., 0., 0., 0., 2., 1., 0., 0., 0., 0., 0., 1.,  INPU0181                    *COR
 * 5., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 2., 0.,  INPU0182                    *COR
 * 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 2., 1., 0., 0., 0.,  INPU0183                    *COR
 * 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 2., 0., 0., 0., 0., 0.,  INPU0184                    *COR
 * 2., 1., 0., 0., 0., 0., 0., 2., 1., 0., 0., 0., 0., 0., 1., 2.,  INPU0185                    *COR
 * 0., 0., 0., 0., 0., 2., 4., 0., 0., 0., 0., 0., 2., 6., 0., 0./  INPU0186                    *COR
  DATA (ALPTX(I),I=1804,2026)/                                                                  *COR
 * 0., 0., 0., 2., 1., 1., 0., 0., 0., 0., 1., 2., 0., 0., 0., 0.,  INPU0188                    *COR
 * 0., 2., 2., 0., 0., 0., 0., 0., 2., 1., 1., 0., 0., 0., 0., 1.,  INPU0189                    *COR
 * 1., 1., 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 2., 3., 1.,  INPU0190                    *COR
 * 0., 0., 0., 0., 3., 1., 0., 0., 0., 0., 0., 2., 6., 0., 0., 0.,  INPU0191                    *COR
 * 0., 0., 3., 1., 1., 0., 0., 0., 0., 2., 0., 0., 0., 0., 0., 0.,  INPU0192                    *COR
 * 2., 0., 0., 0., 0., 0., 0., 2., 0., 0., 0., 0., 0., 0., 2., 0.,  INPU0193                    *COR
 * 0., 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 3., 0., 0., 0.,  INPU0194                    *COR
 * 0., 0., 0., 2., 4., 1., 0., 0., 0., 0., 1., 0., 0., 0., 0., 0.,  INPU0195                    *COR
 * 0., 3., 2., 0., 0., 0., 0., 0., 6., 2., 0., 0., 0., 0., 0., 1.,                              *COR
 * 3., 0., 0., 0., 0., 0., 2., 3., 0., 0., 0., 0., 0., 3., 3., 0.,                              *COR
 * 0., 0., 0., 0., 4., 3., 0., 0., 0., 0., 0., 5., 3., 0., 0., 0.,                              *COR
 * 0., 0., 1., 4., 0., 0., 0., 0., 0., 2., 4., 0., 0., 0., 0.,                                  *COR
 * 0., 1., 0., 0., 0., 0., 0., 0., 2., 2., 0., 0., 0., 0., 0., 1.,  INPU0196                    *COR
 * 6., 3., 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 3., 3., 3./  INPU0197                    *COR
  DATA (ALPTX(I),I=2027,2170)/                                                                  *COR
 * 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 2., 2., 0., 0., 0.,  INPU0199                    *COR
 * 0., 0., 1., 4., 1., 0., 0., 0., 0., 1., 4., 1., 4., 0., 0., 0.,  INPU0200                    *COR
 * 1., 1., 4., 0., 0., 0., 0., 1., 2., 2., 0., 0., 0., 0., 1., 3.,  INPU0201                    *COR
 * 0., 0., 0., 0., 0., 1., 3., 0., 0., 0., 0., 0., 1., 1., 2., 0.,  INPU0202                    *COR
 * 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 2., 5., 1., 0., 0., 0.,  INPU0203                    *COR
 * 0., 3., 0., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1.,  INPU0204                    *COR
 * 0., 0., 0., 0., 0., 0., 3., 1., 0., 0., 0., 0., 0., 4., 3., 0.,  INPU0205                    *COR
 * 0., 0., 0., 0., 2., 4., 1., 0., 0., 0., 0., 1., 0., 0., 0., 0.,  INPU0206                    *COR
 * 0., 0., 2., 3., 0., 0., 0., 0., 0., 1., 0., 0., 0., 0., 0., 0./  INPU0207                    *COR
  DATA (ALPTX(I),I=2171,2330)/                                                                  *COR
 * 2., 3., 0., 0., 0., 0., 0., 1., 4., 0., 0., 0., 0., 0., 1., 0.,  INPU0209                    *COR
 * 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 2., 0., 0.,  INPU0210                    *COR
 * 0., 0., 0., 3., 2., 0., 0., 0., 0., 0., 1., 1., 0., 0., 0., 0.,  INPU0211                    *COR
 * 0., 1., 1., 0., 0., 0., 0., 0., 1., 1., 1., 0., 0., 0., 0., 2.,  INPU0212                    *COR
 * 1., 0., 0., 0., 0., 0., 2., 1., 0., 0., 0., 0., 0., 1., 0., 0.,  INPU0213                    *COR
 * 0., 0., 0., 0., 1., 1., 2., 0., 0., 0., 0., 1., 2., 0., 0., 0.,  INPU0214                    *COR
 * 0., 0., 1., 2., 0., 0., 0., 0., 0., 2., 3., 1., 0., 0., 0., 0.,  INPU0215                    *COR
 * 2., 1., 4., 0., 0., 0., 0., 4., 2., 7., 0., 0., 0., 0., 5., 2.,  INPU0216                    *COR
 *10., 0., 0., 0., 0., 4., 2.,13., 0., 0., 0., 0., 2., 4., 4., 0.,  INPU0217                    *COR
 * 0., 0., 0., 1., 2., 3., 0., 0., 0., 0., 1., 3., 1., 0., 0., 0./  INPU0218                    *COR
  DATA (ALPTX(I),I=2331,2415)/                                                                  *COR
 * 0., 1., 4., 2., 0., 0., 0., 0., 6.,13., 2., 0., 0., 0., 0., 2.,  INPU0220                    *COR
 * 3., 6., 0., 0., 0., 0., 3., 3., 3., 0., 0., 0., 0.,10.,14., 0.,  INPU0221                    *COR
 * 0., 0., 0., 0., 1., 1., 0., 0., 0., 0., 0., 1., 1., 2., 0., 0.,  INPU0222                    *COR
 * 0., 0., 1., 3., 3., 0., 0., 0., 0., 5., 9., 0., 0., 0., 0., 0.,  INPU0223                    *COR
 * 1., 4., 1., 0., 0., 0., 0., 1., 4., 1., 0., 0., 0., 0., 2., 5.,  INPU0224                    *COR
 * 2., 0., 0., 0., 0./                                              INPU0225                    *COR
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      DATA (JATX(I),I=1,139)/                                                   *COR
     * 6, 8, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 1, 8,  INPU0227                *COR
     * 0, 0, 0, 0, 0, 6, 8, 0, 0, 0, 0, 0,106, 0, 0, 0,  INPU0228                *COR
     * 0, 0, 0, 6, 1, 0, 0, 0, 0, 0, 17, 1, 0, 0, 0, 0,  INPU0229                *COR
     * 0, 9, 1, 0, 0, 0, 0, 0, 6, 0, 0, 0, 0, 0, 0, 6,  INPU0230                *COR
     * 0, 0, 0, 0, 0, 0, 6, 0, 0, 0, 0, 0, 0, 6, 0, 0,  INPU0231                *COR
     * 0, 0, 0, 0, 6, 0, 0, 0, 0, 0, 0,                                          *COR
     * 13, 0, 0, 0, 0, 0, 0, 6, 13, 0, 0, 0, 0, 0, 13, 17,  INPU0234             *COR
     * 0, 0, 0, 0, 0, 13, 17, 9, 0, 0, 0, 0, 13, 17, 9, 0,  INPU0235             *COR
     * 0, 0, 0, 13, 17, 8, 0, 0, 0, 0, 13, 17, 0, 0, 0, 0/  INPU0236             *COR
      DATA (JATX(I),I=140,283)/                                                 *COR
     * 0, 13, 17, 9, 0, 0, 0, 0, 13, 17, 0, 0, 0, 0, 0, 13,  INPU0238             *COR
     * 9, 0, 0, 0, 0, 0, 13, 9, 0, 0, 0, 0, 0, 13, 9, 0,  INPU0239               *COR
     * 0, 0, 0, 0, 13, 9, 0, 0, 0, 0, 0, 13, 1, 0, 0, 0,  INPU0240               *COR
     * 0, 0,995, 1, 8, 0, 0, 0, 0, 13, 1, 8, 0, 0, 0, 0,  INPU0241               *COR
     * 13, 7, 0, 0, 0, 0, 0, 13, 8, 0, 0, 0, 0, 0, 13, 17,  INPU0242              *COR
     * 0, 0, 0, 0, 0, 13, 8, 0, 0, 0, 0, 0, 13, 6, 0, 0,  INPU0243               *COR
     * 0, 0, 0, 5, 0, 0, 0, 0, 0, 0, 5, 17, 0, 0, 0, 0,  INPU0244               *COR
     * 0, 5, 17, 9, 0, 0, 0, 0, 5, 17, 9, 0, 0, 0, 0, 5,  INPU0245               *COR
     * 17, 8, 0, 0, 0, 0, 5, 17, 0, 0, 0, 0, 0, 5, 17, 9/  INPU0246              *COR
      DATA (JATX(I),I=284,443)/                                                 *COR
     * 0, 0, 0, 0, 5, 17, 0, 0, 0, 0, 0, 5, 9, 0, 0, 0,  INPU0248               *COR
     * 0, 0, 5, 9, 8, 0, 0, 0, 0, 5, 9, 0, 0, 0, 0, 0,  INPU0249               *COR
     * 5, 9, 0, 0, 0, 0, 0, 5, 1, 0, 0, 0, 0, 0, 5, 1,  INPU0250               *COR
     * 8, 0, 0, 0, 0, 5, 1, 8, 0, 0, 0, 0, 5, 1, 0, 0,  INPU0251               *COR
     * 0, 0, 0, 5, 1, 8, 0, 0, 0, 0, 5, 1, 0, 0, 0, 0,  INPU0252               *COR
     * 0, 5, 1, 8, 0, 0, 0, 0, 5, 7, 0, 0, 0, 0, 0, 5,  INPU0253               *COR
     * 8, 0, 0, 0, 0, 0, 5, 0, 0, 0, 0, 0, 0, 5, 17, 0,  INPU0254               *COR
     * 0, 0, 0, 0, 5, 1, 0, 0, 0, 0, 0, 5, 8, 0, 0, 0,  INPU0255               *COR
     * 0, 0, 5, 8, 0, 0, 0, 0, 0, 5, 17, 8, 0, 0, 0, 0,  INPU0256               *COR
     * 5, 5, 0, 0, 0, 0, 5, 1, 8, 0, 0, 0, 0, 5, 1/  INPU0257                    *COR
      DATA (JATX(I),I=484,587)/                                                 *COR
     * 7, 0, 0, 0, 0, 5, 1, 0, 0, 0, 0, 0, 5, 1, 0, 0,  INPU0259                 *COR
     * 0, 0, 0, 4, 0, 0, 0, 0, 0, 0, 6, 4, 0, 0, 0, 0,  INPU0260                 *COR
     * 0, 4, 17, 0, 0, 0, 0, 0, 4, 17, 9, 0, 0, 0, 0, 4,  INPU0261               *COR
     * 17, 0, 0, 0, 0, 0, 4, 9, 0, 0, 0, 0, 0, 4, 9, 0,  INPU0262                *COR
     * 0, 0, 0, 0,996, 1, 0, 0, 0, 0, 0, 4, 1, 8, 0, 0,  INPU0263                *COR
     * 0, 0, 4, 1, 0, 0, 0, 0, 0, 4, 1, 8, 0, 0, 0, 0,  INPU0264                 *COR
     * 4, 8, 0, 0, 0, 0, 0, 4, 17, 0, 0, 0, 0, 0, 4, 8,  INPU0265                *COR
     * 0, 0, 0, 0, 0, 4, 8, 0, 0, 0, 0, 0, 4, 8, 0, 0,  INPU0266                 *COR
     * 0, 0, 0, 4, 8, 0, 0, 0, 0, 0, 4, 8, 0, 0, 0, 0/  INPU0267                 *COR
      DATA (JATX(I),I=588,747)/                                                 *COR
     * 0, 6, 17, 0, 0, 0, 0, 0, 6, 17, 9, 8, 0, 0, 0, 6,  INPU0269                *COR
     * 17, 9, 0, 0, 0, 0, 6, 17, 7, 0, 0, 0, 0, 6, 17, 8,  INPU0270               *COR
     * 0, 0, 0, 0, 6, 17, 9, 0, 0, 0, 0, 6, 17, 0, 0, 0,  INPU0271                *COR
     * 0, 0, 6, 9, 0, 0, 0, 0, 0, 6, 9, 7, 0, 0, 0, 0,  INPU0272                 *COR
     * 6, 9, 0, 0, 0, 0, 0, 6, 9, 8, 0, 0, 0, 0, 6, 9,  INPU0273                 *COR
     * 0, 0, 0, 0, 0, 6, 9, 0, 0, 0, 0, 0, 6, 1, 0, 0,  INPU0274                 *COR
     * 0, 0, 0, 6, 1, 17, 9, 0, 0, 0, 6, 1, 17, 9, 0, 0,  INPU0275                *COR
     * 0, 6, 1, 17, 0, 0, 0, 0, 6, 1, 9, 8, 0, 0, 0, 6,  INPU0276                 *COR
     * 1, 9, 0, 0, 0, 0, 6, 1, 7, 0, 0, 0, 0, 6, 1, 7,  INPU0277                  *COR
     * 8, 0, 0, 0, 6, 1, 8, 0, 0, 0, 0, 6, 1, 0, 0, 0/  INPU0278                  *COR
      DATA (JATX(I),I=748,891)/                                                 *COR
     * 0, 0, 6, 1, 17, 9, 0, 0, 0, 6, 1, 17, 0, 0, 0, 0,  INPU0280                *COR
     * 6, 1, 9, 0, 0, 0, 0, 6, 1, 8, 0, 0, 0, 0, 6, 1,  INPU0281                  *COR
     * 0, 0, 0, 8, 0, 6, 1, 17, 0, 0, 0, 6, 1, 17, 14,  INPU0282                  *COR
     * 0, 0, 0, 6, 1, 9, 0, 0, 0, 0, 6, 1, 9, 14, 0, 0,  INPU0283                 *COR
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     *  0,  6,  1,  0,  0,  0,  0,  0,  6,  7,  0,  0,  0,  0,  0,  6,  INPUT284          *COR
     *  9,  0,  0,  0,  0,  0,  6,  9,  0,  0,  0,  0,  0,  6,  1,  0,  INPUT285          *COR
     *  0,  0,  0,  0,  6,  1,  8,  0,  0,  0,  0,  6,  7,  0,  0,  0,  INPUT286          *COR
     *  0,  0,  6,  8,  0,  0,  0,  0,  0,  6,  1, 14,  0,  0,  0,  0,  INPUT287          *COR
     *  6,  7,  0,  0,  0,  0,  0, 17,  0,  0,  0,  0,  0,  0, 17,  9/ INPUT288          *COR
      DATA (JATX(I),I=842,1051)/                                                         *COR
     *  0,  0,  0,  0,  0, 17,  9,  3,  0,  0,  0,  0, 17,  9,  8,  0,  INPUT290          *COR
     *  0,  0,  0, 17,  9,  0,  0,  0,  0,  0, 17,  9, 14,  0,  0,  0,  INPUT291          *COR
     *  0, 17,  1,  6,  0,  0,  0,  0, 17,  1, 14,  0,  0,  0,  0, 17,  INPUT292          *COR
     *  3,  0,  0,  0,  0,  0, 17,  3,  8,  0,  0,  0,  0, 17,  7,  8,  INPUT293          *COR
     *  0,  0,  0,  0, 17,  8,  0,  0,  0,  0,  0, 17,  8,  0,  0,  0,  INPUT294          *COR
     *  0,  0, 17, 14,  0,  0,  0,  0,  0, 17,  1, 14,  0,  0,  0,  0,  INPUT295          *COR
     * 17,  3,  0,  0,  0,  0,  0, 17,  8,  6,  0,  0,  0,  0, 17, 14,  INPUT296          *COR
     *  0,  0,  0,  0,  0, 17,  9, 14,  0,  0,  0,  0, 17,  1, 14,  0,  INPUT297          *COR
     *  0,  0,  0, 17,  3,  0,  0,  0,  0,  0, 17, 14,  0,  0,  0,  0,  INPUT298          *COR
     *  0,  9,  0,  0,  0,  0,  0,  0,  9,  1,  8,  0,  0,  0,  0,  9/ INPUT299          *COR
      DATA (JATX(I),I=1052,1195)/                                                        *COR
     *  1, 14,  0,  0,  0,  0,  9,  3,  0,  0,  0,  0,  0,  9,  3,  8,  INPUT301          *COR
     *  0,  0,  0,  0,  9,  7,  0,  0,  0,  0,  0,  9,  7,  8,  0,  0,  INPUT302          *COR
     *  0,  0,  9, 14,  0,  0,  0,  0,  0,  9,  8,  0,  0,  0,  0,  0,  INPUT303          *COR
     *  9, 14,  0,  0,  0,  0,  0,  9,  1, 14,  0,  0,  0,  0,  9,  3,  INPUT304          *COR
     *  0,  0,  0,  0,  0,  9,  8,  0,  0,  0,  0,  0,  9, 14,  0,  0,  INPUT305          *COR
     *  0,  0,  0,  9,  1, 14,  0,  0,  0,  0,  9,  3,  0,  0,  0,  0,  INPUT306          *COR
     *  0,  9,  7,  0,  0,  0,  0,  0,  1,  0,  0,  0,  0,  0,  0,  1,  INPUT307          *COR
     *  3,  0,  0,  0,  0,  0,  1,  3,  8,  0,  0,  0,  0,  1,  7,  0,  INPUT308          *COR
     *  0,  0,  0,  0,  1,  8,  0,  0,  0,  0,  0,  1, 14,  0,  0,  0/ INPUT309          *COR
      DATA (JATX(I),I=1196,1355)/                                                        *COR
     *  0,  0,  1,  3,  8,  0,  0,  0,  0,  1,  7,  0,  0,  0,  0,  0,  INPUT311          *COR
     *  1,  8,  0,  0,  0,  0,  0,  1,  7,  0,  0,  0,  0,  0,  1,  7,  INPUT312          *COR
     *  0,  0,  0,  0,  0,  1, 14,  0,  0,  0,  0,  0,  3,  0,  0,  0,  INPUT313          *COR
     *  0,  0,  0,  3,  7,  0,  0,  0,  0,  0,  3,  8,  0,  0,  0,  0,  INPUT314          *COR
     *  0,  3,  0,  0,  0,  0,  0,  0,  3,  8,  0,  0,  0,  0,  0,  7,  INPUT315          *COR
     *  0,  0,  0,  0,  0,  0,  7,  8,  0,  0,  0,  0,  0,  7,  8,  0,  INPUT316          *COR
     *  0,  0,  0,  0,  7, 14,  0,  0,  0,  0,  0,  7,  8,  0,  0,  0,  INPUT317          *COR
     *  0,  0,  7,  3,  0,  0,  0,  0,  0,  7,  8,  0,  0,  0,  0,  0,  INPUT318          *COR
     *  7,  8,  0,  0,  0,  0,  0,  8,  0,  0,  0,  0,  0,  0,  8, 14,  INPUT319          *COR
     *  0,  0,  0,  0,  0,  8, 14,  0,  0,  0,  0,  0,  8,  0,  0,  0/ INPUT320          *COR
      DATA (JATX(I),I=1356,1499)/                                                        *COR
     *  0,  0,  0, 14,  0,  0,  0,  0,  0, 14,  0,  0,  0,  0,  0,  INPUT322          *COR
     *  0, 14,  0,  0,  0,  0,  0,  0,  6, 17,  3,  0,  0,  0,  0,  5,  INPUT323          *COR
     *  9,  1,  0,  0,  0,  0,  5,  9,  8,  0,  0,  0,  0,  6, 17,  8,  INPUT324          *COR
     *  0,  0,  0,  0,  6,  9,  8,  0,  0,  0,  0,  6,  9,  0,  0,  0,  INPUT325          *COR
     *  0,  0,  9,  7,  8,  0,  0,  0,  0,  5,  3,  8,  0,  0,  0,  0,  INPUT326          *COR
     * 13,  9,  3,  0,  0,  0,  0,  6,  5,  0,  0,  0,  0,  0,  5,  9,  INPUT327          *COR
     *  1,  8,  0,  0,  0,  5,  4,  8,  0,  0,  0,  0,  4,  9,  3,  0,  INPUT328          *COR
     *  0,  0,  0, 17,  7,  8,  0,  0,  0,  0,  9,  7,  0,  0,  0,  0,  INPUT329          *COR
     *  0,  5,  9,  1,  8,  0,  0,  0,  5,  9,  1,  8,  0,  0,  0,  5/ INPUT330          *COR
      DATA (JATX(I),I=1500,1659)/                                                        *COR
     *  1,  8,  0,  0,  0,  0,  9,  7,  8,  0,  0,  0,  0,  1,  7,  8,  INPUT332          *COR
     *  0,  0,  0,  0,  5,  8,  0,  0,  0,  0,  0,  4,  7,  0,  0,  0,  INPUT333          *COR
     *  0,  0.997,  1,  8,  0,  0,  0,  0,  1,  7,  8,  0,  0,  0,  0,  INPUT334          *COR
     *  1,  7,  8,  0,  0,  0,  0,  4,  8,  0,  0,  0,  0,  0,  9,  8,  INPUT335          *COR
     * 14,  0,  0,  0,  0,  9, 14,  0,  0,  0,  0,  0, 13,  1,  8,  0,  INPUT336          *COR
     *  0,  0,  0,  9,  7,  0,  0,  0,  0,  0,  1,  8,  0,  0,  0,  0,  INPUT337          *COR
     *  0,  3,  8,  0,  0,  0,  0,  0,  5,  9,  0,  0,  0,  0,  0,  7,  INPUT338          *COR
     *  8,  0,  0,  0,  0,  0,  6,  9,  8,  0,  0,  0,  0,  6, 17,  0,  INPUT339          *COR
     *  0,  0,  0,  0,  6, 17,  0,  0,  0,  0,  0.998,  1,  0,  0,  0,  INPUT340          *COR
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     *  0,  0,  9,  7,  0,  0,  0,  0,  0,  1,  7,  0,  0,  0,  0,  0/  INPU0341                    *COR
      DATA (JATX(I),I=1660,1803)/                                                                  *COR
     *  5, 17,  1,  0,  0,  0,  0,  5,  1,  8,  0,  0,  0,  0, 13,  5,  INPU0343                    *COR
     *  8,  0,  0,  0,  0,  5,  4,  8,  0,  0,  0,  0,  5,  8,  0,  0,  INPU0344                    *COR
     *  0,  0,  0,  4,  9,  8,  0,  0,  0,  0,999,  1,  0,  0,  0,  0,  INPU0345                    *COR
     *  0,  6,  7,  0,  0,  0,  0,  0,  6,  8,  0,  0,  0,  0,  0, 17,  INPU0346                    *COR
     *  9,  0,  0,  0,  0,  0,  4,  1,  0,  0,  0,  0,  0,  9,  8,  0,  INPU0347                    *COR
     *  0,  0,  0,  0,  3,  7,  8,  0,  0,  0,  0,  6,  1,  0,  0,  0,  INPU0348                    *COR
     *  0,  0,  6, 14,  0,  0,  0,  0,  0,  6, 14,  0,  0,  0,  0,  0,  INPU0349                    *COR
     *  6,  7,  0,  0,  0,  0,  0,  6, 14,  0,  0,  0,  0,  0,  7, 14,  INPU0350                    *COR
     *  0,  0,  0,  0,  0,  6, 17,  0,  0,  0,  0,  0,  6, 17,  0,  0/  INPU0351                    *COR
      DATA (JATX(I),I=1804,2026)/                                                                  *COR
     *  0,  0,  0,  6,  1,  9,  0,  0,  0,  0, 13,  8,  0,  0,  0,  0,  INPU0353                    *COR
     *  0,  6, 17,  0,  0,  0,  0,  0,  6,  1, 17,  0,  0,  0,  0,  6,  INPU0354                    *COR
     *  1, 17,  0,  0,  0,  0,  6,  1,  9,  0,  0,  0,  0,  6,  9,  7,  INPU0355                    *COR
     *  0,  0,  0,  0, 17, 14,  0,  0,  0,  0,  0, 13,  9,  0,  0,  0,  INPU0356                    *COR
     *  0,  0,  9,  7,  8,  0,  0,  0,  0,  9,  0,  0,  0,  0,  0,  0,  INPU0357                    *COR
     * 17,  0,  0,  0,  0,  0,  0,  7,  0,  0,  0,  0,  0,  0,  8,  0,  INPU0358                    *COR
     *  0,  0,  0,  0,  0,  6,  7,  3,  0,  0,  0,  0,  7,  0,  0,  0,  INPU0359                    *COR
     *  0,  0,  0,  5,  9,  8,  0,  0,  0,  0, 18,  0,  0,  0,  0,  0,  INPU0360                    *COR
     *  0,  1,  6,  0,  0,  0,  0,  0,  1,  6,  0,  0,  0,  0,  0,  1,                              *COR
     *  6,  0,  0,  0,  0,  0,  1,  6,  0,  0,  0,  0,  1,  6,  0,  0,                              *COR
     *  0,  0,  0,  0,  1,  6,  0,  0,  0,  0,  0,  1,  6,  0,  0,  0,                              *COR
     *  0,  0,  1,  6,  0,  0,  0,  0,  0,  1,  6,  0,  0,  0,  0,                                  *COR
     *  0,  2,  0,  0,  0,  0,  0,  0,  3,  8,  0,  0,  0,  0,  0, 13,  INPU0361                    *COR
     *  9,  3,  0,  0,  0,  0, 13, 17,  8,  0,  0,  0,  0,  5,  1,  8/  INPU0362                    *COR
      DATA (JATX(I),I=2027,2170)/                                                                  *COR
     *  0,  0,  0,  0,  6, 14,  0,  0,  0,  0,  6,  3,  0,  0,  0,  INPU0364                    *COR
     *  0,  0, 17,  1,  7,  0,  0,  0,  0, 17,  1,  7,  8,  0,  0,  0,  INPU0365                    *COR
     * 17,  3,  8,  0,  0,  0,  0,  4,  1,  8,  0,  0,  0,  0, 13, 17,  INPU0366                    *COR
     *  0,  0,  0,  0,  0, 13,  9,  0,  0,  0,  0,  0, 13,  3,  9,  0,  INPU0367                    *COR
     *  0,  0,  0, 13,  7,  0,  0,  0,  0,  0, 13,  8, 14,  0,  0,  0,  INPU0368                    *COR
     *  0,  6, 13,  0,  0,  0,  0,  0,  5,  7,  0,  0,  0,  0,  0,  3,  INPU0369                    *COR
     *  0,  0,  0,  0,  0,  0,  3,  7,  0,  0,  0,  0,  0,  7, 14,  0,  INPU0370                    *COR
     *  0,  0,  0,  0,  4,  8, 14,  0,  0,  0,  0, 13,  0,  0,  0,  0,  INPU0371                    *COR
     *  0,  0, 13,  8,  0,  0,  0,  0,  0,  5,  0,  0,  0,  0,  0,  0/  INPU0372                    *COR
      DATA (JATX(I),I=2171,2330)/                                                                  *COR
     *  5,  8,  0,  0,  0,  0,  0,  6,  5,  0,  0,  0,  0,  0,  4,  0,  INPU0374                    *COR
     *  0,  0,  0,  0,  0,  4,  8,  0,  0,  0,  0,  0,  6,  4,  0,  0,  INPU0375                    *COR
     *  0,  0,  0,  4,  7,  0,  0,  0,  0,  0, 17,  3,  0,  0,  0,  0,  INPU0376                    *COR
     *  0,  9,  3,  0,  0,  0,  0,  0,  1,  3,  8,  0,  0,  0,  0,  3,  INPU0377                    *COR
     *  6,  0,  0,  0,  0,  0,  8, 14,  0,  0,  0,  0,  0, 14,  0,  0,  INPU0378                    *COR
     *  0,  0,  0,  0,  5,  3,  8,  0,  0,  0,  0,  4, 17,  0,  0,  0,  INPU0379                    *COR
     *  0,  0,  4,  9,  0,  0,  0,  0,  0,  3,  8, 14,  0,  0,  0,  0,  INPU0380                    *COR
     * 13,  4,  8,  0,  0,  0,  0,  5,  3,  8,  0,  0,  0,  0,  5,  3,  INPU0381                    *COR
     *  8,  0,  0,  0,  0,  5,  3,  8,  0,  0,  0,  0,  5,  1,  8,  0,  INPU0382                    *COR
     *  0,  0,  0,  6,  3,  8,  0,  0,  0,  0,  4,  9,  3,  0,  0,  0/  INPU0383                    *COR
      DATA (JATX(I),I=2331,2415)/                                                                  *COR
     *  0,  4,  9,  3,  0,  0,  0,  0, 13,  8, 14,  0,  0,  0,  0,  5,  INPU0385                    *COR
     *  4,  8,  0,  0,  0,  0,  5,  3,  8,  0,  0,  0,  0,  5,  1,  0,  INPU0386                    *COR
     *  0,  0,  0,  0,  1,  3,  0,  0,  0,  0,  0,  5,  1,  8,  0,  0,  INPU0387                    *COR
     *  0,  0,  5,  1,  8,  0,  0,  0,  0,  0,  5,  1,  0,  0,  0,  0,  INPU0388                    *COR
     *  5,  1,  3,  0,  0,  0,  0, 13,  1,  3,  0,  0,  0,  0,  3,  8,  INPU0389                    *COR
     * 14,  0,  0,  0,  0/                                                                          INPU0390                    *COR
      DATA (SORCX(I),I=1,128)/                                                                     *COR
     *2HJA,4HEAE ,4HIAFE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,                                        INPU0392                    *COR
     *2HJA,4HEAE ,4HIAFE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,                                        INPU0393                    *COR
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*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,        INPU0394        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,        INPU0395        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,        INPU0396        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,        INPU0397        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H    ,4H    ,        INPU0398        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPU0399        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,        INPU0400        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPU0401        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPU0402        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPU0403        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,                        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,        INPU0408        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H    ,4H    ,        INPU0409        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    /        INPU0410        *COR
 DATA (SORCY(I),I=129,260)/                                                    *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H    ,4H    ,        INPU0412        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H    ,4H    ,        INPU0413        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H    ,4H    ,        INPU0414        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H    ,4H    ,        INPU0415        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H    ,4H    ,        INPU0416        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPU0417        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0418        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,        INPU0419        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H    ,4H    ,        INPU0420        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPU0421        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H    ,4H    ,        INPU0422        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,        INPU0423        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPU0424        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,        INPU0425        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPU0426        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPU0427        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,        INPU0428        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,        INPU0429        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    /        INPU0430        *COR
 DATA (SORCY(I),I=231,432)/                                                    *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0432        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0433        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0434        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,        INPU0435        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0436        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPU0437        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0438        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0439        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,        INPU0440        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0441        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0442        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0443        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0444        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0445        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPU0446        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0447        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0448        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0449        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H    ,4H    /        INPU0450        *COR
 DATA (SORCY(I),I=433,584)/                                                    *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/68 ,4H    ,4H    ,        INPU0452        *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0453        *COR
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454.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0454        *COR
455.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0455        *COR
456.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0456        *COR
457.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0457        *COR
458.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,        INPU0458        *COR
459.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,        INPU0459        *COR
460.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0460        *COR
461.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,        INPU0461        *COR
462.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,        INPU0462        *COR
463.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0463        *COR
464.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/61 ,4H    ,4H    ,        INPU0464        *COR
465.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/63 ,4H    ,4H    ,        INPU0465        *COR
466.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H    ,4H    ,        INPU0466        *COR
467.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/65 ,4H    ,4H    ,        INPU0467        *COR
468.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/65 ,4H    ,4H    ,        INPU0468        *COR
469.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/63 ,4H    ,4H    ,        INPU0469        *COR
470.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    /        INPU0470        *COR
471.     DATA (SORCX(I),I=585,736)/                                                    *COR
472.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/63 ,4H    ,4H    ,        INPU0472        *COR
473.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,        INPU0473        *COR
474.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0474        *COR
475.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,        INPU0475        *COR
476.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,        INPU0476        *COR
477.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/65 ,4H    ,4H    ,        INPU0477        *COR
478.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,        INPU0478        *COR
479.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,        INPU0479        *COR
480.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,        INPU0480        *COR
481.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,        INPU0481        *COR
482.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,        INPU0482        *COR
483.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPU0483        *COR
484.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/61 ,4H    ,4H    ,        INPU0484        *COR
485.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0485        *COR
486.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H    ,4H    ,        INPU0486        *COR
487.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/61 ,4H    ,4H    ,        INPU0487        *COR
488.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPU0488        *COR
489.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPU0489        *COR
490.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    /        INPU0490        *COR
491.     DATA (SORCY(I),I=737,888)/                                                    *COR
492.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0492        *COR
493.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPU0493        *COR
494.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPU0494        *COR
495.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0495        *COR
496.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0496        *COR
497.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/67 ,4H    ,4H    ,        INPU0497        *COR
498.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPU0498        *COR
499.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPU0499        *COR
500.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPU0500        *COR
501.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/61 ,4H    ,4H    ,        INPU0501        *COR
502.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0502        *COR
503.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPU0503        *COR
504.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H    ,4H    ,        INPU0504        *COR
505.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H    ,4H    ,        INPU0505        *COR
506.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0506        *COR
507.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPU0507        *COR
508.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPU0508        *COR
509.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPU0509        *COR
510.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    /        INPU0510        *COR
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511.        DATA (SORCX(I),I=989,1040)/                                                    *COR
512.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0512        *COR
513.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H    ,4H    ,        INPU0513        *COR
514.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0514        *COR
515.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/63 ,4H    ,4H    ,        INPU0515        *COR
516.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0516        *COR
517.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,        INPU0517        *COR
518.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0518        *COR
519.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/67 ,4H    ,4H    ,        INPU0519        *COR
520.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0520        *COR
521.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,        INPU0521        *COR
522.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,        INPU0522        *COR
523.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,        INPU0523        *COR
524.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/68 ,4H    ,4H    ,        INPU0524        *COR
525.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0525        *COR
526.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,        INPU0526        *COR
527.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,        INPU0527        *COR
528.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,        INPU0528        *COR
529.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0529        *COR
530.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    /        INPU0530        *COR
531.        DATA (SORCX(I),I=1041,1192)/                                                   *COR
532.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,        INPU0532        *COR
533.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0533        *COR
534.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/61 ,4H    ,4H    ,        INPU0534        *COR
535.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0535        *COR
536.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/62 ,4H    ,4H    ,        INPU0536        *COR
537.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0537        *COR
538.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,        INPU0538        *COR
539.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/61 ,4H    ,4H    ,        INPU0539        *COR
540.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,        INPU0540        *COR
541.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H    ,4H    ,        INPU0541        *COR
542.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0542        *COR
543.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/62 ,4H    ,4H    ,        INPU0543        *COR
544.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,        INPU0544        *COR
545.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H    ,4H    ,        INPU0545        *COR
546.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0546        *COR
547.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0547        *COR
548.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/62 ,4H    ,4H    ,        INPU0548        *COR
549.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H    ,4H    ,        INPU0549        *COR
550.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    /        INPU0550        *COR
551.        DATA (SORCX(I),I=1193,1344)/                                                   *COR
552.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,        INPU0552        *COR
553.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0553        *COR
554.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPU0554        *COR
555.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,        INPU0555        *COR
556.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0556        *COR
557.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/61 ,4H    ,4H    ,        INPU0557        *COR
558.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,        INPU0558        *COR
559.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/66 ,4H    ,4H    ,        INPU0559        *COR
560.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPU0560        *COR
561.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0561        *COR
562.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPU0562        *COR
563.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPU0563        *COR
564.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPU0564        *COR
565.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0565        *COR
566.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPU0566        *COR
567.       *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,        INPU0567        *COR
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568.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H     ,4H     ,          INPU0568                    *COR
569.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H     ,4H     ,          INPU0569                    *COR
570.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H     ,4H     /          INPU0570                    *COR
571.       DATA (SORCX(I),I=1345,1496)/                                                                   *COR
572.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H     ,4H     ,          INPU0572                    *COR
573.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H     ,4H     ,          INPU0573                    *COR
574.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H     ,4H     ,          INPU0574                    *COR
575.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H     ,4H     ,          INPU0575                    *COR
576.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H     ,4H     ,          INPU0576                    *COR
577.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H     ,4H     ,          INPU0577                    *COR
578.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H     ,4H     ,          INPU0578                    *COR
579.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H     ,4H     ,          INPU0579                    *COR
580.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H     ,4H     ,          INPU0580                    *COR
581.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/62 ,4H     ,4H     ,          INPU0581                    *COR
582.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/66 ,4H     ,4H     ,          INPU0582                    *COR
583.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H     ,4H     ,          INPU0583                    *COR
584.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/62 ,4H     ,4H     ,          INPU0584                    *COR
585.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H     ,4H     ,          INPU0585                    *COR
586.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H     ,4H     ,          INPU0586                    *COR
587.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H     ,4H     ,          INPU0587                    *COR
588.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H     ,4H     ,          INPU0586                    *COR
589.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H     ,4H     ,          INPU0589                    *COR
590.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H     ,4H     /          INPU0590                    *COR
591.       DATA (SORCX(I),I=1497,1648)/                                                                   *COR
592.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H     ,4H     ,          INPU0592                    *COR
593.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H     ,4H     ,          INPU0593                    *COR
594.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H     ,4H     ,          INPU0594                    *COR
595.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/62 ,4H     ,4H     ,          INPU0595                    *COR
596.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H     ,4H     ,          INPU0596                    *COR
597.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H     ,4H     ,          INPU0597                    *COR
598.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/61 ,4H     ,4H     ,          INPU0598                    *COR
599.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H     ,4H     ,          INPU0599                    *COR
600.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H     ,4H     ,          INPU0600                    *COR
601.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H     ,4H     ,          INPU0601                    *COR
602.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H     ,4H     ,          INPU0602                    *COR
603.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H     ,4H     ,          INPU0603                    *COR
604.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/66 ,4H     ,4H     ,          INPU0604                    *COR
605.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H     ,4H     ,          INPU0605                    *COR
606.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H     ,4H     ,          INPU0606                    *COR
607.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H     ,4H     ,          INPU0607                    *COR
608.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H     ,4H     ,          INPU0608                    *COR
609.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H     ,4H     ,          INPU0609                    *COR
610.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H     ,4H     /          INPU0610                    *COR
611.       DATA (SORCX(I),I=1649,1800)/                                                                   *COR
612.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H     ,4H     ,          INPU0612                    *COR
613.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H     ,4H     ,          INPU0613                    *COR
614.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/65 ,4H     ,4H     ,          INPU0614                    *COR
615.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/62 ,4H     ,4H     ,          INPU0615                    *COR
616.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H     ,4H     ,          INPU0616                    *COR
617.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H     ,4H     ,          INPU0617                    *COR
618.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H     ,4H     ,          INPU0618                    *COR
619.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H     ,4H     ,          INPU0619                    *COR
620.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H     ,4H     ,          INPU0620                    *COR
621.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/63 ,4H     ,4H     ,          INPU0621                    *COR
622.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/63 ,4H     ,4H     ,          INPU0622                    *COR
623.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/60 ,4H     ,4H     ,          INPU0623                    *COR
624.      *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H     ,4H     ,          INPU0624                    *COR
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*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H    ,4H    ,        INPUn625          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H    ,4H    ,        INPUn626          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H    ,4H    ,        INPUn627          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,        INPUn628          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,        INPUn629          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    /        INPUn630          *COR
 DATA (SORCX(I),I=1801,1952)/                                                   *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/67 ,4H    ,4H    ,        INPUn632          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,        INPUn633          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,        INPUn634          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,        INPUn635          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPUn636          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPUn637          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPUn638          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPUn639          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPUn640          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,        INPUn641          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,        INPUn642          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,        INPUn643          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H    ,4H    ,        INPUn644          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H    ,4H    ,        INPUn645          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H    ,4H    ,        INPUn646          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H    ,4H    ,        INPUn647          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H    ,4H    ,        INPUn648          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H    ,4H    ,        INPUn649          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H    ,4H    /        INPUn650          *COR
 DATA (SORCX(I),I=1953,2104)/                                                   *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H    ,4H    ,        INPUn652          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H    ,4H    ,        INPUn653          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H    ,4H    ,        INPUn654          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H    ,4H    ,        INPUn655          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H    ,4H    ,        INPUn656          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H    ,4H    ,        INPUn657          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/66 ,4H    ,4H    ,        INPUn658          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,        INPUn659          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,        INPUn660          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,        INPUn661          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,        INPUn662          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,        INPUn663          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H    ,4H    ,        INPUn664          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H    ,4H    ,        INPUn665          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/67 ,4H    ,4H    ,        INPUn666          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPUn667          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPUn668          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,        INPUn669          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    /        INPUn670          *COR
 DATA (SORCX(I),I=2105,2216)/                                                   *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPUn672          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPUn673          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPUn674          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPUn675          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPUn676          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPUn677          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 **,4H/60 ,4H    ,4H    ,        INPUn678          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 **,4H/61 ,4H    ,4H    ,        INPUn679          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 **,4H/61 ,4H    ,4H    ,        INPUn680          *COR
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H    ,4H    ,        INPUn681          *COR
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682.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H    ,4H    ,        INPU0682    *COR
683.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/** ,4H    ,4H    ,        INPU0683    *COR
684.    *2HCO,4HNVAT,4HR 2P,4HH-12,4H2 12,4H/61 ,4H    ,4H    ,        INPU0684    *COR
685.    *2HDU,4HFF R,4HAUER,4H 6/6,4H1   ,4H    ,4H    ,/                         *COR
686.     DATA (SORCX(I),I=2217,2328)/                                             *COR
687.    *2HDU,4HFF R,4HAUER,4H 6/6,4H1   ,4H    ,4H    ,                          *COR
688.    *2HDU,4HFF R,4HAUER,4H 6/6,4H1   ,4H    ,4H    ,                          *COR
689.    *2HDU,4HFF R,4HAUER,4H 6/6,4H1   ,4H    ,4H    ,                          *COR
690.    *2HDU,4HFF R,4HAUER,4H 6/6,4H1   ,4H    ,4H    ,                          *COR
691.    *2HDU,4HFF R,4HAUER,4H 6/6,4H1   ,4H    ,4H    ,                          *COR
692.    *2HDU,4HFF R,4HAUER,4H 6/6,4H1   ,4H    ,4H    ,                          *COR
693.    *2HDU,4HFF R,4HAUER,4H 6/6,4H1   ,4H    ,4H    ,                          *COR
694.    *2HDU,4HFF R,4HAUER,4H 6/6,4H1   ,4H    ,4H    ,                          *COR
695.    *2H  ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,                          INPU0685    *COR
696.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,        INPU0686    *COR
697.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPU0687    *COR
698.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,        INPU0688    *COR
699.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,        INPU0689    *COR
700.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,/       INPU0690    *COR
701.     DATA (SORCX(I),I=2329,2480)/                                             *COR
702.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,        INPU0692    *COR
703.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,        INPU0693    *COR
704.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/62 ,4H    ,4H    ,        INPU0694    *COR
705.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  0,4H/64 ,4H    ,4H    ,        INPU0695    *COR
706.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/66 ,4H    ,4H    ,        INPU0696    *COR
707.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  0,4H/70 ,4H    ,4H    ,        INPU0697    *COR
708.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPU0698    *COR
709.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/61 ,4H    ,4H    ,        INPU0699    *COR
710.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/62 ,4H    ,4H    ,        INPU0700    *COR
711.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H    ,4H    ,        INPU0701    *COR
712.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,        INPU0702    *COR
713.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H    ,4H    ,        INPU0703    *COR
714.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  0,4H/62 ,4H    ,4H    ,        INPU0704    *COR
715.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H    ,4H    ,        INPU0705    *COR
716.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,        INPU0706    *COR
717.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/65 ,4H    ,4H    ,        INPU0707    *COR
718.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/67 ,4H    ,4H    ,        INPU0708    *COR
719.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,        INPU0709    *COR
720.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,/       INPU0710    *COR
721.     DATA (SORCX(I),I=2481,2632)/                                             *COR
722.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0712    *COR
723.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,        INPU0713    *COR
724.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/61 ,4H    ,4H    ,        INPU0714    *COR
725.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,        INPU0715    *COR
726.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H    ,4H    ,        INPU0716    *COR
727.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,        INPU0717    *COR
728.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/62 ,4H    ,4H    ,        INPU0718    *COR
729.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,        INPU0719    *COR
730.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H    ,4H    ,        INPU0720    *COR
731.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,        INPU0721    *COR
732.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/67 ,4H    ,4H    ,        INPU0722    *COR
733.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,        INPU0723    *COR
734.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,        INPU0724    *COR
735.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/65 ,4H    ,4H    ,        INPU0725    *COR
736.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,        INPU0726    *COR
737.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/67 ,4H    ,4H    ,        INPU0727    *COR
738.    *2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H    ,4H    ,        INPU0728    *COR
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*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/65 ,4H    ,4H    ,                INPU0729                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    /                INPU0730                *COR
 DATE (SORCX(I),I=2633,2760)/                                                                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,                INPU0732                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H    ,4H    ,                INPU0733                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H    ,4H    ,                INPU0734                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H    ,4H    ,                INPU0735                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H    ,4H    ,                INPU0736                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H    ,4H    ,                INPU0737                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H    ,4H    ,                INPU0738                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,                INPU0739                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  0,4H/64 ,4H    ,4H    ,                INPU0740                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H    ,4H    ,                INPU0741                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,                INPU0742                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,                INPU0743                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,                INPU0744                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,                INPU0745                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,                INPU0746                *COR
*2HJA,4HNAE ,4HTAPE,4H 7/7,4H1  6,4H/67 ,4H    ,4H    /                INPU0747                *COR
 DATA (AMOAB(I),I=1,169)/                                                                    *COR
*4HC02 ,4HN2  ,4HH2O ,4HCO  ,4HC*  ,4HC2H2,4HCLH ,4HEH  ,4HC   ,                              *COR
*4HC2  ,4HC3  ,4HC4  ,4HC5  ,4HAL  ,4HCAL ,                                                    *COR
*4HALCL,4HALCL,4HALCL,4HALCL,4HALCL,4HALCL,4HALCL,4HALF ,4HALFO,                INPU0751        *COR
*4HALF2,4HALF3,4HALH ,4HALHO,4HALHO,4HALN ,4HALO ,4HAL2O,4HAL2O,                INPU0752        *COR
*4HAL2O,4HB   ,4HBCL ,4HBCLF,4HBCLF,4HBCLO,4HBCL2,4HBCL2,4HBCL3,                INPU0753        *COR
*4HBF  ,4HBFO ,4HBF2 ,4HBF3 ,4HBH  ,4HBHO ,4HBHO2,4HBH2 ,4HBH2O,                INPU0754        *COR
*4HB2H3,4HB2H4,4HBN  ,4HBO  ,4HB2  ,4HB2CL,4HB2H6,4HB2O2,4HB2O3,                INPU0755        *COR
*4HB3CL,4HB3F3,4HB3H3,4HB3H6,4HB5H9,4HB10H,4HBE  ,4HC23F,4HBECL,                INPU0756        *COR
*4HBECL,4HBECL,4HBEF ,4HBEF2,4HBEH ,4HBEHO,4HBEH2,4HBEH2,4HBEO ,                INPU0757        *COR
*4HBF2C,4HBF2O,4HBF3O,4HBF4O,4HBF5O,4HBEEO,4HCCL ,4HCCLF,4HCCLF,                INPU0758        *COR
*4HCCLN,4HCCL2,4HCCL3,4HCCL4,4HCF  ,4HCFN ,4HCF2 ,4HCF2O,4HCF3 ,                INPU0759        *COR
,4HCF4 ,4HCH  ,4HCHCL,4HCHCL,4HCHCL,4HCHFO,4HCHF3,4HCHN ,4HCHNO,                INPU0760        *COR
*4HCHO ,4HCH2 ,4HCH2C,4HCH2C,4HCH2F,4HCH2O,4HCH3 ,4HCH3C,4HCH3C,                INPU0761        *COR
*4HCH3F,4HCH3F,4HCH4 ,4HCN  ,4HC2F2,4HC2H4,4HC2H4,4HC2H4,4HC2N2,                INPU0762        *COR
*4HC3O2,4HC4H2,4HC4N2,4HCL  ,4HCLF ,4HCLFL,4HCLFO,4HCLF3,4HCLF3,                INPU0763        *COR
*4HCLHO,4HCLH2,4HCLLT,4HCLLT,4HCLNO,4HCLO ,4HCLO2,4HCLST,4HCL2H,                INPU0764        *COR
*4HCL2F,4HCL2O,4HCL2S,4HCL3F,4HCL3H,4HCL3L,4HCL4S,4HF   ,4HFHO ,                INPU0765        *COR
*4HCH3S,4HCLI ,4HCLIO,4HCN  ,4HCNO ,4HC4ST,4HFO  ,4HFSI ,4HF2H2,                INPU0766        *COR
*4HF2LT,4HF2O ,4HF2SI,4HF3HS,4HF3LI,4HF3N ,4HH   ,4HHLT ,4HHLIO/                INPU0767        *COR
 DATA (AMOAB(I),I=169,265)/                                                                  *COR
*4HHN  ,4HHP  ,4HHST ,4HH2LT,4HH2N ,4HH2O2,4HH3N ,4HH4N2,4HH4SI,                INPU0769        *COR
*4HLI  ,4HLIH ,4HLIO ,4HLI2 ,4HLI2O,4HN   ,4HNO  ,4HNO2 ,4HNSI ,                INPU0770        *COR
*4HN2O ,4HN2O3,4HN2O4,4HN2O5,4HO   ,4HOSI ,4HO2SI,4HO3  ,4HSI  ,                INPU0771        *COR
*4HSI2 ,4HSI3 ,4HCCL2,4HBF2H,4HBF2O,4HCCLO,4HCFO ,4HC2F6,4HENO2,                INPU0772        *COR
*4HCLIO,4HLEF4,4HCF  ,4HBF2H,4HB2HE,4HBEF3,4HCLNO,4HF2N ,4HB3FH,                INPU0773        *COR
*4HN3F2,4HF2H3,4HFNO3,4HN2O ,4HP02 ,4HFFN ,4HNNO2,4HNNO2,4HNNO3,                INPU0774        *COR
*4HBF2O,4HF2OS,4HF3SI,4HALHO,4HF4N2,4HNO2 ,4HLI2O,4HP2F4,4HNO3 ,                INPU0775        *COR
*4HCF4O,4HCCL2,4HCCL3,4HF2N2,4HF2H2,4HP2N2,4HCCL2,4HS2H4,4HALHO,                INPU0776        *COR
*4HCFCO,4HC2O ,4HCF2F,4HCN2 ,4HCN2 ,4HC2O ,4HCLF5,4HEFH ,4HFO2 ,                INPU0777        *COR
*4HLI2O,4HC2H ,4HCSI ,4HCSI2,4HC2N ,4HC2SI,4HNSI2,4HC2CL,4HC2CL,                INPU0778        *COR
*4HC2HF,4HCLO2,4HC2CL,4HC2HF,4HCHCL,4HCHF ,4HC2F3,4HCL3S,4HCL2F,                INPU0779        *COR
*4HF3NO,4HF2  ,4HCL2 ,4HN2  ,4HO2  ,4HCNO ,4HN3  ,4HB2F4,4HA   ,                INPU0780        *COR
*4HC2H3,4HC2F6,4HC3H ,4HC3H2,4HC3H3,4HC3H4,4HC3H5,4HC4H ,4HC4H2/                              *COR
 DATA (AMOAB(I),I=286,345)/                                                                  *COR
*4HHF  ,4HI2O,4HALF6,4HALCL,4HB3H3,4HCSI*,4HC2II,4HCLH4,4HCLH4,                INPU0781        *COR
*4HCLLT,4HEF2,4HALCL,4HALF3,4HALLI,4HALN*,4HAL2O,4HC33L,4HRN* ,                INPU0782        *COR
*4HI* ,4HI3N,4HN4SI,4HBF2O,4HAL* ,4HAL2O,4HP* ,4HP2O3,4HCP4*,                INPU0783        *COR
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      *4HFE* ,4HFC*,4HCEF2,4HFE3F,4HCLLI,4HFLI*,4HHLTO,4HLI20,4H02SI,   INPU0784   *COR
      *4HSI* ,4HGLTO,4HFCCL,4HPEF2,4HLT20,4HAL25,4HA4LI,4HB6LI,4HBALI,   INPU0785   *COR
      *4HP2H4,4HCLT2,4HEEF3,4HGEF4,4HAL60,4HP2EE,4HB3F3,4HB10H,4HFLI*,   INPU0786   *COR
      *4HFH02,4HFH30,4HEFH9,4HHH4L,4HALH4,4HI20/                         INPU0787   *COR
       DATA (AMORD(I),I=1,169)/                                                     *COR
      *4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   INPU0789   *COR
      *4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,      ,      ,      ,                *COR
      *4H    ,4HF   ,4HF2  ,4H0   ,4H2   ,4H2F  ,4H3   ,4H    ,4H    ,   INPU0791   *COR
      *4H    ,4H    ,4H    ,4H    ,4H2   ,4H    ,4H    ,4HL6  ,4H    ,   INPU0792   *COR
      *4H2   ,4H    ,4H    ,4H    ,4H2   ,4H    ,4H    ,4HF   ,4H    ,   INPU0793   *COR
      *4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H2   ,   INPU0794   *COR
      *4H    ,4H3   ,4H    ,4H    ,4H    ,4H4   ,4H    ,4H    ,4H    ,   INPU0795   *COR
      *4H3H3 ,4H03  ,4H06  ,4H03  ,4H    ,4H14  ,4H    ,4H    ,4H    ,   INPU0796   *COR
      *4HF   ,4H2   ,4H    ,4H    ,4H    ,4H    ,4H    ,4H02  ,4H    ,   INPU0797   *COR
      *4HL4  ,4H2   ,4H3   ,4H4   ,4H5   ,4H6   ,4H    ,4H0   ,4H3   ,   INPU0798   *COR
      *4H    ,4H0   ,4HF   ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   INPU0799   *COR
      *4H    ,4H    ,4HF2  ,4H2F  ,4H3   ,4H    ,4H    ,4H    ,4H    ,   INPU0800   *COR
      *4H    ,4H    ,4HLF  ,4HL2  ,4H2   ,4H    ,4H    ,4HL   ,4HL3S ,   INPU0801   *COR
      *4H    ,4H2ST ,4H    ,4H    ,4H    ,4H    ,4H    ,4H0   ,4H    ,   INPU0802   *COR
      *4H    ,4HSI  ,4H    ,4H    ,4H    ,4HT2  ,4H3   ,4H    ,4HSI  ,   INPU0803   *COR
      *4H    ,4HST  ,4H    ,4H0   ,4H    ,4H    ,4H    ,4H    ,4H2SI ,   INPU0804   *COR
      *4HT2  ,4H    ,4HI   ,4HSI  ,4HSI  ,4HT3  ,4HI   ,4H    ,4H    ,   INPU0805   *COR
      *4HT   ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4HSI  ,   INPU0806   *COR
      *4H2   ,4H    ,4H    ,4HI   ,4H3   ,4H    ,4H    ,4H    ,4H    /   INPU0807   *COR
       DATA (AMORD(I),I=169,285)/                                                   *COR
      *4H    ,4H    ,4H    ,4H202 ,4H    ,4H    ,4H    ,4H    ,4H    ,   INPU0809   *COR
      *4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   INPU0810   *COR
      *4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   INPU0811   *COR
      *4H    ,4H    ,4HF2  ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   INPU0812   *COR
      *4H2   ,4HLT  ,4H    ,4H0   ,4H04  ,4HLI  ,4H2   ,4H    ,4H203 ,   INPU0813   *COR
      *4H03  ,4H03  ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   INPU0814   *COR
      *4H    ,4HT   ,4H    ,4H    ,4H    ,4H    ,4H2   ,4H    ,4H    ,   INPU0815   *COR
      *4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4HF   ,4H04  ,4H2   ,   INPU0816   *COR
      *4H2   ,4H    ,4H20  ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   INPU0817   *COR
      *4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H4   ,4H6   ,   INPU0818   *COR
      *4H    ,4H    ,4H2   ,4HL   ,4H    ,4H    ,4HN   ,4HI   ,4H6   ,   INPU0819   *COR
      *4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H0   ,4H    ,   INPU0820   *COR
      *4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    /                *COR
       DATA (AMORD(I),I=286,345)/                                                   *COR
      *4H    ,4H2*  ,4HLT3*,4H0*  ,4H03* ,4H    ,4H2*  ,4HN*  ,4HN04*,   INPU0821   *COR
      *4H04* ,4H02* ,4H3*  ,4H*   ,4H02* ,4H    ,4H5ST*,4H4*  ,4H    ,   INPU0822   *COR
      *4H    ,4H*   ,4H3*  ,4H4ST*,4H    ,4H3*  ,4H    ,4H*   ,4H    ,   INPU0823   *COR
      *4H    ,4H    ,4H*   ,4H2*  ,4H*   ,4H    ,4H*   ,4H*   ,4H*   ,   INPU0824   *COR
      *4H    ,4H2*  ,4H2*  ,4H*   ,4H3SI*,4HF04*,4H207*,4H201*,4H201*,   INPU0825   *COR
      *4H04* ,4H03* ,4HLT* ,4HLI2*,4H13S*,4H306*,4H03* ,4H14* ,4H    ,   INPU0826   *COR
      *4H*   ,4H3*  ,4H*   ,4HI*  ,4HLI* ,4H5SI*/                       INPU0827   *COR
       DATA (BAX(I),I=1,108)/                                                       *COR
      *-9.4054E+4,-9.4054E+4,-9.9600E-1,-9.9600E-1,-5.7798E+4,-5.7798E+4,INPU0829   *COR
      *-2.6417E+4,-2.6417E+4, 0.0000E+0, 0.0000E+0, 5.4190E+4, 5.4190E+4,INPU0830   *COR
      *-2.2063E+4,-2.2063E+4,-6.5140E+4,-6.5140E+4, 1.7089E+5, 1.7089E+5,INPU0831   *COR
      * 2.0022E+5, 2.0022E+5, 1.9600E+5, 1.9600E+5, 2.3200E+5, 2.3200E+5,INPU0832   *COR
      * 2.3400E+5, 2.3400E+5, 7.8000E+4, 7.8000E+4, 1.6480E+5, 1.6480E+5,            *COR
      *-1.2300E+4,-1.2300E+4,-1.2000E+5,-1.2000E+5,-2.3760E+5,-2.3760E+5,INPU0835   *COR
      *-8.3200E+4,-8.3200E+4,-7.5000E+4,-7.5000E+4,-1.8860E+5,-1.8860E+5,INPU0836   *COR
      *-1.3970E+5,-1.3970E+5,-6.3400E+4,-6.3400E+4,-1.4020E+5,-1.4020E+5,INPU0837   *COR
      *-1.6500E+5,-1.6500E+5,-2.8903E+5,-2.8903E+5, 6.2000E+4, 6.2000E+4,INPU0838   *COR
      * 8.0000E+3, 8.0000E+3,-1.1000E+5,-1.1000E+5, 1.0400E+5, 1.0400E+5,INPU0839   *COR
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     * 2.0000E+4, 2.0000E+4,-3.0964E+5,-3.0964E+5,-3.1400E+4,-3.1400E+4,INPU0840   *COR
     *-9.7000E+4,-9.7000E+4, 1.3280E+5, 1.3280E+5, 3.3800E+4, 3.3800E+4,INPU0841   *COR
     *-7.5000E+4,-7.5000E+4,-2.1160E+5,-2.1160E+5,-7.5600E+4,-7.5600E+4,INPU0842   *COR
     *-2.0000E+4,-2.0000E+4,-1.5400E+5,-1.5400E+5,-9.6310E+4,-9.6310E+4,INPU0843   *COR
     *-2.7700E+4,-2.7700E+4,-1.4400E+5,-1.4400E+5,-1.3000E+5,-1.3000E+5,INPU0844   *COR
     *-2.7142E+5,-2.7142E+5, 1.0580E+5, 1.0580E+5,-2.0000E+4,-2.0000E+4,INPU0845   *COR
     *-1.3400E+5,-1.3400E+5, 4.8000E+4, 4.8000E+4,-1.1400E+5,-1.1400E+5,INPU0846   *COR
     * 2.5500E+4, 2.5500E+4,-2.3716E+5,-2.3716E+5, 1.1400E+5, 1.1400E+5/INPU0847   *COR
      DATA (RAX(I),I=104,222)/                                                      *COR
     * 1.1300E-1, 1.1300E-1, 1.9500E+5, 1.9500E+5,-1.1690E+5,-1.1690E+5,INPU0849   *COR
     * 9.8000E+3, 9.8000E+3,-1.0900E+5,-1.0900E+5,-1.9914E+5,-1.9914E+5,INPU0850   *COR
     *-3.9000E+5,-3.9000E+5,-5.6530E+5,-5.6530E+5,-5.4300E+5,-5.4300E+5,INPU0851   *COR
     *-1.2190E+5,-1.2190E+5, 1.7500E+4, 1.7500E+4, 1.1300E+4, 1.1300E+4,INPU0852   *COR
     * 7.8255E+4, 7.8255E+4, 1.3500E+5, 1.3500E+5, 1.4500E+4, 1.4500E+4,INPU0853   *COR
     *-1.3700E+5,-1.3700E+5,-8.6100E+4,-8.6100E+4,-4.9678E+4,-4.9678E+4,INPU0854   *COR
     *-1.9025E+5,-1.9025E+5, 7.6768E+4, 7.6768E+4,-2.5000E+4,-2.5000E+4,INPU0855   *COR
     * 3.0000E+4, 3.0000E+4,-1.5640E+5,-1.5640E+5, 3.1000E+4, 3.1000E+4,INPU0856   *COR
     *-1.7900E+5,-1.7900E+5,-9.8000E+4,-9.8000E+4,-2.5200E+5,-2.5200E+5,INPU0857   *COR
     *-3.8000E+5,-3.8000E+5,-5.0500E+5,-5.0500E+5,-6.3600E+5,-6.3600E+5,INPU0858   *COR
     * 1.2000E+5, 1.2000E+5,-1.0200E+5,-1.0200E+5,-1.6920E+5,-1.6920E+5,INPU0859   *COR
     * 3.2970E+4, 3.2970E+4,-5.2600E+4,-5.2600E+4,-6.9000E+4,-6.9000E+4,INPU0860   *COR
     *-2.2940E+4,-2.2940E+4, 6.1000E+4, 6.1000E+4, 8.6000E+3, 8.6000E+3,INPU0861   *COR
     *-4.3500E+4,-4.3500E+4,-1.5270E+5,-1.5270E+5,-1.1240E+5,-1.1240E+5,INPU0862   *COR
     *-2.2304E+5,-2.2304E+5, 1.4200E+5, 1.4200E+5,-1.1510E+5,-1.1510E+5,INPU0863   *COR
     *-6.7700E+4,-6.7700E+4,-2.4660E+4,-2.4660E+4,-9.0000E+4,-9.0000E+4,INPU0864   *COR
     *-1.6660E+5,-1.6660E+5, 3.2300E+4, 3.2300E+4,-2.4300E+4,-2.4300E+4,INPU0865   *COR
     * 1.0400E+4, 1.0400E+4, 9.2070E+4, 9.2070E+4,-6.2600E+4,-6.2600E+4,INPU0866   *COR
     *-2.2830E+4,-2.2830E+4,-1.0771E+5,-1.0771E+5,-2.7700E+4,-2.7700E+4/INPU0867   *COR
      DATA (RAX(I),I=223,336)/                                                      *COR
     * 3.4820E+4, 3.4820E+4,-2.0660E+4,-2.0660E+4,-1.2640E+5,-1.2640E+5,INPU0869   *COR
     *-5.6000E+4,-5.6000E+4,-2.9862E+5,-2.9862E+5,-1.7895E+4,-1.7895E+4,INPU0870   *COR
     * 1.0400E+5, 1.0400E+5, 5.0000E+3, 5.0000E+3,-1.5740E+5,-1.5740E+5,INPU0871   *COR
     * 1.2540E+4, 1.2540E+4,-1.2580E+4,-1.2580E+4, 7.3870E+4, 7.3870E+4,INPU0872   *COR
     *-2.2380E+4,-2.2380E+4,-6.8500E+4,-6.8500E+4, 1.2750E+5, 1.2750E+5,INPU0873   *COR
     * 2.8922E+4, 2.8922E+4,-1.2140E+4,-1.2140E+4,-1.8020E+5,-1.8020E+5,INPU0874   *COR
     *-5.1200E+3,-5.1200E+3,-3.7970E+4,-3.7970E+4,-3.1500E+5,-3.1500E+5,INPU0875   *COR
     *-2.2000E+4,-2.2000E+4,-4.8000E+4,-4.8000E+4,-4.6778E+4,-4.6778E+4,INPU0876   *COR
     *-3.4000E+3,-3.4000E+3, 1.2370E+4, 1.2370E+4, 2.4192E+4, 2.4192E+4,INPU0877   *COR
     * 2.5000E+4, 2.5000E+4, 4.5700E+4, 4.5700E+4,-7.5000E+4,-7.5000E+4,INPU0878   *COR
     *-1.4305E+5,-1.4305E+5, 2.1000E+4, 2.1000E+4,-4.0000E+4,-4.0000E+4,INPU0879   *COR
     *-2.0100E+5,-2.0100E+5,-1.1200E+5,-1.1200E+5,-2.4013E+5,-2.4013E+5,INPU0880   *COR
     *-1.5840E+5,-1.5840E+5, 1.8860E+4, 1.8860E+4,-3.1000E+4,-3.1000E+4,INPU0881   *COR
     *-1.0500E+5,-1.0500E+5,-8.1450E+4,-8.1450E+4,-2.2000E+4,-2.2000E+4,INPU0882   *COR
     * 5.9500E+4, 5.9500E+4,-1.5700E+4,-1.5700E+4,-3.8598E+5,-3.8598E+5,INPU0883   *COR
     * 2.6000E+4, 2.6000E+4,-8.6000E+3,-8.6000E+3,-1.9400E+5,-1.9400E+5,INPU0884   *COR
     *-2.2533E+5,-2.2533E+5, 5.3600E+3, 5.3600E+3,-1.4050E+5,-1.4050E+5,INPU0885   *COR
     *-2.8300E+5,-2.8300E+5,-3.6262E+5,-3.6262E+5,-3.1430E+4,-3.1430E+4,INPU0886   *COR
     * 5.2100E+4, 5.2100E+4, 3.3610E+4, 3.3610E+4,-5.8843E+4,-5.8843E+4/INPU0887   *COR
      DATA (RAX(I),I=337,450)/                                                      *COR
     * 9.1000E+4, 9.1000E+4, 9.4920E+3, 9.4920E+3, 9.0000E+4, 9.0000E+4,INPU0889   *COR
     *-1.8143E+5,-1.8143E+5, 4.0070E+4, 4.0070E+4,-3.2530E+4,-3.2530E+4,INPU0890   *COR
     *-1.0970E+4,-1.0970E+4, 2.2790E+4, 2.2790E+4, 7.8000E+3, 7.8000E+3,INPU0891   *COR
     * 3.8410E+4, 3.8410E+4, 8.0000E+4, 8.0000E+4, 2.0100E+4, 2.0100E+4,INPU0892   *COR
     * 5.0400E+4, 5.0400E+4,-3.9900E+4,-3.9900E+4, 1.1296E+5, 1.1296E+5,INPU0893   *COR
     * 2.1580E+4, 2.1580E+4, 7.9100E+3, 7.9100E+3, 8.9000E+4, 8.9000E+4,INPU0894   *COR
     * 1.9610E+4, 1.9610E+4, 1.9800E+4, 1.9800E+4, 2.1700E+3, 2.1700E+3,INPU0895   *COR
     * 2.7000E+3, 2.7000E+3, 5.9550E+4, 5.9550E+4,-2.4000E+4,-2.4000E+4,INPU0896   *COR
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*-7.3000E+4,-7.3000E+4, 3.4100E+4, 3.4100E+4, 1.0770E+5, 1.0770E+5,INPU0897   *COR
* 1.4100E+5, 1.4100E+5, 1.5200E+5, 1.5200E+5,-1.1750E+5,-1.1750E+5,INPU0898   *COR
*-1.7540E+5,-1.7540E+5,-2.0000E+5,-2.0000E+5,-1.5000E+4,-1.5000E+4,INPU0899   *COR
*-4.1000E+4,-4.1000E+4,-3.2120E+5,-3.2120E+5,-2.6000E+4,-2.6000E+4,INPU0900   *COR
*-1.6036E+5,-1.6036E+5,-4.4300E+5,-4.4300E+5, 1.9800E+5, 1.9800E+5,INPU0901   *COR
*-2.5900E+5,-2.5900E+5,-3.2300E+5,-3.2300E+5,-2.1200E+5,-2.1200E+5,INPU0902   *COR
* 2.9000E+3, 2.9000E+3, 1.0100E+4, 1.0100E+4,-3.8200E+5,-3.8200E+5,INPU0903   *COR
*-4.7500E+5,-4.7500E+5,-2.9100E+5,-2.9100E+5, 2.5000E+3, 2.5000E+3,INPU0904   *COR
* 2.3800E+4, 2.3800E+4,-6.8000E+4,-6.8000E+4, 1.0195E+5, 1.0195E+5,INPU0905   *COR
*-1.8340E+4,-1.8340E+4,-1.8840E+4,-1.8840E+4,-3.2100E+4,-3.2100E+4,INPU0906   *COR
*-1.5000E+4,-1.5000E+4,-2.3100E+5,-2.3100E+5,-2.6300E+5,-2.6300E+5/INPU0907   *COR
 DATA (RAX(I),I=451,556)/                                                      *COR
*-4.3000E+4,-4.3000E+4,-2.0000E+3,-2.0000E+3, 5.0000E+3, 5.0000E+3,INPU0908   *COR
*-5.8000E+4,-5.8000E+4,-3.4220E+5,-3.4220E+5, 1.7000E+4, 1.7000E+4,INPU0910   *COR
*-1.8280E+5,-1.8280E+5, 5.7000E+4, 5.7000E+4, 1.9000E+4, 1.9000E+4,INPU0911   *COR
* 1.6400E+4, 1.6400E+4, 1.9400E+4, 1.9400E+4, 5.0900E+4, 5.0900E+4,INPU0912   *COR
*-5.9300E+4,-5.9300E+4,-3.0700E+5,-3.0700E+5,-1.2940E+5,-1.2940E+5,INPU0913   *COR
*-1.1520E+5,-1.1520E+5, 2.3000E+4, 2.3000E+4,-2.8790E+5,-2.8790E+5,INPU0914   *COR
* 1.3970E+5, 1.3970E+5, 1.1300E+5, 1.1300E+5, 6.8500E+4, 6.8500E+4,INPU0915   *COR
*-5.7000E+4,-5.7000E+4, 2.7640E+5, 2.7640E+5, 3.0000E+3, 3.0000E+3,INPU0916   *COR
* 4.3000E+4, 4.3000E+4, 1.1400E+5, 1.1400E+5, 1.7200E+5, 1.7200E+5,INPU0917   *COR
* 1.2800E+5, 1.2800E+5, 1.3300E+5, 1.3300E+5, 1.4700E+5, 1.4700E+5,INPU0918   *COR
* 9.5000E+4, 9.5000E+4,-2.9700E+3,-2.9700E+3,-3.2030E+4,-3.2030E+4,INPU0919   *COR
* 3.0000E+4, 3.0000E+4,-4.4000E+4,-4.4000E+4, 5.0100E+4, 5.0100E+4,INPU0920   *COR
* 5.1100E+4, 5.1100E+4, 5.0000E+4, 5.0000E+4, 3.0000E+4, 3.0000E+4,INPU0921   *COR
*-1.1840E+5,-1.1840E+5,-9.6000E+4,-9.6000E+4,-6.2945E+5,-6.2945E+5,INPU0922   *COR
*-3.9000E+4,-3.9000E+4,-2.4800E-1,-2.4800E-1,-8.5600E-1,-8.5600E-1,INPU0923   *COR
*-1.1000E-1,-1.1000E-1, 5.7400E-1, 5.7400E-1, 3.8100E+4, 3.8100E+4,INPU0924   *COR
* 9.9000E+4, 9.9000E+4,-4.5350E+5,-4.5350E+5, 0.0000E+0, 0.0000E+0,INPU0925   *COR
* 6.5925E+4, 6.5925E+4,-2.0320E+4,-2.0320E+4/                                 *COR
 DATA (RAX(I),I=557,582)/                                                      *COR
* 1.2770E+5, 1.2770E+5, 1.0652E+5, 1.0652E+5, 7.6485E+4, 7.6485E+4,           *COR
* 4.4294E+4, 4.4294E+4, 3.2431E+4, 3.2431E+4, 1.5520E+5, 1.5520E+5,           *COR
* 1.1172E+5, 1.1172E+5,                                                       *COR
* 0.0000E+0, 0.0000E+0,-1.5120E+5,-1.5120E+5,-8.0470E+5,-8.0470E+5,INPU0926   *COR
*-1.8960E+5,-1.8960E+5,-3.0170E+5,-3.0170E+5,-1.7100E+4,-1.7100E+4/INPU0927   *COR
 DATA (RAX(I),I=583,690)/                                                      *COR
*-1.4200E+4,-1.4200E+4,-7.5180E+4,-7.5180E+4,-7.0690E+4,-7.0690E+4,INPU0929   *COR
*-8.5664E+4,-8.5664E+4,-2.1650E+5,-2.1650E+5,-1.6128E+5,-1.6128E+5,INPU0930   *COR
*-3.6100E+5,-3.6100E+5,-2.8435E+5,-2.8435E+5,-7.6000E+4,-7.6000E+4,INPU0931   *COR
*-6.1861E+5,-6.1861E+5,-5.1550E+4,-5.1550E+4,-5.9970E+4,-5.9970E+4,INPU0932   *COR
* 5.6200E+2, 5.6500E+2,-4.7200E+4,-4.7200E+4,-1.7800E+5,-1.7800E+5,INPU0933   *COR
*-5.0603E+5,-5.0603E+5, 0.0000E+0, 2.0720E+3,-4.0040E+5,-3.7336E+5,INPU0934   *COR
*-7.7300E-1, 5.2600E+3,-3.0364E+5,-2.9920E+5,-9.2960E+3, 1.8095E+4,INPU0935   *COR
*-7.7800E-1, 2.8810E+3,-1.4310E+5,-1.2956E+5,-2.1700E+4,-3.7980E+3,INPU0936   *COR
*-1.4060E+5,-1.1840E+5,-9.7572E+4,-9.3394E+4,-1.4745E+5,-1.4308E+5,INPU0937   *COR
*-1.1584E+5,-1.1326E+5,-1.4310E+5,-1.3213E+5,-2.1770E+5,-2.1574E+5,INPU0938   *COR
*-3.7303E-1, 1.1505E+4,-2.4425E+5,-2.3582E+5,-1.1360E+5,-1.1742E+5,INPU0939   *COR
*-2.4540E+5,-2.4427E+5,-3.9424E+5,-3.8744E+5,-5.4500E+5,-5.4500E+5,INPU0940   *COR
*-8.0360E+5,-7.9276E+5,-1.1137E+6,-1.1137E+6,-1.4136E+6,-1.4136E+6,INPU0941   *COR
*-3.3710E+5,-3.3710E+5,-2.9564E+5,-2.8163E+5,-3.9024E+5,-3.5024E+5,INPU0942   *COR
*-5.3400E+5,-5.4120E+5,-1.6294E+6,-1.6290E+6,-7.4196E+5,-7.4196E+5,INPU0943   *COR
*-5.8650E+5,-5.8650E+5,-1.7000E+3,-1.7000E+3,-2.1660E+4,-1.8573E+4,INPU0944   *COR
*-1.9187E+5,-1.9187E+5,-2.6147E+5,-2.6147E+5, 1.0240E+4, 1.0240E+4,INPU0945   *COR
*-4.5522E+4,-4.5522E+4,-2.8000E+4,-2.8000E+4,-6.1207E+5,-6.0064E+5/INPU0946   *COR
 DATA (RBX(I),I=1,108)/                                                        *COR
* 3.6636E+4, 3.6561E+4, 2.1269E+4, 2.1224E+4, 3.0390E+4, 3.0250E+4,INPU0948   *COR
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     * 2.2420E+4, 2.2370E+4, 1.4048E+4, 1.4020E+4, 4.8489E+4, 4.8312E+4,INPU0949   *COR
     * 2.1947E+4, 2.1886E+4, 2.1122E+4, 2.1070E+4, 1.3525E+4, 1.3549E+4,INPU0950   *COR
     * 2.4726E+4, 2.4685E+4, 3.1054E+4, 3.0987E+4, 5.1213E+4, 5.1129E+4,INPU0951   *COR
     * 6.5491E+4, 6.5380E+4, 1.3478E+4, 1.3453E+4, 2.4162E+4, 2.4159E+4,           *COR
     * 2.4452E+4, 2.4416E+4, 3.6772E+4, 3.6769E+4, 5.2125E+4, 5.2115E+4,INPU0954   *COR
     * 3.9207E+4, 3.9202E+4, 3.7095E+4, 3.7090E+4, 5.2477E+4, 5.2472E+4,INPU0955   *COR
     * 5.2813E+4, 5.2810E+4, 2.4041E+4, 2.4037E+4, 3.8703E+4, 3.8694E+4,INPU0956   *COR
     * 3.6410E+4, 3.6407E+4, 5.1759E+4, 5.1747E+4, 2.3426E+4, 2.3394E+4,INPU0957   *COR
     * 3.6795E+4, 3.6751E+4, 4.8162E+4, 4.8078E+4, 2.3907E+4, 2.3902E+4,INPU0958   *COR
     * 2.7098E+4, 2.6860E+4, 1.1624E+5, 1.1623E+5, 3.6362E+4, 3.6353E+4,INPU0959   *COR
     * 5.0533E+4, 5.0508E+4, 1.3430E+4, 1.3421E+4, 2.4011E+4, 2.4007E+4,INPU0960   *COR
     * 3.5833E+4, 3.5815E+4, 5.0433E+4, 5.0397E+4, 3.7931E+4, 3.7894E+4,INPU0961   *COR
     * 3.6371E+4, 3.6362E+4, 5.1151E+4, 5.1127E+4, 5.1710E+4, 5.1696E+4,INPU0962   *COR
     * 2.3314E+4, 2.3298E+4, 3.7346E+4, 3.7300E+4, 3.5292E+4, 3.5262E+4,INPU0963   *COR
     * 4.9760E+4, 4.9711E+4, 2.2704E+4, 2.2654E+4, 3.5724E+4, 3.5638E+4,INPU0964   *COR
     * 4.5848E+4, 4.5714E+4, 3.4855E+4, 3.4537E+4, 6.0567E+4, 6.0406E+4,INPU0965   *COR
     * 4.2788E+4, 4.2540E+4, 7.9067E+4, 7.8804E+4, 2.3376E+4, 2.3372E+4/INPU0966   *COR
      DATA (RBX(I),I=104,222)/                                                      *COR
     * 2.2704E+4, 2.2658E+4, 2.3023E+4, 2.3815E+4, 7.9958E+4, 7.9034E+4,INPU0968   *COR
     * 9.6344E+4, 9.5926E+4, 5.1041E+4, 5.1759E+4, 6.3798E+4, 6.3695E+4,INPU0969   *COR
     * 1.2637E+5, 1.2631E+5, 1.2341E+5, 1.2329E+5, 1.6120E+5, 1.6039E+5,INPU0970   *COR
     * 1.5092E+5, 1.5036E+5, 1.7703E+5, 1.7637E+5, 3.1602E+5, 3.1503E+5,INPU0971   *COR
     * 1.3463E+4, 1.3414E+4, 3.6864E+4, 3.6800E+4, 2.3994E+4, 2.3981E+4,INPU0972   *COR
     * 3.8630E+4, 3.8814E+4, 3.9166E+4, 3.9157E+4, 2.3487E+4, 2.3473E+4,INPU0973   *COR
     * 3.8343E+4, 3.8318E+4, 2.2993E+4, 2.2952E+4, 3.2298E+4, 3.2206E+4,INPU0974   *COR
     * 3.4725E+4, 3.4620E+4, 6.0021E+4, 5.9850E+4, 2.3213E+4, 2.3192E+4,INPU0975   *COR
     * 8.4462E+4, 8.4456E+4, 4.9893E+4, 4.9853E+4, 7.7045E+4, 7.6928E+4,INPU0976   *COR
     * 1.0799E+5, 1.0790E+5, 1.3734E+5, 1.3722E+5, 1.6658E+5, 1.6643E+5,INPU0977   *COR
     * 2.4046E+4, 2.4035E+4, 4.9932E+4, 4.9862E+4, 6.5474E+4, 6.5434E+4,INPU0978   *COR
     * 3.8740E+4, 3.8687E+4, 5.0652E+4, 5.0612E+4, 6.7015E+4, 6.6997E+4,INPU0979   *COR
     * 6.7715E+4, 6.7706E+4, 2.3887E+4, 2.3866E+4, 3.7082E+4, 3.7024E+4,INPU0980   *COR
     * 3.5398E+4, 3.5402E+4, 4.9141E+4, 4.9079E+4, 4.9935E+4, 4.9896E+4,INPU0981   *COR
     * 6.4612E+4, 6.4560E+4, 2.3649E+4, 2.3501E+4, 6.2381E+4, 6.2270E+4,INPU0982   *COR
     * 6.2873E+4, 6.2769E+4, 2.3546E+4, 2.3452E+4, 4.6410E+4, 4.6289E+4,INPU0983   *COR
     * 6.1282E+4, 6.1151E+4, 3.5031E+4, 3.4925E+4, 4.6394E+4, 4.6264E+4,INPU0984   *COR
     * 3.3029E+4, 3.2942E+4, 3.3928E+4, 3.3780E+4, 5.9007E+4, 5.8816E+4,INPU0985   *COR
     * 5.9743E+4, 5.9566E+4, 5.8208E+4, 5.8000E+4, 4.4062E+4, 4.3866E+4/INPU0986   *COR
      DATA (RBX(I),I=223,336)/                                                      *COR
     * 4.2950E+4, 4.2729E+4, 5.6383E+4, 5.6125E+4, 1.0933E+5, 1.0276E+5,INPU0988   *COR
     * 5.5601E+4, 5.5326E+4, 1.0889E+5, 1.0170E+5, 5.3539E+4, 5.3203E+4,INPU0989   *COR
     * 2.3199E+4, 2.3264E+4, 5.2455E+4, 5.2359E+4, 7.9427E+4, 7.9342E+4,INPU0990   *COR
     * 6.7903E+4, 6.7560E+4, 8.1821E+4, 8.1457E+4, 5.1247E+4, 5.1146E+4,INPU0991   *COR
     * 6.5476E+4, 6.5349E+4, 2.3148E+5, 2.0516E+5, 8.0342E+4, 8.0185E+4,INPU0992   *COR
     * 1.4005E+4, 1.4022E+4, 2.4128E+4, 2.4125E+4, 5.1955E+4, 5.1946E+4,INPU0993   *COR
     * 6.5192E+4, 6.5147E+4, 5.2124E+4, 5.2118E+4, 6.7201E+4, 6.7186E+4,INPU0994   *COR
     * 3.3045E+4, 3.2971E+4, 6.0870E+4, 6.0708E+4, 2.4412E+4, 2.4410E+4,INPU0995   *COR
     * 3.6031E+4, 3.6018E+4, 3.7158E+4, 3.7122E+4, 2.4063E+4, 2.4059E+4,INPU0996   *COR
     * 3.6601E+4, 3.6585E+4, 2.4459E+4, 2.4452E+4, 6.3245E+4, 6.3137E+4,INPU0997   *COR
     * 5.2917E+4, 5.2916E+4, 3.6728E+4, 3.6725E+4, 3.7066E+4, 3.7058E+4,INPU 998   *COR
     * 6.8307E+4, 6.8300E+4, 6.5717E+4, 6.5658E+4, 8.3389E+4, 8.3380E+4,INPU 999   *COR
     * 6.8406E+4, 6.8402E+4, 1.3679E+4, 1.3682E+4, 3.2413E+4, 3.2325E+4,INPU1000   *COR
     * 6.0393E+4, 6.0226E+4, 2.4126E+4, 2.4121E+4, 3.6145E+4, 3.6136E+4,INPU1001   *COR
     * 2.3772E+4, 2.3763E+4, 3.5233E+4, 3.5195E+4, 6.6377E+4, 6.6350E+4,INPU1002   *COR
     * 2.4026E+4, 2.4014E+4, 2.4024E+4, 2.4011E+4, 6.1598E+4, 6.1466E+4,INPU1003   *COR
     * 5.2110E+4, 5.2104E+4, 3.6168E+4, 3.6158E+4, 3.6302E+4, 3.6281E+4,INPU1004   *COR
     * 6.4044E+4, 6.3964E+4, 8.3438E+4, 8.3429E+4, 5.0832E+4, 5.0812E+4,INPU1005   *COR
     * 1.3423E+4, 1.3423E+4, 2.3944E+4, 2.3917E+4, 3.2653E+4, 3.2575E+4/INPU1006   *COR
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      DATA (RPX(I),I=337,450)/                                                  *COR
     * 2.1853E+4, 2.1791E+4, 2.1490E+4, 2.1430E+4, 2.3024E+4, 2.2965E+4,INPU1008 *COR
     * 7.4448E+4, 7.4278E+4, 3.0777E+4, 3.0632E+4, 4.4765E+4, 4.3911E+4,INPU1009 *COR
     * 4.1881E+4, 4.1692E+4, 6.8946E+4, 6.8644E+4, 5.8733E+4, 5.8520E+4,INPU1010 *COR
     * 1.3544E+4, 1.3491E+4, 2.4621E+4, 2.4619E+4, 2.4312E+4, 2.4309E+4,INPU1011 *COR
     * 2.5481E+4, 2.5480E+4, 3.9025E+4, 3.9016E+4, 1.3441E+4, 1.3428E+4,INPU1012 *COR
     * 2.2751E+4, 2.2715E+4, 3.4548E+4, 3.4500E+4, 2.5350E+4, 2.5253E+4,INPU1013 *COR
     * 3.6642E+4, 3.6578E+4, 6.1892E+4, 6.1812E+4, 7.8738E+4, 7.8637E+4,INPU1014 *COR
     * 9.1618E+4, 9.1590E+4, 1.3517E+4, 1.3521E+4, 2.3392E+4, 2.3358E+4,INPU1015 *COR
     * 3.8088E+4, 3.8062E+4, 3.6051E+4, 3.6031E+4, 1.4028E+4, 1.4017E+4,INPU1016 *COR
     * 2.7148E+4, 2.7207E+4, 4.0085E+4, 4.0180E+4, 6.6260E+4, 6.6232E+4,INPU1017 *COR
     * 4.7424E+4, 4.7320E+4, 5.0099E+4, 5.0060E+4, 3.5564E+4, 3.5527E+4,INPU1018 *COR
     * 3.4854E+4, 3.4815E+4, 1.0419E+5, 1.0414E+5, 4.9552E+4, 4.9497E+4,INPU1019 *COR
     * 4.7690E+4, 4.7583E+4, 8.3209E+4, 8.3197E+4, 2.3410E+4, 2.3394E+4,INPU1020 *COR
     * 6.0783E+4, 6.0652E+4, 9.3740E+4, 9.3629E+4, 6.4982E+4, 6.4939E+4,INPU1021 *COR
     * 5.0000E+4, 4.9951E+4, 3.5807E+4, 3.5793E+4, 1.1854E+5, 1.1830E+5,INPU1022 *COR
     * 1.2099E+5, 1.2081E+5, 1.1592E+5, 1.1561E+5, 6.4805E+4, 6.4746E+4,INPU1023 *COR
     * 3.2885E+4, 3.2791E+4, 3.8070E+4, 3.8041E+4, 2.3677E+4, 2.3665E+4,INPU1024 *COR
     * 4.7029E+4, 4.6920E+4, 4.7029E+4, 4.6923E+4, 6.1092E+4, 6.0961E+4,INPU1025 *COR
     * 3.7585E+4, 3.7550E+4, 5.0567E+4, 5.0537E+4, 5.1433E+4, 5.1417E+4/INPU1026 *COR
      DATA (RBX(I),I=451,556)/                                                  *COR
     * 3.4347E+4, 3.4252E+4, 8.0723E+4, 8.0687E+4, 3.2652E+4, 3.2565E+4,INPU1028 *COR
     * 5.2945E+4, 5.2844E+4, 7.7198E+4, 7.7129E+4, 4.9870E+4, 4.9836E+4,INPU1029 *COR
     * 7.7756E+4, 7.7698E+4, 4.0361E+4, 4.0117E+4, 5.1927E+4, 5.1917E+4,INPU1030 *COR
     * 5.0054E+4, 5.0017E+4, 5.0199E+4, 5.0157E+4, 4.4024E+4, 4.3839E+4,INPU1031 *COR
     * 4.8875E+4, 4.8794E+4, 1.2623E+5, 1.2587E+5, 4.9904E+4, 4.9851E+4,INPU1032 *COR
     * 4.9563E+4, 4.9507E+4, 3.4683E+4, 3.4636E+4, 6.6188E+4, 6.6148E+4,INPU1033 *COR
     * 3.6474E+4, 3.6401E+4, 3.7735E+4, 3.7695E+4, 3.8754E+4, 3.8640E+4,INPU1034 *COR
     * 6.3046E+4, 6.3036E+4, 2.2804E+4, 2.2745E+4, 3.5873E+4, 3.5850E+4,INPU1035 *COR
     * 3.5992E+4, 3.5974E+4, 3.5656E+4, 3.5640E+4, 2.6352E+4, 2.6346E+4,INPU1036 *COR
     * 3.8763E+4, 3.9000E+4, 3.8486E+4, 3.8465E+4, 3.8235E+4, 3.8419E+4,INPU1037 *COR
     * 3.9094E+4, 3.9081E+4, 8.1904E+4, 8.1863E+4, 1.1466E+5, 1.1462E+5,INPU1038 *COR
     * 4.9819E+4, 4.9700E+4, 3.8959E+4, 3.8943E+4, 5.3275E+4, 5.3223E+4,INPU1039 *COR
     * 5.0294E+4, 5.0184E+4, 3.7368E+4, 3.7217E+4, 3.3421E+4, 3.3480E+4,INPU1040 *COR
     * 7.9023E+4, 7.8929E+4, 5.2748E+4, 5.2746E+4, 1.1374E+5, 1.1372E+5,INPU1041 *COR
     * 6.5539E+4, 6.5495E+4, 2.4439E+4, 2.4434E+4, 2.4399E+4, 2.4437E+4,INPU1042 *COR
     * 2.2237E+4, 2.2184E+4, 2.3444E+4, 2.3855E+4, 3.7050E+4, 3.6991E+4,INPU1043 *COR
     * 3.7254E+4, 3.7247E+4, 8.5744E+4, 8.9759E+4, 1.4940E+4, 1.4940E+4,INPU1044 *COR
     * 5.6243E+4, 5.6243E+4, 8.9271E+4, 8.9271E+4/                              *COR
      DATA (RBX(I),I=557,582)/                                                  *COR
     * 4.8962E+4, 4.8962E+4, 6.3517E+4, 6.3517E+4, 7.0952E+4, 7.0952E+4,        *COR
     * 8.2247E+4, 8.2247E+4, 9.4621E+4, 9.4621E+4, 6.4503E+4, 6.4503E+4,        *COR
     * 7.6323E+4, 7.6323E+4,                                                    *COR
     * 1.3423E+4, 1.3423E+4, 9.7024E+4, 9.6836E+4, 2.3621E+5, 2.4108E+5,INPU1045 *COR
     * 5.1913E+4, 5.1490E+4, 1.5013E+5, 1.4023E+5, 3.2732E+4, 3.2600E+4/INPU1046 *COR
      DATA (RBX(I),I=583,690)/                                                  *COR
     * 7.4462E+4, 7.4491E+4, 1.3346E+5, 1.1101E+5, 2.5545E+5, 2.2548E+5,INPU1048 *COR
     * 1.0402E+5, 1.0402E+5, 1.1324E+5, 1.0989E+5, 8.1055E+4, 6.1055E+4,INPU1049 *COR
     * 6.7244E+4, 6.8862E+4,  .8768E+4, 6.9567E+4, 3.1163E+4, 3.1305E+4,INPU1050 *COR
     * 1.3645E+5, 1.3652E+5, 1.1773E+5, 1.1664E+5, 2.9520E+4, 2.9082E+4,INPU1051 *COR
     * 1.8540E+4, 1.8557E+4, 9.0932E+4, 8.5948E+4, 1.1464E+5, 1.0904E+5,INPU1052 *COR
     * 1.1348E+5, 1.1342E+5, 2.1984E+4, 2.0502E+4, 8.4352E+4, 8.5659E+4,INPU1053 *COR
     * 1.7587E+4, 1.7458E+4, 1.6282E+5, 7.9819E+4, 5.2956E+4, 7.9040E+4,INPU1054 *COR
     * 2.1822E+4, 1.5284E+4, 3.4148E+4, 3.5875E+4, 5.3322E+4, 5.2443E+4,INPU1055 *COR
     * 7.9275E+4, 8.6459E+4, 5.0220E+4, 5.6114E+4, 4.5984E+4, 4.1446E+4,INPU1056 *COR
     * 7.4176E+4, 5.6036E+4, 6.2000E+4, 6.2762E+4, 4.6268E+4, 4.9499E+4,INPU1057 *COR
     * 1.8585E+4, 1.7562E+4, 8.9556E+4, 8.6401E+4, 4.3712E+4, 7.6316E+4,INPU1058 *COR
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     * 6.6176E+4. 6.7692E+4. 1.0961E+5. 1.0255E+5. 1.2664E+5. 1.2647E+5.INPU1059   *COR
     * 2.4077E+5. 2.8657E+5. 2.8864E+5. 2.8080E+5. 3.5267E+5. 3.5114E+5.INPU1060   *COR
     * 1.9472E+5. 1.6346E+5. 1.8475E+5. 1.1471E+5. 9.8927E+4. 9.8479E+4.INPU1061   *COR
     * 2.1619E+5. 1.4600E+5. 3.4281E+5. 4.4250E+5. 1.8590E+5. 1.8687E+5.INPU1062   *COR
     * 1.7572E+5. 1.4218E+5. 3.9649E+5. 3.1616E+5. 6.6016E+4. 4.0258E+4.INPU1063   *COR
     * 7.6683E+4. 5.8551E+4. 1.2524E+5. 1.1440E+5. 1.9946E+5. 1.8184E+5.INPU1064   *COR
     * 7.3949E+4. 7.5675E+4. 7.7546E+4. 7.7316E+4. 1.6406E+5. 1.5528E+5/INPU1065   *COR
      DATA (RCX(I),I=1,108)/                                                       *COR
     * 1.3073E+1. 1.4266E+1. 6.2626E+0. 8.0030E+0. 8.4750E+0. 1.3201E+1.INPU1067   *COR
     * 7.7994E+0. 8.6695E+0. 5.5039E+0. 5.2640E+0. 1.5270E+1. 1.9961E+1.INPU1068   *COR
     * 7.0559E+0. 8.6336E+0. 6.4131E+0. 8.5586E+0. 4.8618E+0. 5.1472E+0.INPU1069   *COR
     * 7.6672E+0. 8.4361E+0. 1.0223E+1. 1.2524E+1. 1.6990E+1. 2.0473E+1.INPU1070   *COR
     * 2.4175E+1. 2.6301E+1. 4.9166E+0. 3.6204E+0. 8.8485E+0. 8.9314E+0.           *COR
     * 5.8663E+0. 6.3652E+0. 1.3041E+1. 1.3895E+1. 1.9696E+1. 1.9831E+1.INPU1073   *COR
     * 1.4792E+1. 1.4874E+1. 1.3569E+1. 1.3905E+1. 1.9763E+1. 1.9848E+1.INPU1074   *COR
     * 1.5819E+1. 1.9854E+1. 8.8747E+0. 8.9556E+0. 1.4731E+1. 1.4863E+1.INPU1075   *COR
     * 1.3753E+1. 1.3873E+1. 1.9613E+1. 1.9812E+1. 8.3055E+0. 8.8103E+0.INPU1076   *COR
     * 1.3958E+1. 1.4697E+1. 1.7102E+1. 1.9427E+1. 8.8324E+0. 8.9166E+0.INPU1077   *COR
     * 7.4257E+0. 1.1932E+1. 4.3627E+1. 4.3656E+1. 1.3728E+1. 1.3868E+1.INPU1078   *COR
     * 1.9340E+1. 1.9752E+1. 4.9516E+0. 4.4697E+0. 8.8644E+0. 8.9247E+0.INPU1079   *COR
     * 1.3537E+1. 1.3826E+1. 1.9091E+1. 1.8701E+1. 1.4041E+1. 1.4729E+1.INPU1080   *COR
     * 1.3734E+1. 1.3669E+1. 1.9362E+1. 1.9757E+1. 1.9585E+1. 1.9805E+1.INPU1081   *COR
     * 8.5411E+0. 8.6544E+0. 1.3050E+1. 1.4690E+1. 1.3261E+1. 1.3767E+1.INPU1082   *COR
     * 1.8819E+1. 1.9642E+1. 7.6267E+0. 8.7027E+0. 1.2678E+1. 1.4479E+1.INPU1083   *COR
     * 1.5770E+1. 1.9165E+1. 1.1721E+1. 1.4390E+1. 2.1500E+1. 2.5055E+1.INPU1084   *COR
     * 1.3169E+1. 1.6704E+1. 2.6954E+1. 3.3851E+1. 8.2881E+0. 9.1753E+0/INPU1085   *COR
      DATA (RCX(I),I=109,222)/                                                     *COR
     * 8.0618E+0. 7.7617E+0. 8.7727E+0. 8.9040E+0. 3.0296E+1. 3.0696E+1.INPU1087   *COR
     * 3.3132E+1. 4.1734E+1. 1.8095E+1. 2.0480E+1. 2.3479E+1. 2.5350E+1.INPU1088   *COR
     * 4.4252E+1. 4.9350E+1. 4.7011E+1. 4.9693E+1. 5.8656E+1. 6.6062E+1.INPU1089   *COR
     * 5.2294E+1. 6.4872E+1. 6.3194E+1. 7.6347E+1. 1.1408E+2. 1.3042E+2.INPU1090   *COR
     * 4.8632E+0.-1.2613E-1. 1.3425E+1. 1.4605E+1. 8.8465E+0. 8.3859E+0.INPU1091   *COR
     * 1.4570E+1. 1.4830E+1. 1.4701E+1. 1.4854E+1. 8.6483E+0. 8.8767E+0.INPU1092   *COR
     * 1.4356E+1. 1.4786E+1. 7.9351E+0. 8.7470E+0. 1.0877E+1. 1.3410E+1.INPU1093   *COR
     * 1.2485E+1. 1.4409E+1. 2.0551E+1. 2.4957E+1. 8.4776E+0. 8.8434E+0.INPU1094   *COR
     * 3.1574E+1. 3.1766E+1. 1.9009E+1. 1.9688E+1. 2.9264E+1. 3.1244E+1.INPU1095   *COR
     * 4.1648E+1. 4.5255E+1. 5.3057E+1. 5.5060E+1. 6.4519E+1. 6.6878E+1.INPU1096   *COR
     * 8.8371E+0. 8.1161E+0. 1.6741E+1. 1.9639E+1. 2.5002E+1. 2.5645E+1.INPU1097   *COR
     * 1.3602E+1. 1.4660E+1. 1.8952E+1. 1.9683E+1. 2.5861E+1. 2.5747E+1.INPU1098   *COR
     * 2.5642E+1. 2.5784E+1. 8.6071E+0. 8.0361E+0. 1.3444E+1. 1.4627E+1.INPU1099   *COR
     * 1.3370E+1. 1.1708E+1. 1.8462E+1. 1.9179E+1. 1.9039E+1. 1.9686E+1.INPU1100   *COR
     * 2.4711E+1. 2.5584E+1. 6.0476E+0. 4.4941E+0. 2.2838E+1. 2.1287E+1.INPU1101   *COR
     * 2.2961E+1. 2.5319E+1. 2.3204E+1. 2.5368E+1. 1.6457E+1. 1.9247E+1.INPU1102   *COR
     * 2.2414E+1. 2.5196E+1. 1.1517E+1. 1.4771E+1. 1.5903E+1. 1.9200E+1.INPU1103   *COR
     * 1.1411E+1. 1.3313E+1. 1.0225E+1. 1.0552E+1. 2.0506E+1. 2.4892E+1.INPU1104   *COR
     * 2.0803E+1. 2.4958E+1. 2.0187E+1. 2.4617E+1. 1.4656E+1. 1.4928E+1/INPU1105   *COR
      DATA (RCX(I),I=223,336)/                                                     *COR
     * 1.5065E+1. 1.8745E+1. 1.6470E+1. 2.4560E+1. 2.9517E+1. 3.6151E+1.INPU1107   *COR
     * 1.8105E+1. 2.4475E+1. 2.8474E+1. 3.5292E+1. 1.6194E+1. 2.4178E+1.INPU1108   *COR
     * 7.2259E+0. 1.1870E+1. 1.9558E+1. 2.0602E+1. 2.9900E+1. 3.1393E+1.INPU1109   *COR
     * 2.1664E+1. 3.0098E+1. 2.7425E+1. 3.5956E+1. 1.8327E+1. 2.0390E+1.INPU1110   *COR
     * 2.3721E+1. 2.6229E+1. 8.1216E+0. 8.8354E+0. 2.8963E+1. 3.2053E+1.INPU1111   *COR
     * 5.4085E+0. 5.0523E+0. 8.8816E+0. 8.9283E+0. 1.9698E+1. 1.9833E+1.INPU1112   *COR
     * 2.4888E+1. 2.5625E+1. 1.9752E+1. 1.9844E+1. 2.5522E+1. 2.5762E+1.INPU1113   *COR
     * 1.1260E+1. 1.3494E+1. 2.1672E+1. 2.5073E+1. 8.9130E+0. 6.9360E+0.INPU1114   *COR
     * 1.3633E+1. 1.3844E+1. 1.3087E+1. 1.3746E+1. 8.8561E+0. 8.9228E+0.INPU1115   *COR
     * 1.3573E+1. 1.3835E+1. 8.9199E+0. 8.5056E+0. 2.3168E+1. 2.5320E+1.INPU1116   *COR
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     * 1.9551E+1. 1.9864E+1. 1.3043E+1. 1.3694E+1. 1.3834E+1. 1.1870E+1.INPU1117   *COR
     * 2.5697E+1. 2.5601E+1. 2.4366E+1. 2.4554E+1. 3.1609E+1. 3.1752E+1.INPU1118   *COR
     * 2.5745E+1. 2.5812E+1. 5.0377E+0. 4.9836E+0. 1.0934E+1. 1.3424E+1.INPU1119   *COR
     * 2.1758E+1. 2.5047E+1. 8.6363E+0. 8.9196E+0. 1.3714E+1. 1.3865E+1.INPU1120   *COR
     * 8.7447E+0. 8.8564E+0. 1.3632E+1. 1.3731E+1. 2.5287E+1. 2.5708E+1.INPU1121   *COR
     * 8.7682E+0. 8.6730E+0. 8.8345E+0. 8.3281E+0. 2.2687E+1. 2.5213E+1.INPU1122   *COR
     * 1.9770E+1. 1.9646E+1. 1.3717E+1. 1.3866E+1. 1.3697E+1. 1.1741E+1.INPU1123   *COR
     * 2.3921E+1. 2.5457E+1. 3.1411E+1. 3.1752E+1. 1.9463E+1. 1.9777E+1.INPU1124   *COR
     * 4.9680E+0. 4.9674E+0. 8.5329E+0. 8.3574E+0. 1.1100E+1. 1.3459E+1/INPU1125   *COR
      DATA (RCX(I),I=337,450)/                                                     *COR
     * 6.8359E+0. 8.6101E+0. 6.5792E+0. 8.5195E+0. 7.9169E+0. 7.2587E+0.INPU1127   *COR
     * 2.5094E+1. 3.0833E+1. 8.3122E+0. 1.3169E+1. 1.3014E+1. 1.4067E+1.INPU1128   *COR
     * 1.2062E+1. 1.6488E+1. 2.2059E+1. 3.0219E+1. 2.0626E+1. 2.4833E+1.INPU1129   *COR
     * 4.7171E+0.-1.7656E+0. 8.9014E+0. 8.9335E+0. 8.8922E+0. 6.9289E+0.INPU1130   *COR
     * 8.9393E+0. 8.9414E+0. 1.4716E+1. 1.4862E+1. 4.9246E+0. 2.7772E+0.INPU1131   *COR
     * 8.0817E+0. 8.7730E+0. 1.2060E+1. 1.3689E+1. 7.6441E+0. 1.1811E+1.INPU1132   *COR
     * 1.3357E+1. 1.4603E+1. 2.3037E+1. 2.4463E+1. 2.9560E+1. 3.1322E+1.INPU1133   *COR
     * 3.5291E+1. 3.5643E+1. 4.9618E+0. 4.5011E+0. 8.6251E+0. 7.6872E+0.INPU1134   *COR
     * 1.4344E+1. 1.4782E+1. 1.3495E+1. 1.3816E+1. 4.6321E+0. 5.8115E+0.INPU1135   *COR
     * 1.1403E+1. 9.5560E+0. 1.4478E+1. 1.6115E+1. 2.5248E+1. 2.5700E+1.INPU1136   *COR
     * 1.7271E+1. 1.9375E+1. 1.9088E+1. 1.8322E+1. 1.3044E+1. 1.3737E+1.INPU1137   *COR
     * 1.2914E+1. 1.3705E+1. 4.1643E+1. 4.2645E+1. 1.8636E+1. 1.9611E+1.INPU1138   *COR
     * 1.7383E+1. 1.9372E+1. 3.1552E+1. 3.1736E+1. 8.5887E+0. 8.8649E+0.INPU1139   *COR
     * 2.1908E+1. 2.5139E+1. 3.5278E+1. 3.7234E+1. 2.4928E+1. 2.5632E+1.INPU1140   *COR
     * 1.8802E+1. 1.9644E+1. 1.3603E+1. 1.3839E+1. 4.3962E+1. 4.8529E+1.INPU1141   *COR
     * 4.5666E+1. 4.8629E+1. 4.2053E+1. 4.8235E+1. 2.4549E+1. 2.5557E+1.INPU1142   *COR
     * 1.1372E+1. 1.3458E+1. 1.4365E+1. 1.3756E+1. 8.6972E+0. 8.8882E+0.INPU1143   *COR
     * 1.6571E+1. 1.9308E+1. 1.6512E+1. 1.9303E+1. 2.1982E+1. 2.5156E+1.INPU1144   *COR
     * 1.4119E+1. 1.4734E+1. 1.9231E+1. 1.9729E+1. 1.9548E+1. 1.9796E+1/INPU1145   *COR
      DATA (RCX(I),I=451,556)/                                                     *COR
     * 1.1822E+1. 1.4389E+1. 3.1045E+1. 3.1623E+1. 1.1132E+1. 1.3451E+1.INPU1147   *COR
     * 1.9847E+1. 1.9867E+1. 2.9316E+1. 3.0475E+1. 1.9170E+1. 1.9711E+1.INPU1148   *COR
     * 2.9625E+1. 3.0461E+1. 1.4352E+1. 1.4249E+1. 1.9659E+1. 1.9822E+1.INPU1149   *COR
     * 1.9070E+1. 1.9696E+1. 1.8957E+1. 1.9675E+1. 1.4473E+1. 1.8946E+1.INPU1150   *COR
     * 1.7894E+1. 1.9509E+1. 4.4084E+1. 5.2850E+1. 1.8648E+1. 1.9625E+1.INPU1151   *COR
     * 1.8570E+1. 1.9605E+1. 1.2838E+1. 1.3688E+1. 2.4969E+1. 2.5644E+1.INPU1152   *COR
     * 1.2824E+1. 1.4545E+1. 1.4169E+1. 1.4353E+1. 1.3517E+1. 1.5962E+1.INPU1153   *COR
     * 3.1596E+1. 3.1747E+1. 7.7319E+0. 6.6106E+0. 1.3408E+1. 1.3801E+1.INPU1154   *COR
     * 1.3519E+1. 1.3625E+1. 1.1310E+1. 1.7205E+1. 8.8341E+0. 9.9782E+0.INPU1155   *COR
     * 1.3883E+1. 1.7644E+1. 1.4542E+1. 1.4598E+1. 1.3884E+1. 1.5388E+1.INPU1156   *COR
     * 1.4723E+1. 1.4255E+1. 3.0922E+1. 3.1551E+1. 4.4168E+1. 4.3150E+1.INPU1157   *COR
     * 1.7254E+1. 2.0259E+1. 1.4702E+1. 1.3924E+1. 1.9567E+1. 2.0616E+1.INPU1158   *COR
     * 1.7524E+1. 2.0305E+1. 1.4812E+1. 1.3461E+1. 1.0778E+1. 1.6542E+1.INPU1159   *COR
     * 2.9602E+1. 3.1352E+1. 1.9821E+1. 1.9860E+1. 4.3216E+1. 4.3599E+1.INPU1160   *COR
     * 2.4887E+1. 2.5629E+1. 8.6359E+0. 8.9185E+0. 8.9338E+0. 9.7059E+0.INPU1161   *COR
     * 7.6039E+0. 8.5895E+0. 8.0726E+0. 9.7778E+0. 1.3671E+1. 1.4231E+1.INPU1162   *COR
     * 1.3863E+1. 1.4657E+1. 3.6212E+1. 3.6925E+1. 4.1810E+0. 4.1810E+0.INPU1163   *COR
     * 2.3007E+1. 2.3903E+1. 4.8424E+1. 3.9312E+1/                                 *COR
      DATA (RCX(I),I=557,582)/                                                     *COR
     * 1.9446E+1. 1.9950E+1. 2.4744E+1. 2.6662E+1. 2.8693E+1. 2.9167E+1.          *COR
     * 3.7222E+1. 3.4427E+1. 3.9733E+1. 3.9507E+1. 2.5217E+1. 2.4936E+1.          *COR
     * 2.9890E+1. 3.0171E+1.                                                       *COR
     * 4.9678E+0. 4.9678E+0. 1.7190E+1. 1.9109E+1. 5.1911E+1. 4.8363E+1.INPU1164   *COR
     * 1.9205E+1. 2.0298E+1. 4.4964E+1. 5.5060E+1. 1.1363E+1. 1.2437E+1/INPU1165   *COR
      DATA (RCX(I),I=583,690)/                                                     *COR
     * 2.4353E+1. 2.4320E+1. 1.0318E+1. 3.0286E+1. 2.6256E+1. 7.7366E+1.INPU1167   *COR
     * 3.8500E+1. 3.8500E+1. 1.5654E+1. 1.7603E+1. 3.0000E+1. 3.0000E+1.INPU1168   *COR
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     * 2.4146E+1, 2.3695E+1, 2.2076E+1, 3.5026E+1, 1.2408E+1, 1.1942E+1,INPU1169   *COR
     * 4.0773E+1, 4.0808E+1, 4.1234E+1, 4.4855E+1, 1.1280E+1, 1.0388E+1,INPU1170   *COR
     * 6.8219E+0, 6.7989E+0, 3.0774E+1, 3.3646E+1, 3.2728E+1, 4.3491E+1,INPU1171   *COR
     * 4.3367E+1, 4.0269E+1, 2.6809E+0, 7.5880E+0, 2.8773E+1, 3.4622E+1,INPU1172   *COR
     * 5.6068E+0, 7.3001E+0,-1.7948E+0, 2.9804E+1, 2.3000E+1, 3.2520E+1,INPU1173   *COR
     * 4.2931E+0, 7.9250E+0, 1.0622E+1, 1.6000E+1, 1.8114E+1, 2.2002E+1,INPU1174   *COR
     * 3.2065E+1, 3.2001E+1, 1.0370E+1, 1.7521E+1, 1.0053E+1, 1.5340E+1,INPU1175   *COR
     * 9.9257E+0, 2.0740E+1, 1.7845E+1, 2.4000E+1, 1.7404E+1, 2.0511E+1,INPU1176   *COR
     * 5.4604E+0, 6.5000E+0, 1.4373E+1, 3.4558E+1, 2.2462E+1, 2.9020E+1,INPU1177   *COR
     * 1.1416E+1, 1.3845E+1, 3.0894E+1, 4.0000E+1, 3.5032E+1, 3.9538E+1,INPU1178   *COR
     * 4.7558E+1, 1.0114E+2, 8.1614E+1, 7.6250E+1, 1.1085E+2, 1.1088E+2,INPU1179   *COR
     * 3.7206E+1, 6.0372E+1, 7.0881E+0, 4.4321E+1, 3.2377E+1, 3.3346E+1,INPU1180   *COR
     * 2.2189E+1, 5.5500E+1, 1.2060E+2, 1.1204E+2, 7.0971E+1, 6.6165E+1,INPU1181   *COR
     * 3.7881E+1, 6.9517E+1, 8.4657E+1, 1.7419E+2, 3.7210E+0, 1.4900E+1,INPU1182   *COR
     * 1.3631E+1, 2.3636E+1, 2.6043E+1, 4.2291E+1, 5.9686E+1, 6.7238E+1,INPU1183   *COR
     * 2.9515E+1, 2.7617E+1, 2.8410E+1, 2.7439E+1, 5.1062E+1, 6.0000E+1/INPU1184   *COR
      DATA (RDX(I),I=1,108)/                                                        *COR
     * 7.3366E-4, 2.0983E-4, 9.3467E-4, 3.6202E-4, 1.8325E-3, 2.3113E-4,INPU1186   *COR
     * 4.4145E-4, 8.6597E-5, 2.4001E-4, 2.1613E-4, 2.1387E-3, 4.5148E-4,INPU1187   *COR
     * 7.1091E-4, 1.3281E-4, 8.2986E-4, 1.3813E-4, 7.5355E-5, 7.6670E-5,INPU1188   *COR
     * 7.5822E-4, 4.4717E-4, 1.0066E-3, 2.3055E-4, 7.0445E-4, 5.8077E-5,INPU1189   *COR
     * 9.4416E-4, 7.7518E-5, 3.0353E-5, 2.7750E-4, 1.2781E-4, 1.0929E-4,            *COR
     * 1.5288E-4, 6.7172E-4, 2.5915E-5, 2.3900E-6, 6.5923E-5, 6.2719E-6,INPU1192   *COR
     * 4.1685E-5, 3.8524E-6, 8.0914E-6, 9.4385E-7, 4.0810E-5, 3.6685E-6,INPU1193   *COR
     * 1.9832E-5, 1.9300E-6, 1.1610E-4, 9.8090E-5, 6.4798E-5, 6.2062E-6,INPU1194   *COR
     * 5.8926E-5, 5.5773E-6, 9.6159E-5, 8.8091E-6, 3.8821E-4, 1.7961E-4,INPU1195   *COR
     * 3.4815E-4, 3.0878E-5, 9.7846E-4, 6.4302E-5, 1.3162E-4, 9.4657E-5,INPU1196   *COR
     * 1.6050E-7,-2.3623E-4, 3.4088E-5, 3.2831E-6, 6.7860E-5, 6.3272E-6,INPU1197   *COR
     * 1.9485E-4, 1.7866E-5, 1.0067E-5, 1.0434E-4, 1.2265E-4, 9.6225E-5,INPU1198   *COR
     * 1.3827E-4, 1.2620E-5, 2.8693E-4, 2.5576E-5, 3.0983E-4, 2.5995E-5,INPU1199   *COR
     * 6.5913E-5, 6.1657E-6, 1.8822E-4, 1.7170E-5, 1.0708E-4, 1.0014E-5,INPU1200   *COR
     * 2.1969E-6, 8.6130E-5, 3.7919E-4, 3.1900E-5, 2.3841E-4, 2.1388E-5,INPU1201   *COR
     * 3.8529E-4, 3.4185E-5, 5.9728E-4, 1.7700E-4, 7.8441E-4, 6.2918E-5,INPU1202   *COR
     * 1.3535E-3, 1.0251E-4, 1.0922E-3, 8.3036E-5, 1.4850E-3, 1.1449E-4,INPU1203   *COR
     * 2.2724E-3, 1.7133E-4, 2.6030E-3, 1.9314E-4, 3.7280E-4, 1.3944E-4/INPU1204   *COR
      DATA (RDX(I),I=109,222)/                                                      *COR
     * 3.6433E-4, 2.9629E-4, 1.6625E-4, 1.0910E-4, 1.8660E-4, 1.6391E-5,INPU1206   *COR
     * 3.6987E-3, 2.9316E-4, 7.0071E-4, 5.7198E-5, 8.7289E-4, 7.1736E-5,INPU1207   *COR
     * 5.2882E-4, 4.8179E-5, 9.8102E-4, 8.7625E-5, 2.9162E-3, 2.1768E-4,INPU1208   *COR
     * 5.1548E-3, 3.9398E-4, 5.7402E-3, 4.6496E-4, 8.5585E-3, 6.9335E-4,INPU1209   *COR
     * 6.5025E-5, 1.1652E-3, 5.3076E-4, 4.4508E-5, 1.2868E-4, 2.0527E-4,INPU1210   *COR
     * 1.2297E-4, 1.1110E-5, 7.5209E-5, 6.8970E-6, 1.8597E-4, 8.7495E-5,INPU1211   *COR
     * 1.9985E-4, 1.7525E-5, 5.0003E-4, 1.7303E-4, 9.8146E-4, 7.2205E-5,INPU1212   *COR
     * 8.8052E-4, 7.3480E-5, 1.7523E-3, 1.2728E-4, 2.3777E-4, 8.3268E-5,INPU1213   *COR
     * 4.5385E-5, 4.1204E-6, 3.1763E-4, 2.8757E-5, 9.2717E-4, 8.2272E-5,INPU1214   *COR
     * 7.5243E-4, 6.8660E-5, 9.5619E-4, 8.6866E-5, 1.1273E-3, 1.0265E-4,INPU1215   *COR
     * 1.3877E-4, 2.8723E-4, 4.0880E-4, 3.4643E-5, 3.0731E-4, 2.7982E-5,INPU1216   *COR
     * 7.2948E-4, 3.0607E-4, 3.3204E-4, 2.8100E-5, 1.3828E-4, 1.2769E-5,INPU1217   *COR
     * 7.1462E-5, 6.5675E-6, 2.0891E-4, 1.8735E-4, 5.1259E-4, 4.0900E-5,INPU1218   *COR
     * 2.1250E-4, 6.4005E-4, 5.0949E-4, 4.3548E-5, 3.0722E-4, 2.7627E-5,INPU1219   *COR
     * 4.1370E-4, 3.7228E-5, 1.2231E-3, 1.4108E-4, 1.0262E-3, 8.0162E-5,INPU1220   *COR
     * 9.7387E-4, 7.5464E-5, 8.9112E-4, 6.8074E-5, 1.1768E-3, 9.1902E-5,INPU1221   *COR
     * 1.1809E-3, 9.3695E-5, 1.2197E-3, 8.7105E-5, 1.3106E-3, 9.7479E-5,INPU1222   *COR
     * 8.9857E-4, 1.6437E-4, 1.4829E-3, 1.0672E-4, 1.8070E-3, 1.3783E-4,INPU1223   *COR
     * 1.6983E-3, 1.2812E-4, 1.9300E-3, 1.4910E-4, 1.7955E-3, 1.3899E-4/INPU1224   *COR
      DATA (RDX(I),I=223,336)/                                                      *COR
     * 2.2465E-3, 1.6416E-4, 2.4625E-3, 1.8643E-4, 7.2006E-3, 2.5752E-3,INPU1226   *COR
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     * 2.6195E-3, 1.5851E-4, 7.9027E-3, 2.9011E-3, 3.2452E-3, 2.4216E-4,INPU1227   *COR
     * 9.0172E-4,-6.5451E-5, 4.5856E-4, 3.9104E-5, 6.8847E-4, 5.9754E-5,INPU1228   *COR
     * 3.3338E-3, 2.4665E-4, 3.4885E-3, 2.6359E-4, 8.8905E-4, 7.0456E-5,INPU1229   *COR
     * 1.0967E-3, 8.8557E-5, 2.8392E-2, 9.6413E-3, 1.3659E-3, 1.0900E-4,INPU1230   *COR
     *-1.5018E-4,-1.2231E-5, 1.2827E-4, 1.0762E-4, 6.4754E-5, 5.7674E-6,INPU1231   *COR
     * 3.4901E-4, 3.1474E-5, 4.5048E-5, 4.2567E-6, 1.1625E-4, 1.0701E-5,INPU1232   *COR
     * 8.3692E-4, 5.9576E-5, 1.3981E-3, 1.1265E-4, 1.4821E-4, 1.3810E-4,INPU1233   *COR
     * 1.0098E-4, 9.2587E-6, 6.6875E-4, 3.5980E-4, 1.4248E-4, 1.1319E-4,INPU1234   *COR
     * 2.9917E-5, 1.8563E-4, 1.0883E-4, 1.9129E-4, 9.4109E-4, 7.6090E-5,INPU1235   *COR
     * 8.0293E-6, 7.5208E-7, 2.5386E-5, 2.5171E-6, 4.0963E-5, 4.4931E-4,INPU1236   *COR
     * 5.1291E-5, 5.0498E-6, 5.0965E-4, 4.0957E-5, 7.0103E-5, 6.5028E-6,INPU1237   *COR
     * 3.1693E-5, 3.1736E-6,-2.5608E-5,-2.2988E-6, 9.5597E-4, 6.9872E-5,INPU1238   *COR
     * 1.4399E-3, 1.1654E-4, 1.7600E-4, 1.3961E-4, 7.2541E-5, 6.8719E-6,INPU1239   *COR
     * 1.7802E-4, 1.1178E-4, 3.1554E-4, 2.6614E-5, 2.0345E-4, 1.8750E-5,INPU1240   *COR
     * 2.1314E-4, 2.0069E-4, 1.2234E-4, 2.1165E-4, 1.1189E-3, 9.2060E-5,INPU1241   *COR
     * 3.0266E-5, 3.7534E-6, 7.1001E-5, 6.5999E-6, 8.9468E-5, 5.1245E-4,INPU1242   *COR
     * 6.8036E-4, 5.5952E-5, 6.8082E-5, 6.2713E-6, 1.5219E-4, 1.4059E-5,INPU1243   *COR
     * 3.9647E-9, 9.2105E-9, 3.6515E-4, 3.2947E-4, 8.9020E-4, 6.4435E-5/INPU1244   *COR
      DATA (RDX(I),I=337,450)/                                                      *COR
     * 7.9729E-4, 1.6803E-4, 8.2277E-4, 1.5867E-4, 5.0314E-4, 4.9066E-4,INPU1245   *COR
     * 1.8823E-3, 1.3782E-4, 1.5057E-3, 1.0755E-4, 2.4202E-3, 1.7448E-3,INPU1247   *COR
     * 2.6091E-3, 9.3926E-4, 3.1732E-3, 2.2617E-4, 1.5383E-3, 1.4814E-4,INPU1248   *COR
     * 1.5857E-4, 1.6205E-3, 2.1221E-4, 1.9830E-4, 1.5668E-4, 1.3999E-4,INPU1249   *COR
     * 3.2487E-4, 3.2372E-4, 7.0205E-5, 6.3054E-6, 2.7136E-5, 5.2336E-4,INPU1250   *COR
     * 3.5449E-4, 7.2652E-5, 3.8205E-4, 3.2990E-5, 1.1091E-3,-2.2451E-4,INPU1251   *COR
     * 5.4776E-4, 4.4671E-5, 6.5259E-6, 5.6218E-5, 8.1239E-4, 7.0511E-5,INPU1252   *COR
     * 1.9109E-4, 2.0051E-5, 5.6735E-6, 1.3392E-4, 1.7432E-4, 3.0516E-4,INPU1253   *COR
     * 2.0549E-4, 1.6160E-5, 2.7982E-4, 1.4612E-4, 2.8758E-4,-3.9209E-5,INPU1254   *COR
     *-5.0256E-4, 1.3766E-4, 2.9372E-4, 1.6040E-4, 2.1687E-4, 1.9884E-5,INPU1255   *COR
     * 9.1148E-4, 7.3435E-5, 2.9649E-4, 3.6902E-4, 3.0992E-4, 2.5770E-5,INPU1256   *COR
     * 3.5891E-4, 3.0492E-5, 4.0504E-4, 3.3874E-6, 4.4887E-4, 3.8862E-5,INPU1257   *COR
     * 8.9131E-4, 7.4341E-5, 9.0743E-5, 8.6956E-6, 2.1001E-4, 9.1818E-5,INPU1258   *COR
     * 1.3017E-3, 1.0101E-4, 8.9798E-4, 7.7545E-5, 3.3363E-4, 3.0097E-5,INPU1259   *COR
     * 3.8986E-4, 3.4027E-5, 1.1409E-4, 1.0626E-5, 2.0455E-3, 1.7094E-4,INPU1260   *COR
     * 1.4593E-3, 1.2684E-4, 2.6767E-3, 2.1543E-4, 4.6919E-4, 4.1367E-5,INPU1261   *COR
     * 8.6963E-4, 6.6541E-5, 2.0386E-4, 2.6957E-4, 1.9298E-4, 1.1068E-4,INPU1262   *COR
     * 1.0929E-3, 8.2045E-5, 1.1002E-3, 8.2804E-5, 1.2841E-3, 9.8751E-5,INPU1263   *COR
     * 2.8671E-4, 2.5420E-5, 2.3612E-4, 2.1361E-5, 1.2054E-4, 1.1331E-5/INPU1264   *COR
      DATA (RDX(I),I=451,556)/                                                      *COR
     * 1.0009E-3, 7.4210E-5, 2.7014E-4, 2.5046E-5, 9.0831E-4, 6.6485E-5,INPU1266   *COR
     * 9.3983E-6, 8.3375E-7, 5.4563E-4, 4.8767E-5, 2.6057E-4, 2.4080E-5,INPU1267   *COR
     * 4.3665E-4, 4.7646E-5, 7.0355E-4,-1.5667E-6, 7.9269E-5, 7.4334E-6,INPU1268   *COR
     * 2.9459E-4, 2.6314E-5, 3.3046E-4, 2.9377E-5, 1.8080E-3, 1.3516E-4,INPU1269   *COR
     * 5.8836E-4, 5.3386E-5, 3.5174E-3, 2.6179E-4, 4.3850E-4, 3.6599E-5,INPU1270   *COR
     * 4.6749E-4, 3.9525E-5, 3.8753E-4, 3.3084E-5, 3.1693E-4, 2.8110E-5,INPU1271   *COR
     * 7.0351E-4, 5.2573E-5, 2.7247E-4, 1.0094E-4, 8.5235E-4,-1.0109E-4,INPU1272   *COR
     * 7.4495E-5, 6.9569E-6, 5.6507E-4, 6.6713E-4, 1.6332E-4, 1.6224E-5,INPU1273   *COR
     * 1.4362E-4, 1.2702E-5, 1.4264E-3,-9.5952E-5, 2.9723E-4,-7.1462E-6,INPU1274   *COR
     * 5.1361E-4, 2.3627E-4, 1.3584E-4, 5.8690E-5, 4.4857E-4, 6.2392E-4,INPU1275   *COR
     * 7.0958E-5, 1.3875E-4, 3.2053E-4, 3.9088E-5,-1.8914E-4,-4.7796E-5,INPU1276   *COR
     * 1.1982E-2, 8.8105E-5, 7.9677E-5, 2.2035E-4, 4.5768E-4, 3.6923E-5,INPU1277   *COR
     * 1.1070E-3, 8.1508E-5, 3.6211E-4, 1.1266E-4, 1.2786E-3, 1.3563E-5,INPU1278   *COR
     * 7.8411E-4, 6.5587E-5, 1.5091E-5, 1.7960E-6, 1.8692E-4, 1.7677E-5,INPU1279   *COR
     * 3.4511E-4, 3.0400E-5, 2.4729E-4, 2.1132E-4, 1.1774E-4, 3.9077E-5,INPU1280   *COR
     * 5.0147E-8, 9.7232E-5, 5.0308E-4, 1.1062E-4, 4.4650E-4, 1.2923E-4,INPU1281   *COR
     * 3.7649E-4, 3.8305E-5, 1.0778E-4,-2.8793E-5, 1.2296E-5, 1.2296E-5,INPU1282   *COR
     * 6.9132E-4, 3.3177E-4,-1.6972E-3, 7.6488E-4/                                 *COR
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      DATA (REX(I),I=557,582)/                                          *COR
     * 5.0838E-4, 2.4569E-4, 9.9292E-4, 3.6477E-4, 7.6603E-4, 4.5624E-4,  *COR
     *-5.2866E-5, 5.7817E-4, 9.5056E-4, 7.3372E-4, 5.7434E-4, 4.0251E-4,  *COR
     * 7.3594E-4, 4.5690E-4,                                             *COR
     * 0.0000E+0, 0.0000E+0, 1.1762E-2, 1.0713E-2, 2.1943E-2, 2.4824E-2,INPU1283 *COR
     * 4.6588E-4,-1.1031E-4, 9.7667E-3, 1.2602E-3, 8.7132E-4, 4.1360E-4/INPU1284 *COR
      DATA (RDX(I),I=583,690)/                                          *COR
     * 2.4265E-3, 2.4465E-3, 2.4569E-2, 9.2427E-3, 4.1841E-2, 1.2406E-2,INPU1286 *COR
     *-4.6160E-8,-2.7880E-8, 1.6211E-2, 1.0457E-2,-4.3324E-8,-4.7945E-8,INPU1287 *COR
     * 8.1342E-4, 1.6917E-3, 2.9037E-3,-1.8099E-3,-1.0745E-4, 1.1715E-4,INPU1288 *COR
     * 6.7773E-3, 6.7855E-3, 2.4583E-3, 7.2347E-4, 4.1935E-4, 3.0361E-4,INPU1289 *COR
     *-3.4000E-5,-5.9234E-6, 3.1212E-3, 2.4790E-4, 7.0302E-3, 5.6028E-4,INPU1290 *COR
     * 9.3363E-4, 2.1458E-3, 5.3616E-3, 1.1641E-9, 2.2394E-3, 1.6019E-7,INPU1291 *COR
     * 7.8947E-4,-1.2806E-8, 3.7012E-2, 1.6529E-4, 5.3897E-3,-4.2766E-6,INPU1292 *COR
     * 2.2870E-3,-6.2543E-5, 1.5556E-3,-6.3330E-8, 2.1540E-3,-4.8056E-7,INPU1293 *COR
     *-2.5913E-4,-1.2666E-7, 5.0039E-3,-2.2539E-3, 4.2970E-3, 2.7940E-8,INPU1294 *COR
     * 1.0649E-2,-6.0536E-9, 3.5048E-3, 3.6321E-8, 2.9989E-4,-2.2319E-6,INPU1295 *COR
     * 9.1830E-4, 2.7540E-9, 1.1681E-2,-3.5856E-8,-3.2700E-3, 2.6077E-8,INPU1296 *COR
     * 7.9007E-3, 7.0875E-3, 6.3162E-3, 8.3619E-9, 7.9272E-3, 6.4265E-3,INPU1297 *COR
     * 2.6448E-2, 7.5265E-3, 1.6795E-2, 1.6077E-2, 1.4481E-2, 1.4015E-2,INPU1298 *COR
     * 2.0181E-2, 4.5369E-3, 3.6115E-2,-4.3586E-7, 3.5619E-3, 3.0395E-3,INPU1299 *COR
     * 3.5052E-2, 1.8626E-8, 7.2511E-3, 9.6566E-3, 3.1133E-3, 4.6023E-3,INPU1300 *COR
     * 1.7185E-2,-4.9290E-3, 4.1026E-2,-1.8885E-2, 1.2609E-2,-6.0536E-8,INPU1301 *COR
     * 9.3034E-3,-1.8253E-5, 1.4124E-2, 3.1587E-3, 1.1492E-2, 3.1862E-3,INPU1302 *COR
     *-4.0598E-4, 8.8653E-4, 8.8418E-4, 1.1652E-3, 7.4406E-3, 1.0431E-7/INPU1303 *COR
      DATA (REX(I),I=1,108)/                                            *COR
     *-7.5453E+5,-2.3397E+4, 6.1092E+4,-1.8686E+6,-3.0537E+5,-4.8199E+6,INPU1305 *COR
     *-2.6202E+5,-1.5517E+5,-5.5664E+5, 1.3133E+6,-9.0355E+5,-3.8598E+6,INPU1306 *COR
     *-1.3630E+5,-9.6431E+5, 2.4080E+4,-2.5924E+6, 2.2087E+4,-1.7820E+6,INPU1307 *COR
     * 1.8767E+5, 2.4237E+5,-4.4592E+5,-2.7025E+6,-1.1239E+6,-9.2316E+5,INPU1308 *COR
     *-1.5237E+6,-1.2764E+6, 2.3393E+4, 4.2753E+6,-1.5010E+5,-1.2884E+5,  *COR
     *-5.5823E+4, 7.4694E+6,-2.5916E+5,-2.2401E+5,-4.8925E+5,-4.0093E+5,INPU1311 *COR
     *-3.3255E+5,-2.7931E+5,-1.5081E+5,-1.4502E+5,-3.8557E+5,-3.3371E+5,INPU1312 *COR
     *-2.8367E+5,-2.5430E+5,-1.6192E+5,-2.5325E+4,-4.9024E+5,-3.9996E+5,INPU1313 *COR
     *-3.6152E+5,-2.7984E+5,-5.9318E+5,-4.7049E+5,-3.0152E+5,-1.7189E+5,INPU1314 *COR
     *-9.2207E+5,-6.1044E+5,-8.1729E+5,-2.1306E+6,-1.9755E+5,-1.4604E+5,INPU1315 *COR
     *-4.9078E+4, 5.8484E+5,-6.1080E+5,-5.5656E+5,-3.7134E+5,-2.8505E+5,INPU1316 *COR
     *-9.4781E+5,-7.0767E+5, 3.9783E+3, 1.5432E+6,-1.7425E+5,-1.3841E+5,INPU1317 *COR
     *-5.0053E+5,-3.4550E+5,-8.9623E+5,-6.2244E+5,-5.2422E+5,-3.9295E+5,INPU1318 *COR
     *-3.6968E+5,-2.8292E+5,-7.2949E+5,-5.2546E+5,-6.0225E+5,-4.6570E+5,INPU1319 *COR
     *-2.8742E+5,-1.5837E+5,-6.6952E+5,-4.9200E+5,-6.0339E+5,-3.7899E+5,INPU1320 *COR
     *-1.0456E+6,-7.0136E+5,-2.4292E+5,-3.9819E+5,-7.9721E+5,-7.8006E+5,INPU1321 *COR
     *-1.0900E+6,-2.7675E+6,-7.5323E+5,-1.3506E+6,-1.5903E+6,-2.3962E+6,INPU1322 *COR
     *-1.2396E+6,-2.8809E+6,-2.0825E+6,-5.0075E+6,-2.6408E+5,-2.1633E+6/INPU1323 *COR
      DATA (REX(I),I=109,222)/                                          *COR
     *-2.8543E+5, 2.7500E+6,-2.2966E+5,-1.5702E+5,-9.7323E+5,-8.1497E+5,INPU1325 *COR
     *-3.7939E+6,-4.3486E+6,-8.9827E+5,-7.5324E+5,-1.2457E+5,-1.0443E+6,INPU1326 *COR
     *-2.3061E+6,-1.7075E+6,-2.9596E+6,-2.0141E+6,-3.7641E+5,-7.8884E+6,INPU1327 *COR
     *-5.1282E+6,-9.3543E+6,-7.4612E+6,-7.2422E+6,-1.2339E+7,-1.2056E+7,INPU1328 *COR
     * 2.3229E+4, 1.4016E+7,-6.9566E+5,-4.7298E+5,-1.7104E+5, 1.5106E+6,INPU1329 *COR
     *-3.9923E+5,-2.7519E+5,-3.2309E+5,-2.3590E+5,-2.6939E+5,-1.5799E+5,INPU1330 *COR
     *-4.9727E+5,-3.3772E+5,-2.8085E+5,-2.4572E+5,-5.8394E+5,-2.2045E+6,INPU1331 *COR
     *-1.1207E+6,-7.8758E+5,-1.2869E+6,-3.4992E+6,-2.9400E+5,-1.6583E+5,INPU1332 *COR
     *-4.5954E+5,-4.0189E+5,-1.0619E+6,-7.8046E+5,-2.3217E+6,-1.4808E+6,INPU1333 *COR
     *-2.9253E+6,-2.0856E+6,-3.7585E+6,-2.6969E+6,-4.6562E+6,-3.3910E+6,INPU1334 *COR
     *-1.6167E+5, 2.0250E+6,-9.3953E+5,-7.0909E+5,-1.2558E+5,-9.1340E+5,INPU1335 *COR
     *-4.8370E+5,-5.1415E+5,-7.5237E+5,-5.7552E+5,-8.5223E+5,-6.7942E+5,INPU1336 *COR
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*-6.5952E+5,-5.6480E+5,-2.6692E+5, 1.1260E+6,-5.8892E+5,-6.1417E+5,INPU1337
*-6.1577E+5, 3.0859E+6,-1.1277E+6,-8.2686E+5,-1.0609E+6,-7.3597E+5,INPU1338
*-1.4684E+6,-1.0382E+6,-1.5722E+5, 8.3461E+5,-1.4660E+6,-1.9919E+6,INPU1339
*-1.3388E+6,-1.9095E+6,-1.1671E+6,-1.8334E+6,-1.2781E+6,-1.7678E+6,INPU1340
*-1.7235E+6,-2.1241E+6,-6.0798E+5,-3.2513E+6,-9.3816E+5,-2.5933E+6,INPU1341
*-7.2917E+5,-1.1448E+6,-7.8497E+5,-2.5867E+6,-1.7272E+6,-3.0560E+6,INPU1342
*-1.5576E+6,-2.9883E+6,-1.9268E+6,-3.0375E+6,-1.4260E+6,-2.2441E+6/INPU1343
 DATA (REX(I),I=223,336)/                                                *COR
*-9.7562E+5,-3.9400E+6,-1.8171E+6,-4.0063E+6,-8.8224E+5,-2.8907E+6,INPU1345
*-1.9908E+6,-4.0020E+6,-1.1531E+6,-3.1502E+6,-1.9174E+6,-4.8745E+6,INPU1346
*-1.4391E+5,-1.4086E+7,-9.5227E+5,-6.8956E+5,-1.6537E+6,-1.1597E+6,INPU1347
*-2.3054E+6,-5.6154E+6,-3.0504E+6,-5.9776E+6,-8.7164E+5,-9.7038E+5,INPU1348
*-1.3495E+6,-1.2709E+6,-2.2963E+6,-1.0684E+7,-1.4872E+6,-1.5347E+6,INPU1349
* 3.8368E+4, 1.0919E+5,-1.5682E+5,-1.2604E+5,-5.5668E+5,-4.6902E+5,INPU1350
*-1.3175E+6,-9.5046E+5,-5.0195E+5,-4.3726E+5,-8.0664E+5,-6.5743E+5,INPU1351
*-4.3759E+5,-2.2055E+6,-1.7187E+6,-1.6436E+6,-1.1522E+5,-1.0129E+5,INPU1352
*-4.5910E+5,-3.4187E+5,-4.4067E+5,-3.2821E+5,-1.7988E+5,-1.3929E+5,INPU1353
*-5.1418E+5,-3.7707E+5,-4.2351E+4, 1.2586E+6,-1.3421E+6,-1.2794E+6,INPU1354
*-2.5425E+5,-2.4545E+5,-2.7402E+5,-2.3688E+5,-1.5678E+5, 5.7382E+6,INPU1355
*-4.7137E+5,-3.9764E+5,-9.0138E+5,-8.9810E+5,-8.0780E+5,-7.1125E+5,INPU1356
*-4.4545E+5,-4.0080E+5, 6.7590E+4, 5.1107E+4,-5.5054E+5,-2.2720E+6,INPU1357
*-1.8532E+6,-1.7348E+6,-1.9327E+5,-1.4855E+5,-4.4233E+5,-3.4593E+5,INPU1358
*-2.4128E+5,-1.5757E+5,-5.2714E+5,-3.8222E+5,-1.0280E+6,-7.7692E+5,INPU1359
*-2.2601E+5, 5.5863E+5,-1.4872E+5, 1.6766E+6,-1.7843E+6,-1.5285E+6,INPU1360
*-5.0996E+5,-4.5035E+5,-4.3492E+5,-3.4252E+5,-3.9070E+5, 5.2218E+6,INPU1361
*-1.3501E+6,-1.1920E+6,-7.8986E+5,-6.9882E+5,-8.7226E+5,-6.7694E+5,INPU1362
* 1.1896E+6, 2.5245E+2,-2.8399E+5, 1.3705E+6,-5.0873E+5,-2.3509E+6/INPU1363
 DATA (REX(I),I=337,450)/                                                *COR
*-9.8093E+4,-1.3473E+6,-4.3002E+3,-1.7546E+6,-2.5449E+5, 4.0544E+6,INPU1365
*-1.4524E+6,-5.0666E+6,-8.7505E+5,-2.7345E+6,-4.1739E+5,-7.9046E+5,INPU1366
*-3.5456E+5,-2.5002E+6,-1.8727E+6,-6.8527E+6,-2.0359E+6,-1.9226E+6,INPU1367
* 5.4676E+4, 1.7736E+7,-1.5205E+5,-1.1547E+5,-1.4505E+5,-1.1448E+5,INPU1368
*-4.0176E+5,-3.5152E+4,-3.7738E+5,-2.0418E+5, 4.5604E+3, 5.6773E+6,INPU1369
*-2.7634E+5,-1.9289E+5,-7.3108E+5,-4.5391E+5,-8.4866E+4,-5.2893E+6,INPU1370
*-7.2636E+6,-6.5269E+5,-1.2456E+6,-3.3000E+5,-1.7880E+5,-1.2088E+6,INPU1371
*-1.6536E+6,-1.3840E+6, 2.9668E+4, 9.0498E+5,-2.5728E+5, 3.5603E+6,INPU1372
*-5.8903E+5,-3.5500E+5,-6.0869E+5,-4.3034E+5, 8.6210E+4,-2.1789E+6,INPU1373
*-5.3018E+5, 1.0652E+6,-1.0398E+5,-8.3545E+6,-1.0541E+6,-7.9957E+5,INPU1374
*-1.2669E+6,-1.3260E+6,-1.0227E+6, 2.6258E+6,-4.1186E+5,-3.0171E+5,INPU1375
*-6.2051E+5,-4.3747E+5,-2.2201E+6,-2.2043E+6,-1.0473E+6,-7.3497E+5,INPU1376
*-1.2623E+6,-4.2565E+5,-8.5401E+5,-7.2386E+5,-2.8059E+5,-1.6056E+5,INPU1377
*-1.5963E+6,-3.0294E+6,-2.0873E+6,-1.4945E+6,-1.3967E+6,-1.0574E+6,INPU1378
*-5.4094E+5,-6.4924E+5,-5.2908E+5,-3.8732E+5,-3.5522E+6,-2.6099E+5,INPU1379
*-3.2433E+6,-2.2876E+6,-3.6896E+6,-3.8610E+6,-1.3384E+6,-9.4744E+5,INPU1380
*-6.6763E+5,-1.1759E+6,-6.0973E+5, 2.1691E+6,-2.5652E+5,-1.6482E+5,INPU1381
*-1.0030E+6,-2.4129E+6,-8.5208E+5,-2.4934E+6,-1.5232E+6,-2.8375E+6,INPU1382
*-5.8997E+5,-4.5550E+5,-8.9151E+5,-6.4860E+5,-6.8863E+5,-5.3122E+5/INPU1383
 DATA (REX(I),I=451,556)/                                                *COR
*-7.9638E+5,-2.3611E+6,-1.5804E+6,-1.2264E+6,-5.8226E+5,-1.9251E+6,INPU1385
*-2.4474E+5,-2.3180E+5,-1.6475E+6,-1.1218E+6,-1.1253E+6,-8.1434E+5,INPU1386
*-1.5545E+6,-8.2890E+5,-6.3656E+5, 1.1025E+7,-5.4678E+5,-4.4220E+5,INPU1387
*-1.0203E+6,-7.4084E+5,-8.3092E+5,-6.5560E+5,-1.2535E+6,-3.0707E+6,INPU1388
*-3.4915E+5,-1.1762E+6,-3.2625E+6,-7.1782E+6,-9.0650E+5,-7.3072E+5,INPU1389
*-1.8043E+6,-7.8609E+5,-6.6705E+5,-4.3729E+5,-9.9106E+5,-6.9513E+5,INPU1390
*-5.1403E+5,-1.0943E+6,-6.6124E+5, 8.0499E+5,-6.1301E+5,-9.9653E+5,INPU1391
*-9.1803E+5,-8.1021E+5,-2.5330E+5, 5.1599E+6,-4.3872E+5,-2.8683E+5,INPU1392
*-4.3527E+6,-3.0031E+5,-4.9505E+5,-1.3554E+7, 5.1622E+5,-1.8784E+6,INPU1393
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     *-3.9171E+5,-2.0812E+7,-5.1461E+5, 3.6616E+5,-4.8986E+5,-1.2630E+7,INPU1394
     *-3.5536E+5, 1.5120E+6,-1.1195E+6,-6.5354E+5,-1.3740E+5, 2.7797E+6,INPU1395
     *-5.2736E+5,-2.2654E+6,-3.9790E+5, 2.2054E+6,-6.1731E+5,-6.0140E+5,INPU1396
     *-7.6941E+5,-2.1631E+6,-1.3105E+6, 9.2234E+6,-5.5405E+5,-1.6813E+7,INPU1397
     *-1.6785E+6,-1.3720E+6,-3.0527E+5,-2.7948E+5,-1.3634E+5,-1.1139E+6,INPU1398
     *-1.1730E+6,-8.9803E+5,-1.9450E+5,-1.4629E+5,-3.3602E+4,-3.6901E+6,INPU1399
     *-2.3471E+5,-7.0141E+4,-2.3884E+5,-4.7637E+6,-7.1869E+5, 7.3957E+5,INPU1400
     *-7.0131E+5,-7.7492E+5,-3.6603E+6,-6.0407E+6, 3.7120E+5, 3.7120E+6,INPU1401
     *-4.9915E+6,-3.3542E+6,-1.9368E+7,-3.8385E+6/
      DATA (REX(I),I=557,582)/
     *-3.1152E+6,-6.3251E+5,-4.3760E+6,-4.6773E+6,-5.4810E+5,-1.3860E+5,
     *-1.6199E+7,-2.0652E+6,-9.0462E+6,-5.4977E+5,-3.3559E+5, 3.7766E+6,
     *-4.3065E+6, 6.9812E+5,
     * 8.0000E+6, 0.0000,+0,-3.4350E+5,-1.5926E+6,-3.8633E+5,-2.1941E+5,INPU1402
     *-7.4160E+5,-1.0830E+6,-4.0455E+6,-3.0246E+6,-5.6845E+5,-9.9102E+5/INPU1403
      DATA (REX(I),I=583,608)/
     *-7.1163E+5,-7.0230E+5,-2.5175E+5,-4.5528E+5,-1.6547E+5,-2.3330E+7,INPU1405
     *-5.2413E+6,-2.5613E+1,-4.0579E+5,-7.5550E+5,-7.5974E+1,-4.4194E+1,INPU1406
     *-5.2135E+5,-2.4708E+6,-5.5625E+5,-1.0869E+7,-6.7245E+5,-4.2966E+5,INPU1407
     *-1.2762E+6,-1.0163E+6,-1.6348E+6,-3.5714E+6,-1.0700E+5, 3.4232E+5,INPU1408
     * 9.2564E+6,-9.4536E+4,-2.3365E+6,-6.7527E+5,-1.9904E+5,-1.3110E+6,INPU1409
     *-2.5495E+6, 1.5416E+5, 2.7224E+5, 3.0000E+6,-1.1665E+5, 2.0460E+3,INPU1410
     *-3.5311E+5,-2.2400E+2, 1.0220E+6, 1.2669E+5,-1.0309E+5,-6.5536E+4,INPU1411
     *-4.6419E+4,-2.5552E+6,-5.2071E+5,-2.3040E+5,-2.1766E+6,-6.1440E+3,INPU1412
     *-2.2847E+6,-2.0480E+3,-3.0690E+4, 7.6520E+3,-1.0577E+5, 9.6000E+1,INPU1413
     *-5.1730E+5,-6.0000E+0,-8.0534E+5, 5.0000E+2,-7.6407E+5,-3.2448E+4,INPU1414
     *-6.5769E+6, 3.2000E+1,-3.4725E+5,-1.6000E+2,-6.5664E+5, 2.3000E+1,INPU1415
     *-1.2338E+6,-4.6327E+5,-8.3740E+5, 5.6000E+1,-1.1042E+5,-6.7520E+6,INPU1416
     *-2.0532E+6, 2.5593E+6,-2.4575E+6, 6.5076E+5,-3.9563E+5,-3.1940E+6,INPU1417
     *-2.1594E+6,-9.5801E+5, 1.5061E+6,-5.7200E+2,-1.5968E+5,-2.0430E+6,INPU1418
     *-3.6550E+6, 2.0000E+1,-5.3065E+6, 7.6376E+6,-6.2835E+5, 2.8576E+5,INPU1419
     *-1.4527E+2,-1.1416E+7,-5.5270E+6,-3.5218E+7,-7.2469E+4,-7.5000E+1,INPU1420
     *-6.3301E+6,-1.4165E+6,-1.4798E+6,-6.7225E+4,-5.1576E+3,-4.4040E+6,INPU1421
     *-1.4614E+6,-9.6596E+5,-1.1767E+6,-9.6523E+5,-2.2771E+6, 5.1200E+2/INPU1422
      DATA (REX(I),I=1,108)/
     * 7.5485E+1, 7.9055E+1, 4.6486E+1, 4.6469E+1, 6.8442E+1, 6.8438E+1,INPU1424
     * 1.5392E+1, 6.5376E+1, 1.2142E+1, 1.2132E+1, 4.5052E+1, 3.4992E+1,INPU1425
     * 6.2395E+1, 6.2272E+1, 5.8715E+1, 5.8701E+1, 4.9279E+1, 4.9267E+1,INPU1426
     * 6.8575E+1, 6.8561E+1, 6.1271E+1, 6.1248E+1, 3.4936E+1, 3.4906E+1,INPU1427
     * 1.0316E+2, 1.0315E+2, 5.0850E+1, 5.0841E+1, 7.3496E+1, 7.3495E+1,
     * 7.5015E+1, 7.5005E+1, 9.4886E+1, 9.4885E+1, 1.1443E+2, 1.1443E+2,INPU1430
     * 3.2087E+1, 9.2045E+1, 1.0006E+2, 1.0006E+2, 1.1812E+2, 1.1812E+2,INPU1431
     * 1.1940E+2, 1.1940E+2, 7.1797E+1, 7.1796E+1, 8.7702E+1, 8.7699E+1,INPU1432
     * 9.5305E+1, 9.5302E+1, 1.0075E+2, 1.0075E+2, 6.3843E+1, 6.3833E+1,INPU1433
     * 8.0376E+1, 8.0361E+1, 9.9614E+1, 9.6984E+1, 7.0367E+1, 7.0365E+1,INPU1434
     * 7.3307E+1, 7.3305E+1, 2.1123E+2, 2.1123E+2, 9.2024E+1, 9.2021E+1,INPU1435
     * 1.0431E+2, 1.0430E+2, 8.8123E+1, 1.8120E+1, 7.0882E+1, 7.0881E+1,INPU1436
     * 9.2492E+1, 9.2486E+1, 1.0628E+2, 1.0627E+2, 8.7576E+1, 8.7563E+1,INPU1437
     * 9.5026E+1, 9.5023E+1, 1.1043E+2, 1.1043E+2, 1.1186E+2, 1.1186E+2,INPU1438
     * 6.6943E+1, 6.6936E+1, 8.3661E+1, 8.3645E+1, 2.7501E+1, 8.7490E+1,INPU1439
     * 1.0049E+2, 1.0038E+2, 5.9345E+1, 5.9327E+1, 7.6533E+1, 7.6501E+1,INPU1440
     * 9.2556E+1, 9.2509E+1, 6.3654E+1, 6.3612E+1, 1.0463E+2, 1.0457E+2,INPU1441
     * 7.6446E+1, 7.6411E+1, 1.3056E+2, 1.4047E+2, 6.9723E+1, 6.9722E+1/INPU1442
      DATA (REX(I),I=109,222)/
     * 6.7042E+1, 6.7024E+1, 6.7357E+1, 6.7350E+1, 1.5138E+2, 1.5137E+2,INPU1444
     * 1.2575E+2, 1.2560E+2, 9.9865E+1, 9.9845E+1, 1.1552E+2, 1.1848E+2,INPU1445
     * 1.9409E+2, 1.9302E+2, 1.7215E+2, 1.7210E+2, 2.0845E+2, 2.0835E+2,INPU1446
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*COR

