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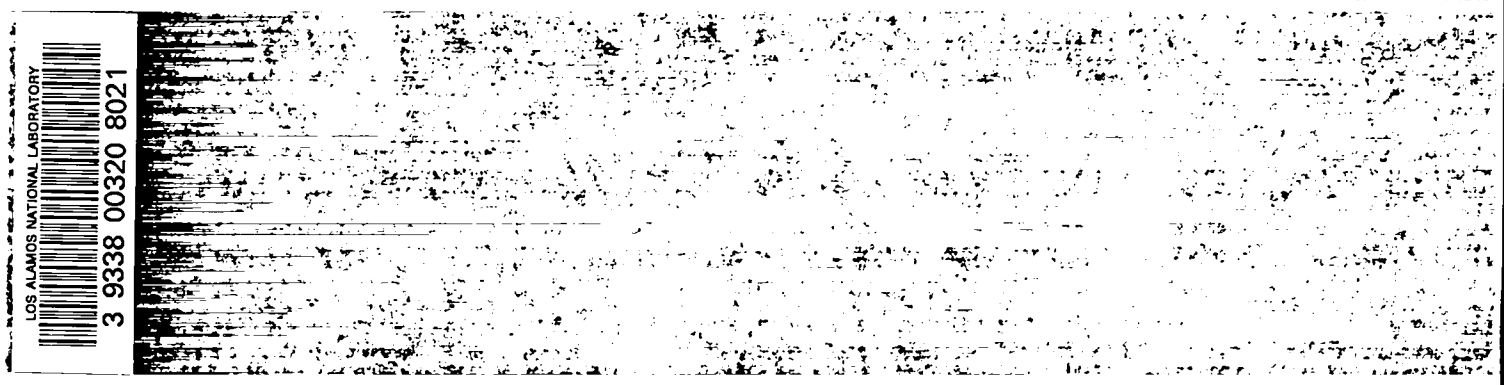
PUBCO-II, AN IBM 704 CODE FOR COMPUTING THE IDEAL THERMODYNAMIC FUNCTIONS OF A DIATOMIC GAS MOLECULE



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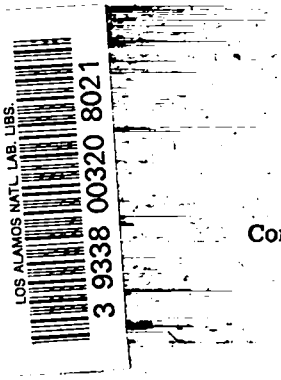
PUBCO-II, AN IBM 704 CODE FOR COMPUTING THE IDEAL THERMODYNAMIC FUNCTIONS OF A DIATOMIC GAS MOLECULE

by

Lawrence R. Sitney



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ABSTRACT

This code is a companion code for PUBCO-I, which computes the ideal thermodynamic functions of polyatomic gas molecules and which is described in LA-2278.

The PUBCO-II code is arranged to handle the ground electronic state plus as many as five excited electronic states with their associated vibration and rotation terms. The code normally computes the nonrigid rotator-anharmonic oscillator thermodynamic functions but drops out the correction factors to give the rigid rotator-harmonic oscillator thermodynamic functions if the operator so desires.

The PUBCO-II code is distinguished from other codes which compute thermodynamic functions for diatomic molecules by its treatment of the rotational energy contribution to the partition function. Three different methods of computing this contribution are used, depending on whether the molecule is in a Σ electronic state, a doublet non-Σ electronic state, or a triplet non-Σ electronic state.

Sample calculations which illustrate certain features of the code are given for OH ($^2\Pi$) and C_2 ($^3\Pi$).

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1. INTRODUCTION

This report, which describes an IBM 704 code to compute the ideal thermodynamic functions of diatomic gas molecules, is intended as a complement to LA-2278, which describes a similar IBM code for calculating the ideal thermodynamic functions of polyatomic gas molecules, and to LA-2110, which describes a code to compute these functions for monatomic gas molecules. The availability of PUBCO-II now makes it possible to compute thermodynamic functions for any type of gas molecule (for which spectral data exist) up to temperatures at which thermal ionization begins to be of importance for that molecule.

By depressing sense switch No. 2, the operator can obtain the thermodynamic functions divided by the gas constant, R, rather than the actual thermodynamic functions.

The equations which are used in the computation of the thermodynamic functions by means of the PUBCO-II code are discussed in Section 2; a general description of the code is given in Section 3; the IBM listing for the code is reproduced in Appendix A; and sample machine printouts for OH ($^2\Pi$) and C_2 ($^3\Pi$) are given in Appendix B and Appendix C, respectively.

2. THERMODYNAMIC FUNCTIONS OF DIATOMIC MOLECULES

2.1 Partition Functions

The thermodynamic functions of any gaseous molecule can be computed by means of the partition function[1,2] defined as

$$Q = \sum_i g_i \, e^{-\epsilon_i/kT} , \tag{1}$$

where

g_i = degeneracy of the ith energy level,

ϵ_i = energy of the ith energy level,

k = Boltzmann constant,

T = absolute temperature in degrees Kelvin.

It is possible to factor the total partition function, Q, into an internal and a translational partition function such that

$$Q = Q_{int} \cdot Q_{tr} . \tag{2}$$

Moreover, if the various possible interactions are neglected, the internal partition function is separable into an electronic component, a vibrational component, and a rotational component with the result that

$$Q = Q_{tr} \cdot Q_{el} \cdot Q_{vib} \cdot Q_{rot} . \tag{3}$$

It can be shown that the translational partition function, Q_{tr}, can be expressed as

$$Q_{tr} = V\left(\frac{2\pi mkT}{h^2}\right)^{3/2} , \tag{4}$$

where

V = molar volume of gas being considered,

m = absolute mass of the molecule,

h = Planck constant.

The electronic partition function, Q_{el}, is defined as

$$Q_{el} = g_{el} \, e^{-\epsilon_{el}/kT} , \tag{5}$$

where

g_{el} = degeneracy of the electronic state,

ϵ_{el} = energy of the electronic state.

The ground electronic state has zero energy so that for the ground state

$$Q_{el} = g_{el} . \tag{6}$$

Each of the excited electronic states will have an electronic partition function as defined by equation (5).

The vibrational partition function for a harmonic oscillator can be expressed as

$$Q_{vib} = \sum_{v=0}^{\infty} g_v \, e^{-hcv\omega/kT} , \tag{7}$$

where

g_v = degeneracy of vibrational level (= 1 for diatomic molecules),

c = velocity of light,

v = vibrational quantum number = 0, 1, 2, ... ,

ω = fundamental vibrational frequency (cm^{-1}).

The vibrational partition function can be simplified to give

$$Q_{vib} = \left(1 - e^{-hc\omega/kT}\right)^{-1} . \tag{8}$$

Normally, in molecular spectra nomenclature, the fundamental frequency, ω, is replaced by the wave number, ν, of the fundamental vibrational band.

The rotational partition function, Q_{rot}, takes the general form

$$Q_{rot} = \sum_{J} (2J + 1) \, e^{-\epsilon_J/kT} , \tag{9}$$

where

J = rotational quantum number,

ϵ_J = energy of Jth rotational level.

A detailed description of the rotational partition function will be given in Sections 2.2 through 2.4 since different treatments are used to handle the three following cases:

a. Σ states of any multiplicity,

b. Doublet states (non-Σ),

c. Triplet states (non-Σ).

The nonrigid rotator-anharmonic oscillator molecules are treated as rigid rotator-harmonic oscillator molecules with three correction terms[3] to take care of the stretching, anharmonicity, and vibration-rotation interaction of the molecules. If some of the spectral data which are required to compute these correction terms are missing, the operator can depress sense switch No. 1 on the 704 console, thereby forcing the code to treat the molecule as a rigid rotator-harmonic oscillator.

The partition function for stretching is expressed as

$$\ln Q_{st} = \rho T , \tag{10}$$

where

$$\rho = 2kD/hcB^2 . \tag{11}$$

In equation (11), D is the centrifugal distortion constant of the molecule.

The anharmonicity partition function is

$$\ln Q_{anh} = \frac{\left[2x_e\omega_e - (13/4)\, y_e\omega_e\right](hc/kT)}{\left(e^{hc\nu/kT} - 1\right)^2} , \tag{12}$$

where

$x_e\omega_e$, $y_e\omega_e$ = anharmonicity constants (cm^{-1}),

ν = fundamental vibrational band wave number.

Here

$$\nu = \omega_e - 2x_e\omega_e + \frac{13}{4} y_e\omega_e . \tag{13}$$

It is convenient to make the replacement

$$u = hc\nu/kT . \tag{14}$$

Equation (12) then simplifies to

$$\ln Q_{anh} = \frac{\left[2x_e\omega_e - (13/4)\, y_e\omega_e\right] (hc/kT)}{\left(e^u - 1\right)^2} . \tag{15}$$

The vibration-rotation interaction partition function can be expressed as

$$\ln Q_{v\text{-}r} = \frac{\delta}{\left(e^u - 1\right)} , \tag{16}$$

where δ is a dimensionless vibration-rotation interaction constant and is defined as

$$\delta = \alpha_e/B_0 . \tag{17}$$

Here

α_e = small rotation constant used to correct B for various vibration levels (cm^{-1}),

B_0 = rotation constant of molecule (cm^{-1}),

$$B_0 = B_e - \alpha_e/2 , \tag{18}$$

where

B_e = value of rotational constant at the equilibrium separation of the two atoms.

2.2 Rotational Partition Function for Molecules in the Σ State

The generalized equation (9) for the rotational partition function takes the following form for molecules in the Σ state:

$$Q_{rot} = \sum_{J=0}^{\infty} (2J + 1)\, e^{-(J)(J+1)(hcB/kT)} . \qquad (19)$$

This equation can be expanded asymptotically to give

$$Q_{rot} = \frac{1}{\sigma^*}\left[\left(\frac{kT}{hcB_0}\right) + \frac{1}{3} + \frac{1}{15}\left(\frac{hcB_0}{kT}\right) + \frac{4}{315}\left(\frac{hcB_0}{kT}\right)^2 + \frac{1}{315}\left(\frac{hcB_0}{kT}\right)^3 + \ldots\right], \qquad (20)$$

where σ^* is the symmetry number of the molecule.

To be rigorous in the treatment of molecules in the Σ state, molecules whose multiplicity is greater than unity should be handled somewhat differently. The rigorous treatment of $^2\Sigma$ and $^3\Sigma$ state molecules is discussed by Herzberg.[4] Fortunately, the simplified treatment used in the PUBCO-II code gives only slightly inaccurate results at low temperatures and gives the correct results at high temperatures.

One can, of course, treat molecules which are not in the Σ state as if they were in that state by changing Λ to zero and multiplying the electronic degeneracy by 2.

2.3 Rotational Partition Function for Doublet Molecules with Λ-type Doubling

The development of the partition function for doublet molecules with Λ-type doubling is an extension of the method of Haar and Friedman[5] for $^2\Pi$ molecules to cover $^2\Delta$ and $^2\Gamma$ molecules.

Hill and Van Vleck[6] have derived expressions for the rotational energies of doublet molecules. For any $^2\Lambda$ state

$$F_1(J) = B_0\left\{\left(J+\frac{1}{2}\right)^2 - \Lambda^2 - \frac{1}{2}\left[4\left(J+\frac{1}{2}\right)^2 + \frac{A}{B_0}\left(\frac{A}{B_0}-4\right)\Lambda^2\right]^{1/2}\right\} - D_v J^4 , \quad (21)$$

$$F_2(J) = B_0\left\{\left(J+\frac{1}{2}\right)^2 - \Lambda^2 + \frac{1}{2}\left[4\left(J+\frac{1}{2}\right)^2 + \frac{A}{B_0}\left(\frac{A}{B_0}-4\right)\Lambda^2\right]^{1/2}\right\} - D_v (J+1)^4 , \quad (22)$$

where

$F_1(J)$, $F_2(J)$ = energy levels of the lower and upper doublet states, respectively,

Λ = orbital angular momentum quantum number = 1, 2, 3, ... ,

A = spin coupling constant (cm^{-1}),

D_v = previously defined D,

J = rotational quantum number = $\frac{1}{2}, \frac{3}{2}, \frac{5}{2}, \ldots$.

In order to refer the rotational energy to the lowest molecular energy as the zero of energy, the lowest molecular energy β must be subtracted from $F_1(J)$ and $F_2(J)$. For normal $^2\Pi$ and inverted $^2\Pi$ molecules, β equals $F_1(1/2)$ and $F_1(3/2)$, respectively; for normal $^2\Delta$ and $^2\Gamma$ molecules, β equals $F_1(3/2)$ and $F_1(5/2)$, respectively. If $0 < A/B_0 < 2$, the lowest rotational level belongs to F_2 even though all the other rotational levels of the same doublet component belong to F_1; in such a case, β would be $F_2(1/2)$ for a $^2\Pi$ state.

If one follows the Haar and Friedman development, he arrives at the following expression for the rotational partition function:

$$Q_{rot} = \frac{2\ \exp\{(hc\beta/kT) + [(2\Lambda + 1)/4]\ \sigma\}}{\sigma^*} \left(\left\{ \sum_{k=0}^{\infty} g_k \frac{d^k}{d\sigma^k} \left[\sum_{J=\frac{1}{2},\frac{3}{2}}^{\infty} (2J + 1)\ e^{-\sigma J(J+1)} \right. \right. \right.$$

$$\left. \left. \left. + \frac{hcD}{kT} \cdot \frac{d^2}{d\sigma^2} \sum_{J=\frac{1}{2},\frac{3}{2}}^{\infty} (2J + 1)\ e^{-\sigma J(J+1)} \right] \right\} - e^{-\gamma\sigma} \right), \qquad (23)$$

where

$$\sigma = \frac{hcB_0}{kT}, \qquad (24)$$

σ^* = symmetry number,

$$g_k = (-1)^k\ \frac{\sigma^{2k}}{k!} \sum_{n=0}^{\infty} \frac{(n + k)!\ (\sigma^2 a)^n}{(2n + 2k)!\ n!}, \qquad (25)$$

$$a = \left[\left(\frac{A}{2B_0} \right)^2 - \frac{A}{B_0} \right] \Lambda^2 + \frac{1}{4}, \qquad (26)$$

$$\gamma = \left(\frac{2\Lambda + 1}{4} \right) - \frac{1}{2B_0} \left[4B_0^2 \left(J + \frac{1}{2} \right)^2 - 4AB_0\ \Lambda^2 + A^2\Lambda^2 \right]^{1/2}. \qquad (27)$$

The g_k all converge. In the PUBCO-II code, n is allowed to run only from 0 to 12 and k from 0 to 7 since these limits are sufficiently large to guarantee convergence of the g_k.

The term $e^{-\gamma\sigma}$ in equation (23) must be included to account for the fact that some of the rotational levels are missing. Thus, for a $^2\Pi$ molecule, only one level with J = 1/2 is present, but in a $^2\Delta$ molecule both the J = 1/2 levels are missing, as well as one level with J = 3/2. Consequently, the coefficient of $e^{-\gamma\sigma}$ for a $^2\Pi$ molecule will be unity and J will equal 1/2; for the case of a $^2\Delta$ molecule there will be two sets of $e^{-\gamma\sigma}$ terms, one set corresponding to J = 1/2 with a coefficient of 2 and the second corresponding to J = 3/2 with a coefficient of 2. If a molecule is encountered with $\Lambda > 3(^2\Gamma)$,

the code will treat the molecule as one in the $^2\Gamma$ state as far as missing rotational levels are concerned.

Equation (23) differs slightly in form from equation (8) in the Haar and Friedman paper because certain simplifications have not been used in the PUBCO-II code.

The evaluation of the sum

$$\sum_{J=\frac{1}{2},\frac{3}{2}}^{\infty} (2J + 1)\, e^{-\sigma J(J+1)}$$

is performed as discussed in the original paper but the summation has been extended to yield additional terms. The following result is obtained:

$$\sum_{J=\frac{1}{2},\frac{3}{2},\ldots}^{\infty} (2J + 1)\, e^{-\sigma J(J+1)} = \frac{1}{\sigma} + 8.33333 \times 10^{-2} - \left(2.70834 \times 10^{-2}\right)\sigma - \left(1.07391 \times 10^{-2}\right)\sigma^2 - \left(3.1731 \times 10^{-3}\right)\sigma^3 - \left(1.1649 \times 10^{-3}\right)\sigma^4 - \left(8.863 \times 10^{-4}\right)\sigma^5 . \tag{28}$$

If the power series in σ in equation (28) is represented as $\Sigma^*(\sigma)$, equation (23) then becomes

$$Q_{rot} = \frac{2\, \exp\{(hc\beta/kT) + [(2\Lambda + 1)/4]\sigma\}}{\sigma^*} \left\{ \left[\sum_{k=0}^{7} g_k \frac{d^k}{d\sigma^k} \times \left(\Sigma^*(\sigma) + \frac{hcD}{kT} \frac{d^2}{d\sigma^2} \Sigma^*(\sigma) \right) \right] - e^{-\gamma\sigma} \right\}. \tag{29}$$

Equation (29) is multiplied by 2 rather than by 4 as in equation (11) of the original Haar and Friedman paper because the other factor of 2 is considered

to be the electronic degeneracy in the PUBCO-II code.

It should be pointed out that the correction term due to the anharmonicity of the molecule has been derived incorrectly in the Haar and Friedman paper although the error resulting from the incorrect expression is not too large.

2.4 Rotational Partition Function for Triplet Molecules with Λ-type Doubling

Budo[7] has derived expressions for the rotational term values for any degree of spin uncoupling for triplet states on the basis of Hill and Van Vleck's general equations. These expressions are given in Herzberg (Ref. 4, p. 235) in the following form:

$$F_1(J) = B_0\left[J(J+1) - \sqrt{Z_1} - 2Z_2\right] - D_v\left(J - \frac{1}{2}\right)^4 , \tag{30}$$

$$F_2(J) = B_0\left[J(J+1) + 4Z_2\right] - D_v\left(J + \frac{1}{2}\right)^4 , \tag{31}$$

$$F_3(J) = B_0\left[J(J+1) + \sqrt{Z_1} - 2Z_2\right] - D_v\left(J + \frac{3}{2}\right)^4 , \tag{32}$$

where

$$Z_1 = \Lambda^2\,\frac{A}{B_0}\left(\frac{A}{B_0} - 4\right) + \frac{4}{3} + 4J(J+1) , \tag{33}$$

$$Z_2 = \frac{1}{3Z_1}\left[\Lambda^2\,\frac{A}{B_0}\left(\frac{A}{B_0} - 1\right) - \frac{4}{9} - 2J(J+1)\right] , \tag{34}$$

and where B_0 has been substituted for B_v in the Herzberg expressions.

As in the case of molecules in the doublet state, it is necessary to subtract the lowest molecular energy β from $F_1(J)$, $F_2(J)$, and $F_3(J)$. For normal $^3\Pi$ and inverted $^3\Pi$ molecules, β equals $F_1(0)$ and $F_1(2)$, respectively; for normal $^3\Delta$ or $^3\Gamma$ molecules, β equals $F_1(1)$ and $F_1(2)$, respectively.

The rotational levels of each of the triplet components can be expressed

by the rigid rotator equation (20) if the spin uncoupling is slight ($A \gg B_0$). However, the effective rotational constant, B_{eff}, for the two rotational levels for which $\Sigma = \pm 1$ is given by

$$B_{eff} = B_0\left(1 \pm \frac{2B_0}{\Lambda A} + \ldots\right), \tag{35}$$

instead of by B_0, as is the case for the level where $\Sigma = 0\left({}^3\Pi_1, {}^3\Delta_2, \ldots\right)$. Even when the spin uncoupling becomes larger, the mean of the three rotational levels for each J still behaves like the rigid rotator equation (20) with the true B_0.

The rotational partition function for a non-Σ triplet state thus becomes

$$Q_{rot} = \frac{e^{hc\beta/kT}}{\sigma^*}\left\{\sum_{i=0}^{2}\left[\frac{kT}{hc}\cdot\frac{1}{B_i} + 1 + \frac{1}{15}\left(\frac{hcB_i}{kT}\right) + \frac{4}{315}\left(\frac{hcB_i}{kT}\right)^2 + \frac{1}{315}\left(\frac{hcB_i}{kT}\right)^3\right] - (2J+1)\, e^{-hcF_i(J)/kT}\right\}, \tag{36}$$

where

B_i = effective B for each of the three triplet components as defined by equation (35).

Thus equation (36) differs from equation (20) only because equation (36) is summed over the three-component rotational levels of the triplet state and because the contributions of any missing rotational levels are subtracted from the rotational partition function. It is obvious that hcF/kT here is equivalent to $\gamma\sigma$ in the case of the doublet states.

2.5 Rigid Rotator-Harmonic Oscillator Thermodynamic Functions

The four thermodynamic functions are derivable from the partition function by means of the following expressions:

Free energy function

$$-(F^\circ - H_o^\circ)/T = R \ln Q \tag{37}$$

Enthalpy function

$$(H - H_o^\circ)/T = -\frac{R}{T}\frac{Q'}{Q} \tag{38}$$

Entropy

$$S^\circ = (H^\circ - H_o^\circ)/T - (F^\circ - H_o^\circ)/T \tag{39}$$

Heat capacity

$$C_p^\circ = \frac{R}{T^2}\left[\frac{Q''}{Q} - \left(\frac{Q'}{Q}\right)^2\right] \tag{40}$$

In equations (37) through (40), Q' and Q'' are defined as follows:

$$Q' = \left[\frac{\partial Q}{\partial(1/T)}\right]_p , \tag{41}$$

$$Q'' = \left[\frac{\partial^2 Q}{\partial(1/T)^2}\right]_p . \tag{42}$$

Since the entropy is merely the sum of the free energy function and the enthalpy function, it is left to the reader to obtain the actual expression for the entropy contributions of various modes of freedom; only the expressions for the free energy function, the enthalpy function, and heat capacity will be given.

Expressions (37), (38), and (40) take the following forms when the total partition function Q is separated into its translational component and its remaining internal components:

$$-(F^\circ - H_o^\circ)/T = R\left(\frac{5}{2}\ln T + \frac{3}{2}\ln M + 20.1976 - \ln P + \ln Q_{int}\right) , \tag{43}$$

$$(H^\circ - H_0^\circ)/T = R\left[\frac{5}{2} - \frac{1}{T}\left(\frac{Q'_{int}}{Q_{int}}\right)\right], \tag{44}$$

$$C_p^\circ = R\left\{\frac{5}{2} + \frac{1}{T^2}\left[\frac{Q''_{int}}{Q_{int}} - \left(\frac{Q'_{int}}{Q_{int}}\right)^2\right]\right\}. \tag{45}$$

If only the ground electronic state is being considered for a given molecule, it is permissible to separate the internal partition function into its vibrational, rotational, and electronic components and to compute the contribution of each of the components to the thermodynamic functions. However, if additional excited electronic states are being considered, one must compute the total Q_{int}, Q'_{int}, and Q''_{int} for each electronic state and then sum these quantities over all the electronic states under consideration before calculating the thermodynamic functions by means of expressions (43), (44), and (45). The PUBCO-II code treats all problems as if more than one electronic level were being considered.

The vibrational, electronic, and rotational partition functions and their first and second derivatives with respect to 1/T are listed below:

$$Q_{vib} = \left(1 - e^{-u}\right)^{-1}, \tag{46}$$

$$Q'_{vib} = (-1)\,(uT)\left(1 - e^{-u}\right)^{-2} e^{-u}, \tag{47}$$

$$Q''_{vib} = (uT)^2\left(1 - e^{-u}\right)^{-3}\left(1 + e^{-u}\right)e^{-u}, \tag{48}$$

$$Q_{el} = g_{el}\, e^{-hcT_i/kT}, \tag{49}$$

$$Q'_{el} = -\left(\frac{hcT_i}{k}\right) Q_{el} , \tag{50}$$

$$Q''_{el} = \left(\frac{hcT_i}{k}\right)^2 Q_{el} . \tag{51}$$

In expressions (49), (50), and (51), T_i is the energy of the ith electronic state.

For molecules in the Σ state,

$$Q_{rot} = \frac{1}{\sigma^*}\left[\frac{1}{\sigma} + \frac{1}{3} + \frac{1}{15}\,\sigma + \frac{4}{315}\,\sigma^2 + \frac{1}{315}\,\sigma^3\right] , \tag{52}$$

$$Q'_{rot} = \frac{T}{\sigma^*}\left[-\frac{1}{\sigma} + \frac{1}{15}\,\sigma + \frac{8}{315}\,\sigma^2 + \frac{3}{315}\,\sigma^3\right] , \tag{53}$$

$$Q''_{rot} = \frac{T^2}{\sigma^*}\left[\frac{2}{\sigma} + \frac{8}{315}\,\sigma^2 + \frac{6}{315}\,\sigma^3\right] . \tag{54}$$

For molecules in the $^2\Lambda$ state,

$$Q_{rot} = \frac{2\,\exp\{(hc\beta/kT) + [(2\Lambda + 1)/4]\,\sigma\}}{\sigma^*}\left\{\left[\sum_{k=0}^{7} g_k \frac{d^k}{d\sigma^k} \times \left(\Sigma^*(\sigma) + \frac{hcD}{kT}\,\frac{d^2}{d\sigma^2}\,\Sigma^*(\sigma)\right)\right] - e^{-\gamma\sigma}\right\}, \tag{55}$$

$$\begin{aligned} Q'_{rot} = {} & \left[\frac{hc\beta}{k} + \left(\frac{2\Lambda + 1}{4}\right)\frac{hcB_0}{k}\right]\left(Q_{rot}\right) \\ & + \frac{2\,\exp\{(hc\beta/kT) + [(2\Lambda + 1)/4]\,\sigma\}}{\sigma^*}\left[\sum_{k=0}^{7} g'_k \frac{d^k}{d\sigma^k}\left(\Sigma^*(\sigma) + \frac{hcD}{kT}\,\frac{d^2}{d\sigma^2}\,\Sigma^*(\sigma)\right)\right. \\ & \left. + \sum_{k=0}^{7} g_k \sigma T\,\frac{d^{k+1}}{d\sigma^{k+1}}\left(\Sigma^*(\sigma) + \frac{hcD}{kT}\,\frac{d^2}{d\sigma^2}\,\Sigma^*(\sigma)\right) + (\gamma\sigma T)\,e^{-\gamma\sigma}\right] , \end{aligned} \tag{56}$$

$$Q''_{rot} = \left[\frac{hc\beta}{k} + \left(\frac{2\Lambda + 1}{4}\right)\frac{hcB_0}{k}\right]\left(Q'_{rot}\right)$$

$$+ \frac{2\exp\{(hc\beta/kT) + [(2\Lambda + 1)/4]\,\sigma\}}{\sigma^*}\left\{\sum_{k=0}^{7} g''_k \frac{d^k}{d\sigma^k}\left(\Sigma^*(\sigma) + \frac{hcD}{kT}\frac{d^2}{d\sigma^2}\Sigma^*(\sigma)\right)\right.$$

$$+ \left[\frac{hc\beta}{k} + \left(\frac{2\Lambda + 1}{4}\right)\frac{hcB_0}{k}\right]\left[\sum_{k=0}^{7} g'_k \frac{d^k}{d\sigma^k}\left(\Sigma^*(\sigma) + \frac{hcD}{kT}\frac{d^2}{d\sigma^2}\Sigma^*(\sigma)\right)\right.$$

$$+ \sum_{k=0}^{7} g_k \sigma T \frac{d^{k+1}}{d\sigma^{k+1}}\left(\Sigma^*(\sigma) + \frac{hcD}{kT}\frac{d^2}{d\sigma^2}\Sigma^*(\sigma)\right) + (\gamma\sigma T)\, e^{-\gamma\sigma}\Bigg]$$

$$+ 2\sum_{k=0}^{7} g'_k \sigma T \frac{d^{k+1}}{d\sigma^{k+1}}\left(\Sigma^*(\sigma) + \frac{hcD}{kT}\frac{d^2}{d\sigma^2}\Sigma^*(\sigma)\right)$$

$$\left.+ \sum_{k=0}^{7} g_k (\sigma T)^2 \frac{d^{k+2}}{d\sigma^{k+2}}\left(\Sigma^*(\sigma) + \frac{hcD}{kT}\frac{d^2}{d\sigma^2}\Sigma^*(\sigma)\right) - (\gamma\sigma T)^2\, e^{-\gamma\sigma}\right\}. \qquad (57)$$

In equations (56) and (57), g'_k and g''_k are the first and second derivations of g_k with respect to $1/T$.

For molecules in the $^3\Lambda$ state,

$$Q_{rot} = \frac{e^{hc\beta/kT}}{\sigma^*}\left[\sum_{i=0}^{2}\left(\frac{1}{\sigma_i} + 1 + \frac{1}{15}\sigma_i + \frac{4}{315}\sigma_i^2 + \frac{1}{315}\sigma_i^3\right)\right.$$

$$\left. - (2J + 1)\, e^{-hcF_i(J)/kT}\right], \qquad (58)$$

$$Q'_{rot} = \frac{hc\beta}{k} Q_{rot} + \frac{e^{hc\beta/kT}}{\sigma^*}\left\{T\left[\sum_{i=0}^{2}\left(-\frac{1}{\sigma_i} + \frac{1}{15}\sigma_i + \frac{8}{315}\sigma_i^2 + \frac{3}{315}\sigma_i^3\right)\right.\right.$$

$$\left.\left. + (2J + 1)\frac{hcF_i(J)}{kT} e^{-hcF_i(J)/kT}\right]\right\}, \qquad (59)$$

$$Q''_{rot} = 2\frac{hc\beta}{k} Q'_{rot} + \frac{e^{hc\beta/kT}}{\sigma^*}\left\{T^2\left[\sum_{i=0}^{2}\left(\frac{2}{\sigma_i} + \frac{8}{315}\sigma_i^2 + \frac{6}{315}\sigma_i^3\right)\right.\right.$$

$$\left.\left. - (2J+1)\left(\frac{hcF_i(J)}{kT}\right)^2 e^{-hcF_i(J)/kT}\right]\right\} - \left(\frac{hc\beta}{k}\right)^2 Q_{rot} , \qquad (60)$$

where

$$\sigma_i = \frac{hcB_i}{kT} . \qquad (61)$$

2.6 Nonrigid Rotator-Anharmonic Oscillator Thermodynamic Functions

The partition functions for the stretching, anharmonicity, and vibration-rotation interactions are

$$\ln Q_{st} = \rho T , \qquad (62)$$

$$Q'_{st} = -\rho T^2 \cdot Q_{st} , \qquad (63)$$

$$Q''_{st} = 2\rho T^3 \cdot Q_{st} - \rho T^2 \cdot Q'_{st} , \qquad (64)$$

$$\ln Q_{anh} = \frac{\left(2x_e\omega_e - (13/4)\, y_e\omega_e\, (hc/kT)\right)}{\left(e^u - 1\right)^2} , \qquad (65)$$

$$Q'_{anh} = Q_{anh}\left(2x_e\omega_e - \frac{13}{4} y_e\omega_e\right)\left(\frac{hc}{k}\right)\left\{e^u - 1 - 2ue^u\right\}\left(e^u - 1\right)^{-3} , \qquad (66)$$

$$Q''_{anh} = 2Q_{anh}\left(2x_e\omega_e - \frac{13}{4} y_e\omega_e\right)\left(\frac{hc}{k}\right)(uT)\, e^u\left\{2 + u - 2e^u + 2ue^u\right\}\left(e^u - 1\right)^{-4}$$

$$+ \left(2x_e\omega_e - \frac{13}{4} y_e\omega_e\right)\left(\frac{hc}{k}\right)\left\{e^u - 1 - 2ue^u\right\}\left(e^u - 1\right)^{-3} \cdot Q'_{anh} , \qquad (67)$$

$$\ln Q_{v-r} = \frac{\delta}{\left(e^{u} - 1\right)} , \tag{68}$$

$$Q'_{v-r} = - \frac{\delta(uT)\ e^{u}}{\left(e^{u} - 1\right)^{2}} \cdot Q_{v-r} , \tag{69}$$

$$Q''_{v-r} = \frac{\delta e^{u} (uT)^{2} \left(e^{u} + 1\right)}{\left(e^{u} - 1\right)^{3}} \cdot Q_{v-r} - \frac{\delta(uT)\ e^{u}}{\left(e^{u} - 1\right)^{2}} \cdot Q'_{v-r} . \tag{70}$$

3. THE PUBCO-II CODE

3.1 General Features

The IBM cards used at the Los Alamos Scientific Laboratory are punched in columns 1 to 36 and 38 to 72. All discussion will be based upon this punching convention.

The code uses decimal floating point numbers for numerical input and Hollerith alphameric characters as binary coded decimal (BCD) data for molecular identification. The output is printed by the SHARE-2 board as floating point numbers for all molecular input data and as fixed point numbers for all computational data, i.e., temperature and thermodynamic functions. The molecular formula is printed as Hollerith characters.

Five Los Alamos subroutines and one Los Alamos auxiliary program are used in the course of the program. They will be identified below and discussed in detail in the following section. The identification and function of each subroutine is as follows:

LAS-011	Floating decimal input
LAS-117	General on-line or off-line print
LAS-800	Square root

LAS-816 Floating exponential

LAS-820 Floating natural logarithm

LAA-027 Binary correction card loader

The computation of the thermodynamic functions is performed in two parts. The rigid rotator-harmonic oscillator functions are calculated for all molecules. If the more exact nonrigid rotator-anharmonic oscillator functions are desired, sense switch No. 1 on the 704 console is left up; depression of this switch causes the 704 to transfer to the print routine as soon as the rigid rotator-harmonic oscillator functions have been computed.

If sense switch No. 2 on the console is depressed, all the thermodynamic functions are divided by the gas constant, R, before the results are printed.

3.2 Subroutines

Since the write-ups for some of the subroutines used in the PUBCO-II code are rather lengthy, only those portions of the write-ups which are necessary for the proper utilization of these subroutines will be covered in this report. Only one error stop can occur in the noncomputing subroutines and it is covered in the discussion of LAS-011.

LAS-011. Blocks of eight digit, floating decimal constants (up to seven per card) are loaded by means of this subroutine. It is identified in the code as region 701 and is used to load all molecular data for the problem. It is entered by means of a transition card. This transition card is punched in columns 1 and 2 in the "9" row. The binary location to which the transition is to be made is punched in the "9" row in the appropriate columns from column 22 to column 36. LAS-011 requires a transition to $(2760)_8$ for the first problem of a series and is enterd by means of a basic linkage-calling routine in region $110.31(5076)_8$ for all problems except the first of a series. Each group of molecular data requires a control card and one or more data cards.

The control card must be punched as follows:

Card Columns	Punch	Significance
1	8	Control card
2-6	FWA	Initial loading address

The data cards must be punched as follows:

Card Columns	Punch	Significance
1	Blank	Data card
2-9	N_1	1st number
10-11	E_1	1st exponent
12-19	N_2	2nd number
20-21	E_2	2nd exponent
22-29	N_3	3rd number
30-31	E_3	3rd exponent
32-36	N_4	First five digits of 4th number
37	Blank	
38-40	N_4	Last three digits of 4th number
41-42	E_4	4th exponent
43-50	N_5	5th number
51-52	E_5	5th exponent
53-60	N_6	6th number
61-62	E_6	6th exponent
63-70	N_7	7th number
71-72	E_7	7th exponent

All zeros must be punched. If fewer than seven numbers are on a card, the unused field must be left blank. Numbers must be punched consecutively, starting at the left of the card. The signs of the numbers and exponents are punched over the first digit of the number and of the exponent,

respectively. An 11 punch is used for minus but no additional punch is used to designate a positive number. To avoid the necessity of punching several sets of zeros for unused electronic states, it is most convenient to use a control card for each type of molecular input data. In this case the following initial loading addresses are required:

$(01950)_{10}$	Electronic degeneracy
$(01956)_{10}$	Rotational B
$(01962)_{10}$	Fundamental frequency
$(01968)_{10}$	$x_e\omega_e$
$(01974)_{10}$	Rotational α
$(01980)_{10}$	Electronic energy
$(01986)_{10}$	Molecular weight and symmetry number
$(01988)_{10}$	Λ
$(01994)_{10}$	Rotational D
$(02000)_{10}$	$y_e\omega_e$
$(02006)_{10}$	Rotational coupling, A
$(02012)_{10}$	Rotational β

The data card for each type of data must follow immediately behind its control card.

An error stop can occur at $(1747)_{10}$ or $(3323)_8$ if a data card is punched incorrectly.

LAS-117. This program prints fixed and/or floating decimal numbers either on-line or off-line. It is used to print on-line in PUBCO-II but it can be modified by 027 correction cards to print off-line. These changes will be discussed later in this section. This subroutine is entered in region 100 at $100.0(4146)_8$ to print molecular data in floating point for both rigid rotator-harmonic oscillator molecules and nonrigid rotator-anharmonic oscillator molecules.

For all molecules, the molecular data are printed consecutively (six words per line). This means that each type of input data, i.e., electronic degeneracy, rotational constants, fundamental frequencies, etc., will occupy one line of print. The temperature, the free energy function, enthalpy function, entropy, and heat capacity are printed in this order on one line as fixed point numbers after the computation of the thermodynamic functions has been performed at each desired temperature. The thermodynamic functions are printed with five significant figures following the decimal point; since most spectroscopic data are not sufficiently accurate to permit this degree of precision, it will be desirable in most cases for the user to round off the thermodynamic functions to the appropriate number of figures for a given molecule. The molecular formula is printed at the head of the molecular data and at the head of the thermodynamic functions.

The following changes in the program are required to print off-line with the same format as the on-line printing. The octal designation for the operation PTW is +200000.

Location	Operation	Address	Tag	Decrement
$(4150)_8$	PTW	0	0	$(2)_8$
$(4161)_8$	PTW	0	0	$(48)_8$
$(4166)_8$	PTW	0	0	$(48)_8$
$(4177)_8$	PTW	0	0	$(48)_8$
$(4203)_8$	PTW	0	0	$(48)_8$
$(4206)_8$	PTW	0	0	$(1)_8$

LAS-800. This program, which is entered at α by a basic linkage, takes the square root of a normalized number, x, in the accumulator and returns to the main program at $\alpha + 2$ with $\sqrt{x}$ in the accumulator. If the $x \leq 0$, the return is to $\alpha + 1$ with $\sqrt{|x|}$ in the accumulator. The PUBCO

code is set up to give a program stop at all $\alpha + 1$ positions in the square root subroutine since there is no situation where x should be a negative number. The square root subroutine is identified in the code as region 704.

LAS-816. This subroutine evaluates the exponential of a floating point number, x, in the accumulator. The 704 requires that $|x| < 87.3$. The entry is at α with x in the accumulator and the normal exit is at $\alpha + 2$ with e^x in the accumulator. Since exponent overflows are possible in the program, the exit for this condition at $\alpha + 1$ is set up to store 10^{30} in the accumulator if $x > 87.3$ and 0 if $x < -87.3$. This subroutine is region 703 of the code.

