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FURTHER DEVELOPMENT OF AN ALGORITHM FOR THE NONLINEAR STABILITY ANALYSIS OF THE ORBITING ASTRONOMICAL OBSERVATORY "PAIRED-TRACKER" CONTROL SYSTEM

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FURTHER DEVELOPMENT OF AN ALGORITHM FOR THE NONLINEAR STABILITY ANALYSIS OF THE ORBITING ASTRONOMICAL OBSERVATORY "PAIRED-TRACKER" CONTROL SYSTEM

by

G. Geiss

V. Cohen

R. D'heedene

D. Rothschild

Systems Research Section

and

A. Chomas

Guidance and Control Section Product Engineering Department

August 1969

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Approved by: Churcher & Hack, J

Charles E. Mack, Jr. Director of Research

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ABSTRACT

This report describes the results of a study directed toward development of an effective algorithm for estimating the domain of attraction of the equilibrium state of the OAO "paired-Tracker" coarse pointing mode attitude control system via "optimal" quadratic form Liapunov functions. The algorithm is developed by formulating the estimation problem as a min-max problem which is solved by random search techniques.

The model of the system is reviewed, and several approximations to it are developed. A Popov type stability analysis is carried out for a simplified model to determine if it is absolutely stable and to then formulate a Luré type Liapunov function to be used in the estimation procedure. The results of the analysis were negative due to a pole at the origin of the linear part of the system and because the dominant nonlinearity was saturation.

The algorithm is tested on both the full nine dimensional model and a six dimensional approximation. The results for both are similar, but disappointing by comparison to simulation results. However, the estimates obtained are well into the region where the nonlinearities are dominant, and this is encouraging.

Recommendations for further research are made in the areas of: better search techniques for problems of high dimension, methods for determining the fundamental limitations of "optimal" quadratic estimation of the domain of attraction, and more direct methods of estimating the domain of attraction.

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I. INTRODUCTION

This report describes work performed under an extension to Contract NAS2-4063, "Nonlinear Analysis of the Orbiting Astronomical Observatory (OAO) Control System." It deals with the development of a numerical algorithm for estimating the domain of attraction of the equilibrium state of the NASA-Ames "paired-Tracker" coarse pointing mode attitude control system. This is the control system devised by Doolin and Showman (Refs. 1 and 2).

In our previous work (Ref. 3) we formulated the system equations in the required quasi-linear form and developed the algorithm as a min-max problem via LaSalle's theorem (Ref. 4) on the extent of asymptotic stability, and proved the feasibility of this approach. The computational approach was to use a gradient search routine (MIN-ALL) and the penalty function approach to solve the minimum problem. Since, in fact, the problem was to find a particular local minimum under a constraint and in the vicinity of the global (trivial, in this case) solution, a great deal of difficulty was encountered. At that time a random search was used to verify the results of the gradient search. It was much more effective than the gradient search, but very costly (it took some 26 minutes of IBM 360-75 time to solve the minimum problem, and this would have to be done repetitively to solve the maximum problem).

The goal of the present study, which is described in this report, is to make the feasible approach practical. We began by trying to improve the gradient search; however, this was abandoned as soon as major success was achieved in making the random search more efficient. The improved efficiency was accomplished by taking advantage of the known geometry of the problem and incorporating a

one dimensional search for the constraint surface. This was effected by judicious choice of the probability distribution of the random points and by incorporating appropriate logic to speed the search.

As soon as the algorithm for solving the minimization problem was functioning satisfactorily, attention was focused on developing an effective random search for the much higher dimensional maximization problem. Here a "creeping accelerated random search" was employed with some success. The dimensionality and complexity of this problem precluded consideration of any search based on gradients.

Thus, to summarize, the objective of this study was to attempt to make a practical tool of an algorithm whose feasibility had been proven and to investigate its effectiveness on a complex real problem. In the following (Section II), we describe briefly the derivation of the system equations and some useful approximations to these equations. Some of the approximations enable the performance of theoretical analyses; some reduce the computational complexity of the problem.

In Section III we describe a frequency domain stability analysis, based on Popov's theory, of the approximate system model and indicate why it does not work for more complex models. The objective was to establish the absolute stability of the approximate model and to derive from this a Luré-Liapunov function that might be used in the algorithm to obtain a better estimate than the quadratic form provided. This is followed (Section IV) by the details of two numerical algorithms that were constructed and tested, along with the experimental results obtained for the complete model and one approximate model and some two dimensional test problems.

Section V details the difficulties encountered in the study and the shortcomings of our approach, along with the outlines of some problems whose solutions might contribute to improving the state of the art in estimating the domain of attraction of physical nonlinear systems. The summary (Section VI) places in capsule form the salient features of the study. Details of the computer programs used in the study are found in the appendices.

II. THE SYSTEM MODEL AND ITS APPROXIMATIONS

Review of Original Model

The basic block diagram of the system is given in Fig. 1.



Fig. 1 Block Diagram of Basic Model

Star Tracker Model

The relationship of the inertial reference coordinates (x_r, y_r, z_r) and body coordinates (x_b, y_b, z_b) is given by a set of rotation transformations $R_{\phi}, R_{\theta}, R_{\psi}$,

$$\begin{pmatrix} \mathbf{x}_{\mathbf{r}} \\ \mathbf{y}_{\mathbf{r}} \\ \mathbf{z}_{\mathbf{r}} \end{pmatrix} = \mathbf{R}_{\psi} \mathbf{R}_{\theta} \mathbf{R}_{\phi} \begin{pmatrix} \mathbf{x}_{\mathbf{b}} \\ \mathbf{y}_{\mathbf{b}} \\ \mathbf{z}_{\mathbf{b}} \end{pmatrix} ,$$

(1)

(2)

where the Euler angles ϕ, θ, ψ are, respectively, the roll, pitch, and yaw angles with respect to the reference coordinates, and $R_{\phi}, R_{\theta}, R_{\psi}$ are given by

$$R_{\phi} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & c\phi & -s\phi \\ 0 & s\phi & c\phi \end{pmatrix},$$
$$R_{\theta} = \begin{pmatrix} c\theta & 0 & s\theta \\ 0 & 1 & 0 \\ -s\theta & 0 & c\theta \end{pmatrix},$$

and

$$R_{\psi} = \begin{pmatrix} c\psi & -s\psi & 0 \\ s\psi & c\psi & 0 \\ 0 & 0 & 1 \end{pmatrix} .$$

For each Star Tracker, the relationship between the Tracker and Tracker reference coordinates is given by the rotation transformations $R_{\alpha}, R_{\beta}, R_{\gamma}$, viz.,

$$\begin{pmatrix} \mathbf{x}_{T} \\ \mathbf{y}_{T} \\ \mathbf{z}_{T} \end{pmatrix} = \mathbf{R}_{\alpha} \mathbf{R}_{\beta} \mathbf{R}_{\gamma} \begin{pmatrix} \mathbf{x}_{TR} \\ \mathbf{y}_{TR} \\ \mathbf{z}_{TR} \end{pmatrix} , \qquad (3)$$

where γ,β are the outer and inner gimbal angles, and the angle α is the rotation about the Tracker optical axis. In Ref. 3, two equations for each Star Tracker are derived by relating the actual and commanded values of β and γ with the corresponding error differences $\Delta\beta$ and $\Delta\gamma$. The equations are given below:

$$\Delta \beta_{1} = \sin^{-1} \left(c \psi c \theta s \beta_{1C} + s \psi c \theta c \gamma_{1C} c \beta_{1C} + s \theta s \gamma_{1C} c \beta_{1C} \right) - \beta_{1C}$$

$$\Delta \gamma_{1} = \tan^{-1} \left(\frac{-(s \psi s \phi + c \psi s \theta c \phi) s \beta_{1C} + (c \psi s \phi - s \psi s \theta c \phi) c \gamma_{1C} c \beta_{1C} + c \theta c \phi s \gamma_{1C} c \beta_{1C}}{-(s \psi c \phi - c \psi s \theta s \phi) s \beta_{1C} + (c \psi c \phi + s \psi s \theta s \phi) c \gamma_{1C} c \beta_{1C} - c \theta s \phi s \gamma_{1C} c \beta_{1C}} \right) - \gamma_{1C}$$

$$\Delta \beta_2 = \sin^{-1} (c\psi c\theta s\beta_{2C} - s\psi c\theta c\gamma_{2C} c\beta_{2C} - s\theta s\gamma_{2C} c\beta_{2C}) - \beta_{2C}$$

$$\Delta \gamma_2 = \tan^{-1} \left(\frac{(s\psi s\phi + c\psi s\theta c\phi) s\beta_{2C} + (c\psi s\phi - s\psi s\theta c\phi) c\gamma_{2C} c\beta_{2C} + c\theta c\phi s\gamma_{2C} c\beta_{2C}}{(s\psi c\phi - c\psi s\theta s\phi) s\beta_{2C} + (c\psi c\phi + s\psi s\theta s\phi) c\gamma_{2C} c\beta_{2C} - c\theta s\phi s\gamma_{2C} c\beta_{2C}} \right) - \gamma_{2C}$$

(4)

$$\Delta \beta_{3} = \sin^{-1} \left(c\psi c\theta s\beta_{3c} + s\psi c\theta s\gamma_{3c} c\beta_{3c} - s\theta c\gamma_{3c} c\beta_{3c} \right) - \beta_{3c}$$

$$\Delta \gamma_{3} = \tan^{-1} \left(\frac{-(s\psi c\phi - c\psi s\theta s\phi) s\beta_{3c} + (c\psi c\phi + s\psi s\theta s\phi) s\gamma_{3c} c\beta_{3c} + c\theta s\phi c\gamma_{3c} c\beta_{3c}}{(s\psi s\phi + c\psi s\theta c\phi) s\beta_{3c} - (c\psi s\phi - s\psi s\theta c\phi) s\gamma_{3c} c\beta_{3c} + c\theta c\phi c\gamma_{3c} c\beta_{3c}} \right) - \gamma_{3c}$$

$$\Delta \beta_{4} = \sin^{-1} (c\psi c\theta s\beta_{4C} - s\psi c\theta s\gamma_{4C} c\beta_{4C} + s\theta c\gamma_{4C} c\beta_{4C}) - \beta_{4C}$$

$$\Delta \gamma_{4} = \tan^{-1} \left(\frac{+(s\psi c\phi - c\psi s\theta s\phi) s\beta_{4C} + (c\psi c\phi + s\psi s\theta s\phi) s\gamma_{4C} c\beta_{4C} + c\theta s\phi c\gamma_{4C} c\beta_{4C}}{-(s\psi s\phi + c\psi s\theta c\phi) s\beta_{4C} - (c\psi s\phi - s\psi s\theta c\phi) s\gamma_{4C} c\beta_{4C} + c\theta c\phi c\gamma_{4C} c\beta_{4C}} \right) - \gamma_{4C}$$

Error Processor and Actuator

The equations for the "partial processor" used in our model for Trackers 1 and 2 are

$$\begin{pmatrix} \epsilon_{\phi} \\ \epsilon_{\theta} \\ \epsilon_{\psi} \end{pmatrix} = \begin{pmatrix} 0 & 1 & 0 \\ d_{12}c(\gamma_{2c} + \Delta\gamma_{2}) & 0 & d_{12}c(\gamma_{1c} + \Delta\gamma_{1}) \\ -d_{12}s(\gamma_{2c} + \Delta\gamma_{2}) & 0 & -d_{12}s(\gamma_{1c} + \Delta\gamma_{1}) \end{pmatrix} \begin{pmatrix} \Delta\beta_{1} \\ \Delta\gamma_{1} \\ \Delta\beta_{2} \end{pmatrix} .$$
(5)

Each of these signals passes through a lead-lag compensation network, thereby producing the set of typical equations:

$$\dot{\omega}_{\phi} + \frac{1}{\tau_{2}} \omega_{\phi} = -K_{c} \frac{\tau_{1}}{\tau_{2}^{2}} \epsilon_{\phi}$$
$$V_{\phi}' = \omega_{\phi} + K_{c} \left(1 + \frac{\tau_{1}}{\tau_{2}}\right) \epsilon_{\phi}$$

with a similar set of equations for θ and ψ . Here V' denotes the output voltage of the compensation network.

The motor saturation is represented as

$$\mathbf{V}'' = \mathbf{f}(\mathbf{V}') , \qquad (7)$$

(6)

where

$$f(V') = \begin{cases} 26 , V' > 26 \text{ volts} \\ V' , |V'| \le 26 \text{ volts} \\ -26 , V' < -26 \text{ volts} \end{cases}$$
(8)

Incorporating the dynamic equations for the motors, momentum wheels, and vehicle in state variable form, and neglecting gyroscopic torques due to the momentum wheels, the state equations for the momentum wheels and vehicle reduce to

$$\vec{v}_{\phi} + \frac{1}{\tau_{m}} v_{\phi} = \frac{K_{m}}{\tau_{m}} V_{\phi}''$$

$$p = -\frac{1}{I} v_{\phi} + \left(p(0) + \frac{1}{I} v_{\phi}(0) \right)$$

$$\vec{v}_{\theta} + \frac{1}{\tau_{m}} v_{\theta} = \frac{K_{m}}{\tau_{m}} V_{\phi}'$$

$$q = -\frac{1}{I} v_{\theta} + \left(q(0) + \frac{1}{I} v_{\theta}(0) \right)$$

$$\vec{v}_{\psi} + \frac{1}{\tau_{m}} v_{\psi} = \frac{K_{m}}{\tau_{m}} V_{\psi}'$$

$$r = -\frac{1}{I} v_{\psi} + \left(r(0) + \frac{1}{I} v_{\psi}(0) \right)$$

$$,$$

(9)

where p,q,r are the rotational rates about the body axes x_b, y_b, z_b and $v_{\phi}, v_{\theta}, v_{\psi}$ are the wheel momentum variables. The equations for the Euler angles ϕ, θ, ψ are

$$\begin{split} \phi &= p + (t\theta s\phi)q + (t\theta c\phi)r \\ \vdots \\ \theta &= (c\phi)q - (s\phi)r \\ \psi &= \frac{s\phi}{c\theta}q + \frac{c\phi}{c\theta}r \end{split}$$
 (10)

The equations presented thus far are summarized in the block diagram of Fig. 2.

Reformulation of the State Equations

For the numerical portion of our stability analysis, we require the system state equations to take the form



Typical Forward Channel [a) Without Wheel Gyro-scopic Torques] and Feedback Path [b) Based on Gimbal Angle Rate Equations] \sim , gir M

$$\dot{\mathbf{x}} = \mathbf{A}\mathbf{x} + \mathbf{f}(\mathbf{x}) , \qquad (11)$$

where x is the state vector of appropriate dimension, A is the matrix of the linear part, and f(x) is the collection of nonlinear terms that have no linear part, i.e.

$$\lim_{\|\mathbf{x}\| \to 0} \frac{\|\mathbf{f}(\mathbf{x})\|}{\|\mathbf{x}\|} = 0 .$$
 (12)

First we define a set of variables whose value at equilibrium $(\dot{x} = 0)$ will be zero, viz.,

$$\Phi' = \Phi - \Phi_{e}$$

$$\theta' = \theta - \theta_{e}$$

$$\psi' = \psi - \psi_{e}$$

$$v_{\phi}' = v_{\phi} - Ih_{\phi}^{O}$$

$$v_{\theta}' = v_{\theta} - Ih_{\theta}^{O}$$

$$v_{\psi}' = v_{\psi} - Ih_{\psi}^{O}$$

$$\omega_{\phi}' = \omega_{\phi} - \left(-\frac{\tau_{1}I}{\tau_{2}K_{m}} \cdot h_{\phi}^{O}\right)$$

$$\omega_{\theta}' = \omega_{\theta} - \left(-\frac{\tau_{1}I}{\tau_{2}K_{m}} h_{\theta}^{O}\right)$$

$$\omega_{\psi}' = \omega_{\psi} - \left(-\frac{\tau_{1}I}{\tau_{2}K_{m}} h_{\theta}^{O}\right)$$

(13)

where

$$h_{\phi}^{o} = p(0) + \frac{1}{I} v_{\phi}(0)$$

$$h_{\theta}^{o} = q(0) + \frac{1}{I} v_{\theta}(0)$$

$$h_{\psi}^{o} = r(0) + \frac{1}{I} v_{\psi}(0) , \qquad (14)$$

and ${}^{\phi}{}_{e}, {}^{\phi}{}_{e}, {}^{\psi}{}_{e}$ are the offset angles that are complicated functions of the initial angular momentum $Ih_{\phi}^{0}, Ih_{\theta}^{0}, Ih_{\psi}^{0}$ and the commanded gimbal angles.

The equations using this newly-defined set of state variables become

$$\dot{\phi}' = -\frac{1}{I} v_{\phi}' - \frac{(t\theta s\phi)}{I} v_{\theta}' - \frac{(t\theta c\phi)}{I} v_{\psi}'$$

$$\dot{v}_{\phi}' = -\frac{1}{\tau_{m}} v_{\phi}' + \frac{K_{m}}{\tau_{m}} f \left(K_{c} \left(1 + \frac{\tau_{1}}{\tau_{2}} \right) \epsilon_{\phi}' + \omega_{\phi}' + \frac{I}{K_{m}} h_{\phi}^{0} \right) - \frac{I}{\tau_{m}} h_{\phi}^{0}$$

$$\dot{\omega}_{\phi}' = -\frac{1}{\tau_{m}} \omega_{\phi}' - \frac{K_{c} \tau_{1}}{\tau_{2}^{2}} \epsilon_{\phi}'$$
(15)

$$\dot{\theta}' = -\frac{(c\phi)}{I} v_{\theta}' + \frac{(s\phi)}{I} v_{\psi}'$$

$$\dot{v}_{\theta}' = -\frac{1}{\tau_{m}} v_{\theta}' + \frac{K_{m}}{\tau_{m}} f \left(K_{c} \left(1 + \frac{\tau_{1}}{\tau_{2}} \right) \epsilon_{\theta}' + \omega_{\theta}' + \frac{I}{K_{m}} h_{\theta}^{o} \right) - \frac{I}{\tau_{m}} h_{\theta}^{o}$$

$$\dot{\omega}_{\theta}' = -\frac{1}{\tau_{2}} \omega_{\theta}' - \frac{K_{c} \tau_{1}}{\tau_{2}^{2}} \epsilon_{\theta}'$$

$$\begin{split} \dot{\psi}' &= -\frac{8\Phi}{1c\theta} v_{\theta}' - \frac{c\Phi}{1c\theta} v_{\psi}' \\ \dot{v}_{\psi}' &= -\frac{1}{\tau_{m}} v_{\psi}' + \frac{K_{m}}{\tau_{m}} f\left(K_{c} \left(1 + \frac{\tau_{1}}{\tau_{2}} \right) \epsilon_{\psi}' + \omega_{\psi}' + \frac{1}{K_{m}} h_{\psi}^{o} \right) - \frac{1}{\tau_{m}} h_{\psi}^{o} \\ \dot{\omega}_{\psi}' &= -\frac{1}{\tau_{2}} \omega_{\psi}' - \frac{K_{c} \tau_{1}}{\tau_{2}^{2}} \epsilon_{\psi}' \\ \epsilon_{\phi}' &= a_{11} \Delta \beta_{1} + \Delta \gamma_{1} + a_{13} \Delta \beta_{2} - \frac{1}{K_{c} K_{m}} h_{\phi}^{o} \\ \epsilon_{\theta}' &= d_{12} c \left(\gamma_{2c} + \Delta \gamma_{2} \right) \cdot \Delta \beta_{1} + d_{12} c \left(\gamma_{1c} + \Delta \gamma_{1} \right) \cdot \Delta \beta_{2} - \frac{1}{K_{c} K_{m}} h_{\theta}^{o} \quad (15) \\ \epsilon_{\psi}' &= - d_{12} s \left(\gamma_{2c} + \Delta \gamma_{2} \right) \cdot \Delta \beta_{1} - d_{12} s \left(\gamma_{1c} + \Delta \gamma_{1} \right) \cdot \Delta \beta_{2} - \frac{1}{K_{c} K_{m}} h_{\theta}^{o} \\ \Delta \beta_{1} &= \sin^{-1} (c \psi c \theta s \beta_{1c} + s \psi c \theta c \gamma_{1c} c \beta_{1c} + s \theta s \gamma_{1c} c \beta_{1c}) - \beta_{1c} \\ \Delta \gamma_{1} &= \tan^{-1} \frac{1}{D_{1}} \left(-(s \psi s \phi + c \psi s \theta c \phi) s \beta_{1c} + (c \psi s \phi - s \psi s \theta c \phi) c \gamma_{1c} c \beta_{1c} \\ &+ c \theta c \phi s \gamma_{1c} c \beta_{1c} \right) - \gamma_{1c} \\ D_{1} &= \left(-(s \psi c \phi - c \psi s \theta s \phi) s \beta_{1c} + (c \psi c \phi + s \psi s \theta s \phi) c \gamma_{1c} c \beta_{1c} \\ &- c \theta s \phi s \gamma_{1c} c \beta_{1c} \right) \end{split}$$

$$\Delta\beta_{2} = \sin^{-1}(c\psi c\theta s\beta_{2c} - s\psi c\theta c\gamma_{2c} c\beta_{2c} - s\theta s\gamma_{2c} c\beta_{2c}) - \beta_{2c}$$

$$\Delta\gamma_{2} = \tan^{-1} \frac{1}{D_{2}} \left((s\psi s\phi + c\psi s\theta c\phi) s\beta_{2c} + (c\psi s\phi - s\psi s\theta c\phi) c\gamma_{2c} c\beta_{2c} + c\theta c\phi s\gamma_{2c} c\beta_{2c} \right) - \gamma_{2c}$$

$$D_{2} = \left((s\psi c\phi - c\psi s\theta s\phi) s\beta_{2c} + (c\psi c\phi + s\psi s\theta s\phi) c\gamma_{2c} c\beta_{2c} - c\theta s\phi s\gamma_{2c} c\beta_{2c} \right)$$

The details of putting these equations into the required form, Eq. (11), are given in Ref. 5, and the general form of the result is illustrated in Fig. 3. The A_{ij} are complicated functions of the commanded gimbal angles and the initial total momenta, and these too are tabulated in Ref. 5. Their linearizations about $\phi_e = \theta_e = \psi_e = 0$ are given in Ref. 3.

If the effects of nonzero equilibrium are assumed to be negligibly small, then the equations of Fig. 3 become those of Fig. 4, where the variables v',ω' have been rescaled to be dimensionless, i.e.,

$$v_{\theta}'' = \frac{1}{K_{m}K_{c}}v_{\theta}', \text{ etc.}, \quad \omega_{\theta}'' = \frac{\tau_{2}}{K_{c}\tau_{1}}\omega_{\theta}', \text{ etc.}$$
 (16)

Note that nonzero initial momenta, $Ih_{\phi}^{o}, Ih_{\theta}^{o}, Ih_{\psi}^{o}$, have the effect of displacing the linear regions of the corresponding saturation terms for f_2 , f_5 , and f_7 .

Effects of Offset on Linear Models

In the models used for our study, the assumption of zero angular offset at equilibrium was made in determining the

State Equations Based on Tracker Angle Model 1 $-K_{c} \frac{\tau_{1}}{\tau_{z}^{2}} \left[\left(a_{11} \Delta \beta_{1} + \Delta Y_{1} + a_{13} \Delta \beta_{z} \right) - \phi' \right] - A_{34} \theta' - A_{37} \psi' + \frac{I\tau_{1}}{K_{m}\tau_{z}^{8}} h_{\phi}^{0}$ $+\frac{K_{m}}{r_{m}}f\left[-K_{c}\left(1+\frac{r_{1}}{r_{2}}\right)d_{12}\left(s(\Delta Y_{2}+Y_{2c})\cdot\Delta\beta_{1}+s(\Delta Y_{1}+Y_{1c})\cdot\Delta\beta_{2}\right)+\omega_{V}^{i}-\frac{r_{1}\cdot\mathbf{I}}{r_{2}\cdot\mathbf{K}}h_{V}^{i}\right]$ $\Delta \gamma_{1} = i \, dn^{-1} \left(\begin{array}{c} -(s \psi s \phi + c \psi s \theta c \phi) s \beta_{1c} + (c \psi s \phi - s \psi s \theta c \phi) c \gamma_{1c} c \beta_{1c} + c \theta c \phi s \gamma_{1c} c \beta_{1c} \\ -(s \psi c \phi - c \psi s \theta s \phi) s \beta_{1c} + (c \psi c \phi + s \psi s \theta s \phi) c \gamma_{1c} c \beta_{1c} - c \theta s \phi s s \gamma_{1c} c \beta_{1c} \\ \end{array} \right) - \gamma_{1c} , \quad \Delta \gamma_{2} = i \, dn^{-1} \left(\begin{array}{c} + + + + \\ + - + - \\ + - + \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + + \\ + - \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + + \\ + - \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + \\ + - \end{array} \right) - \gamma_{2c} + 2 \, dn^{-1} \left(\begin{array}{c} + + \\ + -$ $+\frac{K_{m}}{r_{m}}f\left[K_{c}d_{lz}\left(1+\frac{r_{l}}{r_{z}}\right)\left(c(\Delta Y_{z}+Y_{2c})\cdot\Delta B_{l}+c(\Delta Y_{l}+Y_{1c})\cdot\Delta B_{z}\right)+w\dot{\theta}-\frac{r_{l}\chi}{r_{z}}h_{\theta}^{0}\right]$ $-\frac{1}{1c\left(\theta'+\theta_{\theta}\right)}\left[\nu_{\theta}^{i}s\left(\phi'+\phi_{\theta}\right)+\nu_{\theta}^{i}\left(c\left(\phi'+\phi_{\theta}\right)-1\right)\right]-A_{73}\nu_{\theta}^{i}-A_{76}\nu_{\theta}^{i}$ 14 $-\kappa_{c} \frac{\tau_{1}}{\tau_{2}^{2}} d_{12} \left(c \left(\Delta Y_{2} + Y_{2c} \right) \cdot \Delta \beta_{1} + c \left(\Delta Y_{1} + Y_{1c} \right) \cdot \Delta \beta_{2} \right)$ $-A_{Si} \models -A_{Si4} \theta' - A_{Si7} = \frac{K_m}{r_m} \omega_{\theta}^0 - \frac{1}{r_m} h_{\theta}^0$ $-i(\theta' + \theta_{e}) \left[\frac{1}{T} v_{\theta'} s(\phi' + \phi_{e}) + \frac{1}{T} v_{\psi} c(\phi' + \phi_{e}) \right] - A_{15} v_{\theta} - A_{16} v_{\psi}$ $+\frac{K_{m}}{r_{m}}f\left[K_{c}\left(1+\frac{\tau_{1}}{\tau_{2}}\right)\left(a_{11}\Delta\beta_{1}+\Delta\gamma_{1}+a_{13}\Delta\beta_{2}\right)+\omega_{4}-\frac{\tau_{1}I}{\tau_{2}K_{m}}h_{4}^{6}\right]$ $-\frac{K_{ff}}{Tm}K_{c}\left(1+\frac{\tau_{1}}{\tau_{2}}\right)\phi'-A_{24}\theta'-A_{27}\psi'-\frac{K_{m}}{\tau_{m}}\omega'\phi-\frac{T}{\tau_{m}}h_{\phi}^{\bullet}$ $-\frac{1}{T}\left[-\nu_{\theta'}\left(c \left(\dot{\phi}^{'} + \dot{\phi}_{\theta'} \right)^{-1} \right) + \nu_{\psi} \dot{\psi} s \left(\dot{\phi}^{'} + \dot{\phi}_{\theta'} \right) \right] - A_{43} \nu_{\theta'} \dot{\phi} - A_{46} \nu_{\psi'} \dot{\psi}$ $K_{C} \frac{\tau_{1}}{\tau_{2}^{2}} d_{12} \left(s(\Delta \gamma_{2} + \gamma_{2C}) \cdot \Delta \beta_{1} + s(\Delta \gamma_{1} + \gamma_{1C}) \Delta \beta_{2} \right)$ $-A_{61} \phi - A_{64} \theta - A_{67} \psi + \frac{Ir_1}{K_m r_2^2} h_{\theta}^{0}$) - B_{2C} $-A_{SI} \not\Leftrightarrow -A_{SA} \not\Theta \dot{} - A_{S7} \not\Leftrightarrow \dot{} + \frac{Ir_{I}}{Kmr_{2}^{2}} h_{\psi}^{\circ}$ Fig. 3 1 ł $-A_{\text{El}} \Rightarrow -A_{\text{E4}} \theta' - A_{\text{E7}} \psi' - \frac{K_{\text{III}}}{r_{\text{IIII}}} \omega \psi' - \frac{I}{r_{\text{IIIIII}}} h_{\psi}^{0}$ $\Delta \beta_1 = \sin^{-1}(c \neq c \theta s \beta_{1C} + s \neq c \theta c Y_{1C} c \beta_{1C} + s \theta s Y_{1C} c \beta_{1C}) - \beta_{1C}$, $\Delta \beta_2 = \sin^{-1}(+)$ 1 n saman saman sadah sinin sinin sinin sinin sinin sinin \$ - 0 2 - ⊛ ⊃ -9 - 0 3 ÷ - -)> Э -Î - **^**a • ٥ א ב|ב + -| 2 0 0 0 0 0 0 0 A_{ie} -| ^e Aas A₇₈ 0 0 0 0 0 A27 A37 AGT Asr 0 0 Asr Å97 0 * E -|2 0 0 0 0 0 0 0 Åıs A45 -| <mark>,</mark>E A75 0 0 0 0 0



Nondimensional State Equations Based on Tracker Angle Model- $\Delta Y_{1} = 1 \operatorname{dn}^{-1} \left(\frac{-(s \psi s \phi + c \psi s \theta c \phi) s \beta_{1C} + (c \psi s \phi - s \psi s \theta c \phi) c Y_{1C} c \beta_{1C} + c \theta c \phi s Y_{1C} c \beta_{1C}}{-(s \psi c \phi - c \psi s \theta s \phi) s \beta_{1C} + (c \psi c \phi + s \psi s \theta s \phi) c Y_{1C} c \beta_{1C} - c \theta s \phi s Y_{1C} c \beta_{1C}} \right) - Y_{1C}, \quad \Delta Y_{2} = 1 \operatorname{dn}^{-1} \left(\frac{+ + + + -}{+ - -} \right) - Y_{2C}$ $\frac{1}{K_{c} \tau_{m}} f \left\{ K_{c} d_{12} \left(1 + \frac{\tau_{1}}{\tau_{2}} \right) \left(c(\Delta \gamma_{2} + \gamma_{2c}) \cdot \Delta \beta_{1} + c(\Delta \gamma_{1} + \gamma_{1c}) \cdot \Delta \beta_{2} \right) + \frac{K_{c} \tau_{1}}{\tau_{2}} \omega_{\beta}^{2} - \frac{\tau_{1} I}{\tau_{2} K_{m}} h_{\beta}^{2} \right)$ $\frac{1}{K_{c} \ r_{m}} \ f \ \left| -K_{c} \left(i \ + \ \frac{\tau_{1}}{\tau_{2}} \right) d_{12} \left(s (\Delta \gamma_{2} \ + \ \gamma_{2c}) \cdot \Delta \beta_{1} \ + \ s (\Delta \gamma_{1} \ + \ \gamma_{1c}) \cdot \Delta \beta_{2} \right) + \frac{K_{c} \ \tau_{1}}{\tau_{2}} \ \omega_{\frac{w}{V}} \ - \ \frac{\tau_{1} \ L}{\tau_{2} \ K_{m}} \ h_{\psi}^{o} \right) \right|$ $-\frac{1}{\tau_{2}} \left[\left(a_{11} \Delta \beta_{1} + \Delta \gamma_{1} + a_{13} \Delta \beta_{2} \right) - \left(\phi^{\prime} + \left(a_{11} \cdot \delta \gamma_{1c} - \beta_{1c} \cdot c \gamma_{1c} - a_{13} \cdot \delta \gamma_{2c} \right) \theta^{\prime} \right] \right]$ $-\frac{1}{K_{c} r_{m}} \left[K_{c} d_{12} \left(1 + \frac{T_{i}}{r_{2}} \right) \left(s \left(\gamma_{1c} - \gamma_{2c} \right) \right) \theta + \frac{K_{c} r_{i}}{r_{2}} \omega_{\beta} \right] - \frac{1}{K_{m} K_{c} r_{m}} h_{\beta}^{\circ}$ $+ \left[a_{11} c \gamma_{1c} + i \beta_{1c} s \gamma_{1c} - a_{13} c \gamma_{2c} \right] = \frac{\tau_1}{\tau_m \tau_2} \omega_{\phi}^{*} - \frac{1}{K_m K_c \tau_m} h_{\phi}^{\circ}$ $\frac{1}{K_{c}} f \left[K_{c} \left(i + \frac{v_{1}}{r_{z}} \right) \left(a_{11} \Delta B_{1} + \Delta v_{1} + a_{13} \Delta B_{z} \right) + \frac{K_{c} v_{1}}{r_{z}} \omega_{\phi}^{2} - \frac{v_{1} L}{r_{z} K_{m}} h_{\phi}^{2} \right) \right]$ $-\frac{1}{K_{c}T_{m}}\left[+K_{c}\left(1+\frac{\tau_{1}}{\tau_{2}}\right)d_{12}a(\gamma_{1c}-\gamma_{2c})\psi'+\frac{K_{c}\tau_{1}}{\tau_{2}}\omega\ddot{\psi}\right]-\frac{1}{K_{m}K_{c}T_{m}}h_{\psi}^{o}$ $-\frac{1}{K_{c}}\left[K_{c}\left(1+\frac{T_{c}}{T_{z}}\right)\left(\phi^{\prime}+\left(\theta_{11}-s\right)^{\prime}c-t\beta_{1c}c^{\prime}c_{1c}-\theta_{13}s^{\prime}z_{2c}\right)\theta^{\prime}\right]$ + $(a_{11} cY_{1C} + iB_{1C}sY_{1C} - a_{13} cY_{2C})\psi' \Big) + \frac{I}{r_{2}K_{C}K_{m}}h_{\phi}^{o}$ 1 - B20 $-\frac{1}{1c\theta}\left[K_{m}K_{c}\nu_{\theta}^{2}s\phi + K_{m}K_{c}\nu_{\psi}^{2}(c\phi - c\theta)\right]$ $-\frac{d_{12}}{\tau_{2}}\left(c(\Delta\gamma_{2}+\gamma_{2c})\cdot\Delta\beta_{1}+c(\Delta\gamma_{1}+\gamma_{1c})\Delta\beta_{2}\right)$ $+ \frac{d_{12}}{\tau_{2}^{2}} \left(s(\gamma_{1c} - \gamma_{2c}) \right) \theta' + \frac{1}{\tau_{2}K_{c}K_{m}} h_{\theta}^{2}$ $-\left[\frac{K_mK_c}{I}v_{\beta}^{"}(c\phi-l)-\frac{K_mK_c}{I}v_{\phi}^{"}s\phi\right]$ $\frac{d_{12}}{\tau_{2}} \left(s \left(\Delta \gamma_{2} + \gamma_{2C} \right) \cdot \Delta \beta_{1} + s \left(\Delta \gamma_{1} + \gamma_{1C} \right) \cdot \Delta \beta_{2} \right)$ $= i \vartheta \left[\frac{\kappa_m \kappa_c}{1} v_{\vartheta} s_{\vartheta} + \frac{\kappa_m \kappa_c}{1} v_{\varphi} s_{\varphi} \right] = 0$ + $\frac{d_{12}}{\tau_2}$ s(γ_{1c} - γ_{2c}) ψ' + $\frac{I}{\tau_2 K_c K_m} h_{\psi}^{\circ}$ Δβ. = sın −! (c∳c8sβsic + s∳c8cYıccβic + s8sYıccβıc) − βıc , Δβ. = sın ^{-!} (+ -Fig. 4 ÷ sgn d₁₂ = sgn ($\chi_{1c} - \chi_{2c}$) -* Э ະ0 ລ `+ " ♣ ```` `o . . e ° ∳ 3 -10ŝ ۱. r_m r₂ -|~ 0 0 0 ¢ 0 0 0 - X^mK_c -|**,**E 0 0 0 0 0 0 Q $\frac{-d_{12}}{\tau_2} s (\gamma_{1c} - \gamma_{2c})$ • d12 \$ (Yic - Yzc) - (a 11 C 71C + 1B1C 371C τ₁ + τ₂ τ_mτ₂ $\frac{-\alpha_{13} c \gamma_{2c}}{\tau_{1} + \tau_{2}}$ (α ₁₁ c ^γic * t β₁c s ^γic - 013 CY2C) $\omega_{\beta}^{*} = \frac{\tau_{2}}{K_{c}\tau_{1}} \omega_{\beta}^{*} = \frac{\tau_{2}}{K_{c}\tau_{1}} \left(\omega_{\beta} + \frac{\tau_{1}I}{\tau_{2}K_{m}} h_{\beta}^{*} \right), \text{ etc.}$ 0 0 0 0 0 -| $v_{\theta} = \frac{1}{K_{m}K_{c}} v_{\theta}^{i} = \frac{1}{K_{m}K_{c}} \left(v_{\theta} - Ih_{\theta}^{o} \right)$, etc. τ_m τ₂ -| ~ 0 0 0 0 0 0 0 -|^E - KmKc 0 0 0 0 0 0 0 θ'= θ-θ_e, etc. $\frac{d_{12}}{\tau_2}$ s ($\gamma_{1c} - \gamma_{2c}$) $d_{12} = (\gamma_{1c} - \gamma_{2c})$ - d₁₃ 37₂c) - (0₁₁ sY_{1C} - 1/B_{1C} cY_{1C} 1 BIC CYIC $\begin{array}{c} - q_{13} s \gamma_{2C} \\ \overline{r_1 + r_2} \\ \overline{r_m r_2} \end{array}$ τ₁ + τ₂ τ_m τ₂ (a₁₁ \$ 7_{1C} 0 0 0 0 0

15 Offset Neglected



linearized part of the matrix differential equations. To be exact, however, the state equations should be linearized about the true equilibrium values of the roll, pitch, and yaw angles.

A computer program was written for the IBM 360/75 to compare eigenvalues of the matrices of the linear part which were derived by assuming both zero and nonzero offset, for various values of commanded gimbal angles and initial momenta. Results have shown that for a range of commanded gimbal angles and initial total momenta well beyond those expected, that the differences in both real and imaginary parts of the calculated eigenvalues occur in the fourth significant figure for the actual OAO system (Ref. 6) and in the fifth figure for the "paired-Tracker" system.

System Model with Motor Saturation Only

An analysis of the simplified system where the only nonlinearities considered are those of motor saturation has been carried out literally because the numerical computation was too sensitive. The simplified system is represented as

$$x = Ax + Gf(v) , \qquad (17)$$

where G is a 9×3 matrix, f(v) is a three vector of saturation functions obtained from f(x) by deleting all nonlinear terms except saturation, and v is a three dimensional vector. These terms are:

	0	$-\frac{K_{mc}}{I}$	· 0	0	0	0	0	0	0
	0	$-\frac{1}{\tau_{m}}$	0	0	0	0	0.	.0	0
	$-\frac{1}{\tau_2}$	0	$-\frac{1}{\tau_2}$	^{2t^β1c^{cγ}1c}	0	0	-2t ^β 1c ^{sγ} 1c	0	0
	0	0	0	0	$-\frac{\frac{K}{m}}{I}$	0	0	0	0
A =	0	0	0	0	- <u>1</u> τ _m	0	0	0	0
	0	0	0	$-\frac{1}{\tau_2}$	0	$-\frac{1}{\tau_2}$	0	0	0
	0	0	0	0	0	0	0	$-\frac{K_{mc}}{I}$	0
	0	0	0	0	0	0	0	$-\frac{1}{\tau_{m}}$	0
	0	0	• 0	0	0	0	$-\frac{1}{\tau_2}$	0	$-\frac{1}{\tau_2}$



$$\mathbf{x}' = \begin{bmatrix} \mathbf{v}', \mathbf{v}_{\phi}', \mathbf{\omega}_{\phi}'', \mathbf{\theta}', \mathbf{v}_{\theta}', \mathbf{\omega}_{\theta}''', \mathbf{v}_{\theta}'', \mathbf{v}_{\psi}'', \mathbf{v}_{\psi}'' \end{bmatrix}$$
$$\mathbf{\omega}_{\theta}''' = \frac{\mathbf{\omega}_{\theta}''}{\mathbf{d}_{12}\mathbf{s}(\gamma_{1c} - \gamma_{2c})} \quad ; \quad \mathbf{\omega}_{\psi}''' = \frac{\mathbf{\omega}_{\psi}''}{\mathbf{d}_{12}\mathbf{s}(\gamma_{1c} - \gamma_{2c})}$$

$$f(\mathbf{v}) = \begin{bmatrix} f \left\{ K_{c} \left(1 + \frac{\tau_{1}}{\tau_{2}} \right) (\phi' - t\beta_{1c} c \gamma_{1c} \phi' + t\beta_{1c} s \gamma_{1c} \psi' \right) + \frac{K_{c} \tau_{1}}{\tau_{2}} d_{12} s (\gamma_{1c} - \gamma_{2c}) \omega_{\phi}^{'''} + \frac{\mathbf{I}}{K_{m}} h_{\phi}^{0} \right\} - \frac{\mathbf{I}}{K_{m}} h_{\phi}^{0} \\ f \left\{ K_{c} \left(1 + \frac{\tau_{1}}{\tau_{2}} \right) d_{12} \left[s (\gamma_{1c} - \gamma_{2c}) \cdot \theta' \right] + \frac{K_{c} \tau_{1}}{\tau_{2}} d_{12} s (\gamma_{1c} - \gamma_{2c}) \omega_{\theta}^{'''} + \frac{\mathbf{I}}{K_{m}} h_{\theta}^{0} \right\} - \frac{\mathbf{I}}{K_{m}} h_{\theta}^{0} \\ f \left\{ K_{c} \left(1 + \frac{\tau_{1}}{\tau_{2}} \right) d_{12} \left[s (\gamma_{1c} - \gamma_{2c}) \cdot \theta' \right] + \frac{K_{c} \tau_{1}}{\tau_{2}} d_{12} s (\gamma_{1c} - \gamma_{2c}) \omega_{\psi}^{'''} + \frac{\mathbf{I}}{K_{m}} h_{\theta}^{0} \right\} - \frac{\mathbf{I}}{K_{m}} h_{\theta}^{0} \\ f \left\{ K_{c} \left(1 + \frac{\tau_{1}}{\tau_{2}} \right) d_{12} \left[s (\gamma_{1c} - \gamma_{2c}) \cdot \psi' \right] + \frac{K_{c} \tau_{1}}{\tau_{2}} d_{12} s (\gamma_{1c} - \gamma_{2c}) \omega_{\psi}^{'''} + \frac{\mathbf{I}}{K_{m}} h_{\psi}^{0} \right\} - \frac{\mathbf{I}}{K_{m}} h_{\psi}^{0} \end{bmatrix}$$

If we define T to be a matrix whose columns are the eigenvectors of A, and relate y to x by

$$\mathbf{x} = \mathbf{T}\mathbf{y} \tag{18}$$

we obtain

$$\dot{y} = T^{-1}ATy + T^{-1}Gf(v)$$
 (19)

It can be shown that

$$T^{-1}AT = diag \left[0, 0, 0, -\frac{1}{\tau_{m}}, -\frac{1}{\tau_{m}}, -\frac{1}{\tau_{m}}, -\frac{1}{\tau_{m}}, -\frac{1}{\tau_{2}}, -\frac{1}{\tau_{2}}, -\frac{1}{\tau_{2}} \right], (20)$$

where T can be written as

$$T = \begin{cases} 0 & 0 & 0 & -\frac{1}{\tau_{m}} & -\frac{1}{\tau_{m}} & -\frac{1}{\tau_{m}} & -\frac{1}{\tau_{2}} & -\frac{1}{\tau_{2}} & -\frac{1}{\tau_{2}} & -\frac{1}{\tau_{2}} \\ 1 & 0 & (2\tau_{2}t^{\mu}_{1c}c^{\nu}_{1c}) & \frac{\tau_{2}}{\tau_{m}} - 1 & 0 & -2\tau_{2}t^{\mu}_{1c}s^{\nu}_{1c} & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{I(\tau_{2} - \tau_{m})}{K_{m}K_{c}\tau_{m}^{2}} & 0 & \frac{-2I\tau_{2}t^{\mu}_{2}t^{\mu}_{2}c^{s}\gamma_{1c}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ -1 & 0 & 0 & 1 & \frac{-2\tau_{2}\tau_{m}t^{\mu}t^{\mu}_{1c}c^{c}\gamma_{1c}}{\tau_{2} - \tau_{m}} & 0 & 1 & 0 & 0 \\ 0 & \frac{-1}{c\gamma_{1c}} & 1 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{1}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{c\gamma_{1c}} & -1 & 0 & \frac{\tau_{m}}{\tau_{2} - \tau_{m}} & 0 & 0 & 1 & 0 \\ 0 & \frac{-1}{s\gamma_{1c}} & 0 & 0 & 0 & \frac{1}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & \frac{1}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & -\frac{\tau_{m}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & -\frac{\tau_{m}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & -\frac{\tau_{m}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & -\frac{\tau_{m}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & -\frac{\tau_{m}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & -\frac{\tau_{m}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & -\frac{\tau_{m}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & -\frac{\tau_{m}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & -\frac{\tau_{m}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & -\frac{\tau_{m}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & -\frac{\tau_{m}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & -\frac{\tau_{m}}{\tau_{m}K_{m}K_{c}} & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{s\gamma_{1c}} & 0 & 0 & 0 & 0 & 0 & 0 & 0$$

with

 $\begin{bmatrix} 1 & -\frac{K_{m}K_{c}\tau_{m}}{I} & 0 & -2\tau_{2}t\beta_{1c}c\gamma_{1c} \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$ $\frac{\frac{2\tau_{2}\tau_{m}K_{m}K_{c}t\beta_{1c}c\gamma_{1c}}{I}}{I}$ $\frac{\frac{2\tau_2\tau_mK_mK_ct_{\beta_{1c}}s_{\gamma_{1c}}}{I}}{I}$ 0 ^{2τ}2^{tβ}1c^{sγ}1c 0 $\frac{\frac{K_{m}K_{c}\tau_{m}s_{\gamma}}{1c}}{I}$ 0 0 0 -sγlc $-\frac{\frac{k_{m}k_{c}\tau_{m}}{I}}{I}$ $\frac{\frac{K_{m}K_{c}\tau_{m}s_{\gamma}1c}{Ic\gamma_{1c}}}{Ic\gamma_{1c}}$ -tγlc 0 $\frac{\frac{2\tau_2\tau_m^2K_mK_ct\beta_{1c}s\gamma_{1c}}{\Gamma(\tau_2-\tau_m)}}{I(\tau_2-\tau_m)}$ 0 0 0 $\frac{K_{m}K_{c}\tau_{m}}{I}$ 0 $\frac{\frac{2K_{m}K_{c}\tau_{2}^{2}t\beta_{1c}c\gamma_{1c}\tau_{m}}{I(\tau_{2}-\tau_{m})} \quad 0 \quad 2\tau_{2}t\beta_{1c}s\gamma_{1c}}{0}$ $\frac{2\tau_2^2\tau_m K_m K_c t\beta_{1c} s\gamma_{1c}}{I(\tau_2 - \tau_m)}$ 0 0 0 0 $-\frac{\tau_2\tau_m K_m K_c}{I(\tau_2 - \tau_m)}$ 0 0 0 0 1 1

If we now proceed to "tear" the system by defining

$$z^{T} = [y_{4}, y_{5}, y_{6}, y_{7}, y_{8}, y_{9}]$$

where superscript T denotes transpose and consider v to be just the linear part of the argument in f(v), it can be shown that the system equations will reduce to the form

$$\dot{z} = A^* z + B^* f(v)$$

 $\dot{v} = H^{*}z + J^{*}f(v)$,

(21)

where

$$J^* \equiv 0$$

$$A^* = diag \left[-\frac{1}{\tau_m}, -\frac{1}{\tau_m}, -\frac{1}{\tau_m}, -\frac{1}{\tau_m}, -\frac{1}{\tau_2}, -\frac{1}{\tau_2}, -\frac{1}{\tau_2} \right]$$

$$B^{*} = \begin{pmatrix} \frac{K_{m} \tau_{m}}{I(\tau_{2} - \tau_{m})} & 0 & \frac{2\tau_{2} \tau_{m} K_{m} t\beta_{1c} s\gamma_{1c}}{I(\tau_{2} - \tau_{m})} \\ 0 & \frac{K_{m}}{I} & 0 \\ 0 & 0 & \frac{K_{m}}{I} \\ \frac{K_{m} \tau_{2}}{I(\tau_{m} - \tau_{2})} & \frac{2K_{m} \tau_{2}^{2} t\beta_{1c} c\gamma_{1c}}{I(\tau_{2} - \tau_{m})} & \frac{-2\tau_{2}^{2} K_{m} t\beta_{1c} s\gamma_{1c}}{I(\tau_{2} - \tau_{m})} \\ 0 & \frac{K_{m} \tau_{2}}{I(\tau_{m} - \tau_{2})} & 0 \\ 0 & 0 & \frac{K_{m} \tau_{2}}{I(\tau_{m} - \tau_{2})} & 0 \\ 0 & 0 & \frac{K_{m} \tau_{2}}{I(\tau_{m} - \tau_{2})} \end{pmatrix}$$



Elimination of Compensator Lag Dynamics

The transfer function of the lead-lag compensation network is described by

$$G_{c}(s) = K_{c} \frac{(\tau_{1} + \tau_{2})s + 1}{\tau_{2}s + 1},$$
 (22)

where

$$K_{c} = 2.685 \times 10^{5}$$
 volt/rad
 $\tau_{1} = 4.5 \text{ sec}$, $\tau_{2} = .5 \text{ sec}$.