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     * 1.3065E+2, 1.8046E+2, 1.9419E+2, 1.9396E+2, 3.1670E+2, 3.1635E+2,INPU1447   *COR
     * 4.4038E+1, 4.4012E+1, 8.1650E+1, 8.1627E+1, 7.1911E+1, 7.1906E+1,INPU1448   *COR
     * 9.0965E+1, 9.0960E+1, 9.2843E+1, 9.2840E+1, 6.8403E+1, 6.8403E+1,INPU1449   *COR
     * 8.5725E+1, 8.5716E+1, 6.0753E+1, 6.0778E+1, 7.8558E+1, 7.8525E+1,INPU1450   *COR
     * 6.7706E+1, 6.7660E+1, 1.0569E+2, 1.0563E+2, 6.6153E+1, 6.6146E+1,INPU1451   *COR
     * 1.6203E+2, 1.6203E+2, 9.8677E+1, 9.8662E+1, 1.2476E+2, 1.2472E+2,INPU1452   *COR
     * 1.5661E+2, 1.5656E+2, 1.8436E+2, 1.8432E+2, 2.1164E+2, 2.1159E+2,INPU1453   *COR
     * 7.3623E+1, 7.3624E+1, 1.0616E+2, 1.0614E+2, 1.2068E+2, 1.2067E+2,INPU1454   *COR
     * 8.7655E+1, 8.7636E+1, 1.0392E+2, 1.0690E+2, 1.2891E+2, 1.2891E+2,INPU1455   *COR
     * 1.3004E+2, 1.3004E+2, 7.0137E+1, 7.0130E+1, 8.3649E+1, 8.3628E+1,INPU1456   *COR
     * 8.6069E+1, 8.6070E+1, 1.0063E+2, 1.0061E+2, 1.0311E+2, 1.0309E+2,INPU1457   *COR
     * 1.1365E+2, 1.1363E+2, 8.2334E+1, 8.2287E+1, 1.1586E+2, 1.1582E+2,INPU1458   *COR
     * 1.1959E+2, 1.1950E+2, 1.2117E+2, 1.2113E+2, 9.4506E+1, 9.4460E+1,INPU1459   *COR
     * 1.0914E+2, 1.0909E+2, 7.5484E+1, 7.5466E+1, 9.3005E+1, 9.2959E+1,INPU1460   *COR
     * 7.9400E+1, 7.9369E+1, 6.8992E+1, 6.8939E+1, 1.0776E+2, 1.0769E+2,INPU1461   *COR
     * 1.1025E+2, 1.1013E+2, 1.0232E+2, 1.0225E+2, 8.4985E+1, 8.4916E+1/INPU1462   *COR
      DATA (BFX(I),I=223,336)/                                                      *COR
     * 7.9613E+1, 7.8535E+1, 9.7526E+1, 9.7435E+1, 1.6706E+2, 1.6420E+2,INPU1464   *COR
     * 9.3668E+1, 9.3570E+1, 1.5640E+2, 1.5327E+2, 8.2762E+1, 8.2643E+1,INPU1465   *COR
     * 6.6954E+1, 6.6981E+1, 1.0040E+2, 1.0038E+2, 1.3489E+2, 1.3486E+2,INPU1466   *COR
     * 1.0159E+2, 1.0147E+2, 1.1739E+2, 1.1726E+2, 9.8598E+1, 9.8562E+1,INPU1467   *COR
     * 1.1767E+2, 1.1762E+2, 2.4698E+2, 2.3556E+2, 1.3314E+2, 1.3309E+2,INPU1468   *COR
     * 5.1615E+1, 5.1621E+1, 7.2134E+1, 7.2132E+1, 1.0691E+2, 1.0690E+2,INPU1469   *COR
     * 1.1874E+2, 1.1872E+2, 1.1041E+2, 1.1041E+2, 1.2895E+2, 1.2894E+2,INPU1470   *COR
     * 8.2862E+1, 8.2836E+1, 1.0651E+2, 1.0645E+2, 7.1250E+1, 7.1250E+1,INPU1471   *COR
     * 9.0793E+1, 9.0793E+1, 9.2562E+1, 9.2549E+1, 7.4095E+1, 7.4094E+1,INPU1472   *COR
     * 9.1142E+1, 9.1136E+1, 7.7478E+1, 7.7475E+1, 1.1839E+2, 1.1835E+2,INPU1473   *COR
     * 1.1347E+2, 1.1347E+2, 9.4537E+1, 9.4536E+1, 9.8560E+1, 9.8550E+1,INPU1474   *COR
     * 1.3734E+2, 1.3734E+2, 1.2829E+2, 1.2827E+2, 1.4921E+2, 1.4921E+2,INPU1475   *COR
     * 1.3625E+2, 1.3625E+2, 4.9790E+1, 4.9791E+1, 7.9406E+1, 7.9375E+1,INPU1476   *COR
     * 1.0296E+2, 1.0284E+2, 6.7782E+1, 6.7780E+1, 8.8452E+1, 8.8449E+1,INPU1477   *COR
     * 7.0976E+1, 7.0973E+1, 8.7830E+1, 8.7816E+1, 1.2134E+2, 1.2133E+2,INPU1478   *COR
     * 7.1519E+1, 7.1514E+1, 7.3963E+1, 7.3958E+1, 1.0961E+2, 1.0957E+2,INPU1479   *COR
     * 1.0487E+2, 1.0487E+2, 8.8833E+1, 8.8830E+1, 9.1219E+1, 9.1212E+1,INPU1480   *COR
     * 1.1709E+2, 1.1704E+2, 1.4507E+2, 1.4507E+2, 1.0335E+2, 1.0334E+2,INPU1481   *COR
     * 3.8863E+1, 3.8863E+1, 6.0256E+1, 6.0247E+1, 7.7826E+1, 7.7799E+1/INPU1482   *COR
      DATA (BFX(I),I=337,450)/                                                      *COR
     * 6.0958E+1, 6.0936E+1, 6.1384E+1, 6.1363E+1, 6.5956E+1, 6.5935E+1,INPU1484   *COR
     * 1.2263E+2, 1.2257E+2, 7.0228E+1, 7.0177E+1, 9.0130E+1, 8.9765E+1,INPU1485   *COR
     * 7.6996E+1, 7.6930E+1, 1.0825E+2, 1.0814E+2, 9.2543E+1, 9.2468E+1,INPU1486   *COR
     * 4.4560E+1, 4.4641E+1, 7.0199E+1, 7.0198E+1, 7.0616E+1, 7.0615E+1,INPU1487   *COR
     * 6.8349E+1, 6.8349E+1, 8.7053E+1, 8.7050E+1, 4.8092E+1, 4.8087E+1,INPU1488   *COR
     * 6.8867E+1, 6.8854E+1, 8.4819E+1, 8.4802E+1, 7.1962E+1, 7.1948E+1,INPU1489   *COR
     * 8.1623E+1, 8.1601E+1, 1.2326E+2, 1.2323E+2, 1.3496E+2, 1.3492E+2,INPU1490   *COR
     * 1.5674E+2, 1.5672E+2, 5.0093E+1, 5.0095E+1, 6.9754E+1, 6.9742E+1,INPU1491   *COR
     * 8.5625E+1, 8.5616E+1, 8.6101E+1, 8.6094E+1, 5.1993E+1, 5.1990E+1,INPU1492   *COR
     * 7.7469E+1, 7.7490E+1, 9.7574E+1, 9.7607E+1, 1.2564E+2, 1.2563E+2,INPU1493   *COR
     * 9.4969E+1, 9.4932E+1, 1.0398E+2, 1.0397E+2, 9.2680E+1, 9.2667E+1,INPU1494   *COR
     * 8.7342E+1, 8.7326E+1, 1.6585E+2, 1.6583E+2, 1.0156E+2, 1.0154E+2,INPU1495   *COR
     * 9.8745E+1, 9.8707E+1, 1.4718E+2, 1.4717E+2, 6.8973E+1, 6.8967E+1,INPU1496   *COR
     * 1.1113E+2, 1.1109E+2, 1.5228E+2, 1.5224E+2, 1.1556E+2, 1.1554E+2,INPU1497   *COR
     * 1.0509E+2, 1.0508E+2, 8.8877E+1, 8.8872E+1, 1.6613E+2, 1.6604E+2,INPU1498   *COR
     * 1.7259E+2, 1.7254E+2, 1.5752E+2, 1.5741E+2, 1.2164E+2, 1.2162E+2,INPU1499   *COR
     * 7.8431E+1, 7.8398E+1, 8.5753E+1, 8.5743E+1, 6.9299E+1, 6.9295E+1,INPU1500   *COR
     * 9.6265E+1, 9.6247E+1, 9.6340E+1, 9.6303E+1, 1.1091E+2, 1.1087E+2,INPU1501   *COR
     * 8.2945E+1, 8.2933E+1, 1.0556E+2, 1.0555E+2, 1.0952E+2, 1.0951E+2/INPU1502   *COR
      DATA (BFX(I),I=451,556)/                                                      *COR
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     * 7.8170E+1, 7.8137E+1, 1.3662E+2, 1.3660E+2, 8.0021E+1, 7.9991E+1,INPU1504   *COR
     * 1.0989E+2, 1.0989E+2, 1.3752E+2, 1.3750E+2, 9.9914E+1, 9.9902E+1,INPU1505   *COR
     * 1.3925E+2, 1.3923E+2, 9.5725E+1, 9.5639E+1, 1.137AE+2, 1.1377E+2,INPU1506   *COR
     * 1.0203E+2, 1.0201E+2, 1.0306E+2, 1.0304E+2, 8.5194E+1, 8.5129E+1,INPU1507   *COR
     * 1.0286E+2, 1.0284E+2, 1.7982E+2, 1.7969E+2, 1.0442E+2, 1.0440E+2,INPU1508   *COR
     * 1.0285E+2, 1.0284E+2, 8.2137E+1, 8.2120E+1, 1.2523E+2, 1.2522E+2,INPU1509   *COR
     * 8.4611E+1, 8.4585E+1, 8.4446E+1, 8.4432E+1, 8.649AE+1, 8.6458E+1,INPU1510   *COR
     * 1.4261E+2, 1.4261E+2, 5.9151E+1, 5.9130E+1, 9.1326E+1, 9.1318E+1,INPU1511   *COR
     * 8.8165E+1, 8.8158E+1, 7.7346E+1, 7.7340E+1, 7.3827E+1, 7.3825E+1,INPU1512   *COR
     * 8.9481E+1, 8.9566E+1, 8.6637E+1, 8.6629E+1, 8.7582E+1, 8.7647E+1,INPU1513   *COR
     * 9.3694E+1, 9.3688E+1, 1.4892E+2, 1.4891E+2, 1.8975E+2, 1.8973E+2,INPU1514   *COR
     * 9.4696E+1, 9.4653E+1, 9.0889E+1, 9.0863E+1, 1.0857E+2, 1.0855E+2,INPU1515   *COR
     * 9.7807E+1, 9.7768E+1, 8.5112E+1, 8.5058E+1, 7.9301E+1, 7.9322E+1,INPU1516   *COR
     * 1.3404E+2, 1.3401E+2, 1.2037E+2, 1.2037E+2, 1.8589E+2, 1.8588E+2,INPU1517   *COR
     * 1.1923E+2, 1.1921E+2, 6.8573E+1, 6.8571E+1, 7.3749E+1, 7.3763E+1,INPU1518   *COR
     * 6.3790E+1, 6.3772E+1, 6.7971E+1, 6.7975E+1, 8.5030E+1, 8.5009E+1,INPU1519   *COR
     * 8.3960E+1, 8.3943E+1, 1.5084E+2, 1.5084E+2, 4.8462E+1, 4.8462E+1,INPU1520   *COR
     * 9.6515E+1, 9.6515E+1, 1.1945E+2, 1.1945E+2/                                 *COR
      DATA (REX(I),I=557,582)/                                                     *COR
     * 9.2882E+1, 9.2882E+1, 1.0467E+2, 1.0467E+2, 1.1360E+2, 1.1360E+2,          *COR
     * 1.2029E+2, 1.2029E+2, 1.4176E+2, 1.4176E+2, 1.1317E+2, 1.1317E+2,          *COR
     * 1.1931E+2, 1.1931E+2,                                                       *COR
     * 4.1596E+1, 4.1596E+1, 8.3076E+1, 8.2669E+1, 2.2015E+2, 2.2231E+2,INPU1521   *COR
     * 5.4989E+1, 5.4822E+1, 1.5160E+2, 1.4558E+2, 2.9255E+1, 2.9207E+1/INPU1522   *COR
      DATA (REX(I),I=583,690)/                                                     *COR
     * 7.2826E+1, 7.2838E+1, 1.1607E+2, 1.0529E+2, 2.1518E+2, 2.0282E+2,INPU1524   *COR
     * 1.2813E+2, 1.2813E+2, 8.8543E+1, 8.7005E+1, 1.1059E+2, 1.1059E+2,INPU1525   *COR
     * 7.0772E+1, 7.1452E+1, 6.8213E+1, 6.7766E+1, 2.9859E+1, 2.9915E+1,INPU1526   *COR
     * 1.2829E+2, 1.2830E+2, 1.1483E+2, 1.1440E+2, 2.5834E+1, 2.5668E+1,INPU1527   *COR
     * 2.4230E+1, 2.4236E+1, 7.8085E+1, 7.5953E+1, 1.1284E+2, 1.1062E+2,INPU1528   *COR
     * 1.0427E+2, 1.0444E+2, 2.8747E+1, 2.5938E+1, 7.8628E+1, 9.0875E+1,INPU1529   *COR
     * 1.4504E+1, 1.6620E+1, 1.1345E+2, 8.2051E+1, 6.8180E+1, 7.6762E+1,INPU1530   *COR
     * 1.801AE+1, 1.8432E+1, 2.9344E+1, 3.4760E+1, 4.3107E+1, 5.0250E+1,INPU1531   *COR
     * 7.0635E+1, 8.3305E+1, 5.1462E+1, 5.0233E+1, 4.2744E+1, 4.5683E+1,INPU1532   *COR
     * 6.1670E+1, 5.9465E+1, 5.6128E+1, 6.2633E+1, 4.7040E+1, 4.9611E+1,INPU1533   *COR
     * 1.9109E+1, 2.5633E+1, 7.5236E+1, 8.0552E+1, 5.6904E+1, 8.0446E+1,INPU1534   *COR
     * 6.0897E+1, 6.3138E+1, 1.0268E+2, 1.0441E+2, 1.1199E+2, 1.1193E+2,INPU1535   *COR
     * 2.0892E+2, 2.4998E+2, 2.6722E+2, 2.6363E+2, 3.3754E+2, 3.3695E+2,INPU1536   *COR
     * 1.6038E+2, 1.5120E+2, 1.4281E+2, 1.2088E+2, 9.7955E+1, 9.7777E+1,INPU1537   *COR
     * 1.7563E+2, 1.5717E+2, 3.3667E+2, 3.3646E+2, 1.6765E+2, 1.6763E+2,INPU1538   *COR
     * 1.7652E+2, 1.6311E+2, 3.3655E+2, 3.0192E+2, 4.7046E+1, 3.9714E+1,INPU1539   *COR
     * 6.5637E+1, 5.7682E+1, 1.1247E+2, 1.0600E+2, 1.9140E+2, 1.8342E+2,INPU1540   *COR
     * 7.8284E+1, 7.9020E+1, 8.3588E+1, 8.3470E+1, 1.5665E+2, 1.6186E+2/INPU1541   *COR
      DATA (TUX(I),I=1,165)/                                                       *COR
     * 2500., 6000., 2500., 6000., 2500., 6000., 2500., 6000., 2500.,   INPU1543   *COR
     * 6000., 2500., 6000., 2500., 6000., 2500., 6000., 2500., 6000.,   INPU1544   *COR
     * 2500., 6000., 2500.,                                                         *COR
     * 6000., 2500., 6000., 2500., 6000., 2500., 6000., 2500., 6000.,   INPU1546   *COR
     * 2500., 6000., 2500., 6000., 2500., 6000., 2500., 6000., 2500.,   INPU1547   *COR
     * 6000., 2500., 6000., 2500., 6000., 2500., 6000., 2500., 6000.,   INPU1548   *COR
     * 2500., 6000., 2500., 6000., 2500., 6000., 2500., 6000., 2500.,   INPU1549   *COR
     * 6000., 2500., 6000., 2500., 6000., 2500., 6000., 2500., 6000.,   INPU1550   *COR
     * 2500., 6000., 2500., 6000., 2500., 6000., 2500., 6000., 2500.,   INPU1551   *COR
     * 6000., 2500., 6000., 2500., 6000., 2500., 6000., 2500., 6000.,   INPU1552   *COR
     * 2500., 6000., 2500., 6000., 2500., 6000., 2500., 6000., 2500.,   INPU1553   *COR
     * 6000., 2500., 6000., 2500., 6000., 2500., 6000., 2500., 6000.,   INPU1554   *COR
     * 2500., 6000., 2500., 6000., 2500., 6000., 2500., 6000., 2500.,   INPU1555   *COR
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1594.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1556                    *COR
1595.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1557                    *COR
1596.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1558                    *COR
1597.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1559                    *COR
1598.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1560                    *COR
1599.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500./   INPU1561                    *COR
1600.       DATA (TUX(I),I=166,336)/                                                                     *COR
1601.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1563                    *COR
1602.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1564                    *COR
1603.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1565                    *COR
1604.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1566                    *COR
1605.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1567                    *COR
1606.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1568                    *COR
1607.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 1000.. 1500..   INPU1569                    *COR
1608.      * 2500.. 6000.. 1000.. 1500.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1570                    *COR
1609.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1571                    *COR
1610.      * 2500.. 6000.. 1000.. 1500.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1572                    *COR
1611.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1573                    *COR
1612.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1574                    *COR
1613.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1575                    *COR
1614.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1576                    *COR
1615.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1577                    *COR
1616.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1578                    *COR
1617.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1579                    *COR
1618.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1580                    *COR
1619.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000./   INPU1581                    *COR
1620.       DATA (TUX(I),I=337,507)/                                                                     *COR
1621.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1583                    *COR
1622.      * 6000.. 1000.. 1500.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1584                    *COR
1623.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1585                    *COR
1624.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1586                    *COR
1625.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1587                    *COR
1626.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1588                    *COR
1627.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1589                    *COR
1628.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1590                    *COR
1629.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1591                    *COR
1630.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1592                    *COR
1631.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1593                    *COR
1632.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1594                    *COR
1633.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1595                    *COR
1634.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1596                    *COR
1635.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1597                    *COR
1636.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1598                    *COR
1637.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1599                    *COR
1638.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1600                    *COR
1639.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500./   INPU1601                    *COR
1640.       DATA (TUX(I),I=508,576)/                                                                     *COR
1641.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1603                    *COR
1642.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1604                    *COR
1643.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..   INPU1605                    *COR
1644.      * 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000.. 2500..   INPU1606                    *COR
1645.      * 6000.. 2500.. 6000.. 2500.. 6000.. 2500.. 6000..10000..10000..   INPU1607                    *COR
1646.      * 3000.. 5000.. 3000.. 5000.. 3000.. 5000.. 3000.. 5000.. 3000..                               *COR
1647.      * 5000.. 3000.. 5000.. 3000.. 5000.. 3000.. 5000.. 3000.. 5000./                               *COR
1648.       DATA (TUX(I),I=577,690)/                                                                     *COR
1649.      * 3000.. 5000.. 1200.. 2000.. 1000.. 1600.. 1700.. 3000.. 1200..   INPU1608                    *COR
1650.      * 2000.. 2200.. 4000.. 1200.. 2000.. 1000.. 1500.. 1000.. 1500..   INPU1609                    *COR
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      * 1000., 1500.,  700., 1000., 1000., 1500., 1500., 2500., 1700.,   INPU1610                    *COR
      * 3000., 1700., 3000., 1700., 3000., 1700., 3000., 2000., 3500.,   INPU1611                    *COR
      * 2200., 4000., 1300., 2200., 1700., 4000., 1700., 3000.,  934.,   INPU1612                    *COR
      * 4000., 2316., 3500., 2450., 5000.,  722., 4000., 2743., 4500.,   INPU1613                    *COR
      * 1556., 6000., 2818., 6000., 2400., 3500., 2474., 4000.,  883.,   INPU1614                    *COR
      * 2000., 1121., 3000.,  744., 3500., 1957., 4000., 1695., 4500.,   INPU1615                    *COR
      * 1685., 4500., 1116., 4000.,  679., 2000.,  824., 2000., 1474.,   INPU1616                    *COR
      * 4000., 1700., 3000., 1190., 3000., 1200., 2000., 1200., 2000.,   INPU1617                    *COR
      * 1000., 1500.,  993., 2000., 1900., 1500.,  745., 2000., 1700.,   INPU1618                    *COR
      * 3000., 1700., 3000., 1000., 1500., 1000., 1500.,  962., 2000.,   INPU1619                    *COR
      * 1000., 1500., 1000., 1500., 1000., 1500., 1200., 2000., 1200.,   INPU1620                    *COR
      * 2000., 1307., 3000./                                             INPU1621                    *COR
       DATA    (KPBAX(I),I=1,639)/                                                                   *COR
      *   8 * 1 , 2 * 2 , 562 * 1 , 16 * 2 , 2 * 3 , 2 * 2, 2 * 3, 12 *2,                           *COR
      *3,3,2,2,2,2,2,2,2,3,2,3,2,3,2,3,2,3,2,3,2,3,2,3,2,3,2,3,2,3,2/INPU1644                        *COR
       DATA (KPBAX(I),I=640,690)/                                                                    *COR
      *3,2,3,2,3,2,3,2,3,2,3,2,3,2,2,2,3,2,2,2,2,2,2,2,3,2,2,2,3,2,2,2,2,INPU1646                    *COR
      *2,2,3,3,2,3,2,2,2,2,3,3,2,2,2,2,3/                               INPU1647                    *COR
       DATA CHAP,BLANK/4HCHAP,4H    /                                   INPU1656                    *-63
       J=ISP                                                            INPU1657
       IF (I1) 5,5,10                                                   INPU1658
 5     CONTINUE                                                         INPU1659
       NJAN=0                                                           INPU1660
       REFR=26.7                                                                                    *COR
       FFA=.489                                                                                     *COR
       NFF=0                                                            INPU1663                    **-2
       JC=KR(3)-(KR(3) / 2)*2                                           INPU1664
       VINT=R*1.E-6                                                     INPU1665
       YINT=ALOG(VINT)                                                  INPU1666
       JAT(8)=0                                                         INPU1667
       N=0                                                              INPU1668
       II=ISP                                                           INPU1669
       J=1                                                              INPU1670
       IFL=-1                                                           INPU1671
       IDC=1                                                            INPU1672
 10    IF (KR(3) - 5) 15,60,60                                          INPU1673
 15    IF (KRK(3)) 45,20,45                                             INPU1674
 20    NJAN=NJAN+1                                                      INPU1675
       IF (NJAN.GT.345) GO TO 385                                                                   *COR
       DO 25 I=1,7                                                      INPU1677                    **-1
       ALPT(I)=ALPTD(I,NJAN)                                            INPU1678
       JAT(I)=JATD(I,NJAN)                                              INPU1679
 25    SORCE(I)=SORCD(I,NJAN)                                           INPU1680
       SORCE(8)=SORCD(8,NJAN)                                           INPU1681
       AMOA=AMOAD(NJAN)                                                 INPU1682
       AMOB=AMORD(NJAN)                                                 INPU1683
       GO TO 50                                                         INPU1696                    *-12
 45    READ (KIN,405) (ALPT(K),JAT(K),K=1,7),SORCE,AMOA,AMOB            INPU1697
 50    IF (KR(3)-3) 75,55,55                                            INPU1698
 55    WRITE (JAN)  ALPT,JAT,SORCE,AMOA,AMOB                            INPU1699
       GO TO 75                                                         INPU1700
 60    READ (JAN)  ALPT,JAT,SORCE,AMOA,AMOB                             INPU1701
       NJAN=1                                                           INPU1708                    **-6
 75    IF (ALPT(1)) 80,385,80                                           INPU1709
 80    IF (JAT(1)) 85,85,105                                            INPU1710
 85    INF=NFF+1                                                        INPU1711
       K=ABS(ALPT(1))                                                   INPU1712
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      NFF=K+NFF                                                         INPU1713
      IF (KR(3) - 5) 90,100,100                                         INPU1714
90    READ (KIN,400) (NFIA(I),NFIB(I),FFIN(I),I=INF,NFF)                INPU1715
      IF (KR(3) - 3) 10,95,95                                           INPU1716
95    WRITE (JAN)  (NFIA(I) ,NFIB(I) ,FFIN(I) ,I = INF,NFF)             INPU1717
      GO TO 10                                                          INPU1718
100   READ (JAN)  (NFIA(I) ,NFIB(I) ,FFIN(I) ,I = INF,NFF)              INPU1719
      GO TO 10                                                          INPU1720
105   DO 110 K=1,IS                                                     INPU1721
110   C(K)=0.                                                           INPU1722
      DO 130 I=1,7                                                      INPU1723
      IF (JAT(I)) 115,130,115                                           INPU1724
115   DO 120 K=1,IS                                                     INPU1725
      IF (JAT(I) - KA1(K)) 120,125,120                                  INPU1726
120   CONTINUE                                                          INPU1727
      KK=II                                                             INPU1728
      GO TO 255                                                         INPU1729
125   C(K)=ALPT(I)                                                      INPU1730
130   CONTINUE                                                          INPU1731
      WT=0.                                                             INPU1732
      IF (JC) 140,135,140                                               INPU1733
135   WRITE (KOUT,405) (ALPT(K),JAT(K),K=1,7),SORCE,AMOA,AMOB           INPU1734
140   I=1                                                               INPU1735
      LAMKK=0                                                           INPU1736
      DO 155 I=1,IS                                                     INPU1737
      IF (C(I)) 145,150,145                                             INPU1738
145   LAMKK=LAMKK+1                                                     INPU1739
150   I=I+1                                                             INPU1740
      ALPT(I)=C(I)                                                      INPU1741
155   WT=WT+C(I)*VAT(I)                                                 INPU1742
      IF (J - IS) 160,160,220                                           INPU1743
160   JM=J-1                                                            INPU1744
      IF (JM) 180,190,165                                               INPU1745
165   DO 185 L=1,JM                                                     INPU1746
      IML=IM(L)                                                         INPU1747
      UGH=C(IML)                                                        INPU1748
      UN(L,J)=0.                                                        INPU1749
      IF (UGH) 170,185,170                                              INPU1750
170   DO 175 I=1,L                                                      INPU1751
175   UN(I,J)=UN(I,J)-UN(I,L)*UGH                                       INPU1752
      DO 180 I=IML,IS                                                   INPU1753
180   C(I)=C(I)-TAU(I,L)*UGH                                            INPU1754
185   UN(J,L)=0.                                                        INPU1755
190   DO 195 I=1,IS                                                     INPU1756
      IF (ABS(C(I)) - .001) 195,195,200                                 INPU1757
195   TAU(I,J)=0.                                                       INPU1758
      GO TO 220                                                         INPU1759
200   IM(J)=I                                                           INPU1760
      UN(J,J)=1.                                                        INPU1761
      DO 205 L=1,J                                                      INPU1762
205   UN(L,J)=UN(L,J)/C(I)                                              INPU1763
      DO 210 L=1,IS                                                     INPU1764
210   TAU(L,J)=C(L)/C(I)                                                INPU1765
      YC=YTOT                                                           INPU1766
      DO 215 L=1,IS                                                     INPU1767
215   CTJ(J,L)=ALPT(L)                                                  INPU1768
      KK=J                                                              INPU1769
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      KKK=J                                                             INPU1770
      J=J+1                                                             INPU1771
      GO TO 255                                                         INPU1772
230   CONTINUE                                                          INPU1773
      IF (J - IS) 225,225,200                                           INPU1774
225   DO 230 I=1,JN                                                     INPU1775
230   VMU(II,I)=-UM(I,J)                                                INPU1776
      DO 235 I=J,IS                                                     INPU1777
235   VMU(II,I)=0.                                                      INPU1778
      GO TO 250                                                         INPU1779
240   DO 245 L=1,IS                                                     INPU1780
      VMU(II,L)=0.                                                      INPU1781
      DO 245 I=1,IS                                                     INPU1782
245   VMU(II,L)=VMU(II,L)+C(I)*UM(L,I)                                  INPU1783
250   KK=II                                                             INPU1784
      KKK=II                                                            INPU1785
      II=II+1                                                           INPU1786
      YC=0.                                                             INPU1787
255   IF (KK(3) - 5) 260,290,290                                        INPU1788
260   IF (KKK(3)) 275,265,275                                           INPU1789
265   DO 270 K=1,2                                                      INPU1790
      RA(K)=RAN(K,NJAN)                                                 INPU1791
      RB(KK,K)=RBD(K,NJAN)                                              INPU1792
      RC(KK,K)=RCD(K,NJAN)                                              INPU1793
      RD(KK,K)=RDD(K,NJAN)                                              INPU1794
      RE(KK,K)=RED(K,NJAN)                                              INPU1795
      RF(KK,K)=RFD(K,NJAN)                                              INPU1796
      TU(KK,K)=TUD(K,NJAN)                                              INPU1797
270   KPHA(K)=KPHAD(K,NJAN)                                             INPU1798
      GO TO 280                                                         INPU1799
275   READ (KTR,390) (RA(K),RB(KK,K),RC(KK,K),RD(KK,K),RE(KK,K),RF(KK,K)INPU1800
     1,TU(KK,K),KPHA(K),K=1,2)                                          INPU1801
280   IF (KK(3)-3) 295,285,285                                          INPU1802
285   WRITE (JAN)  (RA(K) ,RB(KK,K) ,RC(KK,K) ,RD(KK,K) ,RE(KK,K) ,RF(KKINPU1803
     1,K) ,TU(KK,K) ,KPHA(K) ,K = 1,2)                                  INPU1804
      GO TO 295                                                         INPU1805
290   READ (JAN)  (RA(K) ,RB(KK,K) ,RC(KK,K) ,RD(KK,K) ,RE(KK,K) ,RF(KK,INPU1806
     1K) ,TU(KK,K) ,KPHA(K) ,K = 1,2)                                   INPU1807
295   IF (KK - II) 300,310,300                                          INPU1808
300   IF(KK)=20000.                                                     INPU1809
      IF (KPHA(1) - KPHA(2)) 305,315,310                                INPU1810
305   IF (KPHA(1) + KPHA(2) - 5) 310,320,310                            INPU1811
310   WRITE (4001,410) ANGA,ANGB                                        INPU1812
      STOP                                                              INPU1813
315   IF (KPHA(1)-1) 310,330,325                                        INPU1814
320   TU(KK,1)=-TU(KK,1)                                                INPU1815
325   FF(KK)=1.E+10                                                     INPU1816
      IFC(KKK)=-1                                                       INPU1817
      VK(KK)=0.                                                         INPU1818
      Y(KK)=AMAX1(YC,0.)                                                INPU1819
      GO TO 345                                                         INPU1820
330   FF(KK)=(DT/2EFD)*EFA                                              INPU1821
      IF (ZT-.1) 335,335,300                                            INPU1822
335   FF(KK)=1.E+10                                                     INPU1823
340   IFC(KKK)=0                                                        INPU1824
      VK(KK)=VINT                                                       INPU1825
      Y(KK)=YINT                                                        INPU1826
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  345   IF (JC) 355,350,355                                                   INPU1827
  350   WRITE (KOUT,395) (RA(K),RB(KK,K),RC(KK,K),RD(KK,K),RE(KK,K),RF(KK,INPU1828
       1K),TU(KK,K),RPHA(K),K=1,2),FF(KK)                                    INPU1829
  355   FF(KK)=FF(KK)**(ANEX                                                  INPU1830
        IF (IFC(KK)) 360,365,360                                              INPU1831
  360   FF(KK)=1.0E+10                                                        INPU1832
  365   FARGA(KK)=ARGA                                                        INPU1833
        FARGB(KK)=ARGB                                                        INPU1834
        LABI(KK)=LABK                                                         INPU1835
        DTM(KK)=DT                                                            INPU1836
        RA(KK,1)=RA(KK,1)+RA(1)                                               INPU1837
        RB(KK,2)=RB(KK,2)+RA(2)                                               INPU1838
        N=N+1                                                                 INPU1839
        IF (N-179) 375,375,370                                                INPU1840
  370   NEX=N-179                                                             INPU1841
        WRITE (KOUT,415) NEX                                                  INPU1842
        STOP                                                                  INPU1843
  375   CONTINUE                                                              INPU1844
        IF (KK-IS) 10,380,10                                                  INPU1845
  380   CONTINUE                                                              INPU1846
  385   VE(N+1)=0.                                                            INPU1847
        TE(N+1)=0.                                                            INPU1848
        IFC(N+1)=-1                                                           INPU1849
        DT(N+1)=-1.                                                           INPU1850
        FARGA(N+1)=BLANK                                                      INPU1851
        FARGB(N+1)=BLANK                                                      INPU1852
        RETURN                                                                INPU1853
C                                                                             INPU1854
  390   FORMAT  (6F9.6,6XF6.0,I1)                                            INPU1855
  395   FORMAT (1X6F12.5,F10.4,I2/1X6F12.5,F10.4,I2,F7.4)                     INPU1856
  400   FORMAT (2A4,E12.4,2A4,F12.4,2A4,E12.4,2A4,F12.4)                      INPU1857
  405   FORMAT ( 7(F3.0,I3),A2,9A4)                                           INPU1858
  410   FORMAT  (////25H BAD PHASE BUFFERING FOR 2A4)                         INPU1859
  415   FORMAT (////11H THERE ARE I2,15H EXCESS SPECIES)                      INPU1860
        END                                                                   INPU1861
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      SUBROUTINE KINET                                                  KINE0001
      DIMENSION XX(20),PRMU(10,50)                                                          *COR
C                                                                       KINE0003            **-1
      REAL NFIA(1),NFIB(1),FFIN(1),TAU(10,10)                           KINE0004
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (FFIN(1),A(101)),    KINE0005
     1(TAU(1),A(151))                                                   KINE0006
      DIMENSION TF(180),CIJ(180,1)                                      KINE0007
      DIMENSION X(1),VLAK(180,1)                                        KINE0008
C                                                                       KINE0009
      COMMON          FAMOA(180),FAMOB(180),RB(180,2),RC(180,2),        KINE0010
     1                RD(180,2),RE(180,2),RF(180,2),TU(180,2),VN(180),  KINE0011
     2                Y(180),WTM(180),VNU(180,10),FF(180),IFC(180),     KINE0012
     3                IP(180),CP(180),H(180),SR(180),TC(180),VLUK(180), KINE0013
     4                E(180),LAMT(180),GAMK(1,1)                        KINE0014
C                                                                       KINE0015
      COMMON /PARAM1/ KIN,KOUT,JAN,MOL,NAE,IDC,N,KKX(3),KR(10),TILF(3), KINE0016
     1                TTMIN,TTMAX,VISC,PR(1)                            KINE0017
C                                                                       KINE0018
      COMMON /PARAM2/ WN,SCH,RHO,VEL,B1,NFF,FFA,TS,ISP,P,T,SIP,HIP,     KINE0019
     1                EL,ENL,FL10,NO,IFL,ISPG,KRALP,CPF,IRE,IER,AA,ITS, KINE0020
     2                IN,IL,TT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    KINE0021
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,      KINE0022
     4                VMACH,KRZZ,SP1,GAM,THI,MX,DMCHT,HCH,NCV,TBT,      KINE0023
     5                IERZ,NOAT,SP1,IXG,SV1,KKJ,TXC,NXG,SH1,NOATO,      KINE0024
     6                SA2,FFF,WS,RV,CNF,VA,HOS,DUM1,DUM2,FP,IFCJC,      KINE0025
     7                ISP2,WTG,VMU2,WTL                                 KINE0026
C                                                                       KINE0027
      COMMON /ARRAYS/ A(16,16),P(16),W(3),XC(50),XG(50),ZKE(10),        KINE0028
     1                TLO(10),DMCLO(10),WALJP(10),FB(10),ALP(10),       KINE0029
     2                GAMH(10),GAMF(10),TO(10,3),TK(10,3),WAT(10),      KINE0030
     3                IR(10),IOAT(10),KAT(10),UN(10,10),FRL(10)         KINE0031
      EQUIVALENCE (TU(181),TF(1)), (VNU(1),CIJ(1))                      KINE0032
C                                                                       KINE0033
      COMMON /KINETX/ MT,FKF(50),EAK(50),FXK(50),PKU(10,50),RMU(10,50), KINE0034
     1    PNP(50), PKKK(50)                                                                 *COR
C                                                                       KINE0036            **-1
      EQUIVALENCE (R(1),X(1)), (GAMK(1),VLAK(1))                        KINE0037
C                                                                       KINE0038
      COMMON /DIFFER/ IF(11),DKPT(50),PKF(50),PKR(50),KAT(50),DUN(50),  KINE0039
     1                LL(50),NA(50)                                     KINE0040
C                                                                       KINE0041
      COMMON/CARKIN/ KRK(10),ROUCM,DCC                                  KINE0042
      COMMON/ZKIN/ UBK(10,50),NCP(10,50),NPP(10,50),NPE(10,50),EKKS(50),                *COR
     *PEX(50),PST(10,50),EKK(10,50),TNP(50)                                                *COR
    5 FORMAT(13I3)                                                      KINE0320            *COR
  254 IF(KR(9)-4) 334,333,255                                                               *COR
  255 IF(KR(9)-5) 334,334,331                                                               *COR
  331 KR(9)=4                                                                               *COR
      DO662 M=1,NT                                                                          *COR
  662 XX(M)=FKF(M)                                                                          *COR
  333 DO 603 M=1,NT                                                                         *COR
      IF(TAP(M).EQ.99) GO TO 604                                                            *COR
      PRX(M)=0.0                                                                            *COR
      EKKS(M)=0.0                                                                           *COR
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      DO 602 J=1,3                                                      *COR
      I=NPP(J,M)                                                        *COR
  603 PPX(M)=PPX(M)+PSI(J,M)*VN(I)                                      *COR
      IS1=NPF(1,M)                                                      *COR
      IS2=NPF(2,M)                                                      *COR
      IF(IS1.GT.0) FKKS(M)=FKK(1,M)*VN(IS1)                             *COR
      IF(IS2.GT.0) FKKS(M)=FKK(2,M)*VN(IS2)                             *COR
      FKKS(M)=1.0+FKKS(M)                                               *COR
      PPX(M)=1.0+PPX(M)                                                 *COR
      FKF(M)=XX(M)/(PPX(M)*FKKS(M))                                     *COR
      GO TO 603                                                         *COR
  604 II=NMP(1,M)                                                       *COR
      III=NMR(1,M)                                                      *COR
      PPX(M)=1.0                                                        *COR
      FKKS(M)=1.0                                                       *COR
      FAK(M)=RMU(1,M)*H(II)-RMU(1,M)*H(III)                             *COR
  920 FKF(M)=XX(M)/SQRT(RMU(1,M))*35.167*EXP((RMU(1,M)*SB(II)-RMU(1,M)*
     1SB(III))/1.9869)                                                  *COR
  603 CONTINUE                                                          *COR
      GO TO 10                                                          *COR
  334 IF(KR(9).EQ.3) GO TO 801                                          *COR
      KR(9)=3                                                           *COR
      DO 802 M=1,MT                                                     *COR
  802 XX(M)=FKF(M)                                                      *COR
  801 DO 800 M=1,MT                                                     *COR
      IF(IUP(M).NE.1) GO TO 804                                         *COR
      PPX(M)=PRSI(1,M)                                                  *COR
      GO TO 800                                                         *COR
  804 PPX(M)=0.0                                                        *COR
      DO 805 J=2,3                                                      *COR
      I=NPP(J,M)                                                        *COR
      II=NPF(J,M)                                                       *COR
  805 PPX(M)=PPX(M)+PSI(J,M)*VN(I) +FKK(J,M)*VN(II)                     *COR
      II=NPF(1,M)                                                       *COR
      I =NPF(1,M)                                                       *COR
      PPX(M)=VN(II)+PPX(M)+FKK(1,M)*VN(I)                               *COR
  800 FKF(M)=XX(M)*PPX(M)                                               *COR
      IF(KR(9).NE.3) GO TO 10                                           *COR
      DO11 M=1,MT                                                       *COR
   11 PPX(M)=-1.0                                                       *COR
   10 RT = 1.9869 * T                                        KINE0330   *COR
      DO 40 M=1,MT                                           KINE0340   *COR
      SUMC = 0.                                              KINE0350   *COR
      SUMK = 0.                                              KINE0360   *COR
      SUMR = 0.                                              KINE0370   *COR
      SUMP = 0.                                              KINE0380   *COR
      DO 15 IZ=1,4                                                      *COR
      IF(ABS(RMU(IZ,M)).LT.1.E-6) GO TO 17                              *COR
      I=NMR(IZ,M)                                                       *COR
      IF(IFC(I).EQ.-1.AND.I.EQ.JC) GO TO 14                             *COR
      IF(IFC(I).EQ.0.OR.IFC(I).EQ.1) GO TO 14                           *COR
   12 VK2=0.0                                                           *COR
      VK1=0.0                                                           *COR
      GO TO 35                                                          *COR
   14 SUMR=SUMR+RMU(IZ,M)*Y(I)                                          *COR
   14 VLNI =-H(I)/RT+SB(I )/1.9869                                      *COR
      SUMK=SUMK                    -RMU(IZ,M)*VLNI                      *COR
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      SUMD=SUMD                    -PMU(IZ,M)*H(I)                                  *COR
   17 IF(ABS(PMU(IZ,M)).LT.1.E-6) GO TO 15                                         *COR
      II=NMP(IZ,M)                                                                 *COR
      IF(IFC(II).EQ.-1.AND.II.EQ.JC) GO TO 22                                      *COR
      IF(IFC(II).LT.0.02.IFC(II).GT.1) GO TO 12                                    *COR
   22 SUMP=SUMP+PMU(IZ,M)*Y(II)                                                    *COR
   21 VLNII=-H(II)/RT+SP(II)/1.9869                                                *COR
      SUMK=SUMK+PMU(IZ,M)*VLNII                                                    *COR
      SUMD=SUMD+PMU(IZ,M)*H(II)                                                    *COR
   15 CONTINUE                                                                     *COR
      DO 16 I=1,IS                                                                 *COR
      PRMU(I,M)=0.0                                                                *COR
      DO 16 IZ=1,5                                                                 *COR
      III=NMP(IZ,M)                                                                *COR
      VNMMR=VNU(III,I)                                                             *COR
      IF(NMP(IZ,M).GT.IS) GO TO 704                                                *COR
      VNUMR=0.0                                                                    *COR
      IF(NMP(IZ,M).EQ.I) VNUMR= 1.0                                                *COR
  704 II=NMP(IZ,M)                                                                 *COR
      VNMMP=VNU(II,I)                                                              *COR
      IF(NMP(IZ,M).GT.IS) GO TO 16                                                 *COR
      VNUMP=0.0                                                                    *COR
      IF(NMP(IZ,M).EQ.I) VNUMP= 1.0                                                *COR
   16 PRMU(I,M)=PRMU(I,M)+VNUMP*PMU(IZ,M)-VNUMR*PMU(IZ,M)                          *COR
C     EQUILIBRIUM CONSTANTS FOR KINETIC REACTIONS IN TERMS OF BASE SPECIKINE0450   *COR
C        LOG KP-S                                                     KINE0460    *COR
C     DERIVATIVES OF LOGS OF ABOVE KP-S WITH RESPECT TO LOG T         KINE0480    *COR
      DKPT(M) = SUMD / RT                                             KINE0490    *COR
C     RIGHT HAND SIDE (OR REVERSE PART) OF DRIVING POTENTIAL          KINE0500    *COR
      VKL=ALOG(AA*FKF(M))+EXK(M)*ALOG(T)-EAK(M)/RT                                 *COR
      PKP(M)=EXP(AMIN1(SUMP-SUMK+VKL,80.))                                         *COR
C     LEFT HAND SIDE (OR FORWARD PART) OF DRIVING POTENTIAL           KINE0520    *COR
      PKR(M)=EXP(AMIN1(SUMK+VKL,80.))                                              *COR
      VK1 = PKR(M) - PKP(M)                                           KINE0540    *COR
      IF (VK1) 25,20,25                                               KINE0550    *COR
   20 VK1=1.E-9*SIGN(PKR(M),SUMK-SUMP+SUMK)                                        *COR
   25 CONTINUE                                                                     *COR
      VK2=AA*FKF(M)*T**EXK(M)*EXP(-EAK(M)/RT)                                      *COR
C     PM TIMES FORWARD RATE OF REACION I  (PM=AA)                     KINE0630    *COR
   35 PMR(M)=VK1                                                                   *COR
      PKP(M)=AMAX1(PKP(M),1.E-25)                                                  *COR
      PKKK(M)=PKR(M)/PKP(M)                                                        *COR
      RAT(M)=AMAX1(PKP(M),PKR(M))                                                  *COR
      IF(KR(7)-1) 40,40,36                                                         *COR
   36 IF(M-1) 37,37,39                                                             *COR
   37 WRITE(KOUT,38)                                                               *COR
   38 FORMAT(2X1HM7X3HLKP6X6HDLKP/DLT6X4HPMRR8X4HPMRP9X3HPMR9X3HRAT)               *COR
   39 WRITE(KOUT,41) M,SUMK,DKPT(M),PKR(M),PKP(M),PMR(M),RAT(M)                    *COR
   40 MA(M) = M                                                       KINE0680    *COR
   41 FORMAT(I3,2X,6E12.5)                                                         *COR
   45 FORMAT(1X26HA(I,J),B(I),I=1,8,J=1,8 IN)                         KINE0690    *COR
   50 FORMAT(1X12E10.3)                                               KINE0700    *COR
   55 FORMAT(1X27HA(I,J),B(I),I=1,8,J=1,8 OUT)                        KINE0710    *COR
      IF (KR(7) - 1) 80,80,65                                         KINE0730    *COR
   65 CONTINUE                                                                     *COR
      WRITE(KOUT,50) ((PRMU(II,JJ),JJ=1,MT),II=1,IS)                               *COR
      WRITE(KOUT,215)                                                 KINE0820    *COR
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      WRITE(KOUT,50)(EB(I),I=1,IS)                                      KINE0830          *COR
   70 WRITE(KOUT,45)                                                    KINE0840          *COR
      DO 75 I=1,ISP2                                                    KINE0850          *COR
   75 WRITE(KOUT,50)(A(I,J),J=1,ISP2),B(I)                              KINE0860          *COR
   80 CONTINUE                                                          KINE0870          *COR
C*****ORDER REACTIONS                                                   KINE0880          *COR
   85 IF (MT - 1) 105,105,90                                            KINE0890          *COR
   90 K = 0                                                             KINE0900          *COR
      DO 100 M=2,MT                                                     KINE0910          *COR
      IF (RAT(M) - RAT(M - 1)) 100,100,95                               KINE0920          *COR
   95 K = MA(M)                                                         KINE0930          *COR
      MA(M) = MA(M - 1)                                                 KINE0940          *COR
      MA(M - 1) = K                                                     KINE0950          *COR
      DUM1 = RAT(M)                                                     KINE0960          *COR
      RAT(M) = RAT(M - 1)                                               KINE0970          *COR
      RAT(M - 1) = DUM1                                                 KINE0980          *COR
  100 CONTINUE                                                          KINE0990          *COR
      IF (K) 105,105,85                                                 KINE1000          *COR
C*****START SECOND MAJOR LOOP ON REACTIONS                              KINE1010          *COR
  105 DO 200 MM=1,MT                                                    KINE1030          *COR
      M = MA(MM)                                                        KINE1040          *COR
C*****IS IT A CONTROLLING REACTION                                       KINE1050          *COR
      LL(MM) = 0                                                        KINE1060          *COR
      DO 125 L=1,IS                                                     KINE1080          *COR
      IF(ABS(PRMU(L,M)).LT.1.E-6) GO TO 125                             KINE1090          *COR
  110 DO 115 K=1,MM                                                     KINE1100          *COR
      IF (L - LL(K)) 115,125,115                                        KINE1110          *COR
  115 CONTINUE                                                          KINE1120          *COR
      IF (RAT(MM) - EE(L)) 125,125,120                                  KINE1130          *COR
C* * * YES,IT IS FOR MASS BALANCE L                                     KINE1150          *COR
  120 LL(MM) = L                                                        KINE1160          *COR
  125 CONTINUE                                                          KINE1170          *COR
C* * *NO, IT IS NOT, ADD INTO ALL MASS BALANCES                          KINE1180          *COR
      I1 = 1                                                            KINE1190          *COR
      I2 = IS                                                           KINE1200          *COR
      GOTO 170                                                          KINE1210          *COR
C*****REARRANGE ACCORDING TO CONTROLLING REACTION                        KINE1220          *COR
  130 DUM1 = PRMU(L,M)                                                  KINE1230          *COR
      PRMU(L,M) = 0.                                                    KINE1240          *COR
      DO 165 I=1,IS                                                     KINE1250          *COR
      IF (PRMU(I,M)) 135,165,135                                        KINE1260          *COR
  135 DUM2 = PRMU(I,M) / DUM1                                           KINE1270          *COR
      MP = MM + 1                                                       KINE1280          *COR
      IF (MT - MP) 155,140,140                                          KINE1290          *COR
  140 DO 150 K=MP,MT                                                    KINE1300          *COR
      MT = MA(K)                                                        KINE1310          *COR
      PRMU(I,MT) = PRMU(I,MT) - DUM2 * PRMU(L,MT)                       KINE1320          *COR
      IF (ABS(PRMU(I,MT)) - .001) 145,150,150                           KINE1330          *COR
  145 PRMU(I,MT) = 0.                                                   KINE1340          *COR
  150 CONTINUE                                                          KINE1350          *COR
  155 DO 160 K=1,ISP2                                                   KINE1360          *COR
  160 A(I + 2,K) = A(I + 2,K) - DUM2 * A(L + 2,K)                       KINE1370          *COR
      B(I + 2) = B(I + 2) - DUM2 * B(L + 2)                             KINE1380          *COR
      EE(I)=EE(I)-DUM2*EE(L)                                            KINE1390          *COR
      DUM2 = ABS(DUM2)                                                  KINE1400          *COR
      EE(I) = AMAX1(EE(I) ,DUM2 * EE(L))                                KINE1410          *COR
  165 CONTINUE                                                          KINE1420          *COR
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      PRHU(L,M) = DUM1                                                  KINE1400                *COR
C****ADD CONTROLLING RESTITION INTO ITS MASS BALANCE                    KINE1410                *COR
      T1 = L                                                            KINE1420                *COR
      T2 = L                                                            KINE1430                *COR
  170 DO 175 J=1,IS                                                     KINE1440                *COR
      SUMD=0.0                                                                                  *COR
      DO 500 JJ=1,8                                                                             *COR
      T=NPF(JJ,M)                                                                               *COR
      VNMPP=VNU(T,J)                                                                            *COR
      IF(NPP(JJ,M).GT.IS) GO TO 502                                                             *COR
      VNNPP=0.                                                                                  *COR
      IF(NPP(JJ,M).EQ.J) VNNPP= 1.0                                                             *COR
  502 TT =NPF(JJ,M)                                                                             *COR
      VNNPF=VNU(TT,J)                                                                           *COR
      IF(NPF(JJ,M).GT.IS) GO TO 503                                                             *COR
      VNNPF=0.                                                                                  *COR
      IF(NPF(JJ,M).EQ.J) VNNPF= 1.0                                                             *COR
  503 SUMD=SUMD-PRR(M)*VN(T          )*PSI(JJ,M)/FPX(M)*VNNPP-PRR(M)                            *COR
     1*VN(TT       ) *FKK(JJ,M)/FKKS(M)*VNNPF                                                   *COR
  500 CONTINUE                                                                                  *COR
      DO 501 IZ=1,4                                                                             *COR
      TTT=NMR(IZ,M)                                                                             *COR
      VNMMR=VNU(TTT,J)                                                                          *COR
      IF(NMR(IZ,M).GT.IS) GO TO 504                                                             *COR
      VNMMR=0.0                                                                                 *COR
      IF(NMR(IZ,M).EQ.J) VNMMR= 1.0                                                             *COR
  504 TT=NMR(IZ,M)                                                                              *COR
      VNMMP=VNU(TT,J)                                                                           *COR
      IF(NMR(IZ,M).GT.IS) GO TO 505                                                             *COR
      VNMMP=0.0                                                                                 *COR
      IF(NMR(IZ,M).EQ.J) VNMMP= 1.0                                                             *COR
  505 SUMD=SUMD+RMU(IZ,M)*PKK(M)*VNMMR-RMU(IZ,M)*PKP(M)*VNMMP                                   *COR
  501 CONTINUE                                                                                  *COR
      DO 175 I=T1,T2                                                    KINE1460                *COR
  175 A(I + 2*J + 2) = A(I + 2*J + 2) - SUMD * PRHU(I,M)                KINE1470                *COR
      SUME=0.0                                                                                  *COF
      SUMF=0.0                                                                                  *COR
      DO 506 JJ=1,8                                                                             *COR
      DPDP=0.0                                                                                  *COP
      TTT=NPP(JJ,M)                                                                             *COR
      IF(NPP(JJ,M).GT.IS)                                                                       *COR
     *DPDP= -PMX(M)*VN(TTT       )*PSI(JJ,M)/FPX(M)                                             *COR
      SUMD=SUMD-DPDP*TC(TTT)                                                                    *COR
      SUMF=SUMF-DPDP*F(TTT)                                                                     *COR
      DPDP=0.0                                                                                  *COR
      TT=NPF(JJ,M)                                                                              *COR
      IF(NPF(JJ,M).GT.IS)                                                                       *COR
     *DPDP=-PRR(M)*VN(TT        )*FKK(JJ,M)/FKKS(M)                                            *COR
      SUMD=SUMD-DPDP*TC(TT)                                                                     *COR
  506 SUMF=SUMF-DPDP*F(TT)                                                                      *COR
      DO 507 IZ=1,4                                                                             *COR
      DPDP=0.0                                                                                  *COR
      IF(NMR(IZ,M).GT.IS)                                                                       *COR
     *DPDP= RMU(IZ,M)*FKK(M)                                                                    *COR
      TTT=NMR(IZ,M)                                                                             *COP
      SUMD=SUMD-DPDP*TC(TTT)                                                                    *COR
      SUMF=SUMF-DPDP*F(TTT)                                                                     *COR
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      DPRF=0.0                                                          *COR
      IF(NMP(IZ,M).GT.IS)                                               *COR
     *DPRF=-PMU(IZ,M)*PKP(M)                                            *COR
      II=NMP(IZ,M)                                                      *COR
      SUMF=SUMF-PKP*TC(II)                                              *COR
  507 SUMF=SUMF-DUMP*E(II)                                              *COR
      SUMD=-PKP(M)*EXPT(M)-(EXP(M)/E1+EXP(M))*PKP(M)-SUMD               *COR
      DO 180 I=I1,I2                                                    KINE1490
      DUM1 = PMU(M) * PRMU(I,M)                                         KINE1500
      A(I+2,2)=A(I+2,2)-DUM1                                            *COR
      A(I + 2,1) = A(I + 2,1) + SUMD * PRMU(I,M)                        KINE1510
      F(I)=F(I)+DUM1                                                    *COR
      B(I+2)=B(I+2)+DUM1-SUMF*PRMU(I,M)                                 *COR
  180 FB(I) = AMAX1(FB(I) ,ABS(PRMU(I,M) * RAT(KM)))                    KINE1530
      IF (KRIT) - 1) 200,200,185                                        KINE1540
  185 WRITE(KOUT,215)                                                   KINE1550
      WRITE(KOUT,50)(FB(I),I=1,IS)                                      KINE1560
  190 WRITE(KOUT,55)                                                    KINE1570
      DO 195 I=1,ISP2                                                   KINE1580
      WRITE(KOUT,50)(A(I,J),J=1,ISP2),F(I)                              KINE1590
  195 CONTINUE                                                          KINE1600
      WRITE(KOUT,5)N,I1,I2,L,LL,MM,MA                                   KINE1610
      WRITE(KOUT,50) ((PRMU(II,JJ),JJ=1,NT),II=1,IS)                    *COR
  200 CONTINUE                                                          KINE1630
      DO 206 MM=1,NT                                                    *COR
      L=LL(MM)                                                          *COR
      L=0                                                               *COR
      IF(L) 201,206,201                                                 *COR
  201 M=MA(MM)                                                          *COR
      AR=1.                                                             *COR
      EXEL=(PKP(M)+1.E-36)/(PKP(M)+1.E-36)                              *COR
      IF(ABS(EXEL-1.)-.1) 204,204,202                                   *COR
  202 ELK=ALOG(EXEL)                                                    *COR
      AR=EXEL/(EXEL-1.)-1./ELK                                          *COR
  204 DO 205 J=1,IS                                                     *COR
  205 A(L+2,J+2)=A(L+2,J+2)+F(L)*(PMU(J,M)*(1.-AR)+AR*PMU(J,M))         *COR
      A(L+2,1)=A(L+2,1)-F(L)*DKPT(M)*(1.-AR)                            *COR
  206 CONTINUE                                                          *COR
      EML = 0.                                                          KINE1650
      DO 210 I=3,ISP2                                                   KINE1660
      IF (FB(I-2) .NE. 0.0) EML=AMAX1(ABS(F(I-2))/FB(I-2),EML)          *COR
  210 CONTINUE                                                          *COR
  215 FORMAT(1X12HFB(I),N=1,NT)                                         KINE1680
      IF(EML-1.E-5) 216,216,225                                         *COR
  216 IF(EML-1.E-4) 220,225,225                                         *COR
  220 IT=ITS                                                            *COR
      ITS=-1                                                            *COR
  225 RETURN                                                            KINE1710
      END                                                               KINE1720
                                                                        *COR
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      SUBROUTINE OUTPT                                                  OUTP0001
      DIMENSION IO(25)                                                  OUTP0002
      DIMENSION SPIE(10,10)                                                          *COR
C                                                                       OUTP0003
      REAL NFIA(1),NFIB(1),FFIN(1),TAU(10,10)                           OUTP0004
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (FFIN(1),A(101)),    OUTP0005
     1(TAU(1),A(151))                                                   OUTP0006
      DIMENSION TF(180),CIJ(180,1)                                      OUTP0007
      DIMENSION X(1),VLAM(180,1)                                        OUTP0008
C                                                                       OUTP0009
      COMMON          FAMOA(180),FAMOB(180),RB(180,2),RC(180,2),        OUTP0010
     1                RD(180,2),RE(180,2),RF(180,2),TU(180,2),VN(180),  OUTP0011
     2                Y(180),WTN(180),VNU(180,10),FF(180),IFC(180),     OUTP0012
     3                IP(180),CP(180),H(180),SB(180),TC(180),VLNK(180), OUTP0013
     4                E(180),LAMI(180),GAMK(1,1)                        OUTP0014
C                                                                       OUTP0015
      COMMON /PARAM1/ KIN,KOUT,JAN,MOL,NAP,IDC,N,KKX(3),KR(10),TILE(3), OUTP0016
     1                TTMIN,TTMAX,VISC,PR(1)                            OUTP0017
C                                                                       OUTP0018
      COMMON /PARAM2/ WM,SCH,RHO,VEL,R1,MFF,FFA,IS,ISP,P,T,SIP,HIP,     OUTP0019
     1                EL,ENL,FLTQ,NG,IFL,ISPQ,KRALP,CPF,IRE,IFK,AA,ITS, OUTP0020
     2                IN,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    OUTP0021
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,      OUTP0022
     4                VMACH,KRZZ,SP1,GAM,THI,MX,DMCHT,HCH,NCV,THT,      OUTP0023
     5                IFRZ,NOAT,SR1,IXG,SV1,KKJ,IXC,NXG,SH1,NOATO,      OUTP0024
     6                SA2,FEF,WS,RV,CMF,VA,HOS,DUM1,DUM2,FP,IFCJC,      OUTP0025
     7                ISP2,WTG,VMU2,WTL                                 OUTP0026
C                                                                       OUTP0027
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKE(10),        OUTP0028
     1                TLO(10),DMCLO(10),WALJP(10),FB(10),ALP(10),       OUTP0029
     2                GAMH(10),GAME(10),TO(10,3),TK(10,3),WAT(10),      OUTP0030
     3                IR(10),IOAT(10),KAT(10),UR(10,10),FBL(10)         OUTP0031
      EQUIVALENCE (TU(181),TF(1)), (VNU(1),CIJ(1))                      OUTP0032
C                                                                       OUTP0033
      COMMON /KINETX/ MT,FKE(50),FAK(50),FXK(50),PMU(10,50),RMU(10,50), OUTP0034
     1        PBP(50),PKKK(50)                                                       *COR
C                                                                       OUTP0036      **-1
      EQUIVALENCE (B(1),Y(1)), (GAMK(1),VLAM(1))                        OUTP0037
C                                                                       OUTP0038
      COMMON/ACF1/GAMEX,PEEN,PCH,ACHSQ,SGMAK,SXP                        OUTP0039
C                                                                       OUTP0040
      COMMON /DIFFER/ IR(11),FBU(10),PNUS(10),SLAM(10),PF(10),BY(10),   OUTP0041
     1                IBC(10),JJ(10),SLB(16),SLA(16,16)                 OUTP0042
C                                                                       OUTP0043
      COMMON/CARKIN/ KRK(10),RGUCM,NCC                                  OUTP0044
      DATA (SPIE(1,I),I=1,9)/4HLAYE,4HR-OR,4HIENT,4HED P,4HYROL,4HYTIC,                *COR
     *4H GRA,4HPHIT,4HE   /                                                            *COR
      DATA (SPIE(2,I),I=1,9)/4HEDGE,4H-OST,4HENTE,4HD PY,4HROLY,4HTIC ,                *COR
     *4HGRAF,4HHITE,4H    /                                                            *COR
      DATA (SPIE(3,I),I=1,9)/4HBULK,4H GRA,4HPHIT,4HE   ,4H    ,4H    ,                *COR
     *4H    ,4H    ,4H    /                                                            *COR
      DATA (SPIE(4,I),I=1,9)/4HG-90,4H    ,4H    ,4H    ,4H    ,4H    ,                *COR
     *4H    ,4H    ,4H    /                                                            *COR
      DATA (SPIE(5,I),I=1,9)/4HATJ ,4HGRAP,4HHITE,4H    ,4H    ,4H    ,                *COR
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     *4H    ,4H    ,4H    /                                                    *COR
      DATA (SPIF(6,I),I=1,9)/4HCARB,4HITEX,4H 700,4H    ,4H    ,4H    ,         *COR
     *4H    ,4H    ,4H    /                                                    *COR
      DATA (SPIF(7,I),I=1,9)/4HFC 9,4H01  ,4H    ,4H    ,4H    ,4H    ,         *COR
     *4H    ,4H    ,4H    /                                                    *COR
      DATA (SPIF(8,I),I=1,9)/4HSTC/,4HPG  ,4H    ,4H    ,4H    ,4H    ,         *COR
     *4H    ,4H    ,4H    /                                                    *COR
      ASQRT(Q)=SIGN(SQRT(ABS(Q)),Q)                                             OUTP0045
      TAN(Q)=SIN(Q)/COS(Q)                                                      OUTP0046
      HEPS=0.01                                                                 OUTP0047
C     FIND VKIN AS FIRST NONZERO FRE(M)                                         OUTP0048
      VKIN=ROUCK                                                                OUTP0049
      WM=AA/P                                                                   OUTP0050
      CALL ETIMEE (TIME)                                                        OUTP0051
      WRITE (KOUT,350)  IT,TIME                                                 OUTP0052
      SHIP=HIP                                                                  OUTP0053
      SSIP=SIP                                                                  OUTP0054
      KRB=KR(8)                                                                 OUTP0055
      IF (JC*(N+1-IRE)) 5,5,10                                                  OUTP0056
5     JC=N+1                                                                    OUTP0057
      KRB=0                                                                     OUTP0058
10    HG=0.                                                                     OUTP0059
      HL=0.                                                                     OUTP0060
      SG=0.                                                                     OUTP0061
      SL=0.                                                                     OUTP0062
      SPL=0.                                                                    OUTP0063
      HIP=0.                                                                    OUTP0064
      WTLS=WTL                                                                  OUTP0065
      SIP=0.                                                                    OUTP0066
      PMU2=0.                                                                   OUTP0067
      HTTL=0.                                                                   OUTP0068
      RPRM=W(3)                                                                 OUTP0069
      TT=T*1.8                                                                  OUTP0070
      DO 25 J=1,6                                                               OUTP0071
      IF (FF(J) .EQ. 0.0) GO TO 11                                              *COR
      HTTL=HTTL+VN(J)/FF(J)*H(J)                                                OUTP0072
      PMU2=PMU2+VN(J)/FF(J)*WT*(J)                                              OUTP0073
   11 CONTINUE                                                                  *COR
      VA=VN(J)*H(J)                                                             OUTP0074
      IF (IFC(J)) 20,15,20                                                      OUTP0075
15    HG=HG+VA                                                                  OUTP0076
      SG=SG+VN(J)*(SP(J)-1.9869*Y(J))                                           OUTP0077
      GO TO 25                                                                  OUTP0078
20    HL=HL+VA                                                                  OUTP0079
      SL=SL+VN(J)*SH(J)                                                         OUTP0080
      SPL=SPL+VN(J)                                                             OUTP0081
25    CONTINUE                                                                  OUTP0082
      RV=Y(2)+W(3)-WTLS/WTG                                                     OUTP0083
      IF (KR(8)) 35,35,30                                                       OUTP0084
30    WTLS=WTLS+VN(N+1)                                                         OUTP0085
      RPRM=RPRM+VN(N+1)/WTG                                                     OUTP0086
35    HTTL=HTTL/PMU2                                                            OUTP0087
      IF (SPL) 45,40,45                                                         OUTP0088
40    WTLS=0.                                                                   OUTP0089
      WTL=1.E-30                                                                OUTP0090
      SPL=1.0                                                                   OUTP0091
45    WTW=WTLS/WTG                                                              OUTP0092
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      HL=HL+VN(*FLT)*FLTC*HXFLT                                         OUTP0093
      SL=SL+VN(*FLT)*FLTC*SXFLT                                         OUTP0094
      HIP=(HL+HG)/AA                                                    OUTP0095
      SIP=(SL+SG)/AA                                                    OUTP0096
      KR1=KR(1)-IFK2+KRF                                                OUTP0097
      FAF=GAMEX                                                         OUTP0098
      IF (KR(4)) 60,50,55                                               OUTP0099
50    HTTL=HG/AA                                                        OUTP0100
      FAF=0.                                                            OUTP0101
55    WSD=AMAX1(WS-W(3)+RPRM,1.E-30)                                    OUTP0102
      HIP=(HG+(HL-WTR*HG)/WSD)/AA                                       OUTP0103
      SIP=0.                                                            OUTP0104
60    RHO=P*WM/(T*1.3146)                                               OUTP0105
      RHOG=WTG/(T*1.3146)                                               OUTP0106
      HG=HG/WTG*1.8                                                     OUTP0107
      HL=HL/WTL*1.8                                                     OUTP0108
      SL=SL/WTL                                                         OUTP0109
      SG=SG/WTG                                                         OUTP0110
      HRP=HIP*1.8                                                       OUTP0111
      WMG=WTG/P                                                         OUTP0112
      WML=WTL/SPL                                                       OUTP0113
      IF (KR(6)) 65,70,70                                               OUTP0114
65    WRITE (KOUT,355)  WTR                                             OUTP0115
      WRITE (KOUT,360)  TT,T,P                                          OUTP0116
      GO TO 100                                                         OUTP0117
70    WRITE (KOUT,435)                                                  OUTP0118
   75 NSPIF = KRK(4)                                                    *COR
      WRITE (KOUT,415) (SPIF(NSPIF,I),I=1,9)                            *COR
95    WRITE (KOUT,430)  ROUCK                                           OUTP0126  **-7
      WRITE (KOUT,410)  RV,RPRM                                         OUTP0127
      WRITE (KOUT,440)  TT,T,P                                          OUTP0128
100   WRITE (KOUT,365)  HG,HL,HRP,SG,SL,SIP,RHOG,RHO,WMG,WML,WM         OUTP0129
      IF (KKJ) 105,110,110                                              OUTP0130
105   VELSQ=( (SV1 * SIN(SA1)) * * 2. + ( (SR1 / RHO) * SV1 * COS(SA1)) OUTP0131
     1* * 2.)/45054.                                                    OUTP0132
      SA2=(ATAN(RHO / SR1 * TAN(SA1)))*57.29577                         OUTP0133
      SD1=SA1*57.29577                                                  OUTP0134
      SH1=SH1*1.8                                                       OUTP0135
      SQMAK=(VELSQ / GAM * WM / (1.9869 * T))                           OUTP0136
      VMACH=ASQRT(SQMAK)                                                OUTP0137
      VEL=ASQRT(VELSQ*45054.)                                           OUTP0138
      FLUX=VEL*RHO                                                      OUTP0139
      WRITE (KOUT,380)  VEL,VMACH,SA2                                   OUTP0140
      HBH=HCH*1.8                                                       OUTP0141
      WRITE (KOUT,385)  SV1,SH1,HBH,SP1,SR1,SD1                         OUTP0142
      SH1=SH1/1.8                                                       OUTP0143
      GO TO 140                                                         OUTP0144
110   IF (KR(5)-1) 115,130,125                                          OUTP0145
115   IF (KR(5)) 120,140,140                                            OUTP0146
120   WRITE (KOUT,395)                                                  OUTP0147
      HBH=HCH*1.8                                                       OUTP0148
      SD1=SA1*57.29577                                                  OUTP0149
      SB1=SHI*1.8                                                       OUTP0150
      WRITE (KOUT,400)  SV1,SB1,HBH,SP1,SR1,SD1                         OUTP0151
      GO TO 140                                                         OUTP0152
125   HCH=HIP                                                           OUTP0153
      SCH=SIP                                                           OUTP0154
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      PCH=P                                                             OUTP0155
      GO TO 140                                                         OUTP0156
130   VELSQ=(HCH - HIP)*2.                                              OUTP0157
      SQMAK=VELSQ/GAM*WM/(1.9869*T)                                     OUTP0158
      VMACH=ASQRT(SQMAK)                                                OUTP0159
      VEL=ASQRT(VELSQ*45054.)                                           OUTP0160
      FLUX=VEL*RHO                                                      OUTP0161
      HKIN=(HCH-HIP)*1.8                                                OUTP0162
      WRITE (KOUT,375)  HKIN,VEL,FLUX,VMACH                             OUTP0163
      IF (KKX(1)-5) 140,135,140                                         OUTP0164
135   PUNCH 470,  VEL, P, HG , PR(1)                                    OUTP0165
140   CONTINUE                                                          OUTP0166
      IF (KR(10)) 145,185,145                                           OUTP0167
145   IF (NCV + ITS) 150,185,185                                        OUTP0168
150   WRITE (KOUT,445)                                                  OUTP0169
      W(2)=ROUCM                                                        OUTP0170
      IF (KKX(1)-3) 170,155,185                                         OUTP0171
C      SCRIMP OUTPUT FORMATS                                            OUTP0172
155   KSC=0                                                             OUTP0173
      IF (BPRM) 165,165,160                                             OUTP0174
160   KSC=KR1                                                           OUTP0175
165   WRITE (KOUT,475)  TILE (2),W(2),BPRM,T,FAF,HTIL,HIP,KSC,FAMOA(JC),OUTP0176
     1 FAMOB(JC),P,TILE                                                 OUTP0177
      PUNCH 480,        TILE (2),W(2),BPRM,T,FAF,HTIL,HIP,KSC,FAMOA(JC),OUTP0178
     1 FAMOB(JC),P,TILE                                                 OUTP0179
      GO TO 185                                                         OUTP0180
170   CONTINUE                                                          OUTP0181
      IF (KKX(1)) 180,180,175                                           OUTP0182
175   CONTINUE                                                          OUTP0183
C     THE SQUEE CALLS AND FORMAT 167 YIELD A COMPRESSED OUTPUT TO BE    OUTP0184
C     READ AS (F6.4,E8.5,2F6.4,F4.2,F7.5,F6.4,2F8.5,.....)              OUTP0185
      CALL SQUEE (P,IO(1),4)                                            OUTP0186
      CALL SQUEE (W(2),IO(4),4)                                         OUTP0187
      CALL SQUEE (BPRM,IO(7),5)                                         OUTP0188
      CALL SQUEE (VKIN,IO(10),4)                                        OUTP0189
      IO(13)=FAF*100.                                                   OUTP0190
      CALL SQUEE (T,IO(14),5)                                           OUTP0191
      CALL SQUEE (ABS(WTR),IO(17),4)                                    OUTP0192
      CALL SQUEE (HTIL,IO(20),5)                                        OUTP0193
      HIPP=HG/1.8                                                       OUTP0194
      CALL SQUEE (HIPP,IO(23),5)                                        OUTP0195
      KR1=KR1+1                                                         OUTP0196
      WRITE (KOUT,490)  IO,FAMOA(JC),FAMOB(JC),KR1,TILE                 OUTP0197
      PUNCH 485,   IO,FAMOA(JC), FAMOB(JC), KR1,TILE                    OUTP0198
      KR1=KR1-1                                                         OUTP0199
      W(2)=0.                                                           OUTP0200
      IF (KKX(1) - 1) 180,185,180                                       OUTP0201
180   HIPP=HG/1.8                                                       OUTP0202
      WRITE (KOUT,495) P,W(2),BPRM,T,FAF,HTIL,HIPP,KR1,FAMOA(JC),FAMOB(JOUTP0203
     1C)     ,WTR                                                       OUTP0204
      PUNCH 500,       P,W(2),BPRM,T,FAF,HTIL,HIPP,KR1,FAMOA(JC),FAMOB(JCOUTP0205
     1)     ,WTR                                                        OUTP0206
      W(2)=0.                                                           OUTP0207
185   IF (ITS) 190,305,305                                              OUTP0208
190   IF (MT*KR(9)) 205,205,195                                         OUTP0209
195   DO 200 L=1,MT                                                     OUTP0210
200   PMR(L)=PMR(L)/AA                                                  OUTP0211
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      WRITE (KOUT,460) (L,PKR(L),L=1,MT)                                OUTP0212
      WRITE (KOUT,462) (L,PKKK(L),L=1,MT)                                          *COR
  462 FORMAT(/6HR RATIO OF FORWARD TO REVERSE KINETICALLY CONTROLLED R20           *COR
     *DUCTION RATES   /5(I3,1H=E12.5))                                             *COR
  205 IF (KR(6)) 215,210,210                                                       OUTP0213
  210 WRITE (KOUT,450)                                                             OUTP0214
      GO TO 240                                                                    OUTP0215
  215 IF (KR(5)) 230,220,220                                                       OUTP0216
  220 IF (KKJ) 235,225,225                                                         OUTP0217
  225 WRITE (KOUT,370)                                                             OUTP0218
      GO TO 240                                                                    OUTP0219
  230 WRITE (KOUT,405)                                                             OUTP0220
      GO TO 240                                                                    OUTP0221
  235 WRITE (KOUT,390)                                                             OUTP0222
  240 DO 255 I=1,N                                                                 OUTP0223
      IF (IFC(I)-1) 255,245,255                                                    OUTP0224
  245 IF (KR(6)) 255,250,250                                                       OUTP0225
  250 VN(I)=VN(I)/WM*FLTN(I)                                                       OUTP0226
  255 VN(I)=VN(I)/P                                                                OUTP0227
      IF (NCV) 260,260,280                                                         OUTP0228
  260 IF (KR(7)-1) 265,265,280                                                     OUTP0229
  265 IF (L-60) 270,270,275                                                        OUTP0230
  270 WRITE (KOUT,505) (FAMOA(I),FAMOB(I),VN(I),I=1,N)                             OUTP0231
      GO TO 285                                                                    OUTP0232
  275 WRITE (KOUT,510) (FAMOA(I),FAMOB(I),VN(I),I=1,N)                             OUTP0233
      GO TO 285                                                                    OUTP0234
  280 WRITE (KOUT,465) (FAMOA(I),FAMOB(I),VN(I),FC(I),Y(I),VLMK(I),IFC(IOUTP0235
     1),F(I),CP(I),I=1,N)                                                          OUTP0236
  285 DO 300 I=1,N                                                                 OUTP0237
      IF (IFC(I)-1) 300,290,300                                                    OUTP0238
  290 IF (KR(6)) 300,295,295                                                       OUTP0239
  295 VN(I)=VN(I)/WTM(I)*WM                                                        OUTP0240
  300 VN(I)=VN(I)*P                                                                OUTP0241
  305 IF (FLTW) 315,315,310                                                        OUTP0242
  310 FSOL=1.-FLTW                                                                 OUTP0243
      WRITE (KOUT,455)  FAMOA(KFLT),FAMOB(KFLT),FLTW,FSOL                          OUTP0244
  315 IF (ITS) 320,345,345                                                         OUTP0245
  320 IF (KR(5)) 325,340,325                                                       OUTP0246
  325 IF (KKJ+KR(5)) 335,330,335                                                   OUTP0247
  330 KKJ=1                                                                        OUTP0248
      KR(1)=3                                                                      OUTP0249
      NCOE=3                                                                       OUTP0250
      KR(2)=1                                                                      OUTP0251
      KR(5)=-3                                                                     OUTP0252
      ACUSM=0.                                                                     OUTP0253
      ITS=0                                                                        OUTP0254
      GAME=GAM/(GAM - 1.)                                                          OUTP0255
C     FIRST GUESS OF STAGNATION PRESSURE BEHIND SHOCK                              OUTP0256
      P=( (1. + ( (GAM - 1.) / 2.) * (SQMAK)) * * GAME)*P                          OUTP0257
      CALL  ETIME                                                                  OUTP0258
  335 SXP=SIP                                                                      OUTP0259
  340 RETURN                                                                       OUTP0260
  345 HTF=SHIP                                                                     OUTP0261
      STF=SSTP                                                                     OUTP0262
      RETURN                                                                       OUTP0263
C                                                                                  OUTP0264
  350 FORMAT (/15H SOLUTION TIMES,/10X,13HITERATIONS = ,I4,23X,7HTIME = OUTP0265
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      1,F8.3,1X,4HSEC.)                                                 OUTP0266
355   FORMAT (/42H CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT.//29H   MASOUTP0267
      1S CONDENSED/MASS GAS = ,F12.5)                                   OUTP0268
360   FORMAT (3X,7HTEMP = ,F10.4,1X,6HDEG R.,2X,1H=,1X,F10.4,1X,6HDEG K.OUTP0269
      1,5X7HPRESS = F13.5,4H ATM)                                       OUTP0270
365   FORMAT (/34X40HGAS              CONDENSED        COMPOSITE/3X,18HENTHOUTP0271
      1ALPY - BTU/LBM,5X,3(5X,F12.5)/3X,23HENTROPY - BTU/LBM DEG R,3(5X,FOUTP0272
      212.5)/3X,17HDENSITY - LBM/FT3,2(11XE12.5,11X)/3X16HMOLECULAR WEIGHOUTP0273
      3I5X,3(5X,F12.4)/)                                                OUTP0274
370   FORMAT (/2X71HCHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHOUTP0275
      1ASE MOLECULES).....)                                             OUTP0276
375   FORMAT (2X27HABOVE ARE STATIC PROPERTIES,15X,12HH-KINETIC = ,E12.5OUTP0277
      1,1X,7HBTU/LBM/3X,7HVEL. = ,F12.4,1X,6HFT/SEC,3X,7HFLUX = ,E12.5,1XOUTP0278
      2,10HLBM/FT2SEC,3X,7HMACH = ,F9.5)                                OUTP0279
380   FORMAT (3X,7HVEL2 = ,E12.4,1X,6HFT/SEC,5X,8HMACH2 = ,F9.5,3X,9HTHEOUTP0280
      1TA 2 =,F10.6,1X,3HDEG)                                           OUTP0281
385   FORMAT (2X,60HABOVE ARE STATIC CONDITIONS DOWNSTREAM OF THE SHOCK OUTP0282
      1FOR ....,/3X,6HVEL1 =,E9.3,1X,6HFT/SEC,2X,11HH1-STATIC =,E9.3,1X,16OUTP0283
      2HBTU/LBM  H-TOT =,E9.3,1X, 7HBTU/LBM/3X,5HP1 = ,F12.5,1X,13HATM   OUTP0284
      3RHO1 = ,F12.5,1X,17HLBM/FT3 THETA 1 =,F10.6,1X,3HDEG)            OUTP0285
390   FORMAT (/2X71HSTATIC CHEMICAL STATE (MOLE FR.=MOLECULES/TOTAL GAS OUTP0286
      1PHASE MOLECULES)...)                                             OUTP0287
395   FORMAT (2X,76HABOVE ARE ISENTROPIC STAGNATION CONDITIONS DOWNSTREAOUTP0288
      1M OF THE SHOCK FOR . . .)                                        OUTP0289
400   FORMAT (3X,6HVEL1 =,E9.3,1X,19HFT/SEC  H1-STATIC =,E9.3,1X,16HBTU/OUTP0290
      1LBM  H-TOT =,E9.3,1X,7HBTU/LBM/3X,5HP1 = ,F12.5,1X,3HATM,3X,7HRHO1OUTP0291
      2 = ,E12.5,1X,20HLBM/FT3   THETA 1 = ,F10.6,1X,3HDEG)             OUTP0292
405   FORMAT (/2X77HISEN. STAG. CHEMICAL STATE (MOLE FR.=MOLECULES / TOTOUTP0293
      1AL GAS PHASE MOLECULES)..)                                       OUTP0294
410   FORMAT (26H  RHO V WALL/RHOE UE CM = ,E12.5,3X,9HBPRIME = ,E12.5) OUTP0295
      4) FORMAT (/, 13H  SURFACE IS , 10A4)                                          *COR
430   FORMAT (36H  MASS TRANSFER COEFFICIENT ROUCM = ,E12.5)            OUTP0299     **-3
435   FORMAT (/46H OPEN SYSTEM CHEMICAL KINETICS SOLUTION OUTPUT)       OUTP0300
440   FORMAT (/39H  STATE ADJACENT TO THE SURFACE . . . ./3X,7HTEMP = , OUTP0301
      1 F10.4,1X,7HDEG R = ,F11.4,1X17HDEG K      PRESS = ,F13.5,1X3HATM) OUTP0302
445   FORMAT (/2X,40HPUNCHED CARD OUTPUT (80 COLUMNS) . . . .)          OUTP0303
450   FORMAT (/2X,38HCHEMICAL STATE ADJACENT TO THE SURFACE/3X,54H(MOLE OUTP0304
      1FR FOR GASES = MOLECULES / TOTAL GAS MOLECULES )/3X,50H(MOLE FR FOOUTP0305
      2R CONDENSED = BPRIME CONDENSED ). . . .)                         OUTP0306
455   FORMAT (8X2A4,2HISF8.5,11H LIQUID ANDF8.5,6H SOLID)               OUTP0307
460   FORMAT (/54H  NET FORWARD RATE OF KINETICALLY CONTROLLED REACTIONSOUTP0308
      1/ 70H   (MOLES OF REACTION / UNIT SURFACE AREA / TIME / RHOE UE CMOUTP0309
      2). . . . /(I4,1H=F12.5,I3,1H=F12.5,I3,1H=E12.5,I3,1H=E12.5,I3,1H=FOUTP0310
      312.5))                                                           OUTP0311
465   FORMAT ( /87H  SPECIES  MOL.FRAC.   O-LN-KP/O-LN-T  LOG-PP       LOUTP0312
      1OG-KP     FLAG   ERROR          CP   /(1X2A4,4E13.5,I5,2E13.5))  OUTP0313
470   FORMAT (13X,3E11.5,22X,F11.2)                                     OUTP0314
475   FORMAT (2X1H(4XA4,2F8.5,F9.4,F5.3,2F9.3,I2,2XA4,A2,F4.2,2A4,A2,1H)OUTP0315
      1)                                                                OUTP0316
480   FORMAT (      4XA4,2F8.5,F9.4,F5.3,2F9.3,I2,2XA4,A2,F4.2,2A4,A2,1H)OUTP0317
      1)                                                                OUTP0318
485   FORMAT  (I4,A1,I1,I4,A1,I1,I6,A1,I1,I4,A1,I1,                     OUTP0319
      1        I4,I5,A1,I1,I4,A1,I1,I6,A1,I1,I6,A1,I1,A4,A2,I1,4X,2A4,A2)OUTP0320
490   FORMAT (3H  (I4,A1,I1,I4,A1,I1,I6,A1,I1,I4,A1,I1,I4,I5,A1,I1,     OUTP0321
      1    I4,A1,I1,I6,A1,I1,I6,A1,I1,A4,A2,I1,4X,2A4,A2,1H))           OUTP0322
495   FORMAT (3H  (F8.4,2F8.5,F9.4,F5.3,2F9.3,I2,2X,2A4,E10.3,3H  ))   OUTP0323
500   FORMAT  (   F8.4,2F8.5,F9.4,F5.3,2F9.3,I2,2X,2A4,E10.3)           OUTP0324
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  505   FORMAT (/3(5X7HSPECIES3X8HMOLE FR.2X)/(5X2A4,F12.5,5X2A4,F12.5,5X2OUTP0325
       1A4,E12.5))                                                        OUTP0326
  510   FORMAT (/5(5X7HSPECIES3X8HMOLE FR.2X)/(5X2A4,E12.5,5X2A4,E12.5,5X2OUTP0327
       1A4,E12.5,5X2A4,E12.5,5X2A4,F12.5))                                OUTP0328
        END                                                               OUTP0329
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      SUBROUTINE THERM                                                  THER0001
      DIMENSION BLNK(30), BC(30)                                                        *COR
C                                                                       THER0004        **-2
      REAL NFIA(1),NFIB(1),FFIN(1),TAU(10,10)                           THER0005
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (FFIN(1),A(101)),    THER0006
     1(TAU(1),A(151))                                                   THER0007
      DIMENSION TF(180),CIJ(180,1)                                      THER0008
      DIMENSION X(1),VLAM(180,1)                                        THER0009
      DIMENSION FKAM(10,50)                                                             *COR
C                                                                       THER0010
      COMMON          FAMOA(180),FAMOB(180),R3(180,2),RC(180,2),        THER0011
     1                RD(180,2),RE(180,2),RF(180,2),TU(180,2),VP(180),  THER0012
     2                Y(180),WTM(180),VNU(180,10),FF(180),IFC(180),     THER0013
     3                IP(180),CP(180),H(180),SR(180),TC(180),VLAK(180), THER0014
     4                E(180),LAMI(180),GAMK(1,1)                        THER0015
C                                                                       THER0016
      COMMON /PARAM1/ KTB,KOUT,JAN,MOL,NAB,IDC,M,KFX(3),KR(10),TILE(3), THER0017
     1                TTMIN,TTMAX,VISC,FR(1)                            THER0018
C                                                                       THER0019
      COMMON /PARAM2/ WR,SCH,RHO,VEL,B1,NFF,FFA,TS,ISP,P,T,SIP,HIP,     THER0020
     1                EL,ENL,FLIO,WO,IFL,ISPQ,KRALP,CPF,TRF,IFR,AA,TTS, THER0021
     2                IN,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    THER0022
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,      THER0023
     4                VMACH,KRZZ,SP1,GAM,THT,MX,DMCHT,HCH,NCV,TPT,      THER0024
     5                IFRZ,NOAT,SK1,IXG,SV1,KKJ,IXC,UXG,SH1,NOATO,      THER0025
     6                SA2,FFF,WS,RV,CMF,VA,HOS,DUM1,DUM2,FP,IFCJC,      THER0026
     7                ISP2,WTG,VMU2,WTL                                 THER0027
C                                                                       THER0028
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKE(10),        THER0029
     1                TLO(10),DMCLO(10),WALJP(10),FB(10),ALP(10),       THER0030
     2                GAMH(10),GAMF(10),TO(10,3),TK(10,3),WAT(10),      THER0031
     3                IR(10),IOAT(10),KAT(10),UG(10,10),FBL(10)         THER0032
      EQUIVALENCE (TU(181),TF(1)), (VNU(1),CIJ(1))                      THER0033
C                                                                       THER0034
      COMMON /KINETX/ MT,FKF(50),FAK(50),FXK(50),PMU(10,50),RMU(10,50), THER0035
     1                PMP(50),PKKK(50)                                                  *COR
C                                                                       THER0037        **-1
      EQUIVALENCE (B(1),X(1)), (GAMK(1),VLAM(1))                        THER0038
C                                                                       THER0039
      COMMON /DIFFER/ IP(11),FNU(10),PNUS(10),SLAM(10),BF(10),PY(10),   THER0040
     1                IRC(10),JJ(10),SL5(16),SLA(16,16)                 THER0041
C                                                                       THER0042
      COMMON/ZKIN/ MOR(10,50),NMP(10,50),NPC(10,50),NPE(10,50),FKKS(50),                *COR
     *PPX(50),PSI(10,50),FKK(10,50),INP(50)                                             *COR
      COMMON/CACKIN/ KRK(10),ROHCM,NCC                                  THER0043
      REAL INHB                                                                         *COR
      DIMENSION FKFD(3,10),FAKD(3,10),FXKD(3,10),PSID(8,3,10),FKKD(8,3,1                *COR
     *0),RXSP(8,4),PRSP(8,4),INHB(6),POIS(8),FSS(5)                                     *COR
      DATA (RXSP(1,I),I=1,4)/4HH2O ,4HC*  ,4H    ,4H    /,(RXSP(2,I),I=1                *COR
     *,4)/4HCO2 ,4HC*  ,4H    ,4H    /,(RXSP(3,I),I=1,4)/4HH2  ,4HC*  ,4                *COR
     *H    ,4H    /,(RXSP(4,I),I=1,4)/4HC*  ,4H    ,4H    ,4H    /,(RXSP                *COR
     *(5,I),I=1,4)/4HC*  ,4H    ,4H    ,4H    /,(RXSP(6,I),I=1,4)/4HC*                *COR
     *,4H    ,4H    ,4H    /,(RXSP(7,I),I=1,4)/4HC*  ,4H    ,4H    ,4H                *COR
     *  /,(RXSP(3,I),I=1,4)/4HC*  ,4H    ,4H    ,4H    /                              *COR
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 55.          DATA (PRSP(1,I),I=1,4)/4HCO  ,4HH2  ,4H    ,4H    /,(PRSP(2,I),I=1      *COR
 56.         *,4)/4HCO  ,4H    ,4H    ,4H    /,(PRSP(3,I),I=1,4)/4HC2H2,4H    ,4     *COR
 57.         *H    ,4H    /,(PRSP(4,I),I=1,4)/4HC   ,4H    ,4H    ,4H    /,(PRSP      *COR
 58.         *(5,I),I=1,4)/4HC2  ,4H    ,4H    ,4H    /,(PRSP(6,I),I=1,4)/4HC3      *COR
 59.         *,4H    ,4H    ,4H    /,(PRSP(7,I),I=1,4)/4HC4  ,4H    ,4H    ,4H      *COR
 60.         *  /,(PRSP(8,I),I=1,4)/4HC5  ,4H    ,4H    ,4H    /                    *COR
 61.          DATA (INHR(I),I=1,8)/4HP20 ,4HCO2 ,4HCO  ,4HH2  ,4HCLH ,4HFH  ,4H     *COR
 62.         *   ,4H    /                                                            *COR
 63.          DATA (POIS(I),I=1,8)/4HCLH ,4HFH  ,4H    ,4H    ,4H    ,4H    ,4H      *COR
 64.         *   ,4H    /                                                            *COR
 65.          DATA (FSS(I),I=1,5)/.125,.261,.012,.130,.00056/                        *COR
 66.          DATA (FKFD(I,1),I=1,3)/12.5,12.5,0.771/,(FAKD(I,1),I=1,3)/4.6E+4,      *COR
 67.         *4.6E+4,5.55E+4/,(FXKD(I,1),I=1,3)/0.0,0.0,0.0/,(FKFD(I,2),I=1,3)/      *COR
 68.         *2.63724E+3,3.434485E+6,5.136124E+5/,(FAKD(I,2),I=1,3)/61910.5,         *COR
 69.         *69431.3,124460./,(FXKD(I,2),I=1,3)/0.0,0.0,0.0/,(FKFD(I,3),I           *COR
 70.         *=1,3)/1.99E+5,1.98E+5,4.94E+7/,(FAKD(I,3),I=1,3)/6.55E+4,6.55E+4,      *COR
 71.         *1.295E+5/,(FXKD(I,3),I=1,3)/0.0,0.0,0.0/,(FKFD(I,4),I=1,3)/.03868,     *COR
 72.         *.0015,1.9138/,(FAKD(I,4),I=1,3)/4175.34,4175.34,57175.34/,(FXKD(I,     *COR
 73.         *4),I=1,3)/-.29,-.29,0.0/,(FKFD(I,5),I=1,3)/.74,3.493,19610.44/,(FA     *COR
 74.         *KD(I,5),I=1,3)/4551.4,4551.4,110500.0/,(FXKD(I,5),I=1,3)/0.0,0.0,0.0,0 *COR
 75.         *.0/,(FKFD(I,6),I=1,3)/.478,14.4776,.017/,(FAKD(I,6),I=1,3)/34308.2     *COR
 76.         *,34308.2,34883.6/,(FXKD(I,6),I=1,3)/.617,.617,0.0/,(FKFD(I,7),I=1,      *COR
 77.         *3)/6.8906E+5,1.31779E+7,4.41603E+4/,(FAKD(I,7),I=1,3)/101676.95,1       *COR
 78.         *01676.95,117282.75/,(FXKD(I,7),I=1,3)/.433,.433,0.0/                   *COR
 79.          DATA (FKFD(I,8),I=1,3)/11.0901,208.87,0.700445/,(FAKD(I,8),I=1,3)/      *COR
 80.         *29386.7,29386.7,50640.4/,(FXKD(I,8),I=1,3)/0.0,0.0,0.0/                *COR
 81.          DATA (PSID(I,1,1),I=1,8)/1.0,1.0,1.0,1.0,1.0,0.0,0.0,0.0,0.0,0.0/,(PSID(I,  *COR
 82.         *2,1),I=1,8)/1.0,1.0,1.0,1.0,1.0,0.0,0.0,0.0,0.0,0.0/,(PSID(I,3,1),I=1,8)/ *COR
 83.         *1.0,1.0,1.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0/,(PSID(I,1,2),I=1,8)/151.32,26.05, *COR
 84.         *2.16,0.0,93.1145,0.0,0.0,0.0,0.0/,(PSID(I,2,2),I=1,8)/46.75,166.49,     *COR
 85.         *29.87,0.0,1325.44,0.0,0.0,0.0,0.0/,(PSID(I,3,2),I=1,8)/0.0,0.0,0.0,0.558, *COR
 86.         *0.0,0.0,53.355,0.0,0.0,0.0/,(PSID(I,1,3),I=1,8)/1.0,1.0,1.0,1.0,1.0,0.0, *COR
 87.         *0.0,0.0,0.0/,(PSID(I,2,3),I=1,8)/1.0,1.0,1.0,1.0,1.0,0.0,0.0,0.0,0.0,0.0/, *COR
 88.         *(PSID(I,3,3),I=1,8)/1.0,1.0,1.0,1.0,0.0,0.0,0.0,0.0,0.0,0.0/           *COR
 89.          DATA (PSID(I,1,4),I=1,8)/.0331,.064,.021,.0058,1.0,0.0,0.0,0.0,0.0,0.0/,(P  *COR
 90.         *SID(I,2,4),I=1,8)/.0331,.064,.021,.0058,1.0,0.0,0.0,0.0,0.0,0.0/,(PSID(I,3 *COR
 91.         *,4),I=1,8)/.0058,.0058,.0058,0.0,0.0,0.0,0.0,0.0,0.0,0.0/,(PSID(I,1,5),I=1 *COR
 92.         *,8)/163.87,399.3,166.5,13.12,100.,0.0,0.0,0.0,0.0,0.0/,(PSID(I,2,5),I=1,8) *COR
 93.         */163.87,399.3,166.5,13.12,100.,0.0,0.0,0.0,0.0,0.0/,(PSID(I,3,5),I=1,8)/0. *COR
 94.         *0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0/,(PSID(I,1,6),I=1,8)/16.61,142.25,75 *COR
 95.         *.69,21.8,.1,0.0,0.0,0.0,0.0/,(PSID(I,2,6),I=1,8)/16.61,142.25,75.69,21  *COR
 96.         *.8,.1,0.0,0.0,0.0,0.0/,(PSID(I,3,6),I=1,8)/0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0 *COR
 97.         *,0.0/,(PSID(I,1,7),I=1,8)/252.67,5418.31,.054,.0001,0.0,0.0,0.0,0.0,0.0, *COR
 98.         *0/,(PSID(I,2,7),I=1,8)/252.67,5418.31,.054,.0001,0.0,0.0,0.0,0.0,0.0,0.0/, *COR
 99.         *(PSID(I,3,7),I=1,8)/53.681,18.786,.059,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0/ *COR
100.          DATA (PSID(I,1,8),I=1,8)/29.41,373.68,0.0,1.72,.01,2500.,0.0,0.0,0.0/,  *COR
101.         *(PSID(I,2,8),I=1,8)/29.41,373.68,0.0,1.72,.01,2500.,0.0,0.0,0.0/,       *COR
102.         *(PSID(I,3,8),I=1,8)/88.38,20.19,13.69,0.0,0.0,0.0,0.0,0.0,0.0,0.0/      *COR
103.          DATA (FKKD(I,1,1),I=1,8)/3.0,3.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0/,(FKKD(I,  *COR
104.         *2,1),I=1,8)/3.0,3.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0/,(FKKD(I,3,1),I=1,8)/ *COR
105.         *0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0/,(FKKD(I,1,2),I=1,8)/0.0,0.0,0.0,0.0, *COR
106.         *0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0/,(FKKD(I,2,2),I=1,8)/0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0, *COR
107.         *0.0,0.0,0.0,0.0/,(FKKD(I,3,2),I=1,8)/0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0/, *COR
108.         *(FKKD(I,1,3),I=1,8)/3.0,3.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0/,(FKKD(I,2,3), *COR
109.         *I=1,8)/3.0,3.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0/,(FKKD(I,3,3),I=1,8)/0.0, *COR
110.         *0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0,0.0/                                *COR
111.          DATA BLLK/4H    /                                                       *COR
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    5   MODE=KR(1)                                          THER0053
        IF (ITS) 50,10,50                                   THER0054
   10   WTG=0.                                              THER0055
        WTL=0.                                              THER0056
        IF (KR(8)) 40,40,15                                 THER0057
   15   IF (IFC(N+1)-1) 25,20,25                            THER0058
   20   IF (T+.001-TF(N+1)) 25,25,30                        THER0059
   25   IFC(N+1)=-1                                         THER0060
        VN(N+1)=0.                                          THER0061
   30   DO 35 K=1,IS                                        THER0062
   35   VNU(N+1,K)=-TQ(K,3)                                 THER0063
        WTL=-VN(N+1)                                        THER0064
   40   DUM2=0.                                             THER0065
        SUMN=0.                                             THER0066
        DO 45 I=1,IS                                        THER0067
        PMUS(I)=0.                                          THER0068
   45   SLAM(I)=0.                                          THER0069
   50   HMELT=0.                                            THER0070
        FLTQ=0.                                             THER0071
        SMELT=0.                                            THER0072
        MELT=1                                              THER0073
        TMIN=TTMIN                                          THER0074
        TMAX=TTMAX                                          THER0075
        TFMAX=500.                                          THER0076
        VA=ALOG(T / 3000.)                                  THER0077
        VB=T-3000.                                          THER0078
        VC=(T + 3000.)/2.                                   THER0079
        VD=T*3000.                                          THER0080
        VE=VC/(VD * VD)                                     THER0081
        RT=1.9869*T                                         THER0082
        IF (NCV) 65,65,55                                   THER0083
   55   PIN=P*10.E-3                                        THER0084
        WM=20.                                              THER0085
        AA=P*WM                                             THER0086
        IF (MODE) 65,65,60                                  THER0087
   60   T=3000.                                             THER0088
   65   CONTINUE                                            THER0089
        I=1                                                 THER0090
        DO 255 IK=1,N                                       THER0091
        J=2                                                 THER0092
        IF (NCV) 80,80,70                                   THER0093
   70   IF (IFC(I)) 80,75,80                                THER0094
   75   VN(I)=VN(I)+PIN                                     THER0095
        Y(I)=ALOG(VN(I))                                    THER0096
   80   CONTINUE                                            THER0097
        IF (IFC(I) + 1) 185,85,85                           THER0098
   85   IF (IFC(I)) 90,95,140                               THER0099
   90   IF (MODE - 1) 185,180,185                           THER0100
   95   IF (ITS) 185,100,185                                THER0101
  100   SUMN=SUMN+VN(I)                                     THER0102
        DUM1=WTM(I)*VN(I)                                   THER0103
        WTG=WTG+DUM1                                        THER0104
        DUM2=DUM2+DUM1/FF(I)                                THER0105
        IF (IK - IS) 105,105,115                            THER0106
  105   PMUS(I)=VN(I)                                       THER0107
        IF (KR(6)) 185,110,130                              THER0108
  110   SLAM(I)=VN(I)/FF(I)                                 THER0109
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      GO TO 185                                                         THERO110
  115 DO 125 K=1,IS                                                     THERO111
      DUM1=VDU(I,K)*VN(I)                                               THERO112
      IF (KR(6)) 125,120,125                                            THERO113
  120 SLAM(K)=SLAM(K)+DUM1/FF(I)                                        THERO114
  125 PHDS(K)=PHDS(K)+DUM1                                              THERO115
      IF (KR(6)) 165,185,130                                            THERO116
  130 DO 135 K=1,IS                                                     THERO117
  135 SLAM(K)=SLAM(K)+VLAM(I,K)*VN(I)                                   THERO118
  140 IF (IFC(I) - 1) 145,145,185                                       THERO119
  145 IF (ITS) 170,150,170                                              THERO120
  150 IF (KR(6)) 165,155,155                                            THERO121
  155 IF (T - TK(I) + .001) 160,160,165                                 THERO122
  160 IFC(I)=-1                                                         THERO123
      VN(I)=0.                                                          THERO124
      GO TO 98                                                          THERO125
  165 WTL=WTL+VN(I)*FN(I)                                               THERO126
  170 IF (MODE - 1) 185,175,185                                         THERO127
  175 TMIN=AMAX1(TMIN,TF(I))                                            THERO128
  180 TFMAX=AMAX1(TF(I) ,TFMAX)                                         THERO129
  185 IF (T - ABS(TU(I,1))) 190,195,195                                 THERO130
  190 J=1                                                               THERO131
  195 PP(I)=PC(I,J)+T*RO(I,J)+RF(I,J)/(T * T)                           THERO132
      R(I)=RR(I,J)+VB*(RC(I,J) + RO(I,J) * VC + RF(I,J) / V))           THERO133
      SR(I)=RF(I,J)+PC(I,J)*VA+VB*(RO(I,J) + RF(I,J) * VE)              THERO134
      IF (MODE - 2) 230,200,200                                         THERO135