LAS-820. This program evaluates the natural logarithm of a normalized floating point number, $x > 0$. Entry to the program is at α with x in the accumulator and the normal exit is at $\alpha + 2$ with ln x in the accumulator. If $x \leq 0$, the exit is at $\alpha + 1$. Some of the $\alpha + 1$ exits are programmed as "halts", while others are "halt and proceed"; the instruction used in a particular calling sequence depends upon whether x can physically be zero in that particular situation. LAS-820 is identified as region 702 in the code.

LAA-027. This self-loading auxiliary routine for binary correction cards is used to load the molecular formula into the IBM 704. The card bearing the molecular identification for a given problem is loaded into $802.63(3735)_8$ by LAA-027 after the corresponding decimal data for that problem have been loaded. The BCD punched alphameric characters are punched in columns 38 to 72. Binary punched correction cards also can be loaded by LAA-027 if it becomes necessary to change some of the instructions of the code itself.

3.3 Regions within the Code

The code is composed of 90 regions. Thirty-five of these regions are used as operational regions and can be identified by the fact that their region

numbers are between 100 and 402; 45 regions are used for the temporary storage of computational results and have region numbers between 500 and 645; five regions are the previously discussed subroutines and are numbered from 700 through 704; and five regions, numbered 800 through 804, contain input data for the problem. Region 1 is used for subroutine erasable storage.

The following list gives the functions of the operational regions.

Region	Function
100	Print input data
101	Calculate translational contribution to the thermodynamic functions
102	Calculate vibrational contribution
103	Calculate rotational contribution for molecules in the Σ state
105	Calculate electronic contribution
106	Calculate stretching contribution
107	Calculate vibration-rotation interaction contribution
108	Calculate anharmonicity contribution
109	Print output of computations
110	Increment temperature
200-213	Calculate rotational contribution for $^2\Lambda$ molecules
300-307	Calculate rotational contribution for $^3\Lambda$ molecules
400	Gather all Q, Q', and Q'' terms
401	Form total Q, Q', and Q'' for each electronic level
402	Compute thermodynamic functions

3.4 Input Data

Because the possibility exists that an individual may desire to change one or more pieces of input data, some discussion of the data now stored in the code will be given.

The 800 block contains the values of the physical constants needed in the computation. The constants are those of Cohen, et al.,[8] with the exception of data pertaining to the gas constant, R, and the Boltzmann constant, k, which are based upon constants used by the National Bureau of Standards.

The order of the physical constants in region 800 is as follows:

Region	Function
800.0	Gas constant, R
800.1	π
800.2	Boltzmann constant, k
800.3	Planck constant, h
800.4	Velocity of light, c
800.5	Avogadro number, N
800.6	Pressure in dynes/cm^2
800.7	Sackur-Tetrode constant
800.8	5/2 R
800.9	R ln P
800.10	3/2 R
800.11	hc/k

The 801 block contains numbers needed in the calculations and will not be discussed. The 802 region contains the molecular data in the following order:

Region	Function
802.0-802.5	Electronic degeneracy, g_{el}
802.6-802.11	Rotational constant, B
802.12-802.17	Wave number of fundamental frequency, ω_e
802.18-802.23	Anharmonicity constant, $x_e \omega_e$

Region	Function
802.24-802.29	Rotational constant, α
802.30-802.35	Electronic energy, T_i
802.36	Molecular weight
802.37	Symmetry number
802.38-802.43	Orbital angular momentum quantum number, Λ
802.44-802.49	Rotational constant, D
802.50-802.55	Anharmonicity constant, $y_e\omega_e$
802.56-802.61	Rotational spin coupling constant, A
802.62	Rotational constant, β, to correct D for different vibrational levels
802.63	Molecular identification

The data in blocks of six are for the ground electronic state and for as many as five excited electronic states, the order of these states being in the order of increasing values of T. There must be a one-to-one correspondence for all data which occupy blocks of six, i.e., as many g_{el}'s as B's as ω_e's, etc.

Region 803 has various temperatures and temperature increments stored in it so that the code will compute the thermodynamic functions at 50°K intervals from 50°K to 250°K, at 298.16°K, and at 100°K intervals from 300°K through 5000°K. The initial temperature is stored at 803.0; the initial ΔT is at 803.1; the second ΔT is stored at 803.4; and the final test temperature is stored at 803.6. New temperatures can be stored in this region by means of LAS-011 if one wishes to change the temperature scanning routine.

Region 804 contains constants needed in the computations.

3.5 The PUBCO-II Deck

The PUBCO-II deck is formed by the following cards:

LAA-020 self-loading binary card

PUBCO-II binary cards

TNX to $(2760)_8$ transition card (to LAS 011.10)

LAS-011 control cards and decimal data cards for 802 block

LAA-027 self-loading correction card

Binary card with molecular formula in $(3735)_8$

TNX to $(4146)_8$ transition card (to start of problem)

Two blank cards

If several molecules are being computed at the same time, the blank cards should be removed and placed at the end of the cards for the last molecule being computed. Each of the molecules after the first requires the LAS-011 control and data cards, the LAA-027 self-loading correction card and binary card with molecular formula, and a transition card to $(4146)_8$.

ADDENDUM

Region 646 has been added to the operational regions as a catch-all region for corrections made after the report was originally written.

The PUBCO-II code has been checked out on an IBM 709 using IBM 704 Compatibility Package #2.

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Appendix A

IBM LISTING FOR PUBCO-II CODE

ORIGIN TABLE.	SYMBOL.FWA	SYMBOL.LWA	OCT.FWA	LWA	DECIM.FWA	LWA
	1.0000.	1.3107.1	1750	77777	1000	32767
	700.0000.	700.3107.1	2114	77777	1100	32767
	701.0000.	701.3107.1	2746	77777	1510	32767
	702.0000.	702.3107.1	3340	77777	1760	32767
	703.0000.	703.3107.1	3410	77777	1800	32767
	704.0000.	704.3107.1	3516	77777	1870	32767
	800.0000.	800.3107.1	3547	77777	1895	32767
	801.0000.	901.3107.1	3566	77777	1910	32767
	802.0000.	802.3107.1	3636	77777	1950	32767
	803.0000.	803.3107.1	3744	77777	2020	32767
	804.0000.	904.3107.1	3756	77777	2030	32767
	100.0000.	100.0029.	4146	4211	2150	2185
	101.0000.	101.0019.	4214	4237	2188	2207
	102.0000.	102.0050.	4242	4332	2210	2266
	103.0003.	103.0070.	4336	4441	2270	2337
	105.0000.	105.0032.	4456	4516	2350	2382
	106.0000.	106.0028.	4521	4561	2385	2417
	107.0000.	107.0025.	4564	4622	2420	2450
	108.0000.	108.0064.	4641	4753	2465	2539
	109.0000.	109.0032.	4766	5031	2550	2585
	110.0000.	110.0032.	5036	5077	2590	2623
	200.0000.	200.0043.	5101	5154	2625	2668
	201.0000.	201.0056.	5170	5260	2680	2736
	202.0000.	202.0018.	5276	5320	2750	2768
	203.0000.	203.0018.	5327	5351	2775	2793
	204.0000.	204.0024.	5377	5430	2815	2840
	205.0000.	205.0112.	5442	5624	2850	2964
	206.0000.	206.0099.	5644	6014	2980	3084
	207.0000.	207.0070.	6015	6126	3085	3158
	208.0000.	208.0153.	6130	6336	3160	3294
	209.0000.	209.0095.	6402	6543	3330	3427
	210.0000.	210.0046.	6560	6640	3440	3488
	211.0000.	211.0022.	6654	6702	3500	3522
	212.0000.	212.0018.	6712	6737	3530	3551
	213.0000.	213.0014.	6750	6766	3560	3574
	300.0000.	300.0045.	6774	7053	3580	3627
	301.0000.	301.0182.	7070	7366	3640	3830
	302.0000.	302.0089.	7412	7562	3850	3954
	303.0000.	303.0100.	7602	7754	3970	4076
	304.0000.	304.0112.	7772	10157	4090	4207
	305.0000.	305.0058.	10174	10267	4220	4279
	306.0000.	306.0040.	10302	10352	4290	4330
	307.0000.	307.0061.	10364	10462	4340	4402
	400.0000.	400.0036.	10472	10536	4410	4446
	401.0000.	401.0061.	10554	10651	4460	4521
	402.0000.	402.0038.	10662	10735	4530	4573
	500.0000.	500.3107.1	10744	77777	4580	32767
	501.0000.	501.3107.1	10756	77777	4590	32767
	502.0000.	502.3107.1	10770	77777	4600	32767
	503.0000.	503.3107.1	11002	77777	4610	32767