Therefore,

$$G_{c}(s) = K_{c}\left[\frac{9s}{s+2} + 1\right]$$
 (23)

Considering the fact that the rotational rates of the vehicle are much slower than 2 rad/sec, let us ignore for this treatment the effect of lag dynamics in $G_c(p)$. With this simplifying assumption, the resulting equations become

$$\frac{V'(s)}{\epsilon(s)} = K_c(4.5 s + 1)$$
(24)

with a corresponding differential equation for each channel,

$$V' = K_{c}(4.5 \dot{\epsilon} + \epsilon) . \qquad (25)$$

Proceeding to solve for ϵ, ϵ we obtain:

$$\epsilon_{\phi} = \Delta \gamma_{1}$$

$$\epsilon_{\theta} = d_{12} \Big[c (\Delta \gamma_{2} + \gamma_{2c}) \Delta \beta_{1} + c (\Delta \gamma_{1} + \gamma_{1c}) \Delta \beta_{2} \Big]$$

$$\epsilon_{\psi} = - d_{12} \Big[s (\Delta \gamma_{2} + \gamma_{2c}) \Delta \beta_{1} + s (\Delta \gamma_{1} + \gamma_{1c}) \Delta \beta_{2} \Big]$$

$$\dot{\epsilon}_{\phi} = \Delta \dot{\gamma}_{1} = p - t (\Delta \beta_{1} + \beta_{1c}) \cdot c (\Delta \gamma_{1} + \gamma_{1c}) \cdot q$$

$$+ t (\Delta \beta_{1} + \beta_{1c}) \cdot s (\Delta \gamma_{1} + \gamma_{1c}) \cdot r$$

$$\dot{\epsilon}_{\phi} = \left(h_{\phi}^{o} - \frac{v_{\phi}}{1}\right) - t (\Delta \beta_{1} + \beta_{1c}) \cdot c (\Delta \gamma_{1} + \gamma_{1c}) \cdot \left(h_{\theta}^{o} - \frac{v_{\theta}}{1}\right)$$

$$+ t (\Delta \beta_{1} + \beta_{1c}) \cdot s (\Delta \gamma_{1} + \gamma_{1c}) \cdot \left(h_{\theta}^{o} - \frac{v_{\theta}}{1}\right)$$

$$(27)$$

$$\dot{\epsilon}_{\theta} = d_{12}c(\Delta\gamma_{2} + \gamma_{2c})\cdot\Delta\beta_{1} - d_{12}s(\Delta\gamma_{2} + \gamma_{2c})\cdot\Delta\gamma_{2}\Delta\beta_{1}$$

$$+ d_{12}c(\Delta\gamma_{1} + \gamma_{1c})\cdot\Delta\beta_{2} - d_{12}s(\Delta\gamma_{1} + \gamma_{1c})\cdot\Delta\gamma_{1}\Delta\beta_{2}$$
(27)
(Cont.)

By defining the following variables as:

$$PJ_{1} \equiv s(\Delta\gamma_{1} + \gamma_{1c}) \cdot \left(h_{\theta}^{o} - \frac{v_{\theta}}{I}\right) + c(\Delta\gamma_{1} + \gamma_{1c}) \cdot \left(h_{\psi}^{o} - \frac{v_{\psi}}{I}\right)$$

$$PJ_{2} = -s(\Delta\gamma_{2} + \gamma_{2c}) \cdot \left(h_{\theta}^{o} - \frac{v_{\theta}}{I}\right) - c(\Delta\gamma_{2} + \gamma_{2c}) \cdot \left(h_{\psi}^{o} - \frac{v_{\psi}}{I}\right)$$

$$PJ_{3} \equiv \left(h_{\phi}^{o} - \frac{v_{\phi}}{I}\right) + t\left(\Delta\beta_{2} + \beta_{2c}\right) \cdot c\left(\Delta\gamma_{2} + \gamma_{2c}\right) \cdot \left(h_{\theta} - \frac{v_{\theta}}{I}\right)$$
(28)
$$- t\left(\Delta\beta_{2} + \beta_{2c}\right) \cdot s\left(\Delta\gamma_{2} + \gamma_{2c}\right) \cdot \left(h_{\psi}^{o} - \frac{v_{\psi}}{I}\right)$$

$$PJ_{4} \equiv \left(h_{\phi}^{o} - \frac{v_{\phi}}{I}\right) - t\left(\Delta\beta_{1} + \beta_{1c}\right) \cdot c\left(\Delta\gamma_{1} + \gamma_{1c}\right) \cdot \left(h_{\theta}^{o} - \frac{v_{\theta}}{I}\right)$$
$$+ t\left(\Delta\beta_{1} + \beta_{1c}\right) \cdot s\left(\Delta\gamma_{1} + \gamma_{1c}\right) \cdot \left(h_{\psi}^{o} - \frac{v_{\psi}}{I}\right)$$

$$\begin{aligned} \dot{\epsilon}_{\phi} &= PJ_{4} \\ \dot{\epsilon}_{\theta} &= d_{12} \Big[c \left(\Delta \gamma_{2} + \gamma_{2c} \right) \cdot PJ_{1} + c \left(\Delta \gamma_{1} + \gamma_{1c} \right) \cdot PJ_{2} \\ &- s \left(\Delta \gamma_{2} + \gamma_{2c} \right) \cdot \Delta \beta_{1} \cdot PJ_{3} - s \left(\Delta \gamma_{1} + \gamma_{1c} \right) \cdot \Delta \beta_{2} \cdot PJ_{4} \Big] \end{aligned}$$

$$\begin{aligned} \dot{\epsilon}_{\psi} &= - d_{12} \Big[s (\Delta \dot{\gamma}_{2} + \gamma_{2c}) \cdot PJ_{1} + s (\Delta \gamma_{1} + \gamma_{1c}) \cdot PJ_{2} & (28) \\ &+ c (\Delta \gamma_{2} + \gamma_{2c}) \cdot \Delta \beta_{1} \cdot PJ_{3} + c (\Delta \gamma_{1} + \gamma_{1c}) \cdot \Delta \beta_{2} \cdot PJ_{4} \Big] \end{aligned}$$

the resulting state equations become:

$$\dot{\phi} = h_{\phi}^{o} - \frac{1}{I} v_{\phi} + (t\theta s\phi) \cdot (h_{\theta}^{o} - \frac{1}{I} v_{\theta}) + (t\theta c\phi) \cdot (h_{\psi}^{o} - \frac{1}{I} v_{\psi})$$

$$\dot{v}_{\phi} = -\frac{1}{\tau_{m}} v_{\phi} + \frac{K_{m}}{\tau_{m}} f (K_{c}(\epsilon_{\phi} + 4.5 \dot{\epsilon}_{\phi}))$$

$$\dot{\theta} = c\phi \cdot (h_{\theta}^{o} - \frac{1}{I} v_{\theta}) - s\phi \cdot (h_{\psi}^{o} - \frac{1}{I} v_{\psi})$$

$$\dot{v}_{\theta} = -\frac{1}{\tau_{m}} v_{\theta} + \frac{K_{m}}{\tau_{m}} f (K_{c}(\epsilon_{\theta} + 4.5 \dot{\epsilon}_{\theta}))$$

$$\dot{\psi} = (\frac{s\phi}{c\theta})(h_{\theta}^{o} - \frac{1}{I} v_{\theta}) + (\frac{c\phi}{c\theta})(h_{\psi}^{o} - \frac{1}{I} v_{\psi})$$

$$\dot{v}_{\psi} = -\frac{1}{\tau_{m}} v_{\psi} + \frac{K_{m}}{\tau_{m}} f (K_{c}(\epsilon_{\psi} + 4.5 \dot{\epsilon}_{\psi})) .$$
(29)

Rescaling as before, we obtain

$$v'' = \frac{1}{K_m K_c} v' = \frac{1}{K_m K_c} (v - Ih^{\circ})$$

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with Eq. (29) becoming: A data graduated and the provide the second seco

$$\dot{\phi}' = -\frac{K_{m}K_{c}}{I} \left[v_{\phi}'' + (t\theta s \phi)v_{\phi}'' + (t\theta c \phi)v_{\psi}'' \right]$$

$$\dot{v}_{\phi}'' = -\frac{1}{\tau_{m}}v_{\phi}'' + \frac{1}{K_{c}\tau_{m}}f \left(K_{c}(\epsilon_{\phi} + 4.5 \dot{\epsilon}_{\phi})\right) - \frac{1}{\tau_{m}K_{m}K_{c}}h_{\phi}^{0}$$

$$\dot{\theta}' = -\frac{K_{m}K_{c}}{I} \left[c\phi \cdot v_{\theta}'' - s\phi \cdot v_{\psi}'' \right]$$

$$\dot{v}_{\theta} = -\frac{1}{\tau_{m}}v_{\theta}'' + \frac{1}{K_{c}\tau_{m}}f \left(K_{c}(\epsilon_{\theta} + 4.5 \dot{\epsilon}_{\theta})\right) - \frac{1}{\tau_{m}K_{m}K_{c}}h_{\theta}^{0}$$

$$\dot{\psi}' = -\frac{K_{m}K_{c}}{I} \left(\frac{s\phi}{c\theta} \cdot v_{\theta}'' + \frac{c\phi}{c\theta} \cdot v_{\psi}''\right)$$

$$\dot{v}_{\psi}'' = -\frac{1}{\tau_{m}}v_{\psi}'' + \frac{1}{K_{c}\tau_{m}}f \left(K_{c}(\epsilon_{\psi} + 4.5 \dot{\epsilon}_{\psi})\right) - \frac{1}{\tau_{m}K_{m}K_{c}}h_{\psi}^{0}$$
(30)

Separating the linear and nonlinear terms in Eq. (30), putting them into the required form Eq. (11), and assuming that $\Delta \beta_1^e^*$ and $\Delta \beta_2^{e^*}$ are negligible, it can be shown that the six dimensional state equations take the form shown in Fig. 5. If we wish to consider the six dimensional model, and include only the nonlinearity due to the motor saturation function, the form of Fig. 5 reduces to that of Fig. 6.

Comparison of Models via Simulation

Four models of the Ames system were simulated, namely: the basic nine dimensional nonlinear model, the basic model with a hard saturation of the error signals $(\epsilon_{\phi}, \epsilon_{\theta}, \epsilon_{\psi})$, the model with motor saturation as the only nonlinearity, and the six dimensional version (lead-lag replaced by pure lead) of the basic model. The purpose of these simulations is two-fold: 1) to gain

$$\Delta \beta_{1}^{e} = \left[\Delta \beta_{1} (\phi_{e}, \theta_{e}, \psi_{e}) \right], \text{ etc.}$$

ž

 $\frac{1}{K_c^{-}\pi} f \Big(K_c \big(\varepsilon_{\psi} + 4.5 \ \dot{\varepsilon}_{\psi} \big) \Big) - \frac{I h_{\psi}^0}{\pi m_{\pi}^2 \kappa_c} - \frac{1}{K_c^{-}\pi} \Big\{ lin \ f_6 \Big\}$ $\frac{1}{K_{c}^{T}} f \left(K_{c}(\varepsilon_{\phi} + 4.5 \dot{\varepsilon}_{\phi}) \right) - \frac{Ih_{\phi}^{O}}{\tau_{m}^{R}K_{c}} - \frac{1}{K_{c}^{T}} \left\{ Iin f_{2} \right\}$ $\frac{1}{K_{c}\tau_{m}}\left\{ \text{lin }f_{4}\right\}$ $\vec{\epsilon} = d_{12} \left[c(\Delta_{12} + \gamma_{2c}) \cdot PJ_1 + c(\Delta_{11} + \gamma_{1c}) \cdot PJ_2 - s(\Delta_{12} + \gamma_{2c}) \cdot \Delta F_1 \cdot PJ_3 - s(\Delta_{11} + \gamma_{1c}) \cdot \Delta F_2 \cdot PJ_4 \right]$ $\dot{\epsilon}_{\mathcal{Y}} = -d_{12} \Big[s(\Delta_{1}_{2} + \gamma_{2c}) \cdot PJ_{1} + s(\Delta_{1}_{1} + \gamma_{1c})PJ_{2} + c(\Delta_{1}_{2} + \gamma_{2c}) \cdot \Delta_{B}_{1} \cdot PJ_{3} + c(\Delta_{1}_{1} + \gamma_{1c}) \cdot \Delta_{B}_{2} \cdot PJ_{4} \Big]$ $\frac{1}{\kappa_{c}\pi_{m}} f \left(\kappa_{c} \left(\varepsilon_{\theta} + 4.5 \dot{\varepsilon}_{\theta} \right) \right) - \frac{Ih_{\theta}^{o}}{\pi_{m}^{2}\pi_{c}^{2}} = \frac{K_{m}K_{c}}{I} \left(\sum_{c \in f}^{s \oplus} v_{\beta}^{r} + \left(\frac{c \oplus}{c \theta} - 1 \right) v_{\psi}^{r} \right)$ $- \frac{K_{m}K_{e}}{I} \left((c \phi - 1) v_{\theta}'' - s \phi v_{\psi}'' \right)$ Fig. 5 Six Dimensional Approximation of OAO "Paired-Tracker" System Model $\cdot \frac{k_{m}k}{\tau} \left(t\theta s \phi v_{\theta}^{*} + t\theta c \phi v_{\psi}^{*} \right)$ + `¢ ν θ "^" ^ , _Ф **,** * $\lim \mathbf{f}_{2} = \mathbf{K}_{c} \left[\left(\mathbf{i}^{\prime} - (\mathbf{t}^{2} \mathbf{l}_{c}^{c} \mathbf{i}_{1c}^{})^{\beta} + (\mathbf{t}^{2} \mathbf{l}_{c}^{c} \mathbf{s}_{\gamma}^{} \mathbf{l}_{c}^{})^{\beta} \right)^{\beta} \right] + \frac{\mathbf{I}}{\mathbf{K}_{c}^{\mathbf{K}}} \mathbf{h}_{a}^{0} - \frac{4.5 \frac{\mathbf{K}}{\mathbf{M}^{c}}}{1} \left(\mathbf{v}_{a}^{\mu} - (\mathbf{t}^{2} \mathbf{l}_{c}^{c} \mathbf{v}_{1c}^{}) \mathbf{v}_{\theta}^{\mu} + \mathbf{t}^{2} \mathbf{l}_{c}^{c} \mathbf{s}_{\gamma}^{} \mathbf{l}_{c}^{}) \mathbf{v}_{\psi}^{n} \right]$ $\left(\gamma_{\rm lc} - \gamma_{\rm 2c}\right)$ 4.5 K_mcd₁₂. I 4.5 KK $t_{\beta_{1c}s\gamma_{1c}}$ - <mark>1</mark> [1 + ж Ч 0 ļ 0 0 $\frac{d_{12}}{\tau_m} \cdot s(\gamma_{1c} - \gamma_{2c})$ $t^{\beta}lc^{s\gamma}lc$ B $\lim f_6 = -K_c d_{12} \Big| -s()_{1c} - (2c) \psi' + \frac{\pi h_c^0}{K_c m} - \frac{4.5 \ K_m K}{1} \Big| (s)_{2c}^{c} (1c - s)_{1c}^{c} (2c)_{2c} \psi'_{\psi} \Big|$ 0 $\lim \mathbf{f}_4 = \mathbb{K}_c d_{12} \bigg|_{\mathbf{S}} (\gamma_{1c} - \gamma_{2c}) \cdot \theta + \frac{\mathrm{Ih}_{\theta}}{\mathbb{K}_{\mathbf{m}}} - \frac{4.5 \, \mathbb{K}_{\mathbf{k}} \mathbb{K}}{1} (c\gamma_{2c}^{\mathrm{SY}_{1c}} - c\gamma_{1c}^{\mathrm{SY}_{2c}}) v_{\theta}^{*} \bigg|$ 0 0 0 $\epsilon_{\pm} = PJ_{\Delta}$ 4.5 K_mcd₁₂ s(_{1c} - 7_{2c}) t51ccv1c 4.5 ^{m C}. ж^в л 1 + 1 + 0 0 $\mathbf{\varepsilon}_{\psi} = -\mathbf{d}_{\mathbf{1}\mathbf{2}} \, \, \mathbf{s}^{(\lambda)}\mathbf{z}_{\mathbf{2}} + \mathbf{v}_{\mathbf{2}\mathbf{c}}^{}) \cdot \, \Delta \mathbf{\hat{P}}_{\mathbf{1}} + \mathbf{s}^{(\Delta \mathbf{v}_{\mathbf{1}}} + \mathbf{v}_{\mathbf{1}\mathbf{c}}^{}) \cdot \, \mathbf{w}^{2} \mathbf{z}^{]}$ $\epsilon_{i} = d_{12} \left[c(1)_{c} + \frac{1}{2} c_{c} \right] \cdot \frac{d_{i}}{2} + \frac{1}{2} + c(\frac{d_{i}}{2} + \frac{1}{2} c_{c}) \cdot \frac{w}{2} \right]$ $\frac{d_{12}}{\tau_{m}} \cdot s(\gamma_{1c} - \gamma_{2c})$ t^Plc^c,lc E ò 0 0 4.5 KK ж Ч 0 0 0 ᆔᇩᄩ 0 0 €; ≝ `₁] ... ••• •**`**>`' • *> i. `.`>`



 $\frac{4.5 \text{ KK}}{\text{T}} \left(\text{s}\gamma_2 \text{c}^{\gamma} \text{lc} - \text{s}\gamma_1 \text{c}^{\gamma} \text{c}^{\sigma} \right) \text{v}_{\psi}^{\prime} \right)$

lin f₆ = - K_cd₁₂ $\left| -s(\gamma_{1c} - \gamma_{2c})\psi' + \frac{Ih_o^o}{K_c M_m} \right|$

 $\lim f_4 = K_c d_{12} \left[s(\gamma_{1c} - \gamma_{2c}) \cdot \theta + \frac{\mathrm{Th}_{\theta}^O}{K_c \mathrm{H}} - \frac{4.5 \mathrm{K}_{\mathrm{H}} \mathrm{K}_c}{1} (\mathrm{c}\gamma_{2c} \mathrm{s}\gamma_{1c} - \mathrm{c}\gamma_{1c} \mathrm{s}\gamma_{2c}) v_{\theta}^{\prime} \right]$
insight into the effect on performance of parameter (gimbal command, total momentum) variation, and 2) to compare the various models in order to evaluate the use of a simpler model for the determination of the estimate of the domain of attraction.

The system variables plotted are the roll, pitch, and yaw, euler angles and the wheel momenta. For the models presented with no gyro and inertia coupling, the wheel momenta are identical to the vehicle body rates within a constant scale factor and bias. One set of initial conditions (of the state) was used for all the runs. Variations were made on the commanded gimbal angles and the total system momentum. Figure 7 presents a run plan and a list of symbols that represent the four models. The criteria for comparison are settling time, number of overshoots, peak overshoot, and a general similarity of wave shape.

Some specific comparisons of the models are:

- AN and MV are always very similar and MV always displays less coupling than AN (Figs. 8 through 12).
- 2) The pitch and yaw response are nearly identical to each other for AN, ANL and MV. The yaw response always has a longer settling time and more overshoots than pitch for 6D. This shows one radical difference between 6D and AN. The reason is unexplained to date, but it is unlikely to be a simulation flaw (Figs. 8 through 12).
- ANL and AN are similar, but ANL displays less damping (Fig. 8).
- 4) ANL and 6D are effected more strongly by nonzero system momentum and $\beta_{1c} = 30^{\circ}$. Figure 10 shows ANL

Momenta ec \mathbf{Ih}_{ψ}^{o}	0.0	0.0	1.0	0.0	1.0	: sec; 5 • 10 ⁵
Axis] -1b s Ihe Ihe	0.0	0.0	1.0	0.0	1.0	ft-1h 2.68 701t;
Total ft Ih ^o	0.0	0.0	1.0	0.0	1.0	$v_{\psi} = 1$ sec; K _c = bf-sec/v
al Commands ees ^B 2c	-30.0	-30.0	-30.0	-30.0	-30.0	.0°; ν _φ , ν _θ , 100 volts ; τ ₂ = 0.5 ^ε = 1/13 ft-1 tg-ft ²
Inner Gimb Degr ^β lc	0.0	30.0	30.0	0.0	0.0	$\Phi, \theta, \psi = 15$ $\omega_{\Phi}, \omega_{\Theta}, \omega_{\psi} =$ $\tau_{1} = 4.5 \text{ sec}$ $volt/rad; K_{m}$ I = 1500 slu
$\sin(\gamma_{1c}$ - $\gamma_{2c})$	0.1	0.1	0.1	1.0	1.0	l Conditions: m Parameters:
Run : #	1	2	с	4	ŝ	Initia

Six Dimensional Model - ANL Basic Model with Limiting

- AN

Basic Nonlinear Model

- MV - 6D

Motor Voltage Only Nonlinearity

Fig. 7 Control System Simulation Run Plan

and 6D undergoing roll motor voltage reversal significantly sooner than AN and MV. The pitchyaw coupling into roll seems greater for the ANL and 6D pair under the above condition.

Thus it can be said that all four models have varying degrees of similarity with some radical differences appearing for the more severe initial conditions.

In addition to the runs described above two other situations were simulated and they are discussed separately because they produced unstable motions. The models used were AN, 6D, and MV with initial conditions $\phi(0) = \theta(0) = \psi(0) = 15^\circ$, $v_{\phi}(0) = v_{\theta}(0) = v_{\theta}(0) = v_{\theta}(0)$ these parameter values differ from those used previously, viz., $\beta_{1c} = 0$, 30° and $\beta_{2c} = -30^{\circ}$, and they do not satisfy the stability criterion given in Ref. 2, i.e., $|\gamma_{1c} - \gamma_{2c}| \ge 10^{\circ}$. Figure 13 presents the plotted results for the case $v_{\phi}(0) = v_{\rho}(0) =$ $v_{\eta \prime}(0) = 2 \text{ ft-lb}_{f}$ -sec, the other case (initial wheel momentum at half wheel capacity) yields similar results. As the figures show, unstable motions result when the AN and 6D models are used, but not when the MV model is used. Calculation of the error signals $\epsilon_{\phi}, \epsilon_{\theta},$ and ϵ_{ψ} at the initial point shows that ϵ_{θ} and ϵ_{ψ} have the wrong sign in AN and 6D, but they have the correct sign Thus, it is seen that although the motor saturation is in MV. the dominant nonlinearity for magnitude considerations (+ 20 arc secs of attitude error), the transcendental nonlinearities of the Tracker-error processor combination have an important bearing on the system stability; i.e., the use of the linearized error signal

can produce erroneous stability conclusions. This emphasizes the need for the nonlinear analysis which was carried out in this study.



Fig. 8 Control System Simulation Run 1 (Sheet 1 of 6)



Fig. 8 Control System Simulation Run 1 (Sheet 2 of 6)



Fig. 8 Control System Simulation Run 1 (Sheet 3 of 6)



Run 1 Pitch Wheel Momentum

(oes-d1-j1) mujuemoM

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Fig. 8 Control System Simulation Run 1 (Sheet 4 of 6)



Angle (Degrees)

Fig. 8 Control System Simulation Run 1 (Sheet 5 of 6)



Fig. 8 Control System Simulation Run 1 (Sheet 6 of 6)

signA iloX 2 nuX





Fig. 9 Control System Simulation Run 2 (Sheet 1 of 6)



2 Roll Wheel Momentum

Run

(ose-d1-j1) mujnemoM

Fig. 9 Control System Simulation Run 2 (Sheet 2 of 6)



Angle (Degrees)

Fig. 9 Control System Simulation Run 2 (Sheet 3 of 6)

Run 2 Pitch Angle



Fig. 9 Control System Simulation Run 2 (Sheet 4 of 6)



Fig. 9 Control System Simulation Run 2 (Sheet 5 of 6)



(oəs-di-ti) mutnamoM

Fig. 9 Control System Simulation Run 2 (Sheet 6 of 6)



Run 3 Roll Angle

Angle (Degrees)

Fig. 10 Control System Simulation Run 3 (Sheet 1 of 6)



(oes-d1-ji) mujnemoM

Fig. 10 Control System Simulation Run 3 (Sheet 2 of 6)



Angle (Degrees)

Fig. 10 Control System Simulation Run 3 (Sheet 3 of 6)



(ces-di-ti) mutamoM

Fig. 10 Control System Simulation Run 3 (Sheet 4 of 6)



Fig. 10 Control System Simulation Run 3 (Sheet 5 of 6)



(ɔəɛ-dī-jì) muinəmoM

Fig. 10 Control System Simulation Run 3 (Sheet 6 of 6)



Fig. 11 Control System Simulation Run 4 (Sheet 1 of 6)



Fig. 11 Control System Simulation Run 4 (Sheet 2 of 6)



Fig. 11 Control System Simulation Run 4 (Sheet 3 of 6)



Fig. 11 Control System Simulation Run 4 (Sheet 4 of 6)



Fig. 11 Control System Simulation Run 4 (Sheet 5 of 6)



Fig. 11 Control System Simulation Run 4 (Sheet 6 of 6)



Fig. 12 Control System Simulation Run 5 (Sheet 1 of 6)



Fig. 12 Control System Simulation Run 5 (Sheet 2 of 6)



Fig. 12 Control System Simulation Run 5 (Sheet 3 of 6)





Fig. 12 Control System Simulation Run 5 (Sheet 4 of 6)



Fig. 12 Control System Simulation Run 5 (Sheet 5 of 6)



Fig. 12 Control System Simulation Run 5 (Sheet 6 of 6)





Control System Simulation Unstable Case (Sheet 2 of Fig. 13

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Fig. 13 Control System Simulation Unstable Case (Sheet 3 of 6)

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(pas-di-ji) mujnamoM

Control System Simulation Unstable Case (Sheet 4 of Fig. 13

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Fig. 13 Control System Simulation Unstable Case (Sheet 6 of 6)

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III. STABILITY ANALYSIS OF A SIMPLIFIED MODEL

The stability analysis of simplified models (motor saturation only) of the "paired-Tracker" control system serves two purposes in this study. First, if the simplified model can be proven to be globally asymptotically stable, then the domain of attraction is the whole space and, the algorithm could be tested on this model to determine its effectiveness by comparing the estimate to the known domain. The algorithm could then be tested with the more exact model to determine the effects of the other nonlinearities. Secondly, if the simplified model is globally asymptotically stable, the existence of a Luré-Liapunov function (quadratic form plus integral of the nonlinear terms) is guaranteed, and this could be used in the algorithm with the more exact model to see if it produces a better estimate of the domain of attraction than the optimum quadratic form. It is for these reasons that we carry out the stability analysis of the simplified model.

In Section II, the models of the "paired-Tracker" coarse pointing mode system were derived for the case in which all nonlinearities except the momentum wheel motor saturation are linearized. This resulted in the system of equations

 $\dot{z} = A^{*}z + B^{*}f(v)$ $\dot{v} = H^{*}z + J^{*}f(v)$ $J^{*} \equiv 0 \qquad .$ (21)

By applying the Laplace transform Eqs. (21) can be written as

$$z_{v}(s) = (sI - A^{*})^{-1} B^{*} f(v)$$

$$y_{v}(s) = \frac{1}{s} H^{*} z_{v}(s)$$
(31)

where z(s) is the Laplace transform of z(t), etc., and thus,

$$v_{x}(s) = \frac{1}{s} H^{*}(sI - A^{*}) B^{*}_{x} f(v)$$
 (32)

By defining the transfer function from f(v) to (-v) as W(s), viz.,

$$W_{v}(s) = \frac{-1}{s} H^{*}(sI - A^{*}) B^{*},$$
 (33)

we obtain the block diagram of Fig. 14.



Fig. 14 Simplified System Model for Popov Analysis

A somewhat tedious calculation results in the exact form of $\overset{W(s)}{\sim}(s),$ viz.,

$$\mathcal{W}(s) = \mathcal{W}(s)\mathcal{W} \tag{34}$$

where

$$w(s) = + \frac{K_{m}K_{c}}{I} \left[\frac{(\tau_{1} + \tau_{2})s + 1}{s(\tau_{m}s + 1)(\tau_{2}s + 1)} \right]$$
(35)

and

$$W = \begin{bmatrix} 1 & -t\beta_{1c}c\gamma_{1c} & t\beta_{1c}s\gamma_{1c} \\ 0 & d_{12}s(\gamma_{1c} - \gamma_{2c}) & 0 \\ 0 & 0 & d_{12}s(\gamma_{1c} - \gamma_{2c}) \end{bmatrix}$$

Thus, in the case $t\beta_{1c} = 0$, it is clear that the problem reduces to three single channel problems of the Popov type. In any event, the pitch and yaw channels are always completely decoupled in this model and can always be treated as separate Popov problems. Unfortunately, in each case there is a pole at the origin and this requires using a special form of the Popov theorem (Ref. 7).

THEOREM (Popov)

For the particular case of a system to be absolutely stable in the sector $[\epsilon, K]$ (where $\epsilon > 0$ is an arbitrarily small number), it is sufficient that there exist a finite real number q such that for all $\omega \ge 0$

$$\operatorname{Re}(1 + i\omega_q) \mathbb{W}(i\omega) + \frac{1}{K} > 0 , \qquad (36)$$

and that the conditions for stability in the limit (i.e., if there is a single pole at the origin then $\lim_{\omega \to 0^+} \operatorname{Im} W(i\omega) = -\infty$) are satisfied.

Note that the sector $[\epsilon, K]$ means that $\epsilon v^2 \leq v f(v) \leq K v^2$, $v \neq 0$, which does not hold for saturation functions when $|v| \rightarrow \infty$. One could argue that since in reality the nonlinearity is only known for finite limits on v, it could be continued in an arbitrary fashion beyond the limits within which it is known and thus fit into the sector $[\epsilon, K]$. Although it would seem that the analysis is upset by just a fine mathematical point, the argument above is still not physically satisfying. In any event, let us continue to prove that W(s) as given in Eqs. (34 and 35), satisfies the theorem.

Let us assume $t\beta_{1c} = 0$, then we have three separate problems, two of which are identical. In particular, if we define

$$W_{\sim}^{\dagger}(s) = \frac{K_{m}K_{c}}{I} d_{12}s(\gamma_{1c} - \gamma_{2c}) \left[\frac{(\tau_{1} + \tau_{2})s + 1}{s(\tau_{m}s + 1)(\tau_{2}s + 1)} \right] , \quad (37)$$

we can solve all three problems simultaneously by recognizing that setting $d_{12} = (s(\gamma_{1c} - \gamma_{2c}))^{-1}$ results in the pitch and yaw channels being identical to the roll channel. Note that for the system treated here K = 1.

Let us first examine the stability in the limit requirement, viz.,

$$\lim_{\omega \to 0^{+}} \operatorname{Im} \mathbb{W}^{*}(i\omega) = \lim_{\omega \to 0^{+}} \frac{\operatorname{K}_{m} \operatorname{K}_{c}}{\mathrm{I}} d_{12} s(\gamma_{1c} - \gamma_{2c}) \frac{1}{i\omega} = -\infty , \quad (38)$$

if

$$\frac{K_{m}K_{c}}{I} d_{12}s(\gamma_{1c} - \gamma_{2c}) > 0$$

Since K_m , K_c , and I are all positive, we have stability in the limit if $d_{12}s(\gamma_{1c} - \gamma_{2c}) > 0$, which is a design requirement, in fact $d_{12} = 2.0 \operatorname{sgn} (\gamma_{1c} - \gamma_{2c})$.

Now let us examine Eq. (36), i.e.,

$$\operatorname{Re}(1+i\omega q)\left[\frac{K_{m}K_{c}}{I}d_{12}s(\gamma_{1c}-\gamma_{2c})\left(\frac{(\tau_{1}+\tau_{2})i\omega+1}{i\omega(\tau_{m}i\omega+1)(\tau_{2}i\omega+1)}\right)\right]+\frac{1}{K}>0, \quad (39)$$

which can be rewritten as

$$\frac{\overset{K}{m}\overset{K}{c}}{I} d_{12} s(\gamma_{1c} - \gamma_{2c}) \operatorname{Re} \left[\frac{(i\omega q + 1)((\tau_1 + \tau_2)i\omega + 1))}{i\omega(\tau_m i\omega + 1)(\tau_2 i\omega + 1)} \right] + \frac{1}{K} > 0 \quad . \tag{40}$$

Recall that a ratio of two polynomials whose roots are negative, real, and interlace, and whose numerator degree is one less than the denominator degree, is a positive real function. Thus, if we choose $q > \tau_m$, since $\tau_2 < (\tau_1 + \tau_2) < \tau_m$, the real part of the transfer function in brackets will be positive for all ω , and the system will be absolutely stable for all K > 0.

We have proven that each channel of the "paired-Tracker" system is absolutely stable for all K > 0 and all f(v) if $d_{12}s(\gamma_{1c} - \gamma_{2c}) > 0$ and $ev^2 \leq vf(v) \leq Kv^2$. Unfortunately, this does not admit the saturation function. Note that

$$f(v) = sat\left(v + \frac{Ih^{o}}{K_{m}}\right) - \frac{Ih^{o}}{K_{m}}$$

Thus the $[\epsilon, K]$ sector requirement is satisfied for finite v only when $\mathrm{Ih}^{O}/\mathrm{K}_{m}$ is less than the saturation level, or the initial momentum Ih^{O} in that channel is less than the wheel capacity. We have also proven that the entire system is absolutely stable under the same conditions if $t\beta_{1c} = 0$ since the three loops are uncoupled.

Attempts were made to prove the absolute stability of the coupled system via the methods of Moore and Anderson (Ref. 8), Sandberg (Ref. 9) and the very inclusive results of Yakubovich (Ref. 10). In all cases the pole at the origin caused the required conditions to be violated. The reason for the difficulty becomes apparent in the uncoupled case. In order to have absolute stability in the sector [0,K], it is necessary that the system be asymptotically stable for all $f(v) = c_1 v$, where $0 \le c_1 \le K$; however, because of the pole at the origin, the system is <u>only stable</u> for $c_1 = 0$.

The conclusions of this analysis are that: 1) for the uncoupled simplified system (t β_{1c} = 0) the analysis implies that the system model with saturation only is asymptotically stable for all finite values of the initial conditions, when the initial total vehicle momentum is less than the wheel capacity; 2) for the coupled simplified system, the theory is not sufficiently developed to treat this system successfully. As a result, our plan to use the simplified system as a test of the algorithm's effectiveness and to use the resulting Luré-Liapunov function to obtain improved estimates of the domain of attraction are not fulfilled because of the pole at the origin in the transfer function and the present state of analysis techniques for systems with multiple nonlinearities.

IV. <u>NUMERICAL TECHNIQUE FOR ESTIMATING</u> THE DOMAIN OF ATTRACTION

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Picking a Q-Matrix

Theory

A review of the theory of how and why a Q-matrix is chosen so that it results in a volume estimate of the domain of attraction is presented in this section.

Given the set of differential equations partitioned to be of the form

$$\dot{\mathbf{x}} = \mathbf{A}\mathbf{x} + \mathbf{f}(\mathbf{x}) , \qquad (41)$$

where A is a stable matrix and f(x) contains terms of $O(x^2)$ and higher, we define a Liapunov function

$$V = x^{T} P x , \qquad (42)$$

such that the matrix P is a positive definite matrix which is insured by solving the Liapunov equation

$$A^{T}P + PA = -Q$$
 (43)

given a positive definite Q-matrix. In general, if Q is of order n, then there are n(n + 1)/2 independent variables that describe Q and are bounded as follows (see Ref. 11):

$$0 < \lambda_{i} < \infty \qquad i = 1, 2, ..., n$$

$$-\frac{\pi}{2} \le \theta_{j} \le \frac{\pi}{2} \qquad j = 1, 2, ..., (n-1)(n-2)/2$$

$$-\pi \le \Phi_{k} < \pi \qquad k = 1, 2, ..., (n-1) .$$

The λ 's are the eigenvalues of Q, while the θ 's and ϕ 's are rotation components of the Q-matrix and essentially orient the

Q-matrix in the n(n + 1)/2 space from which it is generated. Thus, n(n + 1)/2 arbitrary variables are chosen within prescribed limits and by proper manipulation by QGEN subroutine of the search program, there results a positive definite matrix designated Q.

The Liapunov equation is then solved for the P-matrix, which is now assuredly positive definite. The search of the n-dimensional state space is then begun in a random fashion until a maximum V and a \dot{V}^{\dagger} close to zero is achieved, where $\dot{V} = -x^{T}Qx + 2x^{T}Pf(x)$. (44)

A point at which \dot{V} is approximately zero is achieved by a deterministic sectioning of a line that is struck from the origin to the point where V > 0 and $\dot{V} > 0$. The line is then searched by consecutively halving it, to most closely approximate the point where \dot{V} changes sign, i.e., the $\dot{V} = 0$ constraint curve — thus the approximation of $\dot{V} = 0$.

The result of the search is a Liapunov function V from which the volume estimate of the domain of attraction can be computed directly as proportional to

$$\operatorname{vol} \alpha \left(\frac{V^{n}}{|P|} \right)^{\frac{1}{2}}$$
 (45)

The general idea of the method is to maximize the volume estimate to obtain the largest estimate of the domain of attraction that can then be translated into physical constraints on each of the state variables.

 $\dot{}^{\dagger}(\cdot)$ indicates differentiation with respect to time.

Experimental Results - Nine Dimensional Problem

which for this case was 31 × 81. Double predict and deemed Prior to presenting the numerical experimental results, a · 你不可以的心学。 presentation of the development of the algorithm from the theory is thought to be not only of casual interest, but of a great degree of relevence to those persons concerned with search techniques in general. Although all known search techniques in multidimensional spaces fall into the local minimum trap and no assurance can be had that you have a global minimum since you have not examined every point or every realizable trajectory in the space, it was originally felt that gradient methods or modified gradient methods could eventually (if pursued for many trials from many initial points), yield an answer that would be satisfactory. In the case presented here, any estimate of the angular variables larger than that obtained from the limits of the linear system's angular variables which in turn were finally set by thousands of computer trials of the equations of motion would be called satiswas inded, but the function was too varied in white the factory and

The problem of searching for a largest volume estimate of the domain of attraction in an n-space is two fold. First a technique must be developed to search the state space of order n, while the second aspect requires that a space of order n(n+1)/2be searched optimally to acquire a best point from which the state space search can proceed.

The initial development began by arbitrarily choosing a point in the n(n + 1)/2 space such that a positive definite Q-matrix was forthcoming, and the Liapunov equation could be solved for a positive definite P. Thus the Liapunov function $V = x^{T}Px$ could be evaluated and a search of the state space could begin. The solution of the Liapunov equation entailed an $n^{2} \times n^{2}$ inversion,

which for this case was 81×81 . Double precision was deemed necessary after a check of the resulting single precision P-matrix showed it to be in error when substituted back into the Liapunov equation. The search of the nine space was initially begun by a straight gradient technique (MIN-ALL), which was touted to be an ownipotent tool in the analyses of a multidimensional (up to onehundred independent variables) space for the minimum of a given function in that space. Much time was spent in arriving at an analytic gradient needed to facilitate operation of the program. Debugging of this analytic gradient was tedious and a numerical gradient was employed as a check.

In the numerical gradient, step size was critical in that a single fixed step size was not applicable in all coordinate directions; zero gradients in certain directions were obtained while very large gradients were obtained in other directions. An adaptive step size was tried, but the function was too varied in each direction, and we subsequently resorted to the analytic gradient after assurance of its accuracy by different persons checking the calculations.

The next step was minimization of V with $\dot{V} = 0$, along with the exclusion of the origin. Because the problem had a constrained minimum, the penalty function approach was chosen so that a constraint violation becomes penalized by virtue of the magnitude of the gain associated with the constraint; in this case, $\dot{V} = 0$ is the constraint. The function chosen to be minimized was

$$\ell = \min_{\mathbf{x} \neq 0} \left[\left(\mathbf{V}(\mathbf{x}) \right)^2 + K_1^2 \left(\dot{\mathbf{V}}(\mathbf{x}) \right)^2 \right] , \qquad (46)$$

where x = 0 must be avoided because it is a trivial solution to the problem. This was overcome by first minimizing an unconstrained problem

$$d = \min_{x} \left[(V(x) - r)^{2} + K_{1}^{2} (\dot{V}(x))^{2} \right] , \qquad (47)$$

which drives $\dot{V}(x) \rightarrow 0$ and $V(x) \rightarrow r$. Adjustment of the gain K_1^2 during different phases of the search was of interest. Since V(x) - r is the most important aspect in the d-minimization, $K_1^2 = 0.001$ was found to be satisfactory, whereas in the second phase (i.e., ℓ -minimization) $\dot{V}(x) \simeq 0$ was to be maintained, and hence $K_1^2 = 1000$ was found to be satisfactory to penalize the system from straying from this constraint. The choice of r was initially 0.1, but this was ultimately reduced to $r = 10^{-5}$ based on evidence produced by many runs.

The gradient method procedure was evaluated at this point. A great deal of time was required by the procedure for a search; this was due to the gradient computation at every point along the trajectory, and the local minimum problem which this method could not overcome. This, coupled with the fact that in the 45-space (n(n+1)/2) search a gradient would be absurd, at least from an analytical point of view, and open to question concerning its validity in any numerical computation, dictated that another search method be found.

A random search was decided upon as a means of more effectively covering the nine-space with a better probability of avoiding the local minimum problem. How many points (nine-tuples) to evaluate for reasonable assurance of results was still a question, only to be answered by trial and error. Basically, a point (nine-tuple) was chosen arbitrarily (see Fig.15 for a two dimensional version of this technique) in the x-space along with an arbitrary Q and a large value of V, called V_0 . ($V_0 = 1$ is very large; V_0



 $V_{OPT} = Largest V$ for which $\dot{V}_{INT} < 0$

Fig. 15 Two Dimensional Representation of Search Region

corresponds to r in the gradient search discussed previously.) The Liapunov equation is still solved for P;

$$V = x^{T} P x$$
 (48)

and

$$\dot{\mathbf{V}} = -\mathbf{x}^{\mathrm{T}}\mathbf{Q}\mathbf{x} + 2\mathbf{x}^{\mathrm{T}}\mathbf{P}\mathbf{f} \quad . \tag{49}$$

It can be seen from the expression for V that the eigenvalues of P will determine the magnitude of the intercepts along the eigenvector directions by

$$y_{i_{INT}} = \sqrt{V/\lambda_{i}}$$
 $i = 1, 2, ..., 9$, (50)

where λ_i are the eigenvalues of P and V is a value of the function V(x) at a particular point. A point in the x-space is related to a point in the y-space (eigenvector space) by a pure rotation given by

$$x = Cy$$
 , (51)

where C is the normalized matrix of eigenvectors of P (see Fig. 16). Thus the random points are determined by selecting a random number from a Gaussian distribution with zero mean and specified variance σ .

[Experimental results indicated that when the random numbers were generated from a uniform distribution, a high percentage of the resulting V's were larger than the V calculated at the y-intercept point. In an attempt to compensate for this skewing effect, the eigenvector coordinates were generated such that the distribution near the boundaries would be attenuated. The Gaussian distribution model was tried and proved quite successful. Each scaled vector component is generated independently via the same Gaussian model (all zero mean, same variance). This gives a Rayleigh type distribution in the scaled radial envelope, i.e.,

$$p(\mathbf{r}) \approx \frac{r^{n-1}e}{k(\sigma,n)}$$

where σ^2 is the variance for the Gaussian distribution and n is the dimension of the space. The tail of the radial distribution can be attenuated as desired by varying σ . A further modification was made by introducing a switching function which changes σ after a certain number of iterations: for less than 1000 iterations, $\sigma = 1/6$, while between 1000 and 5000 iterative points $\sigma = 1/3$.]



Fig. 16 Relationship of State Space (x) to its Associated Eigenvector Space (y) in Two Dimensions

Multiplying the random number by the intercept value (y_{i}) yields a random point along y_i lying between $\pm y_i$. Transformation to the x-space will allow a computation of V and \dot{V} in the form expressed in Eqs. (48) and (49), respectively. If the Gaussian distribution produces a number outside the limits ± 1 , this shows up in the calculation of V where the calculated V is greater than the last best V. If $V > V_{min}$, the point is discarded and a new random point is selected.