  200 IF (IFC(I) - 1) 230,205,230                                       THERO136
  205 IF (TU(I,1)) 210,230,230                                          THERO137
  210 IF (T + TU(I,1)) 220,215,225                                      THERO138
  215 DMELT=-R(I)-DMELT                                                 THERO139
      SMELT=-SR(I)-SMELT                                                THERO140
      MELT=I                                                            THERO141
      IF (J - 2) 230,190,230                                            THERO142
  220 TMAX=AMIN1(TMAX, - TU(I,1))                                       THERO143
      GO TO 230                                                         THERO144
  225 TMIN=AMAX1(TMIN, - TU(I,1))                                       THERO145
  230 TC(I)=-R(I)/RT                                                    THERO146
      VLMK(I)=TC(I)+SR(I)/1.9069                                        THERO147
      IF (IK - IS) 235,235,240                                          THERO148
  235 ELMK(I)=VLMK(I)                                                   THERO149
      IFC(I)=IFC(I)                                                     THERO150
      RC(I)=TC(I)                                                       THERO151
      GO TO 255                                                         THERO152
  240 DO 250 K=1,IS                                                     THERO153
      IF (IFC(K) + 1) 250,245,245                                       THERO154
  245 VLMK(I)=VLMK(I)-VDU(I,K)*ELMK(K)                                  THERO155
      TC(I)=TC(I)-VDU(I,K)*RC(K)                                        THERO156
  250 CONTINUE                                                          THERO157
  255 I=I+1                                                             THERO158
      MCV=-IABS(MCV)                                                    THERO159
      IF (MODE-1) 310,311,310                                                   *COR
  311 IF (TFMAX-T) 312,310,310                                                  *COR
  312 T=TFMAX                                                                   *COR
      IF (T-500.) 313,313,5                                                     *COR
  313 WRITE(KOUT,403)                                                           *COR
      STOP                                                              THERO165  **-5
  314 IF (ITS) 314,315,314                                                      *COR
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  315 AA=P*LP                                                          *COR
      UCV=0                                                  THER0168  **-2
      RUCP=ROUCP                                                       *COR
      IMF=0                                                            *COR
      NUT=0                                                            *COR
      MS = 5                                                           *COR
      IF (KR(9)-5) 335,411,411                                         *COR
  411 DO 607 M=1,8                                                     *COR
      DO 608 IZ=1,4                                                    *COR
      RMU(IZ,M)=0.0                                                    *COR
      RMP(IZ,M)=0.0                                                    *COR
      NKR(IZ,M)=1                                                      *COR
  608 NMP(IZ,M)=1                                                      *COR
      DO 607 IZ=1,8                                                    *COR
      NPP(IZ,M)=1                                                      *COR
      PSI(IZ,M)=0.0                                                    *COR
      FKK(IZ,M)=0.0                                                    *COR
      FNAM(1,IZ+8)=BLLK                                                *COR
      FNAM(1,IZ+16)=BLLK                                               *COR
  607 NPF(IZ,M)=1                                                      *COR
  603 FORMAT(8X,2A4,32HSPECIES NOT FOUND IN THERMO DATA)               *COR
      IF (KRK(8)-4) 413,414,414                                        *COR
  414 II=1                                                             *COR
      MR=3                                                             *COR
      IRY=1                                                            *COR
C*****H2O+C*==CO+H2*****                                               *COR
      RMU(1,1)=1.0                                                     *COR
      RMU(2,1)=1.0                                                     *COR
      PRU(1,1)=1.0                                                     *COR
      PRU(2,1)=1.0                                                     *COR
      II=2                                                             *COR
      GO TO 421                                                        *COR
  413 IF (KPK(8)-2) 416,415,416                                        *COR
  415 II=1                                                             *COR
      MR=1                                                             *COR
      IRY=2                                                            *COR
C*****CO2+C*==2CO*****                                                 *COR
  421 RMU(1,II)=1.0                                                    *COR
      RMU(2,II)=1.0                                                    *COR
      PRU(1,II)=2.0                                                    *COR
      IF (MR .EQ. 1) GO TO 417                                         *COR
      II=3                                                             *COR
      GO TO 422                                                        *COR
  416 II=1                                                             *COR
      MR=1                                                             *COR
      IRY=3                                                            *COR
C*****H2+2C*==C2H2*****                                                *COR
  422 RMU(1,II)=1.0                                                    *COR
      RMU(2,II)=2.0                                                    *COR
      PMU(1,II)=1.0                                                    *COR
  417 DO 418 I=1,MS                                                    *COR
      SUBC=FLOAT(I)                                                    *COR
      RMU(1,I+MR)=SUBC                                                 *COR
  418 PMU(1,I+MR)=1.0                                                  *COR
      MT=MR+MS                                                         *COR
      NICK=KRK(4)                                                      *COR
      IF (KRK(7)) 701,702,701                                          *COR
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  701 IF (KRK(7)-2) 756,702,756                                         *COR
  702 IF (KRK(8)-4) 703,706,706                                         *COR
  703 IF (KRK(8)-2) 705,704,705                                         *COR
  704 FKF(1)=FKFD(2,NICK)/RUCM                                          *COR
      EAK(1)=EAKD(2,NICK)                                               *COR
      EXK(1)=EXKD(2,NICK)                                               *COR
      GO TO 707                                                         *COR
  705 FKF(1)=FKFD(3,NICK)/RUCM                                          *COR
      EAK(1)=EAKD(3,NICK)                                               *COR
      EXK(1)=EXKD(3,NICK)                                               *COR
      GO TO 707                                                         *COR
  706 DO 708 I=1,MR                                                     *COR
      FKF(I)=FKFD(I,NICK)/RUCM                                          *COR
      EAK(I)=EAKD(I,NICK)                                               *COR
  709 EXK(I)=EXKD(I,NICK)                                               *COR
C*****SUBLIMATION KINETICS*****                                         *COR
  707 DO 709 M=1,MS                                                     *COR
      FKF(M+MR)=FSS(M)/RUCM                                             *COR
      EAK(M+MR)=0.0                                                     *COR
  709 EXK(M+MR)=-0.5                                                    *COR
  756 IF (KRK(7)-2) 711,716,716                                         *COR
  711 IF (KRK(8)-4) 712,715,715                                         *COR
  712 IF (KRK(8)-2) 714,713,714                                         *COR
  713 DO 717 II=1,8                                                     *COR
      PST(II,1)=PSID(II,2,NICK)                                         *COR
  717 FKK(II,1)=FKKD(II,2,NICK)                                         *COR
      GO TO 716                                                         *COR
  715 DO 718 I=1,MR                                                     *COR
      DO 718 II=1,8                                                     *COR
      PST(II,I)=PSID(II,I,NICK)                                         *COR
  718 FKK(II,I)=FKKD(II,I,NICK)                                         *COR
      GO TO 716                                                         *COR
  714 DO 719 II=1,8                                                     *COR
      PST(II,1)=PSID(II,3,NICK)                                         *COR
  719 FKK(II,1)=FKKD(II,3,NICK)                                         *COR
  716 IF (KRK(7)) 752,752,721                                           *COR
  721 IF (KRK(7)-2) 722,752,722                                         *COR
  722 DO 723 M=1,MT                                                     *COR
      READ(KIN,724) FKF(M),EAK(M),EXK(M)                                *COR
  724 FORMAT(3E10.4)                                                    *COR
  723 FKF(M)=FKF(M)/RUCM                                                *COR
  752 IF (KRK(7)-1) 727,727,725                                         *COR
  725 DO 726 M=1,MR                                                     *COR
      READ(KIN,728) (PST(J,M),J=1,8)                                    *COR
  726 READ(KIN,728) (FKK(J,M),J=1,8)                                    *COR
  728 FORMAT(8E10.0)                                                    *COR
  727 MRS=MR                                                            *COR
      M=0                                                               *COR
  423 DO 426 MM=IRX,8                                                   *COR
      M=M+1                                                             *COR
      IF (M-MR) 424,424,425                                             *COR
  424 INP(M)=8                                                          *COR
      INF=8                                                             *COR
      IIZ=24                                                            *COR
      GO TO 427                                                         *COR
  425 IIZ=8                                                             *COR
      INP(M)=24                                                         *COR
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      427 DO 600 IZ=1,TIZ                                                *COR
          IF (IZ .GT. 4) GO TO 429                                       *COR
          FNAM(1,IZ)=PXSP(MN,IZ)                                         *COR
          GO TO 428                                                      *COR
      429 IF (IZ .GT. 8) GO TO 430                                       *COR
          FNAM(1,IZ)=PRSP(MN,IZ-4)                                       *COR
          GO TO 428                                                      *COR
      430 IF (IZ .GT. 16) GO TO 431                                      *COR
          FNAM(1,IZ)=TUBS(IZ-8)                                          *COR
          GO TO 428                                                      *COR
      431 FNAM(1,IZ)=PCIS(IZ-16)                                         *COR
      428 FNAM(2,IZ)=BLK                                                 *COR
          IF(FNAM(1,IZ).EQ.BLK) GO TO 600                                *COR
          DO 601 J=1,N                                                   *COR
          IF(FANOA(J).NE.FNAM(1,IZ)) GO TO 601                           *COR
          IF(FANOB(J).EQ.FNAM(2,IZ)) GO TO 602                           *COR
      601 CONTINUE                                                       *COR
          IF (IZ-8) 731,731,732                                          *COR
      732 IF (IZ-16) 733,733,734                                         *COR
      733 PSI(IZ-8,M)=0.0                                                *COR
          GO TO 600                                                      *COR
      734 FKK(IZ-16,M)=0.0                                               *COR
          GO TO 600                                                      *COR
      731 CONTINUE                                                       *COR
          WRITE(KOUT,605) FNAM(1,IZ),FNAM(2,IZ)                          *COR
          STOP                                                           *COR
      602 IF(IZ.GT.4) GO TO 604                                          *COR
          NMP(IZ,M)=J                                                    *COR
          GO TO 600                                                      *COR
      604 IF(IZ.GT.8) GO TO 605                                          *COR
          NMP(IZ-4,M)=J                                                  *COR
          GO TO 600                                                      *COR
      605 IF(IZ.GT.16) GO TO 606                                         *COR
          NPP(IZ-8,M)=J                                                  *COR
          GO TO 600                                                      *COR
      606 NPF(IZ-16,M)=J                                                 *COR
      600 CONTINUE                                                       *COR
          IF (MRS .EQ. 1) GO TO 735                                      *COR
      426 CONTINUE                                                       *COR
          GO TO 736                                                      *COR
      735 MRS=0                                                          *COR
          IRY=4                                                          *COR
          GO TO 423                                                      *COR
      736 CONTINUE                                                       *COR
      265 FORMAT (//3X,32HTRANSFER COEFFICIENT RHOF*UE*CM=,E12.5//3X,7HKINET  *COR
         *IC)                                                            *COR
      270 FORMAT (3X,11HREACTION---,I7,9I10)                             *COR
      275 FORMAT (/3X,8HREACTANT)                                        *COR
      280 FORMAT (5X,12HCOEFFICIENTS/)                                   *COR
      285 FORMAT (8X,2A4,F8.2,9F10.2)                                    THER1460  *COR
      300 FORMAT (/3X,19HPRE-EXPONENT FACTOR,   E10.3,4X,                *COR
         *17HACTIVATION ENERGY,   F10.3,4X,10HT EXPONENT,E10.3,3I6//)    *COR
      295 FORMAT(8X,5(F8.2,2A4))                                         *COR
          WRITE(KOUT,265) RHOM                                           *COR
          DO 400 M=1,NT                                                  *COR
          WRITE(KOUT,270) M                                              *COR
      710 FORMAT (8X,5(F8.2,2A4))                                        *COR
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      IF (K-[illegible]) [illegible]                                          *COR
  401 I1=[illegible](1,M)                                                     *COR
      I2=[illegible](2,M)                                                     *COR
      J1=[illegible](1,M)                                                     *COR
      J2=[illegible](2,M)                                                     *COR
      WRITE(KOUT,290) [illegible](1,M),FAMOA(I1),[illegible](2,M),FAMOA(I2),[illegible](1,M),   *COR
     *                FAMOA(J1),PMU(2,M),FAMOA(J2)                             *COR
  290 FORMAT(/[illegible],F4.2,A8,1H+,F8.2,A8,4H-->,F4.2,A8,1H+,F8.[illegible],A4)   *COR
      WRITE(KOUT,751)                                                         *COR
  751 FORMAT(/52X,16HINTERACTION TERMS/)                                      *COR
  741 FORMAT(/8X,15HDISPONIBLE TERMS/)                                        *COR
      DO720 IZ=1,8                                                            *COR
      IF(ABS(PSI(IZ,M)).LT.1.E-6) GO TO 720                                   *COR
      I=NMP(IZ,M)                                                             *COR
      WRITE(KOUT,710) PSI(IZ,M),FAMOA(I),FAMOR(I)                             *COR
  720 CONTINUE                                                                *COR
      WRITE(KOUT,741)                                                         *COR
      DO730 IZ=1,8                                                            *COR
      IF(ABS(FKK(IZ,M)).LT.1.E-6) GO TO 730                                   *COR
      I=NMP(IZ,M)                                                             *COR
      WRITE(KOUT,710) FKK(IZ,M),FAMOA(I),FAMOR(I)                             *COR
  730 CONTINUE                                                                *COR
      GO TO 803                                                               *COR
  402 I=NMR(1,M)                                                              *COR
      J=NMP(1,M)                                                              *COR
      WRITE(KOUT,753) PMU(1,M),FAMOA(I),PMU(1,M),FAMOA(J)                     *COR
  753 FORMAT(/10X,F4.2,A4,3H-->,F4.2,A4)                                      *COR
  603 WRITE(KOUT,300) FKP(M),FAK(M),FXK(M),TNP(M),TNF,NUT                     *COR
  400 CONTINUE                                                                *COR
      WRITE(KOUT,755)                                                         *COR
  755 FORMAT(1H1)                                                             *COR
  335 SUMP = SUMN / P                                          THER1710       *COR
                                                                              *COR
      SUML=ALOG(SUMN)                                          THER0263       *-63
      FFF=WTG/DUM2                                             THER0264
      WTG=WTG/SUMN                                             THER0265
      WTL=WTL/SUMN                                             THER0266
      DO 316 I=1,IS                                                           *COR
      PNUS(I)=PNUS(I)/SUMN                                     THER0268       **-1
  316 SLAM(I)=SLAM(I)/SUMN*FFF                                                *COR
      WS=W(2)+W(3)                                             THER0270       **-1
      SUMC=1.0                                                 THER0271
      IF (KRALP+KR(2)) 314,314,320                                            *COR
  320 IF (WTL/WTG-WS) 314,314,321                                             *COR
  321 SUMC=0.                                                                 *COR
      IF (WS.EQ.0. .OR. WTG.EQ.0.) GO TO 314                                  *COR
      SUMC=WTL/(WTG*WS)                                        THER0276       **-4
      WTL=WTL/SUMC                                             THER0277
  314 RETURN                                                                  *COR
C                                                              THER0279       **-1
  435 FORMAT (////40H NO AVAILABLE SURFACE SPECIES. .  .STOP )  THER0280
      END                                                      THER0296       *-15
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      SUBROUTINE  KININ                                                 KINI0001
      DIMENSION KRA(10,33),WRA(3,33),ZA(33),PRA(33),TEA(8),TSA(15)      KINI0002
C                                                                       KINI0003
      REAL NFIA(1),NFIB(1),FFIN(1),TAU(10,10)                           KINI0004
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (FFIN(1),A(101)),    KINI0005
     1(TAU(1),A(151))                                                   KINI0006
      DIMENSION TF(180),CIJ(180,1)                                      KINI0007
      DIMENSION X(1),VLAM(180,1)                                        KINI0008
C                                                                       KINI0009
      COMMON          FAMOA(180),FAMOB(180),RB(180,2),RC(180,2),        KINI0010
     1                RD(180,2),RE(180,2),RF(180,2),TU(180,2),VN(180),  KINI0011
     2                Y(180),WTN(180),VNU(180,10),FF(180),IFC(180),     KINI0012
     3                IP(180),CP(180),H(180),SH(180),TC(180),VLPK(180), KINI0013
     4                E(180),LAMI(180),GAMK(1,1)                        KINI0014
C                                                                       KINI0015
      COMMON /PARAM1/ KTN,KOUT,J4N,FOL,NAB,IDC,N,KRX(3),KR(10),TILE(3), KINI0016
     1                TTMIN,TTMAX,VISC,PR(1)                            KINI0017
C                                                                       KINI0018
      COMMON /PARAM2/ WM,SCH,RHO,VEL,P1,NFF,FFA,TS,ISP,P,T,SIP,HIP,     KINI0019
     1                FL,ENL,FLIQ,NO,IFL,ISPQ,KRALP,CPF,IRE,TEP,AA,TTS, KINI0020
     2                IN,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    KINI0021
     3                SUPL,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,      KINI0022
     4                VMACH,KBZZ,SP1,GAM,THI,MX,DACHI,HCH,NCV,TBT,      KINI0023
     5                IFRZ,NOAT,SR1,IXG,SV1,KKJ,IXC,HXG,SH1,NOATC,      KINI0024
     6                SA2,FFF,WS,RV,CBF,VA,HOS,DUM1,DUM2,EP,IFCJC,      KINI0025
     7                ISP2,WTG,VNU2,WTL                                 KINI0026
C                                                                       KINI0027
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKE(10),        KINI0028
     1                TLO(10),DMCLO(10),WALJP(10),EB(10),ALP(10),       KINI0029
     2                GAMH(10),GAMF(10),TG(10,3),TK(10,3),WAT(10),      KINI0030
     3                IR(10),IOAT(10),KAT(10),UN(10,10),EBL(10)         KINI0031
      EQUIVALENCE (TU(181),TF(1)), (VNU(1),CIJ(1))                      KINI0032
C                                                                       KINI0033
      COMMON /KINETX/ MT,FKF(50),EAK(50),FXK(50),PMU(10,50),PMU(10,50), KINI0034
     1                PNR(50),PKKK(50)                                  *COR
C                                                                       KINI0036  **-1
      EQUIVALENCE (B(1),X(1)), (GAMK(1),VLAM(1))                        KINI0037
C                                                                       KINI0038
      COMMON/CAPKIN/ KRK(10),ROUCM,NCC                                  KINI0039
      COMMON/CONCRD/ Z,GAMER,WR(3)                                      KINI0040
      COMMON/SICPG/ PERCT,STPER,CPER                                    *COR
      DATA (TEA(I),I=1, 8)/500.,1000.,1500.,2000.,2500.,3000.,3500.,    KINI0041
     14000./                                                            KINI0042
      DATA (TSA(I),I=1,15)/1200.,1400.,1600.,1800.,2000.,2200.,2400.,   KINI0043
     12600.,2800.,3000.,3200.,3400.,3600.,3800.,4000./                  KINI0044
      DATA KTF,KTS/8,15/                                                KINI0045
    5 NCC=NCC+1                                                         KINI0046
      IF (NCC-1) 315,10,315                                             KINI0047
   10 READ (KIN,360)  KRK,Z,PR,ZE,PC,ROUCM,GAMER,TILE                   KINI0048
      IF (KRK(1)-8) 20,15,20                                            KINI0049
   15 KR(1)=8                                                           KINI0050
      GO TO 355                                                         KINI0051
   20 IF (KRK(4) .LT. 8) GO TO 33                                       *COR
      READ(KIN,32) PERCT                                                *COR
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   32 FORMAT(F10.0)                                                    *COR
      SIPER=.7005*PERCT                                                *COR
      CPER=1.-SIPER                                                    *COR
   34 IF (KRK(5)-2) 40,25,40                                           *COR
25    KTF=0                                                  KINI0053 **-1
30    KTF=KTF+1                                              KINI0054
      READ (KIN,365)  TFA(KTF)                               KINI0055
      IF (TFA(KTF)) 30,35,30                                 KINI0056
35    KTF=KTF-1                                              KINI0057
40    IF (KRK(6)-2) 60,45,60                                 KINI0058
45    KTS=0                                                  KINI0059
50    KTS=KTS+1                                              KINI0060
      READ (KIN,365)  TSA(KTS)                               KINI0061
      IF (TSA(KTS)) 50,55,50                                 KINI0062
55    KTS=KTS-1                                              KINI0063
60    KR(7)=KRK(10)                                          KINI0064
      KR(8)=KRK(9)-1                                         KINI0065
      KR(9)=0                                                KINI0066
      IF (KRK(9)) 70,65,70                                   KINI0067
65    KR(10)=0                                               KINI0068
      GO TO 75                                               KINI0069
70    KR(10)=1                                               KINI0070
75    IF (KRK(3)) 85,80,85                                   KINI0071
80    KRA(3,1)=1                                             KINI0072
      GO TO 90                                               KINI0073
85    KRA(3,1)=KRK(3)                                        KINI0074
90    KRKS=1                                                 KINI0075
      KRKSS=0                                                KINI0076
      IF (KRK(3)-5) 100,95,100                               KINI0077
95    KRK(3)=0                                               KINI0078
      KRA(3,1)=1                                             KINI0079
      KRKSS=5                                                KINI0080
      GO TO 115                                              KINI0081
100   IF (KRK(3)-4) 115,105,110                              KINI0082
105   KRKS=5                                                 KINI0083
      GO TO 115                                              KINI0084
110   KRKS=6                                                 KINI0085
115   KRA(1,1)=KRK(2)                                        KINI0086
      KRA(2,1)=1                                             KINI0087
      KRA(4,1)=0                                             KINI0088
      KRA(9,1)=0                                             KINI0089
      KTC=7+KTF+KTS                                          KINI0090
      DO 120 I=1,KTC                                         KINI0091
      KRA(6,I)=KR(6)                                         KINI0092
      KRA(7,I)=KR(7)                                         KINI0093
      KRA(8,I)=KR(8)                                         KINI0094
      KRA(10,I)=KR(10)                                       KINI0095
      WRA(1,I)=1.0                                           KINI0096
      WRA(2,I)=0.0                                           KINI0097
      WRA(3,I)=0.0                                           KINI0098
120   CONTINUE                                               KINI0099
      ZA(1)=Z                                                KINI0100
      PRA(1)=PR                                              KINI0101
      IF (KRK(1)) 140,125,140                                KINI0102
125   KRA(5,1)=0                                             KINI0103
      NCT=1                                                            *COR
      GO TO 215                                              KINI0110 *-12
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  140   IF (KRK(1)-2) 145,145,170                                  KINIo117
  145   KRA(5,1)=0                                                 KINIo118
        KRA(1,2)=0                                                 KINIo119
        KRA(2,2)=0                                                 KINIo120
        KRA(3,2)=0                                                 KINIo121
        KRA(4,2)=0                                                 KINIo122
        KRA(5,2)=0                                                 KINIo123
        KRA(9,2)=0                                                 KINIo124
        ZA(2)=0.0                                                  KINIo125
        PRA(2)=0.0                                                 KINIo126
        IF (KRK(1)-2) 155,150,155                                  KINIo127
  150   KRA(5,2)=3                                                 KINIo128
  155   NCT=2                                                                        *COR
        GO TO 215                                                  KINIo141          *-12
  170   IF (KRK(1)-3) 190,175,190                                  KINIo142
  175   KRA(5,1)=2                                                 KINIo143
        KRA(1,2)=3                                                 KINIo144
        KRA(2,2)=0                                                 KINIo145
        KRA(3,2)=0                                                 KINIo146
        KRA(4,2)=0                                                 KINIo147
        KRA(5,2)=1                                                 KINIo148
        KRA(9,2)=0                                                 KINIo149
        ZA(2)=0.0                                                  KINIo150
        PRA(2)=ZF                                                  KINIo151
        NCT=2                                                                        *COR
        GO TO 215                                                  KINIo164          *-12
  190   KRA(5,1)=2                                                 KINIo165
        KRA(1,2)=3                                                 KINIo166
        KRA(2,2)=0                                                 KINIo167
        KRA(3,2)=0                                                 KINIo168
        KRA(4,2)=0                                                 KINIo169
        KRA(5,2)=1                                                 KINIo170
        KRA(9,2)=0                                                 KINIo171
        ZA(2)=0.0                                                  KINIo172
        PRA(2)=ZF                                                  KINIo173
        KRA(1,3)=0                                                 KINIo174
        KRA(2,3)=0                                                 KINIo175
        KRA(3,3)=0                                                 KINIo176
        KRA(4,3)=0                                                 KINIo177
        KRA(5,3)=1                                                 KINIo178
        KRA(9,3)=0                                                 KINIo179
        ZA(3)=0.0                                                  KINIo180
        PRA(3)=0.0                                                 KINIo181
        IF (KRK(1)-5) 200,195,200                                  KINIo182
  195   KRA(5,3)=3                                                 KINIo183
  200   NCT=3                                                                        *COR
  215   DO 220 I=1,NCT                                             KINIo196          *-12
  220   KRA(10,I)=0                                                KINIo197
        IF (KRK(5)) 225,235,225                                    KINIo198
  225   NCT1=NCT+1                                                 KINIo199
        NCT2=NCT+KTF                                               KINIo200
        DO 230 I=NCT1,NCT2                                         KINIo201
        KRA(1,I)=0                                                 KINIo202
        KRA(2,I)=0                                                 KINIo203
        KRA(3,I)=0                                                 KINIo204
        KRA(4,I)=0                                                 KINIo205
        KRA(5,I)=0                                                 KINIo206
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      KRA(9,I)=0                                                        KINI0207
      ZA(I)=-TFA(I-NCT)                                                 KINI0208
      PRA(I)=0.0                                                        KINI0209
230   CONTINUE                                                          KINI0210
      KRA(3,NCT1)=KRKSS                                                 KINI0211
      NCT3=NCT2+1                                                       KINI0212
      NCT4=NCT2+KTS                                                     KINI0213
      GO TO 240                                                         KINI0214
235   NCT3=NCT+1                                                        KINI0215
      NCT4=NCT+KTS                                                      KINI0216
240   IF (KRK(6)) 245,240,245                                           KINI0217
245   NCT5=NCT3+1                                                       KINI0218
      DO 250 I=NCT3,NCT5                                                KINI0219
      KRA(1,I)=0                                                        KINI0220
      KRA(2,I)=0                                                        KINI0221
      KRA(3,I)=0                                                        KINI0222
      KRA(4,I)=3                                                        KINI0223
      KRA(5,I)=0                                                        KINI0224
      KRA(9,I)=0                                                        KINI0225
      ZA(I)=500.0                                                       KINI0226
      PRA(I)=0.0                                                        KINI0227
      WRA(2,I)=1.0E-19                                                  *COP
250   CONTINUE                                                          KINI0229  **-1
      IF (KRK(5)) 260,255,260                                           KINI0230
255   KRA(3,NCT3)=KRKSS                                                 KINI0231
260   KRA(4,NCT5)=2                                                     KINI0232
      ZA(NCT5)=1000.0                                                   KINI0233
      NCT3=NCT3+2                                                       KINI0234
      NCT4=NCT4+2                                                       KINI0235
      DO 275 I=NCT3,NCT4                                                KINI0236
      KRA(1,I)=5                                                        KINI0237
      KRA(2,I)=0                                                        KINI0238
      KRA(3,I)=0                                                        KINI0239
      KRA(4,I)=2                                                        KINI0240
      KRA(5,I)=0                                                        KINI0241
      ZA(I)=TSA(I-NCT3+1)                                               KINI0242
      PRA(I)=0.0                                                        KINI0243
      IF (KRK(8)-1) 265,265,270                                         KINI0244
265   KRA(9,I)=0                                                        KINI0245
      GO TO 275                                                         KINI0246
270   KRA(9,I)=4                                                        KINI0247
275   CONTINUE                                                          KINI0248
      IF (KRK(8)-1) 285,285,280                                         KINI0249
280   KRA(9,NCT4)=6                                                     KINI0250
285   NCT3=NCT4+1                                                       KINI0251
290   CONTINUE                                                          KINI0252
      IF (PC) 295,315,295                                               KINI0253
295   DO 305 I=1,NCT3                                                   KINI0254
      K=NCT3+2-I                                                        KINI0255
      DO 300 J=1,10                                                     KINI0256
300   KRA(J,K)=KRA(J,K-1)                                               KINI0257
      ZA(K)=ZA(K-1)                                                     KINI0258
      PRA(K)=PRA(K-1)                                                   KINI0259
      WRA(1,K)=WRA(1,K-1)                                               KINI0260
      WRA(2,K)=WRA(2,K-1)                                               KINI0261
305   WRA(3,K)=WRA(3,K-1)                                               KINI0262
      DO 310 I=1,10                                                     KINI0263
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  310   KRA(I,1)=KRA(I,2)                                          KINIn264
        KRA(1,2)=0                                                 KINIn265
        KRA(2,2)=0                                                 KINIn266
        KRA(3,2)=0                                                 KINIn267
        ZA(2)=0.0                                                  KINIn268
        KRA(5,1)=0                                                 KINIn269
        ZA(1)=Z                                                    KINIn270
        PRA(1)=PC                                                  KINIn271
        NCT3=NCT3+1                                                KINIn272
  315   IF (NCC-NCT3) 325,320,320                                  KINIn273
  320   NCC=0                                                      KINIn274
        GO TO 5                                                    KINIn275
  325   DO 330 I=1,10                                              KINIn276
        KR(I)=KRA(I,NCC)                                           KINIn277
  330   CONTINUE                                                   KINIn278
        Z=ZA(NCC)                                                  KINIn279
        PR=PRA(NCC)                                                KINIn280
        WR(1)=WRA(1,NCC)                                           KINIn281
        WR(2)=WRA(2,NCC)                                           KINIn282
        WR(3)=WRA(3,NCC)                                           KINIn283
        IF (KR(4)) 355,355,335                                     KINIn284
  335   DO 345 I=TSP,N                                             KINIn285
        IF ((IFC(I)/3)*3-IFC(I)) 340,345,340                       KINIn286
  340   NS=I-1                                                     KINIn287
        GO TO 350                                                  KINIn288
  345   CONTINUE                                                   KINIn289
        GO TO 355                                                  KINIn290
  350   VN(NS+1)=VN(N+1)                                           KINIn291
        TF(NS+1)=TF(N+1)                                           KINIn292
        IFC(NS+1)=IFC(N+1)                                         KINIn293
        WTN(NS+1)=WTN(N+1)                                         KINIn294
        FANOA(NS+1)=FANOA(N+1)                                     KINIn295
        FANOB(NS+1)=FANOB(N+1)                                     KINIn296
        N=NS                                                       KINIn297
  355   RETURN                                                     KINIn298
C                                                                  KINIn299
  360   FORMAT (10I1,6F10.5,2A4,A2)                                KINIn300
  365   FORMAT (F10.5)                                             KINIn301
        END                                                        KINIn302
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      SUBROUTINE  ZIPIN                                                 ZIPI0001
C                                                                       ZIPI0002
      REAL NFIA(1),NFIB(1),FFIN(1),TAU(10,10)                           ZIPI0003
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (FFIN(1),A(101)),    ZIPI0004
     1(TAU(1),A(151))                                                   ZIPI0005
      DIMENSION TF(180),CIJ(180,1)                                      ZIPI0006
      DIMENSION X(1),VLAM(180,1)                                        ZIPI0007
C                                                                       ZIPI0008
      COMMON          FAMOA(180),FAMOB(180),RB(180,2),RC(180,2),        ZIPI0009
     1                RD(180,2),RE(180,2),RF(180,2),TU(180,2),VN(180),  ZIPI0010
     2                Y(180),WTN(180),VNU(180,10),FF(180),IFC(180),     ZIPI0011
     3                IP(180),CP(180),H(180),SH(180),TC(180),VLNK(180), ZIPI0012
     4                E(180),LAMI(180),GAMK(1,1)                        ZIPI0013
C                                                                       ZIPI0014
      COMMON /PARAM1/ KTN,KOUT,JAN,MOL,NAP,IDC,N,KKX(3),KR(10),TILE(3), ZIPI0015
     1                TTMIN,TTMAX,VISC,PR(1)                            ZIPI0016
C                                                                       ZIPI0017
      COMMON /PARAM2/ WK,SCH,RHO,VFL,B1,AFF,FFA,IS,ISP,P,T,SIF,HIP,     ZIPI0018
     1                FL,FNL,FLIQ,NQ,IFL,ISPQ,KRALP,CPF,TRF,IFR,AA,ITS, ZIPI0019
     2                IM,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    ZIPI0020
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,      ZIPI0021
     4                VMACH,KRZZ,SP1,GAM,THI,MX,DMCHT,HCH,NCV,IRT,      ZIPI0022
     5                IFRZ,NOAT,SR1,IXG,SV1,KKJ,IXC,NXG,SH1,NOATO,      ZIPI0023
     6                SA2,FFF,WS,RV,CMF,VA,HOS,DUM1,DUM2,EP,IFCJC,      ZIPI0024
     7                ISP2,WTG,VMU2,WTL                                 ZIPI0025
C                                                                       ZIPI0026
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKF(10),        ZIPI0027
     1                TLO(10),DMCLO(10),WALJP(10),FB(10),ALP(10),       ZIPI0028
     2                GAMH(10),GAMF(10),TQ(10,3),TK(10,3),WAT(10),      ZIPI0029
     3                IP(10),IOAT(10),KAT(10),UM(10,10),FBL(10)         ZIPI0030
      EQUIVALENCE (TU(101),TF(1)), (VNU(1),CIJ(1))                      ZIPI0031
C                                                                       ZIPI0032
      COMMON /KINETX/ MT,FKF(50),EAK(50),FXK(50),PMU(10,50),RMU(10,50), ZIPI0033
     1                PMP(50),PKKK(50)                                  *COR
C                                                                       ZIPI0035  **-1
      EQUIVALENCE (B(1),X(1)), (GAMK(1),VLAM(1))                        ZIPI0036
C                                                                       ZIPI0037
      COMMON/ACF1/GAMEX,REFM,PCH,ACHSQ,SQMAK,SXP                        ZIPI0038
C                                                                       ZIPI0039
      COMMON /DIFFER/ IC(11),ALPT(10),C(10),SORCE(8),RA(2),IN(10),      ZIPI0040
     1                II,KK,J,VINT,YINT,JAT(10),LIM(10,10),FAMA(10),    ZIPI0041
     2                FAMB(10),KPHA(2)                                  ZIPI0042
C                                                                       ZIPI0043
      DIMENSION ATA(10),ATB(10),ATC(10)                                 ZIPI0044
      EQUIVALENCE (TQ(1),ATA(1)), (TQ(11),ATB(1)), (TQ(21),ATC(1))      ZIPI0045
C                                                                       ZIPI0046
      COMMON/CARKIN/ KPK(10),ROUCM,NCC                                  ZIPI0047
      COMMON/CONCRD/ Z,GAMER,WR(3)                                      ZIPI0048
      CALL  FTIME                                                       ZIPI0049
      NFF=0                                                             ZIPI0050
      TTMIN=300.                                                        ZIPI0051
      TTMAX=20000.                                                      ZIPI0052
      Z=0.0                                                             ZIPI0053
      PR=0.0                                                            ZIPI0054
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      KKJ=0                                                             ZIPIn055
      PSV=P                                                             ZIPIn056
      II=0                                                              ZIPIn057
      IF (ITS + 1) 5,10,5                                               ZIPIn058
    5 GAMEX=0.6666667                                                   ZIPIn059
      W(1)=1.0                                                          ZIPIn060
      W(2)=0.                                                           ZIPIn061
      W(3)=0.                                                           ZIPIn062
      MT=0                                                              ZIPIn063
      MX=-1                                                             ZIPIn064
      NCV=0                                                             ZIPIn065
      NOAT=0                                                            ZIPIn066
      WM=20.                                                            ZIPIn067
      T=3000.                                                                          *COR
      HIP=0.                                                            ZIPIn069       **-1
      SIP=0.                                                            ZIPIn070
      KR(10)=0                                                          ZIPIn071
   10 ITS=0                                                             ZIPIn072
      TOC=1                                                             ZIPIn073
      KRALP=0                                                           ZIPIn074
      KKJ=0                                                             ZIPIn075
      WS=1.0                                                            ZIPIn076
      KR8=KR(8)                                                         ZIPIn077
      KR4=KR(4)                                                         ZIPIn078
      CALL  KININ                                                       ZIPIn079
      KKX(1)=KR(8)                                                      ZIPIn080
      WRITE (KOUT,290) TITLE,KR                                         ZIPIn081
      KR(8)=0                                                           ZIPIn082
      KRZZ=0                                                            ZIPIn083
      TRT=501.                                                          ZIPIn084
      KR(8)=KR(4)-1                                                     ZIPIn085
      IF (KR(4)) 20,15,15                                               ZIPIn086
   15 IF (KR(6)) 25,25,20                                               ZIPIn087
   20 KR(6)=KR(6)-1                                                     ZIPIn088
   25 IF (KR(7)) 35,45,30                                               ZIPIn089
   30 KR(7)=5*(KR(7) - 1)+1                                             ZIPIn090
   35 IF (ABS(WR(1)) + ABS(WR(2)) + ABS(WR(3))) 45,45,40                ZIPIn091
   40 W(1)=WR(1)                                                        ZIPIn092
      W(2)=WR(2)                                                        ZIPIn093
      W(3)=WR(3)                                                        ZIPIn094
      KRALP=1                                                           ZIPIn095
   45 CONTINUE                                                          ZIPIn096
      IF (KR(1) - 5) 55,50,55                                           ZIPIn097
   50 KR(1)=0                                                           ZIPIn098
      KR(8)=1                                                           ZIPIn099
   55 MODE=KR(1)                                                        ZIPIn100
      KRALP=KRALP+IABS(KR8-KR(8))+IABS(KR4-KR(4))                       ZIPIn101
      SVA=0.                                                            ZIPIn102
      SVP=0.                                                            ZIPIn103
      TERZ=0                                                            ZIPIn104
      IF (MODE - 8) 65,60,65                                            ZIPIn105
   60 STOP                                                              ZIPIn106
   65 IF (GAMER) 70,95,70                                               ZIPIn107
   70 GAMER=SIGN(AMAX1(ABS(GAMER),0.0001),GAMER)                        ZIPIn108
      IF (KR(3)) 80,80,75                                               ZIPIn109
   75 IF (KR(3)-9) 90,80,90                                             ZIPIn110
   80 J=1                                                               ZIPIn111
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      DO 85 IK=1,N                                                      ZIPI0112
      FF(J)=FF(J)**(GAMER/GAMEX)                                        ZIPI0113
   85 J=J+1                                                             ZIPI0114
   90 GAMEX=GAMER                                                       ZIPI0115
   95 IF (Z) 120,100,120                                                ZIPI0116
  100 IF (MODE-4) 105,155,270                                           ZIPI0117
  105 IF (MODE-3) 270,110,270                                           ZIPI0118
  110 IF (KR(5)) 270,270,115                                            ZIPI0119
  115 SIP=SXP                                                           ZIPI0120
      GO TO 270                                                         ZIPI0121
  120 IF (MODE - 1) 125,125,140                                         ZIPI0122
  125 T=Z                                                               ZIPI0123
      IF (T) 130,135,135                                                ZIPI0124
  130 T=-T                                                              ZIPI0125
      IFBZ=1                                                            ZIPI0126
  135 CONTINUE                                                          ZIPI0127
      GO TO 270                                                         ZIPI0128
  140 IF (MODE - 2) 270,255,145                                         ZIPI0129
  145 IF (MODE-4) 260,150,260                                           ZIPI0130
  150 T=Z                                                               ZIPI0131
  155 MODE=2                                                            ZIPI0132
      KKJ=-1                                                            ZIPI0133
      KR(5)=MAX0(KR(5),1)                                               ZIPI0134
      KR(1)=2                                                           ZIPI0135
      READ (KIN,295) KVH,UR,HTP,HSR,RHOR,SA1,PR1                        ZIPI0136
      RHOR=-9999.                                                       ZIPI0137
      PR1=-9999.                                                        ZIPI0138
      IF (UR) 165,170,160                                               ZIPI0139
  160 SV1=UR                                                            ZIPI0140
      GO TO 170                                                         ZIPI0141
  165 SV1=VEL                                                           ZIPI0142
  170 IF (HTP) 175,180,175                                              ZIPI0143
  175 HCH=HTP/1.8                                                       ZIPI0144
  180 IF (HSR) 185,200,185                                              ZIPI0145
  185 IF (HSR + 9999.) 190,195,190                                      ZIPI0146
  190 SH1=HSR/1.8                                                       ZIPI0147
      GO TO 200                                                         ZIPI0148
  195 SH1=HTP                                                           ZIPI0149
  200 IF (RHOR) 210,215,205                                             ZIPI0150
  205 SR1=RHOR                                                          ZIPI0151
      GO TO 215                                                         ZIPI0152
  210 SR1=RHO                                                           ZIPI0153
  215 IF (PR1) 225,230,220                                              ZIPI0154
  220 SP1=PR1                                                           ZIPI0155
      GO TO 230                                                         ZIPI0156
  225 SP1=P                                                             ZIPI0157
  230 GO TO (235,240,245), KVH                                          ZIPI0158
  235 SV1=SQRT( (HCH - SH1) * 90108.)                                   ZIPI0159
      GO TO 250                                                         ZIPI0160
  240 HCH=SH1+SV1/90108.*SV1                                            ZIPI0161
      GO TO 250                                                         ZIPI0162
  245 SH1=HCH-SV1/90108.*SV1                                            ZIPI0163
  250 SA1=SA1/57.29577                                                  ZIPI0164
      SVA=(1.3146 * SR1 * SV1 * COS(SA1))**2./90108.                    ZIPI0165
      SVB=SVA*2./1.9869                                                 ZIPI0166
      SVC=(SV1 * COS(SA1))**2./90108.+SH1                               ZIPI0167
      SVD=SP1+SVB/(1.3146 * SR1)                                        ZIPI0168
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      P=SVD                                                             ZIPIn169
      GO TO 270                                                         ZIPIn170
255   HIP=Z                                                             ZIPIn171
      GO TO 270                                                         ZIPIn172
260   SIP=Z                                                             ZIPIn173
      IF (SIP + 9999.) 270,265,270                                      ZIPIn174
265   SIP=SCH                                                           ZIPIn175
      SCBAK=0.                                                          ZIPIn176
      PSV=PCH                                                           ZIPIn177
270   IF (PR) 275,265,280                                               ZIPIn178
275   KKJ=1                                                             ZIPIn179
      ACHSQ=PR*PR                                                       ZIPIn180
      GAME=GAM-1.0                                                      ZIPIn181
      PR=PSV*((1.+GAME/2.*SCBAK)/(1.+GAME/2.*ACHSQ))**(GAM/GAME)        ZIPIn182
      KR(5)=1                                                           ZIPIn183
280   P=PR                                                              ZIPIn184
285   AA=P*WM                                                           ZIPIn185
      RETURN                                                            ZIPIn186
C                                                                       ZIPIn187
290   FORMAT  (1H19X35HGRAPHITE SURFACE KINETICS (GASKET) 2A4,A2,5X10I1)ZIPIn188
295   FORMAT  (T1,F9.4,5F10.4)                                          ZIPIn189
      END                                                               ZIPIn190
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      SUBROUTINE AFMAT                                                  AFMA0001
C                                                                       AFMA0002
      REAL NFIA(1),NFIB(1),FFIN(1),TAU(10,10)                           AFMA0003
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (FFIN(1),A(101)),    AFMA0004
     1(TAU(1),A(151))                                                   AFMA0005
      DIMENSION TF(180),CIJ(180,1)                                      AFMA0006
      DIMENSION X(1),VLAM(180,1)                                        AFMA0007
C                                                                       AFMA0008
      COMMON          FAMOA(180),FAMOR(180),RB(180,2),RC(180,2),        AFMA0009
     1                RD(180,2),RE(180,2),RF(180,2),TU(180,2),VN(180),  AFMA0010
     2                Y(180),WTM(180),VNU(180,10),FF(180),IFC(180),     AFMA0011
     3                IP(180),CP(180),H(180),SB(180),TC(180),VLNK(180), AFMA0012
     4                E(180),LAMT(180),GAMK(1,1)                        AFMA0013
C                                                                       AFMA0014
      COMMON /PARAM1/ KIN,KOUT,JAN,MOL,NAB,IDC,N,KKX(3),KR(10),TILE(3), AFMA0015
     1                TTMIN,TTMAX,VISC,PR(1)                            AFMA0016
C                                                                       AFMA0017
      COMMON /PARAM2/ WM,SCH,RHO,VEL,B1,NFF,FFA,IS,ISP,P,T,SIP,HIP,     AFMA0018
     1                EL,ENL,FLIQ,NO,IFL,ISPQ,KRALP,CPF,IRE,IER,AA,ITS, AFMA0019
     2                IN,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    AFMA0020
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,      AFMA0021
     4                VMACH,KRZZ,SP1,GAM,THI,MX,DMCHI,HCH,NCV,TBT,      AFMA0022
     5                IFRZ,NOAT,SR1,IXG,SV1,KKJ,IXC,NXG,SH1,NOATO,      AFMA0023
     6                SA2,FFF,WS,RV,CMF,VA,HOS,DUM1,DUM2,EP,IFCJC,      AFMA0024
     7                ISP2,WTG,VMU2,WTL                                 AFMA0025
C                                                                       AFMA0026
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKE(10),        AFMA0027
     1                TLO(10),DMCLO(10),WALJP(10),FB(10),ALP(10),       AFMA0028
     2                GAMH(10),GAMF(10),TQ(10,3),TK(10,3),WAT(10),      AFMA0029
     3                IR(10),IOAT(10),KAT(10),UM(10,10),EBL(10)         AFMA0030
      EQUIVALENCE (TU(181),TF(1)), (VNU(1),CIJ(1))                      AFMA0031
C                                                                       AFMA0032
      COMMON /KINETX/ MT,FKF(50),EAK(50),EXK(50),PMU(10,50),PMU(10,50), AFMA0033
     1                PMR(50),PKKK(50)                                  *COR
C                                                                       AFMA0035  **-1
      EQUIVALENCE (B(1),X(1)), (GAMK(1),VLAM(1))                        AFMA0036
C                                                                       AFMA0037
      COMMON /DIFFER/ IR(11),FNU(10),PNUS(10),SLAM(10),BE(10),BY(10),   AFMA0038
     1                IBC(10),JJ(10),SLB(16),SLA(16,16)                 AFMA0039
C                                                                       AFMA0040
C     IF TRYING TO PUSH THROUGH TMIN OR TMAX -- REINVERT AND DT TO ZERO AFMA0041
      IF (ITS-NCV-1) 5,5,10                                             AFMA0042
5     DTU=1000.                                                         AFMA0043
      DTD=DTU                                                           AFMA0044
      TTMIN=300.                                                        AFMA0045
      TTMAX=20000.                                                      AFMA0046
10    CONTINUE                                                          AFMA0047
      X1=X(1)                                                           AFMA0048
      IF (T - TMIN) 15,15,20                                            AFMA0049
15    IF (X(1)) 95,30,20                                                AFMA0050
20    IF (T - TMAX) 30,25,25                                            AFMA0051
25    IF (X(1)) 30,30,95                                                AFMA0052
C     IF NEW CONDENSED HAS NEG CORRECTION, DELETE AFTER REINVERT        AFMA0053
30    IF (IER) 65,65,35                                                 AFMA0054
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35    IF (VN(IRF)) 40,40,65                                          AFMA0055
40    IF (X(IER) + 1.E-30) 45,65,65                                  AFMA0056
45    IF (IRE-N) 55,55,50                                            AFMA0057
50    JC=0                                                           AFMA0058
55    CALL SWAP (A,B,SLA,SLB)                                        AFMA0059
      DO 60 I=1,ISPQ                                                 AFMA0060
      A(I,IER)=0.                                                    AFMA0061
60    A(IER,I)=0.                                                    AFMA0062
      A(IER,IER)=1.E30                                               AFMA0063
      B(IER)=-0.1                                                    AFMA0064
      IF (DUM1) 175,190,190                                          AFMA0065
C     IF S.E. ERROR AND CORRECTION ON T OF CONFLICTING SIGN,REINVERT AFMA0066
65    IF (MODE - 1) 160,70,165                                       AFMA0067
70    IF (X(1) + B1) 95,75,75                                        AFMA0068
C     ON S.E. IF DELTA LN T .GT. .9 REINVERT NO DI IF EL AND ENL ARE SMAAFMA0069
75    IF (ABS(X(1)) - 0.9) 165,165,80                                AFMA0070
80    IF (ENL - 0.02) 85,90,90                                       AFMA0071
85    IF (EL - 100.) 165,90,90                                       AFMA0072
90    MODE=0                                                         AFMA0073
C     REINVERT                                                       AFMA0074
95    CALL SWAP (A,B,SLA,SLB)                                        AFMA0075
C     IF CONVERGED EXCEPT FOR T ON H OR S OPTIONS  --  NON CONVERGENT AFMA0076
      IF (MODE - 1) 155,105,100                                      AFMA0077
100   IF (EL + 100. * ENL - 1.E - 4) 205,205,155                     AFMA0078
C     ON S.E. OPTION RESULTIN IN CONFLICTING ERROR/CORRECTION OR T PUSH AFMA0079
C     IF OTHER BALANCES RELATIVELY GOOD, SET T TO TMIN/TMAX AS PER ERROREFMA0080
C     AND GO TO THERM (IF T ALREADY THERE - NONCONVERGE) ELSE DT TO ZEROAFMA0061
105   IF (ABS(B1) - 100. * (EL + ENL)) 155,110,110                   AFMA0082
110   TTMIN=AMAX1(TTMIN-DTD,300.)                                    AFMA0083
      TTMAX=AMIN1(TTMAX+DTU,20000.)                                  AFMA0084
      IF (X1*B1) 115,155,145                                         AFMA0085
115   IF (B1) 120,120,130                                            AFMA0086
120   IF (T-TMIN) 200,200,125                                        AFMA0087
125   T=AMAX1(TMIN,T-DTD)                                            AFMA0088
      TTMAX=T                                                        AFMA0089
      DTU=DTD/2.                                                     AFMA0090
      GO TO 195                                                      AFMA0091
130   IF (T-TMAX) 135,200,200                                        AFMA0092
135   T=AMIN1(TMAX,T+DTU)                                            AFMA0093
      TTMIN=T                                                        AFMA0094
      DTD=DTU/2.                                                     AFMA0095
      IF (ABS(T - TF(JC)) - .001) 140,195,195                        AFMA0096
140   IFC(JC)=1                                                      AFMA0097
      VN(JC)=1.E-3/WTM(JC)*WTG                                       AFMA0098
      Y(JC)=0.                                                       AFMA0099
      GO TO 195                                                      AFMA0100
145   IF (T-TTMIN) 200,200,150                                       AFMA0101
150   IF (T-TTMAX) 155,200,200                                       AFMA0102
155   X(1)=0.                                                        AFMA0103
      MODE=0                                                         AFMA0104
      TMIN=TTMIN                                                     AFMA0105
      TMAX=TTMAX                                                     AFMA0106
      IN=IN-1                                                        AFMA0107
      IL=2                                                           AFMA0108
      GO TO 190                                                      AFMA0109
160   X(1)=0.                                                        AFMA0110
165   IF (X(2) + 1.) 170,210,210                                     AFMA0111
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  170   CALL SWAP (A,B,SLA,SLB)                                          AFMA0112
  175   X(2)=WTG                                                         AFMA0113
        IF (KP(6)) 180,185,185                                           AFMA0114
  180   X(2)=X(2)+WTL                                                    AFMA0115
  185   X(2)=0.                                                          AFMA0116
        DUM1=-1.                                                         AFMA0117
        A(2,2)=1.E25                                                     AFMA0118
  190   NQ=1                                                             AFMA0119
        GO TO 215                                                        AFMA0120
  195   NQ=2                                                             AFMA0121
        GO TO 215                                                        AFMA0122
  200   JC=0                                                             AFMA0123
        WRITE (KOUT,220)                                                 AFMA0124
  205   NQ=3                                                             AFMA0125
        GO TO 215                                                        AFMA0126
  210   NQ=4                                                             AFMA0127
  215   RETURN                                                           AFMA0128
C                                                                        AFMA0129
  220   FORMAT (//56H  SOLUTION TERMINATED WHEN TEMPERATURE LIMIT ENCOUNTFAFMA0130
       1RED//)                                                           AFMA0131
        END                                                              AFMA0132
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      SUBROUTINE  ALPST                                                 ALPS0001
      COMMON/ACF1/GAMEX,REFM,PCH,ACHSQ,SQMAK,SXP                        ALPS0002
C                                                                       ALPS0003
      REAL NFIA(1),NFIB(1),FFIN(1),TAU(10,10)                           ALPS0004
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (FFIN(1),A(101)),    ALPS0005
     1(TAU(1),A(151))                                                   ALPS0006
      DIMENSION TF(180),CIJ(180,1)                                      ALPS0007
      DIMENSION X(1),VLAM(180,1)                                        ALPS0008
C                                                                       ALPS0009
      COMMON          FAMOA(180),FAMOB(180),RB(180,2),RC(180,2),        ALPS0010
     1                RD(180,2),RE(180,2),RF(180,2),TU(180,2),VN(180),  ALPS0011
     2                Y(180),WTM(180),VNU(180,10),FF(180),IFC(180),     ALPS0012
     3                IP(180),CP(180),H(180),SB(180),TC(180),VLNK(180), ALPS0013
     4                E(180),LAMI(180),GAMK(1,1)                        ALPS0014
C                                                                       ALPS0015
      COMMON /PARAM1/ KIN,KOUT,JAN,MOL,NAB,IDC,N,KKX(3),KR(10),TILE(3), ALPS0016
     1                TTMIN,TTMAX,VISC,PR(1)                            ALPS0017
C                                                                       ALPS0018
      COMMON /PARAM2/ WM,SCH,RHO,VEL,B1,NFF,FFA,IS,ISP,P,T,SIP,HIP,     ALPS0019
     1                EL,ENL,FLIQ,NQ,IFL,ISPQ,KRALP,CPF,IRE,IER,AA,ITS, ALPS0020
     2                IN,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    ALPS0021
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,      ALPS0022
     4                VMACH,KRZZ,SP1,GAM,THI,MX,DMCHI,HCH,NCV,TBT,      ALPS0023
     5                IFRZ,NOAT,SR1,IXG,SV1,KKJ,IXC,NXG,SH1,NOATO,      ALPS0024
     6                SA2,FFF,WS,RV,CMF,VA,HOS,DUM1,DUM2,EP,IFCJC,      ALPS0025
     7                ISP2,WTG,VMU2,WTL                                 ALPS0026
C                                                                       ALPS0027
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKE(10),        ALPS0028
     1                TLO(10),DMCLO(10),WALJP(10),EB(10),ALP(10),       ALPS0029
     2                GAMH(10),GAMF(10),TQ(10,3),TK(10,3),WAT(10),      ALPS0030
     3                IR(10),IOAT(10),KAT(10),UM(10,10),EBL(10)         ALPS0031
      EQUIVALENCE (TU(181),TF(1)), (VNU(1),CIJ(1))                      ALPS0032
C                                                                       ALPS0033
      COMMON /KINETX/ MT,FKF(50),EAK(50),EXK(50),PMU(10,50),RMU(10,50), ALPS0034
     1                PMR(50),PKKK(50)                                  *COR
C                                                                       ALPS0036  **-1
      EQUIVALENCE (B(1),X(1)), (GAMK(1),VLAM(1))                        ALPS0037
C                                                                       ALPS0038
      COMMON /DIFFER/ IC(11),ALPT(10),C(10),SORCE(8),RA(2),IM(10),      ALPS0039
     1                IT,KK,J,VINT,YINT,JAT(10),LIM(10,10),FAMA(10),    ALPS0040
     2                FAMB(10),KPHA(2)                                  ALPS0041
C                                                                       ALPS0042
      DIMENSION ATA(10),ATB(10),ATC(10)                                 ALPS0043
      EQUIVALENCE (TQ(1),ATA(1)), (TQ(11),ATB(1)), (TQ(21),ATC(1))      ALPS0044
C                                                                       ALPS0045
      DATA REFD,FFAD/4HREFM,4HFFA /                                     ALPS0046
      DATA I5,I6,I7/2H  ,2H*N,2HFW/                                     ALPS0047
      TFMAX=20000.                                                      ALPS0048
      IF (KR(3) - 7) 5,10,10                                            ALPS0049
5     IF (NFF) 145,145,20                                               ALPS0050
10    INF=NFF                                                           ALPS0051
      READ (KIN,475)  NFF                                               ALPS0052
      NFF=NFF+INF                                                       ALPS0053
      INF=INF+1                                                         ALPS0054
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      READ (KIN,455) (NFIA(I),NFIB(I),FFIN(I),I=INF,NFF)                ALPS0055
      KR(3)=9-KR(3)                                                     ALPS0056
      IF (NFIA(INF) - NFIB(INF)) 20,15,20                               ALPS0057
15    TFMAX=FFIN(INF)                                                   ALPS0058
      GO TO 30                                                          ALPS0059
20    INF=1                                                             ALPS0060
      IF (NFIA(1) - NFIB(1)) 30,25,30                                   ALPS0061
25    TFMAX=FFIN(1)                                                     ALPS0062
30    JL=0                                                              ALPS0063
      DO 50 I=1,NFF                                                     ALPS0064
      IF (NFFD-NFIA(I)) 40,35,40                                        ALPS0065
35    PFFB=FFIN(I)                                                      ALPS0066
      JL=JL+1                                                           ALPS0067
      GO TO 50                                                          ALPS0068
40    IF (NFAD-NFIA(I)) 50,45,50                                        ALPS0069
45    FFA=FFIN(I)                                                       ALPS0070
      JL=JL+1                                                           ALPS0071
50    CONTINUE                                                          ALPS0072
      IF (JL) 80,80,55                                                  ALPS0073
55    DO 75 J=1,N                                                       ALPS0074
      FF(J)=1.E+10                                                      ALPS0075
      IF (WTM(J)-.01) 75,75,60                                          ALPS0076
60    IF (IFC(J)) 65,70,65                                              ALPS0077
65    IF (IABS(IFC(J))-3) 75,70,75                                      ALPS0078
70    FF(J)=(WTM(J)/REFM)**(FFA*GAMEX)                                  ALPS0079
75    CONTINUE                                                          ALPS0080
      WRITE (KOUT,480)  PFFB,FFA                                        ALPS0081
      IF (NFF-JL) 145,145,80                                            ALPS0082
80    J=1                                                               ALPS0083
      WRITE (KOUT,460)                                                  ALPS0084
      NP=N+1                                                            ALPS0085
      DO 140 IK=1,NP                                                    ALPS0086
      I=1                                                               ALPS0087
      I1=I5                                                             ALPS0088
      I2=I5                                                             ALPS0089
      I3=I5                                                             ALPS0090
      I4=I5                                                             ALPS0091
      IF (IK-N) 85,85,105                                               ALPS0092
85    IF (IFC(J)) 90,105,90                                             ALPS0093
90    IF (IABS(IFC(J)) - 3) 95,105,95                                   ALPS0094
95    IF (TFMAX - 20000.) 100,105,105                                   ALPS0095
100   TF(J)=TFMAX                                                       ALPS0096
      I=0                                                               ALPS0097
      GO TO 125                                                         ALPS0098
105   IF (NFIA(I) - FAMOA(J)) 135,110,135                               ALPS0099
110   IF (NFIB(I) - FAMOB(J)) 135,115,135                               ALPS0100
115   IF (FFIN(I) - 100.) 130,120,120                                   ALPS0101
120   TF(J)=AMIN1(FFIN(I) ,TFMAX)                                       ALPS0102
125   WRITE (KOUT,465) FAMOA(J),FAMOB(J),TF(J),I1,I2                    ALPS0103
      I1=I6                                                             ALPS0104
      I2=I7                                                             ALPS0105
      GO TO 135                                                         ALPS0106
130   FF(J)=FFIN(I)                                                     ALPS0107
      WRITE (KOUT,470) NFIA(I),NFIB(I),FFIN(I),I3,I4                    ALPS0108
      FF(J)=FF(J)**GAMEX                                                ALPS0109
      I3=I6                                                             ALPS0110
      I4=I7                                                             ALPS0111
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      135   I=I+1                                                          ALPS0112
            IF (I - NFF) 105,105,140                                       ALPS0113
      140   J=J+1                                                          ALPS0114
      145   NFF=0                                                          ALPS0115
            WS=1.0                                                         ALPS0116
            IF (KR(6)) 165,150,150                                         ALPS0117
      150   W(1)=0.                                                        ALPS0118
            IF (KR(4)) 160,160,155                                         ALPS0119
      155   IF (KR(4) - 3) 170,160,170                                     ALPS0120
      160   W(1)=1.0                                                       ALPS0121
            GO TO 170                                                      ALPS0122
      165   WS=W(1)+W(2)+W(3)                                              ALPS0123
      170   NOATO=NOAT                                                     ALPS0124
            NOAT=0                                                         ALPS0125
            DUM1=0.                                                        ALPS0126
            DO 230 K=1,IS                                                  ALPS0127
            ALPH=(W(1) * TK(K,1) + W(2) * TK(K,2) + W(3) * TK(K,3))/WS      ALPS0128
            IF (ALPH) 175,175,230                                          ALPS0129
      175   IF (KAT(K)-99) 185,180,185                                     ALPS0130
      180   IF (KR(6)) 230,225,225                                         ALPS0131
      185   IF (KR(6)) 225,190,205                                         ALPS0132
      190   IF (TK(K,1)) 195,195,230                                       ALPS0133
      195   IF (KR(8)) 225,225,200                                         ALPS0134
      200   IF (TK(K,3)) 225,225,230                                       ALPS0135
      205   IF (NOATO) 220,220,210                                         ALPS0136
      210   DO 215 KK=1,NOATO                                              ALPS0137
            IF (IOAT(KK) - K) 215,225,215                                  ALPS0138
      215   CONTINUE                                                       ALPS0139
      220   CONTINUE                                                       ALPS0140
            GO TO 230                                                      ALPS0141
      225   NOAT=NOAT+1                                                    ALPS0142
            DUM1=DUM1-ALPH                                                 ALPS0143
            IOAT(NOAT)=K                                                   ALPS0144
      230   CONTINUE                                                       ALPS0145
            WS=WS*(1. + DUM1)                                              ALPS0146
            DO 235 K=1,IS                                                  ALPS0147
            GAMF(K)=0.                                                     ALPS0148
      235   ALP(K)=(W(1) * TQ(K,1) + W(2) * TQ(K,2) + W(3) * TQ(K,3))/WS   ALPS0149
            TEST=1.0                                                       ALPS0150
            IF (KR(6)) 315,245,240                                         ALPS0151
      240   STOP 2222                                                      ALPS0152
      C     SURFACE MASS BALANCE PACKAGE GOES HERE                         ALPS0153
      245   IF (KR(4) - 2) 290,250,290                                     ALPS0154
      250   IF (NCV+KR(3)) 255,255,330                                     ALPS0155
      255   PMU2=0.                                                        ALPS0156
            KR(4)=1                                                        ALPS0157
            DO 265 K=1,IS                                                  ALPS0158
            IF (WTM(K)-1.0) 265,260,260                                    ALPS0159
      260   VA=VN(K)/FF(K)                                                 ALPS0160
            ZKF(K)=VA                                                      ALPS0161
            PMU2=PMU2+VA*WTM(K)                                            ALPS0162
      265   CONTINUE                                                       ALPS0163
            J=ISP                                                          ALPS0164
            DO 280 IK=ISP,N                                                ALPS0165
            IF (WTM(J)-1.0) 280,270,270                                    ALPS0166
      270   VA=VN(J)/FF(J)                                                 ALPS0167
            PMU2=PMU2+VA*WTM(J)                                            ALPS0168
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      DO 275 K=1,IS                                                     ALPS0169
275   ZKE(K)=ZKF(K)+VA*VNU(J,K)                                         ALPS0170
280   J=J+1                                                             ALPS0171
      DO 285 K=1,IS                                                     ALPS0172
285   ZKE(K)=ZKF(K)/PMU2                                                ALPS0173
290   DO 310 I=1,IS                                                     ALPS0174
      K=-IR(I)                                                          ALPS0175
      IF (KAT(I)-99) 295,300,295                                        ALPS0176
295   IF (W(1)) 305,305,310                                             ALPS0177
300   ALP(K)=0.                                                         ALPS0178
      GO TO 310                                                         ALPS0179
305   ALP(K)=ALP(K)+ZKF(K)                                              ALPS0180
310   CONTINUE                                                          ALPS0181
      TEST=1.+W(2)+W(3)                                                 ALPS0182
315   DO 320 K=1,IS                                                     ALPS0183
320   TEST=TEST-ALP(K)*WTM(K)                                           ALPS0184
      IF (ABS(TEST) - .001) 335,335,325                                 ALPS0185
325   WRITE (KOUT,485) W                                                ALPS0186
      STOP                                                              ALPS0187
330   WRITE (KOUT,490)                                                  ALPS0188
      STOP                                                              ALPS0189
335   IF (KR(3)) 340,340,400                                            ALPS0190
340   IF (NOATO) 400,400,345                                            ALPS0191
C     REINITIALIZE SPECIES                                              ALPS0192
345   PIN=P/10.                                                         ALPS0193
      PLOG=ALOG(PIN)                                                    ALPS0194
      J=1                                                               ALPS0195
      DO 395 IK=1,N                                                     ALPS0196
      IF (IFC(J) + 1) 350,395,360                                       ALPS0197
350   IFC(J)=IFC(J)+3                                                   ALPS0198
      IF (J - IS) 370,370,355                                           ALPS0199
355   YC=0.                                                             ALPS0200
      GO TO 375                                                         ALPS0201
360   IF (IFC(J) - 1) 395,395,365                                       ALPS0202
365   IFC(J)=IFC(J)-3                                                   ALPS0203
370   YC=PLOG                                                           ALPS0204
375   IF (IFC(J)) 385,390,380                                           ALPS0205
380   IFC(J)=-1                                                         ALPS0206
385   VN(J)=0.                                                          ALPS0207
      Y(J)=YC                                                           ALPS0208
      GO TO 395                                                         ALPS0209
390   VN(J)=PIN                                                         ALPS0210
      Y(J)=PLOG                                                         ALPS0211
395   J=J+1                                                             ALPS0212
400   IF (NOAT) 450,450,405                                             ALPS0213
405   J=1                                                               ALPS0214
      DO 430 IK=1,N                                                     ALPS0215
      IF (NOAT - 1) 425,410,410                                         ALPS0216
410   DO 420 L=1,NOAT                                                   ALPS0217
      K=IOAT(L)                                                         ALPS0218
      LAMT=LAMT(J)/2**(K - 1)                                           ALPS0219
      LAMT=LAMT-(LAMT / 2)*2                                            ALPS0220
      IF (LAMT) 415,420,415                                             ALPS0221
415   VN(J)=0.                                                          ALPS0222
      IFC(J)=IFC(J)-3                                                   ALPS0223
      GO TO 430                                                         ALPS0224
420   CONTINUE                                                          ALPS0225
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425   CONTINUE                                                          ALPS0226
430   J=J+1                                                             ALPS0227
      IF (NOAT - 1) 445,435,435                                         ALPS0228
435   DO 440 L=1,NOAT                                                   ALPS0229
      K=IOAT(L)                                                         ALPS0230
      J=-IR(K)                                                          ALPS0231
440   IFC(J)=IFC(J)+6                                                   ALPS0232
445   CONTINUE                                                          ALPS0233
450   RETURN                                                            ALPS0234
C                                                                       ALPS0235
455   FORMAT (2A4,F12.5,2A4,E12.5,2A4,F12.5,2A4,F12.5)                  ALPS0236
460   FORMAT (29H  UPDATE OF DIFFUSION FACTORS/10X,7HSPECIES5X16HDIFFUSIALPS0237
     1ON FACTOR)                                                        ALPS0238
465   FORMAT (11X2A4,6XF10.3,2A2)                                       ALPS0239
470   FORMAT (11X2A4,6XF10.5,2A2)                                       ALPS0240
475   FORMAT (I3,3X,F6.5,F6.4)                                          ALPS0241
480   FORMAT (/5X54HALL GASEOUS DIFUSSION FACTORS RECALCULATED AS (MOL.ALPS0242
     1T/F7.3,3H)**F6.3//)                                               ALPS0243
485   FORMAT (//// 5X39HSICK MASS BALANCE INITIATION. CHECK . . /       ALPS0244
     1  10X73H1. REARRANGEMENT OF ELEMENTS BETWEEN EDGE AND WALL SOLUTIOALPS0245
     2NS (KR(2).GT.0) /10X28H2. COMPONENT MASS FRACTION ( 3E12.4,11H) MOALPS0246
     3T EQUAL/14X71HTO ZERO FOR UNDEFINED COMPONENT (ALL ZERO GRAM-ATOMIALPS0247
     4C-WEIGHTS PER GRAM) )                                             ALPS0248
490   FORMAT (////5X75HNO VALID EDGE COMPOSITION AVAILABLE BECAUSE LAST ALPS0249
     1SOLUTION HAS BEEN CONVERGENT OR/11X73HNEW FIRST GUESSES HAVE BEEN IALPS0250
     2NTRODUCED IN INPUT SUBROUTINE (KR(3)=1 TO 8) )                    ALPS0251
      END                                                               ALPS0252
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      SUBROUTINE RELCH                                                  RELC0001
C                                                                       RELC0002
      REAL NEIA(1),NEIB(1),EEIN(1),TAU(10,10)                           RELC0003
      EQUIVALENCE (NEIA(1),A(1)), (NEIB(1),A(51)), (EEIN(1),A(101)),    RELC0004
     1(TAU(1),A(151))                                                   RELC0005
      DIMENSION TE(180),CIJ(180,1)                                      RELC0006
      DIMENSION X(1),VLAM(180,1)                                        RELC0007
C                                                                       RELC0008
      COMMON          FAMOA(180),FAMOB(180),RB(180,2),RC(180,2),        RELC0009
     1                RO(180,2),RE(180,2),RF(180,2),TU(180,2),VN(180),  RELC0010
     2                Y(180),WTR(180),VNU(180,10),EE(180),IEC(180),     RELC0011
     3                IP(180),CP(180),H(180),SR(180),TC(180),VLNK(180), RELC0012
     4                E(180),LAMT(180),GAMK(1,1)                        RELC0013
C                                                                       RELC0014
      COMMON /PARAM1/ KIN,KOUT,JAN,MOL,NAF,IGC,G,KKX(3),KR(10),TILE(3), RELC0015
     1                TTMIN,TTMAX,VISC,PR(1)                            RELC0016
C                                                                       RELC0017
      COMMON /PARAM2/ WM,SCH,RHO,VEL,B1,NEE,EEA,TS,ISP,P,T,SIP,HIP,     RELC0018
     1                FL,ENL,ELTQ,MQ,IFL,ISPQ,KRALP,CPF,IRF,IFR,AA,ITS, RELC0019
     2                IN,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    RELC0020
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,      RELC0021
     4                VKACH,KRZZ,SP1,GAM,THT,MX,DMCHT,PCH,NCV,TRT,      RELC0022
     5                IFRZ,NOAT,SR1,IXG,SV1,KKJ,IXC,NXG,SH1,NOATO,      RELC0023
     6                SA2,EFF,WS,RV,CMF,VA,HOS,DUM1,DUM2,EP,IFCJC,      RELC0024
     7                ISP2,WTG,VMU2,WTL                                 RELC0025
C                                                                       RELC0026
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKE(10),        RELC0027
     1                TLO(10),DMCLO(10),WALJP(10),EB(10),ALP(10),       RELC0028
     2                GAMH(10),GAMF(10),TQ(10,3),TK(10,3),WAT(10),      RELC0029
     3                IR(10),IOAT(10),KAT(10),UM(10,10),FBL(10)         RELC0030
      EQUIVALENCE (TU(181),TE(1)), (VNU(1),CIJ(1))                      RELC0031
C                                                                       RELC0032
      COMMON /KINETX/ MT,EKE(50),EAK(50),EXK(50),PMU(10,50),RMU(10,50), RELC0033
     1                PMP(50),PKKK(50)                                  *COR
C                                                                       RELC0035  **-1
      EQUIVALENCE (B(1),X(1)), (GAMK(1),VLAM(1))                        RELC0036
C                                                                       RELC0037
      COMMON /DIFFER/ IC(11),ALPT(10),C(10),SORCE(8),RA(2),IM(10),      RELC0038
     1                II,KK,J,VINT,YINT,JAT(10),LIM(10,10),FAMA(10),    RELC0039
     2                FAMB(10),KPHA(2)                                  RELC0040
C                                                                       RELC0041
      DIMENSION ATA(10),ATB(10),ATC(10)                                 RELC0042
      EQUIVALENCE (TQ(1),ATA(1)), (TQ(11),ATB(1)), (TQ(21),ATC(1))      RELC0043
C                                                                       RELC0044
5     IF (J - IS) 10,10,15                                              RELC0045
10    JM=J-1                                                            RELC0046
      WRITE (KOUT,190) JM,IS,(FAMOA(I),FAMOB(I),I=1,JM)                 RELC0047
      WRITE (KOUT,195) (FAMOA(I),FAMOB(I),I=ISP,N)                      RELC0048
      STOP                                                              RELC0049
15    DO 25 L=2,IS                                                      RELC0050
      JM=ISP-L                                                          RELC0051
      IMJ=IM(JM + 1)                                                    RELC0052
      IF (JM - 1) 30,20,20                                              RELC0053
20    DO 25 K=1,JM                                                      RELC0054
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      UGH=TAU(IMJ,K)                                                    BELC0055
      DO 25 I=1,IS                                                      BELC0056
25    UM(I,K)=UM(I,K)-UGH*UM(I,JM + 1)                                  BELC0057
30    CONTINUE                                                          BELC0058
      DO 50 I=1,IS                                                      BELC0059
35    IMI=IM(I)                                                         BELC0060
      IF (IMI - I) 40,50,40                                             BELC0061
40    DO 45 K=1,IS                                                      BELC0062
      V=UM(K,IMI)                                                       BELC0063
      UM(K,IMI)=UM(K,I)                                                 BELC0064
45    UM(K,I)=V                                                         BELC0065
      IM(I)=IM(IMI)                                                     BELC0066
      IM(IMI)=IMI                                                       BELC0067
      GO TO 35                                                          BELC0068
50    CONTINUE                                                          BELC0069
C     -----ELEMENT -- BASE GAS CORRESPONDENCE                           BELC0070
C     INITIALIZE ROW AND COLUMN SUMS                                    BELC0071
      IG=IS                                                             BELC0072
      DO 55 I=1,IS                                                      BELC0073
      IR(I)=-1                                                          BELC0074
55    IC(I)=-1                                                          BELC0075
C     EVALUATE INITIAL SUMS                                             BELC0076
      LAMD=1                                                            BELC0077
      DO 70 I=1,IS                                                      BELC0078
      DO 65 J=1,IS                                                      BELC0079
      LAMT=LAMI(J)/LAMD                                                 BELC0080
      LIM(I,J)=LAMT-(LAMT / 2)*2                                        BELC0081
      IF (LIM(I,J)) 60,65,60                                            BELC0082
60    IC(J)=IC(J)+1                                                     BELC0083
      IR(I)=IR(I)+1                                                     BELC0084
65    CONTINUE                                                          BELC0085
70    LAMD=LAMD+LAMD                                                    BELC0086
C     CHECK FOR ZEROS                                                   BELC0087
75    IZ=0                                                              BELC0088
80    DO 165 I=1,IS                                                     BELC0089
      IF (IC(I) - IZ) 120,85,120                                        BELC0090
85    DO 90 J=1,IS                                                      BELC0091
      IF (LIM(J,I)) 85,90,85                                            BELC0092
90    CONTINUE                                                          BELC0093
95    IC(I)=-J                                                          BELC0094
      IR(J)=-I                                                          BELC0095
      LIM(J,I)=0                                                        BELC0096
      DO 115 K=1,IS                                                     BELC0097
      IF (LIM(J,K)) 100,105,100                                         BELC0098
100   IC(K)=IC(K)-1                                                     BELC0099
      LIM(J,K)=0                                                        BELC0100
105   IF (LIM(K,I)) 110,115,110                                         BELC0101
110   LIM(K,I)=0                                                        BELC0102
      IR(K)=IR(K)-1                                                     BELC0103
115   CONTINUE                                                          BELC0104
      GO TO 170                                                         BELC0105
120   IF (IR(I) - IZ) 165,125,165                                       BELC0106
125   DO 135 J=1,IS                                                     BELC0107
      IF (LIM(I,J)) 130,135,130                                         BELC0108
130   IC(J)=-I                                                          BELC0109
      IR(I)=-J                                                          BELC0110
      LIM(I,J)=0                                                        BELC0111
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      GO TO 140                                                         RELC0112
135   CONTINUE                                                          RELC0113
140   DO 160 K=1,IS                                                     RELC0114
      IF (LIM(K,J)) 145,150,145                                         RELC0115
145   IR(K)=IR(K)-1                                                     RELC0116
      LIM(K,J)=0                                                        RELC0117
150   IF (LIM(I,K)) 155,160,155                                         RELC0118
155   LIM(I,K)=0                                                        RELC0119
      IC(K)=IC(K)-1                                                     RELC0120
160   CONTINUE                                                          RELC0121
      GO TO 170                                                         RELC0122
165   CONTINUE                                                          RELC0123
      IZ=IZ+1                                                           RELC0124
      GO TO 80                                                          RELC0125
170   IG=IG-1                                                           RELC0126
      J=IS+1                                                            RELC0127
      IF (IS) 175,175,75                                                RELC0128
175   DO 180 I=1,IS                                                     RELC0129
      K=-IR(I)                                                          RELC0130
      FAMA(I)=FAMOA(K)                                                  RELC0131
180   FAMB(I)=FAMOB(K)                                                  RELC0132
      WRITE (KOUT,200) (ATA(I),ATB(I),AIC(I),I=1,IS)                    RELC0133
      WRITE (KOUT,205) (FAMA(I),FAMB(I),I=1,IS)                         RELC0134
      DO 185 L=1,3                                                      RELC0135
      DO 185 I=1,IS                                                     RELC0136
      TS(I,L)=0.                                                        RELC0137
      DO 185 K=1,IS                                                     RELC0138
185   TS(I,L)=TS(I,L)+UF(I,K)*TK(K,L)                                   RELC0139
      RETURN                                                            RELC0140
C                                                                       RELC0141
190   FORMAT (////15H ONLY FOLLOWING,I3,23H PASE SPECIES FOUND FOR13,   RELC0142
     1 9H ELEMENTS/(2X20A4))                                            RELC0143
195   FORMAT (/30H OTHER SPECIES CONSIDERED WERE/(2X20A4))              RELC0144
200   FORMAT (/5X,8HELEMENTS,7X,15A4/(20X,15A4))                        RELC0145
205   FORMAT (/5X,12HPASE SPECIES,3X,5(2A4,4X)/(20X,5(2A4,4X)))         RELC0146
      END                                                               RELC0147
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      SUBROUTINE CRECT (MODE)                                           CRECO001
      DIMENSION DY(1),DYA(1)                                            CRECO002
C                                                                       CRECO003
      REAL NFIA(1),NFIB(1),FETN(1),TAU(10,10)                           CRECO004
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (FETN(1),A(101)),    CRECO005
     1(TAU(1),A(151))                                                   CRECO006
      DIMENSION TR(180),CIJ(180,1)                                      CRECO007
      DIMENSION X(1),VLAM(180,1)                                        CRECO008
C                                                                       CRECO009
      COMMON          FAMOA(180),FAMOB(180),RP(180,2),RC(180,2),        CRECO010
     1                RC(180,2),RE(180,2),PE(180,2),TU(180,2),VN(180),  CRECO011
     2                Y(180),WTN(180),VNU(180,10),FF(180),TFC(180),     CRECO012
     3                IR(180),CF(180),H(180),SB(180),TC(180),VLNK(180), CRECO013
     4                E(180),LAMT(180),GAMK(1,1)                        CRECO014
C                                                                       CRECO015
      COMMON /PARAM1/ KIN,KOUT,JAN,MOL,NAB,IPC,N,KKX(3),KR(10),TILE(3), CRECO016
     1                TTMIN,TTMAX,VISC,PR(1)                            CRECO017
C                                                                       CRECO018
      COMMON /PARAM2/ HR,SCH,RHO,VEL,B1,NEE,EFA,IS,ISP,P,T,STE,HTP,     CRECO019
     1                EL,ENL,FLIG,NO,IEL,ISPG,KKALP,CPF,IRE,IER,AA,TTS, CRECO020
     2                IM,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    CRECO021
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,      CRECO022
     4                VMACH,KPZZ,SP1,GAM,THT,MX,DMCHT,HCH,NCV,TRT,      CRECO023
     5                IERZ,NOAT,SR1,IXG,SV1,KKJ,IXC,NXG,SH1,MOATO,      CRECO024
     6                SA2,FFF,WS,RV,CMF,VA,HOS,DUM1,DUM2,FP,IFCJC,      CRECO025
     7                ISP2,WTG,VMU2,WTL                                 CRECO026
C                                                                       CRECO027
      COMMON /ARRAYS/ A(16,16),R(16),W(3),XC(50),XG(50),ZKE(10),        CRECO028
     1                TLC(10),DMCLO(10),WALJP(10),FB(10),ALP(10),       CRECO029
     2                GAMH(10),GAME(10),TQ(10,3),TK(10,3),WAT(10),      CRECO030
     3                IR(10),TOAT(10),KAT(10),UB(10,10),EBL(10)         CRECO031
      EQUIVALENCE (TU(1)),TF(1)), (VNU(1),CIJ(1))                       CRECO032
C                                                                       CRECO033
      COMMON /KINETX/ MT,FKE(50),EAK(50),EXK(50),PMU(10,50),RMU(10,50), CRECO034
     1                PMR(50),PKKK(50)                                  CRECO036
C                                                                       CRECO037
      EQUIVALENCE (B(1),X(1)), (GAMK(1),VLAM(1))                        CRECO038
C                                                                       CRECO039
      COMMON /DTEFER/ IP(11),FMU(10),PNUS(10),SLAM(10),BF(10),BY(10),   CRECO040
     1                IRC(10),JJ(10),SLB(16),SLA(16,16)                 CRECO041
C                                                                       CRECO042
      EQUIVALENCE(A(1),DY(1),DYA(1))                                    CRECO043
      M1=1                                                              CRECO044
      M=IR(1)                                                           CRECO045
      WTL=0.                                                            CRECO046
      WTG=0.                                                            CRECO047
      DUM2=0.                                                           CRECO048
      T=1                                                               CRECO049
      LIM=KR(6)+N                                                       CRECO050
      DO 130 IK=1,LIM                                                   CRECO051
      DYI=CMF*DY(IK)                                                    CRECO052
      IF (DYI) 10,5,10                                                  CRECO053
    5 IF (IFC(I)) 130,50,120                                            CRECO054
   10 IF (IFC(I)) 90,15,115
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      15    IF (IP(I)) 20,45,20                                       CREC0055
      20    IF (M - IK) 25,30,25                                      CREC0056
      25    IF (MDF) 45,45,35                                         CREC0057
      30    M1=M1+1                                                   CREC0058
            M=IR(M1)                                                  CREC0059
      35    VN(I)=VN(I)*(1. + DYI)                                    CREC0060
            IF (VN(I)) 45,45,40                                       CREC0061
      40    Y(I)=ALOG(VN(I))                                          CREC0062
            GO TO 50                                                  CREC0063
      45    Y(I)=Y(I)+DYI                                             CREC0064
            VN(I)=EXP(Y(I))                                           CREC0065
      50    VA=WTM(I)*VN(I)                                           CREC0066
            WTG=WTG+VA                                                CREC0067
            DUM2=DUM2+VA/FF(I)                                        CREC0068
            IF (IK - IS) 55,55,65                                     CREC0069
      55    PNUS(I)=VN(I)                                             CREC0070
            IF (KR(6)) 130,60,60                                      CREC0071
      60    SLAM(I)=VN(I)/FF(I)                                       CREC0072
            GO TO 130                                                 CREC0073
      65    DO 75 K=1,IS                                              CREC0074
            VA=VNU(I,K)*VN(I)                                         CREC0075
            IF (KR(6)) 75,70,75                                       CREC0076
      70    SLAM(K)=SLAM(K)+VA/FF(I)                                  CREC0077
      75    PNUS(K)=PNUS(K)+VA                                        CREC0078
            IF (KR(6)) 130,130,80                                     CREC0079
      80    DO 85 K=1,IS                                              CREC0080
      85    SLAM(K)=SLAM(K)+VN(I)*VLAM(I,K)                           CREC0081
C           NON-PRESENT BASE CORRECTIONS AND TESTS                    CREC0082
      90    Y(I)=Y(I)+DYI                                             CREC0083
            IF (Y(I)) 130,95,95                                       CREC0084
      95    IF (IFC(I) + 1) 130,100,100                               CREC0085
     100    IF (KR(6)) 110,105,105                                    CREC0086
     105    IF (T - TF(I) + .001) 130,110,110                         CREC0087
     110    Y(I)=0.                                                   CREC0088
            IFC(I)=+1                                                 CREC0089
            GO TO 130                                                 CREC0090
     115    VN(I)=VN(I)+DYI                                           CREC0091
            IF (VN(I)) 125,125,120                                    CREC0092
     120    WTL=WTL+VN(I)*WTN(I)                                      CREC0093
            GO TO 130                                                 CREC0094
     125    VN(I)=0.                                                  CREC0095
            IFC(I)=-1                                                 CREC0096
     130    T=T+1                                                     CREC0097
            IF (KR(6)) 145,135,145                                    CREC0098
     135    FFF=WTG/DUM2                                              CREC0099
            DO 140 I=1,IS                                             CREC0100
     140    SLAM(I)=SLAM(I)*FFF                                       CREC0101
     145    RETURN                                                    CREC0102
            END                                                       CREC0103
```