504.0000.	504.3107.1	11014	77777	4620	32767
505.0000.	505.3107.1	11026	77777	4630	32767
506.0000.	506.3107.1	11040	77777	4640	32767
507.0000.	507.3107.1	11052	77777	4650	32767
600.0000.	600.3107.1	11064	77777	4660	32767
601.0000.	601.3107.1	11071	77777	4665	32767
603.0000.	603.3107.1	11110	77777	4680	32767
604.0000.	604.3107.1	11127	77777	4695	32767
605.0000.	605.3107.1	11141	77777	4705	32767
606.0000.	606.3107.1	11153	77777	4715	32767
607.0000.	607.3107.1	11160	77777	4720	32767
608.0000.	608.3107.1	11172	77777	4730	32767
609.0000.	609.3107.1	11211	77777	4745	32767
610.0000.	610.3107.1	11223	77777	4755	32767
611.0000.	611.3107.1	11235	77777	4765	32767
612.0000.	612.3107.1	11261	77777	4785	32767
613.0000.	613.3107.1	11317	77777	4815	32767
614.0000.	614.3107.1	11331	77777	4825	32767
615.0000.	615.3107.1	11343	77777	4835	32767
616.0000.	616.3107.1	11425	77777	4885	32767
617.0000.	617.3107.1	11432	77777	4890	32767
618.0000.	618.3107.1	11437	77777	4895	32767
619.0000.	619.3107.1	11451	77777	4905	32767
620.0000.	620.3107.1	11463	77777	4915	32767
621.0000.	621.3107.1	11475	77777	4925	32767
622.0000.	622.3107.1	11507	77777	4935	32767
623.0000.	623.3107.1	11533	77777	4955	32767
624.0000.	624.3107.1	11557	77777	4975	32767
630.0000.	630.3107.1	11603	77777	4995	32767
631.0000.	631.3107.1	11622	77777	5010	32767
632.0000.	632.3107.1	11660	77777	5040	32767
633.0000.	633.3107.1	11716	77777	5070	32767
634.0000.	634.3107.1	11754	77777	5100	32767
635.0000.	635.3107.1	12012	77777	5130	32767
636.0000.	636.3107.1	12036	77777	5150	32767
637.0000.	637.3107.1	12062	77777	5170	32767
642.0000.	642.3107.1	12106	77777	5190	32767
643.0000.	643.3107.1	12132	77777	5210	32767
644.0000.	644.3107.1	12156	77777	5230	32767
645.0000.	645.3107.1	12202	77777	5250	32767
646.0000.	646.0046.	12226	12314	5270	5324

```
02114 LAS  002723 001750 7 700. 0000.  LAS 117. 0000.      1. 0052.  GEN ON-OFF LINE PRINT     1500   02114

02746 LAS  003323 001750 7 701. 0000.  LAS  11. 0000.      1. 0023.   FLOATING DEC INPUT       1510   02746

03340 LAS  003406 001750 7 702. 0000.  LAS 820. 0000.      1. 0002.  FL PT LOG BASE E          1760   03340

03410 LAS  003506 001750 7 703. 0000.  LAS 816. 5770.      1. 0005.  FASTER EXP 2.5 MS         1800   03410

03516 LAS  003545 001750 7 704. 0000.  LAS 800. 2893.      1. 0003.  NORMAL EXIT=(A+2)  LG     1870   03516
03547      201774 570651 3 800. 0000.       0. 0000.      0. 0000.  193725000000 00           1895   03547
03550      202622 077325 3 800. 0001.       0. 0000.      0. 0000.  314159265350 00           1896   03550
03551      114476 235455 3 800. 0002.       0. 0000.      0. 0000.  138044000000-16           1897   03551
03552      052406 346323 3 800. 0003.       0. 0000.      0. 0000.  662517000000-27           1898   03552
03553      243676 563112 3 800. 0004.       0. 0000.      0. 0000.  299792000000 10           1899   03553
03554      317776 136520 3 800. 0005.       0. 0000.      0. 0000.  602320000000 23           1900   03554
03555      224756 600400 3 800. 0006.       0. 0000.      0. 0000.  101325000000 06           1901   03555
03556      205503 122254 3 800. 0007.       0. 0000.      0. 0000.  201975510000 01           1902   03556
03557      203475 753412 3 800. 0008.       0. 0000.      0. 0000.  496812500000 00           1903   03557
03560      205667 544466 3 800. 0009.       0. 0000.      0. 0000.  274610310000 01           1904   03560
03561      202575 432477 3 800. 0010.       0. 0000.      0. 0000.  298087500000 00           1905   03561
03562      201560 252000 3 800. 0011.       0. 0000.      0. 0000.  143879700000 00           1906   03562
03563      137667 633767 3 800. 0012.       0. 0000.      0. 0000.  100000000000-10           1907   03563
03564      236734 654500 3 800. 0013.       0. 0000.      0. 0000.  100000000000 09           1908   03564


03566      000000 000000 3 801. 0000.       0. 0000.      0. 0000.  000000000000 00           1910   03566
03567      201400 000000 3 801. 0001.       0. 0000.      0. 0000.  100000000000 00           1911   03567
03570      202400 000000 3 801. 0002.       0. 0000.      0. 0000.  200000000000 00           1912   03570
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03572      211473 000000 3 801. 0004.       0. 0000.      0. 0000.  315000000000 02           1914   03572
03573      175421 042107 3 801. 0005.       0. 0000.      0. 0000.  666666700000-02           1915   03573
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03575      175707 070673 3 801. 0007.       0. 0000.      0. 0000.  111111100000-01           1917   03575
03576      174533 136455 3 801. 0008.       0. 0000.      0. 0000.  423809500000-02           1918   03576
03577      203400 000000 3 801. 0009.       0. 0000.      0. 0000.  400000000000 00           1919   03577
03600      202600 000000 3 801. 0010.       0. 0000.      0. 0000.  300000000000 00           1920   03600
03601      203500 000000 3 801. 0011.       0. 0000.      0. 0000.  500000000000 00           1921   03601
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03607      177600 000000 3 801. 0017.       0. 0000.      0. 0000.  250000000000-01           1927   03607
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03611      206440 000000 3 801. 0019.       0. 0000.      0. 0000.  360000000000 01           1929   03611
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03613      205440 000000 3 801. 0021.       0. 0000.      0. 0000.  180000000000 01           1931   03613
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03616      201525 252523 3 801. 0024.       0. 0000.      0. 0000.  133333300000 00           1934   03616
03617      177707 070706 3 801. 0025.       0. 0000.      0. 0000.  444444440000-01           1935   03617
03620      204400 000000 3 801. 0026.       0. 0000.      0. 0000.  800000000000 00           1936   03620
03621      206600 000000 3 801. 0027.       0. 0000.      0. 0000.  480000000000 01           1937   03621
03622      206500 000000 3 801. 0028.       0. 0000.      0. 0000.  400000000000 01           1938   03622
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03625	204610	000000	3	801.	0031.	0. 0000.	0. 0000.	122500000000 01	1941	03625
03626	205500	000000	3	801.	0032.	0. 0000.	0. 0000.	200000000000 01	1942	03626
03627	203700	000000	3	801.	0033.	0. 0000.	0. 0000.	700000000000 00	1943	03627
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03631	204500	000000	3	801.	0035.	0. 0000.	0. 0000.	100000000000 01	1945	03631
03636	202400	000000	3	802.	0000.	0. 0000.	0. 0000.	200000000000 00	1950	03636
03637	202400	000000	3	802.	0001.	0. 0000.	0. 0000.	200000000000 00	1951	03637
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03641	202400	000000	3	802.	0003.	0. 0000.	0. 0000.	200000000000 00	1953	03641
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03653	214545	546314	3	802.	0013.	0. 0000.	0. 0000.	286160000000 03	1963	03653
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03676	217551	560000	3	802.	0032.	0. 0000.	0. 0000.	231500000000 04	1982	03676
03677	217625	350000	3	802.	0033.	0. 0000.	0. 0000.	259490000000 04	1983	03677
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03705	200400	000000	3	802.	0039.	0. 0000.	0. 0000.	500000000000-01	1989	03705
03706	201400	000000	3	802.	0040.	0. 0000.	0. 0000.	100000000000 00	1990	03706
03707	201400	000000	3	802.	0041.	0. 0000.	0. 0000.	100000000000 00	1991	03707
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03711	201400	000000	3	802.	0043.	0. 0000.	0. 0000.	100000000000 00	1993	03711

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03746      211452 122250 3 803. 0002.        0. 0000.        0. 0000.   298160800000 02   2022   03746
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03750      207620 000000 3 803. 0004.        0. 0000.        0. 0000.   100000000000 02   2024   03750
03751      210764 000000 3 803. 0005.        0. 0000.        0. 0000.   250000000000 02   2025   03751
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03760      -172537 714146 3 804. 0002.        0. 0000.        0. 0000.  -107391000000-02   2032   03760
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03772      -173442 330356 3 804. 0012.        0. 0000.        0. 0000.  -177260000000-02   2042   03772
03773      -173712 035261 3 804. 0013.        0. 0000.        0. 0000.  -279576000000-02   2043   03773
03774      -174663 504545 3 804. 0014.        0. 0000.        0. 0000.  -531780000000-02   2044   03774
03775      -175663 504545 3 804. 0015.        0. 0000.        0. 0000.  -106356000000-01   2045   03775
03776       144422 701372 3 804. 0016.        0. 0000.        0. 0000.   200000000000-09   2046   03776


04146 TSX   007400 402114   100. 0000.  TSX 700. 0000.  C   0. 0000.                        2150   04146
04147 PTH   302046 003735   100. 0001.  PTH 802. 0063.      0. 1062.  MOLECULAR IDENTIFIC.  2151   04147
04150 PON   100000 000362   100. 0002.  PON   0. 0242.      0. 0000.  HALF PAGE            2152   04150
04151 SDX  -053400 104210   100. 0003.  SDX   2. 0028.  A   0. 0000.                      2153   04151
04152 TSX   007400 402114   100. 0004.  TSX 700. 0000.  C   0. 0000.                      2154   04152
04153 SVN  -317523 103700   100. 0005.  SVN 802. 0034.  A   0. 8019.  MULTIPLICITY       2155   04153
04154 SVN  -317547 103701   100. 0006.  SVN 802. 0035.  A   0. 8039.  ROTATION CONSTANT,B  2156   04154
04155 SVN  -317573 103702   100. 0007.  SVN 802. 0036.  A   0. 8059.  OMEGA SUB E         2157   04155
04156 SVN  -317617 103703   100. 0008.  SVN 802. 0037.  A   0. 8079.  X OMEGA SUB E       2158   04156
04157 SVN  -317643 103704   100. 0009.  SVN 802. 0038.  A   0. 8099.  ALPHA              2159   04157
04160 SVN  -317667 1037D5   100. 0010.  SVN 802. 0039.  A   0. 8119.  ELECTRONIC TERM VALUE 2160   04160
04161 PON   100000 000000   100. 0011.  PON   0. 0000.      0. 0000.                      2161   04161
04162 TX    200006 104152   100. 0012.  TX    2. 0004.  A   0. 0006.                      2162   04162
04163 TSX   007400 402114   100. 0013.  TSX 700. 0000.  C   0. 0000.                      2163   04163
04164 SVN  -317573 003702   100. 0014.  SVN 802. 0036.      0. 8059.  MOLECULAR WEIGHT     2164   04164
04165 SVN  -317617 003703   100. 0015.  SVN 802. 0037.      0. 8079.  SYMMETRY NUMBER      2165   04165
04166 PON   100000 000000   100. 0016.  PON   0. 0000.      0. 0000.                      2166   04166
04167 SDX  -053400 104211   100. 0017.  SDX   2. 0029.  A   0. 0000.                      2167   04167
04170 TSX   007400 402114   100. 0018.  TSX 700. 0000.  C   0. 0000.                      2168   04170
04171 SVN  -317523 103734   100. 0019.  SVN 802. 0062.  A   0. 8019.  LAMBDA             2169   04171
04172 SVN  -317547 103735   100. 0020.  SVN 802. 0063.  A   0. 8039.  ROTATION CONSTANT,D 2170   04172
04173 SVN  -317573 103736   100. 0021.  SVN 802. 0064.  A   0. 8059.  Y OMEGA SUB E       2171   04173
04174 SVN  -317617 103737   100. 0022.  SVN 802. 0065.  A   0. 8079.  ROT. COUPLING CONST,A 2172   04174
04175 SVN  -317643 103740   100. 0023.  SVN 802. 0066.  A   0. 8099.                      2173   04175
04176 SVN  -317667 103741   100. 0024.  SVN 802. 0067.  A   0. 8119.                      2174   04176
04177 PON   100000 000000   100. 0025.  PON   0. 0000.      0. 0000.                      2175   04177
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04200 TX   200006 104170   100. 0025.1 TX    2. 0018.   A  0. 0006.                          2176   04200
04201 TSX  007400 402114   100. 0025.2 TSX 700. 0000.   C  0. 0000.                          2177   04201
04202 SVN -317605 003734   100. 0025.3 SVN 802. 0062.      0. 8069.  ROTATIONAL BETA          2178   04202
04203 PON  100000 000000   100. 0026.  PON   0. 0000.      0. 0000.                          2179   04203
04204 TSX  007400 402114   100. 0026.1 TSX 700. 0000.   C  0. 0000.                          2180   04204
04205 PTH  302046 003735   100. 0026.2 PTH 802. 0063.      0. 1062.  MOLECULAR IDENTIFIC.    2181   04205
04206 PON  100000 000361   100. 0026.3 PON   0. 0241.      0. 0000.  RESTORE PAPER           2182   04206
04207 T    002000 004214   100. 0027.  T   101. 0000.      0. 0000.  CALC. TRANSLAT. FNS.    2183   04207
04210      000042 000000   100. 0028.        0. 0000.      0. 0034.                          2184   04210
04211      000030 000000   100. 0029.        0. 0000.      0. 0024.                          2185   04211


04214 CA   050000 003744   101. 0000.  CA  803. 0000.      0. 0000.   T ZERO                 2188   04214
04215 ST   060100 002005   101. 0001.  ST    1. 0029.      0. 0000.   T WKG                  2189   04215
04216 TSX  007400 403340   101. 0002.  TSX 702. 0000.   C  0. 0000.   LN                     2190   04216
04217 H    000000 000000   101. 0003.  H     0. 0000.      0. 0000.                          2191   04217
04220 LR   076500 000043   101. 0004.  LR    0. 0035.      0. 0000.                          2192   04220
04221 FM   026000 003557   101. 0005.  FM  800. 0008.      0. 0000.   5/2 R                  2193   04221
04222 ST   060100 011064   101. 0006.  ST  600. 0000.      0. 0000.       LN T               2194   04222
04223 CA   050000 003702   101. 0007.  CA  802. 0036.      0. 0000.  MOLECULAR WEIGHT        2195   04223
04224 TSX  007400 403340   101. 0008.  TSX 702. 0000.   C  0. 0000.  LN                     2196   04224
04225 H    000000 000000   101. 0009.  H     0. 0000.      0. 0000.                          2197   04225
04226 LR   076500 000043   101. 0010.  LR    0. 0035.      0. 0000.                          2198   04226
04227 FM   026000 003561   101. 0011.  FM  900. 0010.      0. 0000.   3/2 R                  2199   04227
04230 FA   030000 011064   101. 0012.  FA  600. 0000.      0. 0000.                          2200   04230
04231 FA   030000 003556   101. 0013.  FA  800. 0007.      0. 0000.  SACKUR-TETRODE CONST.   2201   04231
04232 FS   030200 003560   101. 0014.  FS  800. 0009.      0. 0000.   R LN P                 2202   04232
04233 ST   060100 002006   101. 0015.  ST    1. 0030.      0. 0000.  -F/T TRANS             2203   04233
04234 CA   050000 003557   101. 0016.  CA  800. 0008.      0. 0000.  5/2 R                  2204   04234
04235 ST   060100 002007   101. 0017.  ST    1. 0031.      0. 0000.  H/T, TRANS.            2205   04235
04236 ST   060100 002011   101. 0018.  ST    1. 0033.      0. 0000.  C SUB P, TRANS.       2206   04236
04237 T    002000 004242   101. 0019.  T   102. 0000.      0. 0000.  CALC. VIB. FNS.        2207   04237


04242 SDX -053400 104332   102. 0000.  SDX   2. 0050.   A  0. 0000.                          2210   04242
04243 CA   050000 103660   102. 0001.  CA  802. 0018.   A  0. 0000.  OMEGA                   2211   04243
04244 TZ   010000 010662   102. 0002.  TZ  402. 0000.      0. 0000.  CALC. THERMO. FNS.     2212   04244
04245 LQ   056000 103726   102. 0003.  LQ  802. 0056.   A  0. 0000.  Y OMEGA SUB E          2213   04245
04246 FM   026000 003614   102. 0004.  FM  801. 0022.      0. 0000.  13/8                    2214   04246
04247 FS   030200 103666   102. 0005.  FS  802. 0024.   A  0. 0000.  K OMEGA E              2215   04247
04250 LR   076500 000043   102. 0006.  LR    0. 0035.      0. 0000.                          2216   04250
04251 FM   026000 003570   102. 0007.  FM  801. 0002.      0. 0000.  2                       2217   04251
04252 FA   030000 103660   102. 0008.  FA  802. 0018.   A  0. 0000.  OMEGA                   2218   04252
04253 ST   060100 011075   102. 0009.  ST  601. 0004.      0. 0000.  NU                    2219   04253
04254 LQ   056000 002005   102. 0010.  LQ    1. 0029.      0. 0000.  T                     2220   04254
04255 FM   026000 002005   102. 0011.  FM    1. 0029.      0. 0000.  T                     2221   04255
04256 ST   060100 011116   102. 0012.  ST  603. 0006.      0. 0000.  T SQ.                  2222   04256
04257 CA   050000 011075   102. 0013.  CA  601. 0004.      0. 0000.  NU                    2223   04257
04260 FD   024000 002005   102. 0014.  FD    1. 0029.      0. 0000.  T                     2224   04260
04261 FM   026000 003571   102. 0015.  FM  801. 0003.      0. 0000.  HC/K                  2225   04261
04262 ST   060100 011072   102. 0016.  ST  601. 0001.      0. 0000.  U                     2226   04262
04263 CHS  076000 000002   102. 0017.  CHS   0. 0000.      0. 0000.                          2227   04263
04264 TSX  007400 403410   102. 0018.  TSX 703. 0000.   C  0. 0000.  EXPON                 2228   04264
04265 ST   060100 011073   102. 0019.  ST  601. 0002.      0. 0000.  STORE ZERO            2229   04265
04266 ST   060100 011073   102. 0020.  ST  601. 0002.      0. 0000.  E TO - U              2230   04266
04267 CA   050000 003567   102. 0021.  CA  801. 0001.      0. 0000.  1                       2231   04267
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04370 FE   330230 011073   101. 0022.  FE   601. 0002.      0. 0000.                          2232   04370
04371 ST   060130 011074   101. 0023.  ST   601. 0003.      0. 0000.  1-E TO - U            2233   04371
04372 CA   050000 003567   101. 0024.  CA   801. 0001.      0. 0000.  1                     2234   04372
04373 FD   024000 011074   102. 0025.  FD   601. 0003.      0. 0000.                        2235   04373
04374 SQ  -060000 011077   102. 0026.  SQ   601. 0003.      0. 0000.  S.VIE               2236   04374
04375 FM   026000 011071   102. 0027.  FM   601. 0001.      0. 0000.  U                   2237   04375
04376 CHS  070010 000002   102. 0028.  CHS    1. 0000.      0. 0000.                        2238   04376
04377 LR   076530 000043   102. 0029.  LR     0. 0035.      0. 0000.                        2239   04377
04300 FM   026000 002005   102. 0030.  FM     1. 0029.      0. 0000.  T                   2240   04300
04301 LR   076500 000043   102. 0031.  LR     0. 0035.      0. 0000.                        2241   04301
04302 FM   026000 011077   102. 0032.  FM   601. 0006.      0. 0000.  Q                   2242   04302
04303 LR   076500 000043   102. 0033.  LR     0. 0035.      0. 0000.                        2243   04303
04304 FM   026000 011073   102. 0034.  FM   601. 0002.      0. 0000.  E TO -U              2244   04304
04305 ST   060100 011100   102. 0035.  ST   601. 0007.      0. 0000.  Q PRIME, VIB.       2245   04305
04306 LQ   056000 011073   102. 0036.  LQ   601. 0002.      0. 0000.                        2246   04306
04307 FM   026000 003570   102. 0037.  FM   801. 0002.      0. 0000.  2                   2247   04307
04310 LR   076500 000043   102. 0038.  LR     0. 0035.      0. 0000.                        2248   04310
04311 FM   026000 011077   102. 0039.  FM   601. 0006.      0. 0000.  Q                   2249   04311
04312 FA   030000 003567   102. 0040.  FA   801. 0001.      0. 0000.  1                   2250   04312
04313 LR   076500 000043   102. 0041.  LR     0. 0035.      0. 0000.                        2251   04313
04314 FM   026000 011100   102. 0042.  FM   601. 0007.      0. 0000.  Q PRIME             2252   04314
04315 CHS  070000 000002   102. 0043.  CHS    0. 0000.      0. 0000.                        2253   04315
04316 LR   076500 000043   102. 0044.  LR     0. 0035.      0. 0000.                        2254   04316
04317 FM   026100 011074   102. 0045.  FM   601. 0001.      0. 0000.  U                   2255   04317
04320 LR   076500 000043   102. 0046.  LR     0. 0035.      0. 0000.                        2256   04320
04321 FM   026000 002005   102. 0047.  FM     1. 0029.      0. 0000.  T                   2257   04321
04322 ST   060100 011101   102. 0049.  ST   601. 0008.      0. 0000.  Q DUBL PRIME,VIB.    2258   04322
04323 CHS  050000 003734   102. 0048.1 CA   802. 0062.      0. 0000.  ROTATIONAL BETA      2259   04323
04324 FD   024000 003570   102. 0048.2 FD   801. 0002.      0. 0000.  2                   2260   04324
04325 SQ  -060000 011141   102. 0048.3 SQ   605. 0000.      0. 0000.                        2261   04325
04326 CA   050000 011141   102. 0048.4 CA   605. 0000.      0. 0000.                        2262   04326
04327 FA   030000 103720   102. 0048.5 FA   802. 0050.  A   0. 0000.  D SUB V              2263   04327
04330 ST   060100 103720   102. 0048.6 ST   802. 0050.  A   0. 0000.  D SUB ZERO           2264   04330
04331 T    002000 004336   102. 0049.  T    103. 0003.      0. 0000.  CALC. ROT. FNS.     2265   04331
04332      030006 000000   102. 0050.       0. 0000.      0. 0006.                        2266   04332


04336 CA   050000 103674   103. 0003.  CA   802. 0030.  A   0. 0000.  ALPHA SUB I          2270   04336
04337 FD   024000 003570   103. 0005.  FD   801. 0002.      0. 0000.  2                   2271   04337
04340 SQ  -060000 011122   103. 0006.  SQ   603. 0010.      0. 0000.                        2272   04340
04341 CS   050200 011122   103. 0007.  CS   603. 0010.      0. 0000.                        2273   04341
04342 FA   030000 102652   103. 0008.  FA   802. 0012.  A   0. 0000.  B SUB E             2274   04342
04343 ST   060100 011110   103. 0009.  ST   603. 0000.      0. 0000.  B ZERO =B EFFECTIVE  2275   04343
04344 FD   024000 002005   103. 0011.  FD     1. 0029.      0. 0000.                        2276   04344
04345 FM   026000 003571   103. 0012.  FM   801. 0003.      0. 0000.   HC/K               2277   04345
04346 ST   060100 011111   103. 0013.  ST   603. 0001.      0. 0000.  HCB/KT = SIGMA       2278   04346
04347 CA   050000 003567   103. 0014.  CA   801. 0001.      0. 0000.   ONE               2279   04347
04350 FD   024000 011111   103. 0015.  FD   603. 0001.      0. 0000.                        2280   04350
04351 SQ  -060000 011112   103. 0016.  SQ   603. 0002.      0. 0000.   KT/HCB            2281   04351
04352 CA   050000 103712   103. 0016.1 CA   802. 0044.  A   0. 0000.  LAMBDA              2282   04352
04353 TZ   010000 004355   103. 0016.2 TZ     2. 0017.      0. 0000.  SIGMA STATE         2283   04353
04354 T    002000 005101   103. 0016.3 T    200. 0000.      0. 0000.  HIGHER STATE        2284   04354
04355 LQ   056000 011111   103. 0017.  LQ   603. 0001.      0. 0000.                        2285   04355
04356 FM   026000 011111   103. 0018.  FM   603. 0001.      0. 0000.                        2286   04356
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04357 ST   060100 011113   103. 0019.  ST   603. 0003.    0. 0000.   HCB*KT SQ                2287   04357
04360 LR   076500 000043   103. 0020.  LR     0. 0035.    0. 0000.                            2288   04360
04361 FM   026000 011111   103. 0021.  FM   603. 0001.    0. 0000.                            2289   04361
04362 ST   060100 011114   103. 0022.  ST   603. 0004.    0. 0000.   CUBED                    2290   04362
04363 FD   024000 003572   103. 0023.  FD   801. 0004.    0. 0000.   315                      2291   04363
04364 SQ  -060000 011115   103. 0024.  SQ   603. 0005.    0. 0000.                            2292   04364
04365 CA   050000 011113   103. 0025.  CA   603. 0003.    0. 0000.                            2293   04365
04366 FD   024000 003572   103. 0026.  FD   801. 0004.    0. 0000.                            2294   04366
04367 FM   026000 003577   103. 0027.  FM   801. 0009.    0. 0000.   4                        2295   04367
04370 FA   030000 011115   103. 0028.  FA   603. 0005.    0. 0000.                            2296   04370
04371 FA   030000 003574   103. 0029.  FA   801. 0006.    0. 0000.   1/3                      2297   04371
04372 ST   060100 011115   103. 0030.  ST   603. 0005.    0. 0000.                            2298   04372
04373 LQ   056000 011111   103. 0031.  LQ   603. 0001.    0. 0000.                            2299   04373
04374 FM   026000 003573   103. 0032.  FM   801. 0005.    0. 0000.   1/15                     2300   04374
04375 FA   030000 011115   103. 0033.  FA   603. 0005.    0. 0000.                            2301   04375
04376 FA   030000 011112   103. 0034.  FA   603. 0002.    0. 0000.   KT /HCB                  2302   04376
04377 FD   024000 003703   103. 0035.  FD   802. 0037.    0. 0000.   SYMMETRY NUMBER          2303   04377
04400 SQ  -060000 011117   103. 0036.  SQ   603. 0007.    0. 0000.   Q                        2304   04400
04401 LQ   056000 011111   103. 0040.  LQ   603. 0001.    0. 0000.                            2305   04401
04402 FM   026000 003573   103. 0041.  FM   801. 0005.    0. 0000.   1/15'                    2306   04402
04403 FS   030200 011112   103. 0042.  FS   603. 0002.    0. 0000.   1/ SIGMA                 2307   04403
04404 ST   060100 011122   103. 0043.  ST   603. 0010.    0. 0000.                            2308   04404
04405 CA   050000 011113   103. 0044.  CA   603. 0003.    0. 0000.   SIGMA SQ.                2309   04405
04406 FD   024000 003572   103. 0045.  FD   801. 0004.    0. 0000.   315                      2310   04406
04407 FM   026000 003577   103. 0046.  FM   801. 0009.    0. 0000.   4                        2311   04407
04410 LR   076500 000043   103. 0047.  LR     0. 0035.    0. 0000.                            2312   04410
04411 FM   026000 003570   103. 0048.  FM   801. 0002.    0. 0000.   2                        2313   04411
04412 ST   060100 011123   103. 0049.  ST   603. 0011.    0. 0000.                            2314   04412
04413 FA   030000 011122   103. 0050.  FA   603. 0010.    0. 0000.                            2315   04413
04414 ST   060100 011122   103. 0051.  ST   603. 0010.    0. 0000.                            2316   04414
04415 CA   050000 011114   103. 0052.  CA   603. 0004.    0. 0000.   SIGMA CUBED              2317   04415
04416 FD   024000 003572   103. 0053.  FD   801. 0004.    0. 0000.   315                      2318   04416
04417 FM   026000 003600   103. 0054.  FM   801. 0010.    0. 0000.   3                        2319   04417
04420 ST   060100 011124   103. 0055.  ST   603. 0012.    0. 0000.                            2320   04420
04421 FA   030000 011122   103. 0056.  FA   603. 0010.    0. 0000.                            2321   04421
04422 LR   076500 000043   103. 0057.  LR     0. 0035.    0. 0000.                            2322   04422
04423 FM   026000 002005   103. 0058.  FM     1. 0029.    0. 0000.   T                        2323   04423
04424 FD   024000 003703   103. 0058.1 FD   802. 0037.    0. 0000.   SYMMETRY NUMBER          2324   04424
04425 SQ  -060000 011120   103. 0059.  SQ   603. 0008.    0. 0000.   Q PRIME, ROTATION        2325   04425
04426 CA   050000 003570   103. 0060.  CA   801. 0002.    0. 0000.   2                        2326   04426
04427 FD   024000 011111   103. 0061.  FD   603. 0001.    0. 0000.   SIGMA                    2327   04427
04430 SQ  -060000 011122   103. 0062.  SQ   603. 0010.    0. 0000.                            2328   04430
04431 LQ   056000 011124   103. 0063.  LQ   603. 0012.    0. 0000.                            2329   04431
04432 FM   026000 003570   103. 0064.  FM   801. 0002.    0. 0000.   2                        2330   04432
04433 FA   030000 011123   103. 0065.  FA   603. 0011.    0. 0000.                            2331   04433
04434 FA   030000 011122   103. 0066.  FA   603. 0010.    0. 0000.                            2332   04434
04435 LR   076500 000043   103. 0067.  LR     0. 0035.    0. 0000.                            2333   04435
04436 FM   026000 011116   103. 0068.  FM   603. 0006.    0. 0000.   T SQ.                    2334   04436
04437 FD   024000 003703   103. 0068.1 FD   802. 0037.    0. 0000.   SYMMETRY NUMBER          2335   04437
04440 SQ  -060000 011121   103. 0069.  SQ   603. 0009.    0. 0000.   Q DUBL PRIME,ROTATION    2336   04440
04441 T    002000 004456   103. 0070.  T    105. 0000.    0. 0000.   CALC. ELECTRONIC FNS.    2337   04441
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04456 CA   050000 103702   105. 0000.  CA  802. 0036.  A   0. 0000.   T SUE EYE                    2350   04456
04457 FD   024000 002005   105. 0001.  FD    1. 0029.      0. 0000.   TEMP                         2351   04457
04460 FM   026000 003571   105. 0002.  FM  801. 0003.      0. 0000.   HC/K                         2352   04460
04461 ST   060100 011127   105. 0003.  ST  604. 0000.      0. 0000.                                2353   04461
04462 CS   050200 011127   105. 0004.  CS  604. 0000.      0. 0000.                                2354   04462
04463 TSX  007400 403410   105. 0005.  TSX 703. 0000.  C   0. 0000.   EXPON                        2355   04463
04464 ST   060100 011130   105. 0006.  ST  604. 0001.      0. 0000.   STORE ZERO                   2356   04464
04465 ST   060100 011130   105. 0007.  ST  604. 0001.      0. 0000.                                2357   04465
04466 LQ   056000 103644   105. 0008.  LQ  802. 0006.  A   0. 0000.   G SUB EYE, ELECTRONIC        2358   04466
04467 FM   026000 011130   105. 0009.  FM  604. 0001.      0. 0000.                                2359   04467
04470 ST   060100 011131   105. 0010.  ST  604. 0002.      0. 0000.   Q,ELECT.                     2360   04470
04471 LQ   056000 011127   105. 0011.  LQ  604. 0000.      0. 0000.                                2361   04471
04472 FM   026000 002005   105. 0012.  FM    1. 0029.      0. 0000.   T                            2362   04472
04473 CHS  076000 000002   105. 0013.  CHS   0. 0000.      0. 0000.                                2363   04473
04474 ST   060100 011127   105. 0014.  ST  604. 0000.      0. 0000.                                2364   04474
04475 LR   076500 000043   105. 0015.  LR    0. 0035.      0. 0000.                                2365   04475
04476 FM   026000 011131   105. 0016.  FM  604. 0002.      0. 0000.   Q                            2366   04476
04477 ST   060100 011132   105. 0017.  ST  604. 0003.      0. 0000.   Q PRIME,ELECTRONIC           2367   04477
04500 LR   076500 000043   105. 0019.  LR    0. 0035.      0. 0000.                                2368   04500
04501 FM   026000 011127   105. 0019.  FM  604. 0000.      0. 0000.                                2369   04501
04502 ST   060100 011133   105. 0020.  ST  604. 0004.      0. 0000.   Q DUBL PRIME,ELECTR.         2370   04502
04503 TL   -076000 000141   105. 0021.  TL    0. 0097.      0. 0000.   TEST LIGHT NO. 1             2371   04503
04504 T    002000 004507   105. 0022.  T     2. 0025.      0. 0000.                                2372   04504
04505 CA   050000 003600   105. 0023.  CA  801. 0010.      0. 0000.   3                            2373   04505
04506 ST   060100 103644   105. 0024.  ST  802. 0006.  A   0. 0000.   RESTORE ORIGINAL G,EL        2374   04506
04507 TL   -076000 000142   105. 0025.  TL    0. 0098.      0. 0000.   TEST LIGHT NO. 2             2375   04507
04510 T    002000 004514   105. 0026.  T     2. 0030.      0. 0000.                                2376   04510
04511 CA   050000 103644   105. 0027.  CA  802. 0006.  A   0. 0000.   G, ELECTRONIC                2377   04511
04512 FD   024000 003570   105. 0028.  FD  801. 0002.      0. 0000.   2                            2378   04512
04513 SQ   -060000 103644   105. 0029.  SQ  802. 0006.  A   0. 0000.   RESTORE ORIGINAL G,EL        2379   04513
04514 SE   076000 000161   105. 0030.  SE    0. 0113.      0. 0000.   TEST SENSE SWITCH 1          2380   04514
04515 T    002000 004521   105. 0031.  T   106. 0000.      0. 0000.   CALC CORRECTION TERMS        2381   04515
04516 T    002000 012310   105. 0032.  T   646. 0042.      0. 0000.   STORE 1 FOR CORR. 0          2382   04516

04521 CA   050000 103720   106. 0000.  CA  802. 0050.  A   0. 0000.   D                            2385   04521
04522 FD   024000 011111   106. 0001.  FD  603. 0001.      0. 0000.   SIGMA                        2386   04522
04523 FM   026000 003570   106. 0002.  FM  801. 0002.      0. 0000.   2                            2387   04523
04524 FD   024000 011111   106. 0003.  FD  603. 0001.      0. 0000.   SIGMA                        2388   04524
04525 FM   026000 003571   106. 0004.  FM  801. 0003.      0. 0000.   HC/K                         2389   04525
04526 FD   024000 002005   106. 0005.  FD    1. 0029.      0. 0000.   T                            2390   04526
04527 SQ   -060000 011141   106. 0006.  SQ  605. 0000.      0. 0000.   RHO T                        2391   04527
04530 CS   050200 011141   106. 0010.  CS  605. 0000.      0. 0000.   RHO T                        2392   04530
04531 LR   076500 000043   106. 0011.  LR    0. 0035.      0. 0000.                                2393   04531
04532 FM   026000 002005   106. 0012.  FM    1. 0029.      0. 0000.   T                            2394   04532
04533 ST   060100 011142   106. 0013.  ST  605. 0001.      0. 0000.   Q PRIME,STRETCH              2395   04533
04534 CHS  076000 000002   106. 0013.1 CHS   0. 0000.      0. 0000.                                2396   04534
04535 LR   076500 000043   106. 0014.  LR    0. 0035.      0. 0000.                                2397   04535
04536 FM   026000 002005   106. 0015.  FM    1. 0029.      0. 0000.                                2398   04536
04537 LR   076500 000043   106. 0016.  LR    0. 0035.      0. 0000.                                2399   04537
04540 FM   026000 003570   106. 0017.  FM  801. 0002.      0. 0000.                                2400   04540
04541 ST   060100 011143   106. 0018.  ST  605. 0002.      0. 0000.   Q DUBL PRIME,STRETCH         2401   04541
04542 CA   050000 003776   106. 0018.1 CA  804. 0016.      0. 0000.   2 TIMES 10 TO - 9            2402   04542
04543 FS   030200 011073   106. 0018.2 FS  601. 0002.      0. 0000.   E TO - 4                     2403   04543
04544 TP   012000 004557   106. 0018.3 TP    2. 0026.      0. 0000.                                2404   04544
04545 CA   050000 003567   106. 0019.  CA  801. 0001.      0. 0000.   1                            2405   04545
04546 FD   024000 011073   106. 0020.  FD  601. 0002.      0. 0000.   E TO - 11                    2406   04546
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04547 SQ  -060000 011102  106. 0021.  SQ  601. 0009.      0. 0000.                          2407  04547
04550 CA   050000 011102  106. 0022.  CA  601. 0009.      0. 0000.                          2408  04550
04551 FS   030200 003567  106. 0023.  FS  801. 0001.      0. 0000.  1                       2409  04551
04552 ST   060100 011103  106. 0024.  ST  601. 0010.      0. 0000.  E TO U MINUS 1          2410  04552
04553 LR   076500 000043  106. 0024.1 LR    0. 0035.      0. 0000.                          2411  04553
04554 FM   026000 011103  106. 0024.2 FM  601. 0010.      0. 0000.                          2412  04554
04555 ST   060100 011104  106. 0024.3 ST  601. 0011.      0. 0000.  E TO U MINUS 1 SQ.      2413  04555
04556 T    002000 012226  106. 0025.  T   646. 0000.      0. 0000.  CALC. EXTRA TERMS       2414  04556
04557 CA   050000 003564  106. 0026.  CA  800. 8013.      0. 0000.  10 TO NINTH POWER       2415  04557
04560 ST   060100 011102  106. 0027.  ST  601. 0009.      0. 0000.                          2416  04560
04561 T    002000 004550  106. 0028.  T     2. 0022.      0. 0000.  CONTINUE CALC.          2417  04561

04564 CA   050000 103674  107. 0000.  CA  802. 0030.  A   0. 0000.  ALPHA                   2420  04564
04565 FD   024000 011110  107. 0001.  FD  603. 0000.      0. 0000.  B ZERO                  2421  04565
04566 SQ  -060000 011153  107. 0002.  SQ  606. 0000.      0. 0000.  DELTA                   2422  04566
04567 CA   050000 011153  107. 0002.1 CA  606. 0000.      0. 0000.                          2423  04567
04570 FD   024000 011103  107. 0003.  FD  601. 0010.      0. 0000.  E TO U -1              2424  04570
04571 SQ  -060000 011154  107. 0004.  SQ  606. 0001.      0. 0000.                          2425  04571
04572 CS   050200 011153  107. 0005.  CS  606. 0000.      0. 0000.  DELTA                   2426  04572
04573 FD   024000 011103  107. 0009.  FD  601. 0010.      0. 0000.                          2427  04573
04574 FM   026000 011072  107. 0010.  FM  601. 0001.      0. 0000.  U                       2428  04574
04575 FD   024000 011103  107. 0011.  FD  601. 0010.      0. 0000.                          2429  04575
04576 FM   026000 011102  107. 0012.  FM  601. 0009.      0. 0000.  E TO U                  2430  04576
04577 LR   076500 000043  107. 0012.1 LR    0. 0035.      0. 0000.                          2431  04577
04600 FM   026000 002005  107. 0012.2 FM    1. 0029.      0. 0000.  T                       2432  04600
04601 ST   060100 011155  107. 0013.  ST  606. 0002.      0. 0000.  Q PRIME,V-R             2433  04601
04602 LQ   056000 011155  107. 0014.  LQ  606. 0002.      0. 0000.                          2434  04602
04603 FM   026000 011072  107. 0015.  FM  601. 0001.      0. 0000.  U                       2435  04603
04604 LR   076500 000043  107. 0015.1 LR    0. 0035.      0. 0000.                          2436  04604
04605 FM   026000 002005  107. 0015.2 FM    1. 0029.      0. 0000.  T                       2437  04605
04606 ST   060100 011156  107. 0016.  ST  606. 0003.      0. 0000.  1ST TERM,Q DUBL PRIME   2438  04606
04607 LQ   056000 011155  107. 0017.  LQ  606. 0002.      0. 0000.                          2439  04607
04610 FM   026000 003570  107. 0018.  FM  801. 0002.      0. 0000.  2                       2440  04610
04611 FD   024000 011103  107. 0019.  FD  601. 0010.      0. 0000.  E TO U -1              2441  04611
04612 FM   026000 011072  107. 0020.  FM  601. 0001.      0. 0000.  U                       2442  04612
04613 LR   076500 000043  107. 0020.1 LR    0. 0035.      0. 0000.                          2443  04613
04614 FM   026000 002005  107. 0020.2 FM    1. 0029.      0. 0000.  T                       2444  04614
04615 LR   076500 000043  107. 0021.  LR    0. 0035.      0. 0000.                          2445  04615
04616 FM   026000 011102  107. 0022.  FM  601. 0009.      0. 0000.  E TO U                  2446  04616
04617 CHS  076000 000002  107. 0022.1 CHS   0. 0000.      0. 0000.                          2447  04617
04620 FA   030000 011156  107. 0023.  FA  606. 0003.      0. 0000.                          2448  04620
04621 ST   060100 011156  107. 0024.  ST  606. 0003.      0. 0000.  Q DUBL PRIME,V-R       2449  04621
04622 T    002000 012246  107. 0025.  T   646. 0012.      0. 0000.  CALC. EXTRA TERMS       2450  04622

04641 LQ   056000 103726  108. 0000.  LQ  802. 0056.  A   0. 0000.  Y OMEGA E               2465  04641
04642 FM   026000 003615  108. 0001.  FM  801. 0023.      0. 0000.  13/4                    2466  04642
04643 CHS  076000 000002  108. 0002.  CHS   0. 0000.      0. 0000.                          2467  04643
04644 FA   030000 103666  108. 0003.  FA  802. 0024.  A   0. 0000.  X OMEGA E               2468  04644
04645 FA   030000 103666  108. 0004.  FA  802. 0024.  A   0. 0000.                          2469  04645
04646 FD   024000 002005  108. 0005.  FD    1. 0029.      0. 0000.  T                       2470  04646
04647 FM   026000 003571  108. 0006.  FM  801. 0003.      0. 0000.  HC/K.                   2471  04647
04650 ST   060100 011161  108. 0007.  ST  607. 0001.      0. 0000.  ANHARMONICITY CORR.     2472  04650
04651 CA   050000 011161  108. 0008.  CA  607. 0001.      0. 0000.                          2473  04651
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04652 FD   024000 011104   108. 0009.   FD   601. 0011.      0. 0000.   (E TO U)-1 SQUARED      2474   04652
04653 SQ  -060000 011162   108. 0010.   SQ   607. 0002.      0. 0000.                           2475   04653
04654 LQ   056000 011161   108. 0013.1  LQ   607. 0001.      0. 0000.   ANHARMONICITY CORR.     2476   04654
04655 FM   026000 002005   108. 0013.2  FM     1. 0029.      0. 0000.   T                       2477   04655
04656 ST   060100 011163   108. 0014.   ST   607. 0003.      0. 0000.   B PRIME                 2478   04656
04657 ZS   060000 011164   108. 0015.   ZS   607. 0004.      0. 0000.   B DUBL PRIME            2479   04657
04660 LQ   056000 003571   108. 0016.   LQ   801. 2003.      0. 0000.   HC/K                    2480   04660
04661 FM   026000 003570   108. 0017.   FM   801. 0002.      0. 0000.   2                       2481   04661
04662 LR   076500 000043   108. 0018.   LR     0. 0035.      0. 0000.                           2482   04662
04663 FM   026000 011075   108. 0019.   FM   601. 0004.      0. 0000.   NU                      2483   04663
04664 LR   076500 000043   108. 0020.   LR     0. 0035.      0. 0000.                           2484   04664
04665 FM   026000 011102   108. 0021.   FM   601. 0009.      0. 0000.   E TO U                  2485   04665
04666 LR   076500 000043   108. 0022.   LR     0. 0035.      0. 0000.                           2486   04666
04667 FM   026000 011103   108. 0023.   FM   601. 0010.      0. 0000.   (E TO U)-1              2487   04667
04670 ST   060100 011165   108. 0024.   ST   607. 0005.      0. 0000.   A PRIME                 2488   04670
04671 CA   050000 011103   108. 0025.   CA   601. 0010.      0. 0000.                           2489   04671
04672 FA   030000 011102   108. 0026.   FA   601. 0009.      0. 0000.   E TO U                  2490   04672
04673 LR   076500 000043   108. 0027.   LR     0. 0035.      0. 0000.                           2491   04673
04674 FM   026000 011102   108. 0028.   FM   601. 0009.      0. 0000.                           2492   04674
04675 LR   076500 000043   108. 0029.   LR     0. 0035.      0. 0000.                           2493   04675
04676 FM   026000 011072   108. 0030.   FM   601. 0001.      0. 0000.   U                       2494   04676
04677 LR   076500 000043   108. 0030.1  LR     0. 0035.      0. 0000.                           2495   04677
04700 FM   026000 002005   108. 0031.   FM     1. 0029.      0. 0000.   T                       2496   04700
04701 LR   076500 000043   108. 0031.1  LR     0. 0035.      0. 0000.                           2497   04701
04702 FM   026000 011072   108. 0032.   FM   601. 0001.      0. 0000.                           2498   04702
04703 LR   076500 000043   108. 0032.1  LR     0. 0035.      0. 0000.                           2499   04703
04704 FM   026000 002005   108. 0033.   FM     1. 0029.      0. 0000.   T                       2500   04704
04705 LR   076500 000043   108. 0033.1  LR     0. 0035.      0. 0000.                           2501   04705
04706 FM   026000 003570   108. 0034.   FM   801. 0002.      0. 0000.   2                       2502   04706
04707 ST   060100 011166   108. 0035.   ST   607. 0006.      0. 0000.   A DUBL PRIME            2503   04707
04710 LQ   056000 011104   108. 0035.1  LQ   601. 0011.      0. 0000.   A                       2504   04710
04711 FM   026000 011104   108. 0035.2  FM   601. 0011.      0. 0000.   A                       2505   04711
04712 ST   060100 011105   108. 0035.3  ST   601. 0012.      0. 0000.   A SQUARE                2506   04712
04713 LQ   056000 011161   108. 0036.   LQ   607. 0001.      0. 0000.   B                       2507   04713
04714 FM   026000 011165   108. 0037.   FM   607. 0005.      0. 0000.   A PRIME                 2508   04714
04715 ST   060100 011167   108. 0038.   ST   607. 0007.      0. 0000.                           2509   04715
04716 LQ   056000 011163   108. 0039.   LQ   607. 0003.      0. 0000.   B PRIME                 2510   04716
04717 FM   026000 011104   108. 0040.   FM   601. 0011.      0. 0000.   A                       2511   04717
04720 FS   030200 011167   108. 0041.   FS   607. 0007.      0. 0000.                           2512   04720
04721 FD   024000 011105   108. 0042.   FD   601. 0012.      0. 0000.   A SQUARE                2513   04721
04722 SQ  -060000 011167   108. 0044.   SQ   607. 0007.      0. 0000.   A PRIME,ANHARM.         2514   04722
04723 LQ   056000 011166   108. 0048.   LQ   607. 0006.      0. 0000.   A DUBL PRIME            2515   04723
04724 FM   026000 011161   108. 0049.   FM   607. 0001.      0. 0000.   B                       2516   04724
04725 LR   076500 000043   108. 0050.   LR     0. 0035.      0. 0000.                           2517   04725
04726 FM   026000 011104   108. 0051.   FM   601. 0011.      0. 0000.   A                       2518   04726
04727 ST   060100 011170   108. 0052.   ST   607. 0008.      0. 0000.                           2519   04727
04730 LQ   056000 011165   108. 0053.   LQ   607. 0005.      0. 0000.   A PRIME                 2520   04730
04731 FM   026000 011165   108. 0054.   FM   607. 0005.      0. 0000.                           2521   04731
04732 LR   076500 000043   108. 0055.   LR     0. 0035.      0. 0000.                           2522   04732
04733 FM   026000 011161   108. 0056.   FM   607. 0001.      0. 0000.   B                       2523   04733
04734 ST   060100 011171   108. 0057.   ST   607. 0009.      0. 0000.                           2524   04734
04735 LQ   056000 011163   108. 0058.   LQ   607. 0003.      0. 0000.   B PRIME                 2525   04735
04736 FM   026000 011165   108. 0058.1  FM   607. 0005.      0. 0000.   A PRIME                 2526   04736
04737 LR   076500 000043   108. 0058.2  LR     0. 0035.      0. 0000.                           2527   04737
04740 FM   026000 011104   108. 0058.3  FM   601. 0011.      0. 0000.   A                       2528   04740
04741 CHS  076000 000002   108. 0058.4  CHS    0. 0000.      0. 0000.                           2529   04741
04742 FA   030000 011171   108. 0058.5  FA   607. 0009.      0. 0000.                           2530   04742
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04743 LR   076500 000043   108. 0058.6 LR     0. 0035.      0. 0000.                          2531   04743
04744 FM   026000 003570   108. 0058.7 FM   801. 0002.      0. 0000.  2                       2532   04744
04745 FS   030200 011170   108. 0058.8 FS   607. 0008.      0. 0000.                          2533   04745
04746 FD   024000 011105   108. 0059.  FD   601. 0012.      0. 0000.  A SQ                    2534   04746
04747 SQ  -060000 011170   108. 0060.  SQ   607. 0008.      0. 0000.                          2535   04747
04750 CA   050000 011170   108. 0061.  CA   607. 0008.      0. 0000.                          2536   04750
04751 FD   024000 011104   108. 0062.  FD   601. 0011.      0. 0000.  A                       2537   04751
04752 SQ  -060000 011170   108. 0063.  SQ   607. 0008.      0. 0000.  Q DUBL PRIME,ANHARM.    2538   04752
04753 T    002000 012266   108. 0064.  T    646. 0024.      0. 0000.  CALC. EXTRA TERMS       2539   04753


04766 CA   050000 002006   109. 0000.  CA     1. 0030.      0. 0000.  FREE ENERGY            2550   04766
04767 ST   060100 005011   109. 0001.  ST     2. 0016.      0. 0000.                          2551   04767
04770 CA   050000 002007   109. 0002.  CA     1. 0031.      0. 0000.  ENTHALPY              2552   04770
04771 ST   060100 005012   109. 0003.  ST     2. 0017.      0. 0000.                          2553   04771
04772 CA   050000 002010   109. 0004.  CA     1. 0032.      0. 0000.  ENTROPY               2554   04772