Since the problem has been formulated as a minimum problem by choice, a maximum V is being sought wherein all points interior to the contour $V = V_{max}$ have $\dot{V} < 0$ (stable trajectories). If $V_j < V_{j-1}$ (j = 1, 2, ..., m, where m is the number of trials and j is the jth trial) and $\dot{V} > 0$, then a line is struck

from that point x to the origin, and this line of length ℓ is halved 15 (arbitrary number) times in order to best achieve the $\dot{V} = 0$ crossing. This portion of the search is termed the BI-SECTION PHASE and is deterministic (see Fig. 17). If $V_j > V_{j-1}$, a new random point is selected, since it has already been determined that, for that P, all trajectories have $\dot{V} > 0$ and are hence divergent. If $V_j < V_{j-1}$ and $\dot{V}_j < 0$ no new information is gained, since it only means that the point lies somewhere interior to the V_{j-1} contour, thus a new random point is selected. Figure 18 shows a flow diagram of the Random Search Technique.

The number of points in any search was still most uncertain. Experimentation showed that even if up to 300,000 nine-tuples were selected, the best estimate or max V, occurred usually before 5000 points were encountered. Thus 5000 points became the magical number as to how many trials were to be run during any one search.

The time to run was still excessive, so a reexamination of the steps was undertaken. The following steps reduced the running time measurably.

- The generation of P from Q required an 81 × 81 inversion which was repeated each time a new Q was selected. This was wholly unnecessary since the inverted matrix was only a function of A which was constant. The revision was to perform the inversion once and store it.
- 2. Comparison of V_j to V_{j-1} was changed to compute the vol⁻¹(V_j) and compare it to the best vol^{-1*} gained since the beginning of



Fig. 17 Schematic Representation of BI-SECTION Deterministic Search



Schematic Flow Chart of the Random Search of the State Space Fig. 18 the run and not just during that particular x-space search. If $vol^{-1}(V_j) > vol^{-1*}$ then the search was aborted immediately.

- 3. The search was also aborted for Liapunov functions $V < 10^{-12}$ since experience implied that V should be on the order of magnitude of 10^{-5} to 10^{-9} . There was an exponential overflow of the computer when $V \simeq 10^{-12}$ and $|P| \simeq 10^{30}$, both of which had occurred.
- 4. Another problem was alleviated by aborting the search if any of the eigenvalues of P were negative. This is possible due to numerical difficulties when the eigenvalues are small. The numerical technique yields small negative eigenvalues in enough cases to be annoying (because $y_i = \sqrt{V/\lambda_i}$, the computer yields incorrect results due to precision).

All of the details mentioned above were associated with the search of the state space (x-space). Those difficulties having been overcome, we next turned our attention to find a method of searching the associated parameter space (45 space) to yield a best Q, which in turn will yield a minimum inverse volume estimate. It could not be done in the same way as the random search of the state space, since the geometry of parameter space was not known as was the geometry of the state space. Gradient techniques were "OUT" based on our unrewarding experience with MIN-ALL. Random search was deemed the way to proceed. Note here that the parameter space in this problem is of order n(n+1)/2, which is 45. The 45 variables are λ_i , i = 1, 2, ..., 9; θ_j , j = 1, 2, ..., 28, and ϕ_k , k = 1, 2, ..., 8.

The first search method was just on the lambdas $(\lambda_i, i = 1, 2, ..., 9)$, which are the diagonal terms of the Q-matrix when the rotation components $(\theta_j, j = 1, 2, ..., 28 \text{ and } \phi_k, k = 1, 2, ..., 8)$ are zero. This method consisted of setting all θ 's and ϕ 's equal to zero and all λ 's initially equal to unity. Since the Q-matrix can be scaled by any one of the λ 's, λ_1 was chosen arbitrarily to remain at unity while the other λ 's werevaried by random choice in the following sequential manner:

- 1. Select, sequentially, ten random choices of λ_2 distributed uniformly from zero to one hundred with λ_3 through λ_9 equal to unity (the choice of the upper bound of one hundred is arbitrary; all that is necessary is that $\lambda_i > 0$).
- 2. Generate an inverse volume estimate for each λ and retain the minimum inverse volume estimate and its associated λ_2 ; call it $\lambda_{2\min}$.
- 3. Starting with $\lambda_1 = 1$ and $\lambda_2 = \lambda_2_{\min}$, search ten random λ_3 's, holding all λ_1 's = 1, i = 4, 5, ..., 9.
- 4. Search the λ_4 through λ_9 variables in the same manner as above, retaining the minimum inverse volume with its associated λ .

The best inverse volume estimate using the above method was $vol^{-1} = .148 \times 10^{50}$ for $\lambda_1 = 1$, $\lambda_2 = 27.70$, and λ_3 through λ_9 equal to 1. This method was abandoned because other work indicated that there might be a greater sensitivity of the volume to changes in the rotation variables than to the hyperellipse axis scaling variables $(\lambda_i, i = 1, ..., 9)$. Furthermore, the search technique employed above tends to restrict the search volume somewhat; a minimum along one axis will not necessarily lead to the minimum over the space in question.

The second technique was also random, and was based on a set of λ 's, θ 's and ϕ 's that were thought to be optimum in the final report of last year's work (Ref. 3). The optimal set was searched with $\gamma_{1c} = -\gamma_{2c} = 2.875^\circ$, $\beta_{1c} = 0$, and $\beta_{2c} = -30^\circ$. This resulted in our best inverse volume estimate at that time of $.111 \times 10^{41}$, which was nine orders of magnitude better than the best result of the λ search mentioned above. Holding the λ 's at the values of the optimal set, the following θ 's and ϕ 's were chosen randomly (uniform distribution over [- $\pi/2$, $\pi/2$]): θ_{i} , j = 6, 7, 13, 21, 22, 25 with $\theta_{22} = \theta_{28}$, $\phi_{7} = \theta_{21}$, and $\phi_8 = \theta_{25}$. All other angular parameters were set equal to zero. This choice of rotations restricts Q and P to consist of three nonzero 3×3 blocks on the diagonal. The best inverse volume estimate in this case was $vol^{-1} = .841 \times 10^{48}$, which is approximately eight orders of magnitude worse than that obtained with the optimal set.

 ${}^{*}\lambda_{1} = 1.99, \ \lambda_{2} = 50.0, \ \lambda_{3} = 0.01, \ \lambda_{4} = \lambda_{7} = 5.1962, \ \lambda_{5} = \lambda_{8} = 10.0, \\ \lambda_{6} = \lambda_{9} = 0.0038, \ \theta_{6} = -\pi/4, \ \theta_{21} = \phi_{7} = -1.373, \ \text{and} \ \theta_{7} = \theta_{13} = \\ \theta_{22} = \theta_{25} = \theta_{28} = \phi_{8} = 0.$

Another series of runs were made with the optimal set and random perturbations, as before, on the θ and ϕ variables, but with $\gamma_{1c} = \beta_{1c} = 30^{\circ}$ and $\gamma_{2c} = \beta_{2c} = -30^{\circ}$. The best value of the inverse volume estimate obtained was $vol^{-1} = .913 \times 10^{48}$, which again is not as good as the previous set of runs. Note that since $\beta_{1c} \neq 0$, P does not have the same form as Q because A is not of the same form.

Some interesting observations of the minimum inverse volume estimate (.111 \times 10⁴¹) are that its calculation contained the smallest determinant of P (|P| = 49.76) that has been observed to date. The determinant of P is usually on the order of from 10^9 to 10^{20} . Besides this, the angular state variables at the end of the search are approximately $\theta = 20$ sec, $\phi = -12$ sec, and ψ = 20 sec of arc, which are also larger than usual. These values are at the point where the minimum V occurs on $\dot{V} = 0$. The maximum values obtained on the axes of the ellipsoidal estimate are $\phi = 26.4 \text{ sec}, \theta = 56.6 \text{ sec}, \text{ and } \psi = 56.5 \text{ sec}.$ The conjectured sensitivity to the rotation variables is borne out by these data, that is: for the case $\gamma_{1c} = -\gamma_{2c} = 2.875$, $\beta_{1c} = 0$ and $\beta_{2c} = -30^{\circ}$, the least and largest inverse volume estimates differ by 14 orders of magnitude; for the case $\gamma_{1c} = \beta_{1c} = 30^{\circ}$, and $\gamma_{2c} = \beta_{2c} = -30^{\circ}$, the range is 5 orders of magnitude. The range of variation observed for the random search over the eigenvalues is only three orders of magnitude.

While the random searches were continuing, a paper given by Barron (Ref. 12) gave some insight into what was termed an accelerated random search, a search with an orderly way of selecting step size. The technique consists of picking a starting point, λ° , θ° , and ϕ° , for which a volume estimate is obtained. A performance measure is defined as:

$$\underline{P} = \log \left[\frac{(vol^{-1})}{10^{30}} \right] ,$$

where 10^{30} is arbitrary and chosen to keep <u>P</u> positive and in the vicinity of unity. Since this first estimate is the best to date, set <u>P</u>^{*}, the best estimate, equal to <u>P</u>. A random step, consistent with the constraints on λ , θ , and ϕ (i.e., $\lambda > 0$, $|\theta| \leq \pi/2$, $|\phi| < \pi$), is chosen by first defining the variance as

$$\sigma = \log \underline{P}^*,$$

picking a random number x, $-1 \le x \le +1$, and finally defining the step size as

$$\Delta u = (\text{sgn x}) \frac{\ell}{d} e^{-x^2/\sigma^2} ,$$

where

$$\ell = \begin{cases} 1000 & \text{for } \lambda_{i} & \text{i} = 1,9 \\ \pi/2 & \text{for } \theta_{i} & \text{i} = 1,28 \\ \pi & \text{for } \phi_{i} & \text{i} = 1,8 \end{cases}$$

and

d = arbitrary divisor (taken as 4 initially).

Addition of this random step to the previous values of λ, θ , and ϕ results in another value of <u>P</u>. If <u>P > P</u>^{*}, a step in the opposite direction is taken by setting $\Delta u = -\Delta u$, the consistency with the constraints is checked again, and <u>P</u> is recalculated. If <u>P</u> is still greater than <u>P</u>^{*}, a new random step is chosen and added to the point associated with <u>P</u>^{*}. As long as $\underline{P} < \underline{P}^{*}$, we set $\underline{P}^{*} = \underline{P}$ and the step size is doubled until $\underline{P} > \underline{P}^{*}$, then a new random step is instituted from the point (λ, θ, ϕ) associated with \underline{P}^{*} . The accelerated random search is based upon the concept of randomly choosing a search direction and a step size, and searching in that direction until a minimum is found. At the minimum, a new random direction and step size are chosen and the process is repeated. As the search gets closer to the minimum, the variance of the random step is decreased to facilitate accurate determination of the minimum.

The best minimum inverse volume estimate gained during the initial phases with the above technique was $.585 \times 10^{38}$ whereas the best previous one was $.111 \times 10^{41}$. Therefore, the other two techniques were abandoned. The last change that was incorporated into the algorithm was a "creeping aspect" of the random search by which the random Δu 's become either larger or smaller as re-In particular, if d = 4 in the expression for Δu , as quired. prescribed above, and say 100 points are looked at with no improvement, then d is halved, thereby doubling Δu . One hundred trials with no improvement causes another halving of d, etc. If an improvement is obtained, d is set back to 4 and the expansion begins anew. If after say 500 trials where Δu is 16 times its original value and no improvement has been found, then d is set back to 4 and is consecutively doubled to decrease the step size in the same manner as the step size was increased above. Thus the creeping random search has an expanding and contracting facility, which has proven useful in determining the best vol^{-1} estimate to date.

The final results and conclusions of the nine dimensional search based on experimentation with the program utilizing an IBM 360/95 at the Institute for Space Studies-NASA (ISS) and the IBM 360/75 at Grumman are summarized in Table 1. Prior to running at the ISS, a 5000 point random search was being used in the state

Table 1

TABULATED RESULTS OF Q-MATRIX SEARCH PROGRAM AT THE INSTITUTE FOR SPACE STUDIES

Run #	Trials	Time (Min)_	vol ^{-1*}	<u> </u>	Comments
1*	~ 150	3	$.606 \times 10^{33}$	1.1217	5000-pt. search, quasi-diagonal Q (q-d-Q); job aborted - excessive output
2*	~ 2500	. 62	(not printed out)	1.1480	5000-pt. search, q-d-Q, reduced output run
3*	1019	105	.599 × 10 ³⁵	1.1592	300,000-pt. search from the best point of run 2, q-d-Q (all runs from here on are 300,000 pts)
4*	1000	14	$.497 \times 10^{35}$	1.1566	Started from the best point of run 3, full-Q
5*	2000	16	$.892 \times 10^{35}$	1.1650	Continuation of run 4 in random # gen., full-Q
6 *	2473	72	$.488 \times 10^{35}$	1.1563	q-d-Q from best point in run 3 (really an extension of 3)
7**	1022	118	$.187 \times 10^{42}$	1.3757	q-d-Q, start from $\lambda_i = 1$, $\theta_j = \phi_k = 0$ i
8 **	1872	136	$.202 \times 10^{41}$	1.3435	Start from the best point in run 3, q-d-Q
*** 9	29	38	$.134 \times 10^{49}$	1.6042	Start from the best point in run 3, $q-d-Q$
10***	453	61	$.105 \times 10^{50}$	1.6340	Same as run 9 except full-Q
11 ^{****}	1000	2	abort condition [†] 10^{51}	1.6666	q-d-Q, started from the best point in run 3
***** 12	1000	3	abort condition [†] 10 ⁵¹	1.6666	q-d-Q, started from the best point in run 3
Total Trials	14518				

 $h_i = 0, \gamma_{1c} = -\gamma_{2c} = .05017822 \text{ rad}, \beta_{1c} = 0, \beta_{2c} = -\pi/6$ ** $h_{i} = 0, \ \gamma_{1c} = -\gamma_{2c} = \pi/4, \ \beta_{1c} = 0, \ \beta_{2c} = -\pi/6$ $h_i = 0, \gamma_{1c} = -\gamma_{2c} = \pi/4, \beta_{1c} = -\beta_{2c} = \pi/6$ *** **** $h_{i} = 1/1500$ (half wheel speed)+,-,+, $\gamma_{1c} = -\gamma_{2c} = .05017822$, $\beta_{1c} = .0$, $\beta_{2c} = -\pi/6$ ***** $h_i = 0.2/1500$ (1/10 wheel speed)+,+,+, $\gamma_{1c} = -\gamma_{2c} = .050178$, $\beta_{1c} = 0$, $\beta_{2c} = -\pi/6$ if the best Liapunov function is $< 10^{-12}$, the vol⁻¹ is set = 10^{51} and P^{*} thus becomes $\sim 5/3$ t

space, and there were vol⁻¹ estimates as small as $.224 \times 10^{34}$ at Grumman. Because the IBM 360/95 at the ISS has a core 10 times larger than the IBM 360/75, and is 5 to 8 times faster, a 300,000-point random state space search was instituted in lieu of 5000-point search in order to gain greater assurance that a the valid answer had been reached. The best vol⁻¹ estimate obtained using the 300,000-random point search was $.488 \times 10^{35}$, which corresponds to physical variable limits of $|\phi| = 2.48$ min, $|v_{\phi}| = 0.181 \text{ ft-lb_fsec}, |\omega_{\phi}| = 1980 \text{ volts}, |\theta| = 5.91 \text{ min},$ $|v_{\theta}| = 0.342 \text{ ft-lb}_{f} - \text{sec}, |\omega_{\theta}| = 941 \text{ volts}, |\psi| = 8.98 \text{ min},$ $|\mathbf{v}_{\eta \eta}| = 0.452$ ft-lb-sec, $|\omega_{\eta \eta}| = 1410$ volts. This result was obtained with a quasi-diagonal Q-matrix, zero initial momenta $(h_{\phi}^{o} = h_{\theta}^{o} = h_{\psi}^{o} = 0)$, $\sin(\gamma_{1c} - \gamma_{2c}) = 0.1$, $\beta_{1c} = 0$, and $\beta_{2c} = -\pi/6$ radians (Run #6, Table 1). The inclusion of a full Q-matrix, addition of initial momenta, the inclusion of $\beta_{1c} \neq 0$, and increasing the $\sin(\gamma_{1c} - \gamma_{2c})$ to values > 0.1 causes de-gradation of the vol⁻¹ as illustrated in Table 1.

The results indicate that the problem is quite sensitive to system parameter variation such as γ_{1c} , γ_{2c} , β_{1c} , and initial momenta. Further, the best Q-matrix for one set of parameters is certainly not the best for all sets of parameters. The best Q-matrix found was for $\beta_{1c} = 0$ and Q chosen as quasi-diagonal. When $\beta_{1c} = 0$, the A-matrix becomes quasi-diagonal thereby decoupling the system, at least in the linear part. The nonlinear part is still coupled through the roll, pitch, and yaw channels. The most severe degradation of the system came when initial momenta were introduced to even one tenth of wheel capacity.

The computer programs which perform the technique illustrated herein are found in Appendix I.

^{*} It should be pointed out that the angle intercepts $|\phi|$, $|\theta|$, and $|\psi|$ were diminished by factors of approximately three from those obtained with the 5000-point random search.

Experimental Results - Six Dimensional Problem

The six dimensional approximation to the nine dimensional Ames OAO system has been programmed for domain of attraction investigation by using the stability analysis algorithm (Pick-a-Q). The Q-matrix parameter space is of dimension 21. After restricting the Q search to quasi-diagonal matrices, with a limit of 100,000 random points per inner loop search, the best results obtained for the case $\beta_{1c} = 0$, $\beta_{2c} = -30^{\circ}$, $\gamma_{1c} = 2.875^{\circ} = -\gamma_{2c}$, $s(\gamma_{1c} - \gamma_{2c}) = 0.1$, h_{ϕ}° , h_{θ}° , $h_{\psi}^{\circ} = 0$ are:

(336.3	2124	0	0	0	0	ł
	2124	$.235 \times 10^{-3}$	0	0	0	0	
0	0	0	.0131	- 1.387	0	0	
Q =	0	0	-1.387	147.9	0	0	
	0	0	0	0	.0203	- 2.036	
	0	0	0	0	-2.036	217.1	

	974.0	-1.291 x 10 ⁴	0.	0	0	0
	- 1.291×10^4	2.169 x 10 ⁵	0	0	0	0
n	0	0	.0488	- 2.512	0	0
r ≈	0	0	- 2.512	621.5	0 ·	0
	0	0	0	0	.0774	- 3.895
	0	0	0	0	-3.895	928.6

Inverse volume =
$$.562 \times 10^{25}$$

 $V_{final} = .353 \times 10^{-6}$
 $\dot{V}_{final} = .117 \times 10^{-10}$

$$X_{\text{final}} = \begin{bmatrix} .170 \times 10^{-4} \\ .210 \times 10^{-5} \\ -.735 \times 10^{-3} \\ -.654 \times 10^{-5} \\ -.432 \times 10^{-4} \\ .272 \times 10^{-5} \end{bmatrix}$$

The semiaxes of the ellipsoid estimating the domain of attraction in nondimensional variables are:

4.15×10^{-5}		0		0
2.48×10^{-6}		0		0
0		0		-3.02×10^{-3}
0	>	0	3	1.22×10^{-5}
0		-2.4×10^{-3}		0
0		-1.01×10^{-5}		. 0

Note that the wide dispersion of eigenvalues in the P matrix gives very thin ellipsoidal projections. The maximum allowable values (not occurring simultaneously) of the physical variables are: $\phi = .14 \text{ min}, \theta = 10.4 \text{ min}, \psi = 8.30 \text{ min}, v_{\phi} = .050 \text{ lb-ft-sec}, v_{\theta} = 0.48 \text{ lb-ft-sec}, v_{\psi} = 0.39 \text{ lb-ft-sec}$. The present computation rate is about 4000 Q matrices per hour.

Comparison of 6 and 9 Dimensional Results

Both programs exhibited best results for the case of the quasi-diagonal Q-matrix, zero initial momenta $(h_{\phi}^{0} = h_{\theta}^{0} = h_{\psi}^{0})$, $\sin(\gamma_{1c} - \gamma_{2c}) = .1$, $\beta_{1c} = 0$, and $\beta_{2c} = -\pi/6$ radians. The 6 dimensional results provided a better $|\theta|$ intercept estimate of 10.4 min than the 9 dimensional estimate of 5.91 min; how-ever, the 9 dimensional program provided surprisingly better $|\phi|$ and $|\psi|$ estimates (2.48 min compared to .14 min for $|\phi|$). Perhaps the failure of the 6 dimensional program to provide clearly

[&]quot;It should be noted that a 100,000-point search in 6 dimensions is equivalent to a 32 million point search in 9 dimensions.

superior estimates in spite of the smaller dimension of its Q parameter search and greater number of trials is due to the fact that the effect of a 100,000-point search per trial in 6 dimensions is approximately equivalent to a 32 million-point search in 9 dimensions; the 32 million is very conservative compared with the 300,000-point search actually used in the 9 dimensional case. It is interesting to compare the P-matrix eigenvector projections corresponding to the above cases (see Fig. 19.

As can be seen by Tables 1 and 2 the volume estimates seem to be affected proportionately for both the 6 and 9 dimensional cases, as the commanded gimbal angles or initial total momentum values are changed.

· •	19925-		2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 - 2010 -	and and the second s	
Run #	Trials	Time (Min)	vol ⁻¹	P*	Comments
1*	~ 8000	120	$.562 \times 10^{25}$	1.237	100,000 point search, $P^* = \log(vo1)^{-1}/20$
2***	~ 3000	60	.261 x 10^{30}	1.471	H H
3**	4200	60	.225 x 10 ²⁷	1.318	11 H
4 *** *	4000	60		us va 85	vol ⁻¹ too small to com- pute without rescaling problem

Table 2

SUMMARY OF RUNS AT ISS FOR 6 DIMENSIONAL MODEL

* $h^{o} = 0$, $\gamma_{1c} = -\gamma_{2c} = .05017822 \text{ rad}$, $B_{1c} = 0$, $B_{2c} = -\pi/6 \text{ rad}$ *** $h^{o} = 0$, $\gamma_{1c} = -\gamma_{2c} = .05017822 \text{ rad}$, $B_{1c} = \pi/6$, $B_{2c} = -\pi/6 \text{ rad}$ ** $h^{o} = 0$, $\gamma_{1c} = -\gamma_{2c} = \pi/4$, $B_{1c} = 0$, $B_{2c} = -0/6 \text{ rad}$ *** $h^{o} = 1/1500 (+, -, +)$, $\gamma_{1c} = -\gamma_{2c} = .05017822 \text{ rad}$, $B_{1c} = 0$, $B_{2c} = -\pi/6 \text{ rad}$

>	0	-3.0 x 10 ⁻³	1.2 × 10 ⁻⁵	0	0																			
			•								•						÷							
>	0	0	0	-2.4×10^{-3}	-1.0 × 10 ⁻⁵		0	0	0	0	0	0	33×10^{-4}	.51 × 10 ⁻⁵	-1.5 × 10 ⁻⁴									
	2.5 × 10 ⁻⁶	0	0	0	0		.51 × 10 ⁻⁴	54 x 10 ⁻⁶	.45 x 10 ⁻⁴	0	0	0	0	0	0.	0	0	0	Q	0	0	-2.5×10^{-3}	-1.7 × 10 ⁻⁵	.57× 10 ⁻³
			<u> </u>			د". د	<u> </u>				•									•				
	0	.96 x 10 ⁻⁷	-2.4 × 10 ⁻⁵	0	0	', ν', ω', ψ',	. 0	0	0	0	0	0	32 × 10 ⁻⁷	-2.3 x 10 ⁻⁵	.81 x 10 ⁻⁶	0	0	0	-1.7×10^{-3}	-1.0 x 10 ⁻⁵	0.4×10^{-3}	0	0	0
			`			, ¹ , C														•				
>	0	0	0	82 x 10 ⁻⁷	1.95×10^{-5}	axes (t', v _{\$} ', (0	0	0	$.25 \times 10^{-7}$	1.7×10^{-5}	.54 x 10 ⁻⁶	0	0	0.	.73 × 10 ⁻³	.91 × 10 ⁻⁵	83×10^{-3}	0	0	0	0	0	0
						Semié	6				,,									•				
DT X C/.	-1.27×10^{-6}	0	0	0	0	ine Dimensional	.39 x 10 ⁻⁸	$.68 \times 10^{-5}$	$.82 \times 10^{-7}$	0	0	0	0	0	0	0	0	0	33 x 10 ⁻⁴	.47 × 10 ⁻⁵	-1.5 × 10 ⁻⁴	0	0	0
					'	B. N	t									L								

A. Six Dimensional Semiaxes (*', $v_4^{'}$, ε' , $v_{\phi}^{'}$, τ' , $v_{\psi}^{'}$)

Comparison of Semiaxes Projections Corresponding to Optimal Ellipsoids for 6 and 9 Dimension Fig. 19

Note: Both cases correspond to $B_{Lc} = 0$, $B_{2c} = -\pi/6$ rad, $I_{Lc} = -1_{2c} = 2.8750$, $s(r_{Lc} - r_{2c}) = 0.1$, h_1° , $h_2^{\circ} = 0.1$

Experimental Results for a Simple System

In the hope of determining whether there is a fundamental limitation inherent in estimating the domain of attraction of a system containing saturation and one or more zero eigenvalues, a two dimensional system with a single saturation and a zero eigenvalue has been formulated as a prototype of the OAO system. The random search algorithm has been programmed for use on the GE-235. A two dimensional stability problem was attempted, with the following system equations:

$$\begin{pmatrix} \dot{\mathbf{x}}_1 \\ \dot{\mathbf{x}}_2 \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ 0 & -\alpha \end{pmatrix} \begin{pmatrix} \mathbf{x}_1 \\ \mathbf{x}_2 \end{pmatrix} + \begin{pmatrix} \mathbf{K}_1 \\ \mathbf{K}_2 \end{pmatrix} \xi$$
$$= -\operatorname{sat}(\sigma) = \begin{cases} -.001 & \sigma > .001 \\ -\sigma & |\sigma| \le .001 \\ .001 & \sigma < - .001 \end{cases}$$

This describes a critical plant with high gain saturating characteristics. Note that our definition of ξ here is equivalent to defining a constant $K_c = 10^3$, and using a ξ defined as

$$\xi = -\frac{1}{K_c} \left(\operatorname{sat}(f(g)) \right) ,$$

 $g = K_{\sigma}$

where

$$-\operatorname{sat}(f) = \begin{cases} -1 & \sigma > 1 \\ -\sigma & \sigma \leq 1 \\ 1 & \sigma < -1 \end{cases}$$
$$\sigma = x_1 \quad .$$

A change of coordinates produces:

$$\begin{pmatrix} \mathbf{y}_1 \\ \mathbf{y}_2 \end{pmatrix} = \begin{pmatrix} -\alpha & 0 \\ 0 & 0 \end{pmatrix} \begin{pmatrix} \mathbf{y}_1 \\ \mathbf{y}_2 \end{pmatrix} + \begin{pmatrix} -\frac{\mathbf{K}_2}{\alpha} \\ \mathbf{K}_1 + \frac{\mathbf{K}_2}{\alpha} \end{pmatrix} \xi$$

$$\xi = -\operatorname{sat}(\sigma)$$

$$\sigma = \mathbf{y}_1 + \mathbf{y}_2 ,$$

where

$$\begin{pmatrix} \mathbf{y}_1 \\ \mathbf{y}_2 \end{pmatrix} = \begin{pmatrix} \mathbf{0} & -\alpha^{-1} \\ \mathbf{1} & \alpha^{-1} \end{pmatrix} \begin{pmatrix} \mathbf{x}_1 \\ \mathbf{x}_2 \end{pmatrix}$$

In the format required for our analysis, the equations are:

$$\begin{pmatrix} \dot{y}_1 \\ \dot{y}_2 \end{pmatrix} = \begin{pmatrix} -\left(\alpha - \frac{K_2}{\alpha}\right) & \frac{K_2}{\alpha} \\ -\left(K_1 + \frac{K_2}{\alpha}\right) & -\left(K_1 + \frac{K_2}{\alpha}\right) \end{pmatrix} \begin{pmatrix} y_1 \\ y_2 \end{pmatrix} + \begin{pmatrix} \frac{K_2}{\alpha} \\ -\left(K_1 + \frac{K_2}{\alpha}\right) \end{pmatrix} g(\sigma)$$

$$\sigma = y_1 + y_2$$

 $g(\sigma) = sat(\sigma) - \sigma$.

The system characteristics exhibited here were chosen for their similarity to the system equations of the OAO stability problem.

Given a $[\lambda, \theta]$ pair, which parameterize the Q-matrix, the objective of the numerical experiments was to find answers to the following.
- 1. Given a particular $[\lambda, \theta]$ pair, how well does the estimate of min V on $\dot{V} = 0$ compare with the true value? The solution to this question can be found by amplifying a specific set of results. For the case where α , K_1 , $K_2 = 1$, $\lambda = .001$, and $\theta = - .40$, the algorithm provided V = .097 as a final answer, with coordinates $y_1 = .64$, $y_2 = - 1.69$ corresponding to the intersection of the constraint $\dot{V} = 0$ with the ellipse V = .097. Neighboring V and \dot{V} loci were plotted with the result that the $\dot{V} = 0$ constraint did not intersect any V curve below approximately V = .090. Thus the estimate is in error by less than 8 percent.
- 2. How large a region of stability can be predicted via the algorithm by searching over the $[\lambda, \theta]$ space? For this case we know that the system is absolutely stable in the $[\epsilon, K]$ sector. Therefore in the case of a saturation nonlinearity, the domain of attraction is nearly the whole space. In our numerical experimentation, most of the points searched in the $[\lambda, \theta]$ space resulted in stability estimates within the region of essential linearity $(|y_1 + y_2| < .001)$. There was, however, a small region in the $[\lambda, \theta]$ space that gave stability estimates well beyond that of essential linearity. Best results for about 100 points searched in the $[\lambda, \theta]$ space provide us with $[\lambda, \theta] = [.001, -.55], \text{ volume} = 2.52, V_{\text{final}} = .1739,$ intersection with $\dot{v} = 0$ at $(y_1, y_2) = [-1.42, 2.46]$.
- 3. How sensitive is the "volume" of the estimate of the region of stability to $[\lambda, \theta]$ parameter changes?

The answer is dramatically evident in reviewing a small sample of results:

$$\left\{ \begin{array}{l} \lambda = .001 \\ \theta = -.35 \end{array} \right\} \longrightarrow \begin{cases} V_{\text{final}} = 3 \times 10^{-6} \\ \text{volume} = 3.5 \times 10^{-5} \\ y_1 = .0046 \\ y_2 = -.0036 \end{cases}$$

$$\left\{ \begin{array}{l} \lambda = .001 \\ \theta = -.40 \end{array} \right\} \longrightarrow \begin{cases} V_{\text{final}} = .097 \\ \text{volume} = 1.24 \\ y_1 = .64 \\ y_2 = -1.69 \end{cases}$$

$$\left\{ \begin{array}{c} \lambda = .001 \\ \theta = -.55 \end{array} \right\} \longrightarrow \begin{cases} V_{\text{final}} = .174 \\ \text{volume} = 2.52 \\ y_1 = -1.42 \\ y_2 = 2.46 \end{cases}$$

$$\left\{ \begin{array}{c} \lambda = .001 \\ \theta = -.60 \end{array} \right\} \longrightarrow \begin{cases} V_{\text{final}} = 5.5 \times 10^{-6} \\ \text{volume} = 7.9 \times 10^{-5} \\ y_1 = -.0133 \\ y_2 = .0123 \end{cases} .$$

The sensitivity to the rotation parameter θ is very apparent.

These results seem to indicate that the optimal quadratic estimation of the domain of attraction is a viable approach for the case of a critical plant with high gain saturating characteristics.

Picking a P-Matrix

Computer runs were made that used the technique of generating a positive definite P-matrix directly, without generating Q and then solving the Liapunov equation

$$PA + A^{T}P = -Q$$
 (52)

for P. This work originated with the motive of speeding the routine so that a great many matrices could be examined with a minimum of machine time. The abort feature described previously was essential to this plan, because the fact that P is positive definite does not ensure the definiteness of Q. Use of the abort procedure without direct generation of P had reduced the time required to investigate a matrix from 50 seconds to an average of about 10 seconds (2 seconds to search nine dimensional space and 8 seconds to generate Q and solve the Liapunov equation for P). Inversion of the 81×81 matrix at A each iteration was corrected as described previously. This reduced the time required to generate both Q and P, but the time saved was not the main advantage of direct P-matrix generation.

It soon became clear that direct generation of the P-matrix has other advantages. The eigenvalues and eigenvectors of P have direct physical interpretation in the nine dimensional state space, so that picking P directly follows Richard Hammings commandment, "the purpose of computing is insight, not numbers" (Ref. 13).

In addition, when the P-matrix is generated directly, the A-matrix
is unnecessary, and the time derivative x can be efficiently com-
puted directly from the nonlinear function. By setting
$$x_1 = \phi'$$
,
 $x_2 = v_{\phi}''$, $x_3 = \omega_{\phi}''$, $x_4 = \theta'$, $x_5 = v_{\theta}''$, $x_6 = \omega_{\theta}''$, $x_7 = \psi'$, $x_8 = v_{\psi}''$,
 $x_9 = \omega_{\psi}''$, the equations of Fig. 4 may be written in the form (for
all initial momenta zero):
 $\dot{x}_1 = -ax_2 - a(x_5 \sin x_1 + x_8 \cos x_1) \tan x_4$
 $\dot{x}_2 = -bx_2 + \frac{b}{k} \operatorname{sat}(10 \mathrm{k} \Delta \gamma_1 + 9 \mathrm{k} x_3)$
 $\dot{x}_3 = -2(x_3 + \Delta \gamma_1)$
 $\dot{x}_5 = -bx_5 + \frac{b}{k} \operatorname{sat}(d_{12} \mathrm{k}(\Delta \beta_1 \cos \Gamma_2 + \Delta \beta_2 \cos \Gamma_1 + \frac{9}{2} x_6))$ (53)
 $\dot{x}_6 = -2x_6 - .2d_{12}(\cos \Gamma_2 \Delta \beta_1 + \cos \Gamma_1 \Delta \beta_2)$
 $\dot{x}_7 = -a(x_5 \sin x_1 + x_8 \cos x_1)/\cos x_4$
 $\dot{x}_8 = -b(x_8 - \operatorname{sat}(d_{12} \mathrm{k}(-\Delta \beta_1 \sin \Gamma_2 - \Delta \beta_2 \sin \Gamma_1 + \frac{9}{2} x_9))$
 $\dot{x}_9 = -2x_9 + .2d_{12}(\sin \Gamma_2 \Delta \beta_1 + \sin \Gamma_1 \Delta \beta_2)$,

where

$$a = K_{m}K_{c}/I, \ b = \frac{I}{\tau_{m}}, \ k = K_{c}, \ d_{12} = 20 \ \text{sgn}(\gamma_{1c} - \gamma_{2c}),$$

$$h_{\theta}^{o} = h_{\phi}^{o} = h_{\psi}^{o} = 0, \ \Gamma_{1} = \Delta\gamma_{1} + \gamma_{1c}, \ \Gamma_{2} = \Delta\gamma_{2} + \gamma_{2c}$$
(54)

relates the present notation to that of Fig. 4. (Note that d_{12} here is ten times d_{12} of Ref. 3.) See Appendix III for subroutine DER, which performs this calculation. The version

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national v in

in the search routine is more sophisticated than the earlier version in the simulation routine. The main improvement is in the calculation of $\Delta\gamma_i$ and $\Delta\beta_i$. Specifically, by using the upper sign for i = 1 and the lower for i = 2, in Eq. (55)

$$\Delta \gamma_{i} = \tan^{-1} \left(\frac{\epsilon_{\alpha} - \epsilon_{\beta} \tan \gamma_{ic}}{1 + \epsilon_{\beta} (\tan \gamma_{ic} + \epsilon_{\alpha}) \tan \gamma_{ic}} \right) , \qquad (54)$$

where

$$\epsilon_{\alpha} = (\cos x_4 - 1) \tan \gamma_{ic} + \sin x_7 \tan x_1 \frac{\tan \beta_{ic}}{\cos \gamma_{ic}}$$

$$\frac{1}{7}\cos x_7 \sin x_4 \frac{\tan \beta_{ic}}{\cos \gamma_{ic}} + \cos x_7 \tan x_1 - \sin x_7 \sin x_4 ,$$
(55)

$$\epsilon_{\beta} = (\cos x_7 - 1) + \sin x_7 \sin x_4 \tan x_1 + \sin x_7 \frac{\tan \beta_{ic}}{\cos \gamma_{ic}}$$

 $\pm \tan x_1 \sin x_4 \cos x_7 \frac{\tan \beta_{ic}}{\cos \gamma_{ic}} - \tan x_1 \cos x_4 \tan \gamma_{ic}$

The formula in Fig. 4 is used to compute $\Delta\beta_i$ unless round-off error would be significant because $\Delta\beta_i < 0.1$, in which case $\Delta\beta = \sin^{-1}\mu$, where μ is the iteratively obtained solution of

$$\kappa = -a \tan \beta_{ic} + \mu , \qquad (56)$$

in which

$$1 - a = \cos \Delta \beta_{i} = \sqrt{1 - \mu^{2}} = 1 - \frac{1}{2}\mu^{2} - \frac{1}{2 \cdot 4}\mu^{4} - \frac{1 \cdot 1 \cdot 3}{2 \cdot 4 \cdot 6}\mu^{6} , \qquad (57)$$

and letting $b_i = \cos x_i - 1$, j = 4, 7,

$$\kappa = (b_7 + b_4 + b_7 b_4) \tan \beta_{ic} \pm \sin x_7 (1 + b_4) \cos \gamma_{ic}$$

$$\pm \sin x_4 \sin \gamma_{ic} , \qquad (58)$$

where the upper sign is used for i = 1 and the lower sign for i = 2. The procedure is fast, and does not require double precision arithmetic.

Initial experiments with direct generation of the P-matrix proceeded by using the classical Gershgorin Theorem (Ref. 14) and applying the results to the OAO. See the listing in Appendix III, where a positive definite matrix P is generated by simply requiring that each diagonal element is larger than the sum of the absolute values of the off diagonal elements in the same row. The computations on the PDP-10 time sharing service were so expensive that it was decided to refine the routine by using second order examples before returning to large order systems.

The results of this refinement at present are displayed in Appendix III. These routines have found quadratic Liapunov functions for the van der Pol equation

$$\ddot{x} + \epsilon (1 - x^2)\dot{x} + x = 0$$
 (59)

with $\epsilon = 0.1$, 1.0, and 5.0. For $\epsilon = 0.1$ the quadratic Liapunov function gives an estimate of the domain of attraction of area 4.8, while the actual area is approximately 12.5. A total of 1500 P-matrices were examined in about one minute on the PDP-10 computer, the best P-matrix found at trial number 89. Corresponding numbers for $\epsilon = 1.0$, $\epsilon = 5.0$; for the Faulkner differential equation (Ref. 15)

 $\dot{x} = 6y - 2y^{2}$ $\dot{y} = -10x - y + 4x^{2} + 2xy + 4y^{2}$ (60)

and the Frommer differential equation (Ref. 15)

$$\dot{x} = -y + x^{2} + y^{2}$$

 $\dot{y} = x - 2xy$
(61)

are given in Table 3. The "actual areas" were obtained by counting squares in the figures in Davis's book (Ref. 15), and are intended for rough comparison only. Note that Frommer's equation, for which the quadratic estimate is worthless, has a linear part such that the origin is neutrally stable. The results for the Faulkner equation also appear to be discouraging, but represent a significant improvement over a previously published (Ref. 16) quadratic Liapunov function for this equation, derived through a computer study using Lie series.

Table 3

RESULTS FOR SAMPLE SECOND ORDER SYSTEMS

Equa	tion	Are Quadratic Estimate	a of Actual Domain (Approx.)	Computer Time, min.	Total no. of P-matrices	Trial at which best was found
	$\epsilon = 0.1$	4.8	12.5	1.05	1400	89
Pol	$\epsilon = 1.0$	3.7	13.4	2.78	4600	737
	ε = 5.0	4.9	26.4	0.78	1100	83
Faulkner		.03	3.14	7.62	22,000	3102
Faulkner	····	5×10^{-20}	0.15	1.94	1800	1

The main object of the second order studies described above was not to get answers for second order problems, but to develop a routine that would work efficiently on higher order systems. See the discussion in Appendix III of the third computer listing presented in that appendix.

The routines of Appendix III along with the methods shown in Eqs. (53) through (58) have been programmed for the IBM 360/75and the combination shows promise of investigating over 50,000 P matrices per hour. The subroutined DER and PGGO are considerably more sophisticated than their predecessors AFX and QGEN, respectively. The former avoid double precision arithmetic and are over ten times faster than the latter. Additional compactness and speed is obtained by generation of points x by letting x = Cy as in Eq. (51), where

$$y_{i} = \xi_{i} R / \left(\sum_{j=1}^{n} \xi_{i}^{2} \right)^{\frac{1}{2}},$$

in which R, ξ_1 , ..., ξ_n are independent, each ξ_i is uniformly distributed on (-1, +1), and R is so distributed that Prob(R < r) = rⁿ. This procedure generates uniformly (by volume) distributed random points y without discarding points as mentioned following Fig. 16.

Some computer runs were also made by simply modifying the previously described PICK-A-Q routine so that it generated P matrices instead of Q matrices. There has been no real success from the PICK-A-P system.

There has been no real success in running the PICK-A-P system for the following reason. As a starting point, a particular selection of 45 parameters is undertaken in order to arrive at a p.d.

(positive-definite) P-matrix from which the search of the state space begins. Since \dot{V} is a required variable in the search and is a function of Q, a p.d. Q is formed by

 $Q = -A^T P - PA .$

Initially, the p.d. P did not yield a p.d. Q, and it is not necessary that it should. After a few hours of computer time in which 35,000 p.d. P-matrices were tried with no success (i.e., no p.d. Q-matrices), an alternative was undertaken.

The alternative was to take the best P from the best p.d. Q of the PICK-A-Q program, factor it into the required 45-input variables, and use these as input to the PICK-A-P program. This was done, but the reconstruction of the 45 variables to arrive at the p.d. P (QGEN-Subroutine) was deficient in that it did not yield the original p.d. P. This difficulty has not been resolved in terms of subroutine QGEN, and hence the negative results.

Another subroutine (PGGO), which utilizes the same factorization as mentioned above, to arrive at the 45 variables, yields the desired p.d. P. The exact reasons for the difference between PGGO and QGEN have not been ascertained to date.

V. FURTHER RESEARCH

To briefly summarize the research described here, an effort has been made to prove the stability of a ninth order system arising in engineering practice. Simulation, experience, and intuition give convincing evidence that the OAO is globally stable, within the momentum capacities of the wheels. Mathematical proofs of this stability have continually failed, but always, it seems, because of some subtle mathematical triviality rather than real physical attributes of the system or important characteristics of the system model. Brute force computer studies using quadratic Liapunov functions and random searches to estimate the domain of attraction have continually given estimates of the domain which extend well into the nonlinear region, but are disappointingly small compared to simulation studies. One consolation is that a conservative estimate of the volume of the domain has been found for a real ninth order system and this represents a first. However, future work based on the present foundations should be more definitive.

Many questions of interest have been opened by the research described herein. The most fundamental questions involve: 1) the basic effectiveness of the widely used quadratic Liapunov functions for estimating actual domains of attraction and 2) methods of random search that will succeed in high dimensional problems. Insight into both questions can be obtained by developing a numerical algorithm that efficiently generates quadratic Liapunov functions and simultaneously assures that the best quadratic estimate of the domain of attraction has been obtained. Experience in developing such an algorithm has provided information about random and deterministic search techniques. The algorithm itself gives

experimental information on quadratic estimation of the domain of attraction. This information, it is hoped, will further stimulate more theoretical approaches, in particular, approaches that will lead to more sophisticated methods for directly describing the domain of attraction, a complicated set in Euclidian n-space.

Five very specific areas require immediate study: 1) methods of factoring a positive definite matrix into its diagonal eigenvalue matrix and its rotation matrices;[†] 2) the development of an algorithm to shrink the search in n-space to a set of points close to x^* and inside the estimated domain $x^T Px \leq \ell$ when a point x^* is discovered such that $\dot{V}(x^*) = 0$; 3) investigate more fully "almost diagonal" P-matrices (such matrices have provided the best estimates to date), 4) examine the possibility of describing the domain as a union of hyperellipses and possibly hyperannuli; and 5) construction of a neater algorithm for selecting random points inside a given domain in Euclidean n-space.

The above areas should not be regarded as main future research goals, but as representing ways in which further insight into the larger problem might be obtained, thereby leading to a better understanding of stable systems and models. The computer programs that have constituted the main emphasis in this report are regarded as tools leading to comprehension rather than as research goals.

One point should be emphasized about the viewpoint at Grumman. The most profound stability theorems presently available in the literature all relate to systems with a single nonlinearity or within a specific class of nonlinearities. The case under investigation at Grumman involves many nonlinearities that do not fall † The converse construction problem is described in Ref. 3.

into these classes. The eventual hope is to develop theorems that identify stable systems with multiple nonlinearities, but our method is experimental rather than theoretical. It is based on the conviction that proving theorems in this area will become possible only after experimental evidence has presented a deeper understanding of the factors that cause a system to be stable.

VI. SUMMARY

In this report we have reviewed the development of the state equations of the OAO "paired-Tracker" coarse pointing mode attitude control system and have displayed some simplifications of this model, viz., motor saturation only, and six dimensional approximation. These models were compared by simulation for relatively large initial conditions and were found to be essentially similar in behavior, with the exception of one unexplained difference in yaw response for the full model and the six dimensional approximation.

The motor saturation only model was analyzed using the Popov Theory, and it was shown that when the channels are linearly uncoupled, i.e., $\beta_{lc} = 0$, each channel is absolutely stable when the initial total momentum is within the wheel capacity, if the gain of the nonlinearity does not go to zero with large argument. Unfortunately, this is not the case for a saturation and so we can only conclude that the domain of attraction is large, but that the channels are not globally stable. This difficulty arises because of a pole at the origin in the transfer function of the linear part. This also prevents successful analysis of the coupled system via the methods of Moore and Anderson, Sandberg, and Yacubovich.

The algorithm (Pick a Q-Matrix) for estimating the domain of attraction was developed and random search techniques for solving the required minimization problem and maximization problem were developed. The former problem was solved very successfully by taking advantage of the known geometry of the problem. The latter problem was solved with some degree of success by using a "creeping accelerated random search." However, because of the unknown geometry of

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this latter problem and its higher dimensionality (45 versus 9), similar success was not achieved. The algorithm was tested on both the nine and six dimensional full nonlinear models with similar results. The results are disappointing by comparison to the simulation results; however, they are significantly beyond the region in which the nonlinear effects first become dominant.