```
      PROGRAM GASKET(INPUT,OUTPUT,PUNCH,TAPE16,TAPE5=INPUT,TAPE6=OUTPUT)GASK0001
C                                                                       GASK0002
C***********************************************************************GASK0003
C                                                                       GASK0004
C  GGGGGGGG    AAAAAAAA    SSSSSSSS   KK      KK   EEEEEEEEEE  TTTTTTTTTTGASK0005
C GGGGGGGGGG  AAAAAAAAAA  SSSSSSSSSS  KK     KK    EEEEEEEEEE  TTTTTTTTTTGASK0006
C GG          AA      AA  SS        S  KK   KK      EE                TT  GASK0007
C GG          AA      AA  SS           KK KK        EE                TT  GASK0008
C GG   GGGGG  AA      AA  SSSSSSSSS    KKKKK        EEEEEE            TT  GASK0009
C GG   GGGGG  AAAAAAAAAA   SSSSSSSSS   KK  KK       EEEEEE            TT  GASK0010
C GG      GG  AAAAAAAAAA           SS  KK   KK      EE                TT  GASK0011
C GG      GG  AA      AA  S        SS  KK    KK     EE                TT  GASK0012
C GGGGGGGGGG  AA      AA  SSSSSSSSSS  KK     KK    EEEEEEEEEE        TT  GASK0013
C  GGGGGGGG   AA      AA   SSSSSSSS   KK      KK   EEEEEEEEEE        TT  GASK0014
C                                                                       GASK0015
C***********************************************************************GASK0016
C                                                                       GASK0017
C     MAINLINE ROUTINE FOR GASKET PROGRAM . . . .NOVEMBER 1971          GASK0018
      REAL NEIA(1),NEIB(1),EETN(1),TAU(10,10)                           GASK0019
      EQUIVALENCE (NEIA(1),A(1)), (NEIB(1),A(51)), (EETN(1),A(101)),    GASK0020
     1(TAU(1),A(151))                                                   GASK0021
      DIMENSION TF(180),CIJ(180,1)                                      GASK0022
      DIMENSION X(1),VLAM(180,1)                                        GASK0023
C                                                                       GASK0024
      COMMON          FAMDA(180),FAMDB(180),PR(180,2),RC(180,2),        GASK0025
     1                PE(180,2),RE(180,2),RF(180,2),TU(180,2),VN(180),  GASK0026
     2                Y(180),WTM(180),VMU(180,10),FF(180),IFC(180),     GASK0027
     3                JP(180),CP(180),H(180),SH(180),TC(180),VLNK(180), GASK0028
     4                F(180),LAM(180),GAMK(1,1)                         GASK0029
C                                                                       GASK0030
      COMMON /PARAM1/ KIN,KOUT,JAN,MOL,NAF,IDC,N,KKX(3),KP(10),TITLE(3), GASK0031
     1                TTMIN,TTMAX,VISC,PR(1)                            GASK0032
C                                                                       GASK0033
      COMMON /PARAM2/ VM,SCH,PHO,VEL,H1,NFF,FFA,TS,ISP,P,T,SIP,HIP,     GASK0034
     1                FL,FNL,FLIG,NG,IFL,ISPG,KRALP,CPF,IRF,IFR,AA,TTS, GASK0035
     2                IN,IL,IT,NODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    GASK0036
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,      GASK0037
     4                VMACH,KRZZ,SP1,GAM,TMT,MX,DMCHT,HCH,NCV,TRT,      GASK0038
     5                IFRZ,MOAT,SR1,IXC,SV1,KKJ,TXC,NXG,SH1,MOATO,      GASK0039
     6                SA2,FFF,HS,RV,CPF,VA,HOS,DUM1,DUM2,FP,IFCJC,      GASK0040
     7                ISP2,UTG,VMU2,WTL                                 GASK0041
C                                                                       GASK0042
      COMMON /ARRAYS/ A(16,16),H(16),W(3),XC(50),XO(50),ZKF(10),        GASK0043
     1                FLC(10),DMCLO(10),WALJP(10),EF(10),AL2(10),       GASK0044
     2                GAMH(10),GAMF(10),TO(10,4),TK(10,4),WAT(10),      GASK0045
     3                IK(10),IOAT(10),KAT(10),UF(10,10),FBL(10)         GASK0046
      EQUIVALENCE (IJ(181),TF(1)), (VMU(1),CIJ(1))                      GASK0047
C                                                                       GASK0048
      COMMON /KINTX/ M1,FKF(50),EAK(50),FXK(50),PMU(10,50),PKU(10,50),  GASK0049
     1                PX2(50),PKKK(50)                                  *COR
C                                                                       GASK0051  **-1
      EQUIVALENCE (K(1),X(1)), (GAMK(1),VLAM(1))                        GASK0052
C                                                                       GASK0053
      COMMON /DIFFF/ IR(11),FNU(10),PUUS(10),SLAN(10),BF(10),BY(10),    GASK0054
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      1                 IC(10),JJ(10),SLB(16),SLA(16,16)                GASK0055
      2                 ,DUMMY(8)                                       GASK0056
C                                                                       GASK0057
      COMMON/CARKIN/ KPK(10),ROUCM,NCC                                  GASK0058
C     I/O SPECIFICATIONS ALSO IN RERAY                                  GASK0059
      KIN=5                                                             GASK0060
      KOUT=6                                                            GASK0061
      JAN=18                                                            GASK0062
      NCC=0                                                             GASK0063
      REWIND  JAN                                                       GASK0064
      ITS=0                                                             GASK0065
5     CALL  ZIPIN                                                       GASK0066
      IF (KP(2) + KP(3)) 10,10,15                                       GASK0067
10    IF (KRALP) 40,40,35                                               GASK0068
15    TI=0                                                              GASK0069
      IF (KP(2)) 25,25,20                                               GASK0070
20    CALL  IMELM                                                       GASK0071
      IF (KR(3)) 35,35,25                                               GASK0072
25    IF (KR(3) - 9) 30,35,35                                           GASK0073
30    CALL  INPUT                                                       GASK0074
      CALL  BELCH                                                       GASK0075
      CALL  INPUT                                                       GASK0076
      REWIND  JAN                                                       GASK0077
35    CALL  ALPST                                                       GASK0078
40    IF (KP(7) - 1) 85,85,80                                           GASK0079
45    IF (KKJ) 50,55,55                                                 GASK0080
50    KKJ=-3                                                            GASK0081
      GO TO 60                                                          GASK0082
55    IF (KR(1)-2) 60,65,65                                             GASK0083
60    MODE=2                                                            GASK0084
      JJC=JC                                                            GASK0085
      IIT=IT                                                            GASK0086
      CALL  MAT1                                                        GASK0087
      CALL  MAT2                                                        GASK0088
      CALL  MAT3                                                        GASK0089
      JC=JJC                                                            GASK0090
      IT=IIT                                                            GASK0091
65    IF (KR(6)) 75,70,70                                               GASK0092
70    ISPQ=ISP2                                                         GASK0093
75    MODE=KR(1)                                                        GASK0094
      CALL RERAY (ISPQ,A,0,B,0,0,IG)                                    GASK0095
      CALL  PROPS                                                       GASK0096
      KR(7)=MIN0(1,KP(7))                                               GASK0097
      IQI=0                                                             GASK0098
      IF (KKJ) 80,80,40                                                 GASK0099
80    CALL  OUTPT                                                       GASK0100
C     PRINCIPAL ITERATIVE LOOP                                          GASK0101
85    IF (ITS) 5,95,90                                                  GASK0102
90    IF (MODE) 100,100,95                                              GASK0103
95    CALL  THERM                                                       GASK0104
      IF (IFRZ) 100,100,150                                             GASK0105
100   MODE=KR(1)                                                        GASK0106
      FLIQ=0.                                                           GASK0107
      CALL  MAT1                                                        GASK0108
      CALL  MAT2                                                        GASK0109
      CALL  MAT3                                                        GASK0110
      ITS=ITS+1                                                         GASK0111
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      B1=B(1)                                                           GASK0112
      IF (KR(9)) 110,110,105                                            GASK0113
105   CALL  KINET                                                       GASK0114
110   MOF=1                                                             GASK0115
      IF (KR(7) - 1) 125,120,115                                        GASK0116
115   IQQ=-2                                                            GASK0117
      WRITE (KOUT,215) (T,I=1,IS)                                       GASK0118
120   WRITE (KOUT,210) ITS,T,AA,FL,FNL,CMF,(E(I),I=1,IS)                GASK0119
125   IF (ITS) 45,A0,130                                                GASK0120
130   I1=ITS                                                            GASK0121
      IF (ITS-67) 140,135,140                                           GASK0122
135   KR(7)=9                                                           GASK0123
      IQQ=-2                                                            GASK0124
140   IF (ITS-70) 155,155,145                                           GASK0125
145   NCV=1                                                             GASK0126
      KR(7)=4                                                           GASK0127
      IG=-2                                                             GASK0128
150   ITS=-1                                                            GASK0129
      GO TO 45                                                          GASK0130
155   CALL SWAP (SLA,SLB,A,B)                                           GASK0131
      ICT=10                                                            GASK0132
      DUM1=0.                                                           GASK0133
      IQT=IQQ                                                           GASK0134
160   DO 170 I=1,IS                                                     GASK0135
      IF (IFC(I) - 1) 170,170,165                                       GASK0136
165   A(I + 2,I + 2)=1.E+10                                             GASK0137
170   CONTINUE                                                          GASK0138
      IQQ=IQT                                                           GASK0139
      CALL PERAY (TR,A(IL,IL) ,0,B(IL) ,1,0,IQQ)                        GASK0140
      ICT=ICT-1                                                         GASK0141
      IF (ICT) 190,175,175                                              GASK0142
175   IF (IQQ) 190,180,180                                              GASK0143
180   CALL  AERAT                                                       GASK0144
      GO TO (160,45,145,185), NO                                        GASK0145
185   CALL SCALE (MOF)                                                  GASK0146
      CALL CRECT (MOF)                                                  GASK0147
      IF (CMF - 1.E - 12) 190,190,205                                   GASK0148
190   IF (NCV) 195,200,195                                              GASK0149
195   CALL SWAP (A,B,SLA,SLB)                                           GASK0150
      GO TO 145                                                         GASK0151
200   NCV=1                                                             GASK0152
      GO TO 95                                                          GASK0153
205   IF (KR(7) - 1) 85,65,80                                           GASK0154
C                                                                       GASK0155
210   FORMAT (/61X,I3,F6.2,1P4E10.2/(1P10E12.5))                        GASK0156
215   FORMAT (1H1,40X,49HITS TEMP   PRES*MUT  EQUIL FR  MASSAL FR  SCALEGASK0157
     1    /(10(15,7H MASSAL)))                                          GASK0158
      END                                                               GASK0159
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      SUBROUTINE MAT1                                                   MAT10001
C                                                                       MAT10002
      REAL MFIA(1),MFIB(1),FFIN(1),TAU(16,16)                           MAT10003
      EQUIVALENCE (MFIA(1),A(1)), (MFIB(1),A(5)), (FFIN(1),A(101)),     MAT10004
     1(TAU(1),A(151))                                                   MAT10005
      DIMENSION TF(180),CIJ(180,1)                                      MAT10006
      DIMENSION X(1),VLAM(180,1)                                        MAT10007
C                                                                       MAT10008
      COMMON          FAMOA(180),FAMOB(180),RB(180,2),RC(180,2),        MAT10009
     1                RD(180,2),RE(180,2),RF(180,2),TU(180,2),VN(180),  MAT10010
     2                Y(180),WTM(180),VNU(180,10),FF(180),IFC(180),     MAT10011
     3                IP(180),CP(180),H(180),SB(180),TC(180),VLNK(180), MAT10012
     4                E(180),LAMT(180),GAMK(1,1)                        MAT10013
C                                                                       MAT10014
      COMMON /PARAM1/ KIN,KOUT,JAN,MOL,NAF,IDC,N,KKX(3),KR(10),TTLE(3), MAT10015
     1                TTMIN,TTMAX,VISC,PR(1)                            MAT10016
C                                                                       MAT10017
      COMMON /PARAM2/ WK,SCH,RHO,VEL,B1,NFF,FFA,IS,ISP,P,T,SIP,HIP,     MAT10018
     1                EL,ENL,FLIO,MQ,IFL,ISPQ,KRALP,CPF,IRE,IER,AA,ITS, MAT10019
     2                IN,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    MAT10020
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,      MAT10021
     4                VMACH,KRZZ,SP1,GAM,THI,MX,DMCHI,HCH,NCV,TBT,      MAT10022
     5                IFRZ,NOAT,SR1,IXG,SV1,KKJ,IXC,NXG,SH1,NOATO,      MAT10023
     6                SA2,FFF,WS,RV,CMF,VA,HDS,DUM1,DUM2,EP,IFCJC,      MAT10024
     7                ISP2,WTG,VMU2,WTL                                 MAT10025
C                                                                       MAT10026
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKE(10),        MAT10027
     1                TLO(10),DMCLO(10),WALJP(10),EB(10),ALP(10),       MAT10028
     2                GAMH(10),GAMF(10),TQ(10,3),TK(10,3),WAT(10),      MAT10029
     3                IR(10),IOAT(10),KAT(10),UM(10,10),EBL(10)         MAT10030
      EQUIVALENCE (TU(181),TF(1)), (VNU(1),CIJ(1))                      MAT10031
C                                                                       MAT10032
      COMMON /KINETX/ MT,FKF(50),EAK(50),FXK(50),PMU(10,50),RMU(10,50), MAT10033
     1                PNR(50),PKKK(50)                                                  *COR
C                                                                       MAT10035        **-1
      EQUIVALENCE (B(1),X(1)), (GAMK(1),VLAM(1))                        MAT10036
C                                                                       MAT10037
      COMMON /DIFFER/ IB(11),FNU(10),PNUS(10),SLAM(10),BE(10),BY(10),   MAT10038
     1                IBC(10),JJ(10),SLB(16),SLA(16,16)                 MAT10039
C                                                                       MAT10040
      WSS=WS                                                            MAT10041
      DO 5 I=1,IS                                                       MAT10042
    5 IBC(I)=IFC(I)                                                     MAT10043
      IF (KR(6)) 40,15,10                                               MAT10044
   10 WSS=AMIN1(W(1),0.)+AMIN1(W(2),0.)+AMIN1(W(3),0.)                  MAT10045
      WS=W(1)+W(2)+W(3)                                                 MAT10046
      GO TO 20                                                          MAT10047
   15 CONTINUE                                                          MAT10048
   20 IF (ITS) 25,40,40                                                 MAT10049
   25 DO 35 I=1,IS                                                      MAT10050
      IF (IBC(I)-1) 35,30,35                                            MAT10051
   30 IBC(I)=-1                                                         MAT10052
   35 CONTINUE                                                          MAT10053
   40 RV=WSS-WTL/WTG                                                    MAT10054
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      IF (KR(7) - 1) 60,45,50                                           MAT10055
45    IF (ITS) 60,55,60                                                 MAT10056
50    WRITE (KOUT,325) FFF,WTL,WTG,AA,RV,ALP,PNUS,SLAM                  MAT10057
      KR(7)=KR(7)-1                                                     MAT10058
      IF (KR(7) - 1) 60,55,60                                           MAT10059
55    WRITE (KOUT,330) (I,I=1,IS)                                       MAT10060
C     INITIALIZE                                                        MAT10061
60    EL=0.                                                             MAT10062
      CPG=0.                                                            MAT10063
      EP=P                                                              MAT10064
      CPF=0.                                                            MAT10065
      JC=0                                                              MAT10066
      JCS=0                                                             MAT10067
      ISPQ=IS+2                                                         MAT10068
      B(1)=0.                                                           MAT10069
      B(2)=0.                                                           MAT10070
      A(1,1)=0.                                                         MAT10071
      A(1,2)=0.                                                         MAT10072
      A(2,1)=0.                                                         MAT10073
      A(2,2)=0.                                                         MAT10074
C     -----INITIALIZE CONTRIBUTION OF MOST SIGNIFICANT SPECIES IN EACH MMAT10075
      DO 65 I=1,IS                                                      MAT10076
      EB(I)=0.                                                          MAT10077
65    E(I)=AA*ALP(I)                                                    MAT10078
      ISP2=ISPQ                                                         MAT10079
C     - - - MAIN BASE SPECIES LOOP                                      MAT10080
      DO 315 IK=1,IS                                                    MAT10081
      I=2-IR(IK)                                                        MAT10082
      IF (KAT(IK)-99) 75,70,75                                          MAT10083
70    PNUS(I-2)=0.                                                      MAT10084
C     ZERO MATRIX                                                       MAT10085
75    DO 80 K=1,ISPQ                                                    MAT10086
80    A(K,I)=0.                                                         MAT10087
      IF (ITS) 100,85,100                                               MAT10088
C     NORMALIZE ON PRESSURE ON FIRST PASS                               MAT10089
85    VN(I - 2)=VN(I - 2)/SUMN                                          MAT10090
      EPL(I - 2)=0.                                                     MAT10091
      IF (IBC(I-2)) 100,90,95                                           MAT10092
90    Y(I - 2)=Y(I - 2)-SUML                                            MAT10093
      GO TO 100                                                         MAT10094
   95 IF (SUMC .NE. 0.0) VN(I-2)=VN(I-2)/SUMC                                    *COR
      IF (SUMC .EQ. 0.0) VN(I-2)=0.0                                                *COR
C     INITIALIZE SOME MORE                                              MAT10096  **-1
100   B(I)=0.                                                           MAT10097
      A(I,1)=0.                                                         MAT10098
      IP(I - 2)=0.                                                      MAT10099
C     SET FLAG INDICATING SIGNIFICANCE OF SPECIES IN MASS               MAT10100
C     BALANCE(S) AND INCREMENT COUNT ON SIGNIFICANT SPECIES             MAT10101
      IF (VN(I - 2) - EPL(I - 2)) 110,110,105                           MAT10102
105   IP(I - 2)=-1                                                      MAT10103
C     TREAT BASE SPECIES CONTAINING BUT NOT REPRESENTING NON-PRESENT    MAT10104
C     ELEMENTS IN SAME MANNER AS NON-PRESENT CONDENSED SPECIES          MAT10105
110   IF (IBC(I-2)+1) 315,115,115                                       MAT10106
115   IF (IBC(I-2)) 170,205,120                                         MAT10107
120   A(I,I)=1.                                                         MAT10108
      VA=VN(I - 2)                                                      MAT10109
      IF (IABS(IBC(I-2)-3)-1) 125,270,130                               MAT10110
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125   A(2,I)=1.0                                                    MAT10111
      GO TO 270                                                     MAT10112
130   IF (ER(I - 2) - ABS(VA)) 135,140,140                          MAT10113
135   ER(I - 2)=ABS(VA)                                             MAT10114
      IR(I - 2)=I-2                                                 MAT10115
140   F(I - 2)=F(I - 2)-VA                                          MAT10116
      IF (KR(6)) 145,150,150                                        MAT10117
145   IF (MODE - 1) 270,160,270                                     MAT10118
150   DO 155 K=1,IS                                                 MAT10119
155   A(K+2,I)=-WTM(I-2)*(PNUS(K)/WTG+GAMF(K))                      MAT10120
      A(I,I)=A(I,I)+1.                                              MAT10121
160   TMIN=AMAX1(TMIN,TF(I - 2))                                    MAT10122
      IF (T - TF(I - 2) + .001) 165,165,170                         MAT10123
165   A(I,I)=1.0E+10                                                MAT10124
      F(I - 2)=-VN(I - 2)*1.001E+10                                 MAT10125
      MODE=0                                                        MAT10126
170   IF (MODE-1) 175,180,175                                       MAT10127
175   IF (KR(8)) 270,270,180                                        MAT10128
180   IF (TF(I - 2) + .001 - T) 315,185,185                         MAT10129
185   IF (JC) 195,195,190                                           MAT10130
190   IF (Y(I-2)-RJC) 315,315,195                                   MAT10131
195   RJC=Y(I-2)                                                    MAT10132
      JCS=JC                                                        MAT10133
      TMAX=TF(I - 2)                                                MAT10134
      JC=I-2                                                        MAT10135
      TFCJC=TFC(I-2)                                                MAT10136
      IF (KR(8)) 200,200,270                                        MAT10137
200   A(1,JCS+2)=0.                                                 MAT10138
      A(1,I)=-1.0                                                   MAT10139
      B(1)=RJC                                                      MAT10140
      GO TO 315                                                     MAT10141
C     -----GAS PHASE                                                MAT10142
205   VA=VN(I - 2)                                                  MAT10143
      CPG=CPG+VA*CP() - 2)                                          MAT10144
      A(I,1)=VA                                                     MAT10145
      A(2,I)=VA                                                     MAT10146
      FP=FP-VA                                                      MAT10147
      IF (KAT(IK)-99) 210,265,210                                   MAT10148
210   IF (KR(6)) 265,240,215                                        MAT10149
215   DO 220 K=1,IS                                                 MAT10150
220   A(K+2,I)=(GAMF(I-2,K) + GAMR(K) * B(I-2))*VA                  MAT10151
      A(I,I)=A(I,I)+VA*RV                                           MAT10152
      DUM2=WTM(I - 2)/WTG*WTL/WTG*VA                                MAT10153
      DO 235 K=1,IS                                                 MAT10154
      IF (ER(K) - ABS(A(K + 2,I))) 225,230,230                      MAT10155
225   ER(K)=ABS(A(K + 2,I))                                         MAT10156
      IR(K)=I-2                                                     MAT10157
230   F(K)=F(K)-A(K + 2,I)                                          MAT10158
235   A(K + 2,I)=A(K + 2,I)+DUM2*PNUS(K)                            MAT10159
      GO TO 270                                                     MAT10160
240   DUM1=WTM(I - 2)/WTG*VA                                        MAT10161
      DUM2=WTL/WTG*DUM1                                             MAT10162
      IF (KR(4)) 245,245,250                                        MAT10163
245   DUM1=0.                                                       MAT10164
      VA=(RV + 1.)*VA                                               MAT10165
      GO TO 255                                                     MAT10166
250   DUM1=DUM1*(1. - FEF / FF(I - 2))                              MAT10167
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      VA=(PV + FFF / FF(I - 2))*VA                                      MAT10168
255   DO 260 K=1,IS                                                     MAT10169
260   A(K + 2,I)=DUM1*SLAM(K)+DUM2*PNUS(K)                              MAT10170
      A(I,I)=A(I,I)+VA                                                  MAT10171
265   FR(I - 2)=ABS(VA)                                                 MAT10172
      IF(I - 2)=I-2                                                     MAT10173
      F(I - 2)=F(I - 2)-VA                                              MAT10174
270   IF (SODE - 2) 310,290,275                                         MAT10175
275   IF (IBC(I-2)) 315,285,280                                         MAT10176
280   HOS=SB(I - 2)                                                     MAT10177
      GO TO 295                                                         MAT10178
285   HOS=SB(I - 2)-1.9869*Y(I - 2)-1.9869                              MAT10179
      GO TO 300                                                         MAT10180
290   HOS=H(I - 2)                                                      MAT10181
      IF (IBC(I-2)) 315,300,295                                         MAT10182
295   A(1,I)=HOS                                                        MAT10183
      GO TO 305                                                         MAT10184
300   A(1,I)=HOS*VN(I - 2)                                              MAT10185
305   A(1,2)=A(1,2)-HOS*VN(I - 2)                                       MAT10186
310   CPF=CPF+CP(I - 2)*VN(I - 2)                                       MAT10187
315   CONTINUE                                                          MAT10188
      DO 320 I=1,IS                                                     MAT10189
      RE(I)=F(I)                                                        MAT10190
320   RY(I)=Y(I)                                                        MAT10191
      RETURN                                                            MAT10192
C                                                                       MAT10193
325   FORMAT (32H FFF,WTI,WTG,AA,RV/ALP/PNUS/SLAM/1X5E12.5/(1X10E12.5)) MAT10194
330   FORMAT (1H1,40X,49HITS TEMP   PRES*MVT  EQUIL FR  MASBAL FR  SCALEMAT10195
     1    /(10(I5,7H MASBAL)))                                          MAT10196
      END                                                               MAT10197
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      SUBROUTINE MAT2                                                   MAT20001
C                                                                       MAT20002
      REAL NFIA(1),NFIB(1),EFIM(1),TAU(180,10)                          MAT20003
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (EFIM(1),A(101)),    MAT20004
     1(TAU(1),A(151))                                                   MAT20005
      DIMENSION TF(180),CIJ(180,1)                                      MAT20006
      DIMENSION X(1),VLAM(180,1)                                        MAT20007
C                                                                       MAT20008
      COMMON            FAMOA(180),FAMOB(180),RR(180,2),RC(180,2),      MAT20009
     1                  RU(180,2),RE(180,2),RF(180,2),TU(180,2),VN(180), MAT20010
     2                  Y(180),WTM(180),VNU(180,10),FF(180),IFC(180),   MAT20011
     3                  IP(180),CP(180),H(180),SB(180),TC(180),VLNK(180), MAT20012
     4                  F(180),LAMI(180),GAMK(1,1)                      MAT20013
C                                                                       MAT20014
      COMMON /PARAM1/ KIN,KOUT,JAN,MOL,NAB,IDC,N,KKX(3),KR(10),TILE(3), MAT20015
     1                  TTMIN,TTMAX,VISC,PR(1)                          MAT20016
C                                                                       MAT20017
      COMMON /PARAM2/ WM,SCH,RHO,VEL,B1,NFF,FFA,IS,ISP,P,T,SIP,HIP,     MAT20018
     1                  EL,ENL,FLIQ,NQ,IFL,ISPQ,KRALP,CPF,IRE,IER,AA,ITS, MAT20019
     2                  IN,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,  MAT20020
     3                  SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,    MAT20021
     4                  VMACH,KRZZ,SP1,GAM,THI,MX,DMCHT,HCH,NCV,TBT,    MAT20022
     5                  IERZ,NOAT,SR1,IXG,SV1,KKJ,IXC,NXG,SH1,NOATO,    MAT20023
     6                  SA2,FFF,WS,RV,CMF,VA,HOS,DUM1,DUM2,EP,IFCJC,    MAT20024
     7                  ISP2,WTG,VML2,WTL                               MAT20025
C                                                                       MAT20026
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKF(10),        MAT20027
     1                  TLQ(10),DMCLO(10),WALJP(10),EB(10),ALP(10),     MAT20028
     2                  GAMM(10),GAMF(10),TQ(10,3),TK(10,3),WAT(10),    MAT20029
     3                  IR(10),IOAT(10),KAT(10),UM(10,10),EBL(10)       MAT20030
      EQUIVALENCE (TU(181),TF(1)), (VNU(1),CIJ(1))                      MAT20031
C                                                                       MAT20032
      COMMON /KINETIX/ MT,FKF(50),EAK(50),FXK(50),PMU(10,50),RMU(10,50), MAT20033
     1                  PMR(50),PKKK(50)                                *COR
C                                                                       MAT20035  **-1
      EQUIVALENCE (B(1),X(1)), (GAMK(1),VLAM(1))                        MAT20036
C                                                                       MAT20037
      COMMON /DIFFER/ IP(11),FNU(10),PNUS(10),SLAM(10),BE(10),BY(10),   MAT20038
     1                  IRC(10),JJ(10),SLB(16),SLA(16,16)               MAT20039
C                                                                       MAT20040
      ISPG=IS+2                                                         MAT20041
      ISP2=ISPQ                                                         MAT20042
      IER=0                                                             MAT20043
      IRE=0                                                             MAT20044
      EER=0.                                                            MAT20045
C     - - - MATM NON-BASE SPECIES LOOP                                  MAT20046
      IF (JC) 10,10,5                                                   MAT20047
5     BJC=Y(JC)                                                         MAT20048
10    LIM=N+KR(B)                                                       MAT20049
      IF (LIM-ISP) 390,15,15                                            MAT20050
15    J=ISP                                                             MAT20051
      DO 385 IK=ISP,LIM                                                 MAT20052
      IF (IK-N) 25,25,20                                                MAT20053
20    F(J)=1.E-10                                                       MAT20054
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      IF (IFC(J)) 70,385,105                                    MAT20055
25    IF (IFC(J)+1) 385,30,30                                   MAT20056
30    IF (ITS) 50,35,50                                         MAT20057
35    VN(J)=VN(J)/SUMN                                          MAT20058
      IF (IFC(J)) 50,45,40                                      MAT20059
   40 IF (SUMC .NE. 0.0) VN(J)=VN(J)/SUMC                                *COR
      IF (SUMC .EQ. 0.0) VN(J)=0.0                                      *COR
      GO TO 50                                                  MAT20061  **-1
45    Y(J)=Y(J)-SUML                                            MAT20062
50    E(J)=VLMK(J)-Y(J)                                         MAT20063
      DO 65 I=1,IS                                              MAT20064
      IF (IBC(I)) 60,60,55                                      MAT20065
55    FNU(I)=0.                                                 MAT20066
      GO TO 65                                                  MAT20067
60    FNU(I)=VNU(J,I)                                           MAT20068
      E(J)=E(J)+FNU(I)*BY(I)                                    MAT20069
65    CONTINUE                                                  MAT20070
      EAB=ABS(E(J))                                             MAT20071
      IF (IFC(J)) 70,250,105                                    MAT20072
C     CONDENSED SPECIES                                         MAT20073
70    EAB=E(J)                                                  MAT20074
      IF (KR(6)) 85,75,75                                       MAT20075
75    IF (1-TF(J)+.001) 80,85,85                                MAT20076
80    EAB=0.                                                    MAT20077
      IF (KR(5)) 195,195,205                                    MAT20078
85    IF (E(J) - EER) 195,195,90                                MAT20079
90    EER=E(J)                                                  MAT20080
      IF (ISP) 95,95,100                                        MAT20081
95    ISPQ=ISPQ+1                                               MAT20082
      IER=ISPQ                                                  MAT20083
100   IE=IER                                                    MAT20084
      IRE=IK                                                    MAT20085
      GO TO 110                                                 MAT20086
105   ISPQ=ISPQ+1                                               MAT20087
      IE=ISPQ                                                   MAT20088
110   WTR=0.                                                    MAT20089
      IF (KR(5)) 120,115,115                                    MAT20090
115   TMIN=AMAX1(TF(J) ,TMIN)                                   MAT20091
      WTR=WTX(J)/WTG                                            MAT20092
120   DO 125 I=1,ISPQ                                           MAT20093
      A(I,IE)=0.                                                MAT20094
125   A(IE,I)=0.                                                MAT20095
      DO 140 K=1,IS                                             MAT20096
      DUM1=VNU(J,K)                                             MAT20097
      IF (IBC(K)-1) 130,130,140                                 MAT20098
130   VA=DUM1*VN(J)                                             MAT20099
      A(K+2,IE)=DUM1-WTR*(PNUS(K) +GAMF(K)*WTG)                 MAT20100
      BE(K)=BE(K)-VA                                            MAT20101
      IF (ABS(VA) - EB(K)) 140,140,135                          MAT20102
135   EB(K)=ABS(VA)                                             MAT20103
      IB(K)=IK                                                  MAT20104
140   CONTINUE                                                  MAT20105
      K=IE-ISP2                                                 MAT20106
      IF (IK-N) 165,165,145                                     MAT20107
145   JJ(K)=JC                                                  MAT20108
      B(IE)=Y(JC)                                               MAT20109
      IF (JC-IS) 155,155,150                                    MAT20110
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150   A(IF,1)=TC(JC)                                          MAT20111
      B(IF)=F(JC)                                             MAT20112
155   FAB=-B(IF)                                              MAT20113
      IF (IFCJC) 375,375,160                                  MAT20114
160   FAB=ABS(FAB)                                            MAT20115
      GO TO 375                                               MAT20116
165   JU(K)=J                                                 MAT20117
      A(IF,1)=TC(J)                                           MAT20118
      B(IF)=F(J)                                              MAT20119
      IF (T+.001-TF(J)) 175,170,170                           MAT20120
170   IF (KR(8)) 190,190,200                                  MAT20121
175   IF (MODE - 1) 180,185,180                               MAT20122
180   IF (KR(6)) 190,185,185                                  MAT20123
185   A(IF,IF)=1.E+10                                         MAT20124
      B(IF)=-VN(J)*1.001E+10                                  MAT20125
      MODE=0                                                  MAT20126
190   IF (MODE - 2) 195,235,240                               MAT20127
195   IF (MODE - 1) 375,200,375                               MAT20128
200   IF (T-TF(J)-.001) 205,205,220                           MAT20129
205   IF (JC) 215,215,210                                     MAT20130
210   IF (F(J)-FJC) 365,365,215                               MAT20131
215   FJC=F(J)                                                MAT20132
      JC=IK                                                   MAT20133
      IFCJC=IFC(JC)                                           MAT20134
      TMAX=TF(J)                                              MAT20135
      IF (KR(8)) 225,225,220                                  MAT20136
220   IF (MODE-2) 365,235,240                                 MAT20137
225   B(1)=FJC                                                MAT20138
      DO 230 K=1,IS                                           MAT20139
230   A(1,K + 2)=-FDD(K)                                      MAT20140
      A(1,1)=TC(J)                                            MAT20141
      GO TO 365                                               MAT20142
235   HOS=H(J)                                                MAT20143
      GO TO 245                                               MAT20144
240   HOS=SR(J)                                               MAT20145
245   A(1,IF)=HOS                                             MAT20146
      A(1,2)=A(1,2)-VN(J)*HOS                                 MAT20147
      CPF=CPF+CP(J)*VN(J)                                     MAT20148
      GO TO 375                                               MAT20149
C     GAS PHASE SPECIES                                       MAT20150
250   TF(J)=0                                                 MAT20151
      IF (VN(J)) 255,375,255                                  MAT20152
255   TG=0                                                    MAT20153
      CPG=CPG+VN(J)*CP(J)                                     MAT20154
      IF (KR(6)) 285,260,265                                  MAT20155
260   FFJ=FFF/FF(J)                                           MAT20156
265   DUM1=KTR(J)/VTG*VN(J)                                   MAT20157
      DUM2=DUM1/VTG*RTI                                       MAT20158
      IF (KR(6)) 270,270,285                                  MAT20159
270   IF (KR(4)) 275,275,280                                  MAT20160
275   DUM1=0.                                                 MAT20161
      FFJ=1.0                                                 MAT20162
      GO TO 285                                               MAT20163
280   DUM1=DUM1*(1. - FFJ)                                    MAT20164
285   DO 340 KI=1,IS                                          MAT20165
      I=2-IR(KI)                                              MAT20166
      VA=VN(J,I - 2)*VN(J)                                    MAT20167
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      IF (KAT(KT)-99) 290,305,290                                       MAT20168
290   IF (KR(K)) 305,300,295                                            MAT20169
295   VA=VA*RV+VN(J)*(VLAM(J,I - 2) + GAMP(I - 2) * H(J))               MAT20170
      RE(I - 2)=RE(I - 2)-VA                                            MAT20171
      ABSVA=ABS(VA)                                                     MAT20172
      VA=VA+PNUS(I - 2)*DUM2                                            MAT20173
      GO TO 310                                                         MAT20174
300   VE=VA*FEJ                                                         MAT20175
      VA=RV*VA+VE                                                       MAT20176
      RE(I - 2)=RE(I - 2)-VA                                            MAT20177
      ABSVA=ABS(VA)                                                     MAT20178
      VA=VA+SLAN(I - 2)*DUM1+DUM2*PNUS(I - 2)                           MAT20179
      GO TO 310                                                         MAT20180
305   RE(I - 2)=RE(I - 2)-VA                                            MAT20181
      ABSVA=ABS(VA)                                                     MAT20182
310   IF (ABSVA - EBL(I - 2)) 320,320,315                               MAT20183
315   IW=1                                                              MAT20184
      IF (ABSVA - EB(I - 2)) 330,330,325                                MAT20185
320   IF (ABS(VA) - EPL(I - 2)) 340,340,330                             MAT20186
325   EP(I - 2)=ABSVA                                                   MAT20187
      IS(I - 2)=IK                                                      MAT20188
330   DO 335 K=3,ISP2                                                   MAT20189
335   A(I,K)=A(I,K)+VA*FNU(K - 2)                                       MAT20190
      B(I)=B(I)-VA*E(J)                                                 MAT20191
      A(I,1)=A(I,1)-VA*TC(J)                                            MAT20192
      A(2,I)=A(2,I)+VN(J)*FNU(I - 2)                                    MAT20193
340   CONTINUE                                                          MAT20194
      IF (IO) 375,375,345                                               MAT20195
345   EP=EP-VN(J)                                                       MAT20196
      IP(J)=-1                                                          MAT20197
      B(2)=B(2)-VN(J)*E(J)                                              MAT20198
      A(2,1)=A(2,1)-VE(J)*TC(J)                                         MAT20199
      IF (MODE - 2) 370,350,355                                         MAT20200
350   HOS=H(J)*VE(J)                                                    MAT20201
      GO TO 360                                                         MAT20202
355   HOS=VN(J)*(SR(J) - 1.9869 * Y(J) - 1.9869)                        MAT20203
360   DO 365 I=3,ISP2                                                   MAT20204
365   A(1,I)=HOS*FNU(I - 2)+A(1,I)                                      MAT20205
      A(1,2)=A(1,2)-HOS                                                 MAT20206
      A(1,1)=A(1,1)-HOS*TC(J)                                           MAT20207
      B(1)=B(1)-HOS*E(J)                                                MAT20208
370   CPF=CPF+VN(J)*CP(J)                                               MAT20209
375   IF (EL - EAP) 380,385,385                                         MAT20210
380   EL=EAP                                                            MAT20211
385   J=J+1                                                             MAT20212
390   CONTINUE                                                          MAT20213
      RETURN                                                            MAT20214
      END                                                               MAT20215
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      SUBROUTINE MAT3                                                   MAT30001
      DIMENSION L(10),AR(10)                                            MAT30002
C                                                                       MAT30003
      REAL NFIA(1),NFIB(1),FFIN(1),TAU(10,10)                           MAT30004
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (FFIN(1),A(101)),    MAT30005
     1(TAU(1),A(151))                                                   MAT30006
      DIMENSION TF(180),CIJ(180,1)                                      MAT30007
      DIMENSION X(1),VLAM(180,1)                                        MAT30008
C                                                                       MAT30009
      COMMON          FAMOA(180),FAMOB(180),RB(180,2),RC(180,2),        MAT30010
     1                RD(180,2),RE(180,2),RF(180,2),TU(180,2),VN(180),  MAT30011
     2                Y(180),WTM(180),VNU(180,10),FF(180),IFC(180),     MAT30012
     3                IP(180),CP(180),H(180),SB(180),TC(180),VLNK(180), MAT30013
     4                E(180),LAMT(180),GAMK(1,1)                        MAT30014
C                                                                       MAT30015
      COMMON /PARAM1/ KIN,KOUT,JAN,MOL,NAB,IDC,N,KKX(3),KP(10),TILE(3), MAT30016
     1                TTMIN,TTMAX,VISC,PR(1)                            MAT30017
C                                                                       MAT30018
      COMMON /PARAM2/ WM,SCH,RHO,VEL,B1,NFF,FFA,IS,ISP,P,T,SIP,HIP,     MAT30019
     1                EL,ENL,FLIO,NG,IFL,ISPQ,KRALP,CPF,IRE,IER,AA,ITS, MAT30020
     2                IN,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    MAT30021
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,NXC,SA1,      MAT30022
     4                VMACH,KRZZ,SP1,GAN,THI,MX,DMCHI,HCH,NCV,TRT,      MAT30023
     5                IFRZ,NOAT,SR1,IXG,SV1,KKJ,IXC,NXG,SH1,NOATO,      MAT30024
     6                SA2,FFF,WS,RV,CMF,VA,HOS,DUM1,DUM2,EP,IFCJC,      MAT30025
     7                ISP2,WTG,VMU2,WTL                                 MAT30026
C                                                                       MAT30027
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKE(10),        MAT30028
     1                TLO(10),DMCLO(10),WALJP(10),FB(10),ALP(10),       MAT30029
     2                GAMH(10),GAMF(10),TO(10,3),TK(10,3),WAT(10),      MAT30030
     3                IP(10),IOAT(10),KAT(10),UK(10,10),FBL(10)         MAT30031
      EQUIVALENCE (IU(181),TF(1)), (VNU(1),CIJ(1))                      MAT30032
C                                                                       MAT30033
      COMMON /KINETX/ MT,FKF(50),EAK(50),FXK(50),PMU(10,50),RNU(10,50), MAT30034
     1                PMP(50),PKKK(50)                                  *COR
C                                                                       MAT30036  **-1
      EQUIVALENCE (B(1),X(1)), (GAMK(1),VLAM(1))                        MAT30037
C                                                                       MAT30038
      COMMON /DIFFER/ IR(11),FNU(10),PMUS(10),SLAM(10),BF(10),HY(10),   MAT30039
     1                IBC(10),JJ(10),SLB(16),SLA(16,16)                 MAT30040
C                                                                       MAT30041
      ISP3=IS+3                                                         MAT30042
      IF (MODE - 2) 50,5,25                                             MAT30043
5     CPA=CPF*T                                                         MAT30044
      SHMLT=HFELT*VN(MELT)                                              MAT30045
      FHS=AA*HIP+A(1,2)                                                 MAT30046
      IF (KKJ+1) 20,10,20                                               MAT30047
10    DUM1=SVA/AA*T*T                                                   MAT30048
      FHS=AA*SVC-DUM1+A(1,2)                                            MAT30049
      HIP=-A(1,2)/AA                                                    MAT30050
      A(1,2)=-AA*SVC-DUM1                                               MAT30051
      CPA=(CPF + 2. * DUM1 / T)*T                                       MAT30052
      DUM2=SVB/AA*T                                                     MAT30053
      P=P-EP                                                            MAT30054
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      EP=0.                                                             MAT30055
      IF (ABS(EHS/AA)-10.) 15,15,20                                     MAT30056
15    EP=-P+SVD-DUM2                                                    MAT30057
      A(2,1)=A(2,1)+DUM2                                                MAT30058
      A(2,2)=-DUM2                                                      MAT30059
20    CONTINUE                                                          MAT30060
      GO TO 30                                                          MAT30061
25    CPA=CPF                                                           MAT30062
      SHMLT=SMELT*VN(MELT)                                              MAT30063
      EHS=AA*STF+A(1,2)-1.9869*(P - EP)                                 MAT30064
      A(1,2)=-AA*STF                                                    MAT30065
30    B(1)=B(1)+EHS                                                     MAT30066
      A(1,1)=A(1,1)+CPA                                                 MAT30067
      IF (SHMLT) 50,50,35                                               MAT30068
35    IF (EHS) 50,50,40                                                 MAT30069
40    EHS=EHS-SHMLT                                                     MAT30070
      B(1)=B(1)-SHMLT                                                   MAT30071
      IF (EHS) 45,50,50                                                 MAT30072
45    FLTG=1.+EHS/SHMLT                                                 MAT30073
      MOVE=0                                                            MAT30074
      A(1,1)=1.E+10                                                     MAT30075
      TMIN=500.                                                         MAT30076
      TMAX=5000.                                                        MAT30077
50    ENL=ABS(EP)/P*100.                                                MAT30078
      DO 75 I=3,ISP2                                                    MAT30079
      L(I - 2)=I-2                                                      MAT30080
      E(I - 2)=BE(I - 2)                                                MAT30081
      EPL(I-2)=EE(I-2)*1.E-7                                            MAT30082
      A(I,2)=-AA*MLP(I - 2)                                             MAT30083
      IF (IEC(I - 2) - 1) 60,60,55                                      MAT30084
55    NEG=NEG+1                                                         MAT30085
      GO TO 75                                                          MAT30086
60    IF (KR(6)) 70,70,65                                               MAT30087
65    A(I,1)=A(I,1)+GAMH(I - 2)*T*CPG                                   MAT30088
      E(I-2)=E(I-2)+WTL*GAMF(I-2)                                       MAT30089
70    ER=E(I - 2)                                                       MAT30090
      ABER=ABS(ER)/(EE(I - 2) + 1.E - 20)                               MAT30091
      ENL=AMAX1(ABER,ENL)                                               MAT30092
      B(I)=B(I)+ER                                                      MAT30093
75    CONTINUE                                                          MAT30094
      IF (ISP2 - ISPG) 80,275,275                                       MAT30095
80    IV=0                                                              MAT30096
      JZ=0                                                              MAT30097
C     ADD CONDENSED GOMPASE SPECIES TO ARRAY                            MAT30098
85    DO 110 IE=ISP3,ISPG                                               MAT30099
      J=IE-ISP2                                                         MAT30100
      J=JJ(J)                                                           MAT30101
      IF (J-IS) 90,90,100                                               MAT30102
90    DO 95 K=1,IS                                                      MAT30103
95    A(IE,K+2)=0.                                                      MAT30104
      A(IE,J+2)=-1.0                                                    MAT30105
      GO TO 110                                                         MAT30106
100   DO 105 K=1,IS                                                     MAT30107
105   A(IE,K+2)=-VNU(J,K)                                               MAT30108
110   CONTINUE                                                          MAT30109
      IF (IV) 115,115,235                                               MAT30110
C     CHECK FOR SINGULAR CONDENSED SET                                  MAT30111
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115     DO 160 IE=ISP3,ISP0                                     MAT30112
        IV=IV+1                                                 MAT30113
        IF (IV - 1) 140,140,120                                 MAT30114
C       REDUCE NEW ROW BY PREVIOUS ROWS                         MAT30115
120     DO 135 J=2,IV                                           MAT30116
        K=L(J - 1)                                              MAT30117
        DIV=-A(IE,K + 2)                                        MAT30118
        IF (DIV) 125,135,125                                    MAT30119
125     A(IE,K + 2)=0.                                          MAT30120
        JM=J+ISP                                                MAT30121
        DO 130 M=3,ISP2                                         MAT30122
130     A(IE,M)=A(IE,M)+DIV*A(JM,M)                             MAT30123
135     CONTINUE                                                MAT30124
C       SEEK VALID NON-ZERO ELEMENT                             MAT30125
140     DO 150 J=IV,IS                                          MAT30126
        M=L(J)                                                  MAT30127
        IF (ABS(A(IE,M + 2)) - .01) 150,150,145                 MAT30128
145     IF (IFC(M)) 150,155,150                                 MAT30129
150     CONTINUE                                                MAT30130
C       SINGULAR CONDENSED SET                                  MAT30131
        GO TO 165                                               MAT30132
155     L(J)=L(IV)                                              MAT30133
        L(IV)=M                                                 MAT30134
        DIV=A(IE,M + 2)                                         MAT30135
        A(IE,M + 2)=1.                                          MAT30136
C       NORMALIZE NEW ROW                                       MAT30137
        DO 160 J=3,ISP2                                         MAT30138
160     A(IE,J)=A(IE,J)/DIV                                     MAT30139
C       COMPLETES MAJOR LOOP=NON SINGULAR                       MAT30140
        GO TO 85                                                MAT30141
C       EXTRACT COEFFICIENTS ON SINGULAR SET-NONBASE            MAT30142
165     DO 170 J=2,IV                                           MAT30143
        K=L(J - 1)                                              MAT30144
170     AR(J - 1)=A(IE,K + 2)                                   MAT30145
        AR(IV)=1.                                               MAT30146
C       EXTRACT COEFFICIENTS ON SINGULAR SET - BASE             MAT30147
        DO 185 K=1,IS                                           MAT30148
        IF (IFC(K)) 185,185,175                                 MAT30149
175     IF (ABS(A(IE,K + 2)) - .01) 185,185,180                 MAT30150
180     IV=IV+1                                                 MAT30151
        AR(IV)=-A(IE,K + 2)                                     MAT30152
        JJ(IV)=K                                                MAT30153
185     CONTINUE                                                MAT30154
C       ISOLATE NEW CONDENSED CANDIDATE                         MAT30155
        DO 195 J=1,IV                                           MAT30156
        K=JJ(J)                                                 MAT30157
        IF (VN(K)) 190,190,195                                  MAT30158
190     JZ=J                                                    MAT30159
        KZ=K                                                    MAT30160
        GO TO 200                                               MAT30161
195     CONTINUE                                                MAT30162
        STOP                                                    MAT30163
C       WHO MUST GO TO ALLOW ENTRY OF NEW CANDIDATE             MAT30164
200     TEST=-1.0E10                                            MAT30165
        JX=0                                                    MAT30166
        DO 220 J=1,IV                                           MAT30167
        IF (ABS(AR(J))-.01) 220,220,205                         MAT30168
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205   DUM1=AR(JZ)/AR(J)                                          MAT30169
      IF (DUM1) 210,220,220                                      MAT30170
210   K=JJ(J)                                                    MAT30171
      DUM1=DUM1*VN(K)                                            MAT30172
      IF (DUM1 - TEST) 220,220,215                               MAT30173
215   TEST=DUM1                                                  MAT30174
      JX=J                                                       MAT30175
      KX=K                                                       MAT30176
220   CONTINUE                                                   MAT30177
      IF (AR(JX) .NE. 0.0) TEST=VN(KX)/AR(JX)                                    *COR
      IF (AR(JX) .EQ. 0.0) TEST=0.0                                              *COR
C      DOES NEW CANDIDATE ENTER                                  MAT30179        **-1
      IF (E(KZ) - E(KX)) 85,85,225                               MAT30180
C     YES                                                        MAT30181
225   DO 230 J=1,IV                                              MAT30182
      K=JJ(J)                                                    MAT30183
230   VN(K)=VN(K)-TEST*AR(J)                                     MAT30184
      KR(7)=KR(7)+1                                              MAT30185
      VN(KX)=0.                                                  MAT30186
      KZ=KX                                                      MAT30187
      JZ=JX                                                      MAT30188
      GO TO 85                                                   MAT30189
C     ELIMINATE TERMS CORRESPONDING TO PRESENT BASE CONDENSED    MAT30190
235   DO 250 K=1,IS                                              MAT30191
      IF (IFC(K)) 250,250,240                                    MAT30192
240   DO 245 IE=ISP3,ISPC                                        MAT30193
245   A(IE,K + 2)=0.                                             MAT30194
250   CONTINUE                                                   MAT30195
      IF (JZ) 270,270,255                                        MAT30196
C     FIX MATRIX TO YIELD SMALL NEG CORRECTION ON ELIMINATED SPECIES MAT30197
255   IF (KX - IS) 265,265,260                                   MAT30198
260   KZ=JZ+IS                                                   MAT30199
265   A(KZ + 2,KZ + 2)=1.E+15                                    MAT30200
      B(KZ + 2)=-1.E+10                                          MAT30201
270   CONTINUE                                                   MAT30202
275   B(2)=FP+B(2)                                               MAT30203
      IF (MODE - 1) 310,290,280                                  MAT30204
280   IF (ABS(EHS / A(1,1)) - .0001) 310,310,320                 MAT30205
285   IF (ABS(B(1)) - 1.E - 4) 310,310,320                       MAT30206
290   IF (IFCJC) 295,285,305                                     MAT30207
295   IF (JC - TRE) 300,305,300                                  MAT30208
300   GO TO 285                                                  MAT30209
305   MODE=0                                                     MAT30210
      TMIN=TTMIN                                                 MAT30211
      TMAX=TTMAX                                                 MAT30212
      GO TO 285                                                  MAT30213
310   IF (EL - 1.E - 4) 315,315,320                              MAT30214
315   IF (EWL - 1.E - 5) 335,335,320                             MAT30215
320   IV=ISPO                                                    MAT30216
      IL=1                                                       MAT30217
      IF (MODE) 325,325,330                                      MAT30218
325   IV=ISPO-1                                                  MAT30219
      IL=2                                                       MAT30220
      X(1)=0.                                                    MAT30221
330   RETURN                                                     MAT30222
335   IF (KR(9)) 340,340,330                                     MAT30223
340   TTS=-2                                                     MAT30224
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226.        GO TO 330                                          MAT3o225
227.        END                                                MAT3o226
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      SUBROUTINE  PROPS                                                 PROP0001
      DIMENSION TI(1), RHO(1), CPRAF(1), SC(1), CAPC(1)                 PROP0002
      DIMENSION ZK(10),ZT(10),VK(10),VI(10)                             PROP0003
      COMMON/ACF1/GAMEX,REFK,PCH,ACHSQ,SOMAK,SXP                        PROP0004
C                                                                       PROP0005
      REAL NFIA(1),NFIB(1),EFIN(1),TAU(10,10)                           PROP0006
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (EFIN(1),A(101)),    PROP0007
     1(TAU(1),A(151))                                                   PROP0008
      DIMENSION TF(180),CIJ(180,1)                                      PROP0009
      DIMENSION X(1),VLAM(180,1)                                        PROP0010
C                                                                       PROP0011
      COMMON          FAMOA(180),FAMOR(180),RB(180,2),RC(180,2),        PROP0012
     1                RO(180,2),RE(180,2),RF(180,2),TU(180,2),VN(160),  PROP0013
     2                Y(180),WTM(180),VNU(180,10),EF(180),IFC(180),     PROP0014
     3                IP(180),CP(180),H(180),SR(180),TC(180),VLMK(180), PROP0015
     4                F(180),LAMI(180),GAMK(1,1)                        PROP0016
C                                                                       PROP0017
      COMMON /PARAM1/ KIN,KOUT,JAN,MOL,NAB,IDC,N,KKX(3),KP(10),TILE(3), PROP0018
     1                TTMIN,TTMAX,VISC,PR(1)                            PROP0019
C                                                                       PROP0020
      COMMON /PARAM2/ WM,SCH,RHO,VEL,B1,NFF,FFA,TS,ISP,P,T,SIP,HIP,     PROP0021
     1                EL,ENL,FLIQ,NQ,IFL,ISPG,KPALP,CPF,IRF,IER,AA,ITS, PROP0022
     2                IN,IL,IT,MODE,DMELT,SHELT,TMAX,TMIN,MELT,SUMN,    PROP0023
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,MXC,SA1,      PROP0024
     4                VMACH,KRZZ,SP1,GAM,THI,MX,DDCHI,HCH,NCV,TRT,      PROP0025
     5                IERZ,NOAT,SR1,IXG,SV1,KKJ,IXC,NXG,SH1,NOATO,      PROP0026
     6                SA2,EFF,HS,RV,CMF,VA,HOS,DUM1,DUM2,EP,IFCJC,      PROP0027
     7                ISP2,WTG,VMU2,WTL                                 PROP0028
C                                                                       PROP0029
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKE(10),        PROP0030
     1                TLO(10),DMCLO(10),VALJP(10),FB(10),ALP(10),       PROP0031
     2                GAMH(10),GAME(10),TG(10,3),TK(10,3),WAT(10),      PROP0032
     3                IR(10),IOAT(10),KAT(10),UM(10,10),EBL(10)         PROP0033
      EQUIVALENCE (TU(181),TF(1)), (VNU(1),CIJ(1))                      PROP0034
C                                                                       PROP0035
      COMMON /KINETX/ MT,FKF(50),FAK(50),FXK(50),PMU(10,50),RMU(10,50), PROP0036
     1                PMR(50),PKKK(50)                                  *COR
C                                                                       PROP0038  **-1
      EQUIVALENCE (P(1),X(1)), (GAMK(1),VLAM(1))                        PROP0039
C                                                                       PROP0040
      COMMON /DIFFER/ IR(11),FNU(10),PNUS(10),SLAM(10),BE(10),BY(10),   PROP0041
     1                IPC(10),JJ(10),SLB(16),SLA(16,16)                 PROP0042
C                                                                       PROP0043
      ALF=A(2,1)/A(1,1)                                                 PROP0044
      CSP=1./(A(1,1) * AA)                                              PROP0045
      IF (MODE - 3) 5,10,5                                              PROP0046
5     CSP=CSP/T                                                         PROP0047
10    BETA=P*(A(2,2) - A(1,2) / A(1,1) * A(2,1))-1.                     PROP0048
      GAMP=1.-ALF                                                       PROP0049
      GAMP=1./(1.+BETA-1.9869/AA*GAMP/CSP*GAMP*P)                       PROP0050
      IF (KR(5)) 15,20,15                                               PROP0051
15    GAM=GAMP                                                          PROP0052
20    ITS=-1                                                            PROP0053
      HMW=0.                                                            PROP0054
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      CAPC(1)=1.                                                        PROP0055
      II=1                                                              PROP0056
      WM=AA/P                                                           PROP0057
      ISM=IS-1                                                          PROP0058
      TT(II)=T*1.8                                                      PROP0059
      RHO(II)=AA/(1.3146 * T)                                           PROP0060
      CPBAR(II)=CPF                                                     PROP0061
      AISTR=1.13                                                        PROP0062
C     FORM NECESSARY SUMMATIONS                                         PROP0063
      PMU2=0.                                                           PROP0064
      CPTIL=0.                                                          PROP0065
      HTIL=0.                                                           PROP0066
      HTZ=0.                                                            PROP0067
      PMUZ=0.                                                           PROP0068
      PMU1=0.                                                           PROP0069
      TMU3=0.                                                           PROP0070
      CPG=0.                                                            PROP0071
      CPGPR=0.                                                          PROP0072
      IER=0                                                             PROP0073
      IF=0                                                              PROP0074
      DO 55 K=1,IS                                                      PROP0075
      VK(K)=0.                                                          PROP0076
      ZK(K)=0.                                                          PROP0077
      IF (WAT(K)-0.1) 25,30,30                                          PROP0078
25    IF=K                                                              PROP0079
30    IF (IFC(K)) 35,40,35                                              PROP0080
35    IF (KR(6)) 40,55,55                                               PROP0081
40    IF (WTM(K)-0.1) 50,50,45                                          PROP0082
45    ZK(K)=VN(K)/FF(K)                                                 PROP0083
50    VK(K)=VN(K)                                                       PROP0084
55    CONTINUE                                                          PROP0085
      I=1                                                               PROP0086
      DO 85 IK=1,N                                                      PROP0087
      IF (WTM(I)-0.1) 60,75,75                                          PROP0088
60    IER=IK                                                            PROP0089
      HE=H(I)                                                           PROP0090
      WTE=WTM(I)                                                        PROP0091
      CPE=CP(1)                                                         PROP0092
      H(I)=0.                                                           PROP0093
      WTM(I)=0.                                                         PROP0094
      CP(I)=0.                                                          PROP0095
      IF (IK-IS) 65,85,65                                               PROP0096
65    DO 70 K=1,IS                                                      PROP0097
70    VK(K)=VK(K)+VN(I)*VNU(I,K)                                        PROP0098
      GO TO 85                                                          PROP0099
75    IF (IFC(I)) 85,80,85                                              PROP0100
80    PMU1=PMU1+VN(I)*FF(I)**(1./GAMEX)                                 PROP0101
85    I=I+1                                                             PROP0102
      VMU1=PMU1/P                                                       PROP0103
      AMU5=0.                                                           PROP0104
      PMU6=0.                                                           PROP0105
      WD2=1.385                                                         PROP0106
      WD2=1.2*AISTR/PMU1                                                PROP0107
      WD7=WD2/PMU1-WD2                                                  PROP0108
      WD4=0.284*WD7                                                     PROP0109
      WD5=0.32*AISTR/PMU1                                               PROP0110
      WDP=WD4/PMU1-WD5                                                  PROP0111
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      I=1
      DO 165 IK=1,N
      IF (IFC(I)) 165,95,90
90    IF (KP(6)) 95,165,165
95    IF (WTM(I)-0.1) 165,100,100
100   VA=VN(I)/FF(I)
      IF (IFR) 130,130,105
105   IF (IK-IS) 110,110,115
110   CEJ=CIJ(IF,I)
      GO TO 125
115   CEJ=0.
      DO 120 K=1,IS
120   CEJ=CEJ+VNU(I,K)*CIJ(IF,K)
125   H(I)=H(I)-CEJ*HE
      CP(I)=CP(I)-CEJ*CPE
      WTM(I)=WTM(I)-CEJ*WTE
130   VB=VA*WTM(I)
      PMU2=PMU2+VB
      HT2=HT2+VA*H(I)
      IF (IK-IS) 145,145,135
135   DO 140 K=1,IS
      VK(K)=VK(K)+VN(I)*VNU(I,K)
140   ZK(K)=ZK(K)+VA*VNU(I,K)
145   FFI=FF(I)
      IF (IFC(I)) 155,150,155
150   FFI=FF(I)**(1./GAMFX)
155   VA=VN(I)/FFI
      VB=VA*WTM(I)
      VC=VN(I)*FFI
      PMU2=PMU2+VB
      TMU3=TMU3+VA
      CPTTL=VA*CP(I)+CPTTL
      HTTL=HTTL+VA*H(I)
      CPG=CPG+VN(I)*CP(I)
      HMW=HMW+VN(I)*H(I)
      AMU5=AMU5+VB/(WDZ -VC * WD7 )
      PMU6=PMU6+VA/(WE4 - VC * WD8 )
      IF (IFC(I)) 165,160,165
160   CPGPR=CPGPR+VN(I)*CP(I)
165   I=I+1
      VMU5=AMU5/AA
      VMU6=(PMU6 + CPTTL / 1.9869 - 2.5 * TMU3)/P
      VMU2=PMU2/P
      VMU3=TMU3/PMU2
      HTZ=HT2/PMU2*1.8
      DO 170 K=1,IS
      VK(K)=VK(K)/AA*WTM(K)
170   ZK(K)=ZK(K)/PMU2*WTM(K)
      DO 175 I=1,IS
      ZT(I)=0.
      VT(I)=0.
      DO 175 K=1,IS
      VT(I)=VT(I)+CIJ(K,I)*VK(K)/WTM(K)*WAT(I)
175   ZT(I)=ZT(I)+CIJ(K,I)*ZK(K)/WTM(K)*WAT(I)
      CPG=CPG/AA
      CPGPR=CPGPR/AA
      HMW=HMW/AA
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      CPTIL=CPTIL/PMU2                                                  PROP0169
      HTIL=HTIL/PMU2*1.8                                                PROP0170
      OMEGA=1.07/(T / 106.7)**0.159                                     PROP0171
      DBAR=4.16E-8*T/P*SQRT(T)/OMEGA                                    PROP0172
      VMU=RHO(II)*DBAR*VMU5/VMU1                                        PROP0173
      TCOND=RHO(II)*DBAR*WM*VMU6/VMU1*1.9869                            PROP0174
      SC(II)=VMU5/VMU2*WM                                               PROP0175
      PR(II)=CPGPR/VMU6*VMU5/1.9869*WM                                  PROP0176
      IF (KKJ) 205,205,180                                              PROP0177
180   GAME=GAM-1.0                                                      PROP0178
      SQMAK=(HCH-HMW)/GAM*1.0065/T*WM                                   PROP0179
      PSP=((1.+GAME/2.*SQMAK)/(1.+GAME/2.*ACHSQ))**(GAM/GAME)           PROP0180
      IF (ABS(PSP-1.0)-1.E-4) 200,200,185                               PROP0181
185   IF (KKJ-10) 190,190,195                                           PROP0182
190   P=P*PSP                                                           PROP0183
      AA=P*WM                                                           PROP0184
      KKJ=KKJ+1                                                         PROP0185
      ITS=IT                                                            PROP0186
      GO TO 240                                                         PROP0187
195   NCV=1                                                             PROP0188
200   KKJ=0                                                             PROP0189
205   IF (NCV) 215,215,210                                              PROP0190
210   WRITE (KOUT,255)  TILE                                            PROP0191
      GO TO 225                                                         PROP0192
215   IF (KR(10)/2 +KR(7) +KR(2) +KR(3)) 225,225,220                    PROP0193
220   WRITE (KOUT,250)  TILE                                            PROP0194
  225 IF (KR(6)) 226,227,227                                                          *COR
  226 WRITE(KOUT,245) CPG,CSP,ALF,BETA,GAMP                                           *COR
      GO TO 229                                                                       *COR
  227 WRITE(KOUT,228) CPG                                                             *COR
  228 FORMAT(/10X,11H CP-FROZEN=  ,E12.5)                                             *COR
  229 CONTINUE                                                                        *COR
      VMU12=VMU1*VMU2                                                   PROP0196      **-1
      IF (KKX(1)-4) 235,230,235                                         PROP0197
230   HMW=HMW*1.8                                                       PROP0198
      PUNCH 260,  HMW, TT, WM, CSP, ALF, VMU, PR                        PROP0199
235   CONTINUE                                                          PROP0200
      WRITE (KOUT,265) TT,VMU,TCOND,DBAR,PR,SC,VMU1,VMU2,WM,HTIL,CPTIL  PROP0201
     1   ,HTZ                                                           PROP0202
      WRITE (KOUT,275)  GAMEX,(KAT(J),J=1,IS)                           PROP0203
      WRITE (KOUT,270) (VI(J),J=1,IS)                                   PROP0204
      WRITE (KOUT,270) (ZI(J),J=1,IS)                                   PROP0205
240   RETURN                                                            PROP0206
C                                                                       PROP0207
245   FORMAT (/27H DERIVATIVE PROPERTY OUTPUT,/57H  CP-FROZEN    CP-EQUIPROP0208
     1L   DLNM/DLNT   DLNM/DLNP     GAMMA,/5E12.5)                      PROP0209
250   FORMAT (1H115X45HGRAPHITE SURFACE KINETICS (GASKET) SOLUTION   5X PROP0210
     1  2A4,A2//)                                                      PROP0211
255   FORMAT  (4H1---50H-----FOLLOWING OUTPUT NON-CONVERGENT-----------PROP0212
     1-- 2A4,A2//)                                                     PROP0213
260   FORMAT (6E12.5,F8.4)                                              PROP0214
265   FORMAT (/58H PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEPROP0215
     1G-R    /67H    TEMP        VISC        COND        DBAR        PRPROP0216
     2          SC/6E12.5/57H     MU1         MU2        MOL.WT       HTIPROP0217
     3L         CPTIL7X5HHTIL*/6E12.5)                                 PROP0218
270   FORMAT (1X10E12.5)                                                PROP0219
275   FORMAT (/58H ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . .PROP0220
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      1 . . 9H (GAMFX =F6.3,1H)/1X10(4XI3,5X))                          PROP0221
       END                                                              PROP0222
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      SUBROUTINE SCALE (ICE)                                            SCAL0001
      DIMENSION CHEF(180)                                               SCAL0002
      DIMENSION DY(1),DYA(180,1)                                        SCAL0003
C                                                                       SCAL0004
      REAL DEIA(1),DEIB(1),EFIN(1),TAU(10,10)                           SCAL0005
      EQUIVALENCE (DEIA(1),A(1)), (DEIB(1),A(51)), (EFIN(1),A(101)),    SCAL0006
     1(TAU(1),A(151))                                                   SCAL0007
      DIMENSION TF(180),CIJ(180,1)                                      SCAL0008
      DIMENSION X(1),VLAM(180,1)                                        SCAL0009
C                                                                       SCAL0010
      COMMON          FAMDA(180),FAMDB(180),PH(180,2),RC(180,2),        SCAL0011
     1                PM(180,2),PE(180,2),PF(180,2),TU(180,2),VN(180),  SCAL0012
     2                Y(180),BTC(180),VMU(180,10),FF(180),IFC(180),     SCAL0013
     3                IP(180),CP(180),H(180),SH(180),TC(180),VLAM(180), SCAL0014
     4                F(180),LAMT(180),GAMK(1,1)                        SCAL0015
C                                                                       SCAL0016
      COMMON /PARAM1/ KIN,KOUT,JAN,NOL,NAP,TEC,N,KKX(3),KR(10),TTLF(3), SCAL0017
     1                TTMIN,TTMAX,VISC,PR(1)                            SCAL0018
C                                                                       SCAL0019
      COMMON /PARAM2/ WT,SCH,RHO,VEL,H1,DEF,FFA,IS,ISP,P,T,SIP,HIP,     SCAL0020
     1                FL,ENL,FLTG,NQ,IFL,ISPG,KRALP,CPF,IRF,TEK,AA,TTS, SCAL0021
     2                TN,IL,IT,NODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,    SCAL0022
     3                SUML,JC,HG,CPG,SVA,SVB,SVC,SVD,SUMC,AXC,SA1,      SCAL0023
     4                VMACH,KPZZ,SP1,GAM,THT,MX,DMCHT,HCH,NCV,THT,      SCAL0024
     5                IFPZ,NOAT,SP1,IXG,SV1,KKJ,TXC,NXG,SH1,NOATO,      SCAL0025
     6                SC2,FFF,WS,PV,CMF,VA,HOS,DUM1,DUM2,FP,IFCJC,      SCAL0026
     7                ISP2,RTG,VRUP,STL                                 SCAL0027
C                                                                       SCAL0028
      COMMON /ARRAYS/ A(16,16),B(16),W(3),XC(50),XG(50),ZKF(10),        SCAL0029
     1                TLG(10),DRCLU(10),WALJP(10),FB(10),ALP(10),       SCAL0030
     2                GAMH(10),GAMF(10),TO(10,5),TK(10,3),WAT(10),      SCAL0031
     3                IP(10),IOAT(10),KAT(10),DM(10,10),FRL(10)         SCAL0032
      EQUIVALENCE (TU(101),TF(1)), (VMU(1),CIJ(1))                      SCAL0033
C                                                                       SCAL0034
      COMMON /KINETX/ MT,FKF(50),FAK(50),FXK(50),PMU(10,50),KMU(10,50), SCAL0035
     1                PKP(50),PKKK(50)                                  *COR
C                                                                       SCAL0037  **-1
      EQUIVALENCE (P(1),X(1)), (GAMK(1),VLAM(1))                        SCAL0038
C                                                                       SCAL0039
      COMMON /DIFFER/ T(11),FFU(10),PMUS(10),SLAM(10),BF(10),BY(10),    SCAL0040
     1                IC(10),JJ(10),SLM(16),SLA(16,16)                  SCAL0041
C                                                                       SCAL0042
      EQUIVALENCE(A(1),DY(1),DYZ(1))                                    SCAL0043
      CLTH=AMAX1(1.,H(2) + H(3))*0.2*UTG                                SCAL0044
      DTTL=0.                                                           SCAL0045
      DXTG=0.                                                           SCAL0046
      DUMP=P*1.E-7                                                      SCAL0047
      RUMP=P*1.E-4                                                      SCAL0048
      RUMP=ALOG(RUMP)                                                   SCAL0049
      CPF=1.                                                            SCAL0050
    5 K=0                                                               SCAL0051
      DO 20 J=2,15                                                      SCAL0052
      IF (IP(J) - IP(J - 1)) 10,15,20                                   SCAL0053
   10 JA=IP(J)                                                          SCAL0054
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      IB(J)=IB(J - 1)                                                   SCAL0055
      IP(J - 1)=JA                                                      SCAL0056
      K=1                                                               SCAL0057
      GO TO 20                                                          SCAL0058
   15 IB(J)=1000                                                        SCAL0059
   20 CONTINUE                                                          SCAL0060
      IF (K) 25,25,5                                                    SCAL0061
   25 IB(IS + 1)=1000                                                   SCAL0062
      M=TS(1)                                                           SCAL0063
      M1=1                                                              SCAL0064
      L=TS+2                                                            SCAL0065
      I=0                                                               SCAL0066
      LL=1                                                              SCAL0067
      LIM=N+KK(2)                                                       SCAL0068
      DO 280 IK=1,LIM                                                   SCAL0069
      I=I+1                                                             SCAL0070
      IF (IK - TS) 30,30,45                                             SCAL0071
   30 SLAM(I)=0.                                                        SCAL0072
      IBC(I)=IFC(I)                                                     SCAL0073
      PNUS(I)=0.                                                        SCAL0074
      IF (IFC(I) - 1) 35,35,75                                          SCAL0075
   35 DYI=X(I + 2)                                                      SCAL0076
      IF (IFC(I) + 1) 275,40,40                                         SCAL0077
   40 IF (IFC(I)) 205,95,230                                            SCAL0078
   45 IF (IFC(I) + 1) 75,50,50                                          SCAL0079
   50 IF (IFC(I)) 70,55,85                                              SCAL0080
   55 VA=E(I)-TC(I)*X(1)                                                SCAL0081
      DO 65 J=1,TS                                                      SCAL0082
      IF (IBC(J)) 60,60,65                                              SCAL0083
   60 VA=VA+VNU(I,J)*X(J + 2)                                           SCAL0084
   65 CONTINUE                                                          SCAL0085
      DYI=VA                                                            SCAL0086
      GO TO 95                                                          SCAL0087
   70 IF (IK - IRE) 75,60,75                                            SCAL0088
   75 DYI=0.                                                            SCAL0089
      GO TO 275                                                         SCAL0090
   80 IFC(I)=1                                                          SCAL0091
      DYI=X(IER)                                                        SCAL0092
      GO TO 230                                                         SCAL0093
   85 L=L+1                                                             SCAL0094
      IF (L - IRR) 90,85,90                                             SCAL0095
   90 DYI=X(L)                                                          SCAL0096
      GO TO 230                                                         SCAL0097
   95 DWTG=DWTG+VN(I)*DYI*WTM(I)                                        SCAL0098
      IF (IP(I)) 100,195,100                                            SCAL0099
  100 IF (IK - M) 105,145,105                                           SCAL0100
  105 IF (VN(I) - DUMP) 110,140,140                                     SCAL0101
  110 IF (MOE) 195,195,115                                              SCAL0102
  115 IF (DYI) 120,275,125                                              SCAL0103
  120 IF (VN(I) / BUMP - .9999995 - CMF * DYI) 275,275,130              SCAL0104
  125 IF (BUMP / VN(I) - 1. - CMF * DYI) 135,275,275                    SCAL0105
  130 CMF=(VN(I) / BUMP - .9999995)/DYI                                 SCAL0106
      GO TO 275                                                         SCAL0107
  135 CMF=(BUMP / VN(I) - 1.)/DYI                                       SCAL0108
      GO TO 275                                                         SCAL0109
  140 IF (MOE) 175,175,150                                              SCAL0110
  145 M1=M1+1                                                           SCAL0111
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      M=IB(M1)                                                          SCAL0112
  150 IF (DYI) 155,275,160                                              SCAL0113
  155 IF (DYI * CMF + .999) 165,275,275                                 SCAL0114
  160 IF (DYI * CMF - 9.) 275,275,170                                   SCAL0115
  165 CMF=-.999/DYI                                                     SCAL0116
      GO TO 275                                                         SCAL0117
  170 CMF=9./DYI                                                        SCAL0118
      GO TO 275                                                         SCAL0119
  175 IF (DYI * CMF - 2.303) 180,190,190                                SCAL0120
  180 IF (DYI * CMF + 6.909) 185,275,275                                SCAL0121
  185 CMF=-6.909/DYI                                                    SCAL0122
      GO TO 275                                                         SCAL0123
  190 CMF=2.303/DYI                                                     SCAL0124
      GO TO 275                                                         SCAL0125
  195 IF (Y(I) - BULP + ABS(DYI) * CMF) 275,200,200                     SCAL0126
  200 CMF=-(Y(I) - BULP)/ABS(DYI)                                       SCAL0127
      GO TO 275                                                         SCAL0128
C     NON-PRESENT BASE                                                  SCAL0129
  205 IF (KR(6)) 215,210,210                                            SCAL0130
  210 IF (T - TF(I) + .001) 275,215,215                                 SCAL0131
  215 IF (Y(I) + CMF * DYI - 0.1) 275,220,220                           SCAL0132
  220 DUM1=(.1 - Y(I))/DYI                                              SCAL0133
      IF (DUM1 - .001) 275,275,225                                      SCAL0134
  225 CMF=DUM1                                                          SCAL0135
      GO TO 275                                                         SCAL0136
  230 DWTL=DWTL+DYI*WTM(I)                                              SCAL0137
      IF (DYI) 235,275,250                                              SCAL0138
  235 IF (VN(I)) 250,250,240                                            SCAL0139
  240 IF (VN(I) + DYI * CMF) 245,250,250                                SCAL0140
  245 CMF=-VN(I)/DYI*1.00001                                            SCAL0141
  250 IF (KR(6)) 265,255,255                                            SCAL0142
  255 CLIP=ABS(CLIM/WTM(I))                                             SCAL0143
      IF (ABS(CMF * DYI) - CLIP) 275,275,260                            SCAL0144
  260 CMF=CLIP/ABS(DYI)                                                 SCAL0145
      GO TO 275                                                         SCAL0146
  265 IF (ABS(CMF * DYI) - P) 275,275,270                               SCAL0147
  270 CMF=P/ABS(DYI)                                                    SCAL0148
  275 CMFF(I)=CMF                                                       SCAL0149
  280 DY(IK)=DYI                                                        SCAL0150
      IF (KR(6)) 290,285,285                                            SCAL0151
  285 RVL=AMAX1(.1,RV/2.)                                               SCAL0152
      CMF=AMIN1(CMF,WTG / ABS(ABS(DWTL - DWTG / WTG * WTL) / RVL - DWTG)SCAL0153
     1)                                                                 SCAL0154
  290 IF (KR(7)-1) 300,300,295                                          SCAL0155
  295 NQ=I                                                              SCAL0156
      WRITE (KOUT,350) (FAMOA(J),VN(J),Y(J),DYA(J,LL),CMFF(J),F(J),IFC(JSCAL0157
     1),IP(J),J=1,NQ)                                                   SCAL0158
      WRITE (KOUT,360) (FR(I),I=1,IS)                                   SCAL0159
      WRITE (KOUT,360) (Y(I),I=1,ISEJ)                                  SCAL0160
      WRITE (KOUT,355) (IB(I),I=1,IS)                                   SCAL0161
  300 CONTINUE                                                          SCAL0162
      IF (X(1)) 305,345,305                                             SCAL0163
  305 X1=X(1)*CMF                                                       SCAL0164
      ABX=ABS(X(1))                                                     SCAL0165
      IF (ABS(X1) - .5) 315,315,310                                     SCAL0166
  310 CMF=.5/ABX                                                        SCAL0167
      X1=CMF*X(1)                                                       SCAL0168
```