04773 ST   060100 005013   109. 0005.  ST     2. 0018.      0. 0000.                          2555   04773
04774 CA   050000 002011   109. 0006.  CA     1. 0033.      0. 0000.  HEAT CAPACITY.        2556   04774
04775 ST   060100 005014   109. 0007.  ST     2. 0019.      0. 0000.                          2557   04775
04776 SE   076000 000162   109. 0007.1 SE     0. 0114.      0. 0000.  TEST S.S. 2           2558   04776
04777 T    002000 005001   109. 0007.2 T      2. 0008.      0. 0000.                          2559   04777
05000 T    002000 005015   109. 0007.3 T      2. 0020.      0. 0000.                          2560   05000
05001 TSX  007400 402114   109. 0008.  TSX  700. 0000.  C   0. 0000.  LAS S 117 FXD PT PRIN   2561   05001
05002 SIX -203744 011052   109. 0009.  SIX  507. 0000.      0. 2020.  TEMPERATURE            2562   05002
05003 SIX -211660 005011   109. 0010.  SIX    2. 0016.      0. 5040.                          2563   05003
05004 SIX -211704 005012   109. 0011.  SIX    2. 0017.      0. 5060.                          2564   05004
05005 SIX -211730 005013   109. 0012.  SIX    2. 0018.      0. 5080.                          2565   05005
05006 SIX -211754 005014   109. 0013.  SIX    2. 0019.      0. 5100.                          2566   05006
05007 PON  100000 000000   109. 0014.  PON    0. 0000.      0. 0000.                          2567   05007
05010 T    002000 005036   109. 0015.  T    110. 0000.      0. 0000.  INCREASE TEMP          2568   05010
05011 H    000000 000000   109. 0016.  H      0. 0000.      0. 0000.                          2569   05011
05012 H    000000 000000   109. 0017.  H      0. 0000.      0. 0000.                          2570   05012
05013 H    000000 000000   109. 0018.  H      0. 0000.      0. 0000.                          2571   05013
05014 H    000000 000000   109. 0019.  H      0. 0000.      0. 0000.                          2572   05014
05015 CA   050000 005011   109. 0020.  CA     2. 0016.      0. 0000.                          2573   05015
05016 FD   024000 003547   109. 0021.  FD   300. 0000.      0. 0000.  R                       2574   05016
05017 SQ  -060000 005011   109. 0022.  SQ     2. 0016.      0. 0000.                          2575   05017
05020 CA   050000 005012   109. 0023.  CA     2. 0017.      0. 0000.                          2576   05020
05021 FD   024000 003547   109. 0024.  FD   300. 0000.      0. 0000.  R                       2577   05021
05022 SQ  -060000 005012   109. 0025.  SQ     2. 0017.      0. 0000.                          2578   05022
05023 CA   050000 005013   109. 0026.  CA     2. 0019.      0. 0000.                          2579   05023
05024 FD   024000 003547   109. 0027.  FD   300. 0000.      0. 0000.  R                       2580   05024
05025 SQ  -060000 005013   109. 0028.  SQ     2. 0018.      0. 0000.                          2581   05025
05026 CA   050000 005014   109. 0029.  CA     2. 0019.      0. 0000.                          2582   05026
05027 FD   024000 003547   109. 0030.  FD   300. 0000.      0. 0000.  P                       2583   05027
05030 SQ  -060000 005014   109. 0031.  SQ     2. 0019.      0. 0000.                          2584   05030
05031 T    002000 005001   109. 0032.  T      2. 0008.      0. 0000.  PRINT                   2585   05031


05036 CA   050000 011052   110. 0000.  CA   507. 0000.      0. 0000.  T,TEMPORARY            2590   05036
05037 FS   030200 003751   110. 0001.  FS   603. 0005.      0. 0000.  250 DEGREES            2591   05037
05040 TM  -012000 005056   110. 0002.  TM     2. 0016.      0. 0000.  T LESS 250             2592   05040
05041 CA   050000 011052   110. 0003.  CA   507. 0000.      0. 0000.  T                       2593   05041
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05042 FS   030200 003746   110. 0004.  FS   803. 0002.      0. 0000.   298.16                    2594   05042
05043 TM  -012000 005062   110. 0005.  TM     2. 0020.      0. 0000.   T EQUAL 250               2595   05043
05044 CA   050000 011052   110. 0006.  CA   507. 0000.      0. 0000.   T                         2596   05044
05045 FS   030200 003746   110. 0007.  FS   803. 0002.      0. 0000.                             2597   05045
05046 TZ   010000 005065   110. 0008.  TZ     2. 0023.      0. 0000.                             2598   05046
05047 CA   050000 011052   110. 0009.  CA   507. 0000.      0. 0000.   T                         2599   05047
05050 FA   030000 003750   110. 0010.  FA   803. 0004.      0. 0000.   INC T BY 100              2600   05050
05051 ST   060100 002005   110. 0011.  ST     1. 0029.      0. 0000.                             2601   05051
05052 FS   030200 003752   110. 0012.  FS   803. 0006.      0. 0000.   5010 DEG                  2602   05052
05053 TP   012000 005070   110. 0013.  TP     2. 0026.      0. 0000.                             2603   05053
05054 CA   050000 002005   110. 0014.  CA     1. 0029.      0. 0000.                             2604   05054
05055 T    002000 004216   110. 0015.  T    101. 0002.      0. 0000.    RECYCLE                  2605   05055
05056 CA   050000 011052   110. 0016.  CA   507. 0000.      0. 0000.   T                         2606   05056
05057 FA   030000 003745   110. 0017.  FA   803. 0001.      0. 0000.   INC T BY 50               2607   05057
05060 ST   060100 002005   110. 0018.  ST     1. 0029.      0. 0000.                             2608   05060
05061 T    002000 004216   110. 0019.  T    101. 0002.      0. 0000.   RECYCLE                   2609   05061
05062 CA   050000 003746   110. 0020.  CA   803. 0002.      0. 0000.   298.16                    2610   05062
05063 ST   060100 002005   110. 0021.  ST     1. 0029.      0. 0000.                             2611   05063
05064 T    002000 004216   110. 0022.  T    101. 0002.      0. 0000.    RECYCLE                  2612   05064
05065 CA   050000 003747   110. 0023.  CA   803. 0003.      0. 0000.   300                       2613   05065
05066 ST   060100 002005   110. 0024.  ST     1. 0029.      0. 0000.                             2614   05066
05067 T    002000 004216   110. 0025.  T    101. 0002.      0. 0000.    RECYCLE                  2615   05067
05070 RD   076200 000361   110. 0026.  RD     0. 0241.      0. 0000.                             2616   05070
05071 SE   076000 000361   110. 0027.  SE     0. 0241.      0. 0000.   SKIP PAGE                 2617   05071
05072 SDX -053400 405077   110. 0028.  SDX    2. 0032.   C  0. 0000.   62                        2618   05072
05073 ZS   060000 403736   110. 0029.  ZS   802. 0064.   C  0. 0000.   STORE ZEROS               2619   05073
05074 TX   200001 405073   110. 0030.  TX     2. 0029.   C  0. 0001.                            2620   05074
05075 SE   076000 000140   110. 0030.1 SE     0. 0096.      0. 0000.   TURN OFF ALL LIGHTS       2621   05075
05076 T    002000 002760   110. 0031.  T    701. 0010.      0. 0000.   DECIMAL LOAD              2622   05076
05077      000100 000000   110. 0032.       0. 0000.      0. 0064.                             2623   05077

05101 LQ   056000 103712   200. 0000.  LQ   802. 0044.   A  0. 0000.   LAMBDA                    2625   05101
05102 FM   026000 103712   200. 0001.  FM   802. 0044.   A  0. 0000.                            2626   05102
05103 ST   060100 011172   200. 0002.  ST   608. 0000.      0. 0000.   SQ.                       2627   05103
05104 LQ   056000 103712   200. 0003.  LQ   802. 0044.   A  0. 0000.                            2628   05104
05105 FM   026000 003570   200. 0004.  FM   801. 0002.      0. 0000.   2                         2629   05105
05106 FA   030000 003567   200. 0005.  FA   801. 0001.      0. 0000.   1                         2630   05106
05107 ST   060100 011173   200. 0006.  ST   608. 0001.      0. 0000.                             2631   05107
05110 LQ   056000 011110   200. 0007.  LQ   603. 0000.      0. 0000.   B                         2632   05110
05111 FM   026000 011110   200. 0008.  FM   603. 0000.      0. 0000.                             2633   05111
05112 ST   060100 011174   200. 0009.  ST   608. 0002.      0. 0000.   SQ.                       2634   05112
05113 LQ   056000 011110   200. 0010.  LQ   603. 0000.      0. 0000.   B                         2635   05113
05114 FM   026000 103734   200. 0011.  FM   802. 0062.   A  0. 0000.   A                         2636   05114
05115 LR   076500 000043   200. 0012.  LR     0. 0035.      0. 0000.                             2637   05115
05116 FM   026000 003577   200. 0013.  FM   801. 0009.      0. 0000.   4                         2638   05116
05117 ST   060100 011175   200. 0014.  ST   608. 0003.      0. 0000.   4AB                       2639   05117
05120 LQ   056000 103734   200. 0015.  LQ   802. 0062.   A  0. 0000.   A                         2640   05120
05121 FM   026000 103734   200. 0016.  FM   802. 0062.   A  0. 0000.                            2641   05121
05122 ST   060100 011176   200. 0017.  ST   608. 0004.      0. 0000.   SQ.                       2642   05122
05123 FS   030200 011175   200. 0018.  FS   608. 0003.      0. 0000.                             2643   05123
05124 LR   076500 000043   200. 0019.  LR     0. 0035.      0. 0000.                             2644   05124
05125 FM   026000 011172   200. 0020.  FM   608. 0000.      0. 0000.   LAMBDA SQ.                2645   05125
05126 ST   060100 011177   200. 0021.  ST   608. 0005.      0. 0000.   (A SQ.-4AB) LAMBDA SQ     2646   05126
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05127 LQ   056000 011110  200. 0022.  LQ  603. 0000.       0. 0000.  B                          2647  05127
05130 FM   026000 003570  200. 0023.  FM  801. 0002.       0. 0000.  2                          2648  05130
05131 ST   060100 011200  200. 0024.  ST  608. 0006.       0. 0000.  2B                         2649  05131
05132 LQ   056000 011174  200. 0025.  LQ  608. 0002.       0. 0000.  B SQ.                      2650  05132
05133 FM   026000 003577  200. 0026.  FM  801. 0009.       0. 0000.  4                          2651  05133
05134 ST   060100 011201  200. 0027.  ST  608. 0007.       0. 0000.                             2652  05134
05135 CA   050000 011177  200. 0028.  CA  608. 0005.       0. 0000.                             2653  05135
05136 FD   024000 011201  200. 0029.  FD  608. 0007.       0. 0000.                             2654  05136
05137 SQ  -060000 011202  200. 0030.  SQ  608. 0008.       0. 0000.                             2655  05137
05140 CA   050000 003607  200. 0031.  CA  801. 0017.       0. 0000.  1/4                        2656  05140
05141 FA   030000 011202  200. 0032.  FA  608. 0008.       0. 0000.                             2657  05141
05142 ST   060100 011203  200. 0033.  ST  608. 0009.       0. 0000.  LITTLE A                   2658  05142
05143 CA   050000 103644  200. 0034.  CA  802. 0006.  A    0. 0000.  G,ELECTRONIC               2659  05143
05144 FS   030200 003570  200. 0035.  FS  801. 0002.       0. 0000.  2                          2660  05144
05145 TNZ -010000 006774  200. 0036.  TNZ 300. 0000.       0. 0000.  TRIPLET STATE              2661  05145
05146 CA   050000 103712  200. 0037.  CA  802. 0044.  A    0. 0000.  LAMBDA                     2662  05146
05147 FS   030200 003561  200. 0038.  FS  800. 0010.       0. 0000.  2.99                       2663  05147
05150 TP   012000 005236  200. 0039.  TP  201. 0038.       0. 0000.  GAMMA STATE               2664  05150
05151 CA   050000 103712  200. 0040.  CA  802. 0044.  A    0. 0000.                             2665  05151
05152 FS   030200 003547  200. 0041.  FS  800. 0000.       0. 0000.  1.98                       2666  05152
05153 TP   012000 005213  200. 0042.  TP  201. 0019.       0. 0000.  DELTA STATE               2667  05153
05154 T    002000 005170  200. 0043.  T   201. 0000.       0. 0000.  PI STATE                  2668  05154

05170 LQ   056000 011174  201. 0000.  LQ  608. 0002.       0. 0000.  B SQ.                      2680  05170
05171 FM   026000 003577  201. 0001.  FM  801. 0009.       0. 0000.  4                          2681  05171
05172 FA   030000 011177  201. 0002.  FA  608. 0005.       0. 0000.                             2682  05172
05173 TSX  007400 403516  201. 0003.  TSX 704. 0000.  C    0. 0000.  SQ.ROOT                    2683  05173
05174 HP   042000 000000  201. 0004.  HP    0. 0000.       0. 0000.                             2684  05174
05175 FD   024000 011200  201. 0005.  FD  608. 0006.       0. 0000.  2B                         2685  05175
05176 SQ  -060000 011211  201. 0006.  SQ  609. 0000.       0. 0000.                             2686  05176
05177 CA   050000 011173  201. 0007.  CA  608. 0001.       0. 0000.  2 LAMBDA PLUS ONE          2687  05177
05200 FD   024000 003577  201. 0008.  FD  801. 0009.       0. 0000.  4                          2688  05200
05201 SQ  -060000 011212  201. 0009.  SQ  609. 0001.       0. 0000.                             2689  05201
05202 CA   050000 011212  201. 0010.  CA  609. 0001.       0. 0000.                             2690  05202
05203 FS   030200 011211  201. 0011.  FS  609. 0000.       0. 0000.                             2691  05203
05204 ST   060100 011213  201. 0012.  ST  609. 0002.       0. 0000.  GAMMA ONE                 2692  05204
05205 LQ   056000 011213  201. 0013.  LQ  609. 0002.       0. 0000.                             2693  05205
05206 FM   026000 011111  201. 0014.  FM  603. 0001.       0. 0000.  SIGMA                      2694  05206
05207 CHS  076000 000002  201. 0015.  CHS   0. 0000.       0. 0000.                             2695  05207
05210 ST   060100 011216  201. 0016.  ST  609. 0005.       0. 0000.                             2696  05210
05211 ST   060100 011213  201. 0017.  ST  609. 0002.       0. 0000.  - GAMMA SIGMA ONE          2697  05211
05212 T    002000 005276  201. 0018.  T   202. 0000.       0. 0000.  CALC. G.S. SUM            2698  05212
05213 LQ   056000 011174  201. 0019.  LQ  608. 0002.       0. 0000.  B SQ.                      2699  05213
05214 FM   026000 003610  201. 0020.  FM  801. 0018.       0. 0000.  16                         2700  05214
05215 FA   030000 011177  201. 0021.  FA  608. 0005.       0. 0000.                             2701  05215
05216 TSX  007400 403516  201. 0022.  TSX 704. 0000.  C    0. 0000.  SQ.ROOT                    2702  05216
05217 HP   042000 000000  201. 0023.  HP    0. 0000.       0. 0000.                             2703  05217
05220 FD   024000 011200  201. 0024.  FD  608. 0006.       0. 0000.  2B                         2704  05220
05221 SQ  -060000 011211  201. 0025.  SQ  609. 0000.       0. 0000.                             2705  05221
05222 CA   050000 011173  201. 0026.  CA  608. 0001.       0. 0000.  2 LAMBDA PLUS ONE          2706  05222
05223 FD   024000 003577  201. 0027.  FD  801. 0009.       0. 0000.  4                          2707  05223
05224 SQ  -060000 011212  201. 0028.  SQ  609. 0001.       0. 0000.                             2708  05224
05225 CA   050000 011212  201. 0029.  CA  609. 0001.       0. 0000.                             2709  05225
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05226 FS    030200 011211   201. 0030.  FS  609. 0000.        0. 0000.                    2710   05226
05227 ST    060100 011214   201. 0031.  ST  609. 0003.        0. 0000.  GAMMA TWO         2711   05227
05230 LR    076500 000043   201. 0032.  LR    0. 0035.        0. 0000.                    2712   05230
05231 FM    026000 011111   201. 0033.  FM  603. 0001.        0. 0000.  SIGMA             2713   05231
05232 CHS   076000 000002   201. 0034.  CHS   0. 0000.        0. 0000.                    2714   05232
05233 ST    060100 011214   201. 0035.  ST  609. 0003.        0. 0000.  GAMMA SIGMA TWO    2715   05233
05234 ST    060100 011217   201. 0036.  ST  609. 0006.        0. 0000.                    2716   05234
05235 T     002000 005170   201. 0037.  T     2. 0000.        0. 0000.  CALC. G.S. ONE     2717   05235
05236 LQ    056000 011174   201. 0038.  LQ  608. 0002.        0. 0000.  B SQ.             2718   05236
05237 FM    026000 003611   201. 0039.  FM  801. 0019.        0. 0000.  36                2719   05237
05240 FA    030000 011177   201. 0040.  FA  608. 0005.        0. 0000.                    2720   05240
05241 TSX   007400 403516   201. 0041.  TSX 704. 0000.  C     0. 0000.  SQ. ROOT          2721   05241
05242 HP    042000 000000   201. 0042.  HP    0. 0000.        0. 0000.                    2722   05242
05243 FD    024000 011200   201. 0043.  FD  608. 0006.        0. 0000.  2B              2723   05243
05244 SQ   -060000 011211   201. 0044.  SQ  609. 0000.        0. 0000.                    2724   05244
05245 CA    050000 011173   201. 0045.  CA  608. 0001.        0. 0000.  2 LAMBDA PLUS ONE 2725   05245
05246 FD    024000 003577   201. 0046.  FD  801. 0009.        0. 0000.  4                 2726   05246
05247 SQ   -060000 011212   201. 0047.  SQ  609. 0001.        0. 0000.                    2727   05247
05250 CA    050000 011212   201. 0048.  CA  609. 0001.        0. 0000.                    2728   05250
05251 FS    030200 011211   201. 0049.  FS  609. 0000.        0. 0000.                    2729   05251
05252 ST    060100 011215   201. 0050.  ST  609. 0004.        0. 0000.  GAMMA THREE       2730   05252
05253 LR    076500 000043   201. 0051.  LR    0. 0035.        0. 0000.                    2731   05253
05254 FM    026000 011111   201. 0052.  FM  603. 0001.        0. 0000.  SIGMA             2732   05254
05255 CHS   076000 000002   201. 0053.  CHS   0. 0000.        0. 0000.                    2733   05255
05256 ST    060100 011215   201. 0054.  ST  609. 0004.        0. 0000.  GAMMA SIGMA THREE  2734   05256
05257 ST    060100 011220   201. 0055.  ST  609. 0007.        0. 0000.                    2735   05257
05260 T     002000 005213   201. 0056.  T     2. 0019.        0. 0000.  CALC G.S. TWO     2736   05260

05276 CA    050000 103712   202. 0000.  CA  802. 0044.  A     0. 0000.  LAMBDA            2750   05276
05277 FS    030200 003561   202. 0001.  FS  800. 0010.        0. 0000.  2.98              2751   05277
05300 TP    012000 005310   202. 0002.  TP    2. 0010.        0. 0000.                    2752   05300
05301 CA    050000 103712   202. 0003.  CA  802. 0044.  A     0. 0000.                    2753   05301
05302 FS    030200 003547   202. 0004.  FS  800. 0000.        0. 0000.  1.98              2754   05302
05303 TP    012000 005306   202. 0005.  TP    2. 0008.        0. 0000.                    2755   05303
05304 SDX  -053400 205316   202. 0006.  SDX   2. 0016.  B     0. 0000.                    2756   05304
05305 T     002000 005312   202. 0007.  T     2. 0012.        0. 0000.                    2757   05305
05306 SDX  -053400 205317   202. 0008.  SDX   2. 0017.  B     0. 0000.                    2758   05306
05307 T     002000 005342   202. 0009.  T   203. 0011.        0. 0000.                    2759   05307
05310 SDX  -053400 205320   202. 0010.  SDX   2. 0018.  B     0. 0000.                    2760   05310
05311 T     002000 005327   202. 0011.  T   203. 0000.        0. 0000.                    2761   05311
05312 CA    050000 011216   202. 0012.  CA  609. 0005.        0. 0000.                    2762   05312
05313 ST    060100 011220   202. 0013.  ST  609. 0007.        0. 0000.                    2763   05313
05314 ZS    060000 011217   202. 0014.  ZS  609. 0006.        0. 0000.                    2764   05314
05315 T     002000 005327   202. 0015.  T   203. 0000.        0. 0000.                    2765   05315
05316       000001 000000   202. 0016.        0. 0000.        0. 0001.                    2766   05316
05317       000002 000000   202. 0017.        0. 0000.        0. 0002.                    2767   05317
05320       000003 000000   202. 0018.        0. 0000.        0. 0003.                    2768   05320
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05327 CA   050000 011220   203. 0000.  CA  609. 0007.      0. 0000.  - GAMMA SIGMA              2775   05327
05330 TSX  007400 403410   203. 0001.  TSX 703. 0000.  C   0. 0000.  EXPONENTIAL               2776   05330
05331 HP   042000 000000   203. 0002.  HP    0. 0000.      0. 0000.                            2777   05331
05332 ST   060100 211231   203. 0003.  ST  610. 0006.  B   0. 0000.  E TO - GAMMA SIGMA         2778   05332
05333 LR   076500 000043   203. 0004.  LR    0. 0035.      0. 0000.                            2779   05333
05334 FM   026000 011220   203. 0005.  FM  609. 0007.      0. 0000.                            2780   05334
05335 ST   060100 211412   203. 0006.  ST  615. 0039.  B   0. 0000.  E TO - G.S. PRIME          2781   05335
05336 LR   076500 000043   203. 0007.  LR    0. 0035.      0. 0000.                            2782   05336
05337 FM   026000 011220   203. 0008.  FM  609. 0007.      0. 0000.                            2783   05337
05340 ST   060100 211420   203. 0009.  ST  615. 0045.  B   0. 0000.  E TO - G.S. DUB PRIME     2784   05340
05341 TX   200001 205342   203. 0010.  TX    2. 0011.  B   0. 0001.                            2785   05341
05342 CA   050000 011217   203. 0011.  CA  609. 0006.      0. 0000.                            2786   05342
05343 ST   060100 011220   203. 0012.  ST  609. 0007.      0. 0000.                            2787   05343
05344 CA   050000 011216   203. 0013.  CA  609. 0005.      0. 0000.                            2788   05344
05345 ST   060100 011217   203. 0014.  ST  609. 0006.      0. 0000.                            2789   05345
05346 ZS   060000 011216   203. 0015.  ZS  609. 0005.      0. 0000.                            2790   05346
05347 CA   050000 011220   203. 0016.  CA  609. 0007.      0. 0000.                            2791   05347
05350 TZ   010000 005377   203. 0017.  TZ  204. 0000.      0. 0000.  CALC POWERS OF SIGMA       2792   05350
05351 T    002000 005327   203. 0018.  T     2. 0000.      0. 0000.  CALC NEXT E TO - G.S.      2793   05351

05377 SDX -053400 405425   204. 0000.  SDX   2. 0021.  C   0. 0000.  13                         2815   05377
05400 CA   050000 011203   204. 0001.  CA  608. 0009.      0. 0000.  LITTLE A                   2816   05400
05401 ST   060100 011235   204. 0002.  ST  611. 0000.      0. 0000.                            2817   05401
05402 LQ   056000 011203   204. 0003.  LQ  608. 0009.      0. 0000.                            2818   05402
05403 FM   026000 411252   204. 0004.  FM  611. 0013.  C   0. 0000.                            2819   05403
05404 ST   060100 411253   204. 0005.  ST  611. 0014.  C   0. 0000.  A TO N POWER              2820   05404
05405 TX   200001 405402   204. 0006.  TX    2. 0003.  C   0. 0001.                            2821   05405
05406 LQ   056000 103720   204. 0007.  LQ  802. 0050.  A   0. 0000.  ROTATIONAL D              2822   05406
05407 FM   026000 003571   204. 0008.  FM  801. 0003.      0. 0000.  HC/K                      2823   05407
05410 FD   024000 002005   204. 0009.  FD    1. 0029.      0. 0000.  T                         2824   05410
05411 SQ  -060000 011253   204. 0010.  SQ  611. 0014.      0. 0000.  HCD/KT                    2825   05411
05412 SDX -053400 405426   204. 0011.  SDX   2. 0022.  C   0. 0000.  25                        2826   05412
05413 CA   050000 003567   204. 0012.  CA  801. 0001.      0. 0000.  1                         2827   05413
05414 ST   060100 011261   204. 0013.  ST  612. 0000.      0. 0000.  SIGMA TO ZERO POWER       2828   05414
05415 CA   050000 011111   204. 0014.  CA  603. 0001.      0. 0000.  SIGMA                     2829   05415
05416 ST   060100 011262   204. 0015.  ST  612. 0001.      0. 0000.                            2830   05416
05417 LQ   056000 011111   204. 0016.  LQ  603. 0001.      0. 0000.  SIGMA                     2831   05417
05420 FM   026000 411313   204. 0017.  FM  612. 0026.  C   0. 0000.                            2832   05420
05421 TF   014000 005427   204. 0017.1 TF    2. 0023.      0. 0000.                            2833   05421
05422 ST   060100 411314   204. 0018.  ST  612. 0027.  C   0. 0000.  SIGMA TO N POWER          2834   05422
05423 TX   200001 405417   204. 0019.  TX    2. 0016.  C   0. 0001.                            2835   05423
05424 T    002000 005442   204. 0020.  T   205. 0000.      0. 0000.  CALC. ROTATIONAL SUM      2836   05424
05425      000015 000000   204. 0021.      0. 0000.      0. 0013.                            2837   05425
05426      000031 000000   204. 0022.      0. 0000.      0. 0025.                            2838   05426
05427 ZS   060000 411314   204. 0023.  ZS  612. 0027.  C   0. 0000.                            2839   05427
05430 T    002000 005423   204. 0024.  T     2. 0019.      0. 0000.                            2840   05430

05442 CA   050000 011112   205. 0000.  CA  603. 0002.      0. 0000.  1/SIGMA                   2850   05442
05443 FA   030000 003756   205. 0001.  FA  804. 0000.      0. 0000.                            2851   05443
05444 ST   060100 011603   205. 0002.  ST  630. 0000.      0. 0000.                            2852   05444
05445 LQ   056000 011111   205. 0003.  LQ  603. 0001.      0. 0000.  SIGMA                     2853   05445
05446 FM   026000 003757   205. 0004.  FM  804. 0001.      0. 0000.                            2854   05446
05447 FA   030000 011603   205. 0005.  FA  630. 0000.      0. 0000.                            2855   05447
05450 ST   060100 011603   205. 0006.  ST  630. 0000.      0. 0000.                            2856   05450
05451 LQ   056000 011263   205. 0007.  LQ  612. 0002.      0. 0000.  SIGMA SQUARED             2857   05451
05452 FM   026000 003760   205. 0008.  FM  804. 0002.      0. 0000.                            2858   05452
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05453 FA   030000 011603   205. 0009.  FA  630. 0000.      0. 0000.                          2859   05453
05454 ST   060100 011603   205. 0010.  ST  630. 0000.      0. 0000.                          2860   05454
05455 LQ   056000 011264   205. 0011.  LQ  612. 0003.      0. 0000.  SIGMA CUBED             2861   05455
05456 FM   026000 003761   205. 0012.  FM  804. 0003.      0. 0000.                          2862   05456
05457 FA   030000 011603   205. 0013.  FA  630. 0000.      0. 0000.                          2863   05457
05460 ST   060100 011603   205. 0014.  ST  630. 0000.      0. 0000.                          2864   05460
05461 LQ   056000 011265   205. 0015.  LQ  612. 0004.      0. 0000.  SIGMA FOURTH            2865   05461
05462 FM   026000 003762   205. 0016.  FM  804. 0004.      0. 0000.                          2866   05462
05463 FA   030000 011603   205. 0017.  FA  630. 0000.      0. 0000.                          2867   05463
05464 ST   060100 011603   205. 0018.  ST  630. 0000.      0. 0000.                          2868   05464
05465 LQ   056000 011266   205. 0019.  LQ  612. 0005.      0. 0000.  SIGMA FIFTH             2869   05465
05466 FM   026000 003763   205. 0020.  FM  804. 0005.      0. 0000.                          2870   05466
05467 FA   030000 011603   205. 0021.  FA  630. 0000.      0. 0000.                          2871   05467
05470 ST   060100 011603   205. 0022.  ST  630. 0000.      0. 0000.  SUM OVER ROT. LEVELS    2872   05470
05471 CS   050200 003567   205. 0023.  CS  801. 0001.      0. 0000.  1                       2873   05471
05472 FD   024000 011263   205. 0024.  FD  612. 0002.      0. 0000.  SIGMA SQUARED          2874   05472
05473 SQ  -060000 011604   205. 0025.  SQ  630. 0001.      0. 0000.                          2875   05473
05474 CA   050000 011604   205. 0026.  CA  630. 0001.      0. 0000.                          2876   05474
05475 FA   030000 003757   205. 0027.  FA  804. 0001.      0. 0000.                          2877   05475
05476 ST   060100 011604   205. 0028.  ST  630. 0001.      0. 0000.                          2878   05476
05477 LQ   056000 011111   205. 0029.  LQ  603. 0001.      0. 0000.  SIGMA                   2879   05477
05500 FM   026000 003764   205. 0030.  FM  804. 0006.      0. 0000.                          2880   05500
05501 FA   030000 011604   205. 0031.  FA  630. 0001.      0. 0000.                          2881   05501
05502 ST   060100 011604   205. 0032.  ST  630. 0001.      0. 0000.                          2882   05502
05503 LQ   056000 011263   205. 0033.  LQ  612. 0002.      0. 0000.  SIGMA SQUARED          2883   05503
05504 FM   026000 003765   205. 0034.  FM  804. 0007.      0. 0000.                          2884   05504
05505 FA   030000 011604   205. 0035.  FA  630. 0001.      0. 0000.                          2885   05505
05506 ST   060100 011604   205. 0036.  ST  630. 0001.      0. 0000.                          2886   05506
05507 LQ   056000 011264   205. 0037.  LQ  612. 0003.      0. 0000.  SIGMA CUBED             2887   05507
05510 FM   026000 003766   205. 0038.  FM  804. 0008.      0. 0000.                          2888   05510
05511 FA   030000 011604   205. 0039.  FA  630. 0001.      0. 0000.                          2889   05511
05512 ST   060100 011604   205. 0040.  ST  630. 0001.      0. 0000.                          2890   05512
05513 LQ   056000 011265   205. 0041.  LQ  612. 0004.      0. 0000.  SIGMA FOURTH            2891   05513
05514 FM   026000 003767   205. 0042.  FM  804. 0009.      0. 0000.                          2892   05514
05515 FA   030000 011604   205. 0043.  FA  630. 0001.      0. 0000.                          2893   05515
05516 ST   060100 011604   205. 0044.  ST  630. 0001.      0. 0000.  D(SUM)/D SIGMA          2894   05516
05517 CA   050000 003570   205. 0045.  CA  801. 0002.      0. 0000.  2                       2895   05517
05520 FD   024000 011264   205. 0046.  FD  612. 0003.      0. 0000.  SIGMA CUBED            2896   05520
05521 SQ  -060000 011605   205. 0047.  SQ  630. 0002.      0. 0000.                          2897   05521
05522 CA   050000 011605   205. 0048.  CA  630. 0002.      0. 0000.                          2898   05522
05523 FA   030000 003764   205. 0049.  FA  804. 0006.      0. 0000.                          2899   05523
05524 ST   060100 011605   205. 0050.  ST  630. 0002.      0. 0000.                          2900   05524
05525 LQ   056000 011111   205. 0051.  LQ  603. 0001.      0. 0000.  SIGMA                   2901   05525
05526 FM   026000 003770   205. 0052.  FM  804. 0010.      0. 0000.                          2902   05526
05527 FA   030000 011605   205. 0053.  FA  630. 0002.      0. 0000.                          2903   05527
05530 ST   060100 011605   205. 0054.  ST  630. 0002.      0. 0000.                          2904   05530
05531 LQ   056000 011263   205. 0055.  LQ  612. 0002.      0. 0000.  SIGMA SQUARED          2905   05531
05532 FM   026000 003771   205. 0056.  FM  804. 0011.      0. 0000.                          2906   05532
05533 FA   030000 011605   205. 0057.  FA  630. 0002.      0. 0000.                          2907   05533
05534 ST   060100 011605   205. 0058.  ST  630. 0002.      0. 0000.                          2908   05534
05535 LQ   056000 011264   205. 0059.  LQ  612. 0003.      0. 0000.  SIGMA CUBED            2909   05535
05536 FM   026000 003772   205. 0060.  FM  804. 0012.      0. 0000.                          2910   05536
05537 FA   030000 011605   205. 0061.  FA  630. 0002.      0. 0000.                          2911   05537
05540 ST   060100 011605   205. 0062.  ST  630. 0002.      0. 0000.  D2(SUM)/D SIGMA 2       2912   05540
05541 CS   050200 003602   205. 0063.  CS  801. 0012.      0. 0000.  6                       2913   05541
05542 FD   024000 011265   205. 0064.  FD  612. 0004.      0. 0000.  SIGMA FOURTH            2914   05542
05543 SQ  -060000 011606   205. 0065.  SQ  630. 0003.      0. 0000.                          2915   05543
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05544 CA    050000 011606   205. 0066.  CA   630. 0003.      0. 0000.                          2916   05544
05545 FA    030000 003770   205. 0067.  FA   804. 0010.      0. 0000.                          2917   05545
05546 ST    060100 011606   205. 0068.  ST   630. 0003.      0. 0000.                          2918   05546
05547 LQ    056000 011111   205. 0069.  LQ   603. 0001.      0. 0000.  SIGMA                   2919   05547
05550 FM    026000 003773   205. 0070.  FM   804. 0013.      0. 0000.                          2920   05550
05551 FA    030000 011606   205. 0071.  FA   630. 0003.      0. 0000.                          2921   05551
05552 ST    060100 011606   205. 0072.  ST   630. 0003.      0. 0000.                          2922   05552
05553 LQ    056000 011263   205. 0073.  LQ   612. 0002.      0. 0000.  SIGMA SQURED            2923   05553
05554 FM    026000 003774   205. 0074.  FM   804. 0014.      0. 0000.                          2924   05554
05555 FA    030000 011606   205. 0075.  FA   630. 0003.      0. 0000.                          2925   05555
05556 ST    060100 011606   205. 0076.  ST   630. 0003.      0. 0000.  D3(SUM)/D SIGMA 3      2926   05556
05557 CA    050000 003606   205. 0077.  CA   801. 0016.      0. 0000.  24                      2927   05557
05560 FD    024000 011266   205. 0078.  FD   612. 0005.      0. 0000.  SIGMA FIFTH            2928   05560
05561 SQ   -060000 011607   205. 0079.  SQ   630. 0004.      0. 0000.                          2929   05561
05562 LQ    056000 011111   205. 0080.  LQ   603. 0001.      0. 0000.  SIGMA                   2930   05562
05563 FM    026000 003775   205. 0081.  FM   804. 0015.      0. 0000.                          2931   05563
05564 FA    030000 011607   205. 0082.  FA   630. 0004.      0. 0000.                          2932   05564
05565 FA    030000 003773   205. 0083.  FA   804. 0013.      0. 0000.                          2933   05565
05566 ST    060100 011607   205. 0084.  ST   630. 0004.      0. 0000.  D4(SUM)/D SIGMA 4      2934   05566
05567 CS    050200 003606   205. 0085.  CS   801. 0016.      0. 0000.  24                      2935   05567
05570 FD    024000 011267   205. 0086.  FD   612. 0006.      0. 0000.  SIGMA SIXTH            2936   05570
05571 FM    026000 003601   205. 0087.  FM   801. 0011.      0. 0000.  5                       2937   05571
05572 FA    030000 003775   205. 0088.  FA   804. 0015.      0. 0000.                          2938   05572
05573 ST    060100 011610   205. 0089.  ST   630. 0005.      0. 0000.  D5(SUM)/D SIGMA 5      2939   05573
05574 LQ    056000 003622   205. 0090.  LQ   801. 0028.      0. 0000.  40                      2940   05574
05575 FM    026000 003613   205. 0091.  FM   801. 0021.      0. 0000.  18                      2941   05575
05576 ST    060100 011614   205. 0092.  ST   630. 0009.      0. 0000.                          2942   05576
05577 CA    050000 011614   205. 0093.  CA   630. 0009.      0. 0000.                          2943   05577
05600 FD    024000 011270   205. 0094.  FD   612. 0007.      0. 0000.  SIGMA SEVENTH          2944   05600
05601 SQ   -060000 011611   205. 0095.  SQ   630. 0006.      0. 0000.  D6(SUM)/D SIGMA 6      2945   05601
05602 LQ    056000 011614   205. 0096.  LQ   630. 0009.      0. 0000.                          2946   05602
05603 FM    026000 003627   205. 0097.  FM   801. 0033.      0. 0000.  7                       2947   05603
05604 CHS   076000 000002   205. 0097.1 CHS    0. 0000.      0. 0000.                          2948   05604
05605 FD    024000 011271   205. 0098.  FD   612. 0008.      0. 0000.  SIGMA EIGHT            2949   05605
05606 SQ   -060000 011612   205. 0099.  SQ   630. 0007.      0. 0000.  D7(SUM)/D SIGMA 7      2950   05606
05607 LQ    056000 011614   205. 0100.  LQ   630. 0009.      0. 0000.                          2951   05607
05610 FM    026000 003620   205. 0101.  FM   801. 0026.      0. 0000.  8                       2952   05610
05611 FD    024000 011272   205. 0102.  FD   612. 0009.      0. 0000.  SIGMA NINTH            2953   05611
05612 FM    026000 003627   205. 0102.1 FM   801. 0033.      0. 0000.  7                       2954   05612
05613 ST    060100 011613   205. 0103.  ST   630. 0008.      0. 0000.  D8(SUM)/D SIGMA 8      2955   05613
05614 CS    050200 011613   205. 0104.  CS   630. 0008.      0. 0000.                          2956   05614
05615 FD    024000 011111   205. 0105.  FD   603. 0001.      0. 0000.  SIGMA                   2957   05615
05616 FM    026000 003630   205. 0106.  FM   801. 0034.      0. 0000.  9                       2958   05616
05617 ST    060100 011614   205. 0107.  ST   630. 0009.      0. 0000.  D9(SUM)/D SIGMA 9      2959   05617
05620 CS    050200 011614   205. 0108.  CS   630. 0009.      0. 0000.                          2960   05620
05621 FD    024000 011111   205. 0109.  FD   603. 0001.      0. 0000.  SIGMA                   2961   05621
05622 FM    026000 003631   205. 0110.  FM   801. 0035.      0. 0000.  10                      2962   05622
05623 ST    060100 011615   205. 0111.  ST   630. 0010.      0. 0000.  D10(SUM)/D SIGMA 10     2963   05623
05624 T     002000 005644   205. 0112.  T    206. 0000.      0. 0000.                          2964   05624



05644 CA    050000 003567   206. 0000.  CA   801. 0001.      0. 0000.  1                       2980   05644
05645 ST    060100 011622   206. 0001.  ST   631. 0000.      0. 0000.  ZERO FACTORIAL         2981   05645
05646 ST    060100 011623   206. 0002.  ST   631. 0001.      0. 0000.  ONE FACTORIAL          2982   05646
05647 ST    060100 011653   206. 0003.  ST   631. 0025.      0. 0000.  N                       2983   05647
05650 SDX  -053400 405774,  206. 0004.  SDX    2. 0083.  C   0. 0000.  23                      2984   05650
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05651 CA   050000 011653  206. 0005.  CA  631. 0025.      0. 0000.  N                    2985  05651
05652 FA   030000 003567  206. 0006.  FA  801. 0001.      0. 0000.  1                    2986  05652
05653 ST   060100 011653  206. 0007.  ST  631. 0025.      0. 0000.                       2987  05653
05654 LR   076500 000043  206. 0008.  LR    0. 0035.      0. 0000.                       2988  05654
05655 FM   026000 411652  206. 0009.  FM  631. 0024.  C   0. 0000.                       2989  05655
05656 ST   060100 411653  206. 0010.  ST  631. 0025.  C   0. 0000.  N FACTORIAL         2990  05656
05657 TX   200001 405651  206. 0011.  TX    2. 0005.  C   0. 0001.                       2991  05657
05660 XSD -063400 106004  206. 0012.  XSD   2. 0091.  A   0. 0000.  SAVE A INDEX        2992  05660
05661 SDX -053400 105776  206. 0013.  SDX   2. 0085.  A   0. 0000.  12                 2993  05661
05662 SDX -053400 206002  206. 0014.  SDX   2. 0089.  B   0. 0000.  24                 2994  05662
05663 SDX -053400 405775  206. 0015.  SDX   2. 0084.  C   0. 0000.  24                 2995  05663
05664 CA   050000 411653  206. 0016.  CA  631. 0025.  C   0. 0000.  (N+K) FACTORIAL     2996  05664
05665 FD   024000 211654  206. 0017.  FD  631. 0026.  B   0. 0000.  (2N+2K) FACTORIAL   2997  05665
05666 FM   026000 111251  206. 0018.  FM  611. 0012.  A   0. 0000.  A TO N             2998  05666
05667 FD   024000 111637  206. 0019.  FD  631. 0013.  A   0. 0000.  N FACTORIAL        2999  05667
05670 FM   026000 211313  206. 0020.  FM  612. 0026.  B   0. 0000.  SIGMA TO (2N+2K)    3000  05670
05671 TF   014000 006007  206. 0020.1 TF    2. 0094.      0. 0000.                       3001  05671
05672 ST   060100 411711  206. 0021.  ST  632. 0025.  C   0. 0000.                       3002  05672
05673 TX   200001 405674  206. 0022.  TX    2. 0023.  C   0. 0001.                       3003  05673
05674 TX   200001 105675  206. 0023.  TX    2. 0024.  A   0. 0001.                       3004  05674
05675 TX   200002 205664  206. 0024.  TX    2. 0016.  B   0. 0002.                       3005  05675
05676 SDX -053400 405777  206. 0025.  SDX   2. 0086.  C   0. 0000.  11                 3006  05676
05677 SDX -053400 106005  206. 0026.  SDX   2. 0092.  A   0. 0000.  13                 3007  05677
05700 CA   050000 411674  206. 0027.  CA  632. 0012.  C   0. 0000.                       3008  05700
05701 FA   030000 411675  206. 0028.  FA  632. 0013.  C   0. 0000.                       3009  05701
05702 TX   200001 405701  206. 0029.  TX    2. 0028.  C   0. 0001.                       3010  05702
05703 ST   060100 112123  206. 0030.  ST  642. 0013.  A   0. 0000.  G SUB K            3011  05703
05704 ZS   060000 111676  206. 0031.  ZS  632. 0014.  A   0. 0000.                       3012  05704
05705 XSD -063400 106005  206. 0032.  XSD   2. 0092.  A   0. 0000.  SAVE A INDEX       3013  05705
05706 SDX -053400 105776  206. 0033.  SDX   2. 0085.  A   0. 0000.  12                 3014  05706
05707 SDX -053400 206002  206. 0034.  SDX   2. 0089.  B   0. 0000.  24                 3015  05707
05710 SDX -053400 405775  206. 0035.  SDX   2. 0084.  C   0. 0000.  24                 3016  05710
05711 CA   050000 411653  206. 0036.  CA  631. 0025.  C   0. 0000.  (N+K) FACTORIAL     3017  05711
05712 FD   024000 211653  206. 0037.  FD  631. 0025.  B   0. 0000.  (2N+2K-1) FACTORIAL 3018  05712
05713 FM   026000 111251  206. 0038.  FM  611. 0012.  A   0. 0000.  A TO N             3019  05713
05714 FD   024000 111637  206. 0039.  FD  631. 0013.  A   0. 0000.  N FACTORIAL        3020  05714
05715 FM   026000 211313  206. 0040.  FM  612. 0026.  B   0. 0000.  SIGMA TO (2N+2K)    3021  05715
05716 TF   014000 006011  206. 0040.1 TF    2. 0096.      0. 0000.                       3022  05716
05717 ST   060100 411747  206. 0041.  ST  633. 0025.  C   0. 0000.                       3023  05717
05720 TX   200001 405721  206. 0042.  TX    2. 0043.  C   0. 0001.                       3024  05720
05721 TX   200001 105722  206. 0043.  TX    2. 0044.  A   0. 0001.                       3025  05721
05722 TX   200002 205711  206. 0044.  TX    2. 0036.  B   0. 0002.                       3026  05722
05723 SDX -053400 405777  206. 0045.  SDX   2. 0086.  C   0. 0000.  11                 3027  05723
05724 SDX -053400 106005  206. 0046.  SDX   2. 0092.  A   0. 0000.  13                 3028  05724
05725 CA   050000 411732  206. 0047.  CA  633. 0012.  C   0. 0000.                       3029  05725
05726 FA   030000 411733  206. 0048.  FA  633. 0013.  C   0. 0000.                       3030  05726
05727 TX   200001 405726  206. 0049.  TX    2. 0048.  C   0. 0001.                       3031  05727
05730 ST   060100 112147  206. 0050.  ST  643. 0013.  A   0. 0000.  G.SUB K, PRIME     3032  05730
05731 ZS   060000 111734  206. 0051.  ZS  633. 0014.  A   0. 0000.                       3033  05731
05732 XSD -063400 106005  206. 0052.  XSD   2. 0092.  A   0. 0000.  SAVE A INDEX       3034  05732
05733 SDX -053400 105776  206. 0053.  SDX   2. 0085.  A   0. 0000.  12                 3035  05733
05734 SDX -053400 206002  206. 0054.  SDX   2. 0089.  B   0. 0000.  24                 3036  05734
05735 SDX -053400 405775  206. 0055.  SDX   2. 0084.  C   0. 0000.  24                 3037  05735
05736 CA   050000 411653  206. 0056.  CA  631. 0025.  C   0. 0000.  (N+K) FACTORIAL     3038  05736
05737 FD   024000 211652  206. 0057.  FD  631. 0024.  B   0. 0000.  (2N+2K-2) FACTORIAL 3039  05737
05740 FM   026000 111251  206. 0058.  FM  611. 0012.  A   0. 0000.  A TO N             3040  05740
05741 FD   024000 111637  206. 0059.  FD  631. 0013.  A   0. 0000.  N FACTORIAL        3041  05741
05742 FM   026000 211313  206. 0060.  FM  612. 0026.  B   0. 0000.  SIGMA TO (2N+2K)    3042  05742
05743 TF   014000 006013  206. 0060.1 TF    2. 0098.      0. 0000.                       3043  05743
05744 ST   060100 412005  206. 0061.  ST  634. 0025.  C   0. 0000.                       3044  05744
05745 TX   200001 405746  206. 0062.  TX    2. 0063.  C   0. 0001.                       3045  05745
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05746 TX   200001 105747  206. 0063.  TX    2. 0064.  A  0. 0001.                          3046  05746
05747 TX   200002 205736  206. 0064.  TX    2. 0056.  B  0. 0002.                          3047  05747
05750 SDX -053400 405777  206. 0065.  SDX   2. 0086.  C  0. 0000.  11                      3048  05750
05751 SDX -053400 106005  206. 0066.  SDX   2. 0092.  A  0. 0000.  13                      3049  05751
05752 CA   050000 411770  206. 0067.  CA  634. 0012.  C  0. 0000.                          3050  05752
05753 FA   030000 411771  206. 0068.  FA  634. 0013.  C  0. 0000.                          3051  05753
05754 TX   200001 405753  206. 0069.  TX    2. 0068.  C  0. 0001.                          3052  05754
05755 ST   060100 112173  206. 0070.  ST  644. 0013.  A  0. 0000.  G SUB K,DOUBLE PRIME    3053  05755
05756 ZS   060000 111772  206. 0071.  ZS  634. 0014.  A  0. 0000.                          3054  05756
05757 CA   050000 005775  206. 0072.  CA    2. 0084.     0. 0000.  C INDEX                3055  05757
05760 S    040200 006000  206. 0073.  S     2. 0087.     0. 0000.  1                      3056  05760
05761 ST   060100 005775  206. 0074.  ST    2. 0084.     0. 0000.                         3057  05761
05762 CA   050000 006002  206. 0075.  CA    2. 0089.     0. 0000.  B INDEX               3058  05762
05763 S    040200 006001  206. 0076.  S     2. 0088.     0. 0000.  2                      3059  05763
05764 ST   060100 006002  206. 0077.  ST    2. 0089.     0. 0000.                         3060  05764
05765 TX   200001 105766  206. 0078.  TX    2. 0079.  A  0. 0001.                          3061  05765
05766 XSD -063400 106005  206. 0079.  XSD   2. 0092.  A  0. 0000.  SAVE A INDEX           3062  05766
05767 TXG  300001 105661  206. 0080.  TXG   2. 0013.  A  0. 0001.                          3063  05767
05770 SDX -053400 106004  206. 0081.  SDX   2. 0091.  A  0. 0000.  RESTORE A INDEX        3064  05770
05771 CA   050000 006006  206. 0081.1 CA    2. 0093.     0. 0000.  RESTORE ORIGINAL A     3065  05771
05772 ST   060100 006005  206. 0081.2 ST    2. 0092.     0. 0000.                         3066  05772
05773 T    002000 006015  206. 0082.  T   207. 0000.     0. 0000.  FINISH CALCN. OF G     3067  05773
05774      000027 000000  206. 0083.        0. 0000.     0. 0023.                         3068  05774
05775      000030 000000  206. 0084.        0. 0000.     0. 0024.                         3069  05775
05776      000014 000000  206. 0085.        0. 0000.     0. 0012.                         3070  05776
05777      000013 000000  206. 0086.        0. 0000.     0. 0011.                         3071  05777
06000      000001 000000  206. 0087.        0. 0000.     0. 0001.                         3072  06000
06001      000002 000000  206. 0088.        0. 0000.     0. 0002.                         3073  06001
06002      000030 000000  206. 0089.        0. 0000.     0. 0024.                         3074  06002
06003      000030 000000  206. 0090.        0. 0000.     0. 0024.                         3075  06003
06004      000000 000000  206. 0091.        0. 0000.     0. 0000.                         3076  06004
06005      000015 000000  206. 0092.        0. 0000.     0. 0013.                         3077  06005
06006      000015 000000  206. 0093.        0. 0000.     0. 0013.                         3078  06006