The algorithm was also tried on a prototype two dimensional problem to demonstrate that the algorithm would work successfully on a saturated system with a critical linear part, but the results are very sensitive to the matrix rotation parameter. A second algorithm (Pick a P-Matrix) was formulated based upon a more heuristic approach and gave some promising results for two dimensional systems, but failed to produce any results for the nine dimensional problem. This failure was apparently due to our inability to obtain a good starting matrix by factoring the best P-matrix obtained via the first algorithm.

The review of required research shows that this approach (optimal quadratic estimation) is still a promising one, but illuminates some research problems of significance. Particularly, these are: the need for more effective search techniques for problems of high dimension, a method for determining the fundamental limitations of our approach, and a more direct procedure for estimating the domain of attraction.

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APPENDIX I

DETAILED DESCRIPTION OF ESTIMATION ALGORITHMS

This appendix contains a flow chart and listing of the stability analysis algorithms where a Q-matrix is initially selected and where a P-matrix is initially selected. Both algorithms are basically the same, the primary difference being that in the Q-matrix selection an inversion process is required to determine the associated P-matrix (which is assuredly positive definite), whereas in the P-matrix selection the resulting Q-matrix (not necessarily positive definite) found by a matrix multiplication must be tested to ascertain its character. All Q-matrices that result from picking a P-matrix must be discarded if they prove to be semidefinite or negative definite because of the theory being utilized.

A thumbnail sketch of each of the subroutines shown in the flow charts (Figs. I-1 and I-2) follows.

Subroutine AFX

This subroutine calculates the matrix A and the nonlinear vector f(x) of the equations of motion $\dot{x} = Ax + f(x)$.

Subroutine QGEN

This subroutine generates a positive definite matrix Q given a set of n(n+1)/2 independent variables as given in Ref. 3.

Subroutine DSRCH

This subroutine is the search subroutine for the state space where a min V with $\dot{V} = 0$ is to be achieved.

Subroutine PEAIQ

This subroutine solves the equation $A^{T}P + PA = -Q$ for a positive definite P-matrix, given a stable A-matrix and a positive definite Q-matrix.

Subroutine DEIGN

This subroutine calculates the eigenvalues and eigenvectors of the positive definite P-matrix.



Fig. I-1 Flow Chart for Algorithm Based on a Q-Matrix



Fig. I-2 Flow Chart for Algorithm Based on a P-Matrix

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15N 0003	DIMENSION THETA(28), PHIV(8), XLAM(9), RHV(9), SLUF(9)	10100030
ISN 0004	DIMENSION XLMX (5)	10100040
I SN 0005	DIMENSION PRM(9.9)	10100060
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I SN 0009	DIMENSION EX(9) • XINC(9)	10100100
1 SN 0010	DIMENSION DINC(5)	10100110
I SN 0011	DIMENSION BUNCH(3001,6)	10100120
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ISN 0020	COMMON/BLK78/X1E, X4E,X7E	10100200
ISN 0021	COMMON/BLK68/T	10100210
ISN 0022	C CMMON / ABORT / DET. VSR .VGL	10100220
ESU 0023	COMMON/BLK 70/ AAR(5,5),BM(9,9),PA(9,9),ATP(9,9)	10100230
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I SN 0028	102 READ(5+1101+END=10C0) ALP	10100250
ISN 0029	II01 FORMAT(1844)	10100260
15N 0030	WRITE(6,191)(ALP(J),J=1,1E)	10100270
I SN 0031	191 FORMAT(1H / 10X,1EA4)	10100280
ISN 0032	0 III Z	10100290
I SN 0033		10100300
ISN 0034	751 TM = 76.8	10100310
ISN 0035	. 11 = 4+5	10100320
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15N 0040		
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I SN 0042	F2LIM = 26.0	10100390
ISN 0043	READ(5,1001)GAMIC,GAW2C,BETIC,BET2C	10100400
ISN 0044	R EAD(S,1001)HPHI.HTHT,HPSI	10100410
ISN 0045	READ(5.1001)VMINI	10100420
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2 SEZC = SIN(GAM2C)		10101080	
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4 TB1C = SIN(BET1C)/CO	(BETIC)	10101100	
5 XIE = (AITREN) / (XKM	XKC)*(HPHI-HTHT*(A11*SG1C-A13*SG2C-CG1C*TB1C	1010110	
1)/(D12*SDIF) +HPSI	(A11*CG1C-A13*CG2C+SG1C*TH1C)/(D12*SD1F))	10101120	
5 X4E = (AITREN) / (XKM	XKC)*(HTHT/(D12*SD1F))	0110101	
7 X7E = (-ALTREN)/(XKN	XKC)*(HPSI/(D12*SCIF))	10101140	
PHI = {X(1)+X1E)/DTR		10101150	
<pre>9 VPHI = X(2)*(XKM*XKC</pre>	+ HPHI*AITREN	10101160	
20 XDTI = X(3)*XXC*T1/1	- TI *AITREN+HPHI/(TV*XKM)		
		0/110101	

Mode Cost Mode Cost Cost	Other Other <th< th=""><th></th><th></th><th></th><th></th><th></th></th<>					
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And Constraint And Con	Object					
Mode Constraint Constraint <th>Mode Constraint Constraint<th></th><th></th><th></th><th></th><th></th></th>	Mode Constraint Constraint <th></th> <th></th> <th></th> <th></th> <th></th>					
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	0102			PAGE 003	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	0104 551 = (101) 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 = 001 0101 0101 = 001 0101 = 001 0101 0101 = 001	0103	$w_{TT} = x(5) * x(5) * x(5 + 1) + x(1) * x(1) + x(1) + x(1) + x(5) + x(6) + x(6) + x(6) + x(1) + x$	10101190		
0.000 0.001 0.001 0.001 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000 0.000 0.001 0.000 0.000	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	0104	PSI = (X(7) + X7E) / DTR	10101210		
$ \begin{array}{c} 0.000 \\ 0.000 $	0.000 0.000 ± 0.000 0.000 ± 0.000 0.001 0.000 ± 0.000 0.000 ± 0.000 0.001 0.000 ± 0.000 0.000 ± 0.000 0.001 0.000 ± 0.000 0.000 ± 0.000 0.001 0.001 ± 0.000 0.000 ± 0.000 0.001 0.000 ± 0.000 0.000 ± 0.000 0.001 0.001 ± 0.000 0.000 ± 0.000 0.001 0.001 ± 0.000 0.000 ± 0.000 0.001 0.001 ± 0.000 0.000 ± 0.000 0.001 0.001 ± 0.000 0.000 ± 0.000 0.001 0.001 ± 0.000 0.000 ± 0.000 0.001 0.001 ± 0.000 0.000 ± 0.000 0.001 0.001 ± 0.000 0.001 ± 0.000 0.001 0.001 ± 0.000 0.001 ± 0.000 0.001 0.001 ± 0.000 0.001 ± 0.000 0.001 0.001 ± 0.000 0.001 ± 0.000 0.001 0.001 ± 0.000 0.001 ± 0.000 0.001 0.001 ± 0.000 0.001 ± 0.000 0.001 0.001 ± 0.000 0.001 ± 0.000 0.001 0.001 ± 0.000 0.001 ± 0.000 0.001 0.001 ± 0.000 0.001 ± 0.000 0.001 0.001 ± 0.000 0.001 ± 0.000 0.001 0.001 ± 0.000 0.001 ± 0.000 0.001	0105	VPSI = X(8) *XKM*XKC + PPSI*AITREN	10101220		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	0107	VPAX = 0.0 VPAX = 0.0	10101230		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	0108	NPUSS = 2	10101240		
$ \begin{array}{c} 1011 \\ 1$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	0109	3SW = 0	10101260		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	0110	MOVE = 0	10101270		
0111 THUR = FL 0001300 0112 THUR = FL 0001300 0113 UNY = FL 0001300 0114 THUR = FL 0001300 0115 UNY = FL 0001300 0116 UNY = FL 0001300 0117 UNY = FL 0001300 0118 UNY = FL 0001300 0119 UNY = FL 0001300 0111 UNY = FL 0001400 0111 UNY = FL 0001400 0112 UNY = FL 0001400 0113 UNY = FL 0011400 0113 UNY = FL 0011400 <td>$\begin{array}{cccccccccccccccccccccccccccccccccccc$</td> <td>1110</td> <td></td> <td>10101280</td> <td>NATION CONTRACTOR AND A</td> <td></td>	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1110		10101280	NATION CONTRACTOR AND A	
0114 $P_{14}(R_{12} = P_{12})$ 000000000000000000000000000000000000	0114 FTLM # EP12 0000000 0115 FTLM # EP12 0000000 01115 DIVID = 4. 00000000 01115 DIVID = 4. DIVI	0113		10101290		
0115 01V(10 = 0.4) 0101320 0117 01V(10 = 0.4) 0101330 0118 01V(1 = 0.4) 0101330 0128 01V(1 = 0.4) 0101330 0129 01V(1 = 0.4) 0101330 0129 01V(1 = 0.4) 0101330 0129 01V(1 = 0.4) 0101350 0120 01V(1 = 0.4) 0101350 0121	0115 Divid = 0.11, bins Divid = 0.0130 0.01330 0118 00013 000130 000130 0119 00013 000130 000130 0118 00013 000130 000130 0118 00013 000130 000130 0118 00013 000130 001130 0118 00013 001130 001130 0118 00013 001130 001130 0118 00113 001130 001140 0118 00114 001140 001140 0118 00114 001140 001140 0118 00114 001140 001140 0118 00114 001140 001140 0118 00114 001140 001140 0118 00114 001140 001140 0118 001140 001140 001140 0118 001140 001140 001140 0118 001140 001140 001140	0114	THLIM = PI2	10101310		
0119 0110 0110 0110 0110 0110 0110 0110 0110 0110 010	$ \begin{array}{c} 0.000 \\ 0.000 $	0115	DIVID = 4.	10101320		
0111 $Vareo$ 0101340 0122 $Vareo$ 0101340 0123 $Cut_{\rm eff}$ strainty.v.r.w. 0101340 0123 $Cut_{\rm eff}$ strainty. 0101350 0124 $Cut_{\rm eff}$ strainty. 0101350	0111 Control 0101340 0112 Cont. Extract 0101340 0122 Coll. Extract 0101340 0122 Finder Lon 0101340 0123 Finder Lon 0101340 0124 Finder Lon 0101340 0125 Coll. Extract 0101340 0126 Coll. Extract 0101340 0127 Coll. Extract 0101340 0128 Coll. Extract 0101340 0129 Coll. Extract 0101340 0129 Coll. Extract 0101340 0129 Coll. Extract 0101350 0129 Coll. Extract 0101340 0129 Coll. Extract 0101340 0129 Coll. Extract 0101350 0129 Coll. Extract 01010150 0129	0110	D1 VI D T	10101330		1
0119 CALL ARK163) CALL ARK163) 0101420 0121 0 CALL ARK163) 0101420 0101420 0121 0 CAL ARK163) 0101420 0101420 0121 0 CAL ARK163 0101420 0101420 0122 0 CAL ARK164 0101420 0101420 0123 0 CAL ERRM1017 0101420 0101420 0123 0 CAL ERRM1017 0101420 0101420 0123 0 CAL ERRM1016 0101420 0101420 0123 0 CAL ERRM1016 0101420 0101420 0123 0 CALLERRM1016 0101420 0101420 0123 0 CALLERRM1016 0101420 0101420 0123 010141 0101420 0101420 0123 010141 0101420 0101420 0123 010141 0101420 0101420 0123 0101411 0101420 0101420 </td <td>0119 010F = 0 0101000000000000000000000000000000000</td> <td>0118</td> <td></td> <td>10101340</td> <td></td> <td></td>	0119 010F = 0 0101000000000000000000000000000000000	0118		10101340		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	0119	NOPE = 0	10101390		
0.121 3 cku construction 1000000000000000000000000000000000000	0.112 3 Call OGeNT FETA FMILVALMA) 1010 1430 0.112 10 Call To GeNT FETA FMILVALMA) 1010 1430 0.112 10 Call F = 10.0000 1010 1430 0.112 00 Call F = 10.0000 1010 1430 0.113 00 Call F = 10.000 1010 1430 0.113 00 Call F = 10.000 1010 1430 0.113 00 Call F = 10.000 1010 1530 0.113 00 Call F = 10.000 1010 1530 0.113 00 Call F = 10.000 1010 1530 0.113 001 Call F = 000 1010 1530 0.113 001 Call F = 001 1010 1530 0.113 001 Call F = 001 1010 1530 0.114 001 Call F = 001 1010 1530 0.114 001 Call F = 001 1010 1530 0.115 001 Call F = 001 1010 1530 0.114 001 Call F = 001 1010 1530 0.114 <t< td=""><td>0120</td><td>CALL AFX(JSW)</td><td>10101410</td><td></td><td></td></t<>	0120	CALL AFX(JSW)	10101410		
1111111111111111111111111112111111111111111111111112111111111111111111111112111111111111111111111113111111	1111 Trivenerabarri Gn To 45 10101440 1112 Trivenerabarri Gn To 45 10101440 1112 Extra = 1 10101450 1112 Do 703 3=1:0 10101450 1113 Do 703 3=1:0 10101450 1113 Do 703 3=1:0 10101450 1113 Do 703 3=1:0 1010150 1113 Do 704 3=1:0 1010150 1113 Do 704 151 1010150 1114 Do 704 151 1010150 1114 Do 714 151 1010150 1114 Do	01210	3 CALL QGEN(THETA,PHIV,XLAM)	10101430		
000000000000000000000000000000000000	0000 CALLERACE 10000000 0000 CELE 1000000 0000 CALLERACE 1000000 0011 CALLERACE 1000000 0012 CALLERACE 1000000 0013 CALLERACE 1000000 0014 CALLERACE 1000000 0014 CALLERACE 1000000 0014 CALLERACE 1000000 0014 CALLERACE 1000000 00170 CALLERACE <td></td> <td>Ut = 1.0 Friende en 17 co to foi a communication and a communication</td> <td>10101440</td> <td></td> <td>:</td>		Ut = 1.0 Friende en 17 co to foi a communication and a communication	10101440		:
0128 0 for 30 = 11 0 for 30 = 11 0 for 30 = 11 0128 0 for 30 = 11 0 for 30 = 11 0 for 30 = 11 0129 0 for 30 = 11 0 for 30 = 11 0 for 30 = 11 0130 0 for 30 = 11 0 for 30 = 11 0 for 30 = 11 0131 0 for 30 = 11 0 for 30 = 11 0 for 30 = 11 0133 0 for 30 = 11 0 for 30 = 11 0 for 30 = 11 0133 6 for 10 = 11 0 for 10 = 10 10 10 = 50 0133 6 for 10 = 11 0 for 30 = 11 10 10 = 50 0133 6 for 10 = 11 0 for 30 = 11 10 10 = 50 0133 6 for 10 = 11 10 10 = 50 10 10 = 50 0133 6 for 10 = 11 10 10 = 50 10 10 = 50 0133 10 for 10 = 10 10 10 = 50 10 10 = 50 0134 10 for 10 = 10 10 10 = 50 10 10 = 50 0134 10 for 10 = 10 10 10 = 50 10 10 = 50 0134 10 for 10 = 10 10 10 = 50 10 10 = 50 0134 10 for 10 = 10 10 10 = 50 10 10 = 50 0134 10 for 10 = 10 10 10 = 50 10 10 = 50 0134 10 for 10 = 10 10 10 = 50 10 10 = 50 0134 10 for 10 = 10<	0128 0 for 3 = 1 1011460 0128 00 for 3 = 1:4 10101460 0128 00 for 3 = 1:4 10101560 0129 00 for 3 = 1:4 10101560 0131 00 for 3 = 1:4 10101560 0132 cub L below a.s.() 10101560 0133 cub L below a.s.() 10101560 0133 cub for 3 = 1:4 10101560 0133 cub for 1 = 1:4 10101560 0134 0011146 1022 10101560 0134 0011146 1022 10101670 0134 0011146 10101670 10101670 0134 0011146 10101670 10101670 0134 0011146 10101670 10101670 0134 0011146 10101670 10101670 0134 0011146 101011670 10101670 0134	0125	CALL PEALQ(KEEP)	10101450		
0127 DG 703 FEL. 10101900 0123 007 703 FEL. 10101550 0131 006 FEL. 10101550 0131 006 FEL. 10101550 0131 006 FEL. 10101550 0133 006 FEL. 10101550 0133 006 FEL. 10101550 0134 006 FEL. 10101550 0135 006 FEL. 10101550 0135 006 FEL. 10101560 0135 001 FEL. 10101560 0135 001 FEL. 10101660 0135 001 FEL. 10101660 0135 001 FEL. 10101660 0135 001 FEL. 10101660 0135 11 FEL. 10101660 0135 11 FEL. 10101660 0140 90 CN11AL 00101750 0141 90 CN11AL 10101660 0141 90 CN11AL 10101660 0142 90 CN11AL 10101660 0144 90 CN11AL 10101660 0144 90 CN11AL 1010160 0144 90 CN11AL 10101770 0144 90 CN11AL 10101770 0145 90 CN11AL 1010160 0146 <	0127 00 703 Files 10101400 0128 00 703 Files 10101550 0130 00 703 Files 10101550 0131 00 703 Files 10101550 0131 00 701 Files 10101550 0131 00 61 Files 10101550 0131 00 61 Files 10101550 0132 00 61 Files 10101550 0133 00 61 Files 10101550 0134 00 61 Files 10101550 0135 00 Files 10101550 0131 00 Files 10101650	0126	KEEP = 1	10101480	-	
0125 00 70 72 1415 0101510 0129 00 70 72 1415 0101550 0121 00 70 72 1415 0101550 0121 0101550 0101550 0121 0101550 0101550 0121 0101550 0101550 0121 0101550 0101550 0121 0101550 0101550 0121 0101550 0101550 0121 0101550 0101550 0121 0211151 0101550 0121 0211151 0101550 0121 0211151 0101550 0121 0211151 0101550 0121 0211151 0101550 0121 0211151 0101550 0121 0101550 0101550 0121 0101550 0101550 0121 0101550 0101550 0121 010150 0101550 0121 010150 0101550 0121 010150 0101550 0121 010150 0101550 0121 010150 0101550 0121 010150 0101550 0121 010150 010150 0121 010150 010170	0.0120.012410101500.1130.010410101500.1130.01611100.1130.01611100.1130.01611100.1130.0101500.1130.0101500.1130.0101500.1130.0101500.1130.0101500.1130.0101500.1130.0101500.1130.0101500.1130.0101500.1130.0101500.1140.0011600.1150.0101600.1150.0101600.1150.0101600.1160.0101600.1170.0101600.1180.0101600.1190.011600.1190.011600.1110.011700.11110.011700.11110.011700.11110.011700.11110.01170 <tr< td=""><td></td><td></td><td>10101490</td><td></td><td></td></tr<>			10101490		
1259 703 PMAIL 1)=FMAIL 1001550 1231 0.0 C.AL DEGMENHARC) 1001550 1233 6 PUV(1) = 0.0 1001550 1233 6 ALL CLOCK 1001550 1234 C.AL CLOCK 1001550 1235 C.AL CLOCK 1010550 1235 C.AL CLOCK 1010550 1235 C.AL CLOCK 1010550 1235 C.AL CLOCK 1010550 1237 DI CLOCH 1010550 1237 DI CLOCH 1010150 1241 DI CLOCH 1010150 1241 DI CLOCH 1010150 1241 DI CLOCH 1010170 1241 DI CLOCH 1010150 1241 DI CLOCH 1010170 1241 DI CLOCH 1010170 1241 DI CLOCH 1010170 1241 DI CLOCH 1010170 1241 DI CLOCH 1010170 <td>0129 703 PMR(11)=Fart(11)=FAR(11)=F</td> <td>0128</td> <td>00 703 J=1+9</td> <td>10101510</td> <td>-</td> <td></td>	0129 703 PMR(11)=Fart(11)=FAR(11)=F	0128	00 703 J=1+9	10101510	-	
0130 Call Delix(Hw.B.c) [0]01550 0131 00 6 1=1.9 [0]01550 0133 FW(1) = 0.0 [0]01570 0134 FW(1) = 0.0 [0]01560 0135 CALL CLCK [0]01560 0135 CALL CLCK [0]01560 0135 CALL CLCK [0]01560 0135 CALL CLCK [0]01660 0131 CALL CLCK [0]01660 0147 CALL CLCK [0]01660 0148 CALL CLCK [0]01660 0149 CALL CLCK [0]01700 0147 CALL CLCK [0]01700 0147 CALL CLCK [0]01700 0147 CALL CLCK [0]01700 0148 CALL CLCK [0]01700 0149 CALL CLCK [0]01700 0149 CALL CLCK [0]01700 <	0130 $CdL DEGA(CMALE,C)$ 01015500131 $CdL DEGA(CMALE,C)$ 01015500132 $CPT = 1 \text{ (BOTG)}$ 01015500133 $CPT = 1 \text{ (COCK)}$ 01015500134 $CPT = 1 \text{ (COCK)}$ 01015500135 CCC $COCK = -115$ 01010500135 CCC $COCK = -115$ 01010500137 CCC $CCCCK$ 01010500138 $CCCCCK$ $CCCCK$ 01010500139 $CCCCCK$ $CCCCK$ 01010500131 $CCCCK$ $CCCCK$ 01010500132 $CCCCK$ $CCCCK$ 01010500133 $CCCCK$ $CCCCKK$ 01010500134 $CCCKK$ $CCCCKK$ 01010500134 $CCCKK$ $CCCCKKK$ 01010500134 $CCCKK$ $CCCKKK$ 01010500134 $CCCKKK$ $CCCKKK$ 01017000134 $CCCKKK$ $CCCKKKK$ 01017000134 $CCCKKK$ $CCCKKKK$	0129	703 PRM(I,J)=PM(I,J)	10101530	and the other sector of the se	
0.112 0.000 1=0.0 0.000 1=0.0 0.112 0.000 1=0.0 0.000 1=0.0 0.113 0.001 1=0.0 0.001050 0.113 0.001 1=0.0 0.001050 0.115 0.001 1=0.0 0.001050 0.115 0.001 1=0.0 0.010160 0.115 0.001 1=0.0 0.010160 0.117 0.001 1=0.0 0.010160 0.118 0.0111=10 0.010160 0.119 0.001 1=0.0 0.010160 0.110 0.001 1=0.0 0.010160 0.111 0.001 41 0.010160 0.111 0.010 41 0.010160 0.111 0.010 41 0.010160 0.111 0.010 41 0.010160 0.110 0.010 41 0.010160 0.110 0.010 41 0.010160 0.111 0.010160 0.010160 0.111 0.010160 0.010160 0.111 0.010170 0.010170 0.111 0.010170 0.010170 0.111 0.010170 0.010170 0.111 0.010170 <	0133 6 HVU1 = 0.0 01010150 0133 CALL CLOCE 110101570 0135 COLL CLOCE 110101570 0135 CALL CLOCE 110101570 0135 CALL CLOCE 110101570 0135 CALL CLOCE 110101570 0135 CALL CLOCE 110101560 0135 CALL CLOCE 110101560 0135 CALL CLOCE 10101560 0141 CALLOLOE CALLOLOE 0141 CALLOLOE 110101660 0141 CALLOLOE 110101660 0141 CALLOLOE 110101670 0142 CALLINE 10101700 0144 CALLINE 10101700	0130	CALL DEIGN(PM.B,C)	10101550		
0133 Coll T = INEGO(9.5.1.FEN.FEN.DET.SLUF) 1010150 0135 SOLI FICLOKE COLS.NULE ABORT 0101020 0135 SOLI FICLOKE * 010 1010120 0137 USEATIVE ETEN WILE ABORT 1010120 0138 SOLI FILLO 001020 0139 SOLI FILLO 001020 0139 SI FICLONILITOOD GATO 22 1010150 0140 SOLO 21 FILLO 1010150 0140 SOLO 445 1010150 0141 SOLO 445 1010150 0142 SOLO 445 1010150 0143 SOLO 445 1010150 0144 SOLO 445 1010150 0145 SOLO 445 1010170 0145 SOLO 445 1010170 0144 TALM(1) 1010170 0145 TOLO 455 1010170 0144 TOLO 455 1010170 0144 TOLO 455 1010170 0145	0133 CORET = TREGICIO.5.1.FRW.FHV.DET.SLUP) 10101610 0135 CORET = TREGICIO.5.1.FRW.FHV.DET.SLUP) 10101610 0135 GALL CLOCK 0.51.FRW.FHV.DET.SLUP) 10101610 0135 GOL CLOCK 0.51.FRW.FHV.DET.SLUP) 10101650 0135 GOL CLOCK 0.51.FRW.FLEEN WILE ABORT 0.0101620 0135 GOL CLOCK 0.51.FRW.FLEEN WILE ABORT 10101650 0136 COL CLOCK 0.51.FRW.FLEEN WILE ABORT 10101650 0138 21.TERETIAL.SCO GOT QLS 0.010670 10101670 0142 0.010214151 10101670 10101670 0143 0.010445 0.010445 10101670 0143 0.010445 10101670 10101740 0143 0.010445 10101740 10101740 0144 0.01045 10101740 10101740 0145 0.01045 10101740 10101740 0145 0.01045 10101740 10101740 0144 0.01045 10101740 10101740 0145 0.01045 10101740 10101740 0145 <	0132	6 RHV(I) = 0.0	10101560		
0134 Cold CLOCK 0101050 0135 GOM FORMATIC NELE - F. E. LA. T 10101630 0135 GOM FORMATIC NELE - F. E. LA. T 10101630 0135 GOM FORMATIC NELE - F. E. LA. T 10101630 0135 GOM FORMATIC NELE - F. E. LA. T 10101630 0131 DO 21 1 = 1:9 10101630 0131 DO 21 1 = 1:9 10101650 0141 DO 21 1 = 1:9 10101650 0142 DO 701 = 1:9 10101650 0143 DO 704 = 1:9 10101600 0144 DO 704 = 1:9 1010170 0144 DO 704 = 1:9 1010170 0145 DO 704 = 1:1 1010170 0144 Cold 1:1 1010170 0145 DO 704 = 1:1 1010170 0144 Cold 1:1 1010170 0144 Cold 1:1 1010170 0144 Cold 1:1 1010170 0144 Cold 1:1 1010170 <td>0138 cd.L cLock 0111050 0135 9061 FEMARTIC NEUE = 0.15 0 ET = 0.101050 0137 0 21 T=1.9 0 C 1011050 0138 9061 FEMARTIC NEUE = 0.15 0 ET = 0.101050 0138 21 TETG(0.0000 0 C 11 TETG(0.0000 0131 21 TETG(0.0000 0 C 10101650 0143 0 0 0 21 T=1.9 0 0 0 1000 10101650 0143 0 0 0 1 = 1.9 10101650 10101650 0143 0 0 0 1 = 1.9 10101650 10101650 0144 0 0 0 0 1 = 1.9 10101650 10101760 0144 0 0 0 0 1 = 1.9 1010170 1010170 0144 0 0 0 0 1 = 1.9 1010170 1010170 0144 0 0 0 0 1 = 1.9 1010170 1010170 0144 0 0 0 0 1 = 1.9 1010170 1010170 0145 0 0 0 0 1 = 1.9 1010170 1010170 0145 0 0 0 0 1 0 1 0 1.9 1010170 1010170 0144 0 0 0 0 0 1 0 1.9 1010170 1010170 0145 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>0133</td> <td>KDET = IMEQD(9,5,1,PRM,RHV,DET,SLUF)</td> <td>10101590</td> <td></td> <td></td>	0138 cd.L cLock 0111050 0135 9061 FEMARTIC NEUE = 0.15 0 ET = 0.101050 0137 0 21 T=1.9 0 C 1011050 0138 9061 FEMARTIC NEUE = 0.15 0 ET = 0.101050 0138 21 TETG(0.0000 0 C 11 TETG(0.0000 0131 21 TETG(0.0000 0 C 10101650 0143 0 0 0 21 T=1.9 0 0 0 1000 10101650 0143 0 0 0 1 = 1.9 10101650 10101650 0143 0 0 0 1 = 1.9 10101650 10101650 0144 0 0 0 0 1 = 1.9 10101650 10101760 0144 0 0 0 0 1 = 1.9 1010170 1010170 0144 0 0 0 0 1 = 1.9 1010170 1010170 0144 0 0 0 0 1 = 1.9 1010170 1010170 0144 0 0 0 0 1 = 1.9 1010170 1010170 0145 0 0 0 0 1 = 1.9 1010170 1010170 0145 0 0 0 0 1 0 1 0 1.9 1010170 1010170 0144 0 0 0 0 0 1 0 1.9 1010170 1010170 0145 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0133	KDET = IMEQD(9,5,1,PRM,RHV,DET,SLUF)	10101590		
0135 WRITE(\$-0061KUE.pET 10101640 0135 C NEATIVE EIEEN WALE ADDT 10101640 0137 D D 21 10101640 0138 21 FG(1).1(*0.0) GTTGZ 10101640 0142 D D 10101640 0142 D D 10101640 0143 D D 10101640 0144 D D 10101640 0144 D D 10101640 0144 D D 10101640 0144 D D 10101640 0145 D D 10101640 0145 D D 10101750 0145 D D 10101750 0145 D D 10101750 0145 D D 10101750 0145 D D 10101770 0147 D D 10101770 0147 D D 10101770 0147 D D D 10101770 <t< td=""><td>0135 0011 Ferror 00110 Ferror 0010 Ferror 0138 0011 Ferror 0010 Ferror 0010 Ferror 0138 011 Ferror 0101 Ferror 0101 Ferror 0140 021 Ferror 0101 Ferror 0101 Ferror 0141 000 C21 Ferror 0101 Ferror 0101 Ferror 0141 010 C41 Ferror 0101 Ferror 0101 Ferror 0142 017 C41 Ferror 0101 Ferror 0101 Ferror 0142 017 C41 Ferror 0101 Ferror 0101 Ferror 0142 017 Ferror 0101 Ferror 0101 Ferror 0150 000 764 Ferror 0101 Ferror 0101 Ferror 0150 000 774 Ferror 0101 Ferror</td></t<> <td>0134</td> <td>CALL CLOCK</td> <td>• • •</td> <td></td> <td></td>	0135 0011 Ferror 00110 Ferror 0010 Ferror 0138 0011 Ferror 0010 Ferror 0010 Ferror 0138 011 Ferror 0101 Ferror 0101 Ferror 0140 021 Ferror 0101 Ferror 0101 Ferror 0141 000 C21 Ferror 0101 Ferror 0101 Ferror 0141 010 C41 Ferror 0101 Ferror 0101 Ferror 0142 017 C41 Ferror 0101 Ferror 0101 Ferror 0142 017 C41 Ferror 0101 Ferror 0101 Ferror 0142 017 Ferror 0101 Ferror 0101 Ferror 0150 000 764 Ferror 0101 Ferror 0101 Ferror 0150 000 774 Ferror 0101 Ferror	0134	CALL CLOCK	• • •		
0137 C NEGATIVE FIGL. THILE 160 10101620 0138 21 FIGI1.11:0.0 60 T0 22 10101650 0140 00 T0 445 10101670 10101650 0141 00 T0 445 10101670 10101670 0142 00 T0 445 10101670 10101670 0145 00 T0 415 10101670 10101670 0145 00 T0 415 10101670 10101670 0145 00 T0 415 10101750 10101750 0145 00 T0 415 10101720 10101720 0147 00 T0 1010 10101720 10101720 0147 00 T0 1010 10101720 10101740 0147 T04 C(1,1) 10101720 10101740 0147 T04 C(1,1) 10101740 10101740 0147 T04 C(1,1) 10101740 10101770 0147 T04 C(1,1) 10101740 10101740 0147 T04 C(1,1) 10101740 10101770 0147 T04 C(1,1) 10101740 10101740 0150 C C 10101770 </td <td>0137 C and type fielder 0101050 0138 21 Frig(1).1.1.00 66710 22 0101050 0140 00 To 445 0101050 0142 00 To 445 0101050 0143 21 Frig(1).1.1.00 66710 22 0101050 0142 00 To 445 0101050 0143 20 To 445 0101050 0143 21 Frig(1).1.1.00 66710 22 0101050 0143 20 To 445 0101050 0143 20 To 41-915 0101050 0144 20 To 41-915 0101070 0145 20 To 41-915 01010710 0146 20 To 41-915 01010710 0147 704 C(11.9) = 400(1.9) 0101070 0148 704 C(11.9) = 400(1.9) 0101070 0149 20 To 41-91 0101070 0147 704 C(11.9) = 400(1.9) 0101070 0148 704 C(11.9) = 400(1.9) 0101070 0149 20 To 41-91 0101070 0149 20 To 41-91 0101070 0149 20 To 41-91 010170 01010170 20 To 1010170 01</td> <td>0135</td> <td>WRITE(6,9061)NCUE,DET 5061 FORWATCH NCUE - 6 IE • 551-0 - • 110 - 0</td> <td>10101610</td> <td>-</td> <td></td>	0137 C and type fielder 0101050 0138 21 Frig(1).1.1.00 66710 22 0101050 0140 00 To 445 0101050 0142 00 To 445 0101050 0143 21 Frig(1).1.1.00 66710 22 0101050 0142 00 To 445 0101050 0143 20 To 445 0101050 0143 21 Frig(1).1.1.00 66710 22 0101050 0143 20 To 445 0101050 0143 20 To 41-915 0101050 0144 20 To 41-915 0101070 0145 20 To 41-915 01010710 0146 20 To 41-915 01010710 0147 704 C(11.9) = 400(1.9) 0101070 0148 704 C(11.9) = 400(1.9) 0101070 0149 20 To 41-91 0101070 0147 704 C(11.9) = 400(1.9) 0101070 0148 704 C(11.9) = 400(1.9) 0101070 0149 20 To 41-91 0101070 0149 20 To 41-91 0101070 0149 20 To 41-91 010170 01010170 20 To 1010170 01	0135	WRITE(6,9061)NCUE,DET 5061 FORWATCH NCUE - 6 IE • 551-0 - • 110 - 0	10101610	-	
013721Tele901101060013821Tele900104450101056001419070445101016601010166001429070445101016601010166001439170104510101660101016600144701710101660101016600145701710101701010170014770470171010177001477047017101017700147704701710101770014770470177010101770014770470177010101770014770510101770101017701010170704701770101017701147705101017701010177011487051010177010101770114970510101770101017701140705611.0101017701141705101017701010177011477051010177010101770114870510101770101017701149711.010101770101017701150711.0101017701010177011517171.0101017701010177011522621.01010177011532621.01010177011532621.01010177011532621.01010177011532621.01010177011532721.010101770	0137D0 21 I 1: 1.9013821 $\Gamma(5(1), L'1, 0, 0)$ 60 T0 45014100 T0 445017120 T0 445017100 T0 445017100 T0 445017200 T0 445017300 T0 445017400 T0 445017400 T0 445017400 T0 445017400 T0 445017400 T0 445017401 T0 101650014501 T0 101070014601 T0 101070014701 T0 101070014801 T0 101070014901 T0 101070014901 T0 101070014001 T0 101070014110 10170014110 10170014201 T0 101750014310 101770014410 101770014510 101770014610 101750014710 101770014810 101770014910 101770014910 101770014910 101770014910 101770014910 101770014910 101770014910 101770014910 101770014910 101770014910 101770014910 101770014910 101770014910 101770014910 101770014910 101770015910 101770015910 101770015910 101770015910 101770015910		C NEGATIVE EIGEN VALUE ABORT	10101620		
13.821IF(3(1)-L*0.0) 60 T0 221010166001.4190 $00TNWE$ 1010167001.4297 $00T$ 4.1401010167001.4381(1) ± XLAM(1)101016501010166001.4400T 70 4.51101016501010166001.4500T 70 4.51101016501010165001.4700T 70 4.51101017701010177001.47706 T(1.1) = 0(1.1)101017701010177001.47706 C(1.1) = 0(1.1)101017701010177001.47706 C(1.1) = 0(1.1)101017701010177001.4880T 1.1101017701010177001.4980T 1.1101017701010177001.4980T 1.1101017701010177001.4980T 1.1101017701010177001.4980T 1.1101017701010177001.4980T 1.1101017701010177001.4980T 1.1101017701010177001.4980T 1.1101017701010177001.4980T 1.1101017701010177001.5180T 1.1101017701010177001.5290T 2.611.11010177001.5390T 2.611.11010170001.5490T 2.611.11010177001.5526 F1.N101017001010170001.5526 ALL90T 2.61010180001.5526 ALL90T 2.61010180001.5526 ALL90T 2.61010180001.5590T	138211113211110101650014000100145010010101650101016500142017041101010165010101650014301701101010165010101650014401700141010165010101650014501700141010170101017100147014710101701010171010101710014770511.3011.310101720014770511.3011.31010172001477051010172010101720014770510101770101017700147705101017701010177001487051010177010101770014970510101770101017700140705101017701010177001417051010177010101770014270510101770101017700143711.0711.010101770015001250125101017700151002511.0101017700151002511.0101017900152002511.01010179001532611.01010179001532611.0101018001532711.0101018001532711.0101018001530117110101800153011711010180115420171.011.0	0137	D0 21 1=1.9	10101640	×	
014309 $CONTINUE$ 10101650014200704 $=1.9$ 10101650014301704 $=1.9$ 10101650014400704 $=1.9$ 10101760014500704 $=1.5$ 10101720014600704 $=1.9$ 10101720014700704 $C(1,1)$ $= A((1,1))$ 0147704 $C(1,1)$ $= A((1,1))$ 101017200147704 $C(1,1)$ $= A((1,1))$ 101017200147704 $C(1,1)$ $= A((1,1))$ 101017200147704 $C(1,1)$ $= A((1,1))$ 101017200147704 $C(1,1)$ $= A((1,1))$ 101017200147 $C(1,1)$ $= A((1,1))$ $= A((1,1))$ 101017200148 $C(1,1)$ $= A((1,1))$ $= A((1,1))$ 101017200149 $C(1,1)$ $= A((1,1))$ $= A((1,1))$ 101017200149 $C(1,1)$ $= A((1,1))$ $= A((1,1))$ 101017200149 $C(1,1)$ $= A((1,1))$ $= A((1,1))$ 101017600149 $C(1,1)$ $= A((1,1))$ $= A((1,1))$ 101017900150 DC $Z6$ $= 1.0$ 101017900151 DC $Z6$ $= 1.0$ 101017900152 DC $Z6$ $= 1.0$ 101017900153 DC $Z6$ $= 1.0$ 101017900153 DC $Z6$ $= 1.0$ 101017900153 DC $Z6$ $= 1.0$ 1010180<	011199 0.0111 Mat101016500114200.70411.00101650014300.70411.00101650014500.70411.00101760014600.70411.00101770014700.70411.00101770014800.70411.00101770014900.70411.00101770014700.70411.00101770014770411.00101770014870411.00101770014970411.00101770014970411.010101770014070411.010101770014770411.010101770014970411.010101770014970411.010101770014970411.010101770014970411.010101770014970411.010101770014970411.010101770014970411.0101017700150702611.00151707610101770015270711.010101770115426711.010101800115420711.0101018001155777710101800115427711.010101800115577771010180011547711.011.011557711.01010180<	0138	21 IF(B(I).LT.0.0) GO TO 22	10101650	* *	
011207 04 1=1.910101650014306(1) = xtam(1)101016600144017 04 J=1.510101700014507 704 J=1.510101710014707 704 J=1.510101710014707 704 J=1.510101720014707 704 J=1.510101720014707 704 J=1.51010177001470147101017700147014710101770014701471010177001470147101017700147014710101770014901491010177001490174010101770014901740101017700149012710101770014901271010177001490121710101770014901217101017700149012171010177001490121710101770014901217101017700150012611.00151012611.001520127101017700151012611.001270127101017700151012611.0015201701010177001530171.01010177001542611.001550177.01010177001510177.01010177001550177.11010177001550177.11010177001550177.1101018001550177.11010180 <td>012207 04 1=1.9101016700143B(T) = XtAW(T)0101016900144Def T = Ert * kLAW(T)01017700145Def T = Jert * kLAW(T)01017700146PW(T,J) = ART(T,J)01017700147T04 C(T,J) = ART(T,J)01017700148PW(T,J) = ART(T,J)01017700147PW(T,J) = ART(T,J)01017700148PW(T,J) = ART(T,J)01017700149PW(T,J) = ART(T,J)01017700140PR T C(LOLATION DF ATP (A TRANSPOSE P)01017700149Calculation DF ATP (A TRANSPOSE P)01017700149Calculation DF ATP (A TRANSPOSE P)01017700150DC 26 J=1.N01017700151DC 26 J=1.N01017700152DC 26 J=1.N01017700153DC 26 J=1.N01017700154S6 Acti.J) = ATP(1,J) + ATK,IJ * PM(K,J)01018000153DC 26 J=1.N01018000154S6 Acti.J) = ATP(1,J) + PM(T,K) * A(K,J)01018000155DC 26 J=1.N01018000155DC 27 T=1.N01018000155DC 27 T=1.N<</td> <td>0141</td> <td>6U 10 445</td> <td>10101660</td> <td>1 1 1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1</td> <td>1</td>	012207 04 1=1.9101016700143B(T) = XtAW(T)0101016900144Def T = Ert * kLAW(T)01017700145Def T = Jert * kLAW(T)01017700146PW(T,J) = ART(T,J)01017700147T04 C(T,J) = ART(T,J)01017700148PW(T,J) = ART(T,J)01017700147PW(T,J) = ART(T,J)01017700148PW(T,J) = ART(T,J)01017700149PW(T,J) = ART(T,J)01017700140PR T C(LOLATION DF ATP (A TRANSPOSE P)01017700149Calculation DF ATP (A TRANSPOSE P)01017700149Calculation DF ATP (A TRANSPOSE P)01017700150DC 26 J=1.N01017700151DC 26 J=1.N01017700152DC 26 J=1.N01017700153DC 26 J=1.N01017700154S6 Acti.J) = ATP(1,J) + ATK,IJ * PM(K,J)01018000153DC 26 J=1.N01018000154S6 Acti.J) = ATP(1,J) + PM(T,K) * A(K,J)01018000155DC 26 J=1.N01018000155DC 27 T=1.N01018000155DC 27 T=1.N<	0141	6U 10 445	10101660	1 1 1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	1
0143 $B(T) = XLAM(T)$ $D114$ $D101700$ 0114 $D0T = ET + xLAM(T)$ $D1101710$ 0145 $D0T 704$ $D11915$ 0147 $T04$ $D110172$ 0148 $T04$ $D110172$ 0149 $W(T,U) = a(T,U)$ $D101720$ 0147 $T04$ $D110172$ 0148 $W(T,U) = a(T,U)$ $D101720$ 0149 $WETTE(6,9061)KDET; DETD1017200149WETTE(6,9061)KDET; DETD101017400150CCALCUATION DF AT (FANSPOSE P)D101017400151D026E1.ND101017400151D026E1.ND101017400151D026E1.ND101017400151D026E1.ND101017700152D026E1.ND101017700151D026E1.ND101017700152D026E1.ND101017700153D127T1=1.ND101017000154D127T1=1.ND101018000155D127T1=1.ND101018000155D127T1=1.ND10101800$	0143 D(T) = XLAM(T) 10101690 0144 D(T A J=1; S) 10101710 0145 D(T, J=1; S) 10101720 0147 D(T, J) = Q(T, J) 10101720 0147 D(T, J) = Q(T, J) 10101720 0147 D(T, J) = Q(T, J) 10101720 0147 TOA C(T, J) = Q(T, J) 10101720 0147 TOA C(T, J) = Q(T, J) 10101730 0148 TOA C(T, J) = Q(T, J) 10101730 0149 KOET = 0 10101740 0149 C CALCULATION OF PA (F TANSPOSE P) 10101760 0150 C CALCULATION OF PA (F TANSPOSE P) 10101770 0151 DO 26 J=1.N 10101770 0151 DO 26 J=1.N 10101770 0153 Z S J=1.N 10101770 0154 Z S J=1.N 10101770 0155 DO 26 J=1.N 10101770 0155 DO 77 S J=1.N 10101770 0155 DO 78 S J=1.N 10101770 0155 DO 78 S J=1.N 10101770 0155 D0 77 S J=1.N 10101770 0155 D1	0142		10101670		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0144Def = Def * XLAM(1)101017700145 $50 704 J=15$ $01(14)$ 10101720 0147 $704 (C11,3) = AR(1,3)$ 10101720 0148 $RW(1,3) = AR(1,3)$ 10101720 0149 $KDF = 0$ $10(17)$ 0149 $KDF = 0$ 10101720 0149 $KDF = 0$ 10101720 0149 $CCLLATION DF ATP (A TRANSPOSE P)101017400140CCLLATION DF ATP (A TRANSPOSE P)101017400150DC 26 J=1.N101017600151DC 26 J=1.N101017700153APC(1,1) = APC(1,1) + A(K,1) + PM(K,J)101017900153APC(1,1) = APC(1,1) + A(K,1) + PM(K,J)10101820015326 PA(1,1) = PA(1,1) + PM(1,K) + A(K,J)101018200154D7 27 T=1.N101018200155D7 27 T=1.N10101820$	0143	B(T) = XLAM(T)	10101690	•	
$\begin{array}{llllllllllllllllllllllllllllllllllll$	0145D0 704 J=1.5101017200146Pw(1.J) = Q(1.J)Q(1.J) 10101720 0147XDET = 0I0101720101017200148KDET = 0I0101720101017400149KDET = 0I0101740101017400140C CALCULATION OF PAT (A TRANSDOSE P)10101770101017700150D 26 I=1.NI0101770101017700151D 26 I=1.NI0101770101017700152D 26 I=1.NI0101770101017700153ATP(1.J) = ATP(1.J) + A(K.1) *PM(K.J)10101800015426 Pa(1.J) = PA(1.J) + A(K.1) *PM(K.J)101018100155D 27 I=1.N101018000156D 27 I=1.N101018000157D 27 I=1.N10101800	0144	DET = DET + XLAM(I)	10101700		
144704 $C(1,1)$ $=$ $dR(1,1)$ $=$ $dR($	0147704 $C(1,1,3)$ $AAR(1,3)$ $I(1,1,3)$ $I(1,1,3)$ 0147KDET = 0 $I(1,1,3)$ $I(1,1,3)$ $I(1,1,3)$ 0149WRITE(6,061)KDETDET $I(1,1,1,3)$ $I(1,1,1,3)$ 0149WRITE(6,061)KDETDET $I(1,1,1,3)$ $I(1,1,1,3)$ 0149Calculation of PA (f=MATRIX X A) $I(1,1,1,3)$ $I(1,1,1,3)$ 0151DO 26 J=1.N $I(1,1,1,3)$ $I(1,1,1,3)$ $I(1,1,1,3)$ 0152DO 26 J=1.N $I(1,1,1,3)$ $I(1,1,1,3)$ $I(1,1,1,3)$ 015326 J=1.N $I(1,1,1,3)$ $I(1,1,1,3)$ $I(1,1,1,3)$ 015326 J=1.N $I(1,1,1,3)$ $I(1,1,1,3)$ $I(1,1,1,3)$ 015425 K=1.N $I(1,1,1,3)$ $I(1,1,1,3)$ $I(1,1,1,3)$ 0155DO 26 K=1.N $I(1,1,1,3)$ $I(1,1,1,3)$ $I(1,1,1,3)$ 0155DO 26 K=1.N $I(1,1,1,3)$ $I(1,1,1,3)$ $I(1,1,1,3)$ 0155DO 27 I I=1.N $I(1,1,1,3)$ $I(1,1,1,3)$ $I(1,1,1,3)$ 0156DO 27 I I I I I I I I I I I I I I I I I I	0145		10101710	11 11 M 11 M	ł
0144 $KOET = 0$ 101017400145 $KOET = 0$ 101017400145 $KETE(6,9061)KDETDET$ 101017400150 $C = CucLation of ATP (A TRANSPOSE P)$ 101017500151 $O = Calculation of PA (Fanspose P)$ 101017600151 $O = Calculation of PA (Fanspose P)$ 101017600152 $D = 26 J = 1.N$ 101017700153 $26 J = 1.N$ 101017900153 $26 K = 1.N$ 101017900154 $26 K = 1.N$ 101018200155 $27 J = ATP(1,J) + A(K,J) + A(K,J)$ 101018200155 $27 J = 1.N$ 101018200155 $07 27 J = 1.N$ 10101820	0149KDET = 0101017400149KPET = 0101017400149KPET = 0101017400150CCALCULATION DF ATP (A TRANSPOSE P)101017600151D026 1=1.N101017700151D026 3=1.N101017700152D026 3=1.N10101770015326 K=1.N10101790015326 ATP(1,J) = ATP(1,J) + A(K,1) * PM(K,J)10101810015326 PA(1,J) = PA(1,J) + PM(1,K) * A(K,J)10101810015327 T=1.N10101820015427 T=1.N10101820	0140	PW(1+J) = Q(1+J) 70% F/TTTV - AA6/T - (1+J)	10101720		
0149 WRITE(6.9061)KDET.DET C CALCULATION DF ATP (A TRANSPOSE P) C CALCULATION DF ATP (A TRANSPOSE P) 0150 DO 26 1=1.N 0151 DO 26 1=1.N 0152 DO 26 4=1.N 0153 DO 26 K=1.N 0153 DO 26 K=1.N 0154 26 PA(1.J) = ATP(1.J) + A(K.I) *PM(K.J) 0154 26 PA(1.J) = PA(1.J) + A(K.I) * PM(K.J) 0155 DO 27 1=1.N 0101810 0101820 01750 DO 26 K=1.N 0101810 0101810 0101830	0149 WRITE(6.9061)KDET.DET C CALCULATION DF ATP (A TRANSPOSE P) C CALCULATION OF PA (F-MATRIX X A) 0150 DO 26 J=1.N 0151 DO 26 J=1.N 0152 DO 26 K=1.N 0153 DO 26 K=1.N 0153 DO 26 K=1.N 0154 DO 26 K=1.N 0155 DO 26 K=1.N 0157 PO 0157 PO 0101 PO	0148		10101730		
CCALCULATION OF ATP (A TRANSPOSE P)101017600150026 I=1.N101017700151026 I=1.N101017700152026 I=1.N101017700152076 K=1.N101017700153ATP(I.J) = ATP(I.J) + A(K.I) *PM(K.J)10101800015326 PA(I.J) = PA(I.J) + PM(I.K) * A(K.J)10101810015426 PA(I.J) = PA(I.J) + PM(I.K) * A(K.J)1010182001550.1 27 I=1.N10101820	C CALCULATION DF ATP (A TRANSPOSE P) C CALCULATION OF PA (F-MATRIX X A) 0150 26 J=1.N 0151 00 26 J=1.N 0152 $0 = 26$ J=1.N 0152 $0 = 26$ J=1.N 0153 26 PA(1,J) = ATP(1,J) + A(K,I) *PM(K,J) 0153 26 PA(1,J) = PA(1,J) + PM(T,K) * A(K,J) 0154 10101820 0155 0) 27 I=1.N 10101810 10101820 10101820 10101810 10101820 10101820 10101810 10101820 10101830	0149	WRITE(6,9061)KDET,DET	10101750		
C CALCULATION OF PA (F-MATRIX X A) 0150 D0 26 1=1.N 0151 D0 26 1=1.N 0152 D0 26 1=1.N 0153 D0 26 K=1.N 0153 ATP(1.J) = ATP(1.J) + A(K,I) *PM(K,J) 0153 ATP(1.J) = PA(1.J) + PM(1.K) * A(K,J) 0154 26 PA(1.J) = PA(1.J) + PM(1.K) * A(K,J) 0155 D1 27 1=1.N 10101820 10101820 10101830 1010	C CALCULATION OF PA (F-MATRIX X A) 0150 D0 26 1=1.N 0151 D0 26 1=1.N 0152 D0 26 1=1.N 0153 D0 26 4=1.N 0154 D0 26 4=1.N 010101800 0153 ATP(1,J) = ATP(1,J) + A(K,I) * PM(K,J) 0154 26 PA(1,J) = PA(1,J) + PM(1,K) * A(K,J) 0154 26 PA(1,J) = PA(1,J) + PM(1,K) * A(K,J) 0155 D1 27 I=1.N 10101820 10101820 10101820 10101830 10101820 101		C CALCULATION OF ATP (A TRANSPOSE P)	10101760		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$		C CALCULATION OF PA (P-MATRIX X A)	10101770		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0151	DU 26 1=1.N	10101780		
$\begin{array}{llllllllllllllllllllllllllllllllllll$	$\begin{array}{llllllllllllllllllllllllllllllllllll$	152		10101790		
2154 26 $PA(1,J) = PA(1,J) + PM(1,K) * A(K,J)$ 2155 DJ 27 I=1.N 10101820 10101830	$26 PA(1.J) = PA(1.J) + PM(1.K) * A(K.J)$ $155 D_{1} 27 I = 1.N$ 10101820 10101830	0153	ATP(I,J) = ATP(I,J) + A(K,I) *PM(K,J)	10101500		
0155 D1 27 I=1.N	051 57 I≅1.N	0154	26 PA(1, J) = PA(1, J) + PM(1, K) + A(K, J)	10101820		
		0155	N+1=1 15 CQ	10101830		