```
  315   IF (X1) 325,345,320                                          SCAL0169
  320   TM=TMAX                                                      SCAL0170
        X1=AMIN1(.2,X1)                                              SCAL0171
        GO TO 330                                                    SCAL0172
  325   TM=TMIN                                                      SCAL0173
        X1=AMAX1( - 0.2,X1)                                          SCAL0174
  330   DTM=(TM - T)/(TM * X1)                                       SCAL0175
        IF (DTM - 1.) 335,340,340                                    SCAL0176
  335   CMF=DTM*CMF                                                  SCAL0177
        T=TM                                                         SCAL0178
        GO TO 345                                                    SCAL0179
  340   T=T/(1. - X1)                                                SCAL0180
  345   AA=AA*EXP(CMF * X(2))                                        SCAL0181
        RETURN                                                       SCAL0182
C                                                                    SCAL0183
  350   FORMAT  (1X2(8X2HVM9X1HY8X2HDY7X5HSCALE7X1HE4X5HIFC IP)/(1XA4,5E SCAL0184
       1 10.3,I3,I2,1X,A4,5E10.3,I3,I2))                             SCAL0185
  355   FORMAT (10I5)                                                SCAL0186
  360   FORMAT (8F12.4)                                              SCAL0187
        END                                                          SCAL0188
```

SECTION 3

SAMPLE PROBLEMS

Presented in this section are three sample problems which were run on a Univac 1108 digital computer. An attempt was made to utilize almost all of the options available in the GASKET2 program. For each sample problem, the following is presented:

- A brief description of the nature of the problem and solution
- A listing of the input data deck
- A few typical pages of the program output

Sample Problem 1

In this problem, ablation rates at the throat of a rocket nozzle are calculated. The propellant gases are comprised of seven elements, including both hydrogen and oxygen. The surface material option of ATJ bulk graphite is used. The program options which utilize built-in physical data are selected; hence, only 10 cards of input data are required for the complete sequence of calculations. The ideal chamber conditions (propellant flame temperature of 3764°K, ideal pressure of 68.02 atm) are input. After redefining the elemental set to include the fictitious element "GRAPHITE," subsequent calculations performed by the program include determination of the actual chamber state (54.42 atm) and an isentropic expansion to the throat (unity Mach no.). The frozen edge state is computed for the built-in array of eight temperatures, and the surface ablation rate is computed for the built-in array of fifteen surface temperatures.

Listing of Input