06007 ZS   060000 411711  206. 0094.  ZS  632. 0025.  C  0. 0000.                          3079  06007
06010 T    002000 005673  206. 0095.  T     2. 0022.     0. 0000.                         3080  06010
06011 ZS   060000 411747  206. 0096.  ZS  633. 0025.  C  0. 0000.                          3081  06011
06012 T    002000 005720  206. 0097.  T     2. 0042.     0. 0000.                         3082  06012
06013 ZS   060000 412005  206. 0098.  ZS  634. 0025.  C  0. 0000.                          3083  06013
06014 T    002000 005745  206. 0099.  T     2. 0062.     0. 0000.                         3084  06014
06015 CA   050000 006003  207. 0000.  CA  206. 0090.     0. 0000.  24                     3085  06015
06016 ST   060100 006002  207. 0001.  ST  206. 0089.     0. 0000.  RESTORE B INDEX       3086  06016
06017 ST   060100 005775  207. 0002.  ST  206. 0084.     0. 0000.  RESTORE C INDEX       3087  06017
06020 CA   050000 003567  207. 0003.  CA  801. 0001.     0. 0000.  1                      3089  06020
06021 ST   060100 012012  207. 0004.  ST  635. 0000.     0. 0000.                         3089  06021
06022 SDX -053400 406045  207. 0005.  SDX   2. 0022.  C  0. 0000.  12                     3090  06022
06023 SDX -053400 206046  207. 0006.  SDX   2. 0023.  B  0. 0000.  24                     3091  06023
06024 CA   050000 411637  207. 0007.  CA  631. 0013.  C  0. 0000.  (N+K) FACTORIAL        3092  06024
06025 FD   024000 211654  207. 0008.  FD  631. 0026.  B  0. 0000.  (2N+2K) FACTORIAL      3093  06025
06026 FM   026000 211313  207. 0009.  FM  612. 0026.  B  0. 0000.  SIGMA TO 2K           3094  06026
06027 TF   014000 006121  207. 0009.1 TF    2. 0065.     0. 0000.                         3095  06027
06030 ST   060100 412027  207. 0010.  ST  635. 0013.  C  0. 0000.  CONSTANT TERM IN G     3096  06030
06031 TX   200002 206032  207. 0011.  TX    2. 0012.  B  0. 0002.                          3097  06031
06032 TX   200001 406024  207. 0012.  TX    2. 0007.  C  0. 0001.                          3098  06032
06033 SDX -053400 406045  207. 0013.  SDX   2. 0022.  C  0. 0000.  12                     3099  06033
06034 SDX -053400 206046  207. 0014.  SDX   2. 0023.  B  0. 0000.  24                     3100  06034
06035 CA   050000 411637  207. 0015.  CA  631. 0013.  C  0. 0000.  N FACTORIAL           3101  06035
06036 FD   024000 211653  207. 0016.  FD  631. 0025.  B  0. 0000.  (2N+2K-1) FACTORIAL    3102  06036
06037 FM   026000 211313  207. 0017.  FM  612. 0026.  B  0. 0000.  SIGMA TO 2K           3103  06037
06040 TF   014000 006123  207. 0017.1 TF    2. 0067.     0. 0000.                         3104  06040
06041 ST   060100 412053  207. 0018.  ST  636. 0013.  C  0. 0000.  1ST TERM IN G PRIME    3105  06041
06042 TX   200002 206043  207. 0019.  TX    2. 0020.  B  0. 0002.                          3106  06042
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06043 TX    200001 406035  207. 0020.  TX     2. 0015.  C   0. 0001.                          3107   06043
06044 T     002000 006047  207. 0021.  T      2. 0024.      0. 0000.  CONTINUE CALCULATION    3108   06044
06045       000014 000000  207. 0022.         0. 0000.      0. 0012.                          3109   06045
06046       000030 000000  207. 0023.         0. 0000.      0. 0024.                          3110   06046
06047 SDX  -053400 406117  207. 0024.  SDX    2. 0063.  C   0. 0000.  13                      3111   06047
06050 CA    050000 412123  207. 0025.  CA   642. 0013.  C   0. 0000.  G SUB K                 3112   06050
06051 FA    030000 412027  207. 0026.  FA   635. 0013.  C   0. 0000.  CONSTANT TERM           3113   06051
06052 FD    024000 411637  207. 0027.  FD   631. 0013.  C   0. 0000.  K FACTORIAL             3114   06052
06053 SQ   -060000 412123  207. 0028.  SQ   642. 0013.  C   0. 0000.  CORRECT G SUB K         3115   06053
06054 TX    200001 406050  207. 0029.  TX     2. 0025.  C   0. 0001.                          3116   06054
06055 SDX  -053400 406120  207. 0030.  SDX    2. 0064.  C   0. 0000.  11                      3117   06055
06056 CS    050200 412122  207. 0031.  CS   642. 0012.  C   0. 0000.                          3118   06056
06057 ST    060100 412122  207. 0032.  ST   642. 0012.  C   0. 0000.                          3119   06057
06060 TX    200002 406056  207. 0033.  TX     2. 0031.  C   0. 0002.                          3120   06060
06061 SDX  -053400 406045  207. 0034.  SDX    2. 0022.  C   0. 0000.  12                      3121   06061
06062 SDX  -053400 206046  207. 0035.  SDX    2. 0023.  B   0. 0000.  24                      3122   06062
06063 CA    050000 411637  207. 0036.  CA   631. 0013.  C   0. 0000.  N FACTORIAL             3123   06063
06064 FD    024000 211652  207. 0037.  FD   631. 0024.  B   0. 0000.  (2N+2K-2) FACTORIAL     3124   06064
06065 FM    026000 211313  207. 0038.  FM   612. 0026.  B   0. 0000.  SIGMA TO 2K            3125   06065
06066 TF    014000 006125  207. 0038.1 TF     2. 0069.      0. 0000.                          3126   06066
06067 ST    060100 412077  207. 0039.  ST   637. 0013.  C   0. 0000.  1ST TERM,G DUBL PRIME    3127   06067
06070 TX    200002 206071  207. 0040.  TX     2. 0041.  B   0. 0002.                          3128   06070
06071 TX    200001 406063  207. 0041.  TX     2. 0036.  C   0. 0001.                          3129   06071
06072 SDX  -053400 406117  207. 0042.  SDX    2. 0063.  C   0. 0000.  13                      3130   06072
06073 CA    050000 412147  207. 0043.  CA   643. 0013.  C   0. 0000.  G SUB K, PRIME          3131   06073
06074 FA    030000 412053  207. 0044.  FA   636. 0013.  C   0. 0000.                          3132   06074
06075 FD    024000 411637  207. 0045.  FD   631. 0013.  C   0. 0000.  K FACTORIAL             3133   06075
06076 SQ   -060000 412147  207. 0046.  SQ   643. 0013.  C   0. 0000.  CORR. G SUB K,PRIME     3134   06076
06077 TX    200001 406073  207. 0047.  TX     2. 0043.  C   0. 0001.                          3135   06077
06100 SDX  -053400 406120  207. 0048.  SDX    2. 0064.  C   0. 0000.  11                      3136   06100
06101 CS    050200 412146  207. 0049.  CS   643. 0012.  C   0. 0000.                          3137   06101
06102 ST    060100 412146  207. 0050.  ST   643. 0012.  C   0. 0000.                          3138   06102
06103 TX    200002 406101  207. 0051.  TX     2. 0049.  C   0. 0002.                          3139   06103
06104 SDX  -053400 406117  207. 0052.  SDX    2. 0063.  C   0. 0000.  13                      3140   06104
06105 CA    050000 412173  207. 0053.  CA   644. 0013.  C   0. 0000.  G SUB K,DOUBLE PRIME    3141   06105
06106 FA    030000 412077  207. 0054.  FA   637. 0013.  C   0. 0000.                          3142   06106
06107 FD    024000 411637  207. 0055.  FD   631. 0013.  C   0. 0000.  K FACTORIAL             3143   06107
06110 SQ   -060000 412173  207. 0056.  SQ   644. 0013.  C   0. 0000.  CORR.G SUB K,DUB PRIM   3144   06110
06111 TX    200001 406105  207. 0057.  TX     2. 0053.  C   0. 0001.                          3145   06111
06112 SDX  -053400 406120  207. 0058.  SDX    2. 0064.  C   0. 0000.  11                      3146   06112
06113 CS    050200 412172  207. 0059.  CS   644. 0012.  C   0. 0000.                          3147   06113
06114 ST    060100 412172  207. 0060.  ST   644. 0012.  C   0. 0000.                          3148   06114
06115 TX    200002 406113  207. 0061.  TX     2. 0059.  C   0. 0002.                          3149   06115
06116 T     002000 006130  207. 0062.  T      208. 0000.      0. 0000.  CALC. ROTATION TERMS  3150   06116
06117       000015 000000  207. 0063.         0. 0000.      0. 0013.                          3151   06117
06120       000013 000000  207. 0064.         0. 0000.      0. 0011.                          3152   06120
06121 ZS    060000 412027  207. 0065.  ZS   635. 0013.  C   0. 0000.                          3153   06121
06122 T     002000 006031  207. 0066.  T      2. 0011.      0. 0000.                          3154   06122
06123 ZS    060000 412053  207. 0067.  ZS   636. 0013.  C   0. 0000.                          3155   06123
06124 T     002000 006042  207. 0068.  T      2. 0019.      0. 0000.                          3156   06124
06125 ZS    060000 412077  207. 0069.  ZS   637. 0013.  C   0. 0000.                          3157   06125
06126 T     002000 006070  207. 0070.  T      2. 0040.      0. 0000.                          3158   06126
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06130 CA   050000 C11253  208. 0000.  CA  611. 0014.      0. 0000.  HCD/KT                3160  06130
06131 FD   024000 C11111  208. 0001.  FD  603. 0001.      0. 0000.  HCB/KT                3161  06131
06132 SQ  -060000 C12207  208. 0002.  SQ  645. 0005.      0. 0000.  D/B                   3162  06132
06133 ZS   060000 C11331  208. 0002.1 ZS  614. 0000.      0. 0000.                        3163  06133
06134 SDX -053400 4C6336  208. 0003.  SDX   2. 0153.  C   0. 0000.  7                     3164  06134
06135 LQ   056000 411614  208. 0004.  LQ  630. 0009.  C   0. 0000.  2ND DERIV. OF SUM     3165  06135
06136 FM   026000 C11253  208. 0005.  FM  611. 0014.      0. 0000.  HCD/KT                3166  06136
06137 FA   030000 411612  208. 0006.  FA  630. 0007.  C   0. 0000.  ROTATIONAL SUM         3167  06137
06140 ST   060100 C12204  208. 0007.  ST  645. 0002.      0. 0000.                        3168  06140
06141 LQ   056000 411613  208. 0008.  LQ  630. 0008.  C   0. 0000.  1ST DERIV. OF SUM     3169  06141
06142 FM   026000 C12207  208. 0009.  FM  645. 0005.      0. 0000.  D/B                   3170  06142
06143 LR   076500 CC0043  208. 0010.  LR    0. 0035.      0. 0000.                        3171  06143
06144 FM   026000 C11331  208. 0011.  FM  614. 0000.      0. 0000.  N-1                   3172  06144
06145 FA   030000 C12204  208. 0012.  FA  645. 0002.      0. 0000.                        3173  06145
06146 LR   076500 CC0043  208. 0013.  LR    0. 0035.      0. 0000.                        3174  06146
06147 FM   026000 412115  208. 0014.  FM  642. 0007.  C   0. 0000.  G SUB K              3175  06147
06150 FA   030000 C12202  208. 0015.  FA  645. 0000.      0. 0000.                        3176  06150
06151 ST   060100 C12202  208. 0016.  ST  645. 0000.      0. 0000.                        3177  06151
06152 CA   050000 C11331  208. 0017.  CA  614. 0000.      0. 0000.  N-1                   3178  06152
06153 FA   030000 CC3567  208. 0018.  FA  801. 0001.      0. 0000.  1                     3179  06153
06154 ST   060100 C11331  208. 0019.  ST  614. 0000.      0. 0000.                        3180  06154
06155 TX   200001 4C6135  208. 0020.  TX    2. 0004.  C   0. 0001.                        3181  06155
06156 CA   050000 C12202  208. 0021.  CA  645. 0000.      0. 0000.                        3182  06156
06157 ST   060100 C11317  208. 0022.  ST  613. 0000.      0. 0000.  Q INTERNAL, ROT.      3183  06157
06160 ZS   060000 C12202  208. 0023.  ZS  645. 0000.      0. 0000.                        3184  06160
06161 CA   050000 CC3567  208. 0024.  CA  801. 0001.      0. 0000.  1                     3185  06161
06162 ST   060100 C11332  208. 0025.  ST  614. 0001.      0. 0000.  N                     3186  06162
06163 SDX -053400 4C6326  208. 0026.  SDX   2. 0153.  C   0. 0000.  7                     3187  06163
06164 LQ   056000 411615  208. 0027.  LQ  630. 0010.  C   0. 0000.  3RD DERIV. OF SUM     3188  06164
06165 FM   026000 C11253  208. 0028.  FM  611. 0014.      0. 0000.  HCD/KT                3189  06165
06166 FA   030000 411613  208. 0029.  FA  630. 0008.  C   0. 0000.  1ST DERIV. OF SUM     3190  06166
06167 ST   060100 C12204  208. 0030.  ST  645. 0002.      0. 0000.                        3191  06167
06170 LQ   056000 C12207  208. 0031.  LQ  645. 0005.      0. 0000.  D/B                   3192  06170
06171 FM   026000 411614  208. 0032.  FM  630. 0009.  C   0. 0000.  2ND DERIV. OF SUM     3193  06171
06172 LR   076500 CC0043  208. 0033.  LR    0. 0035.      0. 0000.                        3194  06172
06173 FM   026000 C11332  208. 0034.  FM  614. 0001.      0. 0000.  N                     3195  06173
06174 FA   030000 C12204  208. 0035.  FA  645. 0002.      0. 0000.                        3196  06174
06175 LR   076500 CC0043  208. 0036.  LR    0. 0035.      0. 0000.                        3197  06175
06176 FM   026000 C11111  208. 0037.  FM  603. 0001.      0. 0000.  SIGMA                 3198  06176
06177 LR   076500 CC0043  208. 0038.  LR    0. 0035.      0. 0000.                        3199  06177
06200 FM   026000 412115  208. 0039.  FM  642. 0007.  C   0. 0000.  G SUB K              3200  06200
06201 ST   060100 C12204  208. 0040.  ST  645. 0002.      0. 0000.                        3201  06201
06202 LQ   056000 411614  208. 0041.  LQ  630. 0009.  C   0. 0000.  2ND DERIV. OF SUM     3202  06202
06203 FM   026000 C11253  208. 0042.  FM  611. 0014.      0. 0000.  HCD/KT                3203  06203
06204 FA   030000 411612  208. 0043.  FA  630. 0007.  C   0. 0000.  ROTATIONAL SUM         3204  06204
06205 ST   060100 C12205  208. 0044.  ST  645. 0003.      0. 0000.                        3205  06205
06206 ZS   060000 C11331  208. 0045.  ZS  614. 0000.      0. 0000.                        3206  06206
06207 LQ   056000 C11331  208. 0046.  LQ  614. 0000.      0. 0000.  N-1                   3207  06207
06210 FM   026000 411613  208. 0047.  FM  630. 0008.  C   0. 0000.  1ST DERIV. OF SUM     3208  06210
06211 LR   076500 CC0043  208. 0048.  LR    0. 0035.      0. 0000.                        3209  06211
06212 FM   026000 C12207  208. 0049.  FM  645. 0005.      0. 0000.  D/B                   3210  06212
06213 FA   030000 C12205  208. 0050.  FA  645. 0003.      0. 0000.                        3211  06213
06214 LR   076500 CC0043  208. 0051.  LR    0. 0035.      0. 0000.                        3212  06214
06215 FM   026000 412141  208. 0052.  FM  643. 0007.  C   0. 0000.  G SUB K,PRIME         3213  06215
06216 FA   030000 C12204  208. 0053.  FA  645. 0002.      0. 0000.                        3214  06216
06217 FA   030000 C12203  208. 0054.  FA  645. 0001.      0. 0000.                        3215  06217
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06220 ST   060100 012203   208. 0055.  ST  645. 0001.        0. 0000.                                3216   06220
06221 CA   050000 011331   208. 0056.  CA  614. 0000.        0. 0000.   N-1                          3217   06221
06222 FA   030000 003567   208. 0057.  FA  801. 0001.        0. 0000.   1                            3218   06222
06223 ST   060100 011331   208. 0058.  ST  614. 0000.        0. 0000.                                3219   06223
06224 CA   050000 011332   208. 0059.  CA  614. 0001.        0. 0000.   N                            3220   06224
06225 FA   030000 003567   208. 0060.  FA  801. 0001.        0. 0000.   1                            3221   06225
06226 ST   060100 011332   208. 0061.  ST  614. 0001.        0. 0000.                                3222   06226
06227 TX   200001 406164   208. 0062.  TX    2. 0027.  C     0. 0001.                                3223   06227
06230 LQ   056000 012203   208. 0063.  LQ  645. 0001.        0. 0000.                                3224   06230
06231 FM   026000 002005   208. 0064.  FM    1. 0029.        0. 0000.   T                            3225   06231
06232 ST   060100 011320   208. 0065.  ST  613. 0001.        0. 0000.   Q PRIME INTERNAL,ROT.        3226   06232
06233 ZS   060000 012203   208. 0066.  ZS  645. 0001.        0. 0000.                                3227   06233
06234 CA   050000 003570   208. 0067.  CA  801. 0002.        0. 0000.   2                            3228   06234
06235 ST   060100 011333   208. 0068.  ST  614. 0002.        0. 0000.   N+1                          3229   06235
06236 CA   050000 003567   208. 0069.  CA  801. 0001.        0. 0000.   1                            3230   06236
06237 ST   060100 011332   208. 0070.  ST  614. 0001.        0. 0000.   N                            3231   06237
06240 ZS   060000 011331   208. 0070.1 ZS  614. 0000.        0. 0000.                                3232   06240
06241 SDX -053400 406336   208. 0071.  SDX   2. 0153.  C     0. 0000.   7                            3233   06241
06242 LQ   056000 411616   208. 0072.  LQ  630. 0011.  C     0. 0000.   4TH DERIV. OF SUM            3234   06242
06243 FM   026000 011253   208. 0073.  FM  611. 0014.        0. 0000.   HCD/KT                       3235   06243
06244 FA   030000 411614   208. 0074.  FA  630. 0009.  C     0. 0000.   2ND DERIV. OF SUM            3236   06244
06245 ST   060100 012205   208. 0075.  ST  645. 0003.        0. 0000.                                3237   06245
06246 LQ   056000 411615   208. 0076.  LQ  630. 0010.  C     0. 0000.   3RD DERIV. OF SUM            3238   06246
06247 FM   026000 012207   208. 0077.  FM  645. 0005.        0. 0000.   D/B                          3239   06247
06250 LR   076500 000043   208. 0078.  LR    0. 0035.        0. 0000.                                3240   06250
06251 FM   026000 011333   208. 0079.  FM  614. 0002.        0. 0000.   N+1                          3241   06251
06252 FA   030000 012205   208. 0080.  FA  645. 0003.        0. 0000.                                3242   06252
06253 LR   076500 000043   208. 0081.  LR    0. 0035.        0. 0000.                                3243   06253
06254 FM   026000 011263   208. 0082.  FM  612. 0002.        0. 0000.   SIGMA SQUARED                3244   06254
06255 LR   076500 000043   208. 0089.  LR    0. 0035.        0. 0000.                                3245   06255
06256 FM   026000 412115   208. 0090.  FM  642. 0007.  C     0. 0000.   G SUB K                      3246   06256
06257 ST   060100 012205   208. 0091.  ST  645. 0003.        0. 0000.                                3247   06257
06260 LQ   056000 411615   208. 0092.  LQ  630. 0010.  C     0. 0000.   3RD DERIV. OF SUM            3248   06260
06261 FM   026000 011253   208. 0093.  FM  611. 0014.        0. 0000.   HCD/KT                       3249   06261
06262 FA   030000 411613   208. 0094.  FA  630. 0008.  C     0. 0000.   1ST DERIV. OF SUM            3250   06262
06263 ST   060100 012206   208. 0095.  ST  645. 0004.        0. 0000.                                3251   06263
06264 LQ   056000 411614   208. 0096.  LQ  630. 0009.  C     0. 0000.   2ND DERIV. OF SUM            3252   06264
06265 FM   026000 012207   208. 0097.  FM  645. 0005.        0. 0000.   D/B                          3253   06265
06266 LR   076500 000043   208. 0098.  LR    0. 0035.        0. 0000.                                3254   06266
06267 FM   026000 011332   208. 0099.  FM  614. 0001.        0. 0000.   N                            3255   06267
06270 FA   030000 012206   208. 0100.  FA  645. 0004.        0. 0000.                                3256   06270
06271 LR   076500 000043   208. 0101.  LR    0. 0035.        0. 0000.                                3257   06271
06272 FM   026000 011111   208. 0102.  FM  603. 0001.        0. 0000.   SIGMA                        3258   06272
06273 LR   076500 000043   208. 0103.  LR    0. 0035.        0. 0000.                                3259   06273
06274 FM   026000 412141   208. 0106.  FM  643. 0007.  C     0. 0000.   G SUB K, PRIME               3260   06274
06275 LR   076500 000043   208. 0107.  LR    0. 0035.        0. 0000.                                3261   06275
06276 FM   026000 003570   208. 0108.  FM  801. 0002.        0. 0000.   2                            3262   06276
06277 FA   030000 012205   208. 0109.  FA  645. 0003.        0. 0000.                                3263   06277
06300 ST   060100 012205   208. 0110.  ST  645. 0003.        0. 0000.                                3264   06300
06301 LQ   056000 411614   208. 0111.  LQ  630. 0009.  C     0. 0000.   2ND DERIV. OF SUM            3265   06301
06302 FM   026000 011253   208. 0112.  FM  611. 0014.        0. 0000.   HCD/KT                       3266   06302
06303 FA   030000 411612   208. 0113.  FA  630. 0007.  C     0. 0000.   ROTATIONAL SUM               3267   06303
06304 ST   060100 012206   208. 0114.  ST  645. 0004.        0. 0000.                                3268   06304
06305 LQ   056000 411613   208. 0115.  LQ  630. 0008.  C     0. 0000.   1ST DERIV. OF SUM            3269   06305
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06306 FM  026000 C12207  208. 0118.  FM  645. 0005.      0. 0000.  D-E                    3270  06306
06307 LR  076500 000042  208. 0117.  LR    0. 0035.      0. 0000.                        3271  06307
06310 FM  026000 C11321  208. 0118.  FM  614. 0000.      0. 0000.  N-1                    3272  06310
06311 FA  030000 C12200  208. 0119.  FA  645. 0004.      0. 0000.                        3273  06311
06312 LR  076500 000043  208. 0120.  LR    0. 0035.      0. 0000.                        3274  06312
06313 FM  026000 412165  208. 0121.  FM  644. 0007.      0. 0000.  G SUB 1 DOUBLE PRIME   3275  06313
06314 FA  030000 C12205  208. 0122.  FA  645. 0003.      0. 0000.                        3276  06314
06315 FA  030000 C12210  208. 0123.  FA  645. 0006.      0. 0000.                        3277  06315
06316 ST  060100 012210  208. 0124.  ST  645. 0006.      0. 0000.                        3278  06316
06317 CA  050000 011331  208. 0125.  CA  614. 0000.      0. 0000.  1                      3279  06317
06320 FA  030000 003567  208. 0126.  FA  801. 0001.      0. 0000.  N-1                    3280  06320
06321 ST  060100 011331  208. 0127.  ST  614. 0000.      0. 0000.                        3281  06321
06322 CA  050000 011332  208. 0128.  CA  614. 0001.      0. 0000.                        3282  06322
06323 FA  030000 003567  208. 0129.  FA  801. 0001.      0. 0000.                        3283  06323
06324 ST  060100 011332  208. 0130.  ST  614. 0001.      0. 0000.  N                      3284  06324
06325 CA  050000 011333  208. 0131.  CA  614. 0002.      0. 0000.                        3285  06325
06326 FA  030000 003567  208. 0132.  FA  801. 0001.      0. 0000.                        3286  06326
06327 ST  060100 011333  208. 0133.  ST  614. 0002.      0. 0000.  N+1                    3287  06327
06330 TX  200001 406242  208. 0134.  TX    2. 0072.      0. 0001.                        3288  06330
06331 LQ  056000 012210  208. 0135.  LQ  645. 0006.      0. 0000.                        3289  06331
06332 FM  026000 011116  208. 0149.  FM  603. 0006.      0. 0000.  T SQUARED              3290  06332
06333 ST  060100 011321  208. 0150.  ST  613. 0002.      0. 0000.  Q DUBL PRIME INT.-RET  3291  06333
06334 ZS  060000 012210  208. 0151.  ZS  645. 0006.      0. 0000.                        3292  06334
06335 T   002000 006402  209. 0152.  T   209. 0000.      0. 0000.  CALC TOTAL Q ROTAT.    3293  06335
06336     000007 000000  208. 0153.      0. 0000.      0. 0007.                        3294  06336
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06402 CA  050000 103712  209. 0000.  CA  802. 0044.  A   0. 0000.  LAMBDA               3330  06402
06403 FS  030200 003561  209. 0001.  FS  800. 0010.      0. 0000.  2.98                 3331  06403
06404 TP  012000 006426  209. 0002.  TP    2. 0020.      0. 0000.  GAMMA STATE          3332  06404
06405 CA  050000 103712  209. 0003.  CA  802. 0044.  A   0. 0000.                      3333  06405
06406 FS  030200 003547  209. 0004.  FS  800. 0000.      0. 0000.  1.98                 3334  06406
06407 TP  012000 006414  209. 0005.  TP    2. 0010.      0. 0000.  DELTA STATE         3335  06407
06410 CS  050200 011230  209. 0006.  CS  610. 0005.      0. 0000.  E TO - GAMMA SIGMA 1  3336  06410
06411 FA  030000 011317  209. 0007.  FA  613. 0000.      0. 0000.  INTERNAL ROT. Q      3337  06411
06412 ST  060100 011331  209. 0008.  ST  614. 0000.      0. 0000.  TOTAL SUM FOR PI STAT  3338  06412
06413 T   002000 006750  209. 0009.  T   213. 0000.      0. 0000.  SET UP J(J+1) + 1/4   3339  06413
06414 LQ  056000 011230  209. 0010.  LQ  610. 0005.      0. 0000.  E TO - G.S. 1        3340  06414
06415 FM  026000 003570  209. 0011.  FM  801. 0002.      0. 0000.  2                    3341  06415
06416 ST  060100 011230  209. 0012.  ST  610. 0005.      0. 0000.                      3342  06416
06417 LQ  056000 011227  209. 0013.  LQ  610. 0004.      0. 0000.  E TO - G.S. 2        3343  06417
06420 FM  026000 003570  209. 0014.  FM  801. 0002.      0. 0000.  2                    3344  06420
06421 FA  030000 011236  209. 0015.  FA  610. 0005.      0. 0000.                      3345  06421
06422 CHS 076000 000002  209. 0016.  CHS   0. 0000.      0. 0000.                      3346  06422
06423 FA  030000 011317  209. 0017.  FA  613. 0000.      0. 0000.  INTERNAL ROT. Q      3347  06423
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06424 ST   060100 011331   209. 0018.  ST  614. 0000.        0. 0000.   TOTAL SUM FOR DELTA      3348   06424
06425 T    002000 006755   209. 0019.  T   213. 0005.        0. 0000.   SET UP J(J+1) + 1/4      3349   06425
06426 LQ   056000 011230   209. 0020.  LQ  610. 0005.        0. 0000.   E TO - G.S. 1            3350   06426
06427 FM   026000 003570   209. 0021.  FM  901. 0002.        0. 0000.   2                        3351   06427
06430 ST   060100 011230   209. 0022.  ST  610. 0005.        0. 0000.                            3352   06430
06431 LQ   056000 011227   209. 0023.  LQ  610. 0004.        0. 0000.   E TO - G.S. 2            3353   06431
06432 FM   026000 003577   209. 0024.  FM  801. 0009.        0. 0000.   4                        3354   06432
06433 ST   060100 011227   209. 0025.  ST  610. 0004.        0. 0000.                            3355   06433
06434 LQ   056000 011226   209. 0026.  LQ  610. 0003.        0. 0000.   E TO - G.S. 3            3356   06434
06435 FM   026000 003600   209. 0027.  FM  801. 0010.        0. 0000.   3                        3357   06435
06436 CHS  076000 000002   209. 0028.  CHS   0. 0000.        0. 0000.                            3358   06436
06437 FS   030200 011227   209. 0029.  FS  610. 0004.        0. 0000.                            3359   06437
06440 FS   030200 011230   209. 0030.  FS  610. 0005.        0. 0000.                            3360   06440
06441 FA   030000 011317   209. 0031.  FA  613. 0000.        0. 0000.   INTERNAL ROT. Q          3361   06441
06442 ST   060100 011331   209. 0032.  ST  614. 0000.        0. 0000.   TOTAL GAMMA STATE SUM    3362   06442
06443 T    002000 006762   209. 0032.1 T   213. 0010.        0. 0000.   SET UP J(J+1) + 1/4      3363   06443
06444 CA   050000 103734   209. 0033.  CA  802. 0062.  A     0. 0000.   SPIN COUPLING A          3364   06444
06445 TM  -012000 006475   209. 0034.  TM    2. 0059.        0. 0000.   INVERTED STATE,J=3/2     3365   06445
06446 CA   050000 011432   209. 0036.  CA  617. 0000.        0. 0000.   J(J+1) + 1/4             3366   06446
06447 FS   030200 011172   209. 0037.  FS  608. 0000.        0. 0000.   LAMBDA SQ.               3367   06447
06450 ST   060100 011332   209. 0038.  ST  614. 0001.        0. 0000.                            3368   06450
06451 CA   050000 011432   209. 0039.  CA  617. 0000.        0. 0000.   J(J+1) + 1/4             3369   06451
06452 FA   030000 011202   209. 0040.  FA  608. 0008.        0. 0000.                            3370   06452
06453 TSX  007400 403516   209. 0041.  TSX 704. 0000.  C     0. 0000.   SQ. ROOT                 3371   06453
06454 HP   042000 000000   209. 0042.  HP    0. 0000.        0. 0000.                            3372   06454
06455 CHS  076000 000002   209. 0043.  CHS   0. 0000.        0. 0000.                            3373   06455
06456 FA   030000 011332   209. 0044.  FA  614. 0001.        0. 0000.   J(J+1) + 1/4             3374   06456
06457 LR   076500 000043   209. 0045.  LR    0. 0035.        0. 0000.                            3375   06457
06460 FM   026000 011110   209. 0046.  FM  603. 0000.        0. 0000.   B EFFECTIVE              3376   06460
06461 ST   060100 011332   209. 0047.  ST  614. 0001.        0. 0000.                            3377   06461
06462 CA   050000 011432   209. 0048.  CA  617. 0000.        0. 0000.   J(J+1) + 1/4             3378   06462
06463 FS   030200 003607   209. 0049.  FS  801. 0017.        0. 0000.   1/4                      3379   06463
06464 ST   060100 011333   209. 0050.  ST  614. 0002.        0. 0000.                            3380   06464
06465 LR   076500 000043   209. 0051.  LR    0. 0035.        0. 0000.                            3381   06465
06466 FM   026000 011333   209. 0052.  FM  614. 0002.        0. 0000.                            3382   06466
06467 LR   076500 000043   209. 0053.  LR    0. 0035.        0. 0000.                            3383   06467
06470 FM   026000 103720   209. 0054.  FM  802. 0050.  A     0. 0000.   ROTATIONAL D             3384   06470
06471 CHS  076000 000002   209. 0055.  CHS   0. 0000.        0. 0000.                            3385   06471
06472 FA   030000 011332   209. 0056.  FA  614. 0001.        0. 0000.                            3386   06472
06473 ST   060100 011332   209. 0057.  ST  614. 0001.        0. 0000.   BETA,NORMAL              3387   06473
06474 T    002000 006523   209. 0058.  T     2. 0079.        0. 0000.                            3388   06474
06475 CA   050000 011433   209. 0059.  CA  617. 0001.        0. 0000.   J(J+1) + 1/4             3389   06475
06476 FS   030200 011172   209. 0060.  FS  608. 0000.        0. 0000.   LAMBDA SQ.               3390   06476
06477 ST   060100 011332   209. 0061.  ST  614. 0001.        0. 0000.                            3391   06477
06500 CA   050000 011433   209. 0062.  CA  617. 0001.        0. 0000.   J(J+1) + 1/4             3392   06500
06501 FA   030000 011202   209. 0063.  FA  608. 0008.        0. 0000.                            3393   06501
06502 TSX  007400 403516   209. 0064.  TSX 704. 0000.  C     0. 0000.   SQ. ROOT                 3394   06502
06503 HP   042000 000000   209. 0065.  HP    0. 0000.        0. 0000.                            3395   06503
06504 CHS  076000 000002   209. 0066.  CHS   0. 0000.        0. 0000.                            3396   06504
06505 FA   030000 011332   209. 0067.  FA  614. 0001.        0. 0000.                            3397   06505
06506 LR   076500 000043   209. 0068.  LR    0. 0035.        0. 0000.                            3398   06506
06507 FM   026000 011110   209. 0069.  FM  603. 0000.        0. 0000.   B EFFECTIVE              3399   06507
06510 ST   060100 011332   209. 0070.  ST  614. 0001.        0. 0000.                            3400   06510
06511 CA   050000 011433   209. 0071.  CA  617. 0001.        0. 0000.   J(J+1) + 1/4             3401   06511
06512 FS   030200 003607   209. 0072.  FS  801. 0017.        0. 0000.   1/4                      3402   06512
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06513 ST   060100 011333  209. 0073.  ST  614. 0002.      0. 0000.                          3403  06513
06514 LR   076500 000043  209. 0074.  LR    0. 0035.      0. 0000.                          3404  06514
06515 FM   026000 011333  209. 0074.1 FM  614. 0002.      0. 0000.                          3405  06515
06516 LR   076500 000043  209. 0074.2 LR    0. 0035.      0. 0000.                          3406  06516
06517 FM   026000 103720  209. 0075.  FM  802. 0050.  A   0. 0000.  ROTATIONAL D           3407  06517
06520 CHS  076000 000002  209. 0076.  CHS   0. 0000.      0. 0000.                          3408  06520
06521 FA   030000 011332  209. 0077.  FA  614. 0001.      0. 0000.                          3409  06521
06522 ST   060100 011332  209. 0078.  ST  614. 0001.      0. 0000.  BETA,INVERTED           3410  06522
06523 CA   050000 011332  209. 0079.  CA  614. 0001.      0. 0000.                          3411  06523
06524 FD   024000 002005  209. 0080.  FD    1. 0029.      0. 0000.  T                       3412  06524
06525 FM   026000 003571  209. 0081.  FM  801. 0003.      0. 0000.  HC/K                    3413  06525
06526 ST   060100 011332  209. 0082.  ST  614. 0001.      0. 0000.                          3414  06526
06527 CA   050000 011173  209. 0083.  CA  606. 0001.      0. 0000.  2 LAMBDA + 1           3415  06527
06530 FD   024000 003577  209. 0084.  FD  801. 0009.      0. 0000.  4                       3416  06530
06531 FM   026000 011111  209. 0085.  FM  603. 0001.      0. 0000.  SIGMA                   3417  06531
06532 FA   030000 011332  209. 0086.  FA  614. 0001.      0. 0000.  (HC/KT)BETA            3418  06532
06533 TSX  007400 403410  209. 0087.  TSX 703. 0000.  C   0. 0000.  EXPONENTIAL            3419  06533
06534 HP   042000 000000  209. 0088.  HP    0. 0000.      0. 0000.                          3420  06534
06535 ST   060100 011333  209. 0089.  ST  614. 0002.      0. 0000.  E TO BETA              3421  06535
06536 LR   076500 000043  209. 0090.  LR    0. 0035.      0. 0000.                          3422  06536
06537 FM   026000 011331  209. 0091.  FM  614. 0000.      0. 0000.  TOTAL SUM,ROTATION     3423  06537
06540 LR   076500 000043  209. 0092.  LR    0. 0035.      0. 0000.                          3424  06540
06541 FM   026000 003570  209. 0093.  FM  801. 0002.      0. 0000.  2                       3425  06541
06542 ST   060100 011117  209. 0094.  ST  603. 0007.      0. 0000.  Q,ROTATION,TOTAL       3426  06542
06543 T    002000 006560  209. 0095.  T   210. 0000.      0. 0000.  CALC. Q PRIME,ROT.     3427  06543

06560 CA   050000 103712  210. 0000.  CA  802. 0044.  A   0. 0000.  LAMBDA                  3440  06560
06561 FS   030200 003561  210. 0001.  FS  900. 0010.      0. 0000.  2.98                    3441  06561
06562 TP   012000 006606  210. 0002.  TP    2. 0022.      0. 0000.  GAMMA STATE            3442  06562
06563 CA   050000 103712  210. 0003.  CA  802. 0044.  A   0. 0000.                          3443  06563
06564 FS   030200 003547  210. 0004.  FS  800. 0000.      0. 0000.  1.98                    3444  06564
06565 TP   012000 006573  210. 0005.  TP    2. 0011.      0. 0000.  DELTA STATE            3445  06565
06566 CA   050000 011411  210. 0006.  CA  615. 0038.      0. 0000.                          3446  06566
06567 ST   060100 011412  210. 0007.  ST  615. 0039.      0. 0000.  T G.S. SUM              3447  06567
06570 CA   050000 011417  210. 0008.  CA  615. 0044.      0. 0000.                          3448  06570
06571 ST   060100 011413  210. 0009.  ST  615. 0040.      0. 0000.  T SQ. G.S. SUM         3449  06571
06572 T    002000 006630  210. 0010.  T     2. 0038.      0. 0000.                          3450  06572
06573 CA   050000 011411  210. 0011.  CA  615. 0038.      0. 0000.                          3451  06573
06574 FA   030000 011410  210. 0012.  FA  615. 0037.      0. 0000.                          3452  06574
06575 LR   076500 000043  210. 0013.  LR    0. 0035.      0. 0000.                          3453  06575
06576 FM   026000 003570  210. 0014.  FM  801. 0002.      0. 0000.  2                       3454  06576
06577 ST   060100 011412  210. 0015.  ST  615. 0039.      0. 0000.  T G.S. SUM              3455  06577
06600 CA   050000 011417  210. 0016.  CA  615. 0044.      0. 0000.                          3456  06600
06601 FA   030000 011416  210. 0017.  FA  615. 0043.      0. 0000.                          3457  06601
06602 LR   076500 000043  210. 0018.  LR    0. 0035.      0. 0000.                          3458  06602
06603 FM   026000 003570  210. 0019.  FM  801. 0002.      0. 0000.  2                       3459  06603
06604 ST   060100 011413  210. 0020.  ST  615. 0040.      0. 0000.  T SQ. G.S. SUM         3460  06604
06605 T    002000 006630  210. 0021.  T     2. 0038.      0. 0000.                          3461  06605
06606 LQ   056000 011407  210. 0022.  LQ  615. 0036.      0. 0000.                          3462  06606
06607 FM   026000 003600  210. 0023.  FM  801. 0010.      0. 0000.  3                       3463  06607
06610 ST   060100 011407  210. 0024.  ST  615. 0036.      0. 0000.                          3464  06610
06611 LQ   056000 011410  210. 0025.  LQ  615. 0037.      0. 0000.                          3465  06611
06612 FM   026000 003577  210. 0026.  FM  801. 0009.      0. 0000.  4                       3466  06612
06613 FA   030000 011407  210. 0027.  FA  615. 0036.      0. 0000.                          3467  06613
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06614 FA  030000 011411   210. 0028.  FA  615. 0038.    0. 0000.                          3468   06614
06615 FA  030000 011411   210. 0028.1 FA  615. 0038.    0. 0000.                          3469   06615
06616 ST  060100 011412   210. 0029.  ST  615. 0039.    0. 0000.                          3470   06616
06617 LQ  056000 011415   210. 0030.  LQ  615. 0042.    0. 0000.                          3471   06617
06620 FM  026000 003600   210. 0031.  FM  801. 0010.    0. 0000.  3                       3472   06620
06621 ST  060100 011415   210. 0032.  ST  615. 0042.    0. 0000.                          3473   06621
06622 LQ  056000 011416   210. 0033.  LQ  615. 0043.    0. 0000.                          3474   06622
06623 FM  026000 003577   210. 0034.  FM  801. 0009.    0. 0000.  4                       3475   06623
06624 FA  030000 011415   210. 0035.  FA  615. 0042.    0. 0000.                          3476   06624
06625 FA  030000 011417   210. 0036.  FA  615. 0044.    0. 0000.                          3477   06625
06626 FA  030000 011417   210. 0036.1 FA  615. 0044.    0. 0000.                          3478   06626
06627 ST  060100 011413   210. 0037.  ST  615. 0040.    0. 0000.                          3479   06627
06630 LQ  056000 011412   210. 0038.  LQ  615. 0039.    0. 0000.                          3480   06630
06631 FM  026000 002005   210. 0039.  FM    1. 0029.    0. 0000.  T                       3481   06631
06632 ST  060100 011412   210. 0040.  ST  615. 0039.    0. 0000.  T G.S. TOTAL SUM         3482   06632
06633 LQ  056000 011413   210. 0041.  LQ  615. 0040.    0. 0000.                          3483   06633
06634 FM  026000 002005   210. 0042.  FM    1. 0029.    0. 0000.  T                       3484   06634
06635 LR  076500 000043   210. 0043.  LR    0. 0035.    0. 0000.                          3485   06635
06636 FM  026000 002005   210. 0044.  FM    1. 0029.    0. 0000.  T                       3486   06636
06637 ST  060100 011413   210. 0045.  ST  615. 0040.    0. 0000.  T SQ. G.S. TOTAL SUM     3487   06637
06640 T   002000 006654   210. 0046.  T   211. 0000.    0. 0000.  COMPUTE Q PRIME,ROT.     3488   06640


06654 CA  050000 011173   211. 0000.  CA  608. 0001.    0. 0000.  2 LAMBDA + 1             3500   06654
06655 FD  024000 003577   211. 0001.  FD  801. 0009.    0. 0000.  4                       3501   06655
06656 FM  026000 011111   211. 0002.  FM  603. 0001.    0. 0000.  SIGMA                   3502   06656
06657 FA  030000 011332   211. 0003.  FA  614. 0001.    0. 0000.  BETA                    3503   06657
06660 LR  076500 000043   211. 0004.  LR    0. 0035.    0. 0000.                          3504   06660
06661 FM  026000 002005   211. 0005.  FM    1. 0029.    0. 0000.  T                       3505   06661
06662 ST  060100 011343   211. 0006.  ST  615. 0000.    0. 0000.  (HC/K)BETA,SIGMA TERM    3506   06662
06663 LR  076500 000043   211. 0007.  LR    0. 0035.    0. 0000.                          3507   06663
06664 FM  026000 011331   211. 0008.  FM  614. 0000.    0. 0000.  TOTAL INT. ROT. SUM      3508   06664
06665 ST  060100 011344   211. 0009.  ST  615. 0001.    0. 0000.                          3509   06665
06666 LR  076500 000043   211. 0010.  LR    0. 0035.    0. 0000.                          3510   06666
06667 FM  026000 011343   211. 0011.  FM  615. 0000.    0. 0000.                          3511   06667
06670 ST  060100 011345   211. 0012.  ST  615. 0002.    0. 0000.                          3512   06670
06671 CA  050000 011320   211. 0013.  CA  613. 0001.    0. 0000.  Q PRIME,ROT.,INTERNAL   3513   06671
06672 FS  030200 011412   211. 0014.  FS  615. 0039.    0. 0000.  E_TO - G.S.,PRIME       3514   06672
06673 ST  060100 011346   211. 0015.  ST  615. 0003.    0. 0000.  INTERNAL SUM,PRIME      3515   06673
06674 FA  030000 011344   211. 0016.  FA  615. 0001.    0. 0000.                          3516   06674
06675 LR  076500 000043   211. 0017.  LR    0. 0035.    0. 0000.                          3517   06675
06676 FM  026000 011333   211. 0018.  FM  614. 0002.    0. 0000.  E TO BETA,SIGMA         3518   06676
06677 LR  076500 000043   211. 0019.  LR    0. 0035.    0. 0000.                          3519   06677
06700 FM  026000 003570   211. 0020.  FM  801. 0002.    0. 0000.  2                       3520   06700
06701 ST  060100 011120   211. 0021.  ST  603. 0008.    0. 0000.  Q PRIME,ROT.           3521   06701
06702 T   002000 006712   211. 0022.  T   212. 0000.    0. 0000.  CALC DUBL PRIME TERMS    3522   06702


06712 CA  050000 011321   212. 0000.  CA  613. 0002.    0. 0000.  Q.DUBL PRIME,ROT,INT.    3530   06712
06713 FS  030200 011413   212. 0001.  FS  615. 0040.    0. 0000.  E TO -G.S.,DUBL PRIME    3531   06713
06714 ST  060100 011425   212. 0002.  ST  616. 0000.    0. 0000.  TOTAL INT.Q DUB PRIME    3532   06714
06715 LQ  056000 011343   212. 0003.  LQ  615. 0000.    0. 0000.  BETA,SIGMA,PRIME        3533   06715
06716 FM  026000 003570   212. 0004.  FM  801. 0002.    0. 0000.  2                       3534   06716
06717 LR  076500 000043   212. 0005.  LR    0. 0035.    0. 0000.                          3535   06717
06720 FM  026000 011346   212. 0006.  FM  615. 0003.    0. 0000.  Q PRIME,ROT,INTERNAL    3536   06720
06721 FA  030000 011345   212. 0007.  FA  615. 0002.    0. 0000.  (BETA,PRIME)SQ(SIGMA)    3537   06721
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06722 FA   030000 011425   212. 0008.  FA  616. 0000.      0. 0000.                          3538   06722
06723 LR   076500 000043   212. 0009.  LR    0. 0035.      0. 0000.                          3539   06723
06724 FM   026000 011333   212. 0010.  FM  614. 0002.      0. 0000.  EXPONENTIAL            3540   06724
06725 LR   076500 000043   212. 0011.  LR    0. 0035.      0. 0000.                          3541   06725
06726 FM   026000 003570   212. 0012.  FM  801. 0002.      0. 0000.  2                       3542   06726
06727 ST   060100 011121   212. 0013.  ST  603. 0009.      0. 0000.  Q DUBL PRIME ROT.       3543   06727
06730 SDX -053400 406737   212. 0014.  SDX   2. 0018.  C   0. 0000.                          3544   06730
06731 ZS   060000 412214   212. 0015.  ZS  645. 0010.  C   0. 0000.  CLEAR TEMPORARY STOR    3545   06731
06732 TX   200001 406731   212. 0016.  TX    2. 0015.  C   0. 0001.                          3546   06732
06733 CA   050000 011117   212. 0016.1 CA  603. 0007.      0. 0000.  Q, ROTATION            3547   06733
06734 FD   024000 003703   212. 0016.2 FD  802. 0037.      0. 0000.  SYMMETRY NUMBER        3548   06734
06735 SQ  -060000 011117   212. 0016.3 SQ  603. 0007.      0. 0000.  CORR. Q, ROTATION      3549   06735
06736 T    002000 004456   212. 0017.  T   105. 0000.      0. 0000.  CALC. ELECTRONIC FNS   3550   06736
06737      001022 000000   212. 0018.      0. 0000.      0. 0530.                          3551   06737


06750 CA   050000 003567   213. 0000.  CA  801. 0001.      0. 0000.  1                       3560   06750
06751 ST   060100 011432   213. 0001.  ST  617. 0000.      0. 0000.                          3561   06751
06752 CA   050000 003577   213. 0002.  CA  801. 0009.      0. 0000.  4                       3562   06752
06753 ST   060100 011433   213. 0003.  ST  617. 0001.      0. 0000.                          3563   06753
06754 T    002000 006444   213. 0004.  T   209. 0033.      0. 0000.  CALC. BETA            3564   06754
06755 CA   050000 003577   213. 0005.  CA  801. 0009.      0. 0000.  4                       3565   06755
06756 ST   060100 011432   213. 0006.  ST  617. 0000.      0. 0000.                          3566   06756
06757 CA   050000 003630   213. 0007.  CA  801. 0034.      0. 0000.  9                       3567   06757
06760 ST   060100 011433   213. 0008.  ST  617. 0001.      0. 0000.                          3568   06760
06761 T    002000 006444   213. 0009.  T   209. 0033.      0. 0000.  CALC. BETA            3569   06761
06762 CA   050000 003630   213. 0010.  CA  801. 0034.      0. 0000.  9                       3570   06762
06763 ST   060100 011432   213. 0011.  ST  617. 0000.      0. 0000.                          3571   06763
06764 CA   050000 003610   213. 0012.  CA  801. 0018.      0. 0000.  16                      3572   06764
06765 ST   060100 011433   213. 0013.  ST  617. 0001.      0. 0000.                          3573   06765
06766 T    002000 006444   213. 0014.  T   209. 0033.      0. 0000.  CALC. BETA            3574   06766


06774 CA   050000 103644   300. 0000.  CA  802. 0006.  A   0. 0000.  MULTIPLICITY          3580   06774
06775 FS   030200 003600   300. 0001.  FS  801. 0010.      0. 0000.  3                       3581   06775
06776 TNZ -010000 007047   300. 0002.  TNZ   2. 0041.      0. 0000.  NON-TRIPLET STATE     3582   06776
06777 CA   050000 103734   300. 0003.  CA  802. 0062.  A   0. 0000.  A                       3583   06777
07000 FD   024000 011110   300. 0004.  FD  603. 0000.      0. 0000.  B SUB V               3584   07000
07001 SQ  -060000 011437   300. 0005.  SQ  618. 0000.      0. 0000.  Y                       3585   07001
07002 CA   050000 003570   300. 0006.  CA  801. 0002.      0. 0000.  2                       3586   07002
07003 FD   024000 011437   300. 0007.  FD  618. 0000.      0. 0000.                          3587   07003
07004 SQ  -060000 011440   300. 0008.  SQ  618. 0001.      0. 0000.                          3588   07004
07005 CA   050000 011440   300. 0009.  CA  618. 0001.      0. 0000.                          3589   07005
07006 FD   024000 103712   300. 0010.  FD  802. 0044.  A   0. 0000.  LAMBDA                3590   07006
07007 SQ  -060000 011440   300. 0011.  SQ  618. 0001.      0. 0000.  2B/A LAMBDA           3591   07007
07010 CA   050000 003567   300. 0012.  CA  801. 0001.      0. 0000.  1                       3592   07010
07011 FS   030200 011440   300. 0013.  FS  618. 0001.      0. 0000.                          3593   07011
07012 LR   076500 000043   300. 0014.  LR    0. 0035.      0. 0000.                          3594   07012
07013 FM   026000 011111   300. 0015.  FM  603. 0001.      0. 0000.  SIGMA FOR F1           3595   07013
07014 ST   060100 011441   300. 0016.  ST  618. 0002.      0. 0000.                          3596   07014
07015 CA   050000 003567   300. 0017.  CA  801. 0001.      0. 0000.                          3597   07015
07016 FA   030000 011440   300. 0018.  FA  618. 0001.      0. 0000.                          3598   07016
07017 LR   076500 000043   300. 0019.  LR    0. 0035.      0. 0000.                          3599   07017
07020 FM   026000 011111   300. 0020.  FM  603. 0001.      0. 0000.  SIGMA FOR F3           3600   07020