			PAGE 004
ISN 0156	DO 27 J=1,N	10101840	
ISN 0157	27 $Q(I,J) = -ATP(I,J) - PA(I,J)$	10101850	
ISN 0158	WRITE(6,9765)	10101860	
ISN 0159	9765 FCRMAT(1H / 1X,36H Q FROM PUTTING P INTO -ATP-PA = Q , //)	10101870	
ISN 0160	D0941 I=1,N	10101880	
ISN 0161	941 WRITE(6,2963) (G(I,J),J=1,N)	10101890	
ISN 0162	2963 FOPMAT(1H /(1X,SE14,7))	10101900	
ISN 0163	445 VMIN = VMINI	10101910	
ISN 0164	CALL DSRCH(VMIN, B, C, JSUE)	101 01 930	
	C EUS J)6993.6	(ETI 10101940	
ISN 0165	3996 FORMAT(• JSUE = •,15 //)	10101950	
ISN 0166	VL= VMIN	10101970	
ISN 0167	P = DLOG10(VOL)/30.	10102010	
ISN 0168	580 FORMAT(10102020	
ISN 0169	WRITE(6.580) P.PSR	10102030	
ISN 0170	BUNCH(NCUE+1) = T	10102040	
ISN 0171	BUNCH(NCUE,2) = VL	10102050	
ISN 0172	BUNCH(NCUE.3) = VCL	10102060	
ISN 0173	BUNCH (NCUE, 4) = DET	10102070	
ISN 0174	BUNCH(NCUE,5) = P	10102080	
ISN 0175	HUNCH(NCUE.6) = DIVI	10102090	
ISN 0176	IF(NCUE-EQ.NXCUE) GO TO 959	10102100	
ISN 0178	NCUE = NCUE + 1	10102110	
ISN 0179	IF(NUKEY.NE.0) GO TC 4	10102120	· · · ·
ISN 0181	PSR = P	10102130	
ISN 0182	VSR = VOL	10102140	
ISN 0183	WRITE(6,570) PSR	10102150	
ISN 0184	570 FORMAT(• P-STAR = •.E14.7/)	10102160	n and a second of the second secon
ISN 0185	8 SIG2 = DLDG10(PSR)	10102170	
ISN 0186	22 DO 9 I=1,45	10102200	
ISN 0187	RX(I) = RDM(GUM)	10102210	
ISN 0188	XLUV = -1.+ 2.*FX(I)	10102220	
ISN 0189	IF(XLUV.LE.0.0) GC TO 3415	10102230	
ISN 0191	NUTU(I) = 1	10102240	
ISN 0192	GO TO 9	10102250	
ISN 0193	3415 NUTU(I) =-1	10102260	
ISN 0194	9 DU(I) =DEXP(-RX(I)**2/SIG2) * NUTU(I)	10102270	
	C WRITE(6,560)(DU(I),I=1,45)	10102290	
ISN 0195	560 FORMAT(' DU = ' //(1x.9E13.6/))	10102300	
ISN 0196	905 CENTINUE	10102310	
ISN 0197	MOVF = MOVE + 1	10102320	•
ISN 0198	IF(NCUE.GE.NSW) GO TO 2039	101 02330	•
ISN 0200	IF(MOVE.LE.NSW1)GO TO 2166	10102340	•
ISN 0202	DIVI = 0.5*DIVI	10102350	
ISN 0203	MOVE = 0	10102360	
ISN 0204	IF (DIVI+LT+0+25) DIVI = $0+25$	10102370	
ISN 0206	GO TO 2166	10102380	
ISN 0207	2C39 IF(MOVE+LF+NSW2)G0 T0 2166	10102390	
ISN 0209	DIVI = 2.* DIVIO	10102400	
ISN 0210	DIVIO = DIVI	10102410	the second s
ISN 0211	MOVE = 0	10102420	
ISN 0212	$IF (DIVI \bullet GT \bullet 64 \bullet) DIVI = 64 \bullet$	10102430	
	C2165 WRITE(6,2332) DIVI	10102440	
ISN 0214	2166 CONTINUE		
ISN 0215	2332 FORMAT(' DIVI = ', E2C.7 /)	10102450	
- ISN 0215	DO 10 I=1.9	10102460	· · · ·

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ISN 0217	10 DU(I) = XLLIM * DU(I)/DIVI	10102470	
ISN 0218	DO 12 I=10.37	10102480	
ISN 0219	12 DU(I) = THLIM \star DU(I)/DIVI	10102490	
ISN 0220	DO 14 I=38,45	10102500	
ISN 0221	14 DU(I) = PHLIM * DU(I)/DIVI	10102510	and the second
	C WRITE(6,560)(DU(I),I=1,45)	10102530	
ISN 0222	DO 20 I=1.9	10102550	and the second
ISN 0223	$665 \times INC(I) = EX(I) + DU(I)$	101 02560	
ISN 0224	IF(XINC(I).LT.XLLIN) GC TC 209	10102570	na na anagan ang ang ang ang ang ang ang
ISN 0225	DU(I) = 0.5 * DU(I)	10102580	
ISN 0227	GC TO 665	10102590	· · · · · ·
ISN 0228	$209 \text{ If } \{X NC(1) = -9 \cdot 2\} \times 1 NC(1) = -9 \cdot 2$	10102000	
ISN 0230	20 XLAM(I) = DEXP(XINC(I))	10102610	and the second sec
15N 0231	10 - 142	10102630	
13N 0232	$\frac{17}{62} - \frac{177}{146} + \frac{117}{146} + \frac{116}{146} + $	10102640	and an a second of the second s
ISN 0234	$\frac{1}{16} \int \frac{1}{16} $	10102650	·
ISN 0236	THETA(I) = THETA(I) - DU(IP)	10102660	- Alter and the second s
ISN 0237	44 $DU(IP) = 0.5* DU(IP)$	10102670	
ISN 0238	GO TO 52	10102680	,
ISN 0239	30 CONTINUE	10102690	
ISN 0240	DO 40 I=1,8	10102700	Constant Constant of the Strangerstein Strangerstein Strangerstein
ISN 0241	IP= 37+I	10102710	
ISN 0242	62 PFIV(I) = PHIVP(I) + DU(IP)	10102720	
ISN 0243	IF(DABS(PHIV(I)).LT.PI) GO TO 40	10102730	
ISN 0245	PFIV(I) = PHIV(I) - DU(IP)	10102740	· · · · ·
ISN 0246	54 DU(IP) = 0.5 * DU(IP)	10102750	n en
ISN 0247	GO TO 62	10102760	
ISN 0248	40 CONTINUE	10102770	an and the second se
	C WRITE(6,560)(DU(I),I=1,45)	10102790	
ISN 0249	IF(KIKIT.GT.0) G0 10 50	10102810	a da ana ang ang ang ang ang ang ang ang an
ISN 0251		10102820	
ISN 0252		10102840	and an
ISN 0255	DO 72 I=8.12	10102850	
ISN 0255	72 THETA(I) = 0.0	101 02860	••••••••••••••••••••••••••••••••••••••
ISN 0256	D0 73 I = 14,20	10102870	
ISN 0257	73 THETA(I) = 0.0	10102880	the second s
ISN 0258	THETA(23) =0.0	10102890	
ISN 0259	THETA(24) =0.0	10102900	na an a
ISN 0260	DO 74 I=26,27	10102910	• • • • • • • • • • • • • • • • • • • •
ISN 0261	74 T + ETA(1) = 0.0	10102920	
ISN 0262	PHIV(6) =0.0	10102930	Land the set of the se
ISN 0263	THETA(28) = THETA(22)	10102940	
ISN 0264	PHIV(7) = THETA(21)	10102950	المريحية وستدريب المراجع المروح المسترجب المراجع المستحسب
ISN 0265	PHIV(8) =THETA(25)	10102960	
ISN 0266	50 NUKEY = 1 (5.5 ± 5.5)	10102980	and a second the sum of the second of first second
ISN 0267		10102990	
ISN 0265	4 IF(P+LI+PSR) GU 10 305	10103000	المركز والمركز وأرجع ومحمد المحالي المستعمان الم
ISN 0270	INTERINGUEROF GO TO SVS	10103020	
130 0274		10103030	
ISN 0274	GO TO B	10103050	
ISN 0275	305 D0 840 I = 1.9	10103060	and the second se
ISN 0276	840 DU(I) =-DU(I) * 1.* DIVI / XLLIM	10103070	
ISN 0277	10850 I = 10.37	10103080	

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00 000 011 = 30.45 010 011 = 30.01 = 31.4 Dirit / EMLM 010 11 = 00.01 = 1.4 Dirit / EMLM 010 110 EML = 1.4 Dirit / EMLM 010 110 EML = 1.4 Dirit / EMLM 010 120 110 EML / EMLM 010 120 111 = 1.4 Dirit / EML / EMLM 010 200 110 EML / EML	DO 860 I = 38.45 260 DU(I) =-DU(I) * 1.* DIVI / PHLIM LMIN = 1	10103100
$ \begin{array}{c} 00 \ 01(1) = 01(1) + 1 + 01(1) \int e^{1}(1) \int e^{$	GOO DU(L) = -DU(L) * 1.* DIVL / PHLIM GOO DU(L) = 1	
0 00110 001110 0 00110 001110 0 00110 001110 0 00110 001110 0 00110 001110 0 00110 001100 0 00110 001100 0 00110 001000 0 00110 0010000 0 00110 0010000 00110 0010000 00100000 00100000 00100000 00100000 001000000 00100000 0000000 001000000000 0000000 0000000 0010000000000000000000000000000000000		
100 390 100 1		10103120
UV 1000000 1000000 UV 10000	300 PSR = P	10103140
$ \begin{array}{c} V(X) = V(Y) \\ V(X) \\ V(X) = V(Y) \\ V(X) \\ V$	VSR = VOL.	09100101
0701 = 0.01 0701 = 0.01 0701 = 0.01 0711 = 10.01 0710 = 10.0 0710 = 0.01 0710 = 110.0 0710 = 10.0 0710 = 0.01 0710 = 110.0 0710 = 10.0 0710 = 0.01 0710 = 110.0 0710 = 10.0 0710 = 0.01 0710 = 110.0 0710 = 10.0 0710 = 0.01 0710 = 110.0 0710 = 10.0 0710 = 0.01 0710 = 110.0 0710 = 0.01 0710 = 0.01 0710 = 0.01 0710 = 0.01 0710 = 0.01 0711 = 10.0 0710 = 0.01 0710 = 0.01 0711 = 0.01 0710 = 0.01 0710 = 0.01 0711 = 0.01 0710 = 0.01 0710 = 0.01 0711 = 0.01 0710 = 0.01 0710 = 0.01 0711 = 0.01 0710 = 0.01 0710 = 0.01 0711 = 0.01 0710 = 0.01 0710 = 0.01 0711 = 0.01 0710 = 0.01 0710 = 0.01 0711 = 0.01 0710 = 0.01 0700 = 0.01 0711 = 0.01 0710 = 0.01 0700 = 0.01 0711 = 0.01 0700 = 0.01 0700 = 0.01 07	LAY = LAY+1	010101101
UN = UNU UN = UNU (UN = 1) (UN =		10103180
01 7.1 1.1 0.00220 02 0.01 1.1 0.00220 03 1.1 0.00220 0.00220 04 1.1 0.00220 0.00220 05 1.1 1.1 0.00220 0.00220 05 1.1 1.1 0.00220 0.00220 05 0.00211 1.1 0.00220 0.00220 05 0.00211 0.00220 0.00220 05 0.00211 0.00220 0.00220 05 0.00211 0.00220 0.00220 05 0.00220 0.00220 0.00220 05 0.00220 0.00220 0.00220 05 0.00220 0.00220 0.00220 05 0.00220 0.00220 0.00220 05 0.00120 0.00220 0.00220 05 0.00220 0.00220 0.00220 05 0.00120 0.00220 0.00220 05 0.00120 0.00220 0.00220 05 0.00120 0.00220 0.00220		06120101
10. XAMPRID: Diod(A,M(1)) Diod(A,M(1)) 10. XAMPRID: XAMPRID: Diod(A,M(1)) 10. YAMPRID: XAMPRID: Diod(A,M(1)) 10. PEPTOID: PEPTOID: PEPTOID: Diod(A,M(1)) 10. PEPTOID: PEPTOID: PEPTOID: Diod(A,M(1)) 10. PEPTOID: PEPTOID: PETOID: Diod(A,M(1)) 10. PEPTOID: PETATOR Diod(A,M(1)) Diod(A,M(1)) 10. PETOID: PETATOR Diod(A,M(1)) Diod(A,M(1)) Diod(A,M(1)) 10. PETATOR PETATOR Diod(A,M(1)) Diod(A,M(1)) Diod(A) Diod(A) Diod(A) 10. PETATOR PETATOR Diod(A) Diod(A	DO 310 T=1.9	10103220
110 0.000000000000000000000000000000000	EX[I] = DLOG(XLAM(I))	10103230
20 30 30 31 10 <td< td=""><td>310 XLAMP(I) = XLAM(I)</td><td>10103240</td></td<>	310 XLAMP(I) = XLAM(I)	10103240
R0 330 1 = 14 10103260 10 PUTE(1) = 14 1010320 10 PUTE(550)XLAMC(1).1=1.9).(THETP(1).1=1.28).(FHUVC(1).1=1.8) 1010320 10 PUTE(550)XLAMC(1).1=1.9).(THETP(1).1=1.28).(FHUVC(1).1=1.8) 1010320 10 PUTE(550)XLAMC(1).1=1.9).(THETP(1).1=1.28).(FHUVC(1).1=1.8) 1010320 10 FEGA3 STAN-SOURED * E.4.7 // 1010310 10 FEMAT(1) STAN-SOURED * E.4.7 // 1010390 10 FEMAT(1) STAN-SOURED * E.4.7 // 1010390 11 PATE(6.103)(51).1117 PATE(5.100)(51).1118 1010190 11 PATE(6.103)(51).1117 PATE(5.100)(51).1117 10101990 11 PATE(6.103)(51).1117 PATE(5.100)(51).1117 10101990 11 PATE(6.103)(51).1117 PATE(5.100)(51).1117 10101990 11 PATE(6.103)(51).1117 PATE(5.100)(51).1117 10101990 12 PATE(6.103)(51).1117 PATE(5.100)(510).1111 10101990 13 PATE(6.1010)(510).11111 PATE(6.1010) 10101990 14 PATE(6.1010)(510).1111 PATE(6.1010) 10101990	D0 320 I=1,28	10103250
10 0300 = 1 = 01 1010320 10 0400000000000000000000000000000000000	320 THETP(I) = THETA(I)	10103260
130 PHYUT(1) 10103280 130 PHYUT(1) 1010310 130 PHYUT(1) 1010310 131 PHYUT(1) 1010300 131 PHYUT(1) 1010300 132 PHYUT(1) 1010300 132 PHYUT(1) 1010300 132 PHYUT(1) 1010300 132 PHYUT(1) 1010300 133 PHYUT(1) 1010300 133 PHYUT(1) 1010300 134 PHYUT(1) 101010 135 PHYUT(1) 101010 136 PHYUT(1) 101010 137 PHYUT(1) 101010 131 PHYUT(1) 101010 131 PHYUT(1) 101010 131 PHYUT(1) 111	DO 330 I= 1.8	10103270
150 FORMATIC * MARPICIAL TELE 10 * LTHEFFILE*//LIX-FELLED 10103300 150 FORMATIC * MARPICIAL TELE 10 * LTHEFFILE*//LIX-FELLED 10103300 151 FORMATIC * MARPICIAL TELE 10 * LTHEFFILE*//LIX-FELLED 10103100 151 FORMATIC * MARPICIAL TELE 10 * LTHEFFILE*//LIX-FELLED 10103100 155 FORMATIC * MARPICIAL TELE 10 * LTHEFFILE*//LIX-FELLE 10 101031000 155 FORMATIC * MARPICIAL TELE 10 * LTHEFFILE*//LIX-FELLE 10 101031000 155 FORMATICIAL * CHALLE*//LIX-FELLE 10 101031000 155 FORMATICIAL * CHALLE*//LIX-FELLE 10 10103100 155 FORMATICIAL * CHALLE*//LIX-FELLE 10 101030020 155 FORMATICIAL * CHALLE*//LIX-FELLE 10 101030020 155 FORMATICIAL * CHALLE*//LIX-FELLE 10 10103300 155 FORMATICIAL * CHALLE*//LIX-FELLE 10 10103300 155 FORMATICIAL * CHALLE*//LIX-FELLE 10 10103330 155 FORMATICIAL * CHALLE*//LIX-FELLE 10 10103330 </td <td>330 $PHIVP(I) = PHIV(I)$</td> <td>10103280</td>	330 $PHIVP(I) = PHIV(I)$	10103280
10 COMMATCH X,	WRITE(6,550)(XLAMP(I),I=1,9),(THETP(I),I=1,28),(PHIVP(I),	.81 10103300
10.1 10.1	550 FURMAI(* XLAM-PRIME • THETA-PRIME • FHI-PRIME*//(1X•9 mottria acost aton	•6/)) 10103310
00 FORMATI(1) A.T. (16) (LARUNOV ECT = F14.77.7) 10101990 00 ATTE(6:100) V.T. (16) (LARUNOV ECT = F14.77.7) 10101990 00 MATTE(6:100) (V.T. (16) (LARUNOV ECT = F14.77.7) 10101990 00 MATTE(6:100) (V.T. (16) (LARUNOV ECT = F14.77.7) 10101090 00 MATTE(6:100) (CTL.J).J=1.9) 10300200 00 MATTE(6:100) (CTL.J).J=1.9) 10300200 00 MATTE(6:100) (CTL.J).J=1.9) 10300200 01 MATTE(6:100) (CTL.J).J=1.9) 10300200 03 MATTE(6:120) (CTL.J).J=1.9) 10300200 03 MATTE(6:120) (CTL.J).J=1.9) 10300200 03 MATTE(6:120) (CTL.J).J=1.9) 10300200 04 MATTE(6:120) (CTL.J).J=1.9) 10300200 04 MATTE(6:120) (CTL.J).J=1.9) 10300200 05 MATTE(6:120) (CTL.J).J=1.9) 10701090 05 MATTE(6:120) (CTL.J).J=1.9) 107	WKIIE(0,2003) 5162 5672 EDDWAT(1 ETCHA_ECHADED - 1 E1A 777)	10102180
00 FGRAT(1H /1x, 16H LLAPUNCY FCT = F14.7./) 10101900 11 J. J. Z.P.H. JUNGY FCT = F14.7./) 10101900 10 RETE(6.1010)(6(1).1=11) 10 FGRAT(12)H [16F/LAPUNCY FCT.2000000000000000000000000000000000000	COLLOWERT COLGERTOWCRACT F COLLOW COLL	
1 JX.23H JWERE VOL ESTIMATE = [1,7,7, 1] 10,02000 10 WRITE(6,100)(8(1),1:1:4) 10,030020 10 PRMAT(13H E1GENVLUES/(19620.7) 10,030020 10 PRMAT(13H E1GENVLUES/(19620.7) 10,030020 10 PRMAT(13H E1GENVLUES/(19620.7) 10,030020 10 PRMAT(13H E1GENVLUES/(19620.7) 10,030020 10 PRMAT(14/119 E1GENVLUES/(19620.7) 10,030020 11 PRMAT(14/11,1:4))(XY SELAT) 10,00120 12 PRMAT(14/11,1:0)(XY SELAT) 10,00120 13 PRMAT(14/11,1:0)(XY SELAT) 10,00100 14 PRITE(6,03) (XOT1,000T,0011,00 10,00100 10 PRMAT(14/11,000T,0011,000T,0011,00 10,00100 11 PRITE(6,101,1:10,01(1) * DIVI /MLIN 10,010330 11 PU(1) = (2,***(LA'-1))*DU(1) * DIVI /MLIN 10,010330 12 PU(1) = (2,***(LA'-1))*DU(1) * DIVI /MLIN 10,010330 13 PU(1) = (2,***(LA'-1))*DU(1) * DIVI /MLIN 10,03300 14 PU(1) = (2,***(LA'-1))*DU(1) * DIVI /MLIN 10,03300 15 PU(1) = (2,***(LA'-1))*DU(1) * DIVI /MLIN 10,03300 15 PU(1)	100 FORMAT(1H /1X, 16H I TAPUNCV FCT = F1A.7 ./	10101000
R0 WRITE(6.1030)(8(1).1=1.9) IIII IIIII IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	I TO THE TRANSPORT OF A DESCRIPTION OF A	
10. FGEMATI(13H) ETGEWALLEE///19620.71) 10300220 10. MATTE(5-700)(CLU(1+3)-1=19):1=1.01 10300200 10. MATTE(5-700)(CLU(1+3)-1=19):1=1.01 10300200 10. MATTE(5-700)(CLU(1+3)-1=19):1=1.01 10300200 10. MATTE(5-120)(FZERG(1)+1=1.9):XZERG(1)+3=1.91 10300200 10. FGENERCIES/FEL:A/10H XZERG(1)+3=1.91 10301200 10. FGENERCIE:A/10H XZERG(1)+3=1.91 10701100 10. FGENERCIE:A/10H XZERG(1)+1=4.71 10701100 10. FGENERCIE:A/10H XZERG(1)+3=1.91 10701110 10. FGENERCIE:A/10H XZERG(1)+3=1.91 10701110 10. FGENERCIE:A/10H XZERG(1)+3=1.91 10701110 10. FGENERCIE:A/10H XZERG(1)+3=1.91 10701330 10. FGENERCIE:A/10H XZERG(1)+4 10103330 10. D0 610 1 2 ***(LAY-1))*DU(1) * DIVI / MLL* 10103350 10. D0 62 0 1 2 ***(LAY-1))*DU(1) * DIVI / MLL* 10103350 10. D0 63 0 1 2 ***(LAY-1))*DU(1) * DIVI / MLL* 10103350 10. D0 63 0 1 2 ***(LAY-1))*DU(1) * DIVI / MLL* 10103350 10. D1 62 2 ***(LAY-1))*DU(1) * DIVI / MLL* 10103350 10. D1 1 2 ***(LAY-1))*DU(1) * DIVI / ML* 10103350 10. D1 2 2 ***(LAY-1))*DU(1) * DIVI /	020 WRITE(A.1030)(A(T).1=1.0)	
WRITE(6.700)((C(1.J).J=1.9), T=1.9) 10300270 00 PAMATILIA FIGENECTERS(FIZ.4.1) 10901290 93 FORMATILIA FIGENECTERS(FIZ.4.1) 10901290 94 FIE(6.120) 0(1.J).1=1.9) 10901290 95 PARATILIA / XX.7H 0(1.J).1=1.9) 10901290 96 FORMATILIA / XX.7H 0(1.J).1=1.9) 10901290 97 PARATILIA / XX.7H 0(1.J).1=1.9) 10701100 98 FIE(6.120) 7267(1).1=0) 10701100 99 PARATICH / XX.7H 0(1.J) * DIVI / XLLIM 10701100 91 FORMATILIA FIZE-ALTA VODTZ.VMIN 10701100 91 FORMATILIA FIZE-ALTA VODTZ.VMIN 10701100 91 FORMATILIA FIZE-ALTA VODTZ.VMIN 10701100 91 FORMATICH / XX.11 10103330 91 OULD = (2.***(LAY-1))*DU(1) * DIVI / XLLIM 10103340 91 OULD = (2.***(LAY-1))*DU(1) * DIVI / XLLIM 10103340 91 OULD = (2.***(LAY-1))*DU(1) * DIVI / XLLIM 10103340 91 OULD = (2.***(LAY-1))*DU(1) * DIVI / XLLIM 10100340 91 OULD = (2.***(LAY-1))*DU(1) * DIVI / XLLIM 10103340 91 OULD = (2.***(LAY-1))*DU(1) * DIVI / XLLIM 10103340 91 OULD = (2.***(LAY-1))*DU(1) * DIVI / XLLIM 10103340 91 OULD = (2.***(LAY-1))*DU(1) * DIVI / XLLIM 10103340	030 FDRMAT(13H1 EIGENVALUES//(1P6E20_7))	10300210
00 FORMAT(13H ELGENVECTCRS/(SE12.41) 10300280 08 NETE(6.012) (T 0(1.1.)-1=1.N) 10701200 09 REF(6.1201) NEERC(11.1.=1.9) 10701200 00 FORMAT(10H FZEG(11).1.1.1) 10701200 01 REF(6.1201) NNZEG(0)(1).5 SE12.4.7) 10701100 01 PATE(6.1201) NNZEG(11).1.1.1 10701100 01 PATE(6.1201) NNZEG(0)(1).5 SE12.4.7) 10701100 01 PATE(6.1201) NNZEG(0.007Z, WIN 10701100 01 PATE(6.1201) NNZEG(1).5 SE12.4.7) 10701100 01 PATE(6.1201) NNZEG(0.007Z, WIN 10701100 01 PATE(6.1201) NNZEG(0.007Z, WIN 10701100 01 PATE(9.10011) * DU(1) * DU(1 / VLLIW 10103340 01 PATE(9.10011) * DU(1) * DU(1 / VLLIW 10103340 01 PATE(9.10011) * DU(1) * DU(1 / VLLIW 10103340 01 PATE(9.10011) * DU(1) * DU(1 / VLLIW 10103340 01 PATE(9.10011) * DU(1) * DU(1 / VLLIW 10103340 01 PATE(9.11) * DU(1) * DU(1 / VLLIW 10103340 01 PATE(9.10010) 10103340 01 PATE(9.10010) 10103340 10 PATE(9.10010) 10103340 11 PATE(6.111) * DU(1) * DU(1 / VLLIW 10103340 12 PATE(6.11002N) 10100340 13 PATE(6.110	WRITE(6.700)((C(I.J).J=1.5).[=1.9]	10300270
WRITE(6.33) (f a(f.J).J=1.N), f1=1.N) 93 FORMATILH /IX.7F a(f.J)/(IX.9EBa(J.)J=1.9) 10701090 WRITE(6.1200) (FEERC(I).J=1.9): (XERC(J).J=1.9) 10701100 WRITE(6.1201) MAZERO.VOTZ.WIN = ZELA.7) 10701100 107011100 10701110 107011100 1070101000 107011100 1070101000 107011100 107011100 10	700 FORMAT(13H EIGENVECTCRS/(9E12.4))	10300280
93 FORMATICH /1X.7H 0(1.J)/(1X.6E14.7)) 10701060 100 EDRMAT(10M FZER0(1)=1.9)(XZER0(1)JJ=1.9) 10701060 100 EDRMAT(10M FZER0(1)=1.9)(XZER0(1)JJ=1.9) 1070100 100 EDC 1= 10, 1070100 100 EDC 1= 10, 1070110 100 EDC 1= 10, 10103350 100 EDC 1= 2.**(LAV-1))*DU(1) * DIVI /7HL1* 10103350 100 EDC 10 EC ***(LAV-1))*DU(1) * DIVI /7HL1* 10103350 100 EDC 10 EC ***(LAV-1))*DU(1) * DIVI /7HL1* 10103350 15 FORMAT(1HO 2R) 101032400 15 FORMAT(1HO 2R) 101033400 15 FORMAT(1HO 2R) 101033400 15 FORMAT(1HO 2R) 101033400 16 FORMAT(1HO 2R) 101033400 17 FORMAT(1HO 2R) 101033400 101033400 11 IX.*PERFORMANCE *12X**UTAPUNOV FCT*9X*TINVERSE VOL**11X**DET(P)* 101033400 11 IX.*PERFORMANCE *12X**UTAPUNOV FCT*9X*TINVERSE VOL**11X**DET(P)* 10103450 11 IX.*PERFORMANCE *12X**UTAPUNOV FCT*9X*TINVERSE VOL**11X**DET(P)* 10103520 11 IX.*PERFORMANCE *12X**UTAPUNOV FCT*9X*TINVERSE VOL**11X**DET(P)* 10103520 11 IX.*PERFORMANCE *12X**UTAPUNOV FCT*9X*TINVERSE VOL**11X**DET(P)* 10103520 11 IX.*PERFORMANCE *12X**UTAPUNOV FCT*9X*TINVERSE VOL	WRITE(6,93) ((Q(I,J),J=1,N),I=1,N)	10901280
WRITE(6,1200) (FZERG(1).=1=0).(XZERG(1).J=1=0) 1070100 WRITE(6,1201) NZERG(10) XZERG(1)=.9E12.4) 1070110 WRITE(6,1201) NZERG(VONTZ.WHN 1070110 0.0 EDRMAT(8H NNZERG.VOOTZ.WHN 1070110 0.0 D 0810 I = 1.9 10.37 10 00 820 I = 10.37 10.013360 10 00 820 I = 10.37 10103350 10 00 820 I = 10.37 10103350 10 00 100 I = (2.**(LAY-1))*DU(1) * DIVI /THLIN 10103350 10 00 820 I = 10.37 10103350 10 00 100 I = (2.**(LAY-1))*DU(1) * DIVI /THLIN 10103350 10 00 100 I = (2.**(LAY-1))*DU(1) * DIVI /THLIN 10103350 10 00 100 I = (2.**(LAY-1))*DU(1) * DIVI /THLIN 10103420 10 00 820 I = 30.45 10103370 10 00 820 I = 30.45 10103420 10 00 820 I = 30.45 10103420 10 00 820 I = 20.44 10103420 10 00 100 10103420 00 01 01 2.**(LAY-1))*DU(1) * DIVI /THLIN 10 00 100 10103420 00 01 01 10103420 00 01 02 10103420 00 01 02 10102 00 01 02 10102 00 01 02 1	93 FORMAT(1H /1X+7H Q(1+J)/(1X+9E14.7))	10901290
100 FORMAT(10H FZER0(1)=.9E12.4/10H XZER0(1)=.9E12.4/10H 10701100 00 810 1 1.0 10701100 01 810 1 1.0 10701100 01 810 1 1.0 10701100 01 810 1 1.0 10701100 01 820 1 1.0 10103350 00 820 1 1.0 10103350 00 820 1 1.0 10103350 00 820 1 1.0 10103370 00 10 1 1.0 10103370 00 10 1 1.0 10103370 01 1 1.0 1.0 10103370 01 1 1 1.0 10103400 01 1 1 1.0 1.0 1.0 01 1 1 1.0 1.0 1.0 1.0 00 1 1 1 1.0 1.0 1.0 1.0 00 1	WRITE(6,1200) {FZERD(I),I=1,9),(XZERD(J),J=1,9)	10701080
01 FORMAT(64.1201)NUXERAC.000TZ.VMINA 10701100 01 FORMAT(64.101)NUXERAC.000TZ.VMINA 10103330 01 1 1.9 01 01 1 10103350 01 01 1 10103350 01 01 1 10103350 00 050 1 10103360 00 050 1 28.44(LAY-11)#DU(1) * DIVI / THLIP 10103360 00 050 1 28.44(LAY-11)#DU(1) * DIVI / THLIP 10103360 00 050 1 28.44(LAY-11)#DU(1) * DIVI / THLIP 10103370 00 050 1 28.44(LAY-11)#DU(1) * DIVI / THLIP 10103370 00 050 1 28.44(LAY-11)#DU(1) * DIVI / THLIP 10103370 01 01 28.44(LAY-11)#DU(1) * DIVI / THLIP 10103370 10103370 01 03 1 28.44(LAY-11)#DU(1) * DIVI / THLIP 10103370 03 04 1 10103370 10103340 04 01 1 10103460 10103460 05 070 01 1010347	200 FORMAT(10H FZERO(1)=, 9E12.4/10H XZERO(1)=,9E12.4)	10701090
(01 FORMAT(SH NNZERC=.IE/12H VDOTZ.VMIN=.2E14.7) 10701110 10 01 01 1 = 1.9 (10103340) 10 01 02 0 = 2.**(LAY-1))*DU(1) * DIVI /THLIP 10103350 20 01 050 1 = 10.37 10103350 20 01 051 1 = 2.**(LAY-1))*DU(1) * DIVI /THLIP 10103350 30 01 050 1 = 30.45 10103350 30 01 050 1 = 2.**(LAY-1))*DU(1) * DIVI /THLIP 10103350 30 01 050 1 = 2.**(LAY-1))*DU(1) * DIVI /FHLIP 10103340 30 01 050 1 = 2.**(LAY-1))*DU(1) * DIVI /FHLIP 10103340 30 01 050 1 = 2.**(LAY-1))*DU(1) * DIVI /FHLIP 10103400 30 01 050 1 = 2.**(LAY-1))*DU(1) * DIVI /FHLIP 10103400 30 01 050 1 = 2.**(LAY-1))*DU(1) * DIVI /FHLIP 10103400 30 01 050 1 = 2.**(LAY-1))*DU(1) * DIVI /FHLIP 10103400 30 01 01 0 = 2.**(LAY-1))*DU(1) 10103400 9 05 01 0 905 10 0103400 9 05 01 0 020 10103400 9 01 0 02 10103400 9 01 0 02 10103460 9 01 0 02 10103460 9 01 0 02 10103460 9 01 0 02 10103460 9 01 02 10103460 9 01 02 10103460 9 01 02 10103460 9 01 02 10103460 9 01 02 10103460 9 0103400 10103490	WRITE(6,1201)NNZERD,VDDTZ,VMIN	10701100
D0 810 T = 1,9 10 DU(1) = (2,**(LAY-1))*DU(T) * DIVI /XLLIW 10103360 20 DU(1) = (2,**(LAY-1))*DU(T) * DIVI /THLIW 10103360 20 DU(1) = (2,**(LAY-1))*DU(T) * DIVI /THLIW 10103370 30 DU(1) = (2,**(LAY-1))*DU(T) * DIVI /THLIW 10103370 50 DU 95 CLL RMOUT (0UM) 48 TE(6.715) DUM 10103420 48 TE(6.715) DUM 10103420 10 03420 10 03420 10 03420 48 TE(6.191)(ALP(J).J=1.18) 00 CONTINUE 1002 48 TE(6.191)(ALP(J).J=1.18) 50 CONTINUE 10103450 50 CONTINUE 1000 50 CONTINU	201 FORMAT(8H NNZER 0=, 16/12H VD0TZ, VMIN=, 2E14.7)	10701110
<pre>10 Du(I) = (2.**(LAY-1))*Du(I) * DIVI /XLLIM 10103350 D0 630 I = 10.37 D0 630 I = 10.37 D0 630 I = 32.45 D0 630 I = 32.45 D0 630 I = 22.**(LAY-1))*Du(I) * DIVI /THLIM 10103350 G0 T0 905 G1 T0 905 G1 T0 905 G1 T0 905 I5 FORMAT(H0 Z8) WRITE (6.715) DUM 6940 WRITE (6.715) DUM 10103410 WRITE (6.715) DUM 10103410 WRITE (6.715) DUM 10103420 I15 FORMAT(H0 Z8) WRITE (6.715) DUM 10103420 WRITE (6.715) DUM 10103450 WRITE (6.715) DUM 10103450 I10103450 WRITE (6.8600) WRITE (6.8600) WRITE</pre>	DO 810 I = 1.9	10103330
D0 820 I = 10.37 20 DU(I) = (2.**(LAY-1))*DU(I) * DIVI /THLIM 10 00 830 I = 38.45 10 00 830 I = 38.45 10 00 830 I = 38.45 10 03370 10 03400 10 103400 10 03400 10 03500 10 000 10 0	810 DU(I) = (2.***(LAY-1))*DU(I) * DIVI /XLLIW	10103340
<pre>220 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 10103350 33 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /FHLIM 1010340 35 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /FHLIM 1010340 59 CALL RDMOUT(DUM) 50 CALL RDMOUT(DUM) 10103420 10103420 10103420 10103420 10103420 10103420 10103440 10103460 10103480 10103460 10103520 101003520 10100355 100000 1010000 1010000 101000 101000 1010000 101</pre>	D0 820 I = 10,37	10103350
D0 830 I = 32.45 30 DU(I) = (2.**(LAY-I))*DU(I) * DIVI /PHLIW 10103380 60 T0 905 (2 TE (AY-I))*DU(I) * DIVI /PHLIW 10103400 15 FORMAT(HO Z8) 10103420 0103420 0103420 10103420 01003450 10103450 10103450 00 CONTINUE 10103450 10103450 01003450 10103450 10103450 010103450 1010340 010103450 10103450 010103450 10103450 010103450 10103450 010103450 10103450 010103450 10103450 010103450 10103450 010103450 10103450 01111X*PERFORMANCE*I2X*UIAPUNOV FCT*9X*INVERSE VOL*IIX*DET(P)* 10103460 01111X*PERFORMANCE*I2X*UIAPUNOV FCT*9X*INVERSE VOL*IIX*DET(P)* 10103450 01111X*PERFORMANCE*I2X*UIAPUNOV FCT*9X*INVERSE VOL*IIX*DET(P)* 10103450 01111X*PERFORMANCE*I2X*UIAPUNOV FCT*9X*INVERSE VOL*IIX*DET(P)* 10103450 01111X*PERFORMANCE*I2X*UIAPUNOV FCT*9X*INVERSE VOL*IIX*DET(P)* 10103450 01111X*PERFORMANCE*I2X*UIAPUNOV FCT*0X*INVERSE VOL*IIX*DET(P)* 10103500 01111X*PERFORMANCE*I2X*UIAPUNOV FCT*9X*INVERSE VOL*IIX*DET(P)* 10103500 01111X*PERFORMANCE*I2X*UIAPUNOV FCT*9X*INVERSE VOL*IIX*DET(P)* 10103500 01111X*PERFORMANCE*I2X*DIVISOR*///) 0103520 CALL EXIT (7X*6(6X*E14~7)/)	820 00(I) = (2.**(LAY-I))*00(I) * 0IVI /THLIN	10103360
0011 = (2.**(LAY-1))*00(1) * 01VL VPLLM 101033400 15 TO 905 10103420 15 FORMAT(1H0 Z8) 10103420 15 FORMAT(1H0 Z8) 10103440 16 TO 102 10103450 10 TO 102 10103450 10 TO 102 10103440 10 TO 102 10103450 10 TO 100 10103450 10 TO 100 10103460 10 TO 100 10103460 <		10103370
00 0003400 01 000 01 000 01 000 01 000 01 000 01 000 00 000 00 000 00 000 00 000 00 000 00 000 00 000 00 000 00 000 00 000 00 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 </td <td>830 00(1) = (Zo***(LAY-1)/*00(1) * 01VI /PHLIM</td> <td>10103380</td>	830 00(1) = (Zo***(LAY-1)/*00(1) * 01VI /PHLIM	10103380
70 CLL FULL 10103420 15 FORMAT(1H0 Z8) 10103420 60 T0 102 10103440 10103450 10103450 00 CONTINUE 10103450 01 CONTINUE 10103450 00 CONTINUE 10103450 00 CONTINUE 10103450 00 FORMAT(18X: "TIME - 12X:"LIAPUNOV FCT",9X."INVERSE VOL".11X."DET(P)" 10103460 01 111X: PERFORMANCE - 12X: "DIVISOR".///) 10103490 01 111X: PERFORMANCE - 12X: "DIVISOR".///) 10103500 01 111X: PERFORMANCE - 12X: "DIVISOR".///) 10103500 05 FORMAT (7X.6(6X.E14.7)/) 10103500 05 FORMAT (7X.6(6X.E14.7)/) 10103520		10103400
<pre>15 FORMAT(1H0 Z8) UM 15 FORMAT(1H0 Z8) UM 60 T0 102 00 CONTINUE WRITE(6.191)(ALP(J).J=1.18) 00 CONTINUE WRITE(6.8600) 10103460 10103560 10103500 101003500 10103500 1010000 10100000 101000</pre>	979 CALL RUMUUTIONM	
<pre>4.0 T 102 60 T 102 00 CONTINUE write(6.191)(ALP(J).J=1.18) 00 CONTINUE write(6.8600) 00 FORMAT(18X.TIME.12X.LLAPUNOV FCT.95X.'INVERSE VOL.11X.DET(P) 00 T 00 A 40 00 FORMAT(18X.TIME.12X.ULAPUNOV FCT.95X.'INVERSE VOL.11X.DET(P) 00 T 00 034 80 00 FORMAT(7X.6(6X.E14.7)/) 00 FORMAT(7X.6(6X.E14.7)/) 00 CALL EXIT</pre>		10103420
00 CONTINUE WRITE(6.191)(ALP(J).J=1.18) WRITE(6.8600) 00 FORMAT(18X.TIME12X.*LIAPUNOV FCT'.9X.*INVERSE VOL11X.*DET(P)* 10103460 1.11X.*PERFORMANCE'.12X.*DIVISOR*.///) 0.11X.*PERFORMANCE'.12X.*DIVISOR*.///) 0.11X.*PERFORMANCE'.12X.*DIVISOR*.///) 0.11X.*PERFORMANCE'.12X.*DIVISOR*.///) 0.11X.*PERFORMANCE'.12X.*DIVISOR*.///) 0.11X.*PERFORMANCE'.12X.*DIVISOR*.///) 0.11X.*PERFORMANCE'.12X.*DIVISOR*.///) 0.11X.*PERFORMANCE'.12X.*DIVISOR*.///) 0.11X.*PERFORMANCE'.12X.*DIVISOR*.///) 0.10103460 10103460 10103460 10103450 10103520 10103520 10103520		
WRITE(6.191)(ALP(J),J=1.18) WRITE(6.8600) 00 FORMAT(18X.TIME.12X.LIAPUNOV FCT.99X.'INVERSE VOL.11X.'DET(P)' 10103460 1.11X.PERFORMANCE'.12X.'DIVISOR'.///) 01.11X.PERFORMANCE'.12X.'DIVISOR'.///) 01.11X.PERFORMANCE'.12X.'DIVISOR'.///) 01.0103400 01.11X.PERFORMANCE'.12X.'DIVISOR'.///) 01.0103400 01.11X.'PERFORMANCE'.12X.'DIVISOR'.///) 01.0103400 01.11X.'PERFORMANCE'.12X''DIVISOR'.///) 01.0103500 01.11X.'PERFORMANCE'.12X'''''''''''''''''''''''''''''''''''		
WRITE(6.8600) 500 FORMAT(18X.TIME12X.LIAPUNOV FCT9X.TINVERSE VOL11X.DET(P). 10103470 1.11X.PERFORMANCE12X.DIVISOR///) WRITE(6.8505) ((BUNCH(I.J).J=1.6).I=1.NXCUE) 10103500 505 FORMAT (7X.6(6X.E14.7)/) CALL EXIT CALL EXIT 10103520	WRTTF(6.101)(AIP(J),J=11P)	
<pre>50 FDPMAT(18X.TIME12X.LIAPUNOV FCT5X.TINVERSE VOL11X.DET(P). 10103480 1.11X.PERFDRWANCE12X.UTVISDR///) WRITE(6.8505) ((BUNCH(I.J).J=1.6).I=1.NXCUE) 10103500 10103500 10103510 CALL EXIT 10103520</pre>	METTE (A. SKOO)	
1.11X.PERFORMANCE12X.DIVISOR///) WRITE(6.8505) ((BUNCH(I.J).J=1.6).I=1.NXCUE) 805 FORMAT (7X.6(6X.E14.7)/) Call EXIT [0103520] 10103520	600 FORMAT(18X. TIME. 12X. LIAPUNOV FCT. 9X. INVERSE VOL. 11X	ET(P) 10103480
WPITE(6,8505) ((BUNCH(I,J),J=1,6),I=1,NXCUE) 10103500 505 FORMAT (7X,6(6X,E14.7)/) Call EXIT 10103520	1.11X, PERFORMANCE 12X, DIVISOR///)	10103490
005 FORMAT (7X,6(6X,E14,7)/) Call Exit 10103520	WRITE(6,8505) ((BUNCH(I,J),J=1,6),I=1,NXCUE)	10103500
CALL EXIT	605 FURMAT (7X+6(6X+E14.7)/)	10103510
	CALL EXIT	10103520