```
 1.    3005110400  3764.      54.42      -1.0       68.02      0.969      0.
 2.      7
 3.      1 HYDROGEN      1.008      3.3192
 4.      4 BERYLLIUM     9.012      1.4265
 5.      6 CARBON       12.011      0.9236                1.0
 6.      7 NITROGEN     14.007      0.8352
 7.      8 OXYGEN        16.0        1.9161
 8.      9 FLUORINE     19.0        0.8640
 9.     17 CHLORINE     35.453      0.4012
10.     8
```

Sample Problem 1 Output

```
        GRAPHITE SURFACE KINETICS (GASKET) #300. 1          0110000*00

RELATIVE ELEMENTAL COMPOSITIONS, ATOMIC WTS/UNIT MASS
     AT.NO.    ELEMENT      ATOMIC WT      EDGE GAS       SURFACE
       1       HYDROGEN       1.00800      .0330707      .0000000
       4       BERYLLIUM      9.01200      .0142129      .0000000
       6       CARBON        12.01100      .0092023      .0000000
       7       NITROGEN      14.00700      .0063215      .0000000
       8       OXYGEN        16.00000      .0190910      .0000000
       9       FLUORINE      19.00000      .0086483      .0000000
      17       CHLORINE      35.45300      .0034973      .0000000
     106       GRAPHITE      12.01100      .0000000      .0832570

   ELEMENTS          HYDROGEN     BERYLLIUM    CARBON       NITROGEN     OXYGEN
                     FLUORINE     CHLORINE     GRAPHITE

   BASE SPECIES      H2           BE           CO2          CCLN         H2O
                     FH           CLH          C*
```

Sample Problem 1 Output (Continued)

```
                GRAPHITE SURFACE KINETICS (GASKET) SOLUTION        PROB. 1

DERIVATIVE PROPERTY OUTPUT
 CP-FROZEN    CP-EQUIL    DLNM/DLNT    DLNM/DLNP      GAMMA
  .49545+00   .12580+01   -.57602+00    .35229-01    .11338+01

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP         VISC         COND         DBAR          PR          SC
  .67752+04   .61615-04    .75106-04    .23259-03    .31461+00   .72427+00
    MU1          MU2        KOL.WT        HTIL         CPTIL       HTIL*
  .77605+00   .20648+02    .25599+02    .42582+04    .86998+00   .23848+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .667)
     1           4           6           7           8           9          17          104
   .33335-01   .12809+00   .11053+00   .11656+00   .30546+00   .16432+00   .14172+00   .00000
   .89675-01   .69022-01   .13622+00   .14390+00   .23818+00   .17803+00   .14498+00   .00000

SOLUTION TIMES
        ITERATIONS =   32                          TIME =    9.287 SEC.

CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT

  MASS CONDENSED/MASS GAS =    .21215+00
  TEMP =  6775.2000 DEG R.  =  3764.0000 DEG K.      PRESS =     68.02000 ATM

                                GAS            CONDENSED        COMPOSITE
  ENTHALPY - BTU/LBM            .28931+03       -.58624+04       -.78736+03
  ENTROPY - BTU/LBM DEG R       .24060+01        .15349+01        .25835+01
  DENSITY - LBM/FT3             .29030+00                         .35189+00
  MOLECULAR WEIGHT              21.1184          25.0120          25.5946

 CHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHASE MOLECULES).....

   SPECIES   MOLE FR.     SPECIES   MOLE FR.     SPECIES   MOLE FR.     SPECIES   MOLE FR.     SPECIES   MOLE FR.
   CO2       .28681-02    H2        .31374+00    H2O       .32153-01    C*        .00000       CLH       .39942-01
   FH        .26427-01    BE        .37865-02    CCLN      .89119-07    CO        .23259+00    C2H2      .31456-07
   C         .12442-06    C2        .66064-10    C3        .21189-12    C4        .84802-18    C5        .92557-21
   C2BE      .74619-09    HECL      .37108-02    HECLF     .36218-01    HECL2     .82985-02    HEF       .43163-01
   HEF2      .40630-01    HEHO      .66279-02    HEH2      .19498-03    HEH2O2    .38210-02    HEO       .25368-03
   BE2CL4    .35485-07    BE2O2     .27032-03    BE3O3     .24759-03    BE4O4     .85633-04    BE5O5     .31056-05
   BE6O6     .20125-06    CCL       .36754-08    CCLFO     .59481-09    CCLF3     .79560-17    CCL2O     .24220-09
   CCL3F     .43880-17    CCL4      .12540-17    CF        .21656-07    CFN       .44796-08    CF2       .12010-09
   CF2O      .42082-09    CF3       .70361-14    CF4       .41132-17    CH        .10493-06    CHCLF2    .96081-14
   CHCL2F    .86893-14    CHCL3     .47037-14    CHFO      .79573-07    CHF3      .43854-14    CHN       .51285-04
   CHNO      .95549-06    CHO       .45571-04    CH2       .57441-07    CH2CLF    .28644-11    CH2CL2    .37433-11
   CH2F2     .10232-11    CH2O      .27401-05    CH3       .44354-06    CH3CL     .10870-08    CH3F      .23177-09
   CH4       .97096-07    CN        .24543-05    C2F2      .18879-15    C2F4      .28364-22    C2H4      .23420-10
   C2H4O     .19643-14    C2N2      .24840-09    C3O2      .41003-10    C4N2      .75546-17    CL        .59432-02
   CLF       .84859-07    CLFO3     .60026-24    CLF3      .87612-21    CLHO      .17413-05    CLNO      .18065-07
   CLO       .15244-05    CLO2      .85297-11    CL2O      .85230-11    F         .11110-03    FHO       .13169-07
   FN        .68111-08    FNO       .10759-08    FO        .39131-08    F2O       .52961-15    F3N       .24583-19
   H         .69679-01    HN        .40321-04    HO        .38114-02    H2N       .29586-04    H2O2      .53788-07
   H3N       .18218-04    H4N2      .45197-11    N         .27902-04    NO        .36568-03    NO2       .94106-08
   N2O       .58770-07    N2O3      .10572-15    N2O4      .28330-21    N2O5      .17632-25    O         .48951-03
   O3        .22818-11    CCL2F2    .72649-17    CCLO      .51757-05    CFO       .14886-06    C2F6      .68667-30
   FNO2      .41704-14    CLNO2     .41138-13    F2N       .62872-13    FNO3      .19497-20    HNO       .83093-06
   BEN       .17185-04    HNO2      .20359-08    HNO3      .18560-13    BE2O      .10682-02    F4N2      .16499-32
   HO2       .12061-06    NO3       .47547-14    CF4O      .84379-23    CCL2      .82626-10    CCL3      .16171-13
   F2N2      .42902-17    H2N2      .28486-08    BE2F2O    .17103-01    CN2       .88652-09    C2O       .24565-07
   CLF5      .11751-36    BEH       .65541-15    FO2       .24159-11    C2H       .12574-07    C2N       .95277-09
   C2CL4     .12864-20    C2CL6     .28053-30    C2HF      .67411-11    C2CL2     .17562-12    C2HCL     .15177-09
   CHCL      .40746-08    CHF       .35808-08    C2F3N     .17697-19    F3NO      .16489-24    F2        .31941-10
   CL2       .30764-05    N2        .10623+00    O2        .14692-04    CNO       .14911-06    N3        .83700-09
   C2H3      .71395-10    C2H6      .84166-14    C3H       .61907-11    C3H2      .56004-12    C3H3      .97489-13
   C3H4      .45085-14    C3H5      .20283-13    C4H       .39389-14    C4H2      .57922-15    CLH4N4*   .00000
   CLH4NO4*  .00000       BEH2O2*   .00000       BE*       .00000       BEO*      .17912+00    CBE2*     .00000
   BE3N2*    .00000       BECL2*    .00000       BEF2*     .00000
```

Sample Problem 1 Output (Continued)

```
        GRAPHITE SURFACE KINETICS (GASKET) PROB. 1          2000200+00

DERIVATIVE PROPERTY OUTPUT
 CP-FROZEN     CP-EQUIL    DLNM/DLNT    DLNM/DLNP     GAMMA
  .49506+00    .13039+01   -.60504+00    .36699-01    .11327+01

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,PTU,AND DEG-R
   TEMP          VISC          COND          DBAR          PR           SC
 .67212+04     .61287-04     .74620-04     .28689-03     .31494+00    .72426+00
   MU1           MU2          MOL.WT         HTIL         CPTIL        HTIL*
 .77499+00     .20619+02     .25514+02     .43013+04     .86896+00    .24063+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .6671
     1            4            6            7            8            9           17          106
  .33335-01    .12809+00    .11053+00    .11656+00    .30546+00    .16432+00    .14172+00    .00000
  .89582-01    .69338-01    .13601+00    .14368+00    .23836+00    .17807+00    .14496+00    .00000

SOLUTION TIMES
          ITERATIONS =    3                          TIME =    1.249 SEC.

CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT

  MASS CONDENSED/MASS GAS =    .21135+00
  TEMP =  6721.2491 DEG R.  =  3734.0273 DEG K.      PRESS =     54.42000 ATM

                                GAS            CONDENSED       COMPOSITE
  ENTHALPY - BTU/LBM            .29254+03      -.58969+04       -.78736+03
  ENTROPY - BTU/LBM DEG R       .28272+01       .15297+01        .26009+01
  DENSITY - LBM/FT3             .23351+00                        .28286+00
  MOLECULAR WEIGHT              21.0627         25.0120          25.5143

 CHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHASE MOLECULES).....

   SPECIES    MOLE FR.    SPECIES    MOLE FR.    SPECIES    MOLE FR.    SPECIES    MOLE FR.    SPECIES    MOLE FR.
   CO2        .29183-02   H2         .31040+00   H2O        .32357-01   C*         .00000      CLH        .40019-01
   FH         .26414-01   BE         .40393-02   CCLN       .67381-07   CO         .23178+00   C2H2       .19239-07
   C          .10485-06   C2         .43831-10   C3         .11548-12   C4         .35696-18   C5         .31450-21
   C2BE       .49368-09   BECL       .37336-02   BECLF      .35728-01   BECL2      .81426-02   BEF        .44295-01
   BEF2       .40404-01   BEHO       .67278-02   BEH2       .17333-03   BEH2O2     .37582-02   BEO        .27204-03
   BE2CL4     .27308-07   BE2O2      .29386-03   BE3O3      .27990-03   BE4O4      .97476-04   BE5O5      .35546-05
   BE6O6      .23314-06   CCL        .28819-08   CCLFO      .46249-09   CCLF3      .49421-17   CCL2O      .19074-09
   CCL3F      .26988-17   CCL4       .77082-18   CF         .17226-07   CFN        .33543-08   CF2        .89380-10
   CF2O       .33469-09   CF3        .47004-14   CF4        .25784-17   CH         .81195-07   CHCLF2     .60000-14
   CHCL2F     .54184-14   CHCL3      .29411-14   CHFO       .63030-07   CHF3       .27583-14   CHN        .39842-04
   CHNO       .75218-06   CHO        .38831-04   CH2        .42021-07   CH2CLF     .18030-11   CH2CL2     .23708-11
   CH2F2      .64383-12   CH2O       .21617-05   CH3        .30546-06   CH3CL      .69674-09   CH3F       .14695-09
   CH4        .62909-07   CN         .19863-05   C2F2       .10752-15   C2F4       .13398-22   C2H4       .11840-10
   C2H4O      .97335-15   C2N2       .14962-09   C3O2       .25290-10   C4N2       .28097-17   CL         .62048-02
   CLF        .79011-07   CLFO3      .47634-24   CLF3       .58376-21   CLHO       .16640-05   CLNO       .16569-07
   CLO        .15549-05   CLO2       .86633-11   CL2O       .76640-11   F          .11359-03   FHO        .12049-07
   FN         .59609-08   FNO        .97331-09   FO         .37407-08   F2O        .43854-15   F3N        .16507-19
   H          .73024-01   HN         .36701-04   HO         .40034-02   H2N        .25088-04   H2O2       .50038-07
   H3N        .14492-04   H4N2       .27351-11   N          .27506-04   NO         .38019-03   NO2        .94615-08
   N2O        .54463-07   N2O3       .88768-16   N2O4       .22938-21   N2O5       .13586-25   O          .54582-03
   O3         .23779-11   CCL2F2     .44826-17   CCLO       .44727-05   CFO        .12598-06   C2F6       .26883-30
   FNO2       .36221-14   CLNO2      .36384-13   F2N        .48535-13   FNO3       .15578-20   HNO        .76683-06
   BEN        .15949-04   HNO2       .18689-08   HNO3       .16414-13   BF2O       .11155-02   F4N2       .79529-33
   HO2        .12141-06   NO3        .44848-14   CF4O       .48198-23   CCL2       .60609-10   CCL3       .10869-13
   F2N2       .29146-17   H2N2       .21249-08   BE2F2O     .16646-01   CN2        .63233-09   C2O        .17837-07
   CLF5       .55392-37   BEH        .50405-15   FO2        .22864-11   C2H        .81308-08   C2N        .60477-09
   C2CL4      .62617-21   C2CL6      .10766-30   C2HF       .39815-11   C2CL2      .10515-12   C2HCL      .92045-10
   CHCL       .29571-08   CHF        .26186-08   C2F3N      .85521-20   F3NO       .11894-24   F2         .27915-10
   CL2        .29698-05   N2         .10589+00   O2         .22352-04   CNO        .12322-06   N3         .66632-09
   C2H3       .38503-10   C2H6       .34929-14   C3H        .31964-11   C3H2       .26160-12   C3H3       .42035-13
   C3H4       .17873-14   C3H5       .72249-14   C4H        .15952-14   C4H2       .21827-15   CLH4N*     .00000
   CLH4NO4*   .00000      BEH2O2*    .00000      BE*        .00000      BEO*       .17798+00   CBE2*      .00000
   BE3N2*     .00000      BECL2*     .00000      BEF2*      .00000
```

Sample Problem 1 Output (Continued)

```
        GRAPHITE SURFACE KINETICS (GASKET) PROB. 1          3000100+00

DERIVATIVE PROPERTY OUTPUT
 CP-FROZEN     CP-EQUIL    DLNM/DLNT    DLNM/DLNP      GAMMA
  .49587+00    .12511+01   -.54367+00    .31434-01    .11302+01

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP         VISC         COND         DBAR          PR           SC
  .63793+04    .59220-04    .72322-04    .45482-03    .30975+00    .72433+00
   MU1          MU2         MOL.WT        HTIL         CPTIL        HTIL*
  .77413+00    .20596+02    .25806+02    .38464+04    .87149+00    .20679+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMFX =  .667)
     1            4            6            7            8            9           17          106
   .33335-01    .12809+00    .11053+00    .11656+00    .30546+00    .16432+00    .14172+00    .00000
   .91019-01    .65809-01    .13771+00    .14546+00    .23395+00    .17956+00    .14659+00    .00000

SOLUTION TIMES
        ITERATIONS =    6                        TIME =    2.331 SEC.

CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT

  MASS CONDENSED/MASS GAS =    .22523+00
  TEMP =  6379.3015 DEG R.  =  3544.0564 DEG K.      PRESS =     31.47837 ATM

                                   GAS            CONDENSED        COMPOSITE
  ENTHALPY - BTU/LBM              .72630+02       -.61156+04       -.10649+04
  ENTROPY - BTU/LBM DEG R         .29496+01        .14963+01        .26009+01
  DENSITY - LBM/FT3               .14230+00                         .17436+00
  MOLECULAR WEIGHT                21.0621          25.0120          25.8059

 ABOVE ARE STATIC PROPERTIES                   U-KINETIC =    .27759+03 BTU/LBM
  VEL. =     .372A+04 FT/SEC   FLUX =    .64996+03 LBM/FT2SEC   MACH =   1.00004

 CHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHASE MOLECULES).....

    SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.
    CO2      .27318-02      H2       .32262+00      H2O      .30269-01      C*       .00000         CLN      .41191-01
    FH       .26684-01      HE       .29798-02      CCLN     .36303-07      CO       .23469+00      C2H2     .84519-08
    C        .42832-07      C2       .12001-10      C3       .24174-13      C4       .51448-19      C5       .36090-22
    C2BE     .16436-09      BECL     .28718-02      BECLF    .37215-01      BECL2    .81873-02      BEF      .38901-01
    BFF2     .44390-01      BEHO     .46529-02      BEH2     .10469-03      BEH2O2   .30026-02      BFO      .16674-05
    BE2CL4   .15897-07      BE2O2    .19662-03      BF3O3    .24291-03      BEN04    .88306-04      BE5O5    .33367-05
    BE6O6    .23615-06      CCL      .11200-08      CCLFO    .23637-09      CCLF3    .14608-17      CCL2O    .94869-10
    CCL3F    .75742-18      CCL4     .21569-18      CF       .73674-08      CFH      .15668-08      CF2      .37747-10
    CF2O     .17754-09      CF3      .14643-14      CF4      .82069-18      CH       .31011-07      CHCLF2   .20569-14
    CHCL2F   .18370-14      CHCL3    .10163-14      CHFO     .35848-07      CHF3     .94948-15      CHN      .26279-04
    CHNO     .43530-06      CHO      .23341-04      CH2      .18356-07      CH2CLF   .71700-12      CH2CL2   .98335-12
    CH2F2    .25524-12      CH2O     .13182-05      CH3      .15837-06      CH3CL    .34490-09      CH3F     .67572-10
    CH4      .36865-07      CN       .10136-05      C2F2     .25193-16      C2F4     .21301-23      C2H4     .44983-11
    C2H4O    .25131-15      C2N2     .57503-10      C3O2     .41461-11      CH2      .47399-18      CL       .55665-02
    CLF      .44974-07      CLFO3    .47909-25      CLF3     .83535-22      CLHO     .99812-06      CLNO     .73927-08
    CLO      .84982-06      CLO2     .27129-11      CL2O     .27719-11      F        .78547-04      FHO      .55668-08
    FN       .23708-08      FNO      .38823-09      FO       .14624-08      F2O      .90912-16      FXN      .26601-20
    H        .65694-01      HN       .20948-04      HO       .24339-02      H2N      .15136-04      H2O2     .22176-07
    H3N      .97000-05      H4N2     .81142-12      N        .15777-04      NO       .25032-03      NO2      .39910-08
    N2O      .27127-07      N2O3     .14671-16      N2O4     .23465-22      N2O5     .81268-27      O        .35129-03
    O3       .62527-12      CCL2F2   .12848-17      CCLO     .26841-05      CFO      .65594-07      C2F6     .28885-31
    FNO2     .88244-15      CLNO2    .10023-13      F2N      .12418-13      FNO3     .17391-21      HNO      .38649-06
    BEN      .76398-05      HNO2     .72831-09      HNO3     .39992-14      BE2O     .70920-03      F4N2     .34641-34
    HO2      .53635-07      NO3      .99771-15      CH4O     .65570-24      CCL2     .23277-10      CCL3     .35788-14
    F2N2     .53440-18      H2N2     .68778-09      BF2F3O   .15761-01      CF2      .22592-09      C2O      .71994-08
    CLF5     .18459-38      BEH      .69606-16      FO2      .60519-12      C2H      .31929-08      C2N      .20183-09
    C2CL4    .12229-21      C2CL6    .10169-31      C2HF     .13129-11      C2CL2    .34554-13      C2HCL    .36300-10
    CHCL     .11634-08      CHF      .10842-08      C2F3N    .14522-20      F3NO     .11447-25      F2       .10373-10
    CL2      .21579-04      N2       .10720+00      O2       .13016-04      CHO      .58038-07      N3       .24375-09
    C2H3     .12922-10      C2H6     .99522-15      C3H      .92560-12      C3H2     .65852-13      C3H3     .10447-13
    C3H4     .43239-15      C3H5     .14499-14      C4H      .30223-15      C4H2     .43396-16      CLHN0*   .00000
    CLHN04*  .00000         BEH2O2*  .00000         HE*      .00000         BEO*     .18966+00      CHE2*    .00000
    BE3N2*   .00000         BECL2*   .00000         BEF2*    .00000
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Sample Problem 1 Output (Continued)

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        GRAPHITE SURFACE KINETICS (GASKET) PROB. 1          0000000*00

DERIVATIVE PROPERTY OUTPUT
 CP-FROZEN     CP-EQUIL    DLNM/DLNT    DLNM/DLNP      GAMMA
  .36603+00    .49852+02  -.43681+01    .49949-01    .99459+00

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP          VISC        COND         DBAR          PR          SC
  .90000+03    .16292-04   .15778-04    .17653-04    .30751+00   .72433+00
    MU1          MU2        MOL.WT        HTIL        CPTIL       HTIL*
  .77413+00    .20596+02   .25806+02   -.52830+03    .68840+00  -.13648+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .667)
      1            4            6            7            8            9           17          106
   .33335-01    .12809+00    .11053+00    .11656+00    .30546+00    .16432+00    .14172+00    .00000
   .91019-01    .65809-01    .13771+00    .14548+00    .23385+00    .17956+00    .14659+00    .00000

SOLUTION TIMES
         ITERATIONS =    6                          TIME =      .414 SEC.

CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT

  MASS CONDENSED/MASS GAS =     .22523+00
  TEMP =    900.0000 DEG K.  =   500.0000 DEG K.      PRESS =      31.47837 ATM

                                  GAS            CONDENSED        COMPOSITE
  ENTHALPY - BTU/LBM            -.22911+04       -.10178+05       -.37409+04
  ENTROPY - BTU/LBM DEG R        .20345+01        .29797+00        .17153+01
  DENSITY - LBM/FT3              .10087+01                         .12359+01
  MOLECULAR WEIGHT               21.0621          25.0120          25.8059

CHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHASE MOLECULES).....

   SPECIES    MOLE FR.     SPECIES    MOLE FR.     SPECIES    MOLE FR.     SPECIES    MOLE FR.     SPECIES    MOLE FR.
   CO2        .27318-02    H2         .32262+00    H2O        .30269-01    C*         .00000       CLH        .41121-01
   FH         .26694-01    BE         .29798-02    CCLN       .36303-07    CO         .23469+00    C2H2       .88519-08
   C          .42832-07    C2         .12001-10    C3         .28174-13    C4         .51449-19    C5         .36000-22
   C2BE       .16436-09    BECL       .28718-02    BECLF      .37213-01    BECL2      .81873-02    BFF        .38901-01
   BEF2       .44390-01    BEHO       .46529-02    BEH2       .10869-03    BEH2O2     .30026-02    BEO        .16679-03
   BE2CL4     .15897-07    BF2O2      .19662-03    BE3O3      .24291-03    BE4O4      .88306-04    BE5O5      .33307-05
   BE6O6      .23615-06    CCL        .11200-08    CCLFO      .23637-09    CCLF3      .14808-17    CCL2O      .94859-10
   CCL3F      .75742-18    CCL4       .21569-18    CF         .73674-08    CFN        .15664-08    CF2        .37757-10
   CF2O       .17754-09    CF3        .14943-14    CF4        .42069-18    CH         .31811-07    CHCLF2     .20569-14
   CHCL2F     .18370-14    CHCL3      .10163-14    CHFO       .35448-07    CHF3       .94948-15    CHN        .26279-04
   CHNO       .43530-06    CHO        .23341-04    CH2        .18336-07    CH2CLF     .71700-12    CH2CL2     .98335-12
   CH2F2      .25524-12    CH2O       .13182-05    CH3        .15837-06    CH3CL      .34490-09    CH3F       .67572-10
   CH4        .36865-07    CN         .10136-05    C2F2       .25193-16    C2F4       .21301-23    C2H4       .44943-11
   C2H4O      .25131-15    C2N2       .57503-10    C3O2       .91461-11    C4N2       .47399-18    CL         .55665-02
   CLF        .44978-07    CLFO3      .47909-25    CLF3       .83535-22    CLHO       .99812-06    CLNO       .73997-08
   CLO        .84982-06    CLO2       .27128-11    CL2O       .27719-11    F          .78547-04    FHO        .55665-08
   FN         .23708-08    FNO        .38423-09    FO         .14624-08    F2O        .90912-16    F3N        .26601-20
   H          .65694-01    HN         .20448-04    HO         .29339-02    H2N        .15136-04    H2O2       .22176-07
   H3N        .97000-05    H4N2       .41192-12    N          .15777-04    NO         .25032-03    NO2        .39910-08
   N2O        .27127-07    N2O3       .14671-16    N2O4       .23865-22    N2O5       .81268-27    O          .35125-03
   O3         .62527-12    CCL2F2     .12848-17    CCLO       .26841-05    CFO        .65594-07    C2F6       .24885-31
   FNO2       .88244-15    CLNO2      .10023-13    F2N        .12418-13    FNO3       .17391-21    HNO        .38649-06
   BEN        .76398-05    HNO2       .72831-09    HNO3       .39992-14    BE2O       .70920-03    F4N2       .34641-34
   HO2        .53635-07    NO3        .99771-15    OF4O       .65876-24    CCL2       .23277-10    CCL3       .35738-14
   F2N2       .53440-18    H2N2       .88778-09    BE2F2O     .15761-01    CN2        .22592-09    C2O        .71995-08
   CLF5       .18459-38    BEH        .69606-16    FO2        .60519-12    C2H        .31929-08    C2N        .20159-09
   C2CL4      .12224-21    C2CL6      .10169-31    C2HF       .13129-11    C2CL2      .34554-13    C2HCL      .36300-10
   CHCL       .11634-08    CHF        .10942-08    C2F3N      .16822-20    F3NO       .11447-25    F2         .10373-10
   CL2        .21579-05    N2         .10720+00    O2         .13016-04    CNO        .58038-07    N3         .24375-09
   C2H3       .12922-10    C2H6       .99522-15    C3H        .92560-12    C3H2       .65852-13    C3H3       .10497-13
   C3H4       .43239-15    C3H5       .14499-14    C4H        .30223-15    C4H2       .43396-16    CLH4N*     .00000
   CLH4N04*   .00000       BEH2O2*    .00000       BF*        .00000       BEO*       .14966+00    CBE2*      .00000
   BE3N2*     .00000       BECL2*     .00000       BEF2*      .00000
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Sample Problem 1 Output (Continued)

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GRAPHITE SURFACE KINETICS (GASKET) PROB. 1          0003000+00

CP-FROZEN=   .36624+00

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP        VISC        COND        DBAR        PR          SC
 .90000+03   .16355-04   .99522+05   .17653-04   .60185+00   .72464+00
   MU1         MU2        MOL.WT       HTIL       CPTIL       HTIL*
 .94288+00   .25172+02   .26508+02  -.36450+04   .43371+00  -.37859+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .667)
     1           4           6           7           8           9          17         106.
  .71313-01   .87637-01   .11139+00   .13714+00   .22999+00   .20646+00   .15608+00   .00000
  .91019-01   .65809-01   .13771+00   .14546+00   .23385+00   .17956+00   .14659+00   .00000

SOLUTION TIMES
      ITERATIONS =   34                          TIME =    9.753 SEC.

OPEN SYSTEM CHEMICAL KINETICS SOLUTION OUTPUT

 SURFACE IS ATJ GRAPHITE
 MASS TRANSFER COEFFICIENT ROUCM =    .96900+00
 RHO V WALL/RHOE UE CM =    .10000-16   BPRIME =    .00000

 STATE ADJACENT TO THE SURFACE . . . .
  TEMP =   900.0000 DEG R =   500.0000 DEG K      PRESS =      31.47837 ATM

                                  GAS          CONDENSED       COMPOSITE
  ENTHALPY - BTU/LBM            -.41003+04       .00000         -.41003+04
  ENTROPY - BTU/LBM DEG R        .18084+01       .00000          .00000
  DENSITY - LBM/FT3              .12695+01                       .12695+01
  MOLECULAR WEIGHT              26.5080          .0000          26.5080

 CHEMICAL STATE ADJACENT TO THE SURFACE
  (MOLE FR FOR GASES = MOLECULES / TOTAL GAS MOLECULES )
  (MOLE FR FOR CONDENSED = BPRIME CONDENSED ). . . .

   SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.
   CO2       .23277-07     H2        .56640-01     H2O       .26939+00     C*        .00000        CLH       .11182+00
   FH        .27636-03     BE        .00000        CCLN      .75120-27     CO        .34549-10     C2H2      .12934-27
   C         .00000        C2        .00000        C3        .00000        C4        .00000        C5        .00000
   C2BE      .00000        BECL      .15712-33     BECLF     .43118-02     BECL2     .28301-03     BEF       .72840-27
   BEF2      .14155+00     BEHO      .24712-31     BEH2      .97115-34     BEH2O2    .16283-03     BEO       .00000
   BE2CL4    .10721-08     BE2O2     .00000        BE3O3     .63335-25     BF4O4     .92324-17     BE5O5     .21536-10
   BE6O6     .18516-01     CCL       .00000        CCLFO     .67369-25     CCLF3     .00000        CCL2O     .23793-25
   CCL3F     .00000        CCL4      .00000        CF        .00000        CFN       .15286-37     CF2       .00000
   CF2O      .18157-24     CF3       .00000        CF4       .00000        CH        .00000        CHCLF2    .45249-31
   CHCL2F    .22641-30     CHCL3     .27769-28     CHFO      .15828-19     CHF3      .16261-30     CHN       .38271-16
   CHNO      .44396-17     CHO       .32711-28     CH2       .00000        CH2CLF    .63060-22     CH2CL2    .31835-18
   CH2F2     .64381-24     CH2O      .30839-15     CH3       .14482-19     CH3CL     .76154-09     CH3F      .89693-15
   CH4       .24583+00     CN        .00000        C2F2      .00000        C2F4      .00000        C2H4      .32929-15
   C2H4O     .13713-30     C2N2      .64819-37     C3O2      .00000        C4N2      .00000        CL        .92420-21
   CLF       .21185-36     CLFO3     .00000        CLF3      .00000        CLHO      .10898-25     CLNO      .00000
   CLO       .00000        CLO2      .00000        CL2O      .00000        F         .16740-37     FHO       .00000
   FN        .00000        FNO       .00000        FO        .00000        F2O       .00000        F3N       .00000
   H         .29398-21     HN        .34121-35     HO        .12669-26     H2N       .58404-20     H2O2      .13994-36
   H3N       .42508-01     H4N2      .15408-21     N         .00000        NO        .60951-32     NO2       .00000
   N2O       .23507-35     N2O3      .00000        N2O4      .00000        N2O5      .00000        O         .00000
   O3        .00000        CCL2F2    .00000        CCLO      .34905-27     CFO       .17026-37     C2F6      .00000
   FNO2      .00000        CLNO2     .00000        F2N       .00000        FNO3      .00000        HNO       .98394-36
   BEN       .00000        HNO2      .00000        HNO3      .00000        BE2O      .00000        F4N2      .00000
   HO2       .00000        NO3       .00000        CF4O      .00000        CCL2      .00000        CCL3      .00000
   F2N2      .00000        H2N2      .31209-28     BE2F2O    .17438-03     CN2       .00000        C2O       .00000
   CLF5      .00000        BEH       .00000        FO2       .00000        C2H       .00000        C2N       .00000
   C2CL4     .00000        C2CL6     .00000        C2HF      .00000        C2CL2     .00000        C2HCL     .24639-36
   CHCL      .00000        CHF       .00000        C2F3N     .00000        F3NO      .00000        F2        .00000
   CL2       .11230-20     N2        .10851+00     O2        .00000        CNO       .00000        N3        .00000
   C2H3      .86439-35     C2H6      .20206-06     C3H       .00000        C3H2      .00000        C3H3      .00000
   C3H4      .73722-31     C3H5      .28923-26     C4H       .00000        C4H2      .00000
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Sample Problem 1 Output (Continued)

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GRAPHITE SURFACE KINETICS (GASKET' PROB. 1          5002000*40

                                                                                                                                  6  6

CP-FROZEN=   .41587+00

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP          VISC          COND          DBAR          PR            SC
 .25200+04    .32185-04    .33969-04    .97419-04    .39403+00    .72449+00
   MU1           MU2          MOL.WT        HTIL         CPTIL        HTIL*
 .80934+00    .21579+02    .23272+02   -.12491+04    .75158+00   -.17734+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .667)
     1            4            6            7            8            9           17          106
   .39722-01    .81106-01    .13133+00    .13745+00    .23048+00    .20804+00    .17147+00    .00000
   .90963-01    .65695-01    .13893+00    .14526+00    .23353+00    .17927+00    .14635+00    .00000

SOLUTION TIMES
          ITERATIONS =    8                          TIME =    3.121 SEC.

OPEN SYSTEM CHEMICAL KINETICS SOLUTION OUTPUT

 SURFACE IS ATJ GRAPHITE
 MASS TRANSFER COEFFICIENT ROUCM =     .96900+00
 RHO V WALL/RHOE UE CM =     .14042-02    BPRIME =     .14042-02

 STATE ADJACENT TO THE SURFACE . . . .
  TEMP =  2420.0000 DEG R =  1400.0000 DEG K      PRESS =      31.47837 ATM

                                  GAS              CONDENSED        COMPOSITE
  ENTHALPY - BTU/LBM             -.24804+04          .00000          -.24804+04
  ENTROPY - BTU/LBM DEG R         .22753+01          .00000           .00000
  DENSITY - LBM/FT3               .39804+00                           .39804+00
  MOLECULAR WEIGHT                23.2721             .0000           23.2721


 NET FORWARD RATE OF KINETICALLY CONTROLLED REACTIONS
  (MOLES OF REACTION / UNIT SURFACE AREA / TIME / RHOE UE CM). . . .
  1=   .49822-04  2=   .67084-04  3=   .12046-11  4=   .24574-19  5=   .11522-21
  6=   .30147-21  7=   .27480-26  8=   .26413-28

RATIO OF FORWARD TO REVERSE KINETICALLY CONTROLLED PRODUCTION RATES
 1=   .27438+01  2=   .27438+01  3=   .75284+01  4=   .27438+01  5=   .75284+01
 6=   .20656+02  7=   .20492+02  8=   .19474+00

 CHEMICAL STATE ADJACENT TO THE SURFACE
  (MOLE FR FOR GASES = MOLECULES / TOTAL GAS MOLECULES )
  (MOLE FR FOR CONDENSED = BPRIME CONDENSED ). . . .
```

SPECIES	MOLE FR.	SPECIES	MOLE FR.	SPECIES	MOLE FR.	SPECIES	MOLE FR.	SPECIES	MOLE FR.
CO2	.85921-02	H2	.38465+00	H2O	.30121-01	C*	.00000	CLH	.33108-01
FH	.39627-02	BE	.46478-13	CCLN	.17192-09	CO	.25852+00	C2H2	.15142-06
C	.36925-20	C2	.31321-23	C3	.72505-32	C4	.24869-28	C5	.13041-28
C2BE	.31909-19	BECL	.37022-09	BECLF	.47444-11	BECL2	.12952-01	BEF	.75359-07
BEF2	.79827-01	BEHO	.15065-08	BEH2	.68046-10	BEH2O2	.22545-02	BEO	.17680-15
BE2CL4	.67036-07	BE2O2	.18076-12	BE3O3	.47439-07	BE4O4	.60454-05	BE5O5	.57045-04
BE6O6	.38201-02	CCL	.44858-19	CCLFO	.95752-12	CCLF3	.27107-22	CCL2O	.60625-12
CCL3F	.24804-22	CCL4	.23116-22	CF	.15439-17	CFN	.22236-13	CF2	.46485-17
CF2O	.61283-12	CF3	.31722-22	CF4	.25851-22	CH	.15714-17	CHCLF2	.61564-17
CHCL2F	.14021-16	CHCL3	.49252-16	CHFO	.24971-18	CHF3	.32085-17	CHN	.37644-04
CHNO	.25429-06	CHO	.93430-08	CH2	.73062-13	CH2CLF	.52468-12	CH2CL2	.92032-11
CH2F2	.47337-13	CH2O	.25500-05	CH3	.24182-06	CH3CL	.52715-06	CH3F	.31217-08
CH4	.73102-02	CN	.25181-12	C2H2	.62046-25	C2H4	.44047-31	C2H6	.15585-05
C2H4O	.23851-13	C2N2	.78567-11	C3O2	.60515-11	C4H2	.67288-18	CL	.45568-07
CLF	.28423-19	CLF3	.00000	CLF3	.00000	CLHO	.17927-11	CLNO	.40521-17
CLO	.43769-16	CLO2	.18235-27	CL2O	.15793-23	F	.72122-13	FHO	.95053-18
FN	.38856-21	FNO	.14565-20	FO	.61591-24	F2O	.21925-36	F3N	.00000
H	.53855-06	HN	.52852-12	HO	.80142-09	H2N	.43551-08	H2O2	.11815-15
H3N	.22196-03	H4N2	.69154-14	I	.23540-15	NO	.40605-11	NO2	.22003-20
N2O	.48229-15	N2O3	.56012-36	N2O4	.00000	N2O5	.00000	O	.10360-14
O3	.16403-32	CCL2F2	.22206-22	CCLO	.11786-08	CFO	.11261-12	C2F6	.44051-38
FNO2	.38048-31	CLNO2	.61906-28	F2N	.72593-29	FNO3	.00000	HNO	.49163-14
BEN	.81119-18	HNO2	.12122-18	HNO3	.15296-28	HE2O	.54119-14	F4N2	.00000
HO2	.76148-19	NO3	.76539-34	CH4O	.44086-18	CCL2	.33734-17	CCL4	.11915-19
F2N2	.26453-34	H2N2	.20228-13	HE2F2O	.21678-01	CN2	.46774-17	C2O	.69201-14
CLF3	.00000	BEH	.00000	FO2	.62481-31	C2H	.13954-12	C2N	.80212-16
C2CL4	.20215-24	C2CL6	.93260-37	C2HF	.26451-15	C2CL2	.24070-16	C2HCL	.57193-11
CHCL	.25239-15	CHF	.27089-15	C2F3N	.52410-25	F3HC	.00000	F2	.54039-25
CL2	.77717-10	N2	.11405+00	O2	.34436-16	CNO	.29686-13	H3	.66695-19
C2H3	.30471-10	C2H6	.75934-06	C3H	.27705-14	C3H2	.13257-13	C3H3	.26287-11
C3H4	.14686-09	C3H5	.57612-08	C4H	.20537-17	C4H2	.35932-14		

Sample Problem 1 Output (Concluded)

```
GRAPHITE SURFACE KINETICS (GASKET) PROB. 1          5002000+40

                                                                                                                                  6  6

CP-FROZEN=   .52269+00

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP        VISC        COND        DBAR        PR          SC
 .72000+04   .64280-04   .66452-04   .55595-03   .50561+00   .72353+00
   MU1         MU2        MOL.WT       HTIL       CPTIL       HTIL*
 .87984+00   .23487+02   .24810+02   .84810+04   .73985+00   .69927+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GASES =  .667)
     1           4           6           7           8           9          17           ,         106
   .34442-01   .34894-01   .55762+00   .75109-01   .12072+00   .95579-01   .81641-01   .00000
   .59850-01   .34231-01   .53805+00   .77487-01   .12461+00   .93065-01   .72708-01   .00000

SOLUTION TIMES
        ITERATIONS =    6                          TIME =    2.693 SEC.

OPEN SYSTEM CHEMICAL KINETICS SOLUTION OUTPUT

 SURFACE IS ATW GRAPHITE
 MASS TRANSFER COEFFICIENT ROUCM =     .96900+00
 RHO V WALL/RHOE UE CM =     .90496+00    BPRIME =     .90496+00

 STATE ADJACENT TO THE SURFACE . . . .
  TEMP =  7199.9999 DEG R =  4000.0000 DEG K      PRESS =      31.47837 ATM

                                  GAS            CONDENSED        COMPOSITE
  ENTHALPY - BTU/LBM              .55476+04       .00000           .55476+04
  ENTROPY - BTU/LBM DEG R         .29015+01       .00000           .00000
  DENSITY - LBM/FT3               .14852+00                        .14852+00
  MOLECULAR WEIGHT                24.8099          .0000           24.8099

 NET FORWARD RATE OF KINETICALLY CONTROLLED REACTIONS
  (MOLES OF REACTION / UNIT SURFACE AREA / TIME / RHOE UE CM). . . .
  1=   .68928-08  2=   .50169-08  3=   .31663-01  4=   .10209-02  5=   .36008-02
  6=   .10735-02  7=   .14080-03  8=   .24100-05

RATIO OF FORWARD TO REVERSE KINETICALLY CONTROLLED PRODUCTION RATES
 1=   .12717+01  2=   .12717+01  3=   .16173+01  4=   .12717+01  5=   .16173+01
 6=   .20568+01  7=   .26157+01  8=   .33264+01

 CHEMICAL STATE ADJACENT TO THE SURFACE
  (MOLE FR FOR GASES = MOLECULES / TOTAL GAS MOLECULES )
  (MOLE FR FOR CONDENSED = BPRIME CONDENSED ). . . .

   SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.
   CO2       .40920-06     H2        .19220+00     H2O       .26537-05     C*        .00000        CLH       .23856-01
   FH        .23877-01     BE        .68860-02     CCLN      .11922-03     CO        .18708+00     C2H2      .57107-01
   C         .16639-02     C2        .17498-02     C3        .81174-02     C4        .74222-04     C5        .13559-03
   C2BE      .52947-02     BECL      .29082-02     BECLF     .13700-01     BECL2     .21961-02     BEF       .43473-01
   BEF2      .21536-01     BEHO      .69943-06     BEH2      .50970-04     BEH2O2    .20260-10     BEO       .91535-07
   BE2CL4    .11603-08     BE2O2     .47866-11     BE3O3     .17855-15     BE4O4     .31695-20     BE5O5     .60325-26
   BE6O6     .19430-31     CCL       .23411-04     CCLFO     .30149-09     CCLF3     .20419-17     CCL2O     .86599-10
   CCL3F     .54822-14     CCL4      .10582-14     CF        .18453-03     CFN       .10499-04     CF2       .69644-06
   CF2O      .30941-09     CF3       .37664-10     CF4       .14679-13     CH        .50956-03     CHCLF2    .11000-10
   CHCL2F    .67811-11     CHCL3     .24204-11     CHFO      .28027-07     CHF3      .70992-11     CHN       .42659-01
   CHNO      .14881-06     CHO       .22482-04     CH2       .86656-04     CH2CLF    .14420-08     CH2CL2    .12115-08
   CH2F2     .76768-09     CH2O      .46237-06     CH3       .19086-03     CH3CL     .22271-06     CH3F      .76452-07
   CH4       .12706-04     CN        .77934-02     C2F2      .26741-08     C2H4      .27694-15     C2H4      .63300-05
   C2H4O     .13140-12     C2N2      .41630-03     C3O2      .27134-07     C4H2      .51145-04     CL        .11688-01
   CLF       .18686-06     CLFO3     .37722-34     CLF3      .39304-20     CLHO      .30583-09     CLNO      .37919-11
   CLO       .84935-09     CLO2      .14054-17     CL2O      .33655-14     F         .43851-03     FHO       .45589-11
   FN        .14854-07     FNO       .37965-12     FO        .47387-11     F2O       .84732-18     F3N       .64774-19
   H         .10666+00     HO        .30643-04     HO        .11855-05     H2N       .73868-05     H2O2      .16364-14
   H3N       .14042-05     H4N2      .89043-13     N         .60870-04     NO        .11125-06     NO2       .75604-15
   N2O       .73472-11     N2O3      .11833-26     N2O4      .84252-36     N2O5      .00000        O         .50559-06
   O3        .16508-21     CCL2F2    .13176-13     CCLO      .33296-05     CFO       .16610-06     C2F6      .46427-23
   FNO2      .41029-21     CLNO2     .23826-20     F2N       .14381-12     FNO3      .73199-31     HNO       .11726-09
   BEN       .15098-04     HNO2      .61988-16     HNO3      .15359-24     HE2O      .12312-06     F4N2      .37019-32
   HO2       .10567-13     NO3       .12518-24     CFNO      .12314-22     CCL2      .24126-06     CCL3      .25261-10
   F2N2      .44303-17     H2N2      .31978-09     BE2F2O    .57405-06     CN2       .12552-05     C2O       .69242-04
   CLF5      .11706-35     FEH       .25768-14     FO2       .71434-18     C2H       .78099-01     C2N       .61562-02
   C2CL4     .20610-14     C2CL6     .20347-24     C2HF      .33983-04     C2CL2     .77916-06     C2HCL     .42365-03
   CHCL      .88935-05     CHF       .10999-04     C2F3N     .61728-13     F3NO      .13937-27     F2        .16658-09
   CL2       .34953-05     N2        .37622-01     O2        .36842-11     CNO       .83820-07     N3        .27300-09
   C2H3      .63328-04     C2H6      .37495-09     C3H       .68632-01     C3H2      .25206-02     C3H3      .15310-03
   C3H4      .25980-05     C3H5      .48873-05     C4H       .88971-01     C4H2      .43112-02
```

Sample Problem 2

The shockwave option of GASKET is utilized in this problem. The surface material is made of 15% SiC/PG. The boundary layer edge state is specified as the stagnation condition behind a normal shock wave with an upstream Mach number of two. The shock is assumed to exist in the divergent section of a nozzle and, thus, conditions upstream of the shock are calculated via an isentropic expansion from input ideal chamber conditions. Since the edge gases contain both hydrogen and oxygen, all three kinetically-controlled surface reactions are possible. Two temperatures are input for both the frozen edge and surface temperature arrays. Finally, the diffusion factors are updated for 16 selected species.

Listing of Input

```
 1.   5098220400  3901.     40.81     -2.0      68.02     0.463     0.0        PROP. 2
 2.    .15
 3.     1000.
 4.     1500.
 5.
 6.     1200.
 7.     1400.
 8.
 9.     6
10.     1 HYDROGEN    1.008      3.2219
11.     6 CARBON      12.011      .56490            1.0
12.     7 NITROGEN    14.008      .5366
13.     8 OXYGEN      16.0       2.2486
14.    13 ALUMINUM    26.98      1.013
15.    17 CHLORINE    35.453      .5398
16.   1          0.0        -9999.              0.0
17.    16
18.   C            0.69180CH          0.74920CH4         0.93570CN          1.02670
19.   CO           1.01700CO2         1.29140C2H2        1.17460H           0.30180
20.   H2           0.38930H2O         0.77490N           0.74930NO          0.99810
21.   N2           1.026200           0.7397002          1.00000C2          1.02530
22.   8
```

Sample Problem 2 Output

```
        GRAPHITE SURFACE KINETICS (GASKET)     PROB. 2     0110000*J0

RELATIVE ELEMENTAL COMPOSITIONS, ATOMIC WTS/UNIT MASS
     AT.NO.    ELEMENT     ATOMIC WT      EDGE GAS       SURFACE
        1      HYDROGEN      1.00800      .0322205      .0000000
        6      CARBON       12.01100      .0056493      .0000000
        7      NITROGEN     14.00800      .0053663      .0000000
        8      OXYGEN       16.00000      .0224871      .0000000
       13      ALUMIMUN     26.98000      .0101305      .0000000
       17      CHLORINE     35.45300      .0053983      .0000000
       14      SILICON      28.09000      .0000000      .0037407
      106      GRAPHITE     12.01100      .0000000      .0745088

    ELEMENTS          HYDROGEN     CARBON       NITROGEN     OXYGEN       ALUMIMUN
                      CHLORINE     SILICON      GRAPHITE

    BASE SPECIES      H2           CO2          ALN          H2O          AL
                      CLH          CH3CL3S      C*
```

Sample Problem 2 Output (Continued)

```
GRAPHITE SURFACE KINETICS (GASKET) SOLUTION          PROB. 2


DERIVATIVE PROPERTY OUTPUT
 CP-FROZEN    CP-EQUIL    DLNM/DLNT    DLNM/DLNP     GAMMA
  .42289+00   .12704+01   -.81279+00   .49323-01   .11173+01

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP        VISC        COND        DBAR         PR          SC
  .70218+04   .62950-04   .84839-04   .24681-03   .20753+00   .72419+00
   MU1         MU2        MOL.WT       HTIL        CPTIL       HTIL*
  .73200+00   .19437+02   .33303+02   .65193+04   .96142+00   .43301+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .667)
     1          6          7          8          13         17         14         106
  .32478-01  .67853-01  .75170-01  .35979+00  .27332+00  .19138+00  .00000     .00000
  .11322+00  .11673+00  .12994+00  .28974+00  .66727-01  .20364+00  .00000     .00000

SOLUTION TIMES
        ITERATIONS =   27                        TIME =    5.727 SEC.

CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT

  MASS CONDENSED/MASS GAS =    .72922+00
  TEMP =  7021.8000 DEG R.  =  3901.0000 DEG K.     PRESS =     68.02000 ATM

                                GAS          CONDENSED       COMPOSITE
  ENTHALPY - BTU/LBM            .19521+04     -.45284+04      -.78073+03
  ENTROPY - BTU/LBM DEG R       .29114+01      .98044+00       .20971+01
  DENSITY - LBM/FT3             .25544+00                      .44172+00
  MOLECULAR WEIGHT              19.2588       101.9600        33.3027


 CHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHASE MOLECULES).....

   SPECIES   MOLE FR.     SPECIES   MOLE FR.     SPECIES   MOLE FR.     SPECIES   MOLE FR.     SPECIES   MOLE FR.
   CO2       .66796-02    H2        .32612+00    H2O       .10142+00    C*        .00000       CLH       .10317+00
   AL        .34049-02    ALN       .62793-06    CH3CL3S   .00000       CO        .19138+00    C2H2      .21043-08
   C         .61816-07    C2        .82773-11    C3        .55550-14    C4        .61006-20    C5        .15053-23
   CAL       .15823-08    ALCL      .30440-01    ALCLO     .57887-02    ALCL2     .10091-01    ALCL3     .16885-03
   ALH       .47985-03    ALHO2     .26119-02    ALO       .22285-02    AL2CL6    .23514-10    AL2O      .14059-02
   AL2O2     .13163-04    CCL       .40185-08    CCLN      .59882-07    CCL2O     .13643-08    CCL4      .16490-16
   CH        .46292-07    CHCL3     .21843-13    CHN       .12377-04    CHNO      .71144-06    CHO       .43111-04
   CH2       .20564-07    CH2CL2    .62569-11    CH2O      .22209-05    CH3       .12179-06    CH3CL     .65644-09
   CH4       .21298-07    CN        .81008-06    C2H4      .13280-11    C2H4O     .40575-15    C2N2      .14714-10
   C3O2      .67075-11    C4H2SI    .00000       C4N2      .28948-19    CL        .19093-01    CLHO      .18083-04
   CLH3SI    .00000       CLNO      .20144-06    CLO       .19467-04    CLO2      .46439-09    CLSI      .00000
   CL2H2SI   .00000       CL2O      .30342-09    CL2SI     .00000       CL3HSI    .00000       CL4SI     .00000
   H         .92093-01    HN        .54934-04    HO        .16302-01    HSI       .00000       H2N       .33583-04
   H2O2      .78294-06    H3N       .16734-04    H4N2      .46761-11    H4SI      .00000       H         .43874-04
   NO        .14889-02    NO2       .14505-06    NSI       .00000       N2O       .22032-06    N2O3      .65235-14
   N2O4      .67070-19    N2O5      .16945-22    O         .26379-02    OSI       .00000       O2SI      .00000
   O3        .17671-09    SI        .00000       SI2       .00000       SI3       .00000       CCLO      .12080-04
   CLNO2     .17850-11    HNO       .34743-05    HNO2      .28577-07    HNO3      .10030-11    ALHO      .30328-02
   HO2       .20316-05    NO3       .31540-12    CCL2      .19426-09    CCL3      .89640-13    H2N2      .31582-08
   CN2       .28294-09    C2O       .67827-08    C2H       .10781-08    CSI       .00000       CSI2      .00000
   C2N       .80606-10    C2SI      .00000       NSI2      .00000       C2CL4     .41566-20    C2CL6     .66177-29
   ALO2      .30844-03    C2CL2     .68909-13    C2HCL     .27560-10    CHCL      .38211-08    CL3SI     .00000
   CL2       .24563-04    N2        .88527-01    O2        .32099-03    CNO       .14687-06    N3        .10382-08
   C2H3      .50618-11    C2H6      .42956-15    C3H       .12592-12    C3H2      .10796-13    C3H3      .16301-14
   C3H4      .66570-16    C3H5      .29253-15    C4H       .20527-16    C4H2      .25295-17    ALCLO*    .00000
   CSI*      .00000       CLH4N*    .00000       CLH4N2O4* .00000       ALCL3*    .00000       ALN*      .00000
   AL2O5SI*  .00000       C3AL4*    .00000       N4SI3*    .00000       AL*       .00000       AL2O3*    .13774+00
   O2SI*     .00000       SI*       .00000       AL6O13S*  .00000
```

Sample Problem 2 Output (Continued)

```
        GRAPHITE SURFACE KINETICS (GASKET)     PROB. 2      2000200*00

DERIVATIVE PROPERTY OUTPUT
 CP-FROZEN     CP-EQUIL    DLNM/DLNT    DLNM/DLNP      GAMMA
 .42237+00     .13866+01   -.90234+00    .53735-01    .11154+01

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP          VISC        COND         DBAR          PR          SC
 .68843+04     .62125-04   .83769-04    .39809-03    .20738+00   .72416+00
   MU1           MU2        MOL.WT        HTIL         CPTIL       HTIL*
 .72854+00     .19343+02   .32992+02    .66964+04    .96181+00   .44251+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMFX =  .667)
     1          6          7          8          13         17         14         106
  .32478-01  .67853-01  .75171-01  .35979+00  .27332+00  .19138+00  .00000     .00000
  .11334+00  .11629+00  .12945+00  .28969+00  .67757-01  .28347+00  .00000     .00000

SOLUTION TIMES
        ITERATIONS =    4                          TIME =     1.144 SEC.

CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT

  MASS CONDENSED/MASS GAS =     .72521+00
  TEMP =  6884.3399 DEG R.  =  3824.6333 DEG K.      PRESS =      40.81000 ATM

                                GAS            CONDENSED        COMPOSITE
  ENTHALPY - BTU/LBM            .19709+04      -.45750+04        -.78073+03
  ENTROPY - BTU/LBM DEG R       .29646+01       .97375+00         .21277+01
  DENSITY - LBM/FT3             .15522+00                         .26779+00
  MOLECULAR WEIGHT              19.1235        101.9600          32.9921

 CHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHASE MOLECULES).....

    SPECIES    MOLE FR.     SPECIES    MOLE FR.     SPECIES    MOLE FR.     SPECIES    MOLE FR.     SPECIES    MOLE FR.
    CO2        .66546-02    H2         .31914+00    H2O        .98954-01    C*         .00000       CLH        .10119+00
    AL         .38011-02    ALN        .50642-06    CH3CL3S    .00000       CO         .17968+00    C2H2       .74198-09
    C          .42776-07    C2         .34498-11    C3         .15450-14    C4         .97545-21    C5         .15391-24
    CAL        .91928-09    ALCL       .31656-01    ALCLO      .60040-02    ALCL2      .87705-02    ALCL3      .12395-03
    ALH        .42854-03    ALHO2      .26300-02    ALO        .24446-02    AL2CL6     .79259-11    AL2O       .14687-02
    AL2O2      .13715-04    CCL        .23072-08    CCLN       .32720-07    CCL2O      .74694-09    CCL4       .50571-17
    CH         .26478-07    CHCL3      .71824-14    CHN        .72273-05    CHNO       .41045-06    CHO        .29745-04
    CH2        .10254-07    CH2CL2     .21824-11    CH2O       .12917-05    CH3        .54189-07    CH3CL      .24238-09
    CH4        .83002-08    CN         .51440-06    C2H4       .30748-12    C2H4O      .84772-16    C2N2       .49727-11
    C3O2       .22951-11    C4H2SI     .00000       C4N2       .35153-20    CL         .21254-01    CLHO       .15154-04
    CLH3SI     .00000       CLNO       .15342-06    CLO        .18806-04    CLO2       .38063-09    CLSI       .00000
    CL2H2SI    .00000       CL2O       .21360-09    CL2SI      .00000       CL3HSI     .00000       CL4SI      .00000
    H          .10200+00    HN         .43880-04    HO         .17379-01    HSI        .00000       H2N        .22965-04
    H2O2       .60506-06    H3N        .99507-05    H4N2       .14790-11    H4SI       .00000       N          .41830-04
    NO         .15441-02    NO2        .13285-06    NSI        .00000       N2O        .17530-06    N2O3       .37517-14
    N2O4       .33807-19    N2O5       .72599-23    O          .31989-02    OSI        .00000       O2SI       .00000
    O3         .16687-09    SI         .00000       SI2        .00000       SI3        .00000       CCLO       .83900-05
    CLNO2      .11848-11    HNO        .27487-05    HNO2       .21334-07    HNO3       .65512-12    ALHO       .30319-02
    HO2        .18717-05    NO3        .23774-12    CCL2       .93704-10    CCL3       .34541-13    H2N2       .16050-08
    CN2        .13420-09    C2O        .33590-08    C2H        .42842-09    CSI        .00000       CSI2       .00000
    C2N        .30556-10    C2SI       .00000       NSI2       .00000       C2CL4      .77890-21    C2CL6      .68134-30
    ALO2       .34069-03    C2CL2      .28166-13    C2HCL      .92944-11    CHCL       .18481-08    CL3SI      .00000
    CL2        .21420-04    N2         .87684-01    O2         .38878-03    CNO        .93847-07    N3         .60619-09
    C2H3       .13389-11    C2H6       .63183-16    C3H        .31154-13    C3H2       .21307-14    C3H3       .26940-15
    C3H4       .91207-17    C3H5       .31438-16    C4H        .30331-17    C4H2       .31891-18    ALCLO*     .00000
    CSI*       .00000       CLH4N*     .00000       CLH4NO4*   .00000       ALCL3*     .00000       ALN*       .00000
    AL2O5SI*   .00000       C3AL4*     .00000       N4SI3*     .00000       AL*        .00000       AL2O3*     .13692+00
    O2SI*      .00000       SI*        .00000       AL6O13S*   .00000
```

Sample Problem 2 Output (Continued)

```
        GRAPHITE SURFACE KINETICS (GASKET)    PROB. 2     3000100*00

DERIVATIVE PROPERTY OUTPUT
 CP-FROZEN     CP-EQUIL    DLNM/DLNT    DLNM/DLNP      GAMMA
  .42267+00    .11508+01   -.62810+00    .33430-01    .11111+01

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP         VISC         COND         DBAR          PR           SC
  .58395+04    .55713-04    .77229-04    .22498-02    .19013+00    .72459+00
   MU1          MU2         MOL.WT        HTIL         CPTIL        HTIL*
  .71314+00    .18914+02    .34303+02    .54259+04    .98836+00    .35344+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .667)
     1        6        7        8       13       17       14      106
   .32478-01  .67853-01  .75170-01  .35979+00  .27332+00  .19138+00  .00000     .00000
   .12227+00  .12477+00  .13877+00  .26677+00  .35429-01  .31199+00  .00000     .00000

SOLUTION TIMES
        ITERATIONS =    8                          TIME =    2.154 SEC.

CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT

  MASS CONDENSED/MASS GAS =    .88164+00
  TEMP =  5839.4862 DEG R.  =  3244.1602 DEG K.     PRESS =      5.49553 ATM

                                GAS            CONDENSED       COMPOSITE
  ENTHALPY - BTU/LBM           .14629+04       -.4929B+04      -.15324+04
  ENTROPY - BTU/LBM DEG R      .31944+01        .91785+00       .21277+01
  DENSITY - LBM/FT3            .23492-01                        .44203-01
  MOLECULAR WEIGHT             18.2305         101.9600         34.3033

 ABOVE ARE STATIC PROPERTIES                 H-KINETIC =    .75168+03 BTU/LBM
  VEL. =      .6134+04 FT/SEC    FLUX =    .27115+03 LBM/FT2SEC    MACH =    2.00009

 CHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHASE MOLECULES).....

   SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.
   CO2       .57216-02     H2        .35896+00     H2O       .83429-01     C*        .00000        CLH       .13076+00
   AL        .10239-02     ALN       .28250-07     CH3CL3S   .00000        CO        .18806+00     C2H2      .34405-10
   C         .22047-08     C2        .36843-13     C3        .86103-17     C4        .75224-24     C5        .42889-28
   CAL       .13454-10     ALCL      .19183-01     ALCLO     .31966-02     ALCL2     .59746-02     ALCL3     .91144-04
   ALH       .66549-04     ALHO2     .73142-03     ALO       .43774-03     AL2CL6    .87246-12     AL2O      .22585-03
   AL2O2     .16610-05     CCL       .10738-09     CCLN      .39864-08     CCL2O     .87612-10     CCL4      .97907-19
   CH        .10625-08     CHCL3     .23164-15     CH4       .14237-05     CHNO      .55778-07     CHO       .50788-05
   CH2       .52156-09     CH2CL2    .10589-12     CH2O      .20662-06     CH3       .43080-08     CH3CL     .17694-10
   CH4       .87956-09     CN        .49273-07     C2H4      .60120-14     C2H4O     .50464-18     C2N2      .12991-12
   C3O2      .52166-13     C4H2SI    .00000        C4N2      .36796-23     CL        .19762-01     CLHO      .35802-05
   CLH3SI    .00000        CLNO      .14008-07     CLO       .36828-05     CLO2      .12846-10     CLSI      .00000
   CL2H2SI   .00000        CL2O      .11569-10     CL2SI     .00000        CL3HSI    .00000        CL4SI     .00000
   H         .80459-01     HN        .70494-05     HO        .74131-02     HSI       .00000        H2N       .39376-08
   H2O2      .47484-07     H3N       .21441-05     H4N2      .18131-13     H4SI      .00000        N         .76693-05
   NO        .46806-03     NO2       .99751-08     NSI       .00000        N2O       .19283-07     N2O3      .12679-16
   N2O4      .26890-22     N2O5      .10035-26     O         .10040-02     OSI       .00000        O2SI      .00000
   O3        .31641-11     SI        .00000        SI2       .00000        SI3       .00000        CCLO      .16998-05
   CLNO2     .23702-13     HNO       .31141-06     HNO2      .11069-08     HNO3      .78013-14     ALHO      .10207-02
   HO2       .16208-06     NO3       .23454-14     CCL2      .44799-11     CCL3      .10606-14     H2N2      .74808-10
   CN2       .36106-11     C2O       .13467-09     C2H       .13260-10     CSI       .00000        CSI2      .00000
   C2N       .55699-12     C2SI      .00000        NSI2      .00000        C2CL4     .35771-23     C2CL6     .33426-33
   ALO2      .49744-04     C2CL2     .61986-15     C2HCL     .31046-12     CHCL      .79986-10     CL3SI     .00000
   CL2       .10691-04     N2        .91745-01     O2        .93117-04     CNO       .73102-08     N3        .20735-10
   C2H3      .19746-13     C2H6      .39104-18     C3H       .27295-15     C3H2      .10612-16     C3H3      .11610-17
   C3H4      .31700-19     C3H5      .53164-19     C4H       .51075-20     C4H2      .56120-21     ALCLO*    .00000
   CSI*      .00000        CLH4N*    .00000        CLH4NO4*  .00000        ALCL3*    .00000        ALN*      .00000
   AL2O5SI*  .00000        C3AL4*    .00000        H4SI3*    .00000        AL*       .00000        AL2O3*    .15764+00
   O2SI*     .00000        SI*       .00000        AL6O13S*  .00000
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Sample Problem 2 Output (Continued)

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        GRAPHITE SURFACE KINETICS (GASKET)     PROB. 2     4000300*00

DERIVATIVE PROPERTY OUTPUT
 CP-FROZEN    CP-EQUIL   DLNM/DLNT   DLNM/DLNP     GAMMA
  .42208+00   .14694+01  -.95479+00   .55542-01   .11133+01

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP        VISC        COND        DBAR         PR          SC
 .66873+04   .60935-04   .82537-04   .67562-03   .20531+00   .72416+00
   MU1         MU2       MOL.WT        HTIL        CPTIL       HTIL*
 .72372+00   .19211+02   .32842+02   .67796+04   .96604+00   .44566+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .667)
     1           6           7           8          13          17          14         106
  .32478-01   .67853-01   .75171-01   .35979+00   .27332+00   .19138+00   .00000      .00000
  .11435+00   .11673+00   .12993+00   .28765+00   .65560-01   .28578+00   .00000      .00000

SOLUTION TIMES
        ITERATIONS =    6                          TIME =    1.642 SEC.

CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT

  MASS CONDENSED/MASS GAS =     .73616+00
  TEMP =  6687.2614 DEG R.  =  3715.1452 DEG K.      PRESS =     22.91482 ATM

                                   GAS            CONDENSED       COMPOSITE
  ENTHALPY - BTU/LBM              .19543+04       -.46420+04      -.84259+03
  ENTROPY - BTU/LBM DEG R         .30291+01        .96388+00       .21534+01
  DENSITY - LBM/FT3               .88753-01                        .15409+00
  MOLECULAR WEIGHT                18.9163         101.9600         32.8417

  VEL2 =      .1760+04 FT/SEC      MACH2 =     .52408   THETA 2 =    .000000 DEG
 ABOVE ARE STATIC CONDITIONS DOWNSTREAM OF THE SHOCK FOR ....
  VEL1 =  .613+04 FT/SEC  H1-STATIC = -.155+04 BTU/LBM  H-TOT = -.781+03 BTU/LBM
  P1 =       5.49553 ATM   RHO1 =     .44203-01 LBM/FT3 THETA 1 =    .000000 DEG

 STATIC CHEMICAL STATE (MOLE FR.=MOLECULES/TOTAL GAS PHASE MOLECULES)...

    SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.      SPECIES   MOLE FR.
    CO2       .65572-02     H2        .31643+00     H2O       .95764-01     C*        .00000        CLH       .10146+00
    AL        .38066-02     ALN       .34395-06     CH3CL3S   .00000        CO        .17894+00     C2H2      .24690-09
    C         .25328-07     C2        .11888-11     C3        .36136-15     C4        .12391-21     C5        .12456-25
    CAL       .42995-09     ALCL      .31215-01     ALCLO     .59265-02     ALCL2     .75948-02     ALCL3     .93504-04
    ALH       .34166-03     ALHO2     .24153-02     ALO       .23390-02     AL2CL6    .27008-11     AL2O      .13298-02
    AL2O2     .12234-04     CCL       .11578-08     CCLN      .16876-07     CCL2O     .38431-09     CCL4      .14001-17
    CH        .13112-07     CHCL3     .21692-14     CHN       .40659-05     CHNO      .22341-06     CHO       .19150-04
    CH2       .46012-08     CH2CL2    .72123-12     CH2O      .71645-06     CH3       .22819-07     CH3CL     .86581-10
    CH4       .31908-08     CN        .29621-06     C2H4      .67417-13     C2H4O     .15619-16     C2N2      .15312-11
    C3O2      .70543-12     C4H2SI    .00000        C4N2      .36169-21     CL        .23150-03     CLHO      .11745-04
    CLH3SI    .00000        CLNO      .10243-06     CLO       .36222-04     CLO2      .25139-09     CLSI      .00000
    CL2H2SI   .00000        CL2O      .12847-09     CL2SI     .00000        CL3HSI    .00000        CL4SI     .00000
    H         .10940+00     HN        .31834-04     HO        .17250-01     HSI       .00000        H2N       .14683-04
    H2O2      .40452-06     H3N       .57483-05     H4N2      .40745-12     H4SI      .00000        F         .35563-04
    NO        .14605-02     NO2       .10217-06     NSI       .00000        N2O       .12316-06     N2O3      .15545-14
    N2O4      .11272-19     N2O5      .18577-23     O         .34610-02     OSI       .00000        O2SI      .00000
    O3        .11910-09     SI        .00000        SI2       .00000        SI3       .00000        CCLO      .54905-05
    CLNO2     .63045-12     HNO       .19269-05     HNO2      .13443-07     HNO3      .33111-12     ALHO      .28088-02
    HO2       .14622-05     NO3       .13378-12     CCL2      .40636-10     CCL3      .11994-13     H2N2      .72596-09
    CN2       .55106-10     C2O       .14718-08     C2H       .15315-09     CSI       .00000        CSI2      .00000
    C2N       .10102-10     C2SI      .00000        NSI2      .00000        C2CL4     .12619-21     C2CL6     .57432-31
    ALO2      .32283-03     C2CL2     .81011-14     C2HCL     .28981-11     CHCL      .79824-09     CL3SI     .00000
    CL2       .18137-04     N2        .67341-01     O2        .41168-03     CNO       .53474-07     N3        .30164-09
    C2H3      .32188-12     C2H6      .86408-17     C3H       .68220-14     C3H2      .36974-15     C3H3      .39845-16
    C3H4      .11337-17     C3H5      .30216-17     C4H       .38138-18     C4H2      .35184-19     ALCLO*    .00000
    CSI*      .00000        CLH4N4*   .00000        CLH4N04*  .00000        ALCL3*    .00000        ALN*      .00000
    AL2O5SI*  .00000        C3AL4*    .00000        N4SI3*    .00000        AL*       .00000        AL2O3*    .13658+00
    O2SI*     .00000        SI*       .00000        AL6O13S*  .00000
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Sample Problem 2 Output (Continued)

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                    GRAPHITE SURFACE KINETICS (GASKET) SOLUTION          PROB. 2


DERIVATIVE PROPERTY OUTPUT
 CP-FROZEN     CP-EQUIL    DLNM/DLNT    DLNM/DLNP      GAMMA
  .42198+00    .14901+01   -.97911+00    .57415-01    .11137+01

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP          VISC          COND          DBAR          PR           SC
 .67695+04     .61431-04     .82941-04     .59241-03    .20701+00    .72413+00
   MU1           MU2          MOL.WT         HTIL         CPTIL        HTIL*
 .72531+00     .19255+02     .32735+02     .68589+04    .96296+00    .45142+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .667)
     1          6          7          8         13         17         14        106
  .32478-01  .67853-01  .75171-01  .35979+00  .27332+00  .19138+00  .00000    .00000
  .11354+00  .11600+00  .12912+00  .28951+00  .48365-01  .28346+00  .00000    .00000

SOLUTION TIMES
        ITERATIONS =    3                          TIME =     .954 SEC.

CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT

  MASS CONDENSED/MASS GAS =    .72300+00
  TEMP =  6769.4843 DEG R.  =  3760.8246 DEG K.     PRESS =     26.66895 ATM

                                  GAS            CONDENSED       COMPOSITE
  ENTHALPY - BTU/LBM              .19907+04      -.46140+04      -.78073+03
  ENTROPY - BTU/LBM DEG R         .30105+01       .96803+00       .21534+01
  DENSITY - LBM/FT3               .10248+00                       .17658+00
  MOLECULAR WEIGHT                18.9990        101.9600         32.7352

 ABOVE ARE ISENTROPIC STAGNATION CONDITIONS DOWNSTREAM OF THE SHOCK FOR . . .
  VEL1 =  .613+04 FT/SEC   H1-STATIC = -.153+04 BTU/LBM   H-TOT = -.781+03 BTU/LBM
  P1 =      5.49553 ATM    RHO1 =     .44203-01 LBM/FT3    THETA 1 =     .000000 DEG

 ISEN. STAG. CHEMICAL STATE (MOLE FR.=MOLECULES / TOTAL GAS PHASE MOLECULES)..

   SPECIES    MOLE FR.     SPECIES    MOLE FR.     SPECIES    MOLE FR.     SPECIES    MOLE FR.     SPECIES    MOLE FR.
   CO2        .66244-02    H2         .31344+00    H2O        .96757-01    C*         .00000       CLH        .99490-01
   AL         .41177-02    ALN        .41753-06    CH3CL3S    .00000       CO         .17827+00    C2H2       .31299-09
   C          .31162-07    C2         .16515-11    C3         .53108-15    C4         .21172-21    C5         .23125-25
   CAL        .57655-09    ALCL       .32058-01    ALCLO      .61418-02    ALCL2      .77738-02    ALCL3      .95705-04
   ALH        .38606-03    ALHO2      .26195-02    ALO        .26040-02    AL2CL6     .32038-11    AL2O       .14925-02
   AL2O2      .13972-04    CCL        .14413-08    CCLN       .19762-07    CCL2O      .45073-09    CCL4       .18890-17
   CH         .16502-07    CHCL3      .28403-14    CHN        .46268-05    CH4O       .25955-06    CHO        .21769-04
   CH2        .57256-08    CH2CL2     .90902-12    CH2O       .82266-06    CH3        .27663-07    CH3CL      .10615-09
   CH4        .38123-08    CN         .35097-06    C2H4       .91729-13    C2H4O      .23097-16    C2N2       .20210-11
   C3O2       .94123-12    C4H2SI     .00000       C4N2       .61212-21    CL         .25113-01    CLHO       .12976-04
   CLH3SI     .00000       CLNO       .12094-06    CLO        .18052-04    CLO2       .31630-09    CLSI       .00000
   CL2H2SI    .00000       CL2O       .15714-09    CL2SI      .00000       CL3HSI     .00000       CL4SI      .00000
   H          .11054+00    HN         .36137-04    HO         .16184-01    HSI        .00000       H2N        .16675-04
   H2O2       .48268-06    H3N        .64623-05    H4N2       .56597-12    H4SI       .00000       N          .39800-04
   NO         .15772-02    NO2        .12161-06    NSI        .00000       N2O        .14360-06    N2O3       .23112-14
   N2O4       .18551-19    N2O5       .34535-23    O          .37092-02    OSI        .00000       O2SI       .00000
   O3         .15521-09    SI         .00000       SI2        .00000       SI3        .00000       CCLO       .61653-05
   CLNO2      .82745-12    HNO        .22406-05    HNO2       .16511-07    HNO3       .45079-12    ALHO       .30063-02
   HO2        .17225-05    NO3        .18353-12    CCL2       .59759-10    CCL3       .15526-13    H2N2       .90840-09
   CN2        .71735-10    C2O        .16641-08    C2H        .19863-09    CSI        .00000       CSI2       .00000
   C2N        .13594-10    C2SI       .00000       NSI2       .00000       C2CL4      .19262-21    C2CL6      .10207-30
   ALO2       .36435-03    C2CL2      .10809-13    C2HCL      .37568-11    CHCL       .10042-08    CL3SI      .00000
   CL2        .19006-04    N2         .86590-01    O2         .44950-03    CHO        .64254-07    N3         .38382-09
   C2H3       .44419-12    C2H6       .12957-16    C3H        .47754-14    C3H2       .55444-15    C3H3       .60688-16
   C3H4       .17612-17    C3H5       .49639-17    C4H        .62057-18    C4H2       .57383-19    ALCLO*     .00000
   CSI*       .00000       CLH4N*     .00000       CL4N04*    .00000       ALCL3*     .00000       ALN*       .00000
   AL2O5SI*   .00000       C3AL4*     .00000       N4SI3*     .00000       AL*        .00000       AL2O3*     .13472+00
   O2SI*      .00000       SI*        .00000       AL6O13S*   .00000
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Sample Problem 2 Output (Continued)

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        GRAPHITE SURFACE KINETICS (GASKET)     PROB. 2      0090000+00
UPDATE OF DIFFUSION FACTORS
        SPECIES      DIFFUSION FACTOR
         CO2                1.29140
         H2                  .38930
         H2O                 .77490
         CO                 1.01700
         C2H2               1.17460
         C                   .69180
         C2                 1.02530
         CH                  .74920
         CH4                 .93570
         CN                 1.02670
         H                   .30180
         N                   .74930
         NO                  .99810
         O                   .73970
         N2                 1.02620
         O2                 1.00000

DERIVATIVE PROPERTY OUTPUT
 CP-FROZEN    CP-EQUIL    DLNM/DLNT    DLNM/DLNP     GAMMA
 .35736+00   .18551+02   -.39322+01    .90604-01    .99911+00

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP        VISC        COND        DWAR         PR          SC
 .18000+04   .23573-04   .22143-04   .65800-04   .24968+00   .72409+00
   MU1         MU2        POL.WT       WTIL        CPTIL       WTIL*
 .76380+00   .18628+02   .32735+02   .13115+04   .66736+00   .50277+03

ELEMENTAL K ARC Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .667)
     1          6          7          8          13         17         14         106
  .32478-01  .67853-01  .75171-01  .35979+00  .27332+00  .19138+00  .00000     .00000
  .96237-01  .11806+00  .13073+00  .29834+00  .69299-01  .28733+00  .00000     .00000

SOLUTION TIMES
        ITERATIONS =    3                          TIME =      .483 SEC.

CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT

  MASS CONDENSED/MASS GAS =     .72300+00
  TEMP =  1800.0000 DEG R.  =  1000.0000 DEG K.      PRESS =     26.66895 ATM

                                  GAS            CONDENSED       COMPOSITE
  ENTHALPY - BTU/LBM             -.25724+03      -.67396+04       -.29774+04
  ENTROPY - BTU/LBM DEG R         .24231+01       .42230+00        .15835+01
  DENSITY - LBM/FT3               .38543+00                        .66609+00
  MOLECULAR WEIGHT                18.9990        101.9600         32.7352

 CHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHASE MOLECULES).....

   SPECIES   MOLE FR.   SPECIES   MOLE FR.   SPECIES   MOLE FR.   SPECIES   MOLE FR.   SPECIES   MOLE FR.
   CO2       .66244-02  H2        .31944+00  H2O       .96757-01  C*        .00000     CLH       .99990-01
   AL        .41177-02  ALN       .41753-06  CH3CL3S   .00000     CO        .17427+00  C2H2      .31299-09
   C         .31162-07  C2        .16815-11  C3        .53108-15  CN        .21172-21  C5        .23195-25
   CAL       .57655-09  ALCL      .32058-01  ALCLO     .61418-02  ALCL2     .77738-02  ALCL3     .95705-04
   ALH       .38606-03  ALHO2     .26195-02  ALO       .26040-02  AL2CL6    .32038-11  AL2O      .14925-02
   AL2O2     .13972-04  CCL       .19413-08  CCLN      .19762-07  CCL2O     .45073-09  CCL4      .18820-17
   CH        .16502-07  CHCL3     .28403-14  CHN       .48268-05  CHFO      .25955-06  CHO       .21769-04
   CH2       .57256-08  CH2CL2    .90902-12  CH2O      .82266-06  CH3       .27663-07  CH3CL     .10615-09
   CH4       .38123-08  CN        .35097-06  C2H4      .91729-13  C2H4O     .23097-16  C2N2      .20210-11
   C3O2      .94123-12  C4H2ST    .00000     C4O2      .61212-21  CL        .23113-01  CLHO      .12976-04
   CLH3SI    .00000     CLNO      .12094-06  CLO       .18052-04  CLO2      .31630-09  CLSI      .00000
   CL2H2SI   .00000     CL2O      .15714-09  CL2SI     .00000     CL3HSI    .00000     CL4SI     .00000
   H         .11054+00  HN        .36137-04  HO        .18184-01  HSI       .00000     H2N       .16676-04
   H2O2      .48268-06  H3N       .64623-05  H4N2      .56597-12  H4SI      .00000     N         .39800-04
   NO        .15772-03  NO2       .12161-04  NSI       .00000     N2O       .14360-06  N2O3      .23112-14
   N2O4      .18551-19  N2O5      .34535-23  O         .37092-02  OSI       .00000     O2SI      .00000
   O3        .15521-09  SI        .00000     SI2       .00000     SI3       .00000     CCLO      .61695-05
   CLNO2     .82745-12  HNO       .22406-05  HNO2      .16511-07  HNO3      .45079-12  ALHO      .30063-02
   HO2       .17225-05  NO3       .18353-12  CCL2      .50759-10  CCL3      .15528-13  H2N2      .90880-09
   CN2       .71735-10  C2O       .18641-08  C2H       .19463-09  CSI       .00000     CSI2      .00000
   C2N       .13594-10  C2SI      .00000     CSI2      .00000     C2CL4     .19282-21  C2CL6     .10207-30
   ALO2      .36435-03  C2CL2     .10809-13  C2HCL     .37564-11  CHCL      .10042-08  CL3ST     .00000
   CL2       .19006-04  N2        .46990-01  O2        .44950-03  CNO       .64254-07  N3        .38382-09
   C2H3      .44419-12  C2H6      .12457-16  C3H       .97754-14  C3H2      .55444-15  C3H3      .60639-16
   C3H4      .17612-17  C3H5      .49639-17  C4H       .62057-18  C4H2      .57383-19  ALCLO*    .00000
   CSI*      .00000     CLH4N*    .00000     CLH4NO4*  .00000     ALCL3*    .00000     ALN*      .00000
   AL2O5SI*  .00000     C3AL4*    .00000     N4SI3*    .00000     AL*       .00000     AL2O3*    .13972+00
   O2SI*     .00000     SI*       .00000     AL6O13S*  .00000
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Sample Problem 2 Output (Continued)

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        CP-FROZEN=   .37638+00

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP        VISC        COND        DBAR        PR          SC
 .21608+04   .26088-04   .25662-04   .89090-04   .39318+00   .72457+00
   RU1         RU2        MOL.WT       HTIL        CPTIL       HTIL0
 .83987+00   .20538+02   .25884+02  -.11410+04   .68087+00  -.13330+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .667)
     1           6           7           8          13          17          14         106
  .00009-01   .10165+00   .11071+00   .24012+00   .98337-01   .40033+00   .50674-05   .00000
  .96235-01   .11809+00   .13073+00   .29833+00   .69295-01   .28731+00   .46902-05   .00000

SOLUTION TIMES
        ITERATIONS =   29                          TIME =    9.589 SEC.

OPEN SYSTEM CHEMICAL KINETICS SOLUTION OUTPUT

 SURFACE IS SIC/PG
 MASS TRANSFER COEFFICIENT ROUGH =    .46300+00
 RHO V WALL/RHOE UE CM =    .44639-04    HERIME =    .44639-04

 STATE ADJACENT TO THE SURFACE . . . .
  TEMP =  2160.0000 DEG R =  1200.0000 DEG K     PRESS =     26.66895 ATM

                                 GAS            CONDENSED       COMPOSITE
 ENTHALPY - BTU/LBM            -.15525+04        .00000          -.15525+04
 ENTROPY - BTU/LBM DEG R        .20017+01        .00000           .00000
 DENSITY - LBM/FT3              .43759+00                         .43759+00
 MOLECULAR WEIGHT               25.8842          .0000            25.8842


 NET FORWARD RATE OF KINETICALLY CONTROLLED REACTIONS
  (MOLES OF REACTION / UNIT SURFACE AREA / TIME / RHOE UE CM). . . .
 1=   .59581-06  2=   .27601-05  3=   .21504-10  4=   .21079-23  5=   .16877-26
 6=   .66781-26  7=   .60427-32  8=   .50836-34

RATIO OF FORWARD TO REVERSE KINETICALLY CONTROLLED PRODUCTION RATES
 1=   .32888+01  2=   .32888+01  3=   .10816+02  4=   .32888+01  5=   .10816+02
 6=   .35572+02  7=   .42073-04  8=   .35184-06

 CHEMICAL STATE ADJACENT TO THE SURFACE
  (MOLE FR FOR GASES = MOLECULES / TOTAL GAS MOLECULES )
  (MOLE FR FOR CONDENSED = BRIEF CONDENSED ). . . .

   SPECIES   MOLE FR.     SPECIES   MOLE FR.     SPECIES   MOLE FR.     SPECIES   MOLE FR.     SPECIES   MOLE FR.
   CO2       .40879-01    H2        .42502+00    H2O       .15113+00    CO        .00000       CLH       .10230-01
   AL        .27935-14    ALN       .20656-21    CH3CL3S   .21331-09    CO        .15557+00    C2H2      .47929-08
   C         .12600-24    C2        .15941-28    C3        .47686-27    C4        .13707-34    C5        .52747-35
   CAL       .74628-28    ALCL      .57369-06    ALCLO     .15827-05    ALCL2     .97685-03    ALCL3     .88782-01
   ALH       .35058-13    ALHO2     .74119-06    ALO       .10329-14    AL2CL6    .22904-02    AL2O      .77151-11
   AL2O2     .28495-12    CCL       .21845-23    CCLN      .11774-11    CCL2O     .62767-14    CCL4      .98809-27
   CH        .38662-21    CHCL3     .42540-19    CHN       .46419-05    CHNO      .12279-06    CHO       .66837-09
   CH2       .28693-15    CH2CL2    .12754-12    CH2O      .18304-05    CH3       .30078-07    CH3CL     .11247-06
   CH4       .22592-01    CN        .43916-15    C2H4      .56033-06    C2H4O     .54886-14    C2N2      .56047-13
   C3O2      .26131-12    C4H2ST    .21327-15    C4N2      .12867-21    CL        .53377-09    CLHO      .62041-13
   CLH3SI    .13848-05    CLNO      .14849-19    CLO       .92521-19    CLO2      .47599-31    CLSI      .31085-14
   CL2H2SI   .47989-07    CL2O      .23641-27    CL2SI     .11439-07    CL3HSI    .39014-07    CL4ST     .56891-06
   H         .24800-07    HN        .40759-14    HO        .67977-10    HSI       .53955-16    H2N       .40564-09
   H2O2      .16386-16    H3N       .44867-03    HNN2      .14564-14    H4SI      .72323-10    F         .25939-18
   NO        .14821-12    NO2       .23967-22    NSI       .11081-16    N2O       .16621-16    N2O3      .00000
   N2O4      .00000       N2O5      .00000       O         .42029-17    OSI       .25232-05    O2SI      .42141-09
   O3        .53704-36    SI        .98690-18    SI2       .14701-26    SI3       .31258-32    CCLO      .22529-10
   CLNO2     .50891-31    HNO       .15797-15    HNO2      .62473-20    HNO3      .22189-30    ALHO      .15982-06
   HO2       .11399-20    NO3       .58541-37    CCL2      .37581-21    CCL3      .75063-24    H2N2      .86176-15
   CN2       .37960-20    C2O       .12163-16    C2H       .12695-15    CSI       .11571-27    CSI2      .29665-24
   C2N       .18942-19    C2SI      .66610-23    HSI2      .21522-21    C2CL4     .21728-29    C2CL6     .00000
   ALO2      .38095-15    C2CL2     .36320-20    C2HCL     .12642-13    CHCL      .11958-18    CL3SI     .93370-07
   CL2       .32313-12    N2        .10206+00    O2        .76456-18    CHO       .33204-15    H3        .12775-21
   C2H3      .50928-12    C2H6      .27511-05    C3H       .95214-18    C3H2      .14913-16    C3H3      .19866-13
   C3H4      .77395-11    C3H5      .58912-09    C4H       .10980-21    C4H2      .23952-17
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Sample Problem 2 Output (Concluded)

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GRAPHITE SURFACE KINETICS (GARNET)    PROB. 2     5002000+40

 CP-FROZEN=   .38033+00

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP        VISC        COND        DHAR        PP          SC
 .25200+04   .29698-04   .29248-04   .11499-03   .38617+00   .72471+00
   RU1         RU2        MOL.WT       HTIL        CPTIL       HTIL0
 .82010+00   .20169+02   .24940+02  -.75176+03   .70007+00  -.10096+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEA =  .667)
     1          6          7          8         13         17         19        106
   .47829-01  .10288+00  .11222+00  .24211+00  .98068-01  .39687+00  .35932-04  .00000
   .96221-01  .11832+00  .13069+00  .29824+00  .69266-01  .28720+00  .35948-04  .00000

SOLUTION TIMES
      ITERATIONS =   11                          TIME =    3.675 SEC.