07021 ST   060100 011443   300. 0021.  ST  618. 0004.      0. 0000.  SIGMA FOR F SUB 3       3601   07021
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07050 FM   026000 003570   300. 0042.  FM   801. 0002.        0. 0000.   2                          3624   07050
07051 ST   060100 103644   300. 0043.  ST   802. 0006.  A     0. 0000.                              3625   07051
07052 SE   076000 000142   300. 0044.  SE     0. 0098.        0. 0000.   TURN ON LIGHT NO. 2        3626   07052
07053 T    002000 004355   300. 0045.  T    103. 0017.        0. 0000.   CALC ROTATION PART.FN      3627   07053
07022 CA   050000 011111   300. 0021.1 CA   603. 0001.        0. 0000.                              3602   07022
07023 ST   060100 011442   300. 0021.2 ST   618. 0003.        0. 0000.   SIGMA FOR F SUB 2          3603   07023
07024 CA   050000 011437   300. 0022.  CA   618. 0000.        0. 0000.   Y                          3604   07024
07025 FS   030200 003567   300. 0023.  FS   801. 0001.        0. 0000.   Y-1                        3605   07025
07026 LR   076500 000043   300. 0024.  LR     0. 0035.        0. 0000.                              3606   07026
07027 FM   026000 011437   300. 0025.  FM   618. 0000.        0. 0000.   Y                          3607   07027
07030 ST   060100 011444   300. 0026.  ST   618. 0005.        0. 0000.   Y(Y-1)                     3608   07030
07031 LR   076500 000043   300. 0027.  LR     0. 0035.        0. 0000.                              3609   07031
07032 FM   026000 011172   300. 0028.  FM   608. 0000.        0. 0000.   LAMBDA SQ                  3610   07032
07033 FS   030200 003617   300. 0029.  FS   801. 0025.        0. 0000.   4/9                        3611   07033
07034 ST   060100 011445   300. 0030.  ST   618. 0006.        0. 0000.   (3Z1)Z2 FOR J=0            3612   07034
07035 CA   050000 011437   300. 0031.  CA   618. 0000.        0. 0000.   Y                          3613   07035
07036 FS   030200 003577   300. 0032.  FS   801. 0009.        0. 0000.   4                          3614   07036
07037 LR   076500 000043   300. 0033.  LR     0. 0035.        0. 0000.                              3615   07037
07040 FM   026000 011437   300. 0034.  FM   618. 0000.        0. 0000.                              3616   07040
07041 ST   060100 011446   300. 0035.  ST   618. 0007.        0. 0000.   Y(Y-4)                     3617   07041
07042 LR   076500 000043   300. 0036.  LR     0. 0035.        0. 0000.                              3618   07042
07043 FM   026000 011172   300. 0037.  FM   608. 0000.        0. 0000.                              3619   07043
07044 FA   030000 003616   300. 0038.  FA   801. 0024.        0. 0000.   4/3                        3620   07044
07045 ST   060100 011447   300. 0039.  ST   618. 0008.        0. 0000.   2 1 FOR J=0                3621   07045
07046 T    002000 007070   300. 0040.  T    301. 0000.        0. 0000.   CALC BETA                  3622   07046
07047 LQ   056000 103644   300. 0041.  LQ   802. 0006.  A     0. 0000.   MULTIPLICITY               3623   07047

07070 CA   050000 103712   301. 0000.  CA   802. 0044.  A     0. 0000.   LAMEDA                     3640   07070
07071 FS   030200 003561   301. 0001.  FS   800. 0010.        0. 0000.   2.98                       3641   07071
07072 TP   012000 007260   301. 0002.  TP     2. 0113.        0. 0000.   GAMMA STATE                3642   07072
07073 CA   050000 103712   301. 0003.  CA   802. 0044.  A     0. 0000.   LAMBDA                     3643   07073
07074 FS   030200 003547   301. 0004.  FS   800. 0000.        0. 0000.   1.98                       3644   07074
07075 TP   012000 007162   301. 0005.  TP     2. 0054.        0. 0000.   DELTA STATE                3645   07075
07076 CA   050000 103734   301. 0006.  CA   802. 0062.  A     0. 0000.   A                          3646   07076
07077 TM   -012000 007126  301. 0007.  TM     2. 0027.        0. 0000.   INVERTED STATE             3647   07077
07100 CA   050000 011447   301. 0008.  CA   618. 0008.        0. 0000.   Z ONE                      3648   07100
07101 TSX  007400 403516   301. 0009.  TSX  704. 0000.  C     0. 0000.   SQ ROOT                    3649   07101
07102 H    000000 000000   301. 0010.  H      0. 0000.        0. 0000.                              3650   07102
07103 CHS  076000 000002   301. 0011.  CHS    0. 0000.        0. 0000.                              3651   07103
07104 ST   060100 011452   301. 0012.  ST   619. 0001.        0. 0000.                              3652   07104
07105 CS   050200 011445   301. 0013.  CS   618. 0006.        0. 0000.                              3653   07105
07106 FD   024000 011447   301. 0014.  FD   618. 0008.        0. 0000.                              3654   07106
07107 FM   026000 003570   301. 0015.  FM   801. 0002.        0. 0000.   2                          3655   07107
07110 FD   024000 003600   301. 0016.  FD   801. 0010.        0. 0000.   3                          3656   07110
07111 SQ   -060000 011453  301. 0017.  SQ   619. 0002.        0. 0000.                              3657   07111
07112 LQ   056000 003607   301. 0018.  LQ   801. 0017.        0. 0000.   1/4                        3658   07112
07113 FM   026000 003607   301. 0019.  FM   801. 0017.        0. 0000.                              3659   07113
07114 LR   076500 000043   301. 0020.  LR     0. 0035.        0. 0000.                              3660   07114
07115 FM   026000 103720   301. 0021.  FM   802. 0050.  A     0. 0000.   D                          3661   07115
07116 ST   060100 011454   301. 0021.1 ST   619. 0003.        0. 0000.                              3662   07116
07117 CA   050000 011453   301. 0022.  CA   619. 0002.        0. 0000.                              3663   07117
07120 FA   030000 011452   301. 0023.  FA   619. 0001.        0. 0000.                              3664   07120
07121 LR   076500 000043   301. 0024.  LR     0. 0035.        0. 0000.                              3665   07121
07122 FM   026000 011441   301. 0025.  FM   618. 0002.        0. 0000.   B EFFECTIVE                3666   07122
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07123 FS   030200 011454   301. 0025.1 FS   619. 0003.      0. 0000.                          3667   07123
07124 ST   060100 011451   301. 0026.  ST   619. 0000.      0. 0000.  BETA,NORMAL (J=0)       3668   07124
07125 T    002000 007354   301. 0026.1 T      2. 0172.      0. 0000.  CALC. E TO BETA         3669   07125
07126 LQ   056000 003612   301. 0027.  LQ   801. 0020.      0. 0000.  81/16                   3670   07126
07127 FM   026000 103720   301. 0028.  FM   802. 0050.  A   0. 0000.  D                      3671   07127
07130 ST   060100 011452   301. 0029.  ST   619. 0001.      0. 0000.                          3672   07130
07131 CA   050000 011445   301. 0030.  CA   618. 0006.      0. 0000.                          3673   07131
07132 FS   030200 003605   301. 0031.  FS   801. 0015.      0. 0000.  12                      3674   07132
07133 LR   076500 000043   301. 0032.  LR     0. 0035.      0. 0000.                          3675   07133
07134 FM   026000 003570   301. 0033.  FM   801. 0002.      0. 0000.  2                       3676   07134
07135 ST   060100 011453   301. 0034.  ST   619. 0002.      0. 0000.                          3677   07135
07136 CA   050000 011447   301. 0035.  CA   618. 0008.      0. 0000.                          3678   07136
07137 FA   030000 003606   301. 0036.  FA   801. 0016.      0. 0000.  24                      3679   07137
07140 LR   076500 000043   301. 0037.  LR     0. 0035.      0. 0000.                          3680   07140
07141 FM   026000 003600   301. 0038.  FM   801. 0010.      0. 0000.  3                       3681   07141
07142 ST   060100 011454   301. 0039.  ST   619. 0003.      0. 0000.                          3682   07142
07143 CS   050200 011453   301. 0040.  CS   619. 0002.      0. 0000.                          3683   07143
07144 FD   024000 011454   301. 0041.  FD   619. 0003.      0. 0000.                          3684   07144
07145 SQ  -060000 011453   301. 0042.  SQ   619. 0002.      0. 0000.                          3685   07145
07146 CA   050000 011447   301. 0043.  CA   618. 0008.      0. 0000.                          3686   07146
07147 FA   030000 003606   301. 0044.  FA   801. 0016.      0. 0000.  24                      3687   07147
07150 TSX  007400 403516   301. 0045.  TSX  704. 0000.  C   0. 0000.  SQ. ROOT                3688   07150
07151 H    000000 000000   301. 0046.  H      0. 0000.      0. 0000.                          3689   07151
07152 CHS  076000 000002   301. 0047.  CHS    0. 0000.      0. 0000.                          3690   07152
07153 FA   030000 011453   301. 0048.  FA   619. 0002.      0. 0000.                          3691   07153
07154 FA   030000 003602   301. 0049.  FA   801. 0012.      0. 0000.  6                       3692   07154
07155 LR   076500 000043   301. 0050.  LR     0. 0035.      0. 0000.                          3693   07155
07156 FM   026000 011441   301. 0051.  FM   618. 0002.      0. 0000.  B EFFECTIVE            3694   07156
07157 FS   030200 011452   301. 0052.  FS   619. 0001.      0. 0000.                          3695   07157
07160 ST   060100 011451   301. 0053.  ST   619. 0000.      0. 0000.  BETA,INVERTED (J=2)     3696   07160
07161 T    002000 007354   301. 0053.1 T      2. 0172.      0. 0000.  CALC. E TO BETA         3697   07161
07162 CA   050000 103734   301. 0054.  CA   802. 0062.  A   0. 0000.  A                      3698   07162
07163 TM  -012000 007222   301. 0055.  TM     2. 0086.      0. 0000.  INVERTED STATE         3699   07163
07164 LQ   056000 003607   301. 0056.  LQ   801. 0017.      0. 0000.  1/A                     3700   07164
07165 FM   026000 003607   301. 0057.  FM   801. 0017.      0. 0000.                          3701   07165
07166 LR   076500 000043   301. 0058.  LR     0. 0035.      0. 0000.                          3702   07166
07167 FM   026000 103720   301. 0059.  FM   802. 0050.  A   0. 0000.  D                      3703   07167
07170 ST   060100 011452   301. 0060.  ST   619. 0001.      0. 0000.                          3704   07170
07171 CA   050000 011445   301. 0061.  CA   618. 0006.      0. 0000.                          3705   07171
07172 FS   030200 003577   301. 0062.  FS   801. 0009.      0. 0000.  4                       3706   07172
07173 LR   076500 000043   301. 0062.1 LR     0. 0035.      0. 0000.                          3707   07173
07174 FM   026000 003570   301. 0063.  FM   801. 0002.      0. 0000.  2                       3708   07174
07175 ST   060100 011453   301. 0064.  ST   619. 0002.      0. 0000.                          3709   07175
07176 CA   050000 011447   301. 0065.  CA   618. 0008.      0. 0000.                          3710   07176
07177 FA   030000 003620   301. 0066.  FA   801. 0026.      0. 0000.  8                       3711   07177
07200 LR   076500 000043   301. 0067.  LR     0. 0035.      0. 0000.                          3712   07200
07201 FM   026000 003600   301. 0068.  FM   801. 0010.      0. 0000.  3                       3713   07201
07202 ST   060100 011454   301. 0069.  ST   619. 0003.      0. 0000.                          3714   07202
07203 CS   050200 011453   301. 0070.  CS   619. 0002.      0. 0000.                          3715   07203
07204 FD   024000 011454   301. 0071.  FD   619. 0003.      0. 0000.                          3716   07204
07205 SQ  -060000 011453   301. 0072.  SQ   619. 0002.      0. 0000.                          3717   07205
07206 CA   050000 011447   301. 0073.  CA   618. 0008.      0. 0000.                          3718   07206
07207 FA   030000 003620   301. 0074.  FA   801. 0026.      0. 0000.  8                       3719   07207
07210 TSX  007400 403516   301. 0075.  TSX  704. 0000.  C   0. 0000.  SQ. ROOT                3720   07210
07211 H    000000 000000   301. 0076.  H      0. 0000.      0. 0000.                          3721   07211
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07212 CHS  076000 000002   301. 0077.  CHS    0. 0000.        0. 0000.
07213 FA   030000 011453   301. 0078.  FA   619. 0002.        0. 0000.
07214 FA   030000 003570   301. 0079.  FA   801. 0002.        0. 0000.   2
07215 LR   076500 000043   301. 0080.  LR     0. 0035.        0. 0000.
07216 FM   026000 011441   301. 0081.  FM   618. 0002.        0. 0000.   B EFFECTIVE
07217 FS   030200 011452   301. 0082.  FS   619. 0001.        0. 0000.
07220 ST   060100 011451   301. 0083.  ST   619. 0000.        0. 0000.   BETA, NORMAL
07221 T    002000 007354   301. 0084.  T      2. 0172.        0. 0000.   CALC. E TO BETA
07222 LQ   056000 003624   301. 0086.  LQ   801. 0030.        0. 0000.   6.25
07223 FM   026000 003624   301. 0087.  FM   801. 0030.        0. 0000.
07224 LR   076500 000043   301. 0088.  LR     0. 0035.        0. 0000.
07225 FM   026000 103720   301. 0089.  FM   802. 0050.  A     0. 0000.   D
07226 ST   060100 011452   301. 0090.  ST   619. 0001.        0. 0000.
07227 CA   050000 011445   301. 0091.  CA   618. 0006.        0. 0000.
07230 FS   030200 003606   301. 0092.  FS   801. 0016.        0. 0000.   24
07231 LR   076500 000043   301. 0093.  LR     0. 0035.        0. 0000.
07232 FM   026000 003570   301. 0094.  FM   801. 0002.        0. 0000.   2
07233 ST   060100 011453   301. 0095.  ST   619. 0002.        0. 0000.
07234 CA   050000 011447   301. 0096.  CA   618. 0008.        0. 0000.
07235 FA   030000 003621   301. 0097.  FA   801. 0027.        0. 0000.   48
07236 LR   076500 000043   301. 0098.  LR     0. 0035.        0. 0000.
07237 FM   026000 003600   301. 0099.  FM   801. 0010.        0. 0000.   3
07240 ST   060100 011454   301. 0099.1 ST   619. 0003.        0. 0000.
07241 CA   050000 011453   301. 0100.  CA   619. 0002.        0. 0000.
07242 FD   024000 011454   301. 0100.1 FD   619. 0003.        0. 0000.
07243 SQ  -060000 011453   301. 0101.  SQ   619. 0002.        0. 0000.
07244 CA   050000 011447   301. 0102.  CA   618. 0009.        0. 0000.
07245 FA   030000 003621   301. 0103.  FA   801. 0027.        0. 0000.   48
07246 TSX  007400 403516   301. 0104.  TSX  704. 0000.  C     0. 0000.   SQ ROOT
07247 H    000000 000000   301. 0105.  H      0. 0000.        0. 0000.
07250 CHS  076000 000002   301. 0106.  CHS    0. 0000.        0. 0000.
07251 FS   030200 011453   301. 0107.  FS   619. 0002.        0. 0000.
07252 FA   030000 003605   301. 0108.  FA   801. 0015.        0. 0000.   12
07253 LR   076500 000043   301. 0109.  LR     0. 0035.        0. 0000.
07254 FM   026000 011441   301. 0110.  FM   618. 0002.        0. 0000.   B EFFECTIVE
07255 FS   030200 011452   301. 0111.  FS   619. 0001.        0. 0000.
07256 ST   060100 011451   301. 0112.  ST   619. 0000.        0. 0000.   BETA, INVERTED
07257 T    002000 007354   301. 0112.1 T      2. 0172.        0. 0000.   CALC. E TO BETA
07260 CA   050000 103734   301. 0113.  CA   802. 0062.  A     0. 0000.   A
07261 TM  -012000 007317   301. 0114.  TM     2. 0143.        0. 0000.   INVERTED STATE
07262 CA   050000 011445   301. 0115.  CA   618. 0006.        0. 0000.
07263 FS   030200 003605   301. 0116.  FS   801. 0015.        0. 0000.   12
07264 LR   076500 000043   301. 0117.  LR     0. 0035.        0. 0000.
07265 FM   026000 003570   301. 0118.  FM   801. 0002.        0. 0000.   2
07266 ST   060100 011452   301. 0119.  ST   619. 0001.        0. 0000.
07267 CA   050000 011447   301. 0120.  CA   618. 0008.        0. 0000.
07270 FA   030000 003606   301. 0121.  FA   801. 0016.        0. 0000.   24
07271 LR   076500 000043   301. 0122.  LR     0. 0035.        0. 0000.
07272 FM   026000 003600   301. 0123.  FM   801. 0010.        0. 0000.   3
07273 ST   060100 011453   301. 0124.  ST   619. 0002.        0. 0000.
07274 CS   050200 011452   301. 0125.  CS   619. 0001.        0. 0000.
07275 FD   024000 011453   301. 0126.  FD   619. 0002.        0. 0000.
07276 SQ  -060000 011452   301. 0127.  SQ   619. 0001.        0. 0000.
07277 LQ   056000 003612   301. 0128.  LQ   801. 0020.        0. 0000.   81/16
07300 FM   026000 103720   301. 0129.  FM   802. 0050.  A     0. 0000.   D
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3774  07276
3775  07277
3776  07300
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07301 CHS  076000 000002   301. 0130.  CHS    0. 0000.        0. 0000.                          3777   07301
07302 ST   060100 011454   301. 0131.  ST   619. 0003.        0. 0000.                          3778   07302
07303 CA   050000 011447   301. 0133.  CA   618. 0008.        0. 0000.                          3779   07303
07304 FA   030000 003606   301. 0134.  FA   801. 0016.        0. 0000.   24                     3780   07304
07305 TSX  007400 403516   301. 0135.  TSX  704. 0000.   C    0. 0000.                          3781   07305
07306 H    000000 000000   301. 0136.  H      0. 0000.        0. 0000.                          3782   07306
07307 CHS  076000 000002   301. 0137.  CHS    0. 0000.        0. 0000.                          3783   07307
07310 FA   030000 011452   301. 0138.  FA   619. 0001.        0. 0000.                          3784   07310
07311 FA   030000 003602   301. 0139.  FA   801. 0012.        0. 0000.   6                      3785   07311
07312 LR   076500 000043   301. 0140.  LR     0. 0035.        0. 0000.                          3786   07312
07313 FM   026000 011441   301. 0141.  FM   618. 0002.        0. 0000.   B EFF                  3787   07313
07314 FA   030000 011454   301. 0141.1 FA   619. 0003.        0. 0000.                          3788   07314
07315 ST   060100 011451   301. 0142.  ST   619. 0000.        0. 0000.   BETA,NORMAL            3789   07315
07316 T    002000 007354   301. 0142.1 T      2. 0172.        0. 0000.   CALC. E TO BETA        3790   07316
07317 LQ   056000 003625   301. 0143.  LQ   801. 0031.        0. 0000.   12.25                  3791   07317
07320 FM   026000 003625   301. 0144.  FM   801. 0031.        0. 0000.                          3792   07320
07321 LR   076500 000043   301. 0145.  LR     0. 0035.        0. 0000.                          3793   07321
07322 FM   026000 103720   301. 0146.  FM   802. 0050.   A    0. 0000.   D                      3794   07322
07323 ST   060100 011452   301. 0147.  ST   619. 0001.        0. 0000.                          3795   07323
07324 CA   050000 011445   301. 0148.  CA   618. 0006.        0. 0000.                          3796   07324
07325 FS   030200 003622   301. 0149.  FS   801. 0028.        0. 0000.   40                     3797   07325
07326 LR   076500 000043   301. 0150.  LR     0. 0035.        0. 0000.                          3798   07326
07327 FM   026000 003570   301. 0151.  FM   801. 0002.        0. 0000.   2                      3799   07327
07330 ST   060100 011453   301. 0152.  ST   619. 0002.        0. 0000.                          3800   07330
07331 CA   050000 011447   301. 0153.  CA   618. 0008.        0. 0000.                          3801   07331
07332 FA   030000 003623   301. 0154.  FA   801. 0029.        0. 0000.   80                     3802   07332
07333 LR   076500 000043   301. 0155.  LR     0. 0035.        0. 0000.                          3803   07333
07334 FM   026000 003600   301. 0156.  FM   801. 0010.        0. 0000.   3                      3804   07334
07335 ST   060100 011454   301. 0156.1 ST   619. 0003.        0. 0000.                          3805   07335
07336 CA   050000 011453   301. 0157.  CA   619. 0002.        0. 0000.                          3806   07336
07337 FD   024000 011454   301. 0157.1 FD   619. 0003.        0. 0000.                          3807   07337
07340 SQ  -060000 011453   301. 0158.  SQ   619. 0002.        0. 0000.                          3808   07340
07341 CA   050000 011447   301. 0159.  CA   618. 0008.        0. 0000.                          3809   07341
07342 FA   030000 003623   301. 0160.  FA   801. 0029.        0. 0000.   80                     3810   07342
07343 TSX  007400 403516   301. 0161.  TSX  704. 0000.   C    0. 0000.   SQ. ROOT               3811   07343
07344 H    000000 000000   301. 0162.  H      0. 0000.        0. 0000.                          3812   07344
07345 CHS  076000 000002   301. 0163.  CHS    0. 0000.        0. 0000.                          3813   07345
07346 FS   030200 011453   301. 0164.  FS   619. 0002.        0. 0000.                          3814   07346
07347 FA   030000 003626   301. 0165.  FA   801. 0032.        0. 0000.   20                     3815   07347
07350 LR   076500 000043   301. 0166.  LR     0. 0035.        0. 0000.                          3816   07350
07351 FM   026000 011441   301. 0167.  FM   618. 0002.        0. 0000.   B EFFECTIVE            3817   07351
07352 FS   030200 011452   301. 0168.  FS   619. 0001.        0. 0000.                          3818   07352
07353 ST   060100 011451   301. 0171.  ST   619. 0000.        0. 0000.   BETA,INVERTED          3819   07353
07354 CA   050000 011451   301. 0172.  CA   619. 0000.        0. 0000.   BETA                   3820   07354
07355 TSX  007400 403410   301. 0173.  TSX  703. 0000.   C    0. 0000.   EXPONENTIAL            3821   07355
07356 HP   042000 000000   301. 0174.  HP     0. 0000.        0. 0000.                          3822   07356
07357 ST   060100 011452   301. 0175.  ST   619. 0001.        0. 0000.                          3823   07357
07360 LQ   056000 011451   301. 0176.  LQ   619. 0000.        0. 0000.   BETA                   3824   07360
07361 FM   026000 002005   301. 0177.  FM     1. 0029.        0. 0000.   T                      3825   07361
07362 ST   060100 011453   301. 0178.  ST   619. 0002.        0. 0000.   T BETA                 3826   07362
07363 LR   076500 000043   301. 0179.  LR     0. 0035.        0. 0000.                          3827   07363
07364 FM   026000 011453   301. 0180.  FM   619. 0002.        0. 0000.                          3828   07364
07365 ST   060100 011454   301. 0181.  ST   619. 0003.        0. 0000.   SQUARED                3829   07365
07366 T    002000 007412   301. 0182.  T    202. 0000.        0. 0000.                          3830   07366
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07412 LQ   056000 003612  302. 0003.  LQ  801. 0020.      0. 0000.  E1-16                    3850  07412
07413 FM   026000 103720  302. 0001.  FM  802. 0050.  A   0. 0000.  D                       3851  07413
07414 CHS  076000 000002  302. 0002.  CHS   0. 0000.      0. 0000.                          3852  07414
07415 ST   060100 011463  302. 0003.  ST  620. 0000.      0. 0000.                          3853  07415
07416 CA   050000 011447  302. 0004.  CA  618. 0008.      0. 0000.                          3854  07416
07417 TSX  007400 403516  302. 0005.  TSX 704. 0000.  C   0. 0000.  SQ. ROOT               3855  07417
07420 H    000000 000000  302. 0006.  H     0. 0000.      0. 0000.                          3856  07420
07421 ST   060100 011464  302. 0007.  ST  620. 0001.      0. 0000.                          3857  07421
07422 CA   050000 103734  302. 0007.1 CA  802. 0062.  A   0. 0000.  A,ROTATIONAL COUPLING  3858  07422
07423 TM   -012000 007547 302. 0007.2 TM    2. 0084.      0. 0000.  INVERTED STATE         3859  07423
07424 CA   050000 011445  302. 0008.  CA  618. 0006.      0. 0000.                          3860  07424
07425 FD   024000 011447  302. 0009.  FD  618. 0008.      0. 0000.                          3861  07425
07426 FM   026000 003570  302. 0010.  FM  801. 0002.      0. 0000.  2                       3862  07426
07427 FD   024000 003600  302. 0011.  FD  801. 0010.      0. 0000.  3                       3863  07427
07430 SQ   -060000 011465 302. 0012.  SQ  620. 0002.      0. 0000.                          3864  07430
07431 CA   050000 011464  302. 0013.  CA  620. 0001.      0. 0000.                          3865  07431
07432 FS   030200 011465  302. 0014.  FS  620. 0002.      0. 0000.                          3866  07432
07433 LR   076500 000043  302. 0015.  LR    0. 0035.      0. 0000.                          3867  07433
07434 FM   026000 011442  302. 0016.  FM  618. 0004.      0. 0000.  SIGMA 3                 3868  07434
07435 FA   030000 011463  302. 0017.  FA  620. 0000.      0. 0000.                          3869  07435
07436 ST   060100 011463  302. 0018.  ST  620. 0000.      0. 0000.  F3(0)                   3870  07436
07437 LQ   056000 011465  302. 0019.  LQ  620. 0002.      0. 0000.                          3871  07437
07440 FM   026000 003570  302. 0020.  FM  801. 0002.      0. 0000.  2                       3872  07440
07441 LR   076500 000043  302. 0021.  LR    0. 0035.      0. 0000.                          3873  07441
07442 FM   026000 011442  302. 0022.  FM  618. 0003.      0. 0000.  SIGMA 2                 3874  07442
07443 ST   060100 011465  302. 0023.  ST  620. 0002.      0. 0000.                          3875  07443
07444 LQ   056000 003607  302. 0024.  LQ  801. 0017.      0. 0000.  1/4                     3876  07444
07445 FM   026000 003607  302. 0025.  FM  801. 0017.      0. 0000.                          3877  07445
07446 LR   076500 000043  302. 0026.  LR    0. 0035.      0. 0000.                          3878  07446
07447 FM   026000 103720  302. 0027.  FM  802. 0050.  A   0. 0000.  D                       3879  07447
07450 ST   060100 011464  302. 0028.  ST  620. 0001.      0. 0000.                          3880  07450
07451 CA   050000 011465  302. 0029.  CA  620. 0002.      0. 0000.                          3881  07451
07452 FS   030200 011464  302. 0030.  FS  620. 0001.      0. 0000.                          3882  07452
07453 ST   060100 011507  302. 0030.1 ST  622. 0000.      0. 0000.                          3883  07453
07454 FA   030000 011463  302. 0031.  FA  620. 0000.      0. 0000.                          3884  07454
07455 ST   060100 011463  302. 0032.  ST  620. 0000.      0. 0000.  F2(0)+F3(0)            3885  07455
07456 CHS  076000 000002  302. 0033.  CHS   0. 0000.      0. 0000.                          3886  07456
07457 TSX  007400 403410  302. 0034.  TSX 703. 0000.  C   0. 0000.  EXPONENTIAL            3887  07457
07460 HP   042000 000000  302. 0035.  HP    0. 0000.      0. 0000.                          3888  07460
07461 CHS  076000 000002  302. 0035.1 CHS   0. 0000.      0. 0000.                          3889  07461
07462 ST   060100 011475  302. 0036.  ST  621. 0000.      0. 0000.  GAMMA (0), PI STATE     3890  07462
07463 CA   050000 011447  302. 0037.  CA  618. 0008.      0. 0000.                          3891  07463
07464 FA   030000 003620  302. 0038.  FA  801. 0026.      0. 0000.  8                       3892  07464
07465 TSX  007400 403516  302. 0039.  TSX 704. 0000.  C   0. 0000.  SQ. ROOT               3893  07465
07466 H    000000 000000  302. 0040.  H     0. 0000.      0. 0000.                          3894  07466
07467 ST   060100 011466  302. 0041.  ST  620. 0003.      0. 0000.                          3895  07467
07470 CA   050000 103734  302. 0041.1 CA  802. 0062.  A   0. 0000.  A,ROTATIONAL COUPLING  3896  07470
07471 TM   -012000 007560 302. 0041.2 TM    2. 0087.      0. 0000.  INVERTED STATE         3897  07471
07472 CA   050000 011445  302. 0042.  CA  618. 0006.      0. 0000.                          3898  07472
07473 FS   030200 003577  302. 0043.  FS  801. 0009.      0. 0000.  4                       3899  07473
07474 FD   024000 003600  302. 0044.  FD  801. 0010.      0. 0000.  3                       3900  07474
07475 FM   026000 003570  302. 0045.  FM  801. 0002.      0. 0000.  2                       3901  07475
07476 ST   060100 011467  302. 0046.  ST  620. 0004.      0. 0000.                          3902  07476
07477 CA   050000 011447  302. 0047.  CA  618. 0008.      0. 0000.                          3903  07477
07500 FA   030000 003620  302. 0048.  FA  801. 0026.      0. 0000.  8                       3904  07500
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07501 ST   060100 011470   302. 0049.  ST  620. 0005.        0. 0000.                                3905   07501
07502 CS   050200 011467   302. 0050.  CS  620. 0004.        0. 0000.                                3906   07502
07503 FD   024000 011470   302. 0051.  FD  620. 0005.        0. 0000.                                3907   07503
07504 SQ  -060000 011467   302. 0052.  SQ  620. 0004.        0. 0000.                                3908   07504
07505 CA   050000 003570   302. 0053.  CA  801. 0002.        0. 0000.  2                             3909   07505
07506 FA   030000 011466   302. 0053.1 FA  620. 0003.        0. 0000.                                3910   07506
07507 FA   030000 011467   302. 0054.  FA  620. 0004.        0. 0000.                                3911   07507
07510 LR   076500 000043   302. 0055.  LR    0. 0035.        0. 0000.                                3912   07510
07511 FM   026000 011443   302. 0056.  FM  618. 0004.        0. 0000.  SIGMA 3                       3913   07511
07512 ST   060100 011467   302. 0057.  ST  620. 0004.        0. 0000.                                3914   07512
07513 LQ   056000 003624   302. 0058.  LQ  801. 0030.        0. 0000.  6.25                          3915   07513
07514 FM   026000 003624   302. 0059.  FM  801. 0030.        0. 0000.                                3916   07514
07515 LR   076500 000043   302. 0060.  LR    0. 0035.        0. 0000.                                3917   07515
07516 FM   026000 103720   302. 0061.  FM  802. 0050.  A     0. 0000.  D                             3918   07516
07517 CHS  076000 000002   302. 0062.  CHS   0. 0000.        0. 0000.                                3919   07517
07520 FA   030000 011467   302. 0063.  FA  620. 0004.        0. 0000.                                3920   07520
07521 ST   060100 011465   302. 0063.1 ST  620. 0002.        0. 0000.  F3(1)                         3921   07521
07522 CHS  076000 000002   302. 0064.  CHS   0. 0000.        0. 0000.                                3922   07522
07523 TSX  007400 403410   302. 0065.  TSX 703. 0000.  C     0. 0000.  EXPONENTIAL                   3923   07523
07524 HP   042000 000000   302. 0066.  HP    0. 0000.        0. 0000.                                3924   07524
07525 LR   076500 000043   302. 0067.  LR    0. 0035.        0. 0000.                                3925   07525
07526 FM   026000 003600   302. 0068.  FM  801. 0010.        0. 0000.  3                             3926   07526
07527 CHS  076000 000002   302. 0069.  CHS   0. 0000.        0. 0000.                                3927   07527
07530 ST   060100 011476   302. 0070.  ST  621. 0001.        0. 0000.  GAMMA (1), PI STATE           3928   07530
07531 CA   050000 103712   302. 0071.  CA  802. 0044.  A     0. 0000.  LAMBDA                        3929   07531
07532 FS   030200 003567   302. 0072.  FS  801. 0001.        0. 0000.  1                             3930   07532
07533 TNZ -010000 007541   302. 0073.  TNZ   2. 0078.        0. 0000.                                3931   07533
07534 CA   050000 011475   302. 0074.  CA  621. 0000.        0. 0000.                                3932   07534
07535 FA   030000 011476   302. 0075.  FA  621. 0001.        0. 0000.                                3933   07535
07536 ST   060100 011501   302. 0076.  ST  621. 0004.        0. 0000.  TOTAL GAMMA, PI STATE         3934   07536
07537 ZS   060000 011467   302. 0076.1 ZS  620. 0004.        0. 0000.                                3935   07537
07540 T    002000 010174   302. 0077.  T   305. 0000.        0. 0000.                                3936   07540
07541 LQ   056000 003607   302. 0078.  LQ  801. 0017.        0. 0000.  1/4                           3937   07541
07542 FM   026000 003607   302. 0079.  FM  801. 0017.        0. 0000.                                3938   07542
07543 LR   076500 000043   302. 0080.  LR    0. 0035.        0. 0000.                                3939   07543
07544 FM   026000 103720   302. 0081.  FM  802. 0050.  A     0. 0000.  D                             3940   07544
07545 ST   060100 011464   302. 0082.  ST  620. 0001.        0. 0000.                                3941   07545
07546 T    002000 007602   302. 0083.  T   303. 0000.        0. 0000.                                3942   07546
07547 CS   050200 011464   302. 0084.  CS  620. 0001.        0. 0000.                                3943   07547
07550 ST   060100 011464   302. 0085.  ST  620. 0001.        0. 0000.  PUT IN F1(0)FOR F3(0)          3944   07550
07551 CA   050000 011443   302. 0085.1 CA  618. 0004.        0. 0000.                                3945   07551
07552 ST   060100 011437   302. 0085.2 ST  618. 0000.        0. 0000.                                3946   07552
07553 CA   050000 011441   302. 0085.3 CA  618. 0002.        0. 0000.                                3947   07553
07554 ST   060100 011443   302. 0085.4 ST  618. 0004.        0. 0000.                                3948   07554
07555 CA   050000 011437   302. 0085.5 CA  618. 0000.        0. 0000.                                3949   07555
07556 ST   060100 011441   302. 0085.6 ST  618. 0002.        0. 0000.                                3950   07556
07557 T    002000 007424   302. 0086.  T     2. 0008.        0. 0000.                                3951   07557
07560 CS   050200 011466   302. 0087.  CS  620. 0003.        0. 0000.                                3952   07560
07561 ST   060100 011466   302. 0088.  ST  620. 0003.        0. 0000.  PUT IN F1(1)FOR F3(1)          3953   07561
07562 T    002000 007472   302. 0089.  T     2. 0042.        0. 0000.                                3954   07562
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07602 CA   050000 011447  303. 0000.  CA   618. 0008.      0. 0000.                          3970  07602
07603 TSX  007400 403516  303. 0001.  TSX  704. 0000.  C   0. 0000.  SQ. ROOT               3971  07603
07604 H    000000 000000  303. 0002.  H      0. 0000.      0. 0000.                          3972  07604
07605 CHS  076000 000002  303. 0003.  CHS    0. 0000.      0. 0000.                          3973  07605
07606 ST   060100 011466  303. 0004.  ST   620. 0003.      0. 0000.                          3974  07606
07607 CA   050000 103734  303. 0004.1 CA   802. 0062.  A   0. 0000.  A,ROTATIONAL COUPLING  3975  07607
07610 TM   -012000 007747 303. 0004.2 TM     2. 0095.      0. 0000.  INVERTED STATE         3976  07610
07611 CS   050200 011445  303. 0005.  CS   618. 0006.      0. 0000.                          3977  07611
07612 FD   024000 011447  303. 0006.  FD   619. 0008.      0. 0000.                          3978  07612
07613 FM   026000 003570  303. 0007.  FM   801. 0002.      0. 0000.  2                       3979  07613
07614 FD   024000 003600  303. 0008.  FD   801. 0010.      0. 0000.  3                       3980  07614
07615 SQ   -060000 011467 303. 0009.  SQ   620. 0004.      0. 0000.                          3981  07615
07616 CA   050000 011466  303. 0010.  CA   620. 0003.      0. 0000.                          3982  07616
07617 FA   030000 011467  303. 0011.  FA   620. 0004.      0. 0000.                          3983  07617
07620 LR   076500 000043  303. 0012.  LR     0. 0035.      0. 0000.                          3984  07620
07621 FM   026000 011441  303. 0013.  FM   618. 0002.      0. 0000.  SIGMA 1                 3985  07621
07622 FS   030200 011464  303. 0014.  FS   620. 0001.      0. 0000.                          3986  07622
07623 ST   060100 011464  303. 0015.  ST   620. 0001.      0. 0000.  F1(0)                   3987  07623
07624 FA   030000 011463  303. 0016.  FA   620. 0000.      0. 0000.  F1(0)+F2(0)+F3(0)       3988  07624
07625 ST   060100 011463  303. 0017.  ST   620. 0000.      0. 0000.                          3989  07625
07626 CHS  076000 000002  303. 0018.  CHS    0. 0000.      0. 0000.                          3990  07626
07627 TSX  007400 403410  303. 0019.  TSX  703. 0000.  C   0. 0000.  EXPONENTIAL            3991  07627
07630 HP   042000 000000  303. 0020.  HP     0. 0000.      0. 0000.                          3992  07630
07631 CHS  076000 000002  303. 0020.1 CHS    0. 0000.      0. 0000.                          3993  07631
07632 ST   060100 011475  303. 0021.  ST   621. 0000.      0. 0000.  GAMMA (0),DELTA STATE   3994  07632
07633 CA   050000 011447  303. 0022.  CA   618. 0008.      0. 0000.                          3995  07633
07634 FA   030000 003620  303. 0023.  FA   801. 0026.      0. 0000.  8                       3996  07634
07635 LR   076500 000043  303. 0024.  LR     0. 0035.      0. 0000.                          3997  07635
07636 FM   026000 003600  303. 0025.  FM   801. 0010.      0. 0000.  3                       3998  07636
07637 ST   060100 011466  303. 0026.  ST   620. 0003.      0. 0000.                          3999  07637
07640 CA   050000 011445  303. 0027.  CA   618. 0006.      0. 0000.                          4000  07640
07641 FS   030200 003577  303. 0028.  FS   801. 0009.      0. 0000.  4                       4001  07641
07642 FD   024000 011466  303. 0029.  FD   620. 0003.      0. 0000.                          4002  07642
07643 FM   026000 003577  303. 0030.  FM   801. 0009.      0. 0000.  4                       4003  07643
07644 FA   030000 003570  303. 0030.1 FA   801. 0002.      0. 0000.  2                       4004  07644
07645 LR   076500 000043  303. 0031.  LR     0. 0035.      0. 0000.                          4005  07645
07646 FM   026000 011442  303. 0032.  FM   618. 0003.      0. 0000.  SIGMA 2               4006  07646
07647 ST   060100 011466  303. 0033.  ST   620. 0003.      0. 0000.                          4007  07647
07650 LQ   056000 003612  303. 0034.  LQ   801. 0020.      0. 0000.  81/16                  4008  07650
07651 FM   026000 103720  303. 0035.  FM   802. 0050.  A   0. 0000.  D                     4009  07651
07652 CHS  076000 000002  303. 0036.  CHS    0. 0000.      0. 0000.                          4010  07652
07653 FA   030000 011466  303. 0037.  FA   620. 0003.      0. 0000.                          4011  07653
07654 ST   060100 011466  303. 0038.  ST   620. 0003.      0. 0000.  F2(1)                  4012  07654
07655 FA   030000 011465  303. 0039.  FA   620. 0002.      0. 0000.  F3(1)                  4013  07655
07656 ST   060100 011465  303. 0040.  ST   620. 0002.      0. 0000.                          4014  07656
07657 CHS  076000 000002  303. 0041.  CHS    0. 0000.      0. 0000.                          4015  07657
07660 TSX  007400 403410  303. 0042.  TSX  703. 0000.  C   0. 0000.  EXPONENTIAL            4016  07660
07661 HP   042000 000000  303. 0043.  HP     0. 0000.      0. 0000.                          4017  07661
07662 ST   060100 011477  303. 0044.  ST   621. 0002.      0. 0000.                          4018  07662
07663 CHS  076000 000002  303. 0045.  CHS    0. 0000.      0. 0000.                          4019  07663
07664 LR   076500 000043  303. 0046.  LR     0. 0035.      0. 0000.                          4020  07664
07665 FM   026000 003600  303. 0047.  FM   801. 0010.      0. 0000.  3                       4021  07665
07666 ST   060100 011476  303. 0048.  ST   621. 0001.      0. 0000.  GAMMA (1),DELTA STATE   4022  07666
07667 CA   050000 011447  303. 0049.  CA   618. 0008.      0. 0000.                          4023  07667
07670 FA   030000 003606  303. 0050.  FA   801. 0016.      0. 0000.  24                      4024  07670
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07671 TSX  007400 403516  303. 0051.  TSX 704. 0000.  C  0. 0000.  SQ.ROOT                    4025  07671
07672 HP   042000 000000  303. 0052.  HP    0. 0000.     0. 0000.                            4026  07672
07673 ST   060100 011467  303. 0053.  ST  620. 0004.     0. 0000.                            4027  07673
07674 CA   050000 103734  303. 0053.1 CA  802. 0062.  A  0. 0000.  A,ROTATIONAL COUPLING     4028  07674
07675 TM  -012000 007752  303. 0053.2 TM    2. 0098.     0. 0000.  INVERTED STATE           4029  07675
07676 FA   030000 003602  303. 0054.  FA  801. 0012.     0. 0000.  6                         4030  07676
07677 ST   060100 011467  303. 0055.  ST  620. 0004.     0. 0000.                            4031  07677
07700 CA   050000 011445  303. 0056.  CA  618. 0006.     0. 0000.                            4032  07700
07701 FS   030200 003605  303. 0057.  FS  801. 0015.     0. 0000.  12                        4033  07701
07702 FD   024000 003600  303. 0058.  FD  801. 0010.     0. 0000.  3                         4034  07702
07703 FM   026000 003570  303. 0059.  FM  801. 0002.     0. 0000.  2                         4035  07703
07704 ST   060100 011470  303. 0060.  ST  620. 0005.     0. 0000.                            4036  07704
07705 CA   050000 011447  303. 0061.  CA  618. 0008.     0. 0000.                            4037  07705
07706 FA   030000 003606  303. 0062.  FA  801. 0016.     0. 0000.  24                        4038  07706
07707 ST   060100 011471  303. 0063.  ST  620. 0006.     0. 0000.                            4039  07707
07710 CS   050200 011470  303. 0064.  CS  620. 0005.     0. 0000.                            4040  07710
07711 FD   024000 011471  303. 0065.  FD  620. 0006.     0. 0000.                            4041  07711
07712 SQ  -060000 011470  303. 0066.  SQ  620. 0005.     0. 0000.                            4042  07712
07713 CA   050000 011470  303. 0067.  CA  620. 0005.     0. 0000.                            4043  07713
07714 FA   030000 011467  303. 0068.  FA  620. 0004.     0. 0000.                            4044  07714
07715 LR   076500 000043  303. 0069.  LR    0. 0035.     0. 0000.                            4045  07715
07716 FM   026000 011443  303. 0070.  FM  618. 0004.     0. 0000.  SIGMA 3                   4046  07716
07717 ST   060100 011467  303. 0071.  ST  620. 0004.     0. 0000.                            4047  07717
07720 LQ   056000 003625  303. 0072.  LQ  801. 0031.     0. 0000.  12.25                     4048  07720
07721 FM   026000 003625  303. 0073.  FM  801. 0031.     0. 0000.  12.25                     4049  07721
07722 LR   076500 000043  303. 0074.  LR    0. 0035.     0. 0000.                            4050  07722
07723 FM   026000 103720  303. 0075.  FM  902. 0050.  A  0. 0000.  D                         4051  07723
07724 CHS  076000 000002  303. 0076.  CHS   0. 0000.     0. 0000.                            4052  07724
07725 FA   030000 011467  303. 0077.  FA  620. 0004.     0. 0000.                            4053  07725
07726 ST   060100 011467  303. 0078.  ST  620. 0004.     0. 0000.  F3(2)                     4054  07726
07727 CHS  076000 000002  303. 0079.  CHS   0. 0000.     0. 0000.                            4055  07727
07730 TSX  007400 403410  303. 0080.  TSX 703. 0000.  C  0. 0000.  EXPONENTIAL              4056  07730
07731 HP   042000 000000  303. 0081.  HP    0. 0000.     0. 0000.                            4057  07731
07732 ST   060100 011470  303. 0082.  ST  620. 0005.     0. 0000.                            4058  07732
07733 CHS  076000 000002  303. 0083.  CHS   0. 0000.     0. 0000.                            4059  07733
07734 LR   076500 000043  303. 0084.  LR    0. 0035.     0. 0000.                            4060  07734
07735 FM   026000 003601  303. 0085.  FM  801. 0011.     0. 0000.  5                         4061  07735
07736 ST   060100 011477  303. 0086.  ST  621. 0002.     0. 0000.  GAMMA (2)                 4062  07736
07737 CA   050000 103712  303. 0087.  CA  802. 0044.  A  0. 0000.  LAMBDA                    4063  07737
07740 FS   030200 003570  303. 0088.  FS  801. 0002.     0. 0000.  2                         4064  07740
07741 TNZ -010000 007772  303. 0089.  TNZ 304. 0000.     0. 0000.  GAMMA STATE              4065  07741
07742 CA   050000 011477  303. 0090.  CA  621. 0002.     0. 0000.                            4066  07742
07743 FA   030000 011476  303. 0091.  FA  621. 0001.     0. 0000.                            4067  07743
07744 FA   030000 011475  303. 0092.  FA  621. 0000.     0. 0000.                            4068  07744
07745 ST   060100 011501  303. 0093.  ST  621. 0004.     0. 0000.  TOTAL GAMMA,DELTA ST      4069  07745
07746 T    002000 010174  303. 0094.  T   305. 0000.     0. 0000.                            4070  07746
07747 CS   050200 011466  303. 0095.  CS  620. 0003.     0. 0000.                            4071  07747
07750 ST   060100 011466  303. 0096.  ST  620. 0003.     0. 0000.  PUT IN F3(0)FOR F1(0)      4072  07750
07751 T    002000 007611  303. 0097.  T     2. 0005.     0. 0000.                            4073  07751
07752 CS   050200 011467  303. 0098.  CS  620. 0004.     0. 0000.                            4074  07752
07753 ST   060100 011467  303. 0099.  ST  620. 0004.     0. 0000.  PUT IN F1(2)FOR F3(2)      4075  07753
07754 T    002000 007676  303. 0100.  T     2. 0054.     0. 0000.                            4076  07754
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07772 CA   050000 011447   304. 0000.  CA   618. 0008.        0. 0000.                          4090   07772
07773 FA   030000 003620   304. 0001.  FA   801. 0026.        0. 0000.  8                       4091   07773
07774 TSX  007400 403516   304. 0002.  TSX  704. 0009.  *C    0. 0000.  SQ. ROOT                4092   07774
07775 HP   042000 000000   304. 0003.  HP     0. 0000.        0. 0000.                          4093   07775
07776 CHS  076000 000002   304. 0004.  CHS    0. 0000.        0. 0000.                          4094   07776
07777 FA   030000 003570   304. 0005.  FA   801. 0002.        0. 0000.  2                       4095   07777
10000 ST   060100 011470   304. 0006.  ST   620. 0005.        0. 0000.                          4096   10000
10001 CA   050000 103734   304. 0006.1 CA   802. 0062.  A     0. 0000.  A,ROTATIONAL COUPLING    4097   10001
10002 TM   -012000 010152  304. 0006.2 TM     2. 0107.        0. 0000.  INVERTED STATE          4098   10002
10003 CA   050000 011447   304. 0007.  CA   618. 0008.        0. 0000.                          4099   10003
10004 FA   030000 003620   304. 0008.  FA   801. 0026.        0. 0000.  8                       4100   10004
10005 LR   076500 000043   304. 0009.  LR     0. 0035.        0. 0000.                          4101   10005
10006 FM   026000 003600   304. 0010.  FM   801. 0010.        0. 0000.  3                       4102   10006
10007 FD   024000 003570   304. 0011.  FD   801. 0002.        0. 0000.  2                       4103   10007
10010 SQ   -060000 011471  304. 0012.  SQ   620. 0006.        0. 0000.                          4104   10010
10011 CA   050000 011445   304. 0013.  CA   618. 0006.        0. 0000.                          4105   10011
10012 FS   030200 003577   304. 0014.  FS   801. 0009.        0. 0000.  4                       4106   10012
10013 FD   024000 011471   304. 0015.  FD   620. 0006.        0. 0000.                          4107   10013
10014 SQ   -060000 011471  304. 0016.  SQ   620. 0006.        0. 0000.                          4108   10014
10015 CS   050200 011471   304. 0017.  CS   620. 0006.        0. 0000.                          4109   10015