LEVEL 2 FEB 67

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05/360 FORTRAN H

DATE 69+199/15+47-13

COMPILER OPTIONS - NAME= \$MAIN.OPT=02.LINEONT=56.SCURCE.BCD.LIST.NODECK.LOAD.MAP.NOEDIT.IC

ISN	0002	SUBROUTINE DSRCH(VMIN, E.C. JSUE)	10700010	
ISN	0003	IMPLICIT REAL *3 (A-F,O-Z)	10700020	a and the second se
- ISN	0004	DIMENSION $G(9)$, $R(9)$, $GG(9)$, $XX(9)$, $C(9,9)$, $PX(9)$	10700030	
	·	1.PF(9),QX(9),DEL(9)	10700040	
ISN	0005	PEAL*4 B.C.R1.R2	10700060	
ISN	0006	CGMMON/ELKDS/VDOTZ,XZERC(9),FZERO(9),NNZERO		
ISN	0007	COMMON/BLK 11/DB1,CB2,DG1,DG2	10700070	
ISN	0008	CCMMON/BLK77/X(15)	10700080	
ISN	0009	COMMON /BLK5/ A(9,5),Q(9,9),PM(9,9),F(9),DF(9,9)	10700090	
ISN	0010	COMMON/ABORT/ DET, VSR ,VCL	10700100	والمراجع والمتعارفة والمتراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع
ISN	0011	SD = SQRT(DET)	10700110	
ISN	0012	$JSUE \approx 0$	10700120	
ISN	0013	IFLAG = 0	10700130	
ISN	0014	KAM = O	10700140	
ISN	0015	x K 12 = 100	10700150	
ISN	0015	NN = 0	10700160	· · · · · · · · · · · · · · · · · · ·
ISN	0017	NNN = 1	10700170	
	.	C	10700180	
ISN	0018	KFAIL=0	10700190	
ISN	0019	100 DC 1050 I=1,9	10700200	
ISN	0020	G(I) = VMIN/B(I)	10700210	
ISN	0021	1050 GG(I) = SQRT(G(I))	10700220	
ISN	0022	103 IF(NN .LT. 500*NNN)GC TC 800	10700230	
ISN	0024	705 FORMAT(4H NN=,I6)	10700240	
ISN	0025	NNN=NNN + 1	10700250	
ISN	0026	800 NN = NN + 1	10700260	
ISN	0027	IF(NN .GT. 3.0E+CE) GO TO 311	10700270	
ISN	0.029	$DO_{101} I=1.9$	10700280	
ISN	0030	CALL BOXNO (R1,R2)	10700290	in the second
ISN	0031	XX(I) = R1	10700300	
ISN	0032	IF(NN .LT. 1000)XX(I)= GG(I)*XX(I)/6.	10700310	(1) In the second of the second se
ISN	0034	IF(NN .GE. 1000)XX(I)= GG(I)*XX(I)/3.	10700320	
ISN	0036	101 CONTINUE	10700330	 And descent sector of sector of the sector sector of the sector of the sector sect sector sector sect
· · · · · · · · ·		C XX(I) ARE THE EIGENVECTOR COORDINATES	10700340	
		C NOW TRANSFORM TO X(I) COORDINATES	10700350	· · · · · · · · · · · · · · · · · · ·
ISN	0037	DO 930 I=1.9	10700360	
ISN	0038	\$30 X(I)=0.0	10700370	-
ISN	0039	DO 935 I=1,9	10700380	
ISN	0040	DO 935 J=1,9	10700390	* ····
ISN	0041	$35 \times (I) = \times (I) + C(I,J) * \times (J)$	10700400	
		C GENERATE VL	10700410	······································
ISN	0042	259 VL=0.0	10700420	
ISN	0043	DO 260 I=1.9	10700430	· · · · · · · · · · · · · · · · · · ·
ISN	0044	260 PX(I)=0.0	10700440	
ISN	0045	DO 261 I=1,9	10700450	
ISN	0046	DC 261 $J=1.9$	10700460	
ISN	0047	261 PX(I) = PX(I) + PM(I,J) * X(J)	10700470	· · · · · · · · · · · · · · · · · · ·
ISN	0048	DO 262 I=1.9	10700480	
ISN	0049	262 VL=VL + X(I)*PX(I)	10700490	a state of the sta
ISN	0050	IF(VL .GE. VMIN)GC TC 103	10700500	
ISN	0052	JSW=1	10700510	· ·
ISN	0053	CALL AFX(JSW)	10700520	
-		C ************************************	********** 10700530	
ISN	0054	VDNT =0.0	10700540	
ISN	0055	D0 250 I=1.9	10700550	

PAGE 002									and a second and a second and a second					n an a share and a share the second					And a second of the second of the second					and a second		· · · · · · · · · · · · · · · ·			արեր երկուցությունը։ Արենքնանակությունները։ Արենքներությունը հունանակովորներությունը երկուցները։ Արենքի երկուցն		the second of the second se		the formation of the second			•				n men an	· · · · · · · · · · · · · · · · · · ·								
	10700560	10700570	10700580	10700590	10700600	01900201	10700630	10700640	10700650	10700660	10700670	10700580)9+1=1+)1(X()055+6(ETI 107007C0	10700710	10700720	107,00730	10/00/40	10700760	10700770	10700780		LV + 1 UUV J 005 + 6(ET1 10 / 00800)9,1=1,)1(X()055,6(ETI 10700820	10700830	10700840	10700850	10700860	10700870	1070080	10700900	NN)507.6(ETT 10700910	[(F(+2GD+1GD+2BD+1BD)213,6(ETI 10700920	4) 10700930	10700940	1070050	00600101	1070090	10700990	10701000	na na manana na manana na manana na na na manana kanana mananana mananana na mananana na manana manana manana n	10701010 52.4 NN=1.15.1		10701040	10701050	NN) 507, 6(ET I 10701060	10701070		10701120	
		$0^{\circ}0 = (1) \times 0$	DO 251 I=1•5	DO 251 J=1.9	QX(I)= QX(I) + G(I+1)*X(J) 251 pf(I)=pf(I) + DM(I = 3+f(J)	504 FILTER FI	252 VDOT = VDOT - X(I)* (QX(I)-2.0 * PF(IF(IFLAG.EQ.1)GO TO 520	IF(VDOT .LT. 0) GD TC 1C3	IF(VMIN .LT. VL)GO TC 103	1 FLAG = 1 500 DD 510 1-1 0	510 DEL(I)= 0.5*X(I)		512 D0 5151=1.9	515 X(I)= X(I)- DEL(I)	60 T0 535 520 bd f70 t-1 0	520 DEL(I)= DEL(I)* .E	IF(VDDT .GT.0.0)GO TO 512	D0 540 1=1,9	540 X(I)= X(I) + DEL(I)	535 KAM= KAM + 1	C 560 FORMAT(7H VDOT.V/(1X.2F14.71)		550 FDRMAT(3H X=/(1X, 9E13.4))	IF(KAM .LT.I5) GO TO 259	VMIN = VL	DO 1100 I=1,9	FZERO(I)=F(I)	1100 XZERO(I)=X(I)			C ()9+1=1+)	312 FORMAT(6H DB,DG,4E15.7/6H F(I)=,9E12	IFLAG = 0		IF1 VL •LT•1•0E-12) GC TO 66	VDL= SD/((SQRT(VL))**5)	IF(VOL.6T.VSR) GO TC 69	GO TD 100	65 CONTINUE	C 65 WRITE(6+2220) VL+NN 2220 FORMAT(+ VI = *.FIA.7.5X.*TON SWAFF*	VOL = 1.00450	C	69 JSUE = 1		BIT IT(KTALL+EU+0)6U TU LIS Write(A.1202)NN7ER(1202 FCPMAT(* NNZERD = *, 16)	GO TO 316	
	ISN 0056		I SN 0058	ISN 0059	ISN 0060	ISN 0062	ISN 0063	ISN 0064	I SN 0066	I SN 0069	150 000	1200 NSI	- - - -	I SN 0073	ISN 0074	2700 NS1	1200 NSI	ISN 0078	ISN 0080	ISN 0081	15N 0082	15N 0083))) ;	ISN 0084	I SN 0085	ISN 0087	ISN 0088	ISN 0089	15N 0090	1500 NG1		tori tini tini tangga a sangga sangga sangga sangga sang sang	ISN 0093	1SN 0094	9600 NS1	150 NS1	1 SN 0099	15N 0100	ISN 0102	ISN 0103	15N 0104	I SN 0105		ISN 0106		15N 0109	ISN 0110	1110 NS1	

御史 (論)記



DATE 69.199/15.47.21

COMPILER OPTIONS - NAME= \$MAIN,CPT=02,LINECNT=55,SCURCE.BCD,LIST,NODECK,LOAD,MAP,NOEDIT,ID

ISN 0002	SUBROUTINE QGEN (THETA, FHIV, XLAM)	10900010	 Construction of the construction of the second s Second second secon
ISN 0003	IMPLICIT REAL*8 (A-H,D-Z)	10900020	
	c	10900030	
	C GENERATION OF POSITIVE DEFINITE Q MATRIX	10900040	
ISN 0004	DOUBLE PRECISION AAMOD, P. QV. A. E. AM, Q. PM. ATP. PA. QP	10900050	a a composition and a contraction of the second
ISN 0005	COMMON /BLK5/ A(9.9).Q(9.9).PM(9.9).F(9).DF(9.9)	10900060	
ISN 0006	COMMON/ELK 70/ AAR(S,S) = EM(9,9) = PA(9,9) = ATP(9,9)	10900070	n nan dengen i 10 min i 10 min i 10 min yang berkendari na 4 min yan birakerikan kan terperate nan i
TSN 0007	N=9	10900080	
		10900090	A A ANALYSIN AND AND AND AND AND AND AND AND AND AN
TSN 0008	DIMENSION THETA(28). OH IV(8). YI AN(0). JIHETA(28). THETA(28).	10900100	
134 0000	$\frac{1}{1} = \frac{1}{1} = \frac{1}$	10900100	a management of the second
		10900110	
		10700120 E/CA 10000130	ana ana ilay kaominina dia kaominina dia kaominina dia kaominina dia mampina dia kaominina dia kaomini
T CN: 0000	1047 EDDUAT/EE10 AL	5(0, 10900130	
ISN 0009		10900140	and a second the second to the
ISN 0010	EXTERNAL DIMOS	10000170	
ISN 0011	P1 = 3.1415926	10900150	
ISN 0012	P12 = P1/2.	10900160	
	C WRITE(6,3) THETA, PHIV, XLAM	10900170	
ISN 0013	3 FORMAT(23H DATA-THETA,PHIV,XLAM /(1X,SE14.7))	10900180	
ISN 0014	NN = (N-1) * (N-2)/2	10900190	
ISN 0015	DO 6I=1,NN	10900200	
ISN 0016	BAD=THETA(I)	10900210	and the second
ISN 0017	6 TTHETA(I) = DMOD(BAD,PI2)	10900220	
	C WE HAVE NOW INDEXED THETA.	10900230	a angle a parte de la companye de la companye da parte que que en la companye de la companye de la companye de
	C NOW WANT CONTINUED FRODUCT OF SS(I,JsL) FOR L=K+1,N .	10900240	
· ····································	C FOR EACH K=1,N-1 DETAIN Z(K,I,J).	10900250	
ISN 0018	NNI = N-1	10900260	
ISN 0019	69 DO 20 K=1.NNI	10900270	
	C	10900280	
ISN 0020	00 8 I=1.N	10900290	
ISN 0021	DO 8 J=1.N	10900300	
ISN 0022	8 BA(I,J)=0.0	10900310	
ISN 0023	00 99 I=1.N	10900320	No. 1977 MARKA 2017 17 1984 Alas Castalatan Angela (Castalatan Castalatan) (Castalatan) (Castalatan) (Castalatan)
ISN 0024	99 $BA(I,I)=1.0$	10900330	
771 4747 444	C	10900340	ananan ito ina in ing ang ang ang ang ang ang ang ang ang a
ISN 0025	KK=K+1	10900350	
ISN 0026		10900360	an a
		10900370	
ISN 0027	DO 15 1=1-N	10900380	•
TSN 0028		10900300	
ISN 0029	15 SS(1,1,1) = 0.0	10900400	the second se
ISN 0030		10900410	
TEN 0031	QP = C(T, T, 1) = 1, 0	10000420	
13N 0051	- WE DEVELOP SS(T. L.F) AS EPHOTION THETA(T.K.N.) FOR L.L.T. N	10900420	
	AND SELECTION FUNCTION OF DETVICE FOR LONG	10900420	the second constraints and the second constraints
1 CN 0070	TELEVISE 3 22	10900440	
ISN 0002	$\frac{1}{2} = \frac{1}{2} + \frac{1}$	10900450	
15N 0033		10900480	
15N 0034		10900470	
ISN 0035		10900480	
ISN 0036	OS(K + L + L) = -S(N(+)) + E(A(M))	10900490	
ISN 0037	SS(L + K + L) = S(N(T) + H + TA(M))	10900500	
ISN 2039	GN TO 35	10900510	
ISN 0039	23 55(K,K,L)=COS(PHIV(K))	10900520	
ISN 0040	SS(L,L,L)=COS(PHIV(K))	10900530	
ISN 0041	SS(K,L,L) = -SIN(PHIV(K))	10900540	

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ISN 0042 35 00 70 ISN 0044 35 00 70 ISN 0045 70 CC (1, 1) ISN 0046 70 CC (1, 1) ISN 0053 110 BA (1, 1) ISN 0053 110 BA (1, 1) ISN 0055 20 Z (K, 1) ISN 0056 10 Z (1, 1) ISN 0056 10 Z (1, 1) ISN 0056 20 Z (K, 1) ISN 0056 15 BM (1, 1) ISN 0056 7 S M (1, 1) ISN 0056 7 S M (1, 1) ISN 0056 5 D Z (K, 1) ISN 0056 7 S M (1, 1) ISN 0056 5 D Z (K, 1)	<pre>.k.L)=SIN(PHIV(K)) 0 [=1.N 0 J=1.N 1 = 1.N 1 = 1.N 1 = 1.1 0 J=1.N 1 = 1.1 0 = 1.</pre>	10900550 10900560 10900560 10900580 10900500 10900520 10900520 10900550 10900550 10900550 10900550 10900550 10900570 10900550 1000550 1000550 1000550 1000550 1000550 1000550 1000550 1000500 1000500000000
ISN 0043 35 00 70 ISN 0045 70 CC(1) ISN 0046 70 CC(1) ISN 0046 00 50 ISN 0053 110 9A(1) ISN 0055 110 9A(1) ISN 0055 20 20 ISN 0055 20 7 ISN 0056 10 16 ISN 0055 20 7 ISN 0056 10 16 ISN 0055 20 75 ISN 0056 10 7 ISN 0055 20 75 ISN 0056 55 30(1) ISN 0056 50 75 ISN 0056 55 30(0) ISN 0071 55 30(0) ISN 0072 50 00 ISN 0075 50 00 ISN 0075 50 00 ISN 0070	0 1=1.N 0 J=1.N 0 J=1.N 0 J=1.N 0 1=1.N 1 =1.N 1 =1.N 0 J=1.N 1 =1.N 1 = 1.N 1 = 1.N 0 J=1.N 1 = 1.N 1 = 1.	10900560 10900560 10900580 10900590 10900610 10900620 10900650 10900550 10900560 10900560 10900590 10900590 10900590 10900590 10900710 10900720 10900720
ISN 0043 35 D0 70 ISN 0045 70 CC(1.) ISN 0045 70 CC(1.) ISN 0046 00 50 ISN 0045 00 50 ISN 0045 00 50 ISN 0053 110 BA(1.) ISN 0053 100 20 ISN 0055 20 20 ISN 0055 110 BA(1.) ISN 0055 20 20 ISN 0055 20 20 ISN 0055 20 20 ISN 0055 20 7 ISN 0056 15 BM(1.) ISN 0055 00 7 ISN 0055 00 7 ISN 0056 15 BM(1.) ISN 0055 00 7 ISN 0056 00 7 ISN 0055 50 75 ISN 0056 00 7 ISN 0057 50 75 ISN 0056 00 7 ISN 0056 00 7 ISN 0057 00 7 ISN 0071 00 7 ISN 0071 00 7 ISN 0072 00 7 IS	0 [=1.N 0 J=1.N 0 J=1.N 0 J=1.N 1 =1.N 1	10900570 10900580 10900500 10900510 10900520 10900550 10900550 10900550 10900550 10900550 10900590 10900590 10900590 10900710 10900710 10900720 10900720
ISN 0044 70 CC(I; ISN 0045 70 CC(I; ISN 0045 004 ISN 0045 00 ISN 0046 00 ISN 0046 00 ISN 0046 00 ISN 0050 00110 ISN 0053 00110 ISN 0053 10 ISN 0053 100 ISN 0055 00 ISN 0056 00 ISN 0055 00 ISN 0055 00 ISN 0056 00 ISN 0055 00 ISN 0056 00 ISN 0055 00 ISN 0056 00 ISN 0056 00 ISN 0056 00 ISN 0055 00 ISN 0056 ISN 0056 <td>0 J=1.N • J=0.0 0 M=1.N 0 J=1.N 0 J=1.N 1 =1.N 0 J=1.N 1 =1.N 1 =1.N</td> <td>10900580 10900500 10900520 10900520 10900550 10900550 10900560 10900560 10900570 10900590 10900590 10900700 10900710 10900710 10900720</td>	0 J=1.N • J=0.0 0 M=1.N 0 J=1.N 0 J=1.N 1 =1.N 0 J=1.N 1 =1.N 1 =1.N	10900580 10900500 10900520 10900520 10900550 10900550 10900560 10900560 10900570 10900590 10900590 10900700 10900710 10900710 10900720
ISN 0045 70 CC(1, 1, 1) ISN 0046 00 50 ISN 0046 00 50 ISN 0046 00 50 ISN 0046 00 50 ISN 0050 00110 ISN 0052 00 50 ISN 0052 00 50 ISN 0052 00 50 ISN 0052 100 50 ISN 0055 00 20 ISN 0055 100 20 ISN 0055 00 20 ISN 0055 00 20 ISN 0055 00 7 ISN 0055 20 2(K, 1, 1) ISN 0055 20 2(K, 1, 1) ISN 0055 20 2(K, 1, 1) ISN 0055 7 BM(1, 1) ISN 0056 7 BM(1, 1) ISN 0055 7 SM(1, 1) ISN 0056 7 SM(1, 1) ISN 0065 7 SM(1, 1) ISN 0065 7 SM(1, 1) ISN 0065 5 SM(1, 1) ISN 0065 5 SM(1, 1) ISN 0065 5 SM(1, 1) ISN 0070 5 SM(1, 1) ISN 0075 5 SM(1, 1) ISN 0075 5 SM(1, 1) I	.J)=0.0 0 M=1.N 0 J=1.N 0 J=1.N .J)=BA(M.I)*SS(1.J.L) +CC(M.J) 0 J=1.N 0 J=1.N 1.J)=BA(I.J) 1.J)=BA(I.J) 1.J)=BA(I.J) 1.J)=BA(I.J) 1.J)=0.0 0 J=1.N 1.J)=0.0	10900590 10900510 10900520 10900550 10900550 10900550 10900550 10900570 10900590 10900590 10900700 10900710 10900710 10900720
C D <thd< th=""> <thd< th=""> <thd< th=""> <thd< th=""></thd<></thd<></thd<></thd<>	0 M=1.N 0 J=1.N 1 = 1.N 1 = 1.N 0 J=1.N 0 J=1.N 1 = 1.N 1 = 1.N 0 J=1.N 1 = 1.N 1 = 1.N 0 J=1.N 1 = 1.N 0 J=1.N 1 = 1.N 0 J=1.N 1 = 1.N 0 J=1.N 0 J	10900600 10900610 10900650 10900650 10900650 10900650 10900670 10900590 10900590 10900700 10900710 10900710 10900720
ISN 0046 D0 50 ISN 0047 D0 50 ISN 0049 D0 50 ISN 0051 D0110 ISN 0052 D0 20 ISN 0055 10 6A(1) ISN 0055 10 6A(1) ISN 0055 D0 20 ISN 0055 D0 7 ISN 0055 D0 7 ISN 0055 D0 7 ISN 0056 D0 7 ISN 0055 D0 7 ISN 0055 D0 7 ISN 0055 D0 7 ISN 0056 D0 7 ISN 0056 D0 7 ISN 0056 D0 75 ISN 0056 D0 75 ISN 0056 D0 75 ISN 0066 D0 55 ISN 0066 D0 55 ISN 0067 D0 55 ISN 0070 D0 50 ISN 0070 D0 55 ISN 0071 D0 70 ISN 0072	0 M=1.N 1 ==1.N 1 ==1.N 1 ==1.N 0 J==1.N 0 J==1.N 0 J==1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 0 J==1.N 0 J==0.0	10900610 10900620 10900650 10900650 10900660 10900500 10900590 10900590 10900700 10900700 10900710 10900710 10900720
ISN 00447 D0 50 ISN 00449 D0 50 ISN 0051 D0 110 ISN 0053 110 0 411 ISN 0053 110 0 411 ISN 0053 100 20 ISN 0055 20 7 ISN 0055 20 7 ISN 0055 20 7 ISN 0056 7 ISN 0056 7 ISN 0056 7 ISN 0056 16 ISN 0056 16 ISN 0055 20 7 ISN 0056 16 ISN 0056 16 ISN 0056 16 ISN 0056 7 ISN 0056 5 ISN 0056 5 ISN 0056 5 ISN 0057 7 ISN 0071 5 ISN 0072 70 5 ISN 0072 40 80(1.0	0 J=1.N 1 ==1.N 0 J=1.N 0 J=1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 1 ==1.N 0 J=1.N 1 - J =BA(1.J) 1 - J =BA(1.J) 1 = 1.N 0 J=1.N 0 J=0.0 0 J=1.N 0 J=0.0 0 J=1.N 0 J=0.0 0 J=1.N 0 J=0.0 0 J=1.N 0 J=0.0 0 J=0.	10900620 10900640 10900650 10900650 10900660 10900670 10900590 10900590 10900710 10900710 10900720
15N 0049 50 CC(M.J.) 15N 0051 110 BA(1) 15N 0053 110 BA(1) 15N 0053 100 20 15N 0053 100 20 15N 0055 20 2(K, 1) 15N 0055 20 2(K, 1) 15N 0055 20 2(K, 1) 15N 0056 20 7 15N 0056 20 7 15N 0056 20 7 15N 0056 7 16 15N 0066 16 16 15N 0065 7 00 15N 0072 7 50 15N 0072 7 <	D T=1.N J = HA (M.I) *SS(I.J.L) +CC(M.J) O J=1.N J = CC(I.J) I NUE D T=1.N I = 1.N I = 1.N J = 1.N J = 0 0 J=1.N 0 J=0.0 0 J=1.N 0 J=0.0 0 J=1.N 0 J=0.0 0 J=1.N 0 J=0.0 0 J=1.N 0 J=0.0 0 J=0	10900630 10900650 10900650 10900650 10900650 10900590 10900590 10900710 10900710 10900730
ISN 0050 00110 ISN 0051 110 BA(I) ISN 0053 10 C0NTIN ISN 0055 00 20 ISN 0055 20 Z(K, I) ISN 0059 7 BM(I) ISN 0052 00 Z(K, I) ISN 0055 20 Z(K, I) ISN 0056 20 Z(K, I) ISN 0052 20 Z(K, I) ISN 0056 16 BM(I) ISN 0065 7 BM(I) ISN 0070 00 55 ISN 0071 00 55 ISN 0072 00 40 ISN 0072 00 40 ISN 0072 00 40 ISN 0072 00 40	0 JEI.N 0 JEI.N 1 JEC(I.J) 1 NUE 1 II.N 1 JEL.N 1 JEL.N 1 JEL.N 1 JEL.N 1 JEL.N 1 JEL.N 1 JEL.N 1 JEL.N 0 J	10900540 10900550 10900560 10900590 10900590 10900700 10900710 10900720 10900720
ISN 0051 110 84(1) ISN 0052 110 84(1) ISN 0053 10 00000 ISN 0055 20 20 ISN 0055 20 7(k,1) ISN 0059 7 8M(1,1) ISN 0050 15 8M(1,1) ISN 0052 0 40 ISN 0053 7 8M(1,1) ISN 0054 7 8M(1,1) ISN 0055 7 8M(1,1) ISN 0065 7 8M(1,1) ISN 0070 0 7 5 ISN 0070 0 7 5 ISN 0071 0 7 6 ISN 0072 0 80 ISN 0071 0 7 6 ISN 0072 40 8M(1,1)	0 J=1:N 1 NUE 1 NUE 2 J=1:N 1 - J = BA(1.J) 1 - J = BA(1.J) 1 - J = BA(1.J) 1 - J = BA(1.J) 1 - J = 0.0 0 - 1 = 1.N - J = 0.0	10900590 10900580 10900580 10900590 10900700 10900710 10900720 10900730
ISN 0052 110 84(1, 1, 15N 0053 10 CONTIN ISN 0055 20 2(K, 1, 20 ISN 0055 20 2(K, 1, 1, 15N 0055 20 2(K, 1, 1, 15N 0059 7 15N 0051 15N 0051 15 BM(1, 1, 15N 0050 15 BM(1, 1, 15N 0061 15 BM(1, 1, 15N 0005 15 BM(1, 1, 15N 0070 15 BM(1, 1, 1, 15N 0070 15 BM(1, 15N 0	. J) = CC(I.J) 1 NUE 3 I=1.N 1 - J) = BA(I.J) 1 - J) = BA(I.J) 1 = 1.N - J) = 0.0 6 I = 1.N 6 I = 1.N	10900650 10906590 10900590 10900700 10900710 10900730 10900730
I SN 0053 IO CONTIN ISN 0055 20 2(K, I, I ISN 0055 20 2(K, I, I ISN 0055 20 2(K, I, I ISN 0059 7 00 7 1 ISN 0059 7 00 7 1 ISN 0050 15 00 16 ISN 0061 15 00 40 ISN 0065 75 SM(I, I ISN 0065 75 SM(I, I ISN 0065 15 00 55 ISN 0066 17 00 55 ISN 0067 17 00 55 ISN 0070 18 00 40 ISN 0071 00 10 00 40 ISN 0071 10 00 10 10 10 10 10 10 10 10 10 10 10	INUE 1 =1.N 1 -1.SA(1.J) 1 -1)=BA(1.J) 1 =1.N -1)=0.0 6 1=1.N 6 1=1.N	10900590 10900590 10900700 10900710 10900720 10900720
ISN 0054 D0 Z0 Z0 Z1 L1 L2 L2 <thl< td=""><td>0 1=1.N 1.J)=BA(1.J) 1=1.N J=1.N J=1.N J=0.0 0 1=1.N 6 T=1.N</td><td>10900590 10900700 10900710 10900720 10900720</td></thl<>	0 1=1.N 1.J)=BA(1.J) 1=1.N J=1.N J=1.N J=0.0 0 1=1.N 6 T=1.N	10900590 10900700 10900710 10900720 10900720
ISN 0055 Z0 Z(K.1. ISN 0056 C Z(K.1. ISN 0059 C Z(K.1. ISN 0059 T BM(I ISN 0050 15 BM(I ISN 0061 16 BM(I ISN 0061 16 BM(I ISN 0063 C D0 40 ISN 0063 C D0 75 ISN 0065 C D0 55 ISN 0066 D0 55 ISN 0066 D0 55 ISN 0060 15 D0 55 ISN 0070 16 D0 55 ISN 0070 15 D0 55 ISN 00070 15 D0 55 ISN 00070 15 D0 55 ISN 0070 15 D0 55 ISN 0070 15 D0	0	10900700 10900710 10900720 10900720
ISA 0055 20 2(K, I, I, ISA 0059 C 20 7(K, I, ISA 0059 D 7 1 ISN 0059 7 BM(I, I, I ISN 0050 15 BM(I, I, I ISN 0060 15 BM(I, I, I ISN 0061 15 BM(I, I, I ISN 0063 75 BM(I, I, I ISN 0065 75 SM(I, I, I ISN 0066 D 75 SM(I, I, I ISN 0066 D 75 SM(I, I, I ISN 0066 D 75 SM(I, I, I ISN 0067 75 SM(I, I, I ISN 0070 55 SM(I, I) ISN 0071 40 B0 55 ISN 0071 40 B0 40 ISN 0072 15 007 15 D 15 SM(I, I)	[]=BA(I]) [=1.N .]=0.0 6 [=1.N	10900710 10900720 10900730
ISN 0057 C D0 7 1 ISN 0058 7 BM(I) ISN 0050 7 BM(I) ISN 0060 15 BM(I) ISN 0061 16 BM(I) ISN 0062 75 BM(I) ISN 0065 75 SM(I ISN 0066 77 75 SM(I) ISN 0066 77 75 SM(I) ISN 0066 77 75 SM(I) ISN 0067 75 SM(I) ISN 0070 75 BD0 55 ISN 0070 75 SM(I) ISN 0071 75 D00 55 ISN 0070 75 SM(I)	I=1.N J=1.N • J)=0.0 6 T=1.N	10900720 10900730 10900730
ISN 0057 D07 T ISN 0058 7 D0 7 ISN 0050 15 D0 16 ISN 0060 16 D0 16 ISN 0063 16 D0 16 ISN 0063 0 16 D0 16 ISN 0063 0 0 40 17 ISN 0063 0 0 75 11 ISN 0065 75 D0 75 ISN 0066 0 0 55 11 ISN 0066 0 0 55 11 ISN 0066 0 0 55 10 55 ISN 0070 0 0 55 10 55 ISN 0070 0 0 55 10 40 ISN 0070 0 0 0 40 10	I=1.N J=1.N 6 I=1.N	10900730 10900730
ISN 0058 7 BM(I, J ISN 0060 16 M(I, I ISN 0061 16 M(I, I ISN 0062 0 16 M(I, I ISN 0063 75 M(I, I ISN 0064 75 M(I, I ISN 0066 75 M(I, I ISN 0066 6 75 M(I, I ISN 0066 6 75 M(I, I ISN 0066 175 00 55 ISN 0066 175 00 55 ISN 0067 175 00 55 ISN 0071 00 40 11, I ISN 0072 40 M(I, I	J=1.N • J)=0.0 6 T=1.4	10000740
ISN 0065 ISN 0061 IS 00116 ISN 0061 C D0 16 ISN 0062 C D0 40 ISN 0063 C D0 75 ISN 0065 C D0 75 ISN 0065 C D0 75 ISN 0065 C D0 55 ISN 0066 C D0 55 ISN 0066 C D0 55 ISN 0066 C D0 55 ISN 0067 D0 55 D0 55 ISN 0070 D0 55 D0 55 ISN 0071 D0 60 40 ISN 0072 40 ISN 40 10	6 1=1,0 	
ISN 0061 16 MM [1, 1 ISN 0062 2 D0 40 ISN 0063 75 MU [1, 1 ISN 0065 75 MU [1, 1 ISN 0065 2 D0 55 ISN 0066 55 MM [1, 1 ISN 0071 00 40 40 ISN 0072 40 MM [1, 1		10900/50
ISN 0062 C D0 40 ISN 0063 C D0 75 ISN 0064 75 N0 75 ISN 0065 C 75 N(I) ISN 0066 D0 55 ISN 0066 C D0 55 ISN 0068 D0 55 ISN 0071 D0 40 ISN 0072 C M(I)		10900770
ISN 0062 C D0 40 ISN 0063 C D0 75 ISN 00664 75 SM(I ISN 0065 C D0 55 ISN 0066 D0 55 ISN 0066 D0 55 ISN 0067 D0 65 ISN 0072 C D0 40 ISN 0072 C M(I		10000780
ISN 0063 C D0 75 ISN 0066 75 00 75 ISN 0065 C D0 75 ISN 0065 C D0 55 ISN 0066 C D0 55 ISN 0068 55 D0 55 ISN 0069 55 D0 55 ISN 0070 D07 D0 40 ISN 0072 40 EN (I,) EN (I,)	INN * I= J C	10900790
ISN 0063 D0 75 ISN 0066 75 M(I ISN 0065 C 75 M(I ISN 0066 D0 55 ISN 0068 D0 55 ISN 0070 D0 40 ISN 0071 240 EM(I		10900803
ISN 0065 C DU T5 SM(I) ISN 0066 C DO 55 ISN 0065 ISN 0066 C DO 55 ISN 0055 ISN 0068 DO 55 DO 55 ISN 0069 55 DO 55 ISN 0071 ISN 0071 DO 40 40 ISN 0072 ISN 0072 C DO 40 ISN 0072	5 I=1,N	10900810
ISN 0066 C DD 55 ISN 0067 DD 55 ISN 0068 DD 55 ISN 0069 55 SM(M,. SN 0071 DD 40 ISN 0072 C 40 BM(I		10900820
ISN 0066 D0 55 ISN 0067 D0 55 ISN 0068 55 50 55 ISN 0070 55 58 60 40 ISN 0071 40 40 ISN 0072 40 80 1.5		10900840
SN 0067 D0 55 ISN 0068 D0 55 ISN 0069 55 SM(M+) SN 0071 D0 40 SN 0071 40 H0 40 SN 0072 C 40 EM(I+)	. N*1=W 2	1090050
ISN 0068 55 50 00 55 58 00 55 58 00 40 55 58 00 40 55 58 00 40 55 58 00 40 55 58 00 40 55 58 00 40 55 58 00 72		10900860
ISN 0070 00 00 40 40 11-1	5 [=1,N	10900870
ISN 0071 40 EM(1.4		10900880
[SN 0072 40 EM(I+J) J=1+N	10900900
	(['])#SH(I'])	10900910
	(1) C. M. S. P. L. M. S. L. M. S. M.	10900920
C BW(I+1	.J) IS CONTINUED PRODUCT OF Z(K,I,J) FRGM K=1 TO N-1	10900930
ISN 0073 C IF(PP)	1,41,41,15	10900940
ISN 0074 19 CONTIN	twoff	10900960
ISN 0075 18 FORMAT	AT(8H BM(I.J)/(€E15.7))	10900970
ISN 0076 41 DD 78	3 [=1, N	10900980
SN 0077 D0 78	Z =1.5	10900990
SN 0078 78 AAR(I,		10901000
	1) IS TOANSDEED BULL IN	10901010
		10901020
ISN 0079 CO 82	2 [=1.N	10901040
ISN 0080 DC 32	N+1+N	10901050
(L.1) 32 G(I.1)	0 = 0 = 0	10901060
		10901070
	[] XLAM(])	10901080
	UP IS THE LAWUA VALUEX	10901090

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z	zc	z	zz	*(W'1	M D M		z	z	. 2	zz	z	(W'I)									-					:							
S I=1,	1 = 1 •	I=1•	Ω=1,)) = C (∆ 1= (I.		1=1.	. J=1,		J=1.	M=1.)=AAR	z									-											
PC 86	00 86	D0 88	99 D0 P0 88	- I)00	00(1.		06 00	06 00		00 95	D0 95	0.1.0		and a share of																			
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COMPILER OPTIONS - NAME= \$MAIN, CPT=02, LINECNT=56, SOURCE, BCD, LIST, NODECK, LOAD, MAP, NOEDIT, ID

ISN 0002			SUBROUTINE PEATO(KEEE)	10400010	
ISN 0003			IMPLICIT REAL + 3 (A - F - 0 - 7)	10400020	
ISN 0004			COMMON / RI K 5/ A (G, G) + O(G, G) + PM(G, G) + F(G) + DF(G, G)	10400030	
		-		10400040	
ISN 0005		•		10400050	
130 0000		-		10400060	
		9 C		10400070	
ISN 0006			DOUBLE DECISION AANOD P.OV.A.E.AN.C.EN.ATD.EA.OE	10400080	
ISN 00007			DIMENSION AAMON (02, 5), 5(1, 5), (1, 1), (2, 1), (2, 1), (2, 1), (3,	10400090	
134 0007				10400100	
16N 0008			1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +	10400100	
ISN 0008		~	CUMMUNDER TUR AAR(\$.5).BM(9.9).PA(9.9).AIP(9.9)	10400110	
				10400120	
	1		N = 0 IMENSION OF A - MATRIX (INPO) EN CARD NU.2)	10400130	
		-	A = INPUT MATRIX	10400140	
	(5		10400150	
	. (C		10400150	
	I	С		10400170	
		ç		10400180	
	(c	INITIALIZE PM , CP, ATP , PA , AM , E	10400190	
	. •	C,		10400200	
	(c		10400210	
		C	· · · · · · · · · · · · · · · · · · ·	10400220	
ISN 0009			NN = N * N	10400230	
ISN 0010			DO_37 I=1,N	10400240	
 ISN 0011			D9 37 J=1.N	10400250	
ISN 0012			$PM(I,J) = O_{\bullet}O$	10400260	
ISN 0013			OP(I,J) = 0.0	10400270	
ISN 0014			ATP(I,J) = 0.0	10400280	
ISN 0015			$PA(I_{\star}J) = 0.0$	10400290	
ISN 0016			$AM(I_{A}) = 0.0$	10400300	
ISN 0017		37	F(1,1) = 0.0	10400310	
100 001		с ^{0.}	$N_{1}=(1,0)$	10400320	
ISN 0018		2963	FORMAT(1H /(1X,9F14,7))	10400330	
151 0010		~		10400340	
		~ ~ ~		10400350	
				10400360	
TEN 0010		C		10400370	
ISN 0019		40		10400370	
ISN 0020		42		10400360	
ISN 0021			$Q(\mathbf{N},\mathbf{j},\mathbf{J},\mathbf{j}) = Q(\mathbf{J},\mathbf{j},\mathbf{N})$	10400390	
ISN 0022			NUUK = NK-I	10400400	
ISN 0025		-		10400410	
ISN 0025			CUNTING	10400420	
ISN 0026		17	$1 + (NK \cdot EU \cdot 9)$ GU IL E7	10400430	
ISN 0028	-		NK = NK + 1	10400440	
ISN 0029			GU TO 42	10400450	
ISN 0030		87	CONTINUE	10400460	A
	(C		10400470	
		С	SETTING Q-MATRIX TC C-VECTOR	10400480	
	1	с		10400490	
ISN 0031			I A= 1	10400500	
ISN 0032			DO 62 J=1,N	10400510	
ISN 0033			D0 62 J=1.N	10400520	
ISN 0034			(L+I)O = (AI)VO	10400530	
ISN 0035		52		10400540	
		c	WRITE(6.206)	10400550	

		PAGE 002
ISN 0036	206 FORMAT(1H / 1X, 12H G-VECTOR //)	10400560
	C WRITE(6,2963)(QV(IP),IP=1,NN)	10400570
	c	10400580
	C C	10400590
	c	10400600
	C THIS SECTION CALCULATES THE AAMOD MATRIX	10400610
	C WHICH IS GIVEN BY	10400620
	C XXXX XXX	10400630
	с х х	10400640
	C X AT + Allel A21eI A31eV X	10400650
		10400660
	C X A 12.I AT+ A22.I A32.I X	10400670
		10400680
	C X A13-T A23-T AT+ A33-T X	10400690
		10400700
		10400710
		10400720
		10400730
		10400740
		10400750
		10400750
t ch 0077		
ISN 0037	1 - 10 - 1 - 10	10400770
15N 0039		10400700
ISN 0040		10400790
15N 0041	10 AAMOD(L,LA) = 0.0	10400500
		10400810
	C DEFINE UNIT MAIRIX UF URDER N ,CALL IT E	10400820
		10400830
ISN 0042		10400840
ISN 0043	30 E(MAA, MAA) = 1.00	10400850
		10400870
		10400880
	c	10400890
	C THIS SECTION CALCULATES THE SECTION OF THE AMOD	
	C MATRIX WHICH IS CEMERISED OF A(J,I) * E	10400910
ISN 0044	1P = -N	10400920
ISN 0045	DU 50 MR=1,N	10400930
ISN 0045	1P = 1P + N	
ISN 0047		10400950
ISN 0048	DO 50 JR =1.N	10400960
ISN 0049	IDP = IPP + N	10400970
ISN 0050	$DD 40 K = 1 \cdot N$	
ISN 0051	DO 40 KA= I.N	10400990
ISN 0052	AM(K,KA) = A(JR,MR) * E(K,KA)	
ISN 0053	KPIP = K+IP	10401010
ISN 0054	KAP = KA+IPP	10401020
ISN 0055	40 AAMOD(KPIP,KAP)=AN(K,KA)	10401030
ISN 0056	50 CONTINUE	10401040
	c	10401050
	c	10401060
	c contraction of the second	10401070
	C	10401080
	c	10401090
	C THIS SECTION ADDS THE A MATRIX TO THE DIAGONAL NXN	10401100
	C FLEMENTS OF AAMOD	10401110

÷(

					PAGE 003	
		с		10401120		
		c		10401130		
. 1	SN 0057		DD = 50 K = 1.N	10401140	- service care and and an any reason of a constraint front them.	
1	SN 0058		IP = (K-1) * N	10401150		
1	SN 0059		DO 55 LT = $1 + N$	10401160		
E	SN 0060		DD 55 LM = 1 + N	10401170		
1	SN 0061		ILT = IP+LT	10401180		
1	SN 0062		IPM = IP+LM	10401190		
I	SN 0063	55	AAMOD(ILT,IPM)= AAMOC(ILT,IPM)+ A(LM,LT)	10401200		
I	SN 0064	60	CENTINUE	10401210		
		с		10401220		
		ċ	THAT FINISHES THE CALCULATION OF AMOD .NOW WE MUST	10401230		ŕ
		c	PRINT IT OUT BECAUSE SREVNI WIPES OUT AAMOD	10401240		
	· · · ·	ĉ		10401250		
		č	1002-6(FT	10401260		
T	SN 0065	200	ECRMAT(1H / 1Y, 16H AAMOD - MATOTY //)	10401270	· · · · · · · · · · · · · · · · · · ·	
•	311 0005	~ ²⁰⁰	NNN-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	10401280		
		с	NCW FOD A-INVERSE	10401290		
		ĉ	NCW FUR ATINVERSE	10401290		
	CN 0066	ć		10401300		
1	SN 0066	~	I DEMENN + I	10401310		
· · · · · ·		<u> </u>		10401320		
1	SN 0067	_	CALL MINVD(AAMOD,IDEM,NN,ISTEP,IERR)	10401330		
	· · · · · · ·	<u>C</u>		10401340		
		C		10401350		
	an a	<u> </u>	NOW AAMOD INVERSE HAS REPLACED AAMOD	10401360		
		С		10401370		
		<u> </u>)192,6(ETI	10401380	ar na nagagatian, ito i a na gant tang ito i a pinggantibu pingan at ing	
1:	SN 0068	291	FORMAT(1H / 1X,22HAAMOD-INVERSE MATRIX , //)	10401390		
		C	<u>NN,1=I 371</u>	10401400		
		с)NN,1=J,)J,I(DOMAA()3692,6(ETI	10401410		
I	SN 0069	66	DO 70 IB = 1.NN	10401420		
I	SN 0070		P(IB) =0.0	10401430		
I	SN 0071		DO 70 IC = 1,NN	10401440	- And the second s	
1:	SN 0072	70	P(IB) = P(IB) - AAMOD(IB,IC) * QV(IC)	10401450		
		C	WRITE(6,205)	10401460		
I	SN 0073	205	FORMAT(1H / 1X,14H P-MATRIX ,//)	10401470		
		c	WRITE(6,2963) (P(IF),IR=1,NN)	10401480		
		с	SET P-VECTOR TO P-MATRIX TO GET Q-PRIME FROM-ATP-PA = QP	10401490		
I	SN 0074		K=1	10401500		
1	SN 0075		D025 I=1.N	10401510		
1:	SN 0076		N = 1.0	10401520		
I	SN 0077		PM(I,J) = P(K)	10401530	•••••	
I	SN 0078	25	K=K+1 .	10401540		
		С	CALCULATION OF ATP (A TRANSPOSE P)	10401550		
		с,	CALCULATION OF PA (P-MATRIX X A)	10401560		
I	SN 0079		D0 26 I=1,N	10401570	tertitisten in inden en en en en anderen	
I	SN 0080		DO 26 J=1+N	10401580		
T :	SN 0081		DO 26 K=1.N	10401590	and the second constraints and the second	
T	5N 0082		ATP(I,J) = ATP(I,J) + A(K,I) + PM(K,J)	10401600		
T	SN 0083	26	PA(I,J) = PA(I,J) + PM(I,K) * A(K,J)	10401610	· · · ·	
, i	SN 0084	 (.)		10401620		
1 ·	SN 0085		DO 27 JELN	10401630		10 T 10
Т. Т.	SN 0086	27	O(1, 1) = -ATP(1, 1) = PA(1, 1)	10401640		
1	JA UUOU	c	WEITER	10401660		
•	CN 0007	0745	THE CONTRACT STATE OF THE ADDRESS OF THE ADDRESS AND ADDRESS	10401030		
1	5N 0087	9.705	FURMALLIN / IA+3CH & FRUM PULLING F INTU HATP+PA = $(1, 7)$	10401000		
		ι,	DE941 1=1+N	10401670		