OPEN SYSTEM CHEMICAL KINETICS SOLUTION OUTPUT

 SURFACE IS SIC/PG
 MASS TRANSFER COEFFICIENT RHOUE =     .46300+00
 RHO V WALL/RHOE UE CM =     .33747-03   RPRIME =     .33747-03

 STATE ADJACENT TO THE SURFACE . . . .
  TEMP =  2520.0000 DEG R =  1400.0000 DEG K      PPESS =      26.66895 ATM

                                  GAS            CONDENSED        COMPOSITE
 ENTHALPY - BTU/LBM             -.13133+04        .00000          -.13133+04
 ENTROPY - BTU/LBM DEG R         .20949+01        .00000           .00000
 DENSITY - LBM/FT3               .36139+00                         .36139+00
 MOLECULAR WEIGHT                24.9401          .0000            24.9401

 NET FORWARD RATE OF KINETICALLY CONTROLLED REACTIONS
  (MOLES OF REACTION / UNIT SURFACE AREA / TIME / RHOE UE CM). . . .
  1=   .53828-05  2=   .19761-04  3=   .58105-09  4=   .76104-14  5=   .27709-21
  6=   .66291-21  7=   .58943-26  8=   .55636-28

RATIO OF FORWARD TO REVERSE KINETICALLY CONTROLLED PRODUCTION RATES
 1=   .16799+02  2=   .15789+02  3=   .20188+03  4=   .16789+02  5=   .20188+03
 6=   .47325+04  7=   .39939+02  8=   .37005+00

 CHEMICAL STATE ADJACENT TO THE SURFACE
  (MOLE FR FOR GASES = MOLECULES / TOTAL GAS MOLECULES )
  (MOLE FR FOR CONDENSED = MPRIME CONDENSED ). . . .

   SPECIES   MOLE FR.     SPECIES   MOLE FR.     SPECIES   MOLE FR.     SPECIES   MOLE FR.     SPECIES   MOLE FR.
   CO2       .26909-01    H2        .49322+00    H2O       .15805+00    E-        .00000       CLH       .14994-01
   AL        .67689-11    ALH       .23031-17    CH3CL3S   .64615-11    CO        .16533+00    C2H2      .46001-08
   C         .71227-21    C2        .96739-25    C3        .37354-24    C4        .20939-31    C5        .17944-32
   CAL       .61081-28    ALCL      .33044-04    ALCL0     .53675-09    ALCL2     .73661-02    ALCL3     .82370-01
   ALH       .32045-10    ALHO2     .21987-04    ALO       .24668-11    AL2CL4    .40569-09    AL2O      .17494-07
   AL2O2     .40251-09    CCL       .30851-20    CCLN      .53461-11    CCL2O     .50494-13    CCL4      .51203-25
   CH        .37331-18    CHCL3     .32716-18    CHN       .61937-05    CHFO      .16705-06    CHO       .71289-08
   CH2       .13582-13    CH2CL2    .18331-12    CH2O      .19100-05    CH3       .44150-07    CH3CL     .31491-07
   CH4       .13096-02    CN        .41820-13    C2H4      .59772-07    C2H4O     .28137-14    C2N2      .10359-12
   C3O2      .50618-12    C4H2SI    .72869-20    C4H2      .41494-21    CL        .17607-07    CLHO      .27393-11
   CLH3SI    .74722-06    CLNO      .54314-17    CLO       .66143-16    CLO2      .11439-26    CLSI      .44140-12
   CL2H2SI   .29148-07    CL2O      .80466-24    CL2SI     .53279-07    CL3HSI    .14799-07    CL4SI     .77215-07
   H         .62602-06    HF        .52724-12    HO        .37417-18    HSI       .19864-13    H2N       .42640-08
   H2O2      .21820-14    H3N       .21338-03    H4N2      .76146-14    H4SI      .19655-09    N         .23922-15
   NO        .16626-10    NO2       .36302-19    NSI       .37674-14    N2O       .17002-14    N2O3      .32049-36
   N2O4      .00000       N2O5      .00000       O         .49271-14    OSI       .30438-04    O2SI      .88956-08
   O3        .12666-30    SI        .10789-14    SIF       .25627-22    SIH       .13783-27    CCLO      .29989-09
   CLNO2     .33835-27    HNO       .19762-13    HNO2      .15634-17    HNO3      .99422-27    ALHO      .78811-05
   HO2       .14327-17    NO3       .50183-32    FCL2      .69750-19    FCL3      .80622-22    H2N2      .17055-13
   CN2       .66883-18    C2O       .67402-15    C2N       .43193-14    CSI       .12032-23    CSI2      .34592-21
   C2N       .21770-17    C2SI      .26116-20    N3I2      .19772-18    C2CL4     .73178-29    C2CL6     .00000
   ALO2      .62453-12    C2Cl2     .99425-19    C2HCL     .57945-13    CHCL      .15645-16    CL3SI     .90011-07
   CL2       .98299-11    N2        .99785-01    O2        .73650-15    CNO       .19865-13    F2        .50247-19
   C2H3      .90876-12    C2HE      .20960-07    C3H       .14012-16    C3H2      .65019-16    C3H3      .12812-13
   C3H4      .70265-12    C3H5      .27060-10    C4H       .16975-20    C4H2      .29155-17
```

Sample Problem 3

In this problem, all options which require the input of thermophysical properties are utilized. The surface material option of carbon/carbon 901 is used. The edge thermodynamic state (2805.81°K and 12.778 atm) is input directly. Diffusion factors for 16 selected species are input. Preexponential factors, activation energies, and temperature exponents are input for each of the eight possible kinetically controlled reactions, and inhibiting coefficients are input only for the three oxidation reactions. Finally, two frozen-edge temperatures and two surface temperatures are input to be used in lieu of the corresponding built-in temperature arrays.

Listing of Input

```
 1.   0037223400  2805.81   12.778     0.0        0.0      0.246      0.       PROB. 5
 2.     1000.
 3.     1500.
 4.
 5.     1200.
 6.     1400.
 7.
 8.     5
 9.     1 HYDROGEN      1.008      3.6732
10.     6 CARBON       12.011      1.6865                1.0
11.     7 NITROGEN     14.007      1.2430
12.     8 OXYGEN       16.000      3.6376
13.     9 FLUORINE     19.000      0.022683
14.    16
15.   C            0.69180CH            0.74920CH4           0.93570CN            1.02670
16.   CO           1.01700CO2           1.29140C2H2          1.17460H             0.30180
17.   H2           0.38930H2O           0.77490N             0.74930NO            0.99810
18.   N2           1.026200             0.7397002            1.00000C2            1.02530
19.     1  6  2  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          CO2
20.   -940539+5 366362+5 130735+2 733664-3-754525+6 798849+2  500. 2500.1  -0.CO2
21.   -940539+5 365610+5 142661+2 209831-3-233974+5 798583+2 2500. 6000.1  -0.CO2
22.     2  1  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          H2
23.   -996  0+0 212685+5 626264+1 934668-3 610915+5 484856+2  500. 2500.1  -0.H2
24.   -996  0+0 212227+5 800304+1 362 19-3-186878+7 484694+2 2500. 6000.1  -0.H2
25.     2  1  1  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          H2O
26.   -577979+5 303898+5 847497+1 183253-2-305370+6 684879+2  500. 2500.1  -0.H2O
27.   -577979+5 302496+5 132  8+2 231126-3-481992+7 684385+2 2500. 6000.1  -0.H2O
28.     1  6  1  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          CO
29.   -264169+5 224202+5 779944+1 441449-3-262 21+6 653923+2  500. 2500.1  -0.CO
30.   -264169+5 223744+5 866947+1 865971-4-155178+6 653761+2 2500. 6000.1  -0.CO
31.     1106  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          C*
32.      0  0+0 144476+5 550390+1 240 14-3-559635+6 121418+2  500. 2500.2  -0.C*
33.      0  0+0 144197+5 526395+1 216128-3 131328+7 121316+2 2500. 6000.2  -0.C*
34.     1 17  1  1  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/64          CLH
35.   -220629+5 219473+5 705592+1 710907-3-136296+6 623935+2  500. 2500.1  -0.CLH
36.   -220629+5 218861+5 863363+1 132815-3-964314+6 623719+2 2500. 6000.1  -0.CLH
37.     1  9  1  1  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/68          FH
38.   -651399+5 211218+5 641313+1 828856-3 246795+5 587192+2  500. 2500.1  -0.FH
39.   -651399+5 210703+5 855858+1 138134-3-259239+7 587 11+2 2500. 6000.1  -0.FH
40.     1 13  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/65          AL
41.    779999+5 134785+5 491860+1 303528-4 233929+5 508505+2  500. 2500.1  -0.AL
42.    779999+5 134527+5 362 42+1 277499-3 427534+7 508413+2 2500. 6000.1  -0.AL
43.     1 13  1  7  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/67          ALN
44.    104  0+6 239 70+5 883244+1 131622-3-147554+6 703673+2  500. 2500.1  -0.ALN
45.    104  0+6 239 17+5 891661+1 946575-4-146 36+6 703654+2 2500. 6000.1  -0.ALN
46.     2  7  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 **/61          N2
47.   -110  0+0 222368+5 760394+1 501467-3-234708+6 637903+2  500. 2500.1  -0.N2
48.   -110  0+0 221842+5 858948+1 972320-4-781411+5 637717+2 2500. 6000.1  -0.N2
49.     1  6  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          C
50.    170885+6 135249+5 486179+1 753554-4 220874+5 492786+2  500. 2500.1  -0.C
51.    170885+6 135492+5 514716+1 766698-4-178159+7 492872+2 2500. 6000.1  -0.C
52.     1 13  1 17  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/64          ALCLO
53.   -831999+5 392 76+5 147925+2 416648-4-332546+6 920467+2  500. 2500.1  -0.ALCLO
54.   -831999+5 392 19+5 148786+2 385241-5-279308+6 920447+2 2500. 6000.1  -0.ALCLO
```

```
55.     1  1  1  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/70          HO
56.    949199+4 214896+5 657920+1 822769-3-430 21+4 613838+2  500. 2500.1  -0.HO
57.    949199+4 214299+5 651949+1 158668-3-175457+7 613627+2 2500. 6000.1  -0.HO
58.     1  7  3  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/64          HO3
59.    169999+5 498701+5 151696+2 260574-3-112525+7 999138+2  500. 2500.1  -0.HO3
60.    169999+5 498363+5 197111+2 240799-4-814340+6 999 18+2 2500. 6000.1  -0.HO3
61.     2 17  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 **/60          CL2
62.   -856  0+0 243985+5 893363+1 117741-3-936824+5 737499+2  500. 2500.1  -0.CL2
63.   -856  0+0 244366+5 970592+1 390773-4-369 14+7 737629+2 2500. 6000.1  -0.CL2
64.     1 13  1 17  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/70          ALCL
65.   -122999+5 244516+5 686635+1 152881-3-556228+5 750155+2  500. 2500.1  -0.ALCL
66.   -122999+5 244161+5 636523+1 671716-3 746942+7 750 29+2 2500. 6000.1  -0.ALCL
67.     1 13  2 17  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/64          ALCL2
68.   -749999+5 370950+5 138891+2 809140-5-159614+6 100 56+3  500. 2500.1  -0.ALCL2
69.   -749999+5 370939+5 139 46+2 943852-6-145 21+6 100 56+3 2500. 6000.1  -0.ALCL2
70.     1 13  3 17  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/70          ALCL3
71.   -139699+6 528127+5 198157+2 198316-4-283668+6 119442+3  500. 2500.1  -0.ALCL3
72.   -139699+6 528101+5 198586+2 193  1-5-254299+6 119441+3 2500. 6000.1  -0.ALCL3
73.     1 13  1  1  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/63          ALH
74.    619999+5 234264+5 830955+1 388206-3-301523+6 638427+2  500. 2500.1  -0.ALH
75.    619999+5 233986+5 881 31+1 179608-3-171890+6 636329+2 2500. 6000.1  -0.ALH
76.     1 13  1  1  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/67 ALOH    ALHO
77.   -429999+5 343471+5 118221+2 100 86-2-796926+6 761703+2  500. 2500.1  -0.ALHO
78.   -429999+5 342521+5 143840+2 742179-4-236113+7 761368+2 2500. 6000.1  -0.ALHO
79.     1 13  1  1  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/64 HALO    ALHO
80.    799999+4 367950+5 139537+2 348155-3-922 73+6 803765+2  500. 2500.1  -0.ALHO
81.    799999+4 367512+5 146970+2 308785-4-610437+6 803610+2 2500. 6000.1  -0.ALHO
82.     1 13  1  1  2  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/68          ALHO2
83.   -109999+6 481622+5 171817+2 876461-3-817293+6 990138+2  500. 2500.1  -0.ALHO2
84.   -109999+6 480780+5 194272+2 643 25-4-213 59+7 989840+2 2500. 6000.1  -0.ALHO2
85.     1 13  1  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  5/70          ALO
86.    159999+5 270984+5 742567+1 160497-2-490781+5 733871+2  500. 2500.1  -0.ALO
87.    199999+5 268595+5 119322+2-233234-3 584842+6 733 26+2 2500. 6000.1  -0.ALO
88.     1 13  2  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/68          ALO2
89.   -439999+5 389593+5 147 25+2 796767-4-397899+6 908887+2  500. 2500.1  -0.ALO2
90.   -439999+5 389426+5 139242+2 224352-3 220592+7 908827+2 2500. 6000.1  -0.ALO2
91.     2 13  6 17  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/70          AL2CL6
92.   -309639+6 116239+6 436264+2 340883-4-610803+6 211228+3  500. 2500.1  -0.AL2CL6
93.   -309639+6 116234+6 436956+2 328312-5-559560+6 211226+3 2500. 6000.1  -0.AL2CL6
94.     2 13  1  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/65          AL2O
95.   -313999+5 363617+5 137284+2 678596-4-371343+6 920268+2  500. 2500.1  -0.AL2O
96.   -313999+5 363529+5 138685+2 632719-5-285 47+6 920207+2 2500. 6000.1  -0.AL2O
97.     2 13  2  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/65          AL2O2
98.   -969999+5 505329+5 193485+2 194849-3-947805+6 104307+3  500. 2500.1  -0.AL2O2
99.   -969999+5 505 76+5 197524+2 178859-4-707671+6 104298+3 2500. 6000.1  -0.AL2O2
100.    1  6  1 13  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/63          CAL
101.   164799+6 241619+5 688853+1 127808-3-150 98+6 734958+2  500. 2500.1  -0.CAL
102.   164799+6 241593+5 893143+1 109290-3-128839+6 734948+2 2500. 6000.1  -0.CAL
103.    1  6  1 17  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/69          CCL
104.   119999+6 240456+5 883715+1 138774-3-161675+6 736276+2  500. 2500.1  -0.CCL
105.   119999+6 240350+5 811612+1 287235-3 202505+7 736238+2 2500. 6000.1  -0.CCL
106.    1  6  1 17  1  7  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/66          CCLN
107.   329699+5 387396+5 136 17+2 729482-3-483699+6 876548+2  500. 2500.1  -0.CCLN
108.   329699+5 386873+5 146601+2 308 68-3-514152+6 876363+2 2500. 6000.1  -0.CCLN
109.    1  6  1 17  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/65          CCLO
110.   -149999+5 355636+5 130444+2 309923-3-411862+6 926801+2  500. 2500.1  -0.CCLO
111.   -149999+5 355269+5 137371+2 257704-4-301705+6 926670+2 2500. 6000.1  -0.CCLO
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112.    1  6  2 17  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/68          CCL2
113.   569999+5 403610+5 143521+2 703546-3-636557+6 957249+2  500. 2500.1  -0.CCL2
114.   569999+5 401173+5 142490+2-156868-5 110255+8 956386+2 2500. 6000.1  -0.CCL2
115.    1  6  2 17  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/61          CCL2O
116.  -525999+5 506522+5 189516+2 332 45-3-752370+6 108915+3  500. 2500.1  -0.CCL2O
117.  -525999+5 506119+5 198832+2 280999-4-575524+6 108904+3 2500. 6000.1  -0.CCL2O
118.    1  6  3 17  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/70          CCL3
119.   189999+5 519270+5 196590+2 792656-4-546778+6 113779+3  500. 2500.1  -0.CCL3
120.   189999+5 519166+5 198218+2 743343-5-442199+6 113775+3 2500. 6000.1  -0.CCL3
121.    1  6  4 17  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/68          CCL4
122.  -229999+5 677152+5 256419+2 714623-4-659515+6 130 40+3  500. 2500.1  -0.CCL4
123.  -229999+5 677 59+5 257890+2 656752-5-564403+6 130 37+3 2500. 6000.1  -0.CCL4
124.    1  6  1  1  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/67           CH
125.   141999+6 236493+5 684765+1 122313-2-157221+6 623591+2  500. 2500.1  -0.CH
126.   141999+6 235  6+5 959410+1 141 78-3 834614+6 622866+2 2500. 6000.1  -0.CH
127.    1  6  1  1  1 17  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/69          CHCL
128.   799999+5 373682+5 145125+2 302110-3-131 944+7 851119+2  500. 2500.1  -0.CHCL
129.   799999+5 372174+5 134606+2 112657-3 822341+7 850565+2 2500. 6000.1  -0.CHCL
130.    1  6  1  1  3 17  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/68         CHCL3
131.  -246599+5 635456+5 232 42+2 891117-3-116712+7 121166+3  500. 2500.1  -0.CHCL3
132.  -246599+5 634516+5 253684+2 680740-4-183336+7 121133+3 2500. 6000.1  -0.CHCL3
133.    1  6  1  1  1  7  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/69          CHN
134.   322999+5 350311+5 115170+2 121972-2-607975+6 754838+2  500. 2500.1  -0.CHN
135.   322999+5 349247+5 147715+2 871 50-4-325134+7 754462+2 2500. 6000.1  -0.CHN
136.    1  6  1  1  1  7  1  8  0  0  0  0  0  0JANAF TAPE 7/71 12/70         CHNO
137.  -242999+5 463936+5 159 26+2 131 62-2-938162+6 930 47+2  500. 2500.1  -0.CHNO
138.  -242999+5 462643+5 192  3+2 974790-4-259329+7 929589+2 2500. 6000.1  -0.CHNO
139.    1  6  1  1  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/70          CHO
140.   103999+5 330286+5 114114+2 898575-3-729166+6 794  0+2  500. 2500.1  -0.CHO
141.   103999+5 329424+5 133135+2 164370-3-114482+7 793695+2 2500. 6000.1  -0.CHO
142.    1  6  2  1  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/69           CH2
143.   920699+5 339279+5 108245+2 148288-2-784969+6 689918+2  500. 2500.1  -0.CH2
144.   920699+5 337799+5 145532+2 106718-3-258669+7 689395+2 2500. 6000.1  -0.CH2
145.    1  6  2  1  2 17  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/68         CH2CL2
146.  -228999+5 597425+5 208 33+2 169827-2-155760+7 110247+3  500. 2500.1  -0.CH2CL2
147.  -228999+5 595657+5 249576+2 128117-3-298829+7 110185+3 2500. 6000.1  -0.CH2CL2
148.    1  6  2  1  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          CH2O
149.  -275999+5 440617+5 146557+2 179555-2-142597+7 849849+2  500. 2500.1  -0.CH2O
150.  -275999+5 438655+5 185280+2 138986-3-224412+7 849156+2 2500. 6000.1  -0.CH2O
151.    1  6  3  1  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  5/69           CH3
152.   348199+5 429495+5 130653+2 224651-2-975622+6 786134+2  500. 2500.1  -0.CH3
153.   348199+5 427268+5 187455+2 164158-3-393997+7 785354+2 2500. 6000.1  -0.CH3
154.    1  6  3  1  1 17  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/64         CH3CL
155.  -206599+5 563830+5 184696+2 248246-2-181714+7 975262+2  500. 2500.1  -0.CH3CL
156.  -206599+5 561252+5 245600+2 186431-3-400629+7 974351+2 2500. 6000.1  -0.CH3CL
157.    1  6  4  1  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          CH4
158.  -178949+5 535392+5 161977+2 324522-2-191745+7 827619+2  500. 2500.1  -0.CH4
159.  -178949+5 532 32+5 241785+2 242162-3-487445+7 826431+2 2500. 6000.1  -0.CH4
160.    1  6  1  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/69           CN
161.   104  0+6 231992+5 722591+1 901725-3-143911+6 669577+2  500. 2500.1  -0.CN
162.   104  0+6 232642+5 118745+2-654511-4-140858+6 669809+2 2500. 6000.1  -0.CN
163.    1  6  1  7  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/70          CNO
164.   380999+5 370504+5 136709+2 446500-3-718686+6 850301+2  500. 2500.1  -0.CNO
165.   380999+5 369913+5 142307+2 129228-3 739573+6 850 92+2 2500. 6000.1  -0.CNO
166.    1  6  2  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/70 NCN     CN2   NCN
167.   112999+6 377350+5 141690+2 272475-3-661240+6 844463+2  500. 2500.1  -0.CN2   NCN
168.   112999+6 376945+5 143532+2 104945-3 804991+6 844320+2 2500. 6000.1  -0.CN2   NCN
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169.    2  6  2 17  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/68          C2CL2
170.   500999+5 532754+5 195665+2 457680-3-617312+6 108571+3  500. 2500.1  -0.C2CL2
171.   500999+5 532228+5 206159+2 369235-4-601396+6 108552+3 2500. 6000.1  -0.C2CL2
172.    2  6  1  1  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/68          C2H
173.   113399+6 356561+5 113 96+2 142644-2-495 54+6 773461+2  500. 2500.1  -0.C2H
174.   113999+6 356400+5 172 51+2-959518-4-135545+8 773405+2 2500. 6000.1  -0.C2H
175.    2  6  1  1  1 17  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/68          C2HCL
176.   510999+5 502940+5 175238+2 110696-2-764412+6 976 67+2  500. 2500.1  -0.C2HCL
177.   510999+5 501839+5 203 48+2 815 85-4-212305+7 977678+2 2500. 6000.1  -0.C2HCL
178.    2  6  2  1  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          C2H2
179.   541499+5 484894+5 152700+2 213368-2-903550+6 850523+2  500. 2500.1  -0.C2H2
180.   541699+5 483179+5 199610+2 451477-3-385982+7 849917+2 2500. 6000.1  -0.C2H2
181.    2  6  4  1  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/65          C2H4
182.   125399+5 679 30+5 218640+2 333365-2-238541+7 101592+3  500. 2500.1  -0.C2H4
183.   125399+5 675604+5 300938+2 248653-3-561539+7 101471+3 2500. 6000.1  -0.C2H4
184.    2  6  4  1  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/65          C2H4O
185.  -125799+5 818211+5 274248+2 348693-2-305 39+7 11[illegible]88+3  500. 2500.1  -0.C2H4O
186.  -125799+5 814570+5 359562+2 263589-3-597760+7 1[illegible]60+3 2500. 6000.1  -0.C2H4O
187.    2  6  1  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/67          C2N
188.   132999+6 384863+5 145417+2 135841-3-514611+6 566366+2  500. 2500.1  -0.C2N
189.   132999+6 384653+5 145978+2 586896-4 340163+6 866291+2 2500. 6000.1  -0.C2N
190.    2  6  2  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          C2N2
191.   738699+5 512470+5 183275+2 889 50-[illegible]871640+6 985977+2  500. 2500.1  -0.C2N2
192.   738699+5 511460+5 203898+2 704562-4-970377+6 985620+2 2500. 6000.1  -0.C2N2
193.    2  6  1  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/66          C2O
194.   684999+5 387544+5 135167+2 852350-3-613 11+6 864985+2  500. 2500.1  -0.C2O
195.   684999+5 386404+5 159616+2-101 89-3-996533+6 864582+2 2500. 6000.1  -0.C2O
196.    3  6  2  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  5/68          C3O2
197.  -223799+5 654763+5 237207+2 109673-2-134954+7 117669+3  500. 2500.1  -0.C3O2
198.  -223799+5 653493+5 262285+2 885573-4-127 91+7 117624+3 2500. 6000.1  -0.C3O2
199.    1  1  4  6  0  0  0  0  0  0  0  0  0  0DOUFF BAUER 6/61               C4H
200.   155196+6 645030+5 252172+2 574336-3-339547+7 113166+3  500. 3000.1   0.C4H
201.   155196+6 645030+5 249358+2 402513-3 377676+7 113166+3 3000. 5000.1   0.C4H
202.    2  1  4  6  0  0  0  0  0  0  0  0  0  0DOUFF BAUER 6/61               C4H2
203.   111715+6 763230+5 298897+2 735927-3-430646+7 119311+3  500. 3000.1   0.C4H2
204.   111715+6 763230+5 301707+2 456896-3 698124+6 119311+3 3000. 5000.1   0.C4H2
205.    4  6  2  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          C4N2
206.   127499+6 803415+5 289 30+2 136592-2-148718+7 133142+3  500. 2500.1  -0.C4N2
207.   127499+6 801850+5 320530+2 108998-3-153471+7 133 86+3 2500. 6000.1  -0.C4N2
208.    1 17  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          CL
209.   289219+5 140 53+5 540852+1-150184-3 383675+5 516149+2  500. 2500.1  -0.CL
210.   289219+5 140216+5 505231+1-122307-4 109189+6 516206+2 2500. 6000.1  -0.CL
211.    1 17  1  1  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71  5/61          CLHO
212.  -219999+5 330445+5 112679+2 836916-3-437594+6 628621+2  500. 2500.1  -0.CLHO
213.  -219999+5 329709+5 134941+2 595757-4-220546+7 828361+2 2500. 6000.1  -0.CLHO
214.    1 17  1  7  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/65          CLNO
215.   123699+5 371577+5 150871+2 660746-3-440665+6 925616+2  500. 2500.1  -0.CLNO
216.   123699+5 371223+5 137464+2 389803-3-328211+6 925491+2 2500. 6000.1  -0.CLNO
217.    1 17  1  7  2  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/65          CLNO2
218.   289999+4 499998+5 168 21+2 389864-3-948939+6 105 93+3  500. 2500.1  -0.CLNO2
219.   289999+4 499513+5 196438+2 340266-4-649294+6 105 76+3 2500. 6000.1  -0.CLNO2
220.    1 17  1  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  5/61          CLO
221.   241919+5 240629+5 885614+1 142476-3-179885+6 740955+2  500. 2500.1  -0.CLO
222.   241919+5 240587+5 892285+1 113191-3-139289+6 740940+2 2500. 6000.1  -0.CLO
223.    1 17  2  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          CLO2
224.   249999+5 366  7+5 135732+2 299167-3-514181+6 911417+2  500. 2500.1  -0.CLO2
225.   249999+5 365846+5 138352+2 185627-3-377 66+6 911360+2 2500. 6000.1  -0.CLO2
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226.    2 17  1  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/65          CL20
227.   20999+5 36728+5 10642+2 25356-4-274 23+6 94636+2  500. 2500.1  -0.CL20
228.   20999+5 36724+5 13894+2 281708-5-23677+6 94635+2 2500. 6000.1  -0.CL20
229.    1  1  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/65          H
230.   52099+5 13423+5 49674+1 396467-6 11896+1 38627+2  500. 2500.1  -0.H
231.   52099+5 13422+5 49674+1 921 55-6 23245+3 38627+2 2500. 6000.1  -0.H
232.    1  1  1  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/65          H5
233.   80999+5 21853+5 66559+1 797250-3-9[illegible]+5 60957+2  500. 2500.1  -0.H
234.   80999+5 21791+5 661 1+1 168 34-3-13475+7 60956+2 2500. 6000.1  -0.H
235.    1  1  1  7  1  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/63          HN0
236.   23799+5 [illegible] 11671+2 669626-3-6870[illegible]+6 70431+2  500. 2500.1  -0.HN0
237.   23799+5 32790+5 13457+2 66549[illegible]-4-11758+7 7[illegible]+2 2500. 6000.1  -0.HN0
238.    1  1  1  7  2  2  0  0  0  0  0  0  0  0JANAF TAPE 7/71  5/63 TRANS   HN02  TR
239.  -18839+5 47029+5 16511+2 110 24-2-552 79+6 96340+2  500. 2500.1  -0.HN02  TR
240.  -18839+5 46922+5 193 31+2 834 45-4-24954+7 96[illegible] 26+2 2500. 6000.1  -0.HN02  TR
241.    1  1  1  7  3  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/63          HN03
242.  -42099+5 61092+5 21962+2 128411-2-15232+7 11091+3  500. 2500.1  -0.HN03
243.  -42099+5 60961+5 25155+2 987509-4-28575+7 11066+3 2500. 6000.1  -0.HN03
244.    1  1  2  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/64          HO2
245.   49999+4 42652+5 11132+2 908314-3-58226+6 80021+2  500. 2500.1  -0.HO2
246.   49999+4 32564+5 13451+2 664851-4-19250+7 79990+2 2500. 6000.1  -0.HO2
247.    2  1  1  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/65          H2N
248.   40059+5 30776+5 931217+1 150567-2-475 47+6 70228+2  500. 2500.1  -0.H2N
249.   40059+5 30632+5 13169+2 107546-3-27345+7 70176+2 2500. 6000.1  -0.H2N
250.    2  1  2  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/65          H2N2
251.   50999+5 44024+5 14473+2 140804-2-12535+7 85194+2  500. 2500.1  -0.H2N2
252.   50999+5 43539+5 18946+2 135143 3-307 74+7 85128+2 2500. 6000.1  -0.H2N2
253.    2  1  2  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/60          H2O2
254.  -32529+5 44764+5 13016+2 242 20-2-41739+6 90130+2  500. 1000.1  -0.H2O2
255.  -32529+5 43911+5 14067+2 174477-2-79045+6 89765+2 1000. 1500.1  -0.H2O2
256.    3  1  1  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/65          H3N
257.  -10969+5 41280+5 12161+2 260909-2-95655+6 76996+2  500. 2500.1  -0.H3N
258.  -10969+5 41692+5 15403+2 939260-3-250 24+7 76929+2 2500. 6000.1  -0.H3N
259.    4  1  2  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/65          H4N2
260.   22799+5 62945+5 22059+2 317316-2-18727+7 10824+3  500. 2500.1  -0.H4N2
261.   22799+5 64644+5 30218+2 238174-3-68572+7 10814+3 2500. 6000.1  -0.H4N2
262.    1  7  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          H
263.   11296+6 13041+5 95246+1 271364-4 956 39+4 48091[illegible]+2  500. 2500.1  -0.H
264.   11296+6 13427+5 27772+1 523356-3 56772+7 48046[illegible]+2 2500. 6000.1  -0.H
265.    1  7  1  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/63          H0
266.   21579+5 22750+5 50517[illegible]+1 354495-3-27643[illegible]+6 6[illegible]+2  500. 2500.1  -0.H0
267.   21579+5 22714+5 67730[illegible]+1 726516-4-19288+6 5[illegible]+2 2500. 6000.1  -0.H0
268.    1  7  2  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/64          HO2
269.   79099+4 34047+5 12860+2 372 47-3-731 90+6 84815+2  500. 2500.1  -0.HO2
270.   79099+4 345 4+5 13687+2 329899-4-45391+6 846 21+2 2500. 6000.1  -0.HO2
271.    2  7  1  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/64          H2O
272.   196 99+5 36642+5 13356+2 547758-3-72635+6 816233+2  500. 2500.1  -0.H2O
273.   196 99+5 36578+5 146 28+2 446710-4-65269+6 816 7+2 2500. 6000.1  -0.H2O
274.    2  7  3  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/64          H2O3
275.   19799+5 61692+5 23037+2 652593-3-12355+7 12325+3  500. 2500.1  -0.H2O3
276.   19799+5 61812+5 24462+2 562103-4-82999+6 12322+3 2500. 6000.1  -0.H2O3
277.    1  8  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/62          O
278.   59558+5 13516+5 49617+1 567346-5 29868+5 50053[illegible]+2  500. 2500.1  -0.O
279.   59558+5 13521+5 45011+1 133922-3 90496+6 50094[illegible]+2 2500. 6000.1  -0.O
280.    2  8  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 **/61          O2
281.   574  0+0 23444+5 80726+1 503 78-3-23863[illegible]+6 67971[illegible]+2  500. 2500.1  -0.O2
282.   574  0+0 23455+5 977777+1 110622-3-47636[illegible]+7 67975[illegible]+2 2500  6000.1  -0.O2
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283.    6  1  2  6  0  0  0  0  0  0  0  0  0  ODUFF BAUER 6/61                C2H6
284.   -203200+5 692710+5 464236+2-169721-2-193680+8 119447+3  500. 3000.1   0.C2H6
285.   -203200+5 692710+5 393119+2 764877-3-343891+7 119447+3 3000. 5000.1   0.C2H6
286.    3  1  2  6  0  0  0  0  0  0  0  0  0  ODUFF BAUER 6/61                C2H3
287.    659250+5 562430+5 230065+2 691392-3-499095+7 965150+2  500. 3000.1   0.C2H3
288.    659250+5 562430+5 239033+2 331771-3-335425+7 965150+2 3000. 5000.1   0.C2H3
289.    1  1  3  6  0  0  0  0  0  0  0  0  0  ODUFF BAUER 6/61                C3H
290.    127703+6 489620+5 194464+2 508379-3-311933+7 928820+2  500. 3000.1   0.C3H
291.    127703+6 489620+5 195592+2 245887-3-632514+6 928820+2 3000. 5000.1   0.C3H
292.    2  1  3  6  0  0  0  0  0  0  0  0  0  ODUFF BAUER 6/61                C3H2
293.    106522+6 635170+5 247444+2 992918-3-437596+7 104666+3  500. 3000.1   0.C3H2
294.    106522+6 635170+5 260623+2 364767-3-467730+7 104666+3 3000. 5000.1   0.C3H2
295.    3  1  3  6  0  0  0  0  0  0  0  0  0  ODUFF BAUER 6/61                C3H3
296.    764850+5 709520+5 236929+2 766031-3-548098+7 113604+3  500. 3000.1   0.C3H3
297.    764850+5 709520+5 291672+2 456238-3-138601+7 113604+3 3000. 5000.1   0.C3H3
298.    4  1  3  6  0  0  0  0  0  0  0  0  0  ODUFF BAUER 6/61                C3H4
299.    442940+5 622470+5 372219+2-528861-4-101994+8 120293+3  500. 3000.1   0.C3H4
300.    442940+5 622470+5 344271+2 578173-3-208515+7 120293+3 3000. 5000.1   0.C3H4
301.    5  1  3  6  0  0  0  0  0  0  0  0  0  ODUFF BAUER 6/61                C3H5
302.    324310+5 946210+5 397325+2 958555-3-904683+7 141759+3  500. 3000.1   0.C3H5
303.    324310+5 946210+5 395073+2 733720-3-949766+6 141759+3 3000. 5000.1   0.C3H5
304.    2  9  0  0  0  0  0  0  0  0  0  0  0  OJANAF TAPE 7/71 12/60          F2
305.   -248  0+0 244390+5 683592+1 247292-3-194499+6 685728+2  500. 2500.1  -0.F2
306.   -248  0+0 244390+5 891845+1 211324-3-148286+6 685710+2 2500. 6000.1  -0.F2
307.    1  6  1  1  1 17  2  9  0  0  0  0  0  OJANAF TAPE 7/71  6/70         CHCLF2
308.   -115 994+6 623813+5 228379+2 102625-2-146595+7 115861+3  500. 2500.1  -0.CHCLF2
309.   -115 994+6 622701+5 252873+2 801623-4-199187+7 115821+3 2500. 6000.1  -0.CHCLF2
310.    1  6  1  1  2 17  1  9  0  0  0  0  0  OJANAF TAPE 7/71  6/70         CHCL2F
311.   -676999+5 628735+5 229814+2 973871-3-133876+7 119577+3  500. 2500.1  -0.CHCL2F
312.   -676999+5 627688+5 253187+2 754636-4-190953+7 119540+3 2500. 6000.1  -0.CHCL2F
313.    1  6  1  1  1  9  0  0  0  0  0  0  0  OJANAF TAPE 7/71 12/69          CHF
314.    299999+5 334212+5 107733+2 127857-2-554 46+6 793  8+2  500. 2500.1  -0.CHF
315.    299999+5 334799+5 165423+2 135635-4-168133+8 793218+2 2500. 6000.1  -0.CHF
316.    1  6  1  1  1  9  1  3  0  0  0  0  0  OJANAF TAPE 7/71  6/61         CHFO
317.   -899399+5 464183+5 164568+2 117684-2-127806+7 945 56+2  500. 2500.1  -0.CHFO
318.   -899399+5 462892+5 192475+2 919 19-4-176785+7 944599+2 2500. 6000.1  -0.CHFO
319.    1  6  1  1  3  9  0  0  0  0  0  0  0  OJANAF TAPE 7/71  6/69         CHF3
320.   -166599+6 612617+5 224137+2 118 93-2-172348+7 108137+3  500. 2500.1  -0.CHF3
321.   -166599+6 611512+5 251959+2 930955-4-212412+7 109 91+3 2500. 6000.1  -0.CHF3
322.    1  6  2  1  1 17  1  9  0  0  0  0  0  OJANAF TAPE 7/71  6/70         CH2CLF
323.   -625999+5 590 67+5 205 65+2 180700-2-172722+7 107761+3  500. 2500.1  -0.CH2CLF
324.   -625999+5 588158+5 248921+2 137830-3-305601+7 107693+3 2500. 6000.1  -0.CH2CLF
325.    1  6  2  1  2  9  0  0  0  0  0  0  0  OJANAF TAPE 7/71 12/69          CH2F2
326.   -107709+6 582 79+5 201672+2 193  4-2-192677+7 102324+3  500. 2500.1  -0.CH2F2
327.   -107709+6 580  145 248173+2 149182-3-303753+7 102251+3 2500. 6000.1  -0.CH2F2
328.    1  6  3  1  1  9  0  0  0  0  0  0  0  OJANAF TAPE 7/71 12/63          CH3F
329.   -559999+5 556 15+5 161 48+2 261954-2-199 81+7 936679+2  500. 2500.1  -0.CH3F
330.   -559999+5 553257+5 244741+2 198512-3-400196+7 935705+2 2500. 6000.1  -0.CH3F
331.    2  6  2  9  0  0  0  0  0  0  0  0  0  OJANAF TAPE 7/71 12/67          C2F2
332.    499999+4 524547+5 195954+2 458563-3-952266+6 100401+3  500. 2500.1  -0.C2F2
333.    499999+4 523988+5 206 20+2 391 44-4-689564+6 100381+3 2500. 6000.1  -0.C2F2
334.    2  6  3  9  1  7  0  0  0  0  0  0  0  OJANAF TAPE 7/71 12/69          C2F3N
335.   -118399+6 790225+5 296 19+2 794111-3-165851+7 134 42+3  500. 2500.1  -0.C2F3N
336.   -118399+6 789269+5 313523+2 655874-4-137200+7 134  9+3 2500. 6000.1  -0.C2F3N
337.    2  6  4  9  0  0  0  0  0  0  0  0  0  OJANAF TAPE 7/71  6/69          C2F4
338.   -157399+6 794274+5 299  1+2 688468-3-165373+7 134684+3  500. 2500.1  -0.C2F4
339.   -157399+6 793422+5 313929+2 597540-4-115975+7 134864+3 2500. 6000.1  -0.C2F4
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340.     2  6  1  1  1  9  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/67          C2HF
341.    299999+5 498193+5 172540+2 119818-2-82736 4+6 946956+2  500. 2500.1  -0.C2HF
342.    299999+5 496997+5 202593+2 881 54-4-22654 3+7 946533+2 2500. 6000.1  -0.C2HF
343.     1 17  1  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/65          CLF
344.   -121399+5 241277+5 888159+1 128272-3-15681 8+6 721336+2  500. 2500.1  -0.CLF
345.   -121399+5 241247+5 892831+1 107617-3-126 41+6 721325+2 2500. 6000.1  -0.CLF
346.     1 17  1  9  3  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/61          CLFO3
347.   -511999+4 651919+5 248877+2 349  7-3-131754+7 118738+3  500. 2500.1  -0.CLFO3
348.   -511999+4 651473+5 256228+2 314790-4-950455+6 118723+3 2500. 6000.1  -0.CLFO3
349.     1 17  3  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/65          CLF3
350.   -379699+5 521236+5 197523+2 450444-4-501947+6 110408+3  500. 2500.1  -0.CLF3
351.   -379699+5 521176+5 198439+2 425666-5-437256+6 110406+3 2500. 6000.1  -0.CLF3
352.     1  9  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/65           F
353.    188599+5 136789+5 503772+1-250 79-4 675898+5 497896+2  500. 2500.1  -0.F
354.    188599+5 136820+5 498358+1-229881-5 511 68+5 497907+2 2500. 6000.1  -0.F
355.     1  9  1  1  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/65          FHO
356.   -309999+5 324127+5 109339+2 955969-3-550539+6 794 60+2  500. 2500.1  -0.FHO
357.   -309999+5 323249+5 134245+2 698725-4-227199+7 793749+2 2500. 6000.1  -0.FHO
358.     1  9  1  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/65           FN
359.    594999+5 237720+5 874469+1 178 15-3-241277+6 709764+2  500. 2500.1  -0.FN
360.    594999+5 237626+5 889689+1 111780-3-157572+6 709731+2 2500. 6000.1  -0.FN
361.     1  9  1  7  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/61          FNO
362.   -156999+5 352329+5 130324+2 315542-3-527139+6 878299+2  500. 2500.1  -0.FNO
363.   -156999+5 351949+5 137315+2 266136-4-382215+6 878165+2 2500. 6000.1  -0.FNO
364.     1  9  1  7  2  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/65          FNO2
365.   -259999+5 495524+5 186360+2 448868-3-104727+7 101561+3  500. 2500.1  -0.FNO2
366.   -259999+5 494969+5 196111+2 388625-4-734965+6 101541+3 2500. 6000.1  -0.FNO2
367.     1  9  1  7  3  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/63          FNO3
368.    249999+4 648 46+5 245495+2 469189-3-133841+7 121641+3  500. 2500.1  -0.FNO3
369.    249999+4 647459+5 255565+2 413666-4-947439+6 121621+3 2500. 6000.1  -0.FNO3
370.     1  9  1  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/66           FO
371.    259999+5 240260+5 876818+1 213141-3-226  5+6 715186+2  500. 2500.1  -0.FO
372.    259999+5 240140+5 867377+1 200690-3 558627+6 715144+2 2500. 6000.1  -0.FO
373.     1  9  2  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/66          FO2
374.    299999+4 358727+5 134 79+2 183316-3-438715+6 913264+2  500. 2500.1  -0.FO2
375.    299999+4 356496+5 138 13+2 162242-4-286826+6 913183+2 2500. 6000.1  -0.FO2
376.     2  9  1  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/64          F2N
377.    100999+5 358 73+5 136 35+2 114 92-3-529 83+6 868773+2  500. 2500.1  -0.F2N
378.    100999+5 357925+5 138395+2 106264-4-387321+6 888720+2 2500. 6000.1  -0.F2N
379.     2  9  2  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/65          F2N2  TR
380.    193999+5 501991+5 189566+2 334461-3-930923+6 103 57+3  500. 2500.1  -0.F2N2  TR
381.    193999+5 501573+5 196753+2 293767-4-655596+6 103 42+3 2500. 6000.1  -0.F2N2  TR
382.     2  9  1  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/69          F2O
383.    585999+4 361675+5 137175+2 718  7-4-434922+6 888332+2  500. 2500.1  -0.F2O
384.    585999+4 361581+5 138658+2 659989-5-342524+6 888299+2 2500. 6000.1  -0.F2O
385.     3  9  1  7  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/69          F3N
386.   -314299+5 508316+5 194630+2 152192-3-872260+6 103348+3  500. 2500.1  -0.F3N
387.   -314299+5 508117+5 197771+2 140586-4-676939+6 103341+3 2500. 6000.1  -0.F3N
388.     3  9  1  7  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/70          F3NO
389.   -389999+5 655385+5 248870+2 345108-3-117800+7 119228+3  500. 2500.1  -0.F3NO
390.   -389999+5 654954+5 256290+2 303997-4-898 75+6 119212+3 2500. 6000.1  -0.F3NO
391.     1 13  1 17  1  9  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/64          ALCLF
392.   -119999+6 367721+5 138415+2 259154-4-259155+6 990862+2  500. 2500.1  -0.ALCLF
393.   -119999+6 367687+5 138947+2 239  5-5-224  9+6 980850+2 2500. 6000.1  -0.ALCLF
394.     1 13  1 17  2  9  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/64          ALCLF2
395.   -237599+6 521248+5 196956+2 659232-4-489250+6 114429+3  500. 2500.1  -0.ALCLF2
396.   -237599+6 521162+5 198306+2 627195-5-400930+6 114426+3 2500. 6000.1  -0.ALCLF2
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397.    1 13  2 17  1  9  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/64          ALCL2F
398.  -188599+6 524770+5 197633+2 408103-4-385568+6 118120+3  500. 2500.1  -0.ALCL2F
399.  -188599+6 524717+5 198479+2 366848-5-333708+6 118118+3 2500. 6000.1  -0.ALCL2F
400.    1 13  1  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/69          ALF
401.  -633999+5 240411+5 887470+1 116104-3-161923+6 713971+2  500. 2500.1  -0.ALF
402.  -633999+5 240372+5 889563+1 989896-4-253248+5 713957+2 2500. 6000.1  -0.ALF
403.    1 13  1  9  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/64          ALFO
404.  -140199+6 387 28+5 147308+2 647977-4-490235+6 877 21+2  500. 2500.1  -0.ALFO
405.  -140199+6 386943+5 148629+2 620618-5-399958+6 876941+2 2500. 6000.1  -0.ALFO
406.    1 13  2  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  9/64          ALF2
407.  -164999+6 364104+5 137529+2 589260-4-361521+6 935 50+2  500. 2500.1  -0.ALF2
408.  -164999+6 364 26+5 138732+2 557732-5-279841+6 935 23+2 2500. 6000.1  -0.ALF2
409.    1 13  3  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/70          ALF3
410.  -289 34+6 517593+5 196134+2 961594-4-593177+6 108750+3  500. 2500.1  -0.ALF3
411.  -289 34+6 517468+5 198119+2 889909-5-470488+6 108746+3 2500. 6000.1  -0.ALF3
412.    2 13  6  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/70          AL2F6
413.  -629449+6 113740+6 432161+2 186920-3-136338+7 185892+3  500. 2500.1  -0.AL2F6
414.  -629449+6 113715+6 435993+2 176772-4-111393+7 185883+3 2500. 6000.1  -0.AL2F6
415.    1  6  1 17  1  9  1  8  0  0  0  0  0  0JANAF TAPE 7/71  6/61          CCLFO
416.  -101999+6 499318+5 187407+2 408800-3-939527+6 106163+3  500. 2500.1  -0.CCLFO
417.  -101999+6 498819+5 196392+2 346428-4-709 93+6 106145+3 2500. 6000.1  -0.CCLFO
418.    1  6  1 17  3  9  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/69          CCLF3
419.  -169199+6 654737+5 250 18+2 307306-3-125579+7 120684+3  500. 2500.1  -0.CCLF3
420.  -169199+6 654342+5 256454+2 279824-4-913396+6 120670+3 2500. 6000.1  -0.CCLF3
421.    1  6  2 17  2  9  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/70          CCL2F2
422.  -117499+6 662599+5 252480+2 216872-3-105405+7 125637+3  500. 2500.1  -0.CCL2F2
423.  -117499+6 662319+5 256998+2 198840-4-799570+6 125628+3 2500. 6000.1  -0.CCL2F2
424.    1  6  3 17  1  9  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/70          CCL3F
425.  -689999+5 670149+5 254612+2 138280-3-852234+6 128914+3  500. 2500.1  -0.CCL3F
426.  -689999+5 669969+5 257474+2 127695-4-679417+6 128908+3 2500. 6000.1  -0.CCL3F
427.    1  6  1  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/70          CF
428.   609999+5 234870+5 860711+1 208914-3-266925+6 701371+2  500. 2500.1  -0.CF
429.   609999+5 234657+5 843815+1 187354-3 112597+7 701296+2 2500. 6000.1  -0.CF
430.    1  6  1  9  1  7  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/69          CFN
431.   859999+4 370824+5 134438+2 512591-3-588919+6 836489+2  500. 2500.1  -0.CFN
432.   859999+4 370238+5 146279+2 409  1-4-614166+6 836282+2 2500. 6000.1  -0.CFN
433.    1  6  1  9  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/65          CFO
434.  -409999+5 348580+5 129144+2 358914-3-624512+6 873417+2  500. 2500.1  -0.CFO
435.  -409999+5 348145+5 137 35+2 304924-4-437467+6 873263+2 2500. 6000.1  -0.CFO
436.    1  6  2  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/70          CF2
437.  -434999+5 353978+5 133699+2 212496-3-618773+6 860687+2  500. 2500.1  -0.CF2
438.  -434999+5 354 19+5 117 83+2 640 47-3 308590+7 860701+2 2500. 6000.1  -0.CF2
439.    1  6  2  9  1  8  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/69          CF20
440.  -152699+6 491412+5 184618+2 509491-3-112766+7 100635+3  500. 2500.1  -0.CF20
441.  -152699+6 490790+5 195785+2 435480-4-826862+6 100613+3 2500. 6000.1  -0.CF20
442.    1  6  3  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/69          CF3
443.  -112399+6 499352+5 190391+2 307225-3-106 89+7 103108+3  500. 2500.1  -0.CF3
444.  -112399+6 499959+5 196861+2 276268-4-735969+6 103 95+3 2500. 6000.1  -0.CF3
445.    1  6  4  9  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  6/69          CF4
446.  -223 39+6 646124+5 247109+2 413699-3-146842+7 113647+3  500. 2500.1  -0.CF4
447.  -223 39+6 645596+5 255832+2 372280-4-103823+7 113628+3 2500. 6000.1  -0.CF4
448.    2  6  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/69          C2
449.   200223+6 247256+5 766724+1 759223-3 187566+6 685755+2  500. 2500.1  -0.C2
450.   200223+6 246860+5 843612+1 447170-3 242365+6 685615+2 2500. 6000.1  -0.C2
451.    3  6  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/69          C3
452.   195999+6 310538+5 102229+2 100665-2-445919+6 812712+2  500. 2500.1  -0.C3
453.   195999+6 309869+5 125242+2 230548-3-270248+7 812476+2 2500. 6000.1  -0.C3
```

```
454.      4  6  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/69          C4
455.    231999+6 512125+5 188896+2 704455-3-112388+7 949357+2  500. 2500.1  -0.C4
456.    231999+6 511290+5 204734+2 580770-4-923163+6 949 62+2 2500. 6000.1  -0.C4
457.      5  6  0  0  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71 12/69          C5
458.    233999+6 654912+5 241752+2 944161-3-152366+7 109184+3  500. 2500.1  -0.C5
459.    233999+6 653796+5 263 12+2 779183-4-127644+7 109145+3 2500. 6000.1  -0.C5
460.      2 13  3  8  0  0  0  0  0  0  0  0  0  0JANAF TAPE 7/71  3/64 ALPHA   AL203  *
461.   -400399+6 843519+5 287731+2 223942-2-116653+7 786282+2  500. 2316.2  -0.AL203  *
462.   -373355+6 856587+5 346222+2 160187-6 204799+4 908747+2 2316. 3500.3  -0.AL203  *
463.
464.   689068.    101676.95 .433
465.   13177900.  101676.95 .433
466.   44160.3    117282.75
467.     .125                -.5
468.     .261                -.5
469.     .012                -.5
470.     .130                -.5
471.     .00096              -.5
472.   252.67     5418.31    .054       .0001
473.
474.   252.67     5418.31    .054       .0001
475.
476.   53.681     18.786     .059
477.
478.   8
```

Sample Problem 3 Output

```
        GRAPHITE SURFACE KINETICS (GASKET) PROB. 3          0130000*00

RELATIVE ELEMENTAL COMPOSITIONS, ATOMIC WTS/UNIT MASS
     AT.NO.   ELEMENT     ATOMIC WT      EDGE GAS       SURFACE
       1      HYDROGEN      1.00800      .0367311      .0000000
       6      CARBON       12.01100      .0166646      .0000000
       7      NITROGEN     14.00700      .0124297      .0000000
       8      OXYGEN       16.00000      .0363751      .0000000
       9      FLUORINE     19.00000      .0002268      .0000000
     106      GRAPHITE     12.01100      .0000000      .0632570

    ELEMENTS          HYDROGEN     CARBON       NITROGEN     OXYGEN       FLUORINE
                      GRAPHITE

    BASE SPECIES      H2           CO2          N2           H2O          FH
                      C*
 UPDATE OF DIFFUSION FACTORS
          SPECIES     DIFFUSION FACTOR
           CO2              1.29140
           H2                .38930
           H2O               .77490
           N2               1.02620
           CO               1.01700
           C                 .69180
           CH                .74920
           CH4               .93570
           CN               1.02670
           C2H2             1.17460
           H                 .30180
           N                 .74930
           NO                .99810
           O                 .73970
           O2               1.00000
           C2               1.02530
```

Sample Problem 3 Output (Continued)

```
        GRAPHITE SURFACE KINETICS (BARNET) PROB. 5          5002800460

                                                                          6  6

      CP-FROZEN=   .40642+00

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP        VISC        COND        DBAR        PR          SC
 .28200+04   .32282-04   .21946-04   .23999-03   .59490+00   .72560+00
   MU1         MU2        MOL.WT       HTIL        CPTIL       HTIL0
 .91040+00   .24522+02   .24828+02  -.22388+04   .46510+00  -.22777+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (BARER =  .667)
      1           6           7           8           9          106
  .30707-01   .20209+00   .16978+00   .50842+00   .42026-02   .00000
  .69537-01   .18874+00   .16929+00   .50775+00   .46836-02   .00000

SOLUTION TIMES
        ITERATIONS =    9                          TIME =    2.056 SEC.

OPEN SYSTEM CHEMICAL KINETICS SOLUTION OUTPUT

 SURFACE IS PC 901
 MASS TRANSFER COEFFICIENT RHOCM =    .24600+00
 RHO V WALL/RHOE UE CM =    .36569-09   RPRIME =    .36589-09

 STATE ADJACENT TO THE SURFACE . . . .
  TEMP =  2820.0000 DEG R =  1400.0000 DEG K      PRESS =     12.77800 ATM

                                  GAS            CONDENSED        COMPOSITE
  ENTHALPY - BTU/LBM            -.23210+04        .00000          -.23210+04
  ENTROPY - BTU/LBM DEG R        .22778+01        .00000           .00000
  DENSITY - LBM/FT3              .17234+00                         .17234+00
  MOLECULAR WEIGHT               24.8277          .0000            24.8277


 NET FORWARD RATE OF KINETICALLY CONTROLLED REACTIONS
  (MOLES OF REACTION / UNIT SURFACE AREA / TIME / RHOE UE CM). . . .
  1=   .20622-11  2=   .28399-10  3=   .62277-15  4=   .15180-18  5=   .52297-21
  6=   .12444-20  7=   .11020-25  8=   .10493-27

RATIO OF FORWARD TO REVERSE KINETICALLY CONTROLLED PRODUCTION RATES
 1=   .20448+03  2=   .20448+03  3=   .41813+05  4=   .20448+03  5=   .41813+05
 6=   .39606+07  7=   .34961+02  8=   .33290+00

 CHEMICAL STATE ADJACENT TO THE SURFACE
  (MOLE FR FOR GASES = MOLECULES / TOTAL GAS MOLECULES )
  (MOLE FR FOR CONDENSED = MPRIME CONDENSED ). . . .

   SPECIES    MOLE FR.     SPECIES    MOLE FR.     SPECIES    MOLE FR.     SPECIES    MOLE FR.     SPECIES    MOLE FR.
   CO2        .20660+00    H2         .13763+00    H2O        .28701+00    CO         .00000       FH         .54917-02
   N2         .15046+00    CO         .21270+00    C          .12225-21    HO         .20168-07    NO3        .27089-29
   CN         .24684-19    CHN        .38508-06    CHNO       .62813-07    CHO        .31555-08    CH2        .34622-15
   CH2O       .32602-06    CH3        .43417-09    CH4        .45669-05    CN         .60889-14    CNO        .19368-13
   CN2  NCN   .62424-19    C2H        .23449-16    C2H2       .96292-11    C2H4       .12399-10    C2H4O      .58602-17
   C2N        .26030-19    C2N2       .18655-14    C2O        .82604-16    C3O2       .26190-13    C4H        .62058-25
   C4H2       .41220-22    C4N2       .28810-25    H          .58230-06    HN         .36068-12    HNO        .90945-13
   HNO2  TR   .60216-16    HNO3       .20548-24    HO2        .51714-16    H2N        .11257-08    H2N2       .38256-14
   H2O2       .38374-13    H3N        .21726-04    H4N2       .18715-15    N          .42360-15    NO         .19767-09
   NO2        .28066-17    N2O        .17162-13    N2O3       .14489-31    O          .68869-13    O2         .68927-13
   C2H6       .94498-12    C2H3       .73364-15    C3H        .62367-20    C3H2       .11281-19    C3H3       .85095-18
   C3H4       .17992-16    C3H5       .26672-15    F2         .29367-24    CHF        .50361-17    CHFO       .14526-08
   CHF3       .13141-18    CH2F2      .49591-15    CH3F       .83194-11    C2F2       .60764-28    C2F3N      .99379-28
   C2F4       .95265-34    C2HF       .65967-19    F          .26389-12    FHO        .35534-16    FN         .10407-20
   FNO        .18522-18    FNO2       .74188-28    FNO3       .00000       FO         .60793-22    FO2        .16645-27
   F2N        .28079-28    F2N2  TR   .76866-34    F2O        .32145-34    F3N        .34429-39    F3NO       .00000
   CF         .77779-19    CFN        .79870-15    CFO        .14415-12    CF2        .33902-18    CF2O       .12083-11
   CF3        .34321-23    CF4        .41522-28    C2         .13842-26    C3         .43170-27    C4         .19844-35
   C5         .14004-37
```

Sample Problem 3 Output (Continued)

```
                GRAPHITE SURFACE KINETICS (GASKET) SOLUTION        PROB. 3


DERIVATIVE PROPERTY OUTPUT
 CP-FROZEN     CP-EQUIL    DLNM/DLNT   DLNM/DLNP     GAMMA
  .46249+00    .65564+00  -.99470-01   .44135-02   .11752+01

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP         VISC        CONU        DBAR          PR            SC
  .50505+04   .51724-04   .39360-04   .76050-03   .60777+00   .72573+00
   MU1          MU2        MOL.WT       HTIL         CPTIL        HTIL*
  .90353+00   .24443+02   .23866+02  -.78863+03   .54365+00  -.90189+03

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .667)
      1           6           7           8           9          106
   .37025-01   .20256+00   .17410+00   .38200+00   .43097-02   .00000
   .49537-01   .18874+00   .16929+00   .38775+00   .46836-02   .00000

SOLUTION TIMES
        ITERATIONS =   38                          TIME =   13.499 SEC.

CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT

  MASS CONDENSED/MASS GAS =     .00000
  TEMP =  5050.4579 DEG R.  =  2805.8100 DEG K.      PRESS =     12.77800 ATM

                                  GAS              CONDENSED        COMPOSITE
  ENTHALPY - BTU/LBM            -.10389+04          .00000          -.10389+04
  ENTROPY - BTU/LBM DEG R        .26582+01          .00000           .26582+01
  DENSITY - LBM/FT3              .82678-01                           .82678-01
  MOLECULAR WEIGHT               23.8660            .0000            23.8660

 CHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHASE MOLECULES).....

    SPECIES   MOLE FR.       SPECIES   MOLE FR.       SPECIES   MOLE FR.       SPECIES   MOLE FR.       SPECIES   MOLE FR.
    CO2       .12957+00      H2        .10109+00      H2O       .32744+00      C*        .00000         FH        .54117-02
    N2        .14795+00      CO        .27292+00      C         .77738-11      HO        .67376-02      NO3       .39440-13
    CH        .61978-11      CHN       .22775-06      CHNO      .11418-06      CHO       .24462-05      CH2       .83245-11
    CH2O      .20108-06      CH3       .23200-09      CH4       .13789-09      CN        .17571-08      CNO       .39465-08
    CN2  NCN  .18493-12      C2H       .81523-13      C2H2      .69146-12      C2H4      .22785-15      C2H4O     .10718-18
    C2N       .48730-14      C2N2      .88705-14      C2O       .94466-11      C3O2      .53113-13      C4H       .29314-23
    C4H2      .727A2-24      C4N2      .17314-25      H         .73962-02      HN        .66533-06      HNO       .38493-06
    HNO2  TR  .11660-07      HNO3      .34432-12      HO2       .53589-06      H2N       .84655-06      H2N2      .22739-10
    H2O2      .30976-06      H3N       .12701-05      HN2       .46335-14      N         .39010-06      NO        .74492-03
    NO2       .70996-07      N2O       .5822A-07      N2O3      .37731-15      O         .31581-03      O2        .41419-03
    C2H6      .21207-19      C2H3      .25796-15      C3H       .62186-18      C3H2      .29627-19      C3H5      .58943-20
    C3H4      .27923-21      C3H5      .48281-21      F2        .91304-14      CHF       .28473-12      CHFO      .28847-08
    CHF3      .12704-18      CH2F2     .72542-16      CH3F      .54603-13      C2F2      .33838-22      C2F3N     .28234-26
    C2F4      .39976-30      C2HF      .13616-16      F         .17095-05      FHO       .11542-08      FN        .87972-11
    FNO       .870A5-10      FNO2      .94423-15      FNO3      .20093-21      FO        .92544-10      FO2       .32441-12
    F2N       .57401-17      F2N2  TR  .11121-21      F2O       .23175-18      F3N       .95160-25      F3NO      .17392-29
    CF        .16741-11      CFN       .17162-11      CFO       .24658-08      CF2       .61495-14      CF2O      .75542-11
    CF3       .72827-19      CF4       .42956-22      C2        .34436-16      C3        .55451-20      C4        .88885-28
    C5        .24395-32
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Sample Problem 3 Output (Continued)

```
        GRAPHITE SURFACE KINETICS (GASKET) PROB. 3          0000000+00

DERIVATIVE PROPERTY OUTPUT
 CP-FROZEN     CP-EQUIL    DLNM/DLNT    DLNM/DLNP      GAMMA
  .38462+00    .19183+01   -.27575+00    .44135-02    .10709+01

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP          VISC          COND          GBAR          PR            SC
 .18000+04    .26207-04    .16470-04    .15733-03    .61201+00    .72573+00
   MU1           MU2         MOL.WT         HTIL         CPTIL        HTIL*
 .90353+00    .24443+02    .23866+02   -.24210+04    .44749+00   -.24385+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMEX =  .667)
      1            6            7            8            9           106
   .37025-01    .20256+00    .17410+00    .58200+00    .43097-02    .00000
   .49537-01    .18874+00    .16929+00    .58775+00    .46836-02    .00000

SOLUTION TIMES
        ITERATIONS =   38                          TIME =      .232 SEC.

CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT

  MASS CONDENSED/MASS GAS =     .00000
  TEMP =  1800.0000 DEG K.   =  1000.0000 DEG K.      PRESS =      12.77400 ATM

                                  GAS              CONDENSED        COMPOSITE
  ENTHALPY - BTU/LBM             -.24353+04          .00000          -.24353+04
  ENTROPY - BTU/LBM DEG R         .22222+01          .00000           .22222+01
  DENSITY - LBM/FT3               .23198+00                           .23198+00
  MOLECULAR WEIGHT                23.8660            .0000            23.8660

 CHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHASE MOLECULES).....

    SPECIES    MOLE FR.      SPECIES    MOLE FR.      SPECIES    MOLE FR.      SPECIES    MOLE FR.      SPECIES    MOLE FR.
    CO2        .12957+00     H2         .10109+00     H2O        .42744+00     C*         .00000        FH         .54117-02
    N2         .14795+00     CO         .27292+00     C          .77738-11     HO         .67376-02     NO3        .39480-13
    CH         .61978-11     CHN        .22775-06     CHNO       .11414-06     CHO        .24462-05     CH2        .83245-11
    CH2O       .20108-06     CH3        .23200-09     CH4        .13784-09     CN         .17571-08     CHO        .39465-08
    CN2  NCN   .18493-12     C2H        .81523-13     C2H2       .69146-12     C2H4       .22785-15     C2H4O      .10719-18
    C2N        .48730-14     C2N2       .68703-14     C2O        .94466-11     C3O2       .53113-13     C4H        .29314-23
    C4H2       .72782-24     C4N2       .17314-25     H          .73462-02     HN         .46530-06     HNO        .38493-06
    HNO2  TR   .11660-07     HNO3       .24432-12     HO2        .55589-06     H2N        .84655-06     H2N2       .22739-10
    H2O2       .30976-06     H3N        .12701-05     H4N2       .65335-14     N          .39010-06     NO         .74492-03
    NO2        .70996-07     N2O        .58228-07     N2O3       .37731-15     O          .31361-03     O2         .41419-03
    C2H6       .21207-19     C2H3       .25746-15     C3H        .62106-18     C3H2       .29427-19     C3H3       .58943-20
    C3H4       .27923-21     C3H5       .48281-21     F2         .41304-14     CHF        .24475-12     CHFO       .28847-08
    CHF3       .12704-18     CH2F2      .72542-16     CH3F       .54607-13     C2F2       .35638-22     C2F3N      .24234-26
    C2F4       .39976-30     C2HF       .13516-16     F          .17095-05     FHO        .11542-08     FN         .87972-11
    FNO        .87085-10     FNO2       .94423-15     FNO3       .20093-21     FO         .42544-10     FO2        .32441-12
    F2N        .57401-17     F2N2  TR   .11121-21     F2O        .23175-18     F3N        .35160-25     F3NO       .17392-29
    CF         .16781-11     CFN        .17162-11     CFO        .24458-08     CF2        .81495-14     CF2O       .75542-11
    CF3        .72827-19     CF4        .42456-22     C2         .34836-18     C3         .55451-20     C4         .88885-28
    C5         .24395-32
```

Sample Problem 3 Output (Concluded)

```
          CP-FROZEN=   .4930E+00

PROPERTY ROUTINE OUTPUT IN  LB-MASS,FT,SEC,BTU,AND DEG-R
   TEMP          VISC          COND          DMAF          PR          SC
 .21600+04    .28982-04    .19405-04    .16584-03    .58705+00   .7256E+00
   MU1           MU2         MOL.WT        HTIL         CPTIL       UTIL*
 .92343+00    .24500+02    .25186+02   -.24124+04    .47775+00  -.24596+04

ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . . . . (GAMMA =  .667)
     1            6            7            8            9           106
   .33689-01    .20301+00    .16601+00    .59113+00    .41587-02   .00000
   .49537-01    .18874+00    .16924+00    .58775+00    .46836-02   .00000

SOLUTION TIMES
          ITERATIONS =    9                          TIME =    2.474 SEC.

OPEN SYSTEM CHEMICAL KINETICS SOLUTION OUTPUT

 SURFACE IS PC 901
 MASS TRANSFER COEFFICIENT RHOCM =    .24600+00
 RHO V WALL/RHOE UE CM =    .74885-12   RPRIME =    .74885-12

 STATE ADJACENT TO THE SURFACE . . . .
  TEMP =  2160.0000 DEG R =  1200.0000 DEG K     PRESS =     12.77600 ATM

                                  GAS            CONDENSED       COMPOSITE
  ENTHALPY - BTU/LBM             -.25050+04        .00000          -.25050+04
  ENTROPY - BTU/LBM DEG R         .21830+01        .00000           .00000
  DENSITY - LBM/FT3               .20401+00                         .20401+00
  MOLECULAR WEIGHT                25.1859            .0000          25.1859


 NET FORWARD RATE OF KINETICALLY CONTROLLED REACTIONS
  (MOLES OF REACTION / UNIT SURFACE AREA / TIME / RHOE UE CM). . . .
  1=   .34146-14  2=   .58931-13  3=   .62835-18  4=   .55084-23  5=   .34922-26
  6=   .12937-25  7=   .11472-31  8=   .96127-34

RATIO OF FORWARD TO REVERSE KINETICALLY CONTROLLED PRODUCTION RATES
 1=   .28142+02  2=   .28142+02  3=   .79198+03  4=   .28142+02  5=   .11253+02
 6=   .41637+02  7=   .36920-04  8=   .30936-06

 CHEMICAL STATE ADJACENT TO THE SURFACE
  (MOLE FR FOR GASES = MOLECULES / TOTAL GAS MOLECULES )
  (MOLE FR FOR CONDENSED = BRIEF CONDENSED ). . . .

   SPECIES    MOLE FR.      SPECIES    MOLE FR.      SPECIES    MOLE FR.      SPECIES    MOLE FR.      SPECIES    MOLE FR.
   CO2        .23954+00     H2         .15228+00     H2O        .26544+00     C*         .00000        FH         .55127-02
   N2         .15102+00     CO         .18600+00     C          .30789-25     HO         .28817-09     HO3        .12043-34
   CH         .39046-22     CHN        .39986-06     CHOO       .51193-07     CHO        .33118-09     CH2        .12011-16
   CH2O       .37568-06     CH3        .52203-09     CH4        .16233-03     CN         .90151-16     CNO        .33417-15
   CN2  NCN   .65656-21     C2H        .14995-17     C2H2       .23202-10     C2H4       .47110-09     C2H4O      .23390-16
   C2N        .45449-21     C2H2       .11522-14     C2O        .16993-17     C3O2       .20896-13     C4H        .17055-25
   C4H2       .16041-21     CH2        .35552-25     H          .21438-07     HN         .24698-14     HNC        .56387-15
   HNO2  TR   .10929-18     HNO3       .19074-28     HO2        .23691-19     H2N        .12267-09     H2N2       .21887-15
   H2O2       .14108-15     H3N        .56085-04     H4N2       .63371-16     N          .45479-14     NO         .12767-11
   NO2        .10120-20     N2O        .12054-15     N2O3       .53371-17     O          .43012-16     O2         .38343-16
   C2H6       .39598-09     C2H3       .10322-14     C3H        .13123-20     C3H2       .85027-20     C3H3       .44776-17
   C3H4       .76066-15     C3H5       .23645-13     F2         .10012-27     CHF        .12017-18     CHFO       .11720-08
   CHF3       .14802-18     CH2F2      .10057-14     CO3F       .45630-10     C2F2       .74288-30     C2F3N      .37285-28
   C2F4       .69946-35     C2HF       .11434-14     F          .14437-14     FHO        .11290-19     FN         .53599-24
   FNO        .11712-21     FNO2       .34570-32     FNO3       .00000        FO         .55276-26     FO2        .14023-32
   F2N        .53520-32     F2N2  TR   .77616-38     F2O        .00000        FN2        .00000        F3NO       .00000
   CF         .27883-21     CFN        .63874-16     CFO        .58841-14     CF2        .12001-19     CF2O       .69185-12
   CF3        .13559-24     CF4        .22221-25     C2         .45456-40     C3         .15169-29     C4         .53361-38
   C5         .00000
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