10016 FA   030000 011470   304. 0018.  FA   620. 0005.        0. 0000.                          4110   10016
10017 LR   076500 000043   304. 0019.  LR     0. 0035.        0. 0000.                          4111   10017
10020 FM   026000 011441   304. 0020.  FM   618. 0002.        0. 0000.  SIGMA 1                 4112   10020
10021 ST   060100 011470   304. 0021.  ST   620. 0005.        0. 0000.                          4113   10021
10022 LQ   056000 003607   304. 0022.  LQ   801. 0017.        0. 0000.  1/4                     4114   10022
10023 FM   026000 003607   304. 0023.  FM   801. 0017.        0. 0000.                          4115   10023
10024 LR   076500 000043   304. 0024.  LR     0. 0035.        0. 0000.                          4116   10024
10025 FM   026000 103720   304. 0025.  FM   802. 0050.  A     0. 0000.  D                       4117   10025
10026 CHS  076000 000002   304. 0026.  CHS    0. 0000.        0. 0000.                          4118   10026
10027 FA   030000 011470   304. 0027.  FA   620. 0005.        0. 0000.                          4119   10027
10030 ST   060100 011470   304. 0028.  ST   620. 0005.        0. 0000.  F1(1)                   4120   10030
10031 FA   030000 011465   304. 0029.  FA   620. 0002.        0. 0000.                          4121   10031
10032 ST   060100 011465   304. 0030.  ST   620. 0002.        0. 0000.  F1(1)+F2(1)+F3(1)       4122   10032
10033 CHS  076000 000002   304. 0031.  CHS    0. 0000.        0. 0000.                          4123   10033
10034 TSX  007400 403410   304. 0032.  TSX  703. 0000.  C     0. 0000.  EXPONENTIAL             4124   10034
10035 HP   042000 000000   304. 0033.  HP     0. 0000.        0. 0000.                          4125   10035
10036 ST   060100 011476   304. 0034.  ST   621. 0001.        0. 0000.                          4126   10036
10037 CHS  076000 000002   304. 0035.  CHS    0. 0000.        0. 0000.                          4127   10037
10040 LR   076500 000043   304. 0036.  LR     0. 0035.        0. 0000.                          4128   10040
10041 FM   026000 003600   304. 0037.  FM   801. 0010.        0. 0000.  3                       4129   10041
10042 ST   060100 011476   304. 0038.  ST   621. 0001.        0. 0000.  GAMMA (1)              4130   10042
10043 CA   050000 011447   304. 0039.  CA   618. 0008.        0. 0000.                          4131   10043
10044 FA   030000 003606   304. 0040.  FA   801. 0013.        0. 0000.  24                      4132   10044
10045 LR   076500 000043   304. 0041.  LR     0. 0035.        0. 0000.                          4133   10045
10046 FM   026000 003600   304. 0042.  FM   801. 0010.        0. 0000.  3                       4134   10046
10047 ST   060100 011471   304. 0043.  ST   620. 0006.        0. 0000.                          4135   10047
10050 CA   050000 011445   304. 0044.  CA   618. 0006.        0. 0000.                          4136   10050
10051 FS   030200 003605   304. 0045.  FS   801. 0015.        0. 0000.  12                      4137   10051
10052 FD   024000 011471   304. 0046.  FD   620. 0006.        0. 0000.                          4138   10052
10053 FM   026000 003577   304. 0047.  FM   801. 0009.        0. 0000.  4                       4139   10053
10054 FA   030000 003602   304. 0048.  FA   801. 0012.        0. 0000.  6                       4140   10054
10055 LR   076500 000043   304. 0049.  LR     0. 0035.        0. 0000.                          4141   10055
10056 FM   026000 011442   304. 0050.  FM   618. 0003.        0. 0000.  SIGMA 2                 4142   10056
10057 ST   060100 011471   304. 0051.  ST   620. 0006.        0. 0000.                          4143   10057
10060 LQ   056000 003624   304. 0052.  LQ   801. 0171.        0. 0000.  0.25                    4144   10060
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10061	FM	026000	003624	304.	0053.	FM	801.	0030.		0.	0000.		4145	10061
10062	LR	076500	000043	304.	0054.	LR	0.	0035.		0.	0000.		4146	10062
10063	FM	026000	103720	304.	0055.	FM	802.	0050.	A	0.	0000.	D	4147	10063
10064	CHS	076000	000002	304.	0056.	CHS	0.	0000.		0.	0000.		4148	10064
10065	FA	030000	011471	304.	0057.	FA	620.	0006.		0.	0000.		4149	10065
10066	ST	060100	011471	304.	0058.	ST	620.	0006.		0.	0000.	F2(2)	4150	10066
10067	FA	030000	011467	304.	0059.	FA	620.	0004.		0.	0000.	F3(2)	4151	10067
10070	ST	060100	011467	304.	0060.	ST	620.	0004.		0.	0000.		4152	10070
10071	CHS	076000	000002	304.	0060.1	CHS	0.	0000.		0.	0000.		4153	10071
10072	TSX	007400	403410	304.	0061.	TSX	703.	0000.	C	0.	0000.	EXPONENTIAL	4154	10072
10073	HP	042000	000000	304.	0062.	HP	0.	0000.		0.	0000.		4155	10073
10074	CHS	076000	000002	304.	0063.	CHS	0.	0000.		0.	0000.		4156	10074
10075	LR	076500	000043	304.	0064.	LR	0.	0035.		0.	0000.		4157	10075
10076	FM	026000	003601	304.	0065.	FM	801.	0011.		0.	0000.	5	4158	10076
10077	ST	060100	011477	304.	0066.	ST	621.	0002.		0.	0000.	GAMMA (2),GAMMA STATE	4159	10077
10100	CA	050000	011447	304.	0067.	CA	618.	0008.		0.	0000.		4160	10100
10101	FA	030000	003621	304.	0068.	FA	801.	0027.		0.	0000.	48	4161	10101
10102	TSX	007400	403516	304.	0069.	TSX	704.	0000.	C	0.	0000.	SQ. ROOT	4162	10102
10103	HP	042000	000000	304.	0070.	HP	0.	0000.		0.	0000.		4163	10103
10104	ST	060100	011472	304.	0071.	ST	620.	0007.		0.	0000.		4164	10104
10105	CA	050000	103734	304.	0071.1	CA	802.	0062.	A	0.	0000.	A,ROTATIONAL COUPLING	4165	10105
10106	TM	-012000	010155	304.	0071.2	TM	2.	0110.		0.	0000.	INVERTED STATE	4166	10106
10107	CA	050000	011447	304.	0072.	CA	618.	0008.		0.	0000.		4167	10107
10110	FA	030000	003621	304.	0073.	FA	801.	0027.		0.	0000.	48	4168	10110
10111	FD	024000	003570	304.	0074.	FD	801.	0002.		0.	0000.		4169	10111
10112	FM	026000	003600	304.	0075.	FM	801.	0010.		0.	0000.	3	4170	10112
10113	ST	060100	011473	304.	0076.	ST	620.	0008.		0.	0000.		4171	10113
10114	CA	050000	011445	304.	0077.	CA	618.	0006.		0.	0000.		4172	10114
10115	FS	030200	003606	304.	0078.	FS	801.	0016.		0.	0000.	24	4173	10115
10116	FD	024000	011473	304.	0079.	FD	620.	0008.		0.	0000.		4174	10116
10117	SQ	-060000	011473	304.	0080.	SQ	620.	0008.		0.	0000.		4175	10117
10120	CA	050000	003606	304.	0081.	CA	801.	0015.		0.	0000.	12	4176	10120
10121	FA	030000	011472	304.	0082.	FA	620.	0007.		0.	0000.		4177	10121
10122	FS	030200	011473	304.	0083.	FS	620.	0008.		0.	0000.		4178	10122
10123	LR	076500	000043	304.	0084.	LR	0.	0035.		0.	0000.		4179	10123
10124	FM	026000	011443	304.	0085.	FM	618.	0004.		0.	0000.	SIGMA 3	4180	10124
10125	ST	060100	011472	304.	0086.	ST	620.	0007.		0.	0000.		4181	10125
10126	LQ	056000	003625	304.	0087.	LQ	801.	0031.		0.	0000.	12.25	4182	10126
10127	FM	026000	003625	304.	0088.	FM	801.	0031.		0.	0000.		4183	10127
10130	LR	076500	000043	304.	0089.	LR	0.	0035.		0.	0000.		4184	10130
10131	FM	026000	103720	304.	0090.	FM	802.	0050.	A	0.	0000.	D	4185	10131
10132	CHS	076000	000002	304.	0091.	CHS	0.	0000.		0.	0000.		4186	10132
10133	FA	030000	011472	304.	0092.	FA	620.	0007.		0.	0000.		4187	10133
10134	ST	060100	011472	304.	0093.	ST	620.	0007.		0.	0000.	F3(3)	4188	10134
10135	CHS	076000	000002	304.	0094.	CHS	0.	0000.		0.	0000.		4189	10135
10136	TSX	007400	403410	304.	0095.	TSX	703.	0000.	C	0.	0000.	EXPONENTIAL	4190	10136
10137	HP	042000	000000	304.	0096.	HP	0.	0000.		0.	0000.		4191	10137
10140	CHS	076000	000002	304.	0097.	CHS	0.	0000.		0.	0000.		4192	10140
10141	ST	060100	011500	304.	0098.	ST	621.	0003.		0.	0000.		4193	10141
10142	LR	076500	000043	304.	0099.	LR	0.	0035.		0.	0000.		4194	10142
10143	FM	026000	003627	304.	0100.	FM	801.	0033.		0.	0000.	7	4195	10143
10144	ST	060100	011500	304.	0101.	ST	621.	0003.		0.	0000.	GAMMA (3)	4196	10144
10145	FA	030000	011477	304.	0102.	FA	621.	0002.		0.	0000.		4197	10145
10146	FA	030000	011476	304.	0103.	FA	621.	0001.		0.	0000.		4198	10146
10147	FA	030000	011475	304.	0104.	FA	621.	0000.		0.	0000.		4199	10147

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10150 ST   060100 011501   304. 0105.  ST   621. 0004.     0. 0000.                          4200   10150
10151 T    002000 010174   304. 0106.  T    305. 0000.     0. 0000.                          4201   10151
10152 CS   050200 011470   304. 0107.  CS   620. 0005.     0. 0000.                          4202   10152
10153 ST   060100 011470   304. 0108.  ST   620. 0005.     0. 0000.  PUT IN F3(1)FOR F1(1)   4203   10153
10154 T    002000 010003   304. 0109.  T      2. 0007.     0. 0000.                          4204   10154
10155 CS   050200 011472   304. 0110.  CS   620. 0007.     0. 0000.                          4205   10155
10156 ST   060100 011472   304. 0111.  ST   620. 0007.     0. 0000.  PUT IN F1(3)FOR F3(3)   4206   10156
10157 T    002000 010107   304. 0112.  T      2. 0072.     0. 0000.                          4207   10157


10174 CA   050000 003567   305. 0000.  CA   801. 0001.     0. 0000.  1                       4220   10174
10175 FD   024000 011441   305. 0001.  FD   618. 0002.     0. 0000.  SIGMA 1                 4221   10175
10176 SQ   -060000 011507  305. 0002.  SQ   622. 0000.     0. 0000.                          4222   10176
10177 CA   050000 003567   305. 0003.  CA   801. 0001.     0. 0000.                          4223   10177
10200 FD   024000 011442   305. 0004.  FD   618. 0003.     0. 0000.  SIGMA 2                 4224   10200
10201 SQ   -060000 011510  305. 0005.  SQ   622. 0001.     0. 0000.                          4225   10201
10202 CA   050000 003567   305. 0006.  CA   801. 0001.     0. 0000.                          4226   10202
10203 FD   024000 011443   305. 0007.  FD   618. 0004.     0. 0000.  SIGMA 3                 4227   10203
10204 SQ   -060000 011511  305. 0008.  SQ   622. 0002.     0. 0000.                          4228   10204
10205 CA   050000 011507   305. 0009.  CA   622. 0000.     0. 0000.                          4229   10205
10206 FA   030000 011510   305. 0010.  FA   622. 0001.     0. 0000.                          4230   10206
10207 FA   030000 011511   305. 0011.  FA   622. 0002.     0. 0000.                          4231   10207
10210 ST   060100 011512   305. 0012.  ST   622. 0003.     0. 0000.  SUM OF 1/SIGMAS         4232   10210
10211 CA   050000 011441   305. 0013.  CA   618. 0002.     0. 0000.                          4233   10211
10212 FA   030000 011442   305. 0014.  FA   618. 0003.     0. 0000.                          4234   10212
10213 FA   030000 011443   305. 0015.  FA   618. 0004.     0. 0000.                          4235   10213
10214 LR   076500 000043   305. 0016.  LR     0. 0035.     0. 0000.                          4236   10214
10215 FM   026000 003573   305. 0017.  FM   801. 0005.     0. 0000.  1/15                    4237   10215
10216 ST   060100 011513   305. 0018.  ST   622. 0004.     0. 0000.                          4238   10216
10217 LQ   056000 011441   305. 0019.  LQ   618. 0002.     0. 0000.                          4239   10217
10220 FM   026000 011441   305. 0020.  FM   618. 0002.     0. 0000.                          4240   10220
10221 ST   060100 011514   305. 0021.  ST   622. 0005.     0. 0000.  SIGMA 1 SQ              4241   10221
10222 LQ   056000 011442   305. 0022.  LQ   618. 0003.     0. 0000.                          4242   10222
10223 FM   026000 011442   305. 0023.  FM   618. 0003.     0. 0000.                          4243   10223
10224 ST   060100 011515   305. 0024.  ST   622. 0006.     0. 0000.  SIGMA 2 SQ              4244   10224
10225 LQ   056000 011443   305. 0025.  LQ   618. 0004.     0. 0000.                          4245   10225
10226 FM   026000 011443   305. 0026.  FM   618. 0004.     0. 0000.                          4246   10226
10227 ST   060100 011516   305. 0027.  ST   622. 0007.     0. 0000.  SIGMA 3 SQ              4247   10227
10230 LQ   056000 011514   305. 0028.  LQ   622. 0005.     0. 0000.                          4248   10230
10231 FM   026000 011441   305. 0029.  FM   618. 0002.     0. 0000.                          4249   10231
10232 ST   060100 011517   305. 0030.  ST   622. 0008.     0. 0000.  SIGMA 1 CUBED          4250   10232
10233 LQ   056000 011515   305. 0031.  LQ   622. 0006.     0. 0000.                          4251   10233
10234 FM   026000 011442   305. 0032.  FM   618. 0003.     0. 0000.                          4252   10234
10235 ST   060100 011520   305. 0033.  ST   622. 0009.     0. 0000.  SIGMA 2 CUBED          4253   10235
10236 LQ   056000 011516   305. 0034.  LQ   622. 0007.     0. 0000.                          4254   10236
10237 FM   026000 011443   305. 0035.  FM   618. 0004.     0. 0000.                          4255   10237
10240 ST   060100 011521   305. 0036.  ST   622. 0010.     0. 0000.  SIGMA 3 CUBED          4256   10240
10241 FA   030000 011520   305. 0037.  FA   622. 0009.     0. 0000.                          4257   10241
10242 FA   030000 011517   305. 0038.  FA   622. 0008.     0. 0000.                          4258   10242
10243 ST   060100 011517   305. 0039.  ST   622. 0008.     0. 0000.                          4259   10243
10244 FD   024000 003572   305. 0040.  FD   801. 0004.     0. 0000.  315                     4260   10244
10245 SQ   -060000 011520  305. 0041.  SQ   622. 0009.     0. 0000.  SUM SIGMA CUBED/315     4261   10245
10246 CA   050000 011516   305. 0042.  CA   622. 0007.     0. 0000.                          4262   10246
10247 FA   030000 011515   305. 0043.  FA   622. 0006.     0. 0000.                          4263   10247
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10250 FA   030000 011514   305. 0044.   FA   622. 0005.      0. 0000.                          4264   10250
10251 FD   024000 003572   305. 0045.   FD   801. 0004.      0. 0000.   315                    4265   10251
10252 FM   026000 003577   305. 0046.   FM   801. 0009.      0. 0000.   4                      4266   10252
10253 ST   060100 011514   305. 0047.   ST   622. 0005.      0. 0000.   SUM SIGMA SQ(4/315)    4267   10253
10254 FA   030000 003567   305. 0048.   FA   801. 0001.      0. 0000.   1                      4268   10254
10255 FA   030000 011512   305. 0049.   FA   622. 0003.      0. 0000.                          4269   10255
10256 FA   030000 011520   305. 0050.   FA   622. 0009.      0. 0000.                          4270   10256
10257 FA   030000 011513   305. 0051.   FA   622. 0004.      0. 0000.                          4271   10257
10260 ST   060100 011521   305. 0052.   ST   622. 0010.      0. 0000.   QF1+QF2+QF3            4272   10260
10261 FA   030000 011501   305. 0053.   FA   621. 0004.      0. 0000.                          4273   10261
10262 ST   060100 011117   305. 0054.   ST   603. 0007.      0. 0000.   Q,ROT.                 4274   10262
10263 LR   076500 000043   305. 0055.   LR     0. 0035.      0. 0000.                          4275   10263
10264 FM   026000 011462   305. 0056.   FM   619. 0001.      0. 0000.   E TO BETA              4276   10264
10265 FD   024000 003703   305. 0056.1  FD   802. 0037.      0. 0000.   SYMMETRY NUMBER        4277   10265
10266 SQ   -060000 011117  305. 0057.   SQ   603. 0007.      0. 0000.   Q, ROTATION            4278   10266
10267 T    002000 010302   305. 0058.   T    306. 0000.      0. 0000.   CALC. Q PRIME,ROT.     4279   10267

10302 LQ   056000 011475   306. 0000.   LQ   621. 0000.      0. 0000.   GAMMA (0)              4290   10302
10303 FM   026000 002005   306. 0001.   FM     1. 0029.      0. 0000.   T                      4291   10303
10304 LR   076500 000043   306. 0002.   LR     0. 0035.      0. 0000.                          4292   10304
10305 FM   026000 011463   306. 0003.   FM   620. 0000.      0. 0000.   F OF (0)               4293   10305
10306 ST   060100 011533   306. 0004.   ST   623. 0000.      0. 0000.   GAMMA (0) PRIME        4294   10306
10307 LR   076500 000043   306. 0005.   LR     0. 0035.      0. 0000.                          4295   10307
10310 FM   026000 002005   306. 0006.   FM     1. 0029.      0. 0000.   T                      4296   10310
10311 LR   076500 000043   306. 0007.   LR     0. 0035.      0. 0000.                          4297   10311
10312 FM   026000 011463   306. 0008.   FM   620. 0000.      0. 0000.   F(0)                   4298   10312
10313 ST   060100 011537   306. 0009.   ST   623. 0004.      0. 0000.   GAMMA (0) DUBL PRIME   4299   10313
10314 LQ   056000 011476   306. 0010.   LQ   621. 0001.      0. 0000.   GAMMA (1)              4300   10314
10315 FM   026000 002005   306. 0011.   FM     1. 0029.      0. 0000.                          4301   10315
10316 LR   076500 000043   306. 0012.   LR     0. 0035.      0. 0000.                          4302   10316
10317 FM   026000 011465   306. 0013.   FM   620. 0002.      0. 0000.   F(1)                   4303   10317
10320 ST   060100 011534   306. 0014.   ST   623. 0001.      0. 0000.   GAMMA (1) PRIME        4304   10320
10321 LR   076500 000043   306. 0015.   LR     0. 0035.      0. 0000.                          4305   10321
10322 FM   026000 002005   306. 0016.   FM     1. 0029.      0. 0000.   T                      4306   10322
10323 LR   076500 000043   306. 0017.   LR     0. 0035.      0. 0000.                          4307   10323
10324 FM   026000 011465   306. 0018.   FM   620. 0002.      0. 0000.                          4308   10324
10325 ST   060100 011540   306. 0019.   ST   623. 0005.      0. 0000.   GAMMA (1) DUBL PRIME   4309   10325
10326 LQ   056000 011477   306. 0020.   LQ   621. 0002.      0. 0000.   GAMMA (2)              4310   10326
10327 FM   026000 002005   306. 0021.   FM     1. 0029.      0. 0000.   T                      4311   10327
10330 LR   076500 000043   306. 0022.   LR     0. 0035.      0. 0000.                          4312   10330
10331 FM   026000 011467   306. 0023.   FM   620. 0004.      0. 0000.   F(2)                   4313   10331
10332 ST   060100 011535   306. 0024.   ST   623. 0002.      0. 0000.   GAMMA (2) PRIME        4314   10332
10333 LR   076500 000043   306. 0025.   LR     0. 0035.      0. 0000.                          4315   10333
10334 FM   026000 002005   306. 0026.   FM     1. 0029.      0. 0000.   T                      4316   10334
10335 LR   076500 000043   306. 0027.   LR     0. 0035.      0. 0000.                          4317   10335
10336 FM   026000 011467   306. 0028.   FM   620. 0004.      0. 0000.                          4318   10336
10337 ST   060100 011541   306. 0029.   ST   623. 0006.      0. 0000.   GAMMA (2) DUBL PRIME   4319   10337
10340 LQ   056000 011500   306. 0030.   LQ   621. 0003.      0. 0000.   GAMMA (3)              4320   10340
10341 FM   026000 002005   306. 0031.   FM     1. 0029.      0. 0000.   T                      4321   10341
10342 LR   076500 000043   306. 0032.   LR     0. 0035.      0. 0000.                          4322   10342
10343 FM   026000 011472   306. 0033.   FM   620. 0007.      0. 0000.   F(3)                   4323   10343
10344 ST   060100 011536   306. 0034.   ST   623. 0003.      0. 0000.   GAMMA (3) PRIME        4324   10344
10345 LR   076500 000043   306. 0035.   LR     0. 0035.      0. 0000.                          4325   10345
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10346 FM   026000 002005   306. 0038.  FM     1. 0029.    0. 0000.                          4326   10346
10347 LR   076500 000043   306. 0037.  LR     0. 0035.    0. 0000.                          4327   10347
10350 FM   026000 011472   306. 0038.  FM   620. 0007.    0. 0000.                          4328   10350
10351 ST   060100 011542   306. 0039.  ST   623. 0007.    0. 0000.  GAMMA (3) DUBL PRIME     4329   10351
10352 T    002000 010364   306. 0040.  T    307. 0000.    0. 0000.  CALC. Q PRIME SUB F     4330   10352


10364 LQ   056000 011520   307. 0000.  LQ   622. 0009.    0. 0000.                          4340   10364
10365 FM   026000 003600   307. 0001.  FM   301. 0010.    0. 0000.  3                       4341   10365
10366 ST   060100 011543   307. 0002.  ST   623. 0008.    0. 0000.  SIGMA CUBED PRIME       4342   10366
10367 LR   076500 000043   307. 0003.  LR     0. 0035.    0. 0000.                          4343   10367
10370 FM   026000 003570   307. 0004.  FM   301. 0002.    0. 0000.  2                       4344   10370
10371 ST   060100 011544   307. 0005.  ST   623. 0009.    0. 0000.  SIGMA CUBED DUBL PRIM    4345   10371
10372 LQ   056000 011514   307. 0006.  LQ   622. 0005.    0. 0000.                          4346   10372
10373 FM   026000 003570   307. 0007.  FM   201. 0002.    0. 0000.  2                       4347   10373
10374 ST   060100 011545   307. 0008.  ST   623. 0010.    0. 0000.  SIGMA SQ. PRIME         4348   10374
10375 FA   030000 011543   307. 0009.  FA   623. 0008.    0. 0000.                          4349   10375
10376 FA   030000 011513   307. 0010.  FA   622. 0004.    0. 0000.                          4350   10376
10377 FS   030200 011512   307. 0011.  FS   622. 0003.    0. 0000.                          4351   10377
10400 LR   076500 000043   307. 0012.  LR     0. 0035.    0. 0000.                          4352   10400
10401 FM   026000 002005   307. 0013.  FM     1. 0029.    0. 0000.                          4353   10401
10402 ST   060100 011120   307. 0014.  ST   603. 0008.    0. 0000.  Q PPIME F              4354   10402
10403 CA   050000 011544   307. 0015.  CA   623. 0009.    0. 0000.                          4355   10403
10404 FA   030000 011545   307. 0016.  FA   623. 0010.    0. 0000.                          4356   10404
10405 FA   030000 011512   307. 0017.  FA   622. 0003.    0. 0000.                          4357   10405
10406 FA   030000 011512   307. 0018.  FA   622. 0003.    0. 0000.                          4358   10406
10407 LR   076500 000043   307. 0019.  LR     0. 0035.    0. 0000.                          4359   10407
10410 FM   026000 011116   307. 0020.  FM   603. 0006.    0. 0000.  T SQ                    4360   10410
10411 ST   060100 011121   307. 0021.  ST   603. 0009.    0. 0000.  Q DUBL PRIME F          4361   10411
10412 FA   030000 011537   307. 0022.  FA   623. 0004.    0. 0000.  GAMMA (0) DUBL PRIME    4362   10412
10413 FA   030000 011540   307. 0023.  FA   623. 0005.    0. 0000.  GAMMA (1) DUBL PRIME    4363   10413
10414 FA   030000 011541   307. 0024.  FA   623. 0006.    0. 0000.  GAMMA (2) DUBL PRIME    4364   10414
10415 FA   030000 011542   307. 0025.  FA   623. 0007.    0. 0000.  GAMMA (3) DUBL PRIME    4365   10415
10416 FD   024000 003703   307. 0025.1 FD   802. 0037.    0. 0000.  SYMMETRY NUMBER        4366   10416
10417 SQ  -060000 011121   307. 0026.  SQ   603. 0009.    0. 0000.  Q DUBL PRIME,ROTATION   4367   10417
10420 CA   050000 011120   307. 0027.  CA   603. 0008.    0. 0000.  Q PRIME, F             4368   10420
10421 FA   030000 011533   307. 0028.  FA   623. 0000.    0. 0000.  GAMMA (0) PRIME        4369   10421
10422 FA   030000 011534   307. 0029.  FA   623. 0001.    0. 0000.  GAMMA (1) PRIME        4370   10422
10423 FA   030000 011535   307. 0030.  FA   623. 0002.    0. 0000.  GAMMA (2) PRIME        4371   10423
10424 FA   030000 011536   307. 0031.  FA   623. 0003.    0. 0000.  GAMMA (3) PRIME        4372   10424
10425 FD   024000 003703   307. 0031.1 FD   802. 0037.    0. 0000.  SYMMETRY NUMBER        4373   10425
10426 FM   026000 011452   307. 0034.  FM   619. 0001.    0. 0000.  E TO BETA             4374   10426
10427 ST   060100 011557   307. 0035.  ST   624. 0000.    0. 0000.                          4375   10427
10430 LQ   056000 011117   307. 0036.  LQ   603. 0007.    0. 0000.  Q, ROTATION           4376   10430
10431 FM   026000 011453   307. 0037.  FM   619. 0002.    0. 0000.  BETA PRIME             4377   10431
10432 ST   060100 011560   307. 0038.  ST   624. 0001.    0. 0000.                          4378   10432
10433 LR   076500 000043   307. 0039.  LR     0. 0035.    0. 0000.                          4379   10433
10434 FM   026000 011453   307. 0040.  FM   619. 0002.    0. 0000.                          4380   10434
10435 ST   060100 011561   307. 0041.  ST   624. 0002.    0. 0000.                          4381   10435
10436 CA   050000 011557   307. 0042.  CA   624. 0000.    0. 0000.                          4382   10436
10437 FA   030000 011560   307. 0043.  FA   624. 0001.    0. 0000.                          4383   10437
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10440 ST   060100 011120   307. 0044.   ST   603. 0008.      0. 0000.   Q PRIME, ROTATION          4384   10440
10441 LQ   056000 011557   307. 0045.   LQ   624. 0009.      0. 0000.                              4385   10441
10442 FM   026000 011453   307. 0046.   FM   619. 0002.      0. 0000.   BETA PRIME                 4386   10442
10443 LP   076500 000043   307. 0047.   LP     0. 0035.      0. 0000.                              4387   10443
10444 FM   026000 003570   307. 0048.   FM   601. 0002.      0. 0000.   2                          4388   10444
10445 FA   030000 011561   307. 0049.   FA   624. 0002.      0. 0000.                              4389   10445
10446 ST   060100 011562   307. 0050.   ST   624. 0003.      0. 0000.                              4390   10446
10447 LQ   056000 011121   307. 0051.   LQ   603. 0009.      0. 0000.   Q DUBL PRIME, F            4391   10447
10450 FM   026000 011452   307. 0052.   FM   619. 0001.      0. 0000.   E TO BETA                  4392   10450
10451 FA   030000 011562   307. 0053.   FA   624. 0003.      0. 0000.                              4393   10451
10452 ST   060100 011121   307. 0054.   ST   603. 0009.      0. 0000.   Q DUBL PRIME ROTATION      4394   10452
10453 CA   050000 003570   307. 0055.   CA   801. 0002.      0. 0000.   2                          4395   10453
10454 ST   060100 103644   307. 0056.   ST   802. 0006.   A  0. 0000.   G, ELECTRONIC              4396   10454
10455 SDX -053400 410462   307. 0057.   SDX    2. 0061.   C  0. 0000.   85                         4397   10455
10456 ZS   060000 411564   307. 0058.   ZS   624. 0005.   C  0. 0000.   CLEAR TEMPORARY STOR.      4398   10456
10457 TX   200001 410456   307. 0059.   TX     2. 0058.   C  0. 0001.                              4399   10457
10460 SE   076000 000141   307. 0059.1  SE     0. 0097.      0. 0000.   TURN ON LIGHT NO. 1        4400   10460
10461 T    002000 004456   307. 0060.   T    105. 0000.      0. 0000.   CALC. ELECTRONIC FN.       4401   10461
10462      000125 000000   307. 0061.        0. 0000.      0. 0095.                              4402   10462

10472 CA   050000 011144   400. 0000.   CA   605. 0003.      0. 0000.    Q STRETCH                 4410   10472
10473 ST   060100 010747   400. 0001.   ST   500. 0003.      0. 0000.                              4411   10473
10474 CA   050000 011157   400. 0002.   CA   606. 0004.      0. 0000.    Q VIB ROT INTER           4412   10474
10475 ST   060100 010750   400. 0003.   ST   500. 0004.      0. 0000.                              4413   10475
10476 CA   050000 011164   400. 0004.   CA   607. 0004.      0. 0000.   Q ANHARMON                 4414   10476
10477 ST   060100 010751   400. 0005.   ST   500. 0005.      0. 0000.                              4415   10477
10500 CA   050000 011077   400. 0006.   CA   601. 0006.      0. 0000.   Q VUB2A                    4416   10500
10501 ST   060100 010744   400. 0007.   ST   500. 0000.      0. 0000.                              4417   10501
10502 CA   050000 011117   400. 0008.   CA   603. 0007.      0. 0000.   Q ROTATION                 4418   10502
10503 ST   060100 010745   400. 0009.   ST   500. 0001.      0. 0000.                              4419   10503
10504 CA   050000 011131   400. 0010.   CA   604. 0002.      0. 0000.   Q ELECTRIC                 4420   10504
10505 ST   060100 010746   400. 0011.   ST   500. 0002.      0. 0000.                              4421   10505
10506 CA   050000 011100   400. 0012.   CA   601. 0007.      0. 0000.   Q PRIME, VIB.              4422   10506
10507 ST   060100 010756   400. 0013.   ST   501. 0000.      0. 0000.                              4423   10507
10510 CA   050000 011120   400. 0014.   CA   603. 0008.      0. 0000.   Q PRIME, ROT.              4424   10510
10511 ST   060100 010757   400. 0015.   ST   501. 0001.      0. 0000.                              4425   10511
10512 CA   050000 011132   400. 0016.   CA   604. 0003.      0. 0000.   Q PRIME, ELECT.            4426   10512
10513 ST   060100 010760   400. 0017.   ST   501. 0002.      0. 0000.                              4427   10513
10514 CA   050000 011142   400. 0018.   CA   605. 0001.      0. 0000.   STRETCH CONTRIBUTION       4428   10514
10515 ST   060100 010761   400. 0019.   ST   501. 0003.      0. 0000.                              4429   10515
10516 CA   050000 011155   400. 0020.   CA   606. 0002.      0. 0000.   VIB-ROT                    4430   10516
10517 ST   060100 010762   400. 0021.   ST   501. 0004.      0. 0000.                              4431   10517
10520 CA   050000 011167   400. 0022.   CA   607. 0007.      0. 0000.   ANHARMONICITY              4432   10520
10521 ST   060100 010763   400. 0023.   ST   501. 0005.      0. 0000.                              4433   10521
10522 CA   050000 011101   400. 0024.   CA   601. 0008.      0. 0000.   Q DUBL PRIME, VIB.         4434   10522
10523 ST   060100 010770   400. 0025.   ST   502. 0000.      0. 0000.                              4435   10523
10524 CA   050000 011121   400. 0026.   CA   603. 0009.      0. 0000.   Q DUBL PRIME, ROT.         4436   10524
10525 ST   060100 010771   400. 0027.   ST   502. 0001.      0. 0000.                              4437   10525
10526 CA   050000 011133   400. 0028.   CA   604. 0004.      0. 0000.   Q DUBL PRIME, ELECT.       4438   10526
10527 ST   060100 010772   400. 0029.   ST   502. 0002.      0. 0000.                              4439   10527
10530 CA   050000 011143   400. 0030.   CA   605. 0002.      0. 0000.   STRETCH CONTRIBUTION       4440   10530
10531 ST   060100 010773   400. 0031.   ST   502. 0003.      0. 0000.                              4441   10531
10532 CA   050000 011156   400. 0032.   CA   606. 0003.      0. 0000.   VIB-ROT                    4442   10532
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10533 ST   060100 010774   400. 0033.  ST  502. 0004.       0. 0000.                          4443   10533
10534 CA   050000 011170   400. 0034.  CA  607. 0008.       0. 0000.  ANHARMONICITY          4444   10534
10535 ST   060100 010775   400. 0035.  ST  502. 0005.       0. 0000.                          4445   10535
10536 T    002000 010554   400. 0036.  T   401. 0000.       0. 0000.  CALC. TOTAL PART. FN.   4446   10536


10554 SDX -053400 410647   401. 0000.  SDX   2. 0059.  C   0. 0000.  5                       4460   10554
10555 LQ   056000 410751   401. 0001.  LQ  500. 0005.  C   0. 0000.  Q                       4461   10555
10556 FM   026000 410752   401. 0002.  FM  500. 0006.  C   0. 0000.                          4462   10556
10557 LR   076500 000043   401. 0003.  LR    0. 0035.      0. 0000.                          4463   10557
10560 TX   200001 410556   401. 0004.  TX    2. 0002.  C   0. 0001.                          4464   10560
10561 FM   026000 003567   401. 0005.  FM  801. 0001.      0. 0000.  1                       4465   10561
10562 ST   060100 010764   401. 0006.  ST  501. 0006.      0. 0000.  Q                       4466   10562
10563 FA   030000 010752   401. 0007.  FA  500. 0006.      0. 0000.                          4467   10563
10564 ST   060100 010752   401. 0008.  ST  500. 0006.      0. 0000.  Q, TOTAL               4468   10564
10565 SDX -053400 410651   401. 0009.  SDX   2. 0061.  C   0. 0000.  6                       4469   10565
10566 CA   050000 410764   401. 0010.  CA  501. 0006.  C   0. 0000.  Q PRIME                 4470   10566
10567 FDB  024100 410752   401. 0011.  FDB 500. 0006.  C   0. 0000.  Q                       4471   10567
10570 SQ  -060000 411010   401. 0012.  SQ  503. 0006.  C   0. 0000.  Q PRIME/ Q             4472   10570
10571 TX   200001 410566   401. 0013.  TX    2. 0010.  C   0. 0001.                          4473   10571
10572 SDX -053400 410647   401. 0014.  SDX   2. 0059.  C   0. 0000.  5                       4474   10572
10573 CA   050000 411007   401. 0015.  CA  503. 0005.  C   0. 0000.                          4475   10573
10574 FA   030000 411010   401. 0016.  FA  503. 0006.  C   0. 0000.                          4476   10574
10575 TX   200001 410574   401. 0017.  TX    2. 0016.  C   0. 0001.                          4477   10575
10576 ST   060100 011010   401. 0018.  ST  503. 0006.      0. 0000.                          4478   10576
10577 LR   076500 000043   401. 0019.  LR    0. 0035.      0. 0000.                          4479   10577
10600 FM   026000 010764   401. 0020.  FM  501. 0006.      0. 0000.  Q                       4480   10600
10601 FA   030000 010753   401. 0021.  FA  500. 0007.      0. 0000.                          4481   10601
10602 ST   060100 010753   401. 0022.  ST  500. 0007.      0. 0000.  Q PRIME, TOTAL         4482   10602
10603 SDX -053400 410651   401. 0023.  SDX   2. 0061.  C   0. 0000.  6                       4483   10603
10604 CA   050000 410776   401. 0024.  CA  502. 0006.  C   0. 0000.  Q DOUBLE PRIME         4484   10604
10605 FDB  024100 410752   401. 0025.  FDB 500. 0006.  C   0. 0000.  Q                       4485   10605
10606 SQ  -060000 411022   401. 0026.  SQ  504. 0006.  C   0. 0000.  Q DOUBLE PRIME/ Q      4486   10606
10607 TX   200001 410604   401. 0027.  TX    2. 0024.  C   0. 0001.                          4487   10607
10610 SDX -053400 410647   401. 0028.  SDX   2. 0059.  C   0. 0000.  5                       4488   10610
10611 CA   050000 411021   401. 0029.  CA  504. 0005.  C   0. 0000.                          4489   10611
10612 FA   030000 411022   401. 0030.  FA  504. 0006.  C   0. 0000.                          4490   10612
10613 TX   200001 410612   401. 0031.  TX    2. 0030.  C   0. 0001.                          4491   10613
10614 ST   060100 011020   401. 0032.  ST  504. 0004.      0. 0000.  SUM OF Q DUBL PRIME/Q  4492   10614
10615 SDX -053400 210647   401. 0033.  SDX   2. 0059.  B   0. 0000.  5                       4493   10615
10616 SDX -053400 410650   401. 0034.  SDX   2. 0060.  C   0. 0000.  5                       4494   10616
10617 LQ   056000 211007   401. 0035.  LQ  503. 0005.  B   0. 0000.                          4495   10617
10620 FM   026000 411010   401. 0036.  FM  503. 0006.  C   0. 0000.                          4496   10620
10621 FA   030000 011026   401. 0037.  FA  505. 0000.      0. 0000.                          4497   10621
10622 ST   060100 011026   401. 0038.  ST  505. 0000.      0. 0000.                          4498   10622
10623 TX   200001 410617   401. 0039.  TX    2. 0035.  C   0. 0001.                          4499   10623
10624 TX   200001 210625   401. 0040.  TX    2. 0041.  B   0. 0001.                          4500   10624
10625 XSD -063400 210650   401. 0041.  XSD   2. 0060.  B   0. 0000.                          4501   10625
10626 TXG  300001 210616   401. 0042.  TXG   2. 0034.  B   0. 0001.                          4502   10626
10627 LQ   056000 011006   401. 0043.  LQ  503. 0004.      0. 0000.                          4503   10627
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10630 FM   026000 011007  401. 0044.  FM  503. 0005.       0. 0000.                          4504  10630
10631 FA   030000 011026  401. 0045.  FA  505. 0000.       0. 0000.                          4505  10631
10632 ST   060100 011026  401. 0046.  ST  505. 0000.       0. 0000.                          4506  10632
10633 LQ   056000 011026  401. 0047.  LQ  505. 0000.       0. 0000.                          4507  10633
10634 FM   026000 003570  401. 0048.  FM  801. 0002.       0. 0000.  2                       4508  10634
10635 FA   030000 011020  401. 0049.  FA  504. 0004.       0. 0000.  SUM OF Q DUBL PRIME/Q   4509  10635
10636 LR   076500 000043  401. 0050.  LR    0. 0035.       0. 0000.                          4510  10636
10637 FM   026000 010764  401. 0051.  FM  501. 0006.       0. 0000.  Q                       4511  10637
10640 FA   030000 010754  401. 0052.  FA  500. 0008.       0. 0000.                          4512  10640
10641 ST   060100 010754  401. 0053.  ST  500. 0008.       0. 0000.  Q DOUBLE PRIME,TOTAL    4513  10641
10642 ZS   060000 011026  401. 0054.  ZS  505. 0000.       0. 0000.                          4514  10642
10643 CA   050000 010647  401. 0055.  CA    2. 0059.       0. 0000.  RESTORE INDEX          4515  10643
10644 ST   060100 010650  401. 0056.  ST    2. 0060.       0. 0000.  IN C                    4516  10644
10645 TX   200001 104243  401. 0057.  TX  102. 0001.  A    0. 0001.  GO TO NEXT ELECT.LEVL   4517  10645
10646 T    002000 010662  401. 0058.  T   402. 0000.       0. 0000.  CALC. THERMO. FNS.      4518  10646
10647      000005 000000  401. 0059.      0. 0000.       0. 0005.                          4519  10647
10650      000005 000000  401. 0060.      0. 0000.       0. 0005.                          4520  10650
10651      000006 000000  401. 0061.      0. 0000.       0. 0006.                          4521  10651


10662 CA   050000 010752  402. 0000.  CA  500. 0006.       0. 0000.  Q.INTERNAL             4530  10662
10663 TSX  007400 403340  402. 0001.  TSX 702. 0000.  C    0. 0000.  LN.                     4531  10663
10664 HP   042000 000000  402. 0002.  HP    0. 0000.       0. 0000.                          4532  10664
10665 LR   076500 000043  402. 0002.1 LR    0. 0035.       0. 0000.                          4533  10665
10666 FM   026000 003547  402. 0002.2 FM  800. 0000.       0. 0000.  R                       4534  10666
10667 FA   030000 002006  402. 0003.  FA    1. 0030.       0. 0000.  -F/T,TRANS.            4535  10667
10670 ST   060100 002006  402. 0004.  ST    1. 0030.       0. 0000.  -FT,TOTAL             4536  10670
10671 CA   050000 010753  402. 0005.  CA  500. 0007.       0. 0000.  Q PRIME,INTERNAL       4537  10671
10672 FD   024000 010752  402. 0006.  FD  500. 0006.       0. 0000.                          4538  10672
10673 FM   026000 003547  402. 0007.  FM  800. 0000.       0. 0000.  R                       4539  10673
10674 CHS  076000 000002  402. 0008.  CHS   0. 0000.       0. 0000.                          4540  10674
10675 FD   024000 002005  402. 0008.1 FD    1. 0029.       0. 0000.  T                       4541  10675
10676 SQ   -060000 011040  402. 0008.2 SQ  506. 0000.       0. 0000.                          4542  10676
10677 CA   050000 011040  402. 0008.3 CA  506. 0000.       0. 0000.                          4543  10677
10700 FA   030000 002007  402. 0009.  FA    1. 0031.       0. 0000.  H/T,TRANS.            4544  10700
10701 ST   060100 002007  402. 0010.  ST    1. 0031.       0. 0000.  H/T,TOTAL             4545  10701
10702 FA   030000 002006  402. 0011.  FA    1. 0030.       0. 0000.                          4546  10702
10703 ST   060100 002010  402. 0012.  ST    1. 0032.       0. 0000.  S,TOTAL               4547  10703
10704 CA   050000 010754  402. 0013.  CA  500. 0008.       0. 0000.                          4548  10704
10705 FD   024000 010752  402. 0014.  FD  500. 0006.       0. 0000.                          4549  10705
10706 SQ   -060000 011055  402. 0015.  SQ  507. 0003.       0. 0000.                          4550  10706
10707 CA   050000 010753  402. 0016.  CA  500. 0007.       0. 0000.                          4551  10707
10710 FD   024000 010752  402. 0017.  FD  500. 0006.       0. 0000.                          4552  10710
10711 SQ   -060000 011056  402. 0018.  SQ  507. 0004.       0. 0000.                          4553  10711
10712 LQ   056000 011056  402. 0019.  LQ  507. 0004.       0. 0000.                          4554  10712
10713 FM   026000 011056  402. 0020.  FM  507. 0004.       0. 0000.                          4555  10713
10714 CHS  076000 000002  402. 0021.  CHS   0. 0000.       0. 0000.                          4556  10714
10715 FA   030000 011055  402. 0022.  FA  507. 0003.       0. 0000.                          4557  10715
10716 FD   024000 011116  402. 0023.  FD  603. 0006.       0. 0000.  T SQ.                   4558  10716
10717 FM   026000 003547  402. 0024.  FM  800. 0000.       0. 0000.  R                       4559  10717
10720 FA   030000 002011  402. 0025.  FA    1. 0033.       0. 0000.  C SUB P,TRANS.         4560  10720
10721 ST   060100 002011  402. 0026.  ST    1. 0033.       0. 0000.  C SUB P,TOTAL          4561  10721
10722 CA   050000 002005  402. 0027.  CA    1. 0029.       0. 0000.  T                       4562  10722
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10723 ST   060100 011052  402. 0028.  ST  507. 0000.      0. 0000.  T,TEMPORARY          4563  10723
10724 SDX -053400 410735  402. 0029.  SDX   2. 0038.  C   0. 0000.  9                    4564  10724
10725 ZS   060000 410755  402. 0030.  ZS  500. 0009.  C   0. 0000.                      4565  10725
10726 ZS   060000 410767  402. 0031.  ZS  501. 0009.  C   0. 0000.                      4566  10726
10727 ZS   060000 411001  402. 0032.  ZS  502. 0009.  C   0. 0000.                      4567  10727
10730 ZS   060000 411013  402. 0033.  ZS  503. 0009.  C   0. 0000.                      4568  10730
10731 ZS   060000 411025  402. 0034.  ZS  504. 0009.  C   0. 0000.                      4569  10731
10732 ZS   060000 411223  402. 0035.  ZS  609. 0010.  C   0. 0000.                      4570  10732
10733 TX   200001 410725  402. 0036.  TX    2. 0030.  C   0. 0001.                      4571  10733
10734 T    002000 004766  402. 0037.  T   109. 0000.      0. 0000.  PRINT              4572  10734
10735      000011 000000  402. 0038.      0. 0000.      0. 0009.                       4573  10735

12226 CA   050000 011141  646. 0000.  CA  605. 0000.      0. 0000.  LN Q, STRETCH        5270  12226
12227 TSX  007400 403410  646. 0001.  TSX 703. 0000.  C   0. 0000.  EXPONENTIAL         5271  12227
12230 HP   042000 000000  646. 0002.  HP    0. 0000.      0. 0000.                      5272  12230
12231 ST   060100 011144  646. 0003.  ST  605. 0003.      0. 0000.  Q, STRETCH         5273  12231
12232 LR   076500 000043  646. 0004.  LR    0. 0035.      0. 0000.                      5274  12232
12233 FM   026000 011142  646. 0005.  FM  605. 0001.      0. 0000.  Q PRIME            5275  12233
12234 ST   060100 011142  646. 0006.  ST  605. 0001.      0. 0000.  CORR. Q PRIME       5276  12234
12235 CA   050000 011142  646. 0007.  CA  605. 0001.      0. 0000.                      5277  12235
12236 FDB  024100 011144  646. 0007.1 FDB 605. 0003.      0. 0000.  Q                  5278  12236
12237 FM   026000 011142  646. 0007.2 FM  605. 0001.      0. 0000.  Q PRIME            5279  12237
12240 ST   060100 011145  646. 0007.3 ST  605. 0004.      0. 0000.                      5280  12240
12241 LQ   056000 011144  646. 0007.4 LQ  605. 0003.      0. 0000.  Q                  5281  12241
12242 FM   026000 011143  646. 0008.  FM  605. 0002.      0. 0000.  Q DOUBLE PRIME     5282  12242
12243 FA   030000 011145  646. 0009.  FA  605. 0004.      0. 0000.                      5283  12243
12244 ST   060100 011143  646. 0010.  ST  605. 0002.      0. 0000.  CORR. Q DOUBLE PRIME 5284  12244
12245 T    002000 004564  646. 0011.  T   107. 0000.      0. 0000.  CALC. VIB-ROT INTER. 5285  12245
12246 CA   050000 011154  646. 0012.  CA  606. 0001.      0. 0000.  LN Q, VIB-ROT.      5286  12246
12247 TSX  007400 403410  646. 0013.  TSX 703. 0000.  C   0. 0000.  EXPONENTIAL         5287  12247
12250 HP   042000 000000  646. 0014.  HP    0. 0000.      0. 0000.                      5288  12250
12251 ST   060100 011157  646. 0015.  ST  606. 0004.      0. 0000.  Q, VIB-ROT.        5289  12251
12252 LR   076500 000043  646. 0016.  LR    0. 0035.      0. 0000.                      5290  12252
12253 FM   026000 011155  646. 0017.  FM  606. 0002.      0. 0000.  Q PRIME            5291  12253
12254 ST   060100 011155  646. 0018.  ST  606. 0002.      0. 0000.  CORR. Q PRIME       5292  12254
12255 LQ   056000 011156  646. 0019.  LQ  606. 0003.      0. 0000.  Q DOUBLE PRIME     5293  12255
12256 FM   026000 011157  646. 0020.  FM  606. 0004.      0. 0000.  Q, VIB-ROT.        5294  12256
12257 ST   060100 011156  646. 0020.1 ST  606. 0003.      0. 0000.                      5295  12257
12260 CA   050000 011155  646. 0020.2 CA  606. 0002.      0. 0000.  Q PRIME            5296  12260
12261 FDB  024100 011157  646. 0020.3 FDB 606. 0004.      0. 0000.  Q, VIB-ROT.        5297  12261
12262 FM   026000 011155  646. 0020.4 FM  606. 0002.      0. 0000.                      5298  12262
12263 FA   030000 011156  646. 0021.  FA  606. 0003.      0. 0000.                      5299  12263
12264 ST   060100 011156  646. 0022.  ST  606. 0003.      0. 0000.  CORR. Q DOUBLE PRIME 5300  12264
12265 T    002000 004641  646. 0023.  T   108. 0000.      0. 0000.  CALC. ANHARM. Q     5301  12265
12266 CA   050000 011162  646. 0024.  CA  607. 0002.      0. 0000.  LN Q, ANHARM.      5302  12266
12267 TSX  007400 403410  646. 0025.  TSX 703. 0000.  C   0. 0000.  EXPONENTIAL         5303  12267
12270 HP   042000 000000  646. 0026.  HP    0. 0000.      0. 0000.                      5304  12270
12271 ST   060100 011164  646. 0027.  ST  607. 0004.      0. 0000.  Q, ANHARMONICITY    5305  12271
12272 LR   076500 000043  646. 0028.  LR    0. 0035.      0. 0000.                      5306  12272
12273 FM   026000 011167  646. 0029.  FM  607. 0007.      0. 0000.  Q PRIME            5307  12273
12274 ST   060100 011167  646. 0030.  ST  607. 0007.      0. 0000.  CORR. Q PRIME       5308  12274
12275 LQ   056000 011170  646. 0031.  LQ  607. 0008.      0. 0000.  Q DOUBLE PRIME     5309  12275
12276 FM   026000 011164  646. 0032.  FM  607. 0004.      0. 0000.  Q, ANHARM.         5310  12276
12277 ST   060100 011170  646. 0033.  ST  607. 0008.      0. 0000.                      5311  12277
12300 LQ   056000 011167  646. 0034.  LQ  607. 0007.      0. 0000.  Q PRIME, ANHARM.   5312  12300
12301 FM   026000 011167  646. 0035.  FM  607. 0007.      0. 0000.                      5313  12301
12302 FDB  024100 011164  646. 0036.  FDB 607. 0004.      0. 0000.  Q                  5314  12302
12303 SQ  -060000 011171  646. 0037.  SQ  607. 0009.      0. 0000.                      5315  12303
12304 CA   050000 011171  646. 0038.  CA  607. 0009.      0. 0000.                      5316  12304
12305 FA   030000 011170  646. 0039.  FA  607. 0008.      0. 0000.                      5317  12305
12306 ST   060100 011170  646. 0040.  ST  607. 0008.      0. 0000.  CORR. Q DUBL PRIME, A 5318  12306
12307 T    002000 010472  646. 0041.  T   400. 0000.      0. 0000.  GATHER PARTITION FNS. 5319  12307
12310 CA   050000 003567  646. 0042.  CA  801. 0001.      0. 0000.  1                    5320  12310
12311 ST   060100 010747  646. 0043.  ST  500. 0003.      0. 0000.                      5321  12311
12312 ST   060100 010750  646. 0044.  ST  500. 0004.      0. 0000.                      5322  12312
12313 ST   060100 010751  646. 0045.  ST  500. 0005.      0. 0000.                      5323  12313
12314 T    002000 010500  646. 0046.  T   400. 0006.      0. 0000.  CALC RIG ROT FNS    5324  12314
```