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		PAGE 004								
υ 	941 WRITE(5,2963) (QP(I,J),J=1.N) Return FND	10401680 10401690 10401700	a and a second map							
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			T to the second se							
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NT=56 • SCLRCE • 8CD •LIST • NODECK •	2,5 x, * SE CONDS •)						and a strain while the many of the strain of the strain of the		t K	
PTIONS - NAMER SMAIN.CPT#02.LINEC	SURROUTINE CLOCK CCMMDN/BLK68/ T DATA DATA CCMMDN/GEORGE/INIT CLMDN/GEORGE/INIT CALL CLOCKS(NEW) T = FLOAT(NEW-INIT) * .C1 WRITE (6.1) T WRITE (6.1) T FORMAT('00',90X, CLCCK TIME',F16.2 FORMAT('00',90X, CLCCK TIME',F16.2 RETURN END		 The second se				•			
COMPILER 0	ISN 0002 ISN 0003 ISN 0003 ISN 0006 ISN 0005 ISN 0005 ISN 0009 ISN 0010 ISN 0012 ISN 0012	 A state of the sta					•			

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SY 0001 C The LCC In Brack and Autor and Color Match Actions Color Match Action Street Action Ac	ISN 0002	SLEROUTINE DEIGN(P*B.C)	10300010
153 1030 1031000 1031000 154 1000 1000 1000 100000 154 1000 1000 1000 100000 154 1000 1000 1000 100000 154 1000 1000 100000 1000000 154 1000 1000 100000 1000000 154 1000 1000 1000000 1000000 154 1000 1000000 1000000 1000000 154 1000000 1000000 1000000 1000000 154 1000000 1000000 1000000 1000000 154 1000000 1000000 1000000 1000000 154 1000000 1000000 1000000 1000000 154 1000000 1000000 1000000 1000000 154 1000000 1000000 1000000 1000000 154 1000000 1000000 1000000 1000000 154<	1 SN 0003	IMPLICIT REAL*8 (A-F+0-Z) C THIS SUBDUITINE FINDS THE FIGEN VALUES AND VECTORS OF DM	10300020
151 0000 Differ (11) 0010000 0010000 001000000 001000000 001000000 001000000 001000000 001000000 001000000 001000000 0010000000 0010000000 0010000000 0010000000 001000000000 001000000000000 0010000000000000000000000000000000000	ISN 0004	REAL #4 AA, B, C	10300040
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	ISN 0005	DIMENSION AA(60), E(c), QV(9), U(9), C(9, 0), W(9), PM(9,9)	
158 1000 51.00 1000.05 11.00 158 1000 1000 1000 1000 158 1001 1001 1001 1000 158 1001 1001 1001 1001 158 1001 1001 1001 1001 158 1001 1001 1001 1001 158 1001 1001 1001 1001 158 1001 1001 1001 1001 158 1001 1001 1000 1000 158 1001 1001 1000 1000 158 1001 1001 1000 1000 158 1001 1000 1000 1000 158 1001 1000 1000 1000 158 1001 1000 1000 1000 158 1001 1000 10000 10000 158 1001 10000 10000 10000 158 1001 10000 10000 10000 158 1001 10000 10000 10000 158 1001 10000 10000 100000 158 1001 <t< td=""><td>15N 0007</td><td>K=1</td><td>1030070</td></t<>	15N 0007	K=1	1030070
153<000	15N 0008	DQ 1000 K= 1.9	10300080
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	6000 NSI	DO 1000 I= K+9	10300090
1001 1001 100 <	ISN DOLD	AA(IK) = PM(Lak)	10300100
No.011 $k = 4$ 1000150 No.011 $k = 0$ $k = 0$ No.011 $k = 0$ $k = 0$ No.011 $k = 0$ $k = 0$ $k = 0$ No.011 $k = 0$ $k = 0$ $k = 0$ No.011 $k = 0$ $k = 0$ $k = 0$ No.011 $k = 0$ $k = 0$ $k = 0$ No.011 $k = 0$ $k = 0$ $k = 0$ No.011 $k = 0$ $k = 0$ $k = 0$ $k = 0$ No.011 $k = 0$ $k = 0$ $k = 0$ $k = 0$ No.011 $k = 0$ $k = 0$ $k = 0$ $k = 0$ No.012 $k = 0$ $k = 0$ $k = 0$ $k = 0$ No.012 $k = 0$ $k = 0$	ISN 0011	1000 IX = IX + 1 N - 6	
50 0.1 L.EO. L.EO. 1030010 150 001 Lent. Strent (LAD. AF.F.P.OV.U.V.ATES) 1030010 150 001 Lent. Strent (LAD. AF.F.D.OV.U.V.ATES) 1033010 150 001 Cont. Af. Strent (LAD. AF.F.D. AF.F.	ISN 0013	M = 45	10300130
150 0035 CALL STREIGHANLEELEN Meile Provulvatiss) 10300150 150 0017 UNIT STREIGHANLEELEN Meile Provulvatiss) 103300150 150 0017 UNIT STREIGHANLEELEN Meile Provulvatiss) 103300250 150 0021 UNIT STREIGHANLEELEN Meile Provulvatiss) 103300250 150 0022 UNIT STREIGHANLEELEN MEILEN MEILE	ISN 0014	LEAD = 1	10300140
158 0010 IF TATA FRANC IN FULL 1000 FULL	ISN 0015	CALL SYMBIG(AA, N, LEAD, N, M, B, P, QV, U, V, MISS)	10300150
133 0011 1010 01000 0100 0100 <th< td=""><td>ISN 0016</td><td>TF(MISS31010,1020,1010</td><td></td></th<>	ISN 0016	TF(MISS31010,1020,1010	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	100 NS1	IUIU WALLE(0+IU4U) 1040 FURMAT(17H FRRUR IN FIGSYN)	10300180
154 0020 C FIND FIGHVECTOS OF M(1,J) 10500220 155 0022 C (M) = 1 10300230 10300230 155 0022 C (M) = 1 10300250 10300250 155 0022 C (M) = 1 10300250 10300250 155 0022 C (M) = 1 10300250 10300250 155 0023 C (L) = 7 10300350 10300350 155 0023 C (L) = 7 10300350 10300350 158 0023 C (L) = 7 10300350 10300350 158 0023 C (L) = 7 10300310 10300350 158 0023 C (L) = 7 10300310 10300310 158 0023 C (L) = 7 10300310 10300310	ISN 0019	GO TO 60	10300190
581.0021 C F1N5 F1GAVECTORS G # VILL 10300220 153.0022 LUNN E 10300220 153.0025 MD F0 10300200 153.0025 MD F0 10300200 153.0025 GALL 5008E(c,LOWKWANDAN) 10300200 153.0025 60 F1N 10300200 153.0025 61 10300200 10300200 153.0025 61 10300200 10300200 153.0025 61 F1 50 153.0025 61 10300200 10300200 153.0025 61 10300200 10300200 153.0025 61 10300200 10300200 153.0025 61 10300200 10300200 153.0025 61 10300200 10300200 153.0025 61 10300200 10300200 153.0025 61 10300200 10300200 153.0025 61 10300200 10300200 153.0025 61 10300200 10300200 153.0025 61 10300200 10300200 153.0025 61 10300200 10300200 153.0025 61 10300200 1030020<	ISN 0020	1020 CONTINUE	ներդը։ Դետերինել հանձեր երուցավ ստրացանություն։ Հերուն որը հերություն է ստրացերերին հանձներությունը ու ու
135 0022 1000 1000000 138 0025 100000 C.M.L. Scuret C.L.G. ACLINE 400 10 100000 C.M.L. Scuret C.L.G. ACLINE 400 10 100000 159 00026 6 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9		C FIND EIGENVECTORS OF PW(I,J)	10300220
151 0003 MID 9 10300250 151 0003 C LL 10300250 151 0003 C 10300250 10300250 151 0003 EN0 10300250 10300250 151 0003 EN0 10300250 10300250	TZOD NOT		10300240
158 0028 CutL SECURE(CLONKEUNT-NID-N) 10300380 158 0025 60 BEYORN 10300380 158 0025 60 BEYORN 10300390 158 0025 10300300 10300390	15N 0023	5 II (II W	10300250
15N 0025 60 Return 130 0026 130 1300	ISN 0024	CALL SECURE(C*LGW,KGUNT,MID,W)	10300260
			10300200
	ISN 0026		10300310
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COMPILER OPTIONS - NAME= \$MAIN, CPT=02, LINECNT=56, SOURCE, ECD, LIST, NODECK, LOAD, MAP, NOEDIT, ID

ISN 0002	FUNCTION IMEQD(MID, N+N+A+Y+D, SCALE)	10500010
	C THIS FORTRAN 4 PROGRAM SCLVES AX = Y BY TRIANGULAR DECOMPOSITION.	10500020
	C THE ARGUMENTS HAVE THE SAME MEANING AS THOSE OF XSIMEQ.	10500030
ISN 0003	REAL #8 DOTPB	10500040
ISN 0004	DOUBLE PRECISION SUM.A.Y.SCALE.D	10500050
ISN 0005	DIMENSION A(MID.1).Y(MID.1).SCALE(1)	10500060
ISN 0006	COMMON /INFO/ SUM,NUMBER, INCR, INCC	10500070
ISN 0007	INTEGER SPILL	10500080
	C SET OVERFLOW INDICATOR.	10500090
	C TAMPER OVERRIDES STANDARD HANDLING OF SPILL INTERUPTIONS. ITS ARGU-	10500110
	C MENT IS SET TO ZERO AND THEREAFTER THE VALUES 0.1.2.3 INDICATE NO	10500120
	C SPILL, UNDERFLOW ONLY, OVERFLOW ONLY, AND BOTH, RESPECTIVELY.	10500130
ISN 0008	INCR = MID	10500140
ISN 0009	INCC = 1	10500150
ISN 0010	DO 120 I = $1,M$	10500160
ISN 0011	x = 0.	10500170
ISN 0012	$DO \ 100 \ J = 1.M$	10500180
ISN 0013	$GETZ = ABS(A(I \cdot J))$	10500190
ISN 0014	100 x = AMAX1(x, GETZ)	10500200
ISN 0015		10500210
ISN 0016	$105 \times = POWI6(X)$	10500220
134 0010	C DOWIG(Y) IS THE DOWED DE 16 NEYT LADGED THAN ARE(Y)	10500220
TEN 0017	C FURITIES THE FURIE OF A REAT LARGER THAT ADDING	10500230
ISN OOI7		10500240
15N 0010		10500250
ISN 0019		10500280
ISN 0020	110 A(1,3) = A(1,3) + X	10500270
ISN 0021	DU I 2 U J = I, N	10500280
ISN 0022	120 Y(1,J) = Y(1,J) * X	10500290
ISN 0023	DO 140 J = 1,M	10500300
ISN 0024	$\mathbf{x} = 0 \cdot 0$	10500310
ISN 0025	DO 130 I = 1.M	10500320
ISN 0026	GOTZ = ABS(A(I,J))	10500330
ISN 0027	130 X = AMAXI(X,GOTZ)	10500340
ISN 0028	IF (X) 135,490,135	10500350
ISN 0029	135 X = POW16(X)	10500360
ISN 0030	$\mathbf{D} = \mathbf{D} \mathbf{*} \mathbf{X}$	10500370
ISN 0031	SCALE(J) = X	10500380
ISN 0032	$X = 1 \cdot X$	10500390
ISN 0033	DO 140 I = $1,M$	10500400
ISN 0034	140 $A(I,J) = A(I,J) * X$	10500410
	C MAJOR LOOP. TRIANGULAR DECOMPOSITION WITH D.P. ACCUM OF INNER PRODUCT	S 10500420
ISN 0035	DD 310 $K = 1,M$	10500430
ISN 0036	K1 = K - 1	10500440
ISN 0037	150 NUMBER = K1	10500450
ISN 0038	$\mathbf{x} = 0$.	10500460
ISN 0039	1 = K	10500470
ISN 0040	DO 180 T = K • M	10500480
ISN 0041	$SIIM = \Delta(I, K)$	10500490
ISN 0042	A(1-K) = D(1PP(A(1-1)-A(1-K))	10500500
134 0046	C + X(NIMARED) WHEDE X AND Y HAVE THE STODAGE INCOMMENTS	10500510
	C DITROPYLY CIVES THE CO.D. ACCUMULATED VALUE CONTACTIVE TO CONTRACT TO A	10500520
	C DUPERTATE SIVES THE COPER ACCOMPANIANES THEO SUM T ACTIVITIES TO THE AND AND AND AND A THEO	10500520
	C INCH AND INCC. DUTH USES CUMUN AREA INFU	1000030
ISN 0043	100 IF (X - ABS(SUM)) 1 / (+180 + 180)	10500540
ISN 0044	1/0 = ABS(SUM)	10500550
ISN 0045		10500560

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$ \begin{array}{c} 0.007 \\ 0.0007 \\ 0.0000 \\ 0.000$	4 0047 IF (L - K) 490.220.150 C ROW INTERCHANGES TO INSURE L			
0.000 0.001 0.001 0.0010 0.00000 0.0010 0.0010 0.0010 0.00000 0.0010 0.0010 0.00000 0.000000 0.0010 0.0010 0.00000 0.000000 0.0010 0.0010 0.00000 0.000000 0.0010 0.0010 0.000000 0.000000 0.0010 0.0010 0.000000 0.000000 0.0010 0.0010 0.000000 0.000000 0.0010 0.0010 0.000000 0.000000 0.0010 0.0010 0.000000 0.000000 0.0010 0.0010 0.000000 0.000000 0.0010 0.0010 0.000000 0.000000 0.0010 0.0010 0.000000 0.000000 0.0010 0.0010 0.000000 0.000000 0.0010 0.0010 0.000000 0.000000 0.0010 0.0010 0.000000 0.000000 0.0010 0.0010 0.0000000 0.000000		A D C F D I VOI S TOVI D S TOV	105005F0 10500590	
000000000000000000000000000000000000	V 0048 190 D = D		10500600	And an entropy and the second s
0000 XL, J1 = J(L, J) 100000000 0000 XL, J1 = J(L, J) 10000000 0001 200 V(L, J1 = J) 1000000 0001 200 V(L, J1 = J) 10000000 0001 200 U(L, J1 = J) 100000000 0011	V 0049 DD 200 J=1.4M		10500510	
200 200 0.0(x,1): * 0.(x,1) 10000000 200 2.0(x,1): * 0.(x,1) 10	V 0050 X = A(L,J)	and the second	10500620	
$ \begin{array}{c} 200 & 0.0111 \pm 1.8 \\ 0.001 & 0.001 \\ 0.021 & 1.1 \pm 1.6 \\ 0.0201 & 0.02000 \\ 0.0201 & 0.0000 \\ 0.0201 & 0.0000 \\ 0.0201 & 0.0000 \\ 0.0200 & 0.0000 $	N 0051 A(L.J) = A(K.J)		10500630	
0000 210 Y(x,1) = X 1050050 0000 210 Y(x,1) = X 1050050 0000 200 X(x,1) = X 1050050 200 X(x,1) = X 1050070 1050070 200 X(x,1) = X 10000000 1050070 200 Y(x,1) = X 200 X(x,1) 10500700 200 Y(x,1) = X <td>N 0052 200 A(K,J) = X N 0053 DD 210 1=1.N</td> <td></td> <td>10500501</td> <td></td>	N 0052 200 A(K,J) = X N 0053 DD 210 1=1.N		10500501	
0005 210 Y(L.J) = Y(L.J) 10500570 0005 200 T = LA(LA) 10500570 0005 200 A(102) = 200 10500770 0005 200 A(101) = 10707 A(111) 1.11.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	v = v = v = v = v = v = v = v = v = v =		10500660	and a second
0005 210 Y (L1) = X 10000000 0001 200 Y (L1) = X(L1) 10000000	v = 0.055 $Y(L, J) = Y(K, J)$		10500670	
0000 2000 2000 1000000 0000 2000 2000 1000000 2000 2000 2000 1000000 2000 2000 2000 1000000 2000 2000 2000 1000000 2000 2000 2000 1000000 2000 2000 200000 1000000 2000 2000 2000 1000000 2000 2000 2000 1000000 2000 2000 2000 1000000 2000 2000 2000 1000000 2000 2000 2000 200000 2000 2000 2000 200000 2000 2000 2000 200000 2000 2000 2000 200000 2000 2000 2000 200000 2000 2000 2000 200000 2000 2000 2000 200000 2000 2000 2000 200000 2000 2000 2000 200000 2	$v 0056 \qquad 210 Y (K, J) = X$		10500660	
0000 000 000 000 00000 0000 0000 0	4 0057 220 X = -A(K,K)	танир түрк/станарын таланда алында алындарындарындарында жыла тыналындар аласылында таларындары. Таларындары т Талар	10500690	and a second many many many second and second and second second second second second second second second second
0000 240 4(1:4) 1050720 0001 240 4(1:4) 1050770 0002 270 270 1050770 0003 270 4(1:4) 1050770 0004 270 4(1:4) 1050770 0005 270 4(1:4) 1050770 0005 270 4(1:4) 1050770 0006 270 4(1:4) 1050770 0007 270 1050770 1050770 0008 270 4004 1050770 0009 200 106 1050770 0009 200 1060910 10500910 0001 105 4004 10500910 0001 105 4004 10500910 0001 105 4004 10500910 0001 105 4004 10500910 0001 105 4004 10500910 0001 105 4004 10500910 0001 105 4004 10500910 0001 105 4004 10500910 0001 105 4004 10500910 0001 105 10500910 10500910 0001 111 111	4 00000 IF (M-FK) 4 40,2711,730 J 00500 030 KD IF K + 1		10500710	
00001 200 Altto, 1 = K0, M X 1050770 1050770 00003 200 A Altto, 1 = K0, M 1050770 1050770 1050770 00003 200 A Altto, 1 = K0, M 1050770 1050770 1050770 00003 200 A Altto, 1 = K0, M 1050770 1050770 1050770 0003 200 A Altto, 1 = K0, M 1050770 1050770 1050770 0003 200 Altto, 1 = K0, M 1050770 1050770 1050700 0003 200 Altto, 1 = K1, M 1050770 1050700 1050000 0003 200 Altto, 1 = K1, M 1050000 1050000 1050000 0003 200 Altto, 1 = K1, M 1050000 1050000 1050000 0003 201 Altto, 1 = K1, M 1050000 1050000 1050000 0003 201 Altto, 1 = K1, M 1050000 1050000 1050000 0003 201 Altto, 1 = K1, M 1050000 1050000 1050000 0003 201 Altto, 1 = K1, M 1050000 1050000 10500000 001 Altto, 1 =	V 0060 DD 240 I = KD.M	and a second	10500720	and the second
0002 250 00 270 L = KO.M 1000070 0003 270 AK.LJ 1000700 1000070 0004 200 KK.LJ 1000700 1000070 0005 270 AK.LJ 1000700 1000070 0006 200 KK.LJ 1000700 1000070 0006 200 KK.LJ 10007000 1000070 0006 200 CK.LJ 10007000 1000070 0007 100 CK.KLJ 1000000 1000000 0007 100 CK.KLJ 1000000 1000000 0007 100 CK.KLJ 1000000 1000000 0007 100 CK.KLJ 23416EF7J 500.400.310 1000000 0007 100 CK.KLJ 23416EF7J 500.400.310 1000000 0007 100 State 100 CK.KLJ 1000000 0007 100 State 100 CK.KLJ 1000000 0007 100 State 100 CK.KLJ 1000000 0007 100 State 1000000 1000000 0007 100 State 1000000 1000000	V 0061 240 A(I.K) = A(I.K) / X		10500730	a nahi ku mang dipu tang na mang na miningkan na na nahina nahi tang nahina na ku na na nahina na na
0000 270 M(30) L ACART(ACT).ACILL) 1000070 0000 200 M(30) L ACART(ACT).ACILL) 10000700 0000 200 M(30) L ACATAT 100007000 0001 200 M(30) L ACATAT 10000700 0001 200 M(11/1/1/1) M(1/1/1) M(1/1/1) M(1/1) 10000700 0001 200 M(11/1/1/1) M(2/1/1) M(1/1/1) M(2/1/1) M(1/1) 10000700 0001 200 M(11/1/1/1) M(2/1/1) M(2/1/1	V 0062 250 D0 270 L = KD+M		10500740	
0005 2016 0000 10000700 0005 500 = 300 [E(1)] 10000700 0005 100 CUV SML FUTT INICATES AT SINULAR 10000700 0005 100 CNUL PART INICATES AT SINULAR 10000000 0007 0035 KHILE 100 CNUL PART INICATES AT SINULAR 10000000 0007 0035 KHILE 100 CNUL PART INICATES AT SINULAR 10000000 0007 0035 KHILE 110 ET INICATES AT SINULAR 10000000 0007 0035 KHILE 111 ET INICATES AT SINULAR 10000000 0007 0035 KHILE 111 ET INICATES AND RESTORES SINULAR 10000000 0007 0035 VHILE 111 INICATES AND RESTORES SINULAR 1000000 0007 0035 VHILE 111 INICATES AND RESTORES SINULAR 1000000 0007 0035 VHILE 111 INICATES AND RESTORES SINULAR 1000000 0007 0035 VHILE 111 INICATES SINULAR 1000000 0007 0035 VHILE 111 INICATES SINULAR 0007 0035 VHILE <td< td=""><td>V 0063 50M = A(K+L) V 006A 270 A(K-1) = 00709(A(K-1),A(</td><td>(2) A. D. M.</td><td>10500760</td><td> All states are associated as a second state and states are associated as a second state and states </td></td<>	V 0063 50M = A(K+L) V 006A 270 A(K-1) = 00709(A(K-1),A((2) A. D. M.	10500760	 All states are associated as a second state and states are associated as a second state and states
0005 200 Y(k.t.) = Y(k.t.) 10500780 0016 200 Y(k.t.) = Y(k.t.) 10500790 0016 200 Y(k.t.) = Y(k.t.) 10500790 0016 200 Y(k.t.) = Y(k.t.) 10500780 0016 200 Y(k.t.) = Y(k.t.) 10500300 0017 101 F (485K1) = Y(k.t.) 10500300 0017 101 F (485K1) = Y(k.t.) 10500300 0017 101 F (485K1) = Y(k.t.) 10500300 0017 101 F (411) 10500300 0017 11 = Y1 10500300 0017 101 = 1 + 1 10500300 0017 101 = 1 + 1 10500300 0017 101 = 1 + 1 10500300 0017 101 = 1 + 1 10500300 0017 101 = 1 + 1 10500300 0017 101 = 1 + 1 10500300 0017 101 = 1 + 1 10500300 0017 101 = 1 + 1 10500300 0017 101 = 1 + 1 10500300 0017 101 = 1 + 1 10500300 0017 101 = 1 + 1 101 + 1 + 1 + 1 0017 101 = 1 + 1	N 0065 275 D0 290 L=1 •N		10500770	
0007 C users in the interval interval 1050000 0018 300 F (centrule) 10500000 0010 Centrule 10500000 0010 Centrule 10500000 0010 Centrule 10500000 0011 File 10500000 0012 Centrule 10500000 0013 Centrule 10500000 0014 Centrule 10500000 0015 Centrule 10500000 0017 Did Statu 10500000 0017 Did Statu 10500000 0017 Did Statu 10500000 0018 Did Statu 10500000 0017 Did Statu 10500000 0018 Did Statu 10500000	v 0066 SUM = Y(K,L)		10500780	
0005 300 CFF (1687) 1.334466EFFT) \$994,500410 10500800 0007 1.4 m 10500800 10500800 0007 1.4 m 10500800 10500800 0007 1.1 m 10500800 10500800 0007 1.1 m 10500800 10500800 0007 1.1 m 10500800 10500800 0007 330 (Liu) = -V(Liu) 10500900 10500800 0007 336 (Liu) = -V(Liu) 10500900 10500900 0007 350 (Liu) = -V(Liu) 10500900 10500900 0007 350 (Liu) = -V(Liu) 10500900 10500900 0007 350 (Liu) = -V(Liu) 10500900 10500900 0007 351 (Liu) = -V(Liu) 10500900 10500900 0007 350 (Liu) = -V(Liu) 10500900 10500900 0007 0035 (Liu) = -V(Liu) 10500900 10500900 0007 0035 (Liu) = -V(Liu) 10500900 10500900 0008 00108 1010 10500900 10500900 0008 00108 10108 10500900 10500900	V 0067 290 Y(K,L) = DOTPR(A(K,L),Y((1, L)) 5 A TS STNEU AD	1008000	
0050 C BACK SOUTTON 10500320 0071 1 = M 10500340 0072 00 350 KI 1 = M 0072 00 350 KI 10500340 0073 00 350 KI 10500340 0074 00 350 KI 10500340 0075 00 350 KI 10500340 0077 00 350 KI 10500340 0077 00 350 KI 10500340 0077 00 350 KI 10000340 0077 355 KI 101 1000340 0077 355 KI 101 1000340 0077 355 KI 101 1000340 0077 356 J = 1.4 10500300 0077 261 J = 1.4 10500300 0077 356 J = 1.4 10500300 0078 261 J = 1.4 10500300 0079 261 J = 1.4 10500300 0070 0081 J = 1.4 10500300 0071 101 J = 1.4 10500300	V 0068 300 IF (ABS(X) - 2.384186E-7	7) 490,490,310	10500810	
0071 1 = M 1000000 0071 1 = M 1000000 0072 1 = M 1000000 0073 1 = M 1000000 0074 0 = 4M = M 1000000 0075 000 ± 5 1000000 0077 0 = 4M = M 1000000 0077 0 = 1 + 1 1000000 0077 0 = 1 + 1 1000000 0077 0 = 1 + 1 1000000 0077 0 = 1 + 1 1000000 0077 0 = 1 + 1 1000000 0077 0 = 1 + 1 1000000 0077 0 = 1 + 1 1000000 0077 0 = 1 + 1 1000000 0079 0 = 1 + 1 1000000 0071 0 = 1 + 1 1000000 0073 0 = 1 + 1 1000000 0073 0 = 1 + 1 1000000 0073 0 = 1 + 1 1000000 0073 0 = 1 + 1 1000000 0073 1000000 100000 0073 1000000 100000 0074 100000 100000 0075 100000 100000 0075 100000 100000 0075 100000 100000 <	V 0069 310 CCNTINUE	a de la companya de l	10500820	
0070 D1 345 KH1.M 10500040 0071 D1 345 KH1.M 10500040 0072 NUMBER M - 1 10500050 0073 NUMBER M - 1 10500050 0074 D1 360 L = 1.M 10500050 0075 SUM = 7.1(1.1) 10500050 0077 D0 350 L = 1.M 10500050 0077 D0 350 L = 1.M 10500900 0078 D0 350 L = 1.M 10500900 0081 D0 350 L = 1.M 10500900 0082 D0 350 L = 1.M 10500900 0083 D0 350 L = 2.MUADER STANDADE SFILL ACTION. 10500900 0083 D0 40 D = 0. 10501000 0083 D0 40 D = 0. 10501000 0083 D0 40 D = 0. 10501000	C BACK SOLUTION		10500830	
0.071 10 355 K=1.M 10 00050 0.077 11 11 11 11 10 0500870 0.077 20.3 20.4 -V(1.L) 10500890 10500890 0.077 330 V(1.L) 10500890 10500890 0.077 335 Y(1.L) 10500890 10500900 0.077 335 T=1.4 10500990 10500900 0.077 335 Y(1.1) X 10500990 0.077 335 T=1.4 10500990 10500990 0.077 335 Y(1.1) X 10500990 0.077 335 T=1.4 10500990 10500990 0.077 335 Y(1.1) X 10500990 0.083 00 350 J=1.M 10500990 0.083 350 J=1.M 1050090 1050090 0.083 350 J=1.M 1050090 1050090 0.083 350 J=1.M 1050090 1050090 0.084 00350 J=1.M 105	M = 1		10500840	
0.072 NUMER = N - 1 10500800 0.075 50 × (11, 1) = -0(TPR (A(1, 1+1, 1)) / A(1, 1)) 10500800 0.075 35 × (11, 1) = -0(TPR (A(1, 1+1, 1)) / A(1, 1)) 10500800 0.077 355 × (11, 1) = -0(TPR (A(1, 1+1, 1)) / A(1, 1)) 10500800 0.077 355 × (11, 1) = -0(TPR (A(1, 1+1, 1)) / A(1, 1)) 10500800 0.077 355 × (11, 1) = -0(TPR (A(1, 1+1, 1)) / A(1, 1)) 10500800 0.077 355 × (1, 1) / 1 = /0(TPR (A(1, 1)) / A(1, 1)) 10500900 0.077 355 × (1, 1) / 1 = /0(TPR (A(1, 1, 1)) / A(1, 1)) 10500900 0.078 50 + A(1, 1) / 1 = X 10500900 0.081 00 350 ∪ 1 = 10 10500900 0.082 350 A(1, 1) = X(1, 1) / 1 = X 10500900 0.083 100 1 = 1 10500900 0.083 100 1 = 1 10500900 0.083 440 E TAMPER AND RESIDES STANDARD SFILL ACTION 10500900 0.084 0 = 0 10501020 0.085 440 E 0 10501020 0.089 0 = 0 10501020 0.099 0 = 0 10501020 0.099 0 = 0 10501020	4 0071 DO 345 K=1,M		10500850	
0073 001340 UNWERFN # F. I. 11500090 0077 350 K = 1.1. 15500900 0077 350 K = 1.1. 15500900 0077 351 K = 1.1. 15500900 0080 00 K = 1.4. 15500900 0081 00 K = 1.4. 15500900 0081 00 K = 1.4. 15500900 0082 00 K = 1.4. 15500900 0083 350 A (11.1) * X 15500900 0083 1400 H = 1 10500900 0084 1400 H = 1 15500900 0084 1400 H = 1 15500900 0085 1400 H = 1 15500900 0084 1400 H = 0 15500900 0084 1800 K = 1 15500900 0084 1800 K = 1 15500900 0084 1800 K = 1 1550090 0084 1800 K = 1 1550090 0084 1800 K = 1 1550000 0084			10500860	
0075 300 Tell 1000000 10500000 0077 345 Fill 10500910 10500910 0079 5 Fill 10500910 10500910 0079 5 Fill 10500910 10500910 0079 5 Fill 10500910 10500910 0080 00350 101 10500910 0081 00111 10500910 10500910 0081 00111 10500910 10500910 0081 00111 10500910 10500910 0082 300 (111) * X 10500910 10500910 0083 100 11 10501010 10500900 0083 100 120 10501010 10501010 0084 100 2500 21 FH ARC TAMER AND RESTORES STANDARD SPILL ACTION. 10501010 0085 490 0 1050100 0085 0010 400 100 1050100 0085 0010 400 1050100 1050100 0085 0010 400 1050100 1050100 0085 0010 400 10501020 10501020 0085 0010 400		and an annual of the second	0100001	
3307 330 71.1.) = Dorrei (A[1.711) × A[1.1]) 1500000 340 71.1.0 = Dorrei (A[1.711) × A[1.1]) 15000010 340 71.1.0 10500040 1500000 350 71.1.0 11500040 1500040 350 71.1.1 * A(1.1) 1500090 350 71.1.1 * A(1.1) 1500090 350 71.1.1 * A(1.1) * A(1.1) 0001 0350 J = 1.4 1500090 0022 350 A[1.1] * A(1.1) 1050090 1 1050090 0033 350 A[1.1] * A(1.1) 115000 1 1050000 0034 470 FTUAR 1050000 1004 2 A10 1050100 1005 470 D = 0 1050100 1008 400 END 1050100 1009 END END 1050100 1009 END 1050100 1050100			10500890	
0077 35.1 1=1.1 1050030 0079 50 350 1=1.4 1050030 0030 50 4.7 1.1.1 1050030 0031 50 4.7 1=1.4 1050030 0032 35 4(1.1) 1 1050030 0033 35 4(1.1) 4 1050030 0033 1 = 1.4 1050030 0033 35 4(1.1) 4 1050030 0041 430 5000 1050030 1050030 0054 430 5000 1050030 1050030 0055 490 1 1 1050100 0057 1080 1 1050100 0057 490 1 1 1050100 0057 490 1 1050100 0057 490 1 1050100 0057 1 480 1 1050100 0058 490 1 1050100 0058 10 1 1050100 0059 1 1 1050100 0059 1 1 1050100	V 0076 340 Y(I,L) = -DOTPR(A(I,I+1)) • Y (I + 1 • L) > / A (I • I)	10500900	
0077 0073 11.4 10500920 0080 0 = 1.4 10500920 0081 0 = 3.4 (11) 1.0500950 0082 350 4 (1.3) = Y(1.3) * X 10500950 0083 100 350 4 10 10500950 0083 100 350 4 10 10500950 0084 280 CMTNUE 10500990 0085 430 CMTNUE 1050090 0086 430 CMTNUE 1050090 0086 430 CMTNUE 1050090 0087 10800 1050010 0088 430 D = 0 1050100 0089 CO 1050100 0089 END 1050100 0089 END 1050102 0089 END 1050102	4 0077 345 I=I-1	a valadoringer v dotting min den neurovský dodobě do 1970 v Portví v Andrei V (1970 – 19	10500910	
00079 D = 0 * A(T;1) 10500910 00081 D = 0 * A(T;1) 10500950 00081 350 J = 1; M 00182 350 J = 1; M 00193 J = 1; M 10500950 0011 J = 1; M 10501010 0011 J = 1; M 10501010 0011 J = 1; M 10501010 00115 J = 1; M 10501010 00115 J = 1; M 10501010 00115 J = 1; M 10501020 00115 J = 1; M 10501020 00115 J = 1; M 10501020 00110 J = 0; M 10501020 00102 J = 0; M 10501020	4 0075 DO 350 I = 1 *M		10500920	
0000 0000 0000 11.0 10500950 0011 10000 10100 10500950 0002 10000 10100 10500950 0003 1000 10000 10500950 0004 51000 10000 1050090 0005 5100 1050090 1050090 0005 610 1050000 1050100 0007 1050100 1050100 1050100 0008 610 0 1050100 10501020 0009 610 400 10501020 10501020 0009 610 400 10501020 10501020 0009 610 400 10501020 10501020 0008 610 400 10501020 10501020 0009 610 400 10501020 10501020	4 0079 X = 1./ SCALE(I)	A ANNAL ANNALANA I ANNALANA I ANNAL ANNA ANNA	10500930	
0022 350 A(11) = Y(11) * X 10500960 00043 430 CMOTO = 1 10500900 00144 430 CMOTO = 1 1050100 0015 490 D = 0 1050100 0016 490 D = 0 1050100 0017 1050100 1050100 0017 1050100 1050100 0017 1050100 1050100 0017 1000 1050100 0017 1000 1050100 0017 400 1050100 00103 60 1040 00103 60 1050100				
0083 330 CONTINUE 0084 C 350 CONTINUE 0085 C STONDINUE 0086 C STONDINUE 0085 C STONDINUE 0086 C STONDINUE 0085 RETURN 10501000 0087 IMED = 3 10501010 0089 IMED = 3 10501020 0089 END 10501020 0089 END 10501020	1 0082 350 A(1,J) = Y(1,J) * X		10500960	n na sana na mangana na mana na mana na mana na mana na na na na manana na n
400 CONTINUE 400 CONTINUE 0065 C STONDIAL CERD THE ARG GF TAMER AND RESTORES STANDARD SPILL ACTION. 10501000 0086 A90 D = 0. 0087 10 = 0. 10081 10 = 0. 0087 10 = 0. 10081 10 = 0. 10081 10 = 0. 10081 10 = 0. 10081 10 = 0. 10081 10 = 0. 10081 10 = 0. 10081 10 = 0. 10081 10 = 0. 10081 10 = 0.030 10081 10 = 0.030 10081 10 = 0.	4 0083 IMEOD = 1			
0065 RETURN 0085 490 E 0. 10501020 10501020 10501020 10501020 10501020 10501020 10501020 10501020 10501020 10501020 10501020	2 0004 480 CONTINUE		CTTON 100000	
490 D = 0. 10501010 10501020 40088 GD TO 480 400 10501030 10501030 10501030 10501030	I DORS RETURN		10501000	
10501020 10501030 60 T0 480 10501030 10501040 10501040			10501010	
d 0088 END 10501040 10501040	V 0087 IMEQD = 3	one management of the second	10501020	and the second of the second o
10501040	V 0088 GO TO 480		10501030	
	4 0089 END		10501040	
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	representative sequent constraining to the constraining of the con	, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,		
			in the second seco	

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LEVEL 2 FEB 67

DS/360 FORTRAN H

COMPILER OPTIONS - NAME= \$MAIN, CPT=02, LINECNT=56, SOURCE, BCD . LIST, NODECK, LOAD, MAP, NOEDIT, ID

· · · · · · · · ·		
ISN 0002	SUBROUT INE AFX(JSW)	10800010
ISN 0003	IMPLICIT REAL*8 (A-F,O-Z)	10800020
	C ************************************	10800030
ISN 0004	COMMON /BLK1/ PHI,VPHI,WPHI,THT,VTHT,WTHT,PSI,VPSI,WPSI	10800040
ISN 0005	COMMON /BLK2/ TM.T1.T2.XKM.XKC.A11.A13.D12.AITREN.E21 IM	10800050
ISN 0006	COMMON ZELKEZ GAMIC.CAM2C.BETIC.BETIC	10800060
ISN 0007	COMMON /BLK4/ HPHT.HTHT.HEST	10800070
ISN 0008	$C(MM(N) \times E(KS) \wedge (S, S) \wedge (S, S) \wedge E(S) \wedge$	10800080
TSN 0009		10200000
ISN 0010		10800090
15N 0010		10800100
134 0011		10800110
		10800120
	C EXACT MUDEL STATE EQUATIONS	10800130
		10800140
ISN 0012	IF(JSW-GI-0)GO TO 312	10800150
	C (TRACKERS $3-4$ (AMES $1-2$)	10800160
	C	10800170
	C EQUATIONS ARE IN THE FORM X-DOT = A X + F(X)	10800180
	c	10800190
	C WHERE X IS A NINE COMPONENT COLUMN VECTOR AS IS F(X)	10800200
	c	10800210
	C AND A IS 9X9 MATRIX	10800220
W Brockstein	C	10800230
	C X-VECTOR IS (PHI , VPHI , WPHI , THT , VTHT , WTHT , PSI ,	10800240
	C	10800250
	C VPSI, WPSI)	10800260
	C	10800270
	· · · · · · · · · · · · · · · · · · ·	10800280
		10800200
ISN 0014	WPITE(6.1070)DH1.VCH1.WDH1.THT.VTHT.WTHT.DC1.VDC1.WDC1.TH.T1.T3	10800290
130 001	TYPE AVERAGE CANCE CANCE DETIC AVER AVERAGE TO AVERAGE	10000300
75N 0015	1070 FORMAT (14 /10% 14% INTTA STATE / OF12 (10% AT THE OF13 OF	10800310
13N 0015	10/0 FORMALTIN /104,14H INITIAL STATE / 9E13-00 / 104,13H INPUT CUNSTS /	108 00 320
	110A, 290 [M,11,12,24KM,4KC,4A11,413,012 / 8E14+7 / 10X, 304 GAM1C+GA	10800330
····	2M2C, BETIC, BETZC, (RAD) / 4EI4.// 10X, IOH INERTIA = EI4./ ,/10X.	10800340
	$31/H$ H)H, HPH1 + HPS1 = $3214 \cdot 7/7$	10800350
	······································	10800360
ISN 0016	PI = 3-1415626	10800370
ISN 9017	DTR = PI/180.0	10800380 .
ISN 0018	$RTD = 180 \cdot 0/PI$	10800390
	C ************************************	10800400
	c	10800410
ISN 0019	SB2C = SIN(BET2C)	10800420
ISN 0020	CB2C = COS(BET2C)	10800430
ISN 0021	TB2C = SB2C/CB2C	10800440
ISN 0022	SEIC = SIN(GAMIC)	10800450
ISN 0023	$C \in IC = COS(GAM1C)$	10800460
ISN 0024	SGZC = SIN(GAM2C)	10800470
ISN 0025	CG2C = COS(GAM2C)	10800480
TSN 0026	SBIC = SIN(BETIC)	10800490
ISN 0027	CBIC = COS(BETIC)	10800500
ISN 0028	TRIC = SRIC(CRIC)	10800510
ISN: 0020		10800510
ISN DUCH		1000020
15N 0030	$\frac{1}{2} \int \frac{1}{2} \int \frac{1}$	10500330
15N 0031		10800340
ISN 0032	CGAM2C = CG2C	10800550