Appendix B

THERMODYNAMIC FUNCTIONS OF OH MOLECULE ($^2\Pi$)

OH

2.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
1.8871000 01	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
3.7352099 03	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
8.2810000 01	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
7.1399999-01	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
		1.7008000 01	1.0000000 00		
1.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
1.8800000-03	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
-1.3969999 02	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
		0.0000000 00			

OH

50.00	25.02448	5.71423	30.73871	6.96183
100.00	29.28919	6.55990	35.84908	7.56445
150.00	32.01961	6.87685	38.89647	7.43863
200.00	34.01746	6.99896	41.01642	7.30199
250.00	35.58557	7.04953	42.63509	7.21072
298.16	36.82962	7.07044	43.90007	7.15380
300.00	36.87311	7.07094	43.94405	7.15206
400.00	38.90950	7.08188	45.99139	7.08869
500.00	40.48977	7.08012	47.56990	7.06526
600.00	41.78045	7.07759	48.85804	7.07206
700.00	42.87156	7.07889	49.95045	7.10865
800.00	43.81728	7.08620	50.90348	7.17287
900.00	44.65271	7.10032	51.75303	7.25927
1000.00	45.40186	7.12107	52.52294	7.36094
1100.00	46.08182	7.14774	53.22956	7.47129
1200.00	46.70512	7.17933	53.88444	7.58494
1300.00	47.28118	7.21480	54.49598	7.69795
1400.00	47.81727	7.25316	55.07044	7.80769
1500.00	48.31909	7.29357	55.61266	7.91252
1600.00	48.79116	7.33531	56.12646	8.01157
1700.00	49.23715	7.37778	56.61493	8.10447
1800.00	49.66009	7.42052	57.08061	8.19122
1900.00	50.06246	7.46317	57.52563	8.27199
2000.00	50.44637	7.50545	57.95182	8.34711
2100.00	50.81359	7.54716	58.36075	8.41696
2200.00	51.16565	7.58813	58.75379	8.48195

2300.00	51.50387	7.62827	59.13214	8.54249
2400.00	51.82937	7.66751	59.49688	8.59896
2500.00	52.14317	7.70578	59.84895	8.65175
2600.00	52.44614	7.74308	60.18922	8.70119
2700.00	52.73907	7.77939	60.51846	8.74760
2800.00	53.02264	7.81471	60.83736	8.79126
2900.00	53.29749	7.84906	61.14655	8.83244
3000.00	53.56416	7.88246	61.44662	8.87137
3100.00	53.82317	7.91492	61.73809	8.90825
3200.00	54.07497	7.94647	62.02145	8.94329
3300.00	54.31998	7.97715	62.29714	8.97664
3400.00	54.55858	8.00699	62.56557	9.00846
3500.00	54.79112	8.03600	62.82712	9.03889
3600.00	55.01791	8.06424	63.08214	9.06805
3700.00	55.23925	8.09171	63.33096	9.09605
3800.00	55.45540	8.11847	63.57387	9.12298
3900.00	55.66663	8.14453	63.81116	9.14894
4000.00	55.87317	8.16993	64.04309	9.17402
4100.00	56.07522	8.19468	64.26991	9.19827
4200.00	56.27299	8.21883	64.49182	9.22177
4300.00	56.46667	8.24239	64.70907	9.24458
4400.00	56.65644	8.26540	64.92183	9.26674
4500.00	56.84244	8.28786	65.13031	9.28832
4600.00	57.02485	8.30982	65.33467	9.30935
4700.00	57.20380	8.33128	65.53508	9.32987
4800.00	57.37943	8.35227	65.73170	9.34992
4900.00	57.55187	8.37280	65.92467	9.36954
5000.00	57.72124	8.39291	66.11414	9.38875

Appendix C

THERMODYNAMIC FUNCTIONS OF C_2 MOLECULE ($^3\Pi$)

C2

3.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
1.6325999 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
1.6413499 03	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
1.1669999 01	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
1.6829999-02	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
		2.4020000 01	2.0000000 00		
1.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
7.0199999-06	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
-1.6399999 01	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00	0.0000000 00
		0.0000000 00			

C2

50.00	28.93181	7.83394	36.76575	7.16576
100.00	34.29680	7.40783	41.70463	7.00034
150.00	37.28193	7.25869	44.54062	6.97586
200.00	39.36323	7.18394	46.54717	6.97064
250.00	40.96313	7.14049	48.10362	6.98103
298.16	42.21978	7.11624	49.33602	7.01391
300.00	42.26357	7.11559	49.37916	7.01969
400.00	44.30918	7.10667	51.41585	7.16685
500.00	45.89833	7.13973	53.03806	7.38686
600.00	47.20532	7.20017	54.40548	7.61869
700.00	48.32088	7.27531	55.59619	7.83062
800.00	49.29770	7.35633	56.65403	8.01235
900.00	50.16893	7.43786	57.60679	8.16402
1000.00	50.95675	7.51691	58.47366	8.28947
1100.00	51.67677	7.59199	59.26875	8.39329
1200.00	52.34043	7.66245	60.00288	8.47965
1300.00	52.95640	7.72816	60.68456	8.55205
1400.00	53.53139	7.78925	61.32064	8.61329
1500.00	54.07076	7.84597	61.91672	8.66557
1600.00	54.57883	7.89863	62.47746	8.71063
1700.00	55.05917	7.94757	63.00674	8.74983
1800.00	55.51475	7.99311	63.50786	8.78423
1900.00	55.94807	8.03556	63.98363	8.81467
2000.00	56.36126	8.07521	64.43647	8.84184
2100.00	56.75616	8.11231	64.86847	8.86628
2200.00	57.13436	8.14709	65.28144	8.88841
2300.00	57.49724	8.17976	65.67700	8.90860
2400.00	57.84602	8.21052	66.05654	8.92713
2500.00	58.18178	8.23953	66.42132	8.94424

2600.00	58.50548	8.26695	66.77243	8.96013
2700.00	58.81797	8.29290	67.11087	8.97498
2800.00	59.12001	8.31751	67.43752	8.98890
2900.00	59.41229	8.34089	67.75319	9.00203
3000.00	59.69544	8.36314	68.05858	9.01446
3100.00	59.97001	8.38434	68.35436	9.02628
3200.00	60.23653	8.40458	68.64111	9.03755
3300.00	60.49545	8.42393	68.91938	9.04834
3400.00	60.74720	8.44245	69.18965	9.05870
3500.00	60.99219	8.46020	69.45239	9.06868
3600.00	61.23076	8.47724	69.70799	9.07832
3700.00	61.46325	8.49361	69.95686	9.08766
3800.00	61.68997	8.50937	70.19933	9.09672
3900.00	61.91120	8.52454	70.43574	9.10553
4000.00	62.12720	8.53917	70.66638	9.11411
4100.00	62.33823	8.55330	70.89153	9.12249
4200.00	62.54451	8.56695	71.11146	9.13069
4300.00	62.74625	8.58016	71.32641	9.13872
4400.00	62.94365	8.59294	71.53659	9.14659
4500.00	63.13690	8.60533	71.74223	9.15433
4600.00	63.32616	8.61735	71.94351	9.16194
4700.00	63.51161	8.62902	72.14063	9.16942
4800.00	63.69340	8.64036	72.33376	9.17680
4900.00	63.87167	8.65138	72.52305	9.18408
5000.00	64.04656	8.66211	72.70867	9.19127