200 - 200 200 - 200

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Diff: 3. GANC		***************************************	
310 Control 510 F = 51N(C)F 13005000 310 Control 1300 Control 13000000 310 Control 1300 Control 10000000 310 Control 10000000 10000000 310 Control 10000000 10000000 310 Control 10000000 10000000 310 Control 10000000 10000000 310 Control 100000000 10000000 311 Control	5N 0033	DIF = GAMIC - GAM2C	108002 *** 108005 R
0003 0.0110 0.0110 0.000000 0003 0.0110 0.000000 0.0000000 00010 0.0110 0.000000 0.0000000 00010 0.0110 0.000000 0.0000000 00010 0.0110 0.000000 0.0000000 00010 0.0111 0.000000 0.000000 00010 0.0111 0.000000 0.000000 00010 0.0111 0.000000 0.000000 00010 0.0111 0.000000 0.000000 00010 0.0111 0.0111 0.000000 00010 0.0100000 0.000000 0.000000 00010 0.0100000 0.000000 0.000000 000100 0.0100000 0.000000 0.000000 000100 0.000000 0.000000 0.000000 000100 0.000000 0.000000 0.000000 000100 0.000000 0.000000 0.000000 000100 0.000000 0.0000000 0.000000	SN 0034	SDIF = SIN(DIF)	10800590
$ \begin{array}{c cccc} C & Cucultring of the matrix (Colored Colored Col$	ט <u>(</u>	······································	10800600
0.000 0.010 10.0110 10.000000 0.000 0.010 10.0114 10.00000 0.000 0.010 10.010 10.00000 0.000 0.010 10.010 10.00000 0.000 0.010 10.010 10.00000 0.000 0.010 10.010 10.00000 0.000 0.010 10.010 10.00000 0.000 0.010 10.010 10.00000 0.000 0.010 10.00000 10.00000 0.000 0.010 10.00000 10.00000 0.000 0.010 10.00000 10.00000 0.000 0.010 10.00000 10.00000 0.000 0.010 10.00000 10.00000 0.000 0.010 0.010000 10.00000 0.000 0.010000 10.000000 10.000000 0.000 0.010000 0.010000 10.000000 0.000 0.010000 0.010000 10.000000 0.0000 0.010000 0.010000 10.000000 0.000000 0.010000 <td< td=""><td>U O</td><td></td><td>*** 10800610 10800620</td></td<>	U O		*** 10800610 10800620
No D0 10 1:1; 10 0:1; No 10 10 1:1; 1000000 No 11:1; 11:1; No 11:1; No 11:1; <td>υu</td> <td>CALCULATION OF THE A-MATRIX</td> <td>1080630</td>	υu	CALCULATION OF THE A-MATRIX	1080630
0.003 C 111.11 0.00 0.003 A11.0 = xxxxxxxxxxx111EX 10800000 0.003 A11.0 = 10000000 10000000 0.003 A12.0 = 10000000 10000000 0.00	5 N 0035	00 10 1=1,9	10500550
Alt. J) = xuwx(c.JiT46. 1000000 Alt. J) = xuxx(c.JiT46. 1000000 Alt. J) = xux(c.JiT47. 1000000 Alt. J) = xux(c.JiT47. 1000000 Alt. J) = xux(c.JiT41. 1000000 Alt. J) = xux(c.JiT41. 1000000 Alt. J) = xux(c.JiT41. 1000000 Alt. J) = xux(c.JiT1. 1000000	SN 0037	10 Å(I,J) = 0.0	10800660 10800670
0.000 Mittadia matrix matrix matrix 1000000 0.001 Mittadia matrix matrix 1000000 0.001 Mittadia matrix 0.001			10800680
NO 00000 X[2:1] = [T:1:2]/(T:WE2) Titric]/(T:WE2) Titric]/(T:WE2) NO 0001 X[3:0] =077 N(3:0] =077 N(3:0] =075 NO 0001 X[3:0] =077 N(3:0] =077 N(3:0] =075 NO 0001 X[3:0] =077 N(3:0] =075 N(3:0] =075 NO 0001 X[3:0] =077 N(3:0] =075 N(3:0] =075 NO 0001 X[3:0] =077 N(3:0] =075 N(3:0] =075 NO 0001 X[3:0] =072 N(3:0] =075 N(3:0] =075 NO 0001 X[3:0] =072 N(3:0] =075 N(3:0] =075 NO 0001 X[3:0] =073 N(3:0] =075 N(3:0] =075 NO 0001 X[3:0] =074 N(2:0] =075 N(2:0] =075 NO 0001 <td>6200 NG</td> <td>A(1,02) = - XKM#XKC/ALIREN A(7,8)=A(1,2)</td> <td>10800690</td>	6200 NG	A(1,02) = - XKM#XKC/ALIREN A(7,8)=A(1,2)	10800690
NN 00041 ACC - 21=10/14 Description NO 00041 ACC - 21=10/12 Descripro NO 00041 <td>SN 0040</td> <td>A(2,1) = (T1+T2)/(TM*T2)</td> <td>10800700</td>	SN 0040	A(2,1) = (T1+T2)/(TM*T2)	10800700
0.000 M(10) = 4(1,0) 1000720 0.000 M(10,0) = 1/10 1000770 0.000 M(10,0) = 1/10/10 1000700 0.000 M(10,0) = 1/10/10 1000070 0.000 M(10,0) = 1/10/10 1000000 0.000 </td <td>5N 0041</td> <td>A(2,2)=-1,0/TM</td> <td>10800720</td>	5N 0041	A(2,2)=-1,0/TM	10800720
Note Action and the second	N 0044	A (3 + 3) = A (2 + 2) A (8 - 6) - A (6 - 6)	10800730
NOODS A(500):A(50):A(3,3):A(7) Interverse Interverse NOODS A(500):A(50):A(3,3):A(7) Interverse Interverse NOODS A(500):A(500):A(200):A(200) Interverse Interverse NOODS A(200):A(200):A(200):A(200) Interverse Interverse NOODS A(200):A(200):A(200):A(200) Interverse Interverse NOODS A(200):A(200):A(200):A(200) Interverse Interverse NOODS A(200):A(200):A(200):A(200) Interverse Interverse NOODS A(200):A(20	SN 0044	A (3,3)=+1.0/T2	10800740
NO 0005 A19.9.0LT/2 10900770 NO 0005 A15.1.0 1090050 NO 0005 A15.1.0 1000050 NO 0005 A15.1.0 1000050 NO 0005 A15.1.0 1000050	5N 0045	A(6,6)=A(3,3)	10800750
0.00/0 Miscolac(2:0) 1000000 0.00/0 Miscolac(2:0) 1000000 0.00/0 Miscolac(2:0) 10000000 0.00/0 Miscolac(2:0) 10000000 0.00/0 Miscolac(2:0) 10000000 0.00/0 Miscolac(2:0) 10000000 0.00/0 Miscolac(1:0)	N 0046	A(9,9)=-1/T2	10800770
Noncold Alterior 1000000 Alterior 10000000 Noncold Alterior 1000000 Alterior 10000000 Noncold Alterior 10000000 10000000 10000000 Noncold Alterior 10000000 100000000 100000000 Noncold Alterior 10000000 100000000 100000000 Noncold Alterior 10000000 100000000 100000000 Noncold Alterior Noncold 10000000 100000000 Noncold Alterior 10000000 10000000 10000000 Noncold Alterior 10000000 10000000	7400 N	A(2,3) = T1/(TM*T2)	10800780
No NG NG NG NG NG NG NG NG NG NG NG NG NG <	0400 N	A(D:0)=A(C:0) A(B:0)=A(C:3)	10800790
0.001 A(2,7) A(2,1) A(2,1	SN 0050	A(2.4) = A(2.1) *(-TP1C*CC1C)	10800800
M 0002 A (3:1) = 1:10.2 M (3:1) = 1:10.2 M 0005 A (3:1) = 1:10.12 M (3:1) = 1:10.12 M 0005 A (3:1) = 1:10.12 M (3:1) = 1:0.10 M 0005 A (3:1) = 1:0.12 M (3:1) = 1:0.10 M 0005 A (3:1) = 1:0.10 M (3:1) = 1:0.10 M 0005 A (3:1) = 1:0.10 M (3:1) = 1:0.10 M 0005 A (3:1) = 1:0.10 M (3:1) = 1:0.10 M 0005 A (3:1) = 1:0.10 M (3:1) = 1:0.10 M 0005 A (3:1) = 1:0.10 M (3:1) = 1:0.10 M 0005 A (3:1) = 1:0.10 M (3:1) = 1:0.10 M 0005 M M T (H / 1X) HH M M T (H / 1X) HH M M T (H / 1X) HH M 0005 M M T (H / 1X) HH M M T (H / 1X) HH M M T (H / 1X) HH M 0005 M M T (H / 1X) HH M M T (H / 1X) HH M M T (H / 1X) HH M 0005 M M T (H / 1X) HH M M T (H / 1X) HH M M T (H / 1X) HH M 0005 M (3:1) = 1:0.10 M M T (H / 1X) HH M M T (H / 1X) HH M 0005 M M T (H / 1X) HH M M T (H / 1X) HH M M T (H / 1X) HH M 0005 M M T (H / 1X) HH M M T (H / 1X) HH M M T (H / 1X) HH	N 0051	A(2,7)=A(2,1)*TBIC*SGIC	10800810
M 00033 A(3,7)=A(3,1)#A(2,1)/A(2,1) M 00035 A(3,1)#A(2,1)/A(2,1) M 0005 A(3,5)=A(1,2) (2,1)/A(2,1) M 0005 A(4,5)=A(2,1)#A(2,1)/A(2,1) M 0005 A(4,5)=A(2,1)#A(2,1)/A(2,1) M 0005 A(4,5)=A(2,1)#A(2,1)/A(2,1) M 0005 A(4,5)=A(4,1)#A(2,1)/A(2,1) M 0005 A(4,5)=A(4,4) M 0005 A(4,5)=A	N 0052	A(3,1) = -1.0/T2	10800820 10800830
X 00055 A(4)71=A(3,1)X(2,1)X(2,1) 10800850 X 0055 A(4,5)=A(1,2) 101 10800850 X 0055 A(4,5)=A(1,2) 101 10800850 X 0055 A(4,7)=A(1,2) 101 10900950 X 0055 A(4,7)=A(1,2) 10900950 10900950 X 0055 A(4,7)=A(1,2) 10900950 10900950 X 0055 5000 FALTON 10900950 10900950 X 0055 5000 FALTON FEL340 10900950 X 0055 5000 FALTON FEL340 10900950 X 0055 ALCULATION FEL340 10900950 10800950 X 0055 ALCULATION FEL340 10800950 10800950 X 0055 ALCULATION FEL340 10800950 10800950 X 0055 ALCULATION FEL340 10800950 10800950 X 0055 ALCULATION FEL3404 10800950 10800950 X 0055 ALCULATION FEL3404 10800950 10800950 X 0055 ALCULATION FEL3404 108000950 108000950	N 0053	A(3,4)=A(3,1)*A(2,4)/A(2,1)	10800840
N 0055 A(5,4) = A(2,1) * D12 * SDF 10900860 N 0055 A(5,4) = A(2,1) 10900800 N 0055 A(3,1) = A(2,1) 10900900 N 0055 A(3,1) = A(2,1) 10900900 N 0055 A(3,1) = A(2,1) 10900900 N 0055 A(3,1) = A(2,1) 10800900 N 0051 A(3,1) = A(2,1) 10800900 N 0051 S000 FURWATCH / X111H A=ATRIX / (1X, GE13.6) 10800950 N 0051 S000 FURWATCH / X111H A=ATRIX / (1X, GE13.6) 10800950 N 0051 S000 FURWATCH / X111H A=ATRIX / (1X, GE13.6) 10800950 N 0051 Cat Cut ATDN DF DE1.652.001.0 10800950 10800950 N 0052 THI = X(1) NTE 10800950 10800950 N 0055 THI = X(1) NT 10800950 10800950 N 0055 SHI = X(1) NT 10800900 10800100 N 0055 SHI = X(1) NT 10800900 10800100 N 0055 SHI = S(1) 10800900 108009000 108009000	N 0004	A(3,7)=A(3,1)*A(2,7)/A(2,1) 6(4.5)=A(1,2)	10800850
N 0007 A(6.4.)=A(5.1)*(5.4)*A(2.1) N 0009 N 0009 <td>N 0056</td> <td>A(5,4) = A(2,1) + D12 + SD1F</td> <td>10800860</td>	N 0056	A(5,4) = A(2,1) + D12 + SD1F	10800860
N 0055 A(3,7)=A(5,4) 1090090 N 0055 A(3,7)=A(5,4) 10900910 N 0051 5000 WITE(6,5000) ((A(1,J),J=1,9);1=1;4) 10800920 N 0051 5000 WITE(6,5500) ((A(1,J),J=1,9);1=1;4) 10800930 N 0051 5000 WINAND ANGLES ANGLES FROM STATE VECTOR AND COMMAND ANGLES AS INPUT 10800990 N 0052 0052 00500 108001010 10800100 N N 0053 0053 0051 10800100 10800100 N 1005 0053 111 10801000 1080100 N 0053 111 10801000 10801000 1080100 N 0055 111 10801000 10801000 10801000 N 1005 111 10801000 10801000 10801000 N 1005 1111 108010000 <td>N 0057</td> <td>A(6,4)=A(3,1)*A(5,4)/A(2,1)</td> <td>10800870 10800880</td>	N 0057	A(6,4)=A(3,1)*A(5,4)/A(2,1)	10800870 10800880
N 0050 WRITE (5,500) ((A(T,J),J=1,9),T=1,5) 10800930 N 0061 S000 FURMAT(TH / IX,11H A-WATRIX /(IX, GEI3.6)) 10800930 N 0061 S000 FURMAT(TH / IX,11H A-WATRIX /(IX, GEI3.6)) 10800930 N 0061 S000 FURMAT(TH / IX,11H A-WATRIX /(IX, GEI3.6)) 10800930 N 0061 METE (5,500) ((A(T,J),J=1,9),T=1,9) 10800930 N 0061 METE (5,500) ((A(T,J),J=1,9),T=1,9) 10800930 N 0062 METE (5,500) ((A(T,J),J=1,9),T=1,9) 10800950 N 0063 METE (5,500) ((A(T,J),L,T,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1	N 0058	A(3,7)=A(5,4)	10800890
N 0060 WRITE(6,5000) ((A(T,J),J=1.9), [=1.9]) 10800930 N 0061 5000 FURMAT(1H / IX.11H A-WATRIX /(IX. 9E13.6)) 10800930 A ************************************	6900 N	A(9,7)=A(6,4)	10800900
N 0061 5000 FGRMAT(1H / IX,11H - MATRIX /(IX, 9E13.6 1) 10800920 C XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	N 0060	WBITE(6.5000) ((A(I.1).1-1 0) I-1 0)	10800910
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C C.AL CULATION DF DE1.DB2.0G1.DG2 10800960 C NEEDS ANGLES FROM \$TATE VECTOR AND ANGLES AS INPUT 10800100 C NEEDS ANGLES FROM \$TATE VECTOR AND ANGLES AS INPUT 10800100 C NEEDS ANGLES FROM \$TATE VECTOR AND ANGLES AS INPUT 10800100 C STATE X(1) + XJE 1080100 10801010 V 0065 BTI = X(1) + XTE 10801020 10801030 V 0065 STHT = SIN(PHI) 10801050 10801050 V 0065 CPHI = COS(PHI) 10801050 10801050 V 0065 STHT = SIN(THI) 10801070 10801070 V 0065 STHT = SIN(THI) 10801070 10801070 V 0065 STHT = COS(FHI) 10801070 10801070 V 0065 STHT = SIN(THI) 10801070 10801070	ل ر	***************************************	*** 10800950
C NEEDS ANGLES FROM STATE VECTOR AND COMMAND ANGLES AS INPUT 10800990 C NEEDS ANGLES FROM STATE VECTOR AND COMMAND ANGLES AS INPUT 108001000 C C 112 111 N 0065 312 PHI = X(1) + XIE 10801000 N 0065 312 PHI = X(1) + XIE 10801000 N 0065 312 PHI = S(1) + XTE 10801020 N 0065 SPHI = SIN(PHI) 10801020 10801020 N 0065 SPHI = SIN(PHI) 10801050 10801050 N 0065 STHT = SIN(FHI) 10801070 10801070 N 0065 STHT = SIN(FHI) 10801070 10801090 N 0065 STHT = SIN(FHI) 10801070 10801070 N 0065 STHT = SIN(FHI) 10801070 10801070 N 0065 STHT = SIN(FHI) 108010070 10801000	, U	CAL CULATION OF DE1.DB2.061.062	10800960
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$ \begin{array}{llllllllllllllllllllllllllllllllllll$	N 0062 3	12 PHI= X(1) + XIE	10801020
N 0.064 $BSI = X(7) + X7E$ 10601050 N 0.065 $SPHI = SIN(PHI)$ 10801050 N 0.065 $CPHI = COS(PHI)$ 10801070 N 0.065 $CPHI = SIN(PSI)$ 10801070 N 0.065 $CPHI = COS(PSI)$ 10801070 N 0.059 $SPSI = SIN(PSI)$ 10801090 N 0.059 $CPSI = COS(PSI)$ 10801100 N 0.070 $CPSI = COS(PSI)$ 10801100	N 0063	T F T = X (4) + X 4 E	
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N 0067 STHT = SIN(THT) N 0063 CTHT = COS(THT) N 0069 SPSI = SIN(PSI) N 0069 CPSI = COS(PSI) N 0070 CPSI = COS(PSI) N 0070 CPSI = COS(PSI) N 0070 CPSI = COS(PSI)	N 0066	CPHI = COS(PHI)	10A01070
N 0068 CTHT = COS(THT) N 0069 SPSI = SIN(PSI) N 0070 CPSI = CDS(PSI) N 0070 CPSI = CDS(PSI)	N 0067	STHT = SIN(THT)	10801080
N 0059 SPSI = SIN(PSI) 19801100 10801110 10801110	N 0068	CTHT = COS(THT)	10801090
1080110 (PS1 = CD5(PS1)	N 0069	SPSI # SIN(PSI)	10801100
	0200 1	CPSI = COS(PSI)	10801110
			and the second

	10801140	10801130	10801140	10801150	10801160	10801170	10801180	10801190	10801200	10801210	10801220	10801230	10801240	06210801	10001000	10801280	10801290	10801300	10801310	10801320	10801340	10801350	10801360	10801370	10801380	10801390	10801400	10801420	10801430	10801440	10801450	10801460	10801480	10801490	10801500	10801510	10801550	10801540	10801550	10801560	10801570	10801580	10801590	10801610	10801620	10801630	10801640	10801650	10010001
		XNORW = XKC+T1/T2	PUP = 1.0/(XKC*TM)	U	GRI= CPSI*CTHT*SB1C	GR2= SPSI*CTHT*CGIC*CBIC	GR3= STHT*SGIC*CBIC	GR4= GR1 + GR2 + GR3	DBI= ARSIN(GR4) - BETIC		DGI = ATAN((-SBIC*(SPSI*	I SPHI + CPSIIS + CPSI	2 +SGIC*CBIC*CTHT*CPH) / (SBIC *(-SPSI*CPHI + CPSI*SH1*SPHI)	0 +C01C+C21C+C21C+C22C+ 4 44001+00+100+00+00+00+00+00+00+00+00+00+00	JIEKD 1 5 1	C GL1≈ CPS1*CTHT*SB2C-SPS1*CTHT*CG2C*CB2C+STHT*SG2C*CB2C	DB2= ARSIN(GL1) - BET2C	U	DG2 = -GAM2C + ATAN((SB2C*(SPSI*SFHI +CPSI*STHT*CPHI) +CG2C*	I CDSC#(CDSL#SCDT)=CDSL#SCDT#SCTD41) # 502C4CECECTOTT#SCD1 1/ 1/ 02C4 1 CDSC1+(DDSL#SCD1)=CDSL#SCDT, N=CDSC1+CDSC2C4CECECECECECECECECECECECEEEEEEEEEEEE	、 くしつしょうごうしつしん しょうしょう (しんしつい) ション (しんしん) (しんしん) (しんしい) (し		APE1= ABS(DB1/BETIC)	IF(APE1 .LT. 1.0-10)DB1= SG1C4THT + CG1C4PS1	850 IF(GAMIC .EQ. 0.0) CC TC 851	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	IF(APE2 .LT. 1.D-10)DG1= FHI - TBIC+CGIC+THT + TBIC+SGIC+PSI	001 IFTUELEC +EV+ V+VJ VU TU CO2 APE3= ARS(DB2/BET2C)	IF(APE3 LT. 1.0-10)BB2= -SG2C*THT - CG2C*PSI	852 IF(GAM2C •EQ• 0•0) GO TO 853	APE4= ABS(DG2/GAM2C)	IF(APE4 .LT. 1.D-10)DG2= PHI + TB2C*CG2C*THT - TB2C*SG2C*PSI	C x x x x x x x x x x x x x x x x x x x	c	C CALCULATION OF NONLINEAR F(X)	C	C C Bes cina - A/2.41/A /2.41		SUM5 =(COS(D62+GAW2C)) * DB1 + (COS(D61 + GAM1C)) * DB2	SUM6 =(SIN(DG2+GAM2C))* DB1 + (SIN(DG1 + GAMIC)) * DB2	GAIN = XKC * (Ti+TZ)/TZ	F(1) = (TTHT * A(1,2))*(X(5)*SPHI + X(8)*CPHI)		AKGF2 - 1.1.1/2/#AINEV#FPH1/XKM + 0AIN+UGI + XNUNM+AN3) TE 7/88/20/25/9/1/1/2/2011/1/2012/2012/2012/2012/2012	IF (ARGF2.GT.F2LIM) F2 = F2LIM	IF (ARGF2.LTF2LIM) F2= -F2LIM	F(2)= -(-F2 +GAIN*(X(1)+SUM3*X(4) +SUM4*X(7))+AITREN*HPHI	1 /XKM) * PUP - A(2+3)*X(3)	
and a many state of the state of the	12N 0071	ISN 0072	ISN 0073		ESN 0074	ISN 0075	ISN 0076	ISN 0077	ISN 0078	a party statement is a province and a statement of the st	ISN 0079		and the second state of th		er sonska svedija na nasla tektornom – 4 vili Vela Ven, a slovitik na ritiklik kin se	ISN 0080	ISN 0081		I SN 0082			ISN ODRI	I SN 0085	I SN 0066	ISN 0088	1500 NSI	ISN 0091	15N 0095	1 SN 0096	8600 NSI	I SN 0100	ISN 0101		random ale - a space of a state and a set with the state strategy and the state of the state of the state of th			LCN 0103	15N 0104	ISN 0105	ISN 0106	ISN 0107	ISN 0108		15N 0109	ISN 0112	ISN 0114	15N 0116		

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PAGE 004 ISN 0118 $F(4) = -A(1 \cdot 2) * (X(5) * (1 \cdot 0 - CPHI) + SPHI * X(2))$ 10801680 23 10801690 1915 1000 ISN 0119 ARGES= GAIN*SUM5*D12 -(T1/T2)*AITREN#HTHT/XKM + XNORW*X(6 10801700 NOR . 誕 ISN 0120 IF(ABS(ARGF5).LE.F2LIM) F2 =ARGF5 10801710 ISN 0122 IF(ARGE5.GT.F2LIM) F2=F2LIM 10801720 ISN 0124 IF(ARGF5 .LT. -F2LIM)F2 = -F2LIM 10801730 ISN 0126 E(5) =- (-F2 +GAIN*D12*SDIE*X(4) +XNORW*X(6) +AITREN*HTHT/XKM 10801740 * PUP 10801750 1 10801760 F(6) = A(3,1)*D12*(SUM5 - SDIF*X(4)) - HTHT/(T2*A(1,2))ISN 0127 10801770 10801780 ISN 0128 F(7) = A(1,2) * (X(5)*SPHI +X(8)*(CPHI-CTHT))/CTHT 10801790 10801800 ARGF8= -GAIN*D12*SUM6-(T1/T2)*AITREN*HPSI/XKM + XNORW*X(9) ISN 0129 10801810 ISN 0130 IF(ABS(ARGE8) .LE .F2LIM) F2 = ARGE8 10801820 ISN 0132 IF(ARGF8.GT.F2LIM) F2 = F2LIM 10801830 ISN 0134 IF(ARGF8.LT.-F2LIM) F2=-F2LIM 10801840 ISN 0136 F(8) =-(-F2+GAIN*C12*SDIF*X(7) + XNORW*X(9) +AITREN*HPSI/XKM)*PUP 10801850 10801860 ISN 0137 F(9)= -A(3,1)*D12*(SUM6+SDIF*X(7))-HFSI/(T2*A(1,2)) 10801870 10801880 С 10801890 10801900 С 10801910 10801920 ISN 0138 IF(JSW.GT.0)GO TO 6C2 10801930 ISN 0140 WRITE(6,5001) (F(I),I=1,9) 10801940 ISN 0141 5001 FORMAT(1H / 1X, 12H F(X)-VECTOR / 1X,9E13.6) 10801950 ISN 0142 602 CONTINUE 10801960 С 10801970 10801980 ****** С ************ 143 ISN 0143 RETURN 10802000 CONSTRUCT. ISN 0144 END 10802010

LEVEL 2 FEB 67 05/360 FORTRAN H DATE 69.199/15.48.07 COMPILER OPTIONS - NAMF= \$MAIN, OPT=02, LINECNT=56, SOURCE, ECD, LIST, NODECK, LOAD, MAP, NOEDIT, ID ISN 0002 FUNCTION SCAPR(X,Y,SUM,L,IX,IY) 11000010 ISN 0003 REAL*8 X(IX.1).Y(IY.1) 11000020 ISN 0004 REAL *8 SUM . SCAPR 11000030 IF (L .EQ. 0) GD TC 110 11000040 ISN 0005 ISN 0007 DO 100 J = 1,L 11000050 100 SUM = SUM + X(1,J) * Y(1,J)ISN 0008 11000060 ISN 0009 110 SCAPR = SUM 11000070 ISN 0010 RETURN 11000080 ISN 0011 END 11000090 nasti. Ngjeri र तो जेव ale mondale var 144 ÷., \mathcal{S}^{-1} يدو أح

C D000LE TRATUK INVERSION D000LE TRATUK INVERSION D000DS 1 VERSION ACTOLINATI (STEP(1)) 1 VERSION 1 0000DS 1 0000DS 1 VERSION ACTOLINATI (STEP(1)) 1 0000DS 1 0000DS 1 0000DS 1 VERSION ACTOLINATI (STEP(1)) 1 0000DS 1 0000DS 1 0000DS 1 VERSION ACTOLINATI (STEP(1)) 1 0000DS 1 0000DS 1 0000DS 1 VERSION ACTOLINATION 1 0000DS 1 0000DS 1 0000DS 1 VERSION ACTOLINATION 1 0000DS 1 0000DS 1 0000DS 1 VERSION ACTOLINATION 1 0000DS 1 0000DS 1 0000DS 1 VERSION ACTOLINATION 1 0000DS 1 0000DS 1 0000DS 1 VERSION ACTOLINATION 1 0000DS 1 0000DS 1 0000DS 1 VERSION ACTOLINATION 1 0000DS 1 0000DS 1 0000DS 1 VERSION ACTOLINATION 1 0000DS 1 0000DS 1 0000DS 1 VERSION ACTOLINATION 1 0000DS 1 0000DS 1 0000DS 1 VERSION ACTOLINATION 1 0000DS 1 0000DS 1 0000DS 1 VERSION ACTOLINATION	C MATRIX INVERSION DCUBLE PRECISION 3 DOUBLE PRECISION A.ABSAL.ABSAL.TEMP.FAC.ABSA.DARS 14 DIMENSION A.ABSAL.ABSAL.TEMP.FAC.ABSA.DARS 15 K1 16 IERR=0 17 NPI=N+1 18 30 LL=1 19 35 J=1.N 11 40 T=1 2 45 ABSAI=DABS(A(1.1))	10600030 10600030
01945 FRECUSION ALIAISALLARSALSALSALSALSALSALSALSALSALSALSALSALSALS	3 D0UBLE PRECISION A.48SAL.1EMP.FAC.4BSA.0ABS 4 DIMENSION A(IDIM.1).ISTEP(1) 5 K=1 6 IERR=0 7 NP1=N+1 9 30 LL=1 1 40 T=1 1 40 T=1 1 40 T=1 2 A(J.NP1)=A(J.1) 3 A(J.NP1)=A(J.1) 4 5 A(J.NP1)=A(J.1) 2 45 ABSA1=DABS(A(I.1))	1060030
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Noil Noil <th< td=""><td><pre>> NP1=N+1 3 CL=1 > D0 35 J=1.N 3 A(J,NP1)=A(J,1) 2 3 A(J,NP1)=A(J,1) 2 45 ABSA1=DABS(A(1,1))</pre></td><td>1060050</td></th<>	<pre>> NP1=N+1 3 CL=1 > D0 35 J=1.N 3 A(J,NP1)=A(J,1) 2 3 A(J,NP1)=A(J,1) 2 45 ABSA1=DABS(A(1,1))</pre>	1060050
30 U. 13 J. 11.N J. 0001 J. 000100 31 J. 11.N J. 1000100 J. 1000100 J. 1000100 31 J. 11.N J. 1000100 J. 1000100 J. 1000100 31 J. 1000100 J. 1000100 J. 1000100 J. 1000100 31 J. 1000100 J. 1000100 J. 1000100 J. 1000100 32 J. 117.05.65.65 J. 1000100 J. 1000100 J. 1000100 32 J. 117.05.65.65 J. 1000100 J. 1000100 J. 10000100 33 J. 117.05.65.65 J. 100000000 J. 100000000 J. 100000000 34 J. 117.05.65.65 J. 1000000000 J. 100000000 J. 1000000000 34 J. 117.05.65.66 J. 1000000000 J. 1000000000 J. 1000000000 35 J. 117.05.65.66 J. 10000000000 J. 1000000000 J. 1000000000 34 J. 117.05.65.65 J. 100000000000 J. 1000000000000000000000000000000000000	<pre>3 30 LL=1 5 D0 35 J=1.N 1 35 A(J.NP1)=A(J.1) 6 1=1 1 L=2 1 L=2 3 45 ABSA1=DABS(A(I.1))</pre>	10600050
35 U.J. S. J. H.M. (1,1) 1060010 1.21 1.21 1000120 1.21 1.22 10600130 1.22 1.22 10600130 1.22 1.22 10600130 1.22 10600120 10600130 1.22 10600130 10600130 1.22 10600130 10600130 1.22 10600130 10600130 1.22 10600130 10600130 1.22 10600130 10600130 1.22 10600120 10600120 1.22 102 10600120 1.22 10000120 10600120 1.22 1.22 10000120 1.22 1.24 10000120 1.22 1.24 1000020 1.22 1.24 1000020 1.22 1.24 1000020 1.24 1.25 1000020 1.24 1.25 1000020 1.24 1.25 1000020 2.24 1.25<	35 A(J.NP1)=A(J,1) 1 40 I=1 2 L=2 3 45 ABSAI=DABS(A(I,1))	1060080
0.1 0.1 0.1 0.000120 1.2 0.000120 0.000120 0.4 0.000120 0.000120 0.4 0.000120 0.000120 0.5 1.1 0.000120 0.6 0.1 0.000120 0.6 0.1 0.000120 0.6 0.1 0.000120 0.6 0.1 0.000120 0.6 0.1 0.000120 0.6 0.1 0.000120 0.6 0.1 0.000120 0.6 0.1 0.000120 0.6 0.1 0.000120 0.6 0.1 0.000220 0.6 0.1 0.000220 0.6 0.1 0.000220 0.7 0.1 0.000220 0.7 0.1 0.000220 0.7 0.1 0.000220 0.7 0.1 0.000220 0.7 0.1 0.000220 0.7 0.1 0.000220 0.7 0.1 0.000220 0.7 0.1 0.000220 0.7 0.1 0.000220 0.7 0.1 0.000220 0.7 0.1 0.000020 0.7	1 40 1=1 2 L=2 3 45 ABSAI=DABS(A(1,1))	10600090
4 1	2 L=2 3 45 ABSAI=DABS(A(I,1))	10600100
45 ASSAT = TARST = TA	3 45 ABSAI=DABS(A(I,1))	10600120
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No. Telestation Telestation <thtelestation< th=""> <thtel< td=""><td>4 ABSAL=DABS(A(L,1))</td><td>10600140</td></thtel<></thtelestation<>	4 ABSAL=DABS(A(L,1))	10600140
9 55 1F(L=V)65:6:56 10600100 0 1Ex(L=V)70:0.70.0 10600220 1 10000210 10600220 1 10000210 10600220 1 10000210 10600220 1 10000210 10600220 1 101000210 10600230 1 101000210 10600230 1 10100210 10600230 1 10100210 10600230 1 10111 10600330 1 11110.110.110 10600330 1 11111.110.110 10600300 1 11111.110.110 10600300 1 11111.110.110 10600300 1 11111.110.110 10600300 1 11111.110.110 10600300 1 11111.110.110 10600300 1 11111.110.110 1 111111.110.110 1 1100	IF(ABSAI-ABSAL)50,55,55	10600150
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00 TO 45 10000100 00 H [H(H+1)]1.05.00.00 10000200 00 H [H(H+1)]1.05.22 10000200 01 H [H(H+1)]1.05.22 10000200 01 TO 75 10000200 01 TO 75 10000200 01 TO 75 10000200 01 TO 75 10000200 02 TO 71 10000200 03 ALU-111.0.10.0 10000200 03 ALU-111.0.10.0 10000200 03 ALU-111.0.10.0 10000200 03 ALU-111.0.10.0 10000200 03 FRAL 10000200 04 TO 10 10000200 05 FRAL 10000200 04 TO 10 10000200 05 FRAL 10000200 06 TO 10 10000200 07 TO 10 10000200 00 TO 10 10000200 00 TO 10 10000200 00 TO 10 10000200 00 TO 10 10000200 10 TO 10 10000200 10 TO 10 10000200 10 TO 10 10000200 10 TO 10 10000020		10600180
1 05 Fr(-1)70.90.70 1000020 20 Fr(-1)70.90.70 1000020 20 10 1000020 20 10 1000020 20 10 1000020 20 10 1000020 20 10 1000020 20 10 1000020 21 1000020 1000020 22 10 1000020 21 11 1000020 22 10 1000020 23 11 1000020 24 10 1000020 25 10 1000020 26 10 1000020 27 10 1000020 28 11 1000020 20 10 1000020 20 10 10000020 21 10 10000000 22 10 10000000 23 10 10000000 23 10 10000000 23 10 10000000 24 10 10000000 24 10 10000000 25 10 10000000 26 10 10000000 20<		10600190
70 Meil 10000210 80 F(i - ISTE(M)) 50. € 3. € 0 10000230 80 61 7 (i - ISTE (M)) 50. € 3. € 0 10000230 80 60 7 (i - STE (M)) 50. € 3. € 0 10000230 81 0.50 10000230 10000230 82 0.50 10000230 10000230 82 0.50 10000330 10000330 83 161 10000330 10000330 83 161 10000330 10000330 84 100 10000330 10000330 84 100 10000330 10000330 84 100 10000330 10000330 84 100 10000340 10000330 84 100 10000340 10000340 84 100 10000340 10000340 84 100 10000340 10000340 84 100 10000340 10000340 90 100 100000340 100000340	1 65 IF(K-1)70.90.70	10500210
3 7 F[f(-1:Title7(u))30, e4.60 8 0 1 8 0 1 8 0 1 8 0 1 8 0 1 8 0 1 8 0 1 8 0 1 9 1 10600250 9 1 10600250 9 1 10600250 1 10600250 1 10600250 1 10600250 1 10600250 1 10600250 1 10600310 1 10600310 1 10600310 1 10600310 1 10600310 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1 10 1	2 70 M=1	10600220
B0 FK(M++1)B1.62.e2 10000250 6 61 T0 7 10000250 6 61 T0 7 10000250 7 83 (J.13)=K(J,MP1) 10000250 83 (J.13)=K(J,MP1) 10000250 84 F(LL-N166.65.45 1000020 85 F5R=1 1000020 84 F5(LL-N166.65.45 1000020 85 F5R=1 1000020 85 F5R=1 1000020 86 F1=1141 1000020 86 F1=110 1000020 86 F1=1190.00 100 610 86 F1=1190.00 100 610 86 F1=1190.00 100 60020 90 15770 KM=1 1000030 100 17-1110.120.110 1000030 100 170 100 170 100 170 100 00020 100 170 100 00020 100 170 10000300 100 170 10000300 100 170 10000300 100 170 10000300 100 170 10000300 100 170 10000300 100 170 10000000 <td>3 75 IF(I-ISTEP(M))80,64,60</td> <td>10600230</td>	3 75 IF(I-ISTEP(M))80,64,60	10600230
B Mimit 10600250 B 00 33 J=1;N 10600250 B A(J+1)=A(J+1P1) 10600250 B A(J+1)=A(J+1P1) 10600250 B F(L-N)86.85.45 10600250 B F(L-N)86.85.45 10600320 B F(L-N)86.85.45 10600320 B F(L-N)86.85.45 10600330 B S(T-N)1 10600330 B A(L-1)1 10600330 B A(L-1)1 10600330 B A(L-1)1 10600350 B	4 80 IF(M-K+1)81,82,62	10600240
0 0.0 0.0 0.0 0.00020 0 0.0 0.0 0.00020 0.00020 0 0.0 0.0 0.00020 0.00020 0 0.0 0.0 0.00020 0.00020 0 0.0 0.0 0.00020 0.00020 0 0.0 0.0 0.00020 0.00020 0 0.0 0.0 0.00020 0.000200 0 0.0 0.0 0.000200 0.0000200 0 0.0 0.0 0.0 0.000200 0 0.0 0.0 0.0 0.000200 0 0.0 0.0 0.0 0.000200 0 0.0 0.0 0.000200 0.000200 0 0.0 0.0 0.000200 0.000200 0 0.0 0.0 0.0 0.000200 0 0.0 0.0 0.0 0.0 0 0.0 0.0 0.0 0.0 <td>SI M=M+1</td> <td>10600250</td>	SI M=M+1	10600250
82 D0 30 10500270 84 D1 5 10500290 85 TF(LL-N)66.85.65 10600290 84 TF(LL-N)66.85.65 10600290 85 TFRL-N)66.85.65 10600230 85 TFRL-N)66.85.65 10600230 85 TFRL-N)66.85.65 10600320 85 TFRL-N)66.85.65 10600330 86 TL-LLT 10600330 90 G1TF0401 10600350 90 G1TF0401 10600350 90 G1TF0401 10600350 90 G1TF1-1)10.120.11C 10600350 90 G1T10401 10600350 100 Tf(J-1)10.120.11C 10600350 90 G1T1040 10600350 100 Tf(J-1)10.120.11C 10600350 100 Tf(J-1)10.120.11C 10600340 100 Tf(J-1)10.120.11C 10600340 100 Tf(J-1)10.120.11C 10600400 100 Tf(J-1)10.120.11C 1060	6 GG TD 75	10600260
9 60 T0 90 1000280 0 84 [F(L-N)86.85.85 10600300 0 60 T0 90 10600310 0 60 T0 90 10600310 0 61 (1.1)=0.00 10600340 0 11.11=0.00 10600340 0 60 T0 40 10600340 0 11.11=0.00 10600340 0 100 F(1-1)10.120.11C 10600340 0 100 F(1-1)10.120.11C 10600340 100 F(1-1)110.120.11C 10600340 10600340 100 F(1-1)110.120.11C 10600340 10600340 101 F(1-1)110.120.11C 10600340 10600440 100 F(1-1)110.120.11C 10600340 10600440 100 F(1-1)110.120.150 10600440 10600440 100 F(1-1)10.150.150 10600440 10600440 100 F(1-1)10.150.150 10600440 10600440 100 F(1.1)1 100 10600440 10600440 100 F(1.1)1 100 10600440 10600440 100 F(1.1)1 100 10600440		10600270
84 FT(L-N)66.65.65 10500320 5 5 10510320 6 101610 10500320 6 10141 10500320 6 10141 10500320 6 10141 10500320 6 10141 10500350 6 10141 10500350 10 10141 10500350 10 10141 10500350 10 10141 10500350 10 10141 10500350 10 10151 10600350 10 10151 10600350 10 101 10600350 10 101 10600350 10 101 10600350 10 100 10600350 10 100 10600350 10 100 10600350 10 100 10600350 10 100 10600350 10 100 10600350 10 100 10600350 10 100 10600350 10 100 10600350 10 100 10600350 10 100 10600350 10 100 10600350	9 00 00 X(0+1)=X(0+1)	10600280
1 65 168 1680310 2 60 10 10 3 16 10 10600350 4 11 10600350 10600350 5 90 157 10600350 6 90 157 10600350 7 10 10 10600350 8 10 15 10600350 9 10 15 10600350 10 10 10 10600350 10 10 10 10600390 10 10 10 10600390 10 10 10600390 10 10 10 10600420 10 10 10 10600420 10 10 10 10600420 10 10 10 10600450 10 10 10 10600450 10 10 10 10600450 10 10 10 10600450 10 10 10 10600450 10 10 10 10600450 10 10 10 1060050 10 10 10 10 10 106	0 84 IF(LL-N)86,85,85	06200901
CG TO 610 CG TO 610 10600320 A (L=LL+1 10600340 10600340 A (Li,1)=0.00 10600340 10600340 A (Li,1)=0.00 10600340 10600350 A (Li,1)=0.01 10600350 10600350 A (L,1)=1)110.120.11C 10600350 10600350 A (L,1)=1)110.120.11C 10600350 10600350 A (L,1)=1)10.120.11C 10600340 10600340 A (L,1)=1.00 100 10600340 10600340 A (L,1)=1.00 100 10600340 10600340 A (L,1)] 110,1100,150,150 10600340 10600340 A (L,1)] 114 10600340 10600340 A (L,1)] 100 10600340 10600340	1 85 IERE1	10600310
B L1=L+1 A A(1:1)=0.D0 G0 T0 40 10 600350 G0 T0 40 10600350 F 100 F(-1)110.120.11C D0 F(-1)110.120.11C 10600350 D0 F(-1)110.120.11C 10600350 D1 A(J,NP]=1.00 1000390 D2 D1 A(J,NP]=1.00 1060040 D3 D1 A(J,NP]=1.00 1060040 D3 D1 A(J,NP]=1.00 10600440 D3 D1 A(J,J)=A(1,J) 10600440 D4 D1 A(J,J)=A(1,J) 10600450 D3 D1 A(J,J)=A(1,J) 10600450 D4 D1 A(J,J)=1.00 10600450 D3 D1 A(J,J)=1.00 10600450 D4 D1 A(J,J)=1.00 1060050 D4 D1 A(J,J)=1.00 10600500	2 GD TO 610	10600320
5 50 111120.00 10600340 7 10 11 8 100 1 F(J-1)110.120.11C 10600390 90 110 A(J.HD1)=0.00 10600390 100 1F(J-N)140.150.150 10600410 110 A(J.HD1)=1.00 10600410 110 J=J1 10600410 110 J=J1 10600420 110 J=J1 10600440 110 J=J1 10600440 110 J=J1 10600440 110 J=J1 10600440 110 A(T.J.)TEMP 10600440 110 A(T.J.)TEMP 10600440 110 J=J1 10600450 110 J=J1 10600500 110 J=J1 10600500 110 J=J1 10600500 110 J=J1 10600500 110 J=I 10600500 110 J=I 10600500 110 J=I 10600520 100 J=I 10600520 100 J=I 10600520 <		10600330
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7 J=1 100 [F(J-1)10.120.11C 10600390 6 10 A(J.NP1)=0.050 10600390 10600390 6 70 [10 A(J.NP1)=1.D0 10600390 10600390 1 120 A(J.NP1)=1.D0 10600340 10600340 1 120 A(J.NP1)=1.D0 10600420 10600420 1 130 [F(J-N)140.150.150 10600420 10600420 2 150 J=1 10600420 10600420 3 140 J=J+1 10600420 10600420 5 150 J=1 10600420 10600440 6 70 J=J+1 10600450 10600460 6 70 J=J+1 10600450 10600460 7 160 A(1,J)/TEMP 10600460 10600460 7 160 A(1,J)=A(1,J)/TEMP 10600460 10600460 7 160 160 10600460 10600460 180 J=1 10600420 10600450 10600450 190 1F(J-1)[7-1)20125(210.230 10600520 10600520 10600520 100 100 10600520 10600520 10600520 100 10 1060052		10600350
100 If(J-I)110.120.11C 10600330 0 110 A(J.NP1)=0.00 10600390 0 00 T0.130 10600390 11 120 I0000400 10600390 12 130 If(J.NP1)=1.00 10600400 130 If(J.NP1)=1.00 10600420 10600420 140 J=J+1 100600440 10600440 150 If(J.J)=A(I.J)/TEMP 10600440 10600440 160 A(I+J)=A(I.J)/TEMP 10600440 10600440 160 If(J.J)=A(I.J)/TEMP 10600440 10600440 160 If(J.J)=A(I.J)/TEMP 10600440 10600440 170 J=J+1 10600440 10600440 10600450 160 If(J.J)=A(I.J)/TEMP 10600440 10600450 10600450 170 J=J+1 10600420 10600450 10600450 10600450 180 J=I 10600420 10600450 106600500 106600500 190 If(J-I)200.230 10600500 106600500 106600500 106600500 190 If(J-I)200220	27 Jei	0000001
9 110 A(J.NP1)=0.00 10 60 T0.130 11 120 A(J.NP1)=1.50 120 120 IF(J-N)140.150.150 130 1F(J-N)140.150.150 140 J=J+1 150 10600430 160 10600440 160 10600440 160 10600440 160 10600440 160 10600440 160 10600440 160 10600440 160 10600440 160 10600440 170 J=J+1 170 J=J+1 180 170 170 J=J+1 180 170 170 J=J+1 180 J=1 180 J=1 180 J=1 190 16600500 190 10600500 190 10600500 190 10600510 190 10600510 190 10600510 190 10600520 10600520 <t< td=""><td>8 100 FF(J-I)110,120,11C</td><td>10600370 10600380</td></t<>	8 100 FF(J-I)110,120,11C	10600370 10600380
0 G0 T0.130 10600400 1 120 A(J.NPI)=1.D0 10600430 3 140 = 150.150 10600430 3 140 = 150.150 10600430 3 140 = 170 10600440 5 150 J=1 10600440 6 T0 100 10600440 7 150 J=1 10600440 8 150 J=1 10600440 160 A(1,J)/TEMP 10600460 10600460 7 150 J=1 10600460 8 17(J-J)/TEMP 10600460 9 17(J-J)/TEMP 10600460 17(J-J-J)/TEMP 10600460 10600460 18 17(J-J-I)/TEMP 10600490 19 17(J-I)/TEMP 10600500 19 160 10600500 19 16 10600500 19 16005010 10600510 19 17(J-I)/J-I, 1001230 10600510 19 17(J, 1)/TEMP 10600510 19 10600510 10600510 10 10600510 10600510 10	9 110 A(J,NPI)=0.00	10600390
120 A(J,NP1)=1.00 130 F(J-N)140.150.150 140 100 150 11 150 11 150 11 150 11 150 11 150 11 160 10600440 160 10600440 160 10600440 160 10600460 170 10600460 170 10600460 170 10600460 170 10600490 180 170 190 160 180 170 190 160 190 1600500 190 1600500 190 1600500 190 1600500 190 1600500 10600500 1060501 10600500 1060500 10600500 1060500 10600500 1060500 10600500 1060550	0 60 T0 130	10600400
3 140 17.0-10.120.120 5 150 141 6 150 100 7 160 10600440 16 160 10600440 16 160 10600440 10 10600440 10600440 10 10600440 10600460 17 16 10600460 17 101 10600460 17 101 10600490 18 170 101 17 101 10600490 18 170 10600490 17 101 10600500 18 170 10600500 19 11 10600500 19 11 10600520 19 17 10600520 19 17 10600520 10600530 10600530		10600410
4 6 7 10600440 5 150 J=1 10600440 6 TEMP=A(1.1) 10600460 7 160 A(1.J)/TEMP 10600460 8 17(J-NP1)170.130.160 10600460 9 170 J=1 10600490 10 101 160 10600490 11 11 10600490 12 101 160 10600500 13 200 TF(J-1)200230 10600500 190 TF(J-1)200230.290.200 10600510 100600510 10600520		10600420
5 I50 J=1 10600460 7 I60 A(I.J)=A(I.J)/TEMP 10600460 8 I70 J=11 10600490 9 170 J=11 10600490 10 10 10600490 11 10600500 10600500 12 190 IF(J-1)200.290.200.200 10600500 13 200 IF(J-1)200.290.200.200 10600520	4 GG TD 100	1 U 6 U 4 5 U 1 A 6 A A 6 A
7 I60 A(I:J)TEMP 10600460 8 IF(J-NP1)170.130.1E0 10600460 9 170 J=J+1 10600490 170 J=J+1 10600490 10600490 180 J=1 10600500 10600500 180 J=1 10600500 10600500 190 IF(J-1)200.290.201 10600520 10600520 200 IF(J-1)200.230.210 10600520 10600520	5 150 J=1	10600440
7 160 A(1,J) = A(1,J) TEMP 8 17(J-NP1)170.130.160 9 170 J=J+1 0 01 TD 160 1 160 0500 1 10600500 1 10600500 1 10600500 1 10600500 1 10600500 1 10600520 1 10600520 1 10600520 1 10600520	6 TEMP=A(I,1)	10600460
B If(J-NP1)170.130.150 10600490 0 I70 J=J+1 10600500 1 0 J=1 10600500 1 140 J=1 10600500 1 190 If(J-1)200.290.20 10600520 2 190 If(J-1)1-1.200220 10600520	7 160 A(1,J)=A(1,J)/TEMP	10600470
1 1 1 1 1 1 1 1 0 1 0 <td></td> <td>10600490</td>		10600490
180 J=1 190 IF(J-I)200.290.2CC 200 IF(J.I)-1.00)23C.21C.230 10600520		10600490
2 190 IF(J-I)200,290,200 2 200 IF(A(J,I)-1.00)230,210,230 2 2 2 0 1F(A(J,I)-1.00)230,210,230		10600500
3 200 [F(A(J, [)-1.00)23C+21C+230 100000000000000000000000000000000000	2 190 1F(J-1) 200, 290, 200	10600510
	3 200 IF(A(J,I)-1,D0)23C,21C,230	10600530
4 ZIO 00 ZZO M=1,NPI 10600540	210 DJ 220 M=1,NPI	10600540

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				PAGE 002
		ISN 0056	220 CONTINUE	10600560
		ISN 0057	GO TO 290	10600570
		ISN 0058	230 1F(A(J)1)+1.00)26C.24C.26C	10600580
1		ISN 0009	240 00 250 M = 1, NP1	10600590
		ISN 0061		10600600
		ISN 0062	60 TO 290	10600620
1990 - Carlos Carlos (1990 - 1990) 1990 - Carlos Carlos (1990 - 1990) 1990 - Carlos Carlos (1990 - 1990)		ISN 0063	260 IF(A(J.1))270.290.270	10600630
		ISN 0064	270 FAC=A(J.1)	10600640
•		ISN 0065	DO 280 M=1,NP1	10600650
		ISN 0066	280 A(J,M) = A(J,M) - A(I,M) * FAC	10600660
		ISN 0067	290 IF(J-N)300,340,340	10600670
-		ISN 0068	300 J=J+1	10600680
		ISN 0069	GO TO 190	10600690
Adda a sta	•• ••• •••	ISN 0070	<u>340 DC 350 J=1.N</u>	10600700
		ISN 0071	DO 350 M=1.N	10600710
		ISN 0072	MP1=M+1	10600720
		ISN 0075	SSU = A(J,M) = A(J,MP1)	10600730
		ISN 0075	760 K =K+1	10600740
		ISN 0076		10600760
		ISN 0077	390 D0 400 J=1.N	10600770
a light of the		ISN 0078	400 A(NP1.J)=ISTEP(J)	10600780
		ISN 0079	M=1	10600790
		ISN 0080	410 I=ISTEP(M)	10600800
		ISN 0081	IF(I-M)420,470,42C	10600810
		ISN 0082	420 DC 430 J=1.N	10600820
		ISN 0083	TEMP=A(M,J)	106 008 30
		ISN 0084	A(M,J)=A(I,J)	10600840
	с <u>н</u>	ISN 0085	430 A(I,J)=TEMP	10600850
	46	ISN 0086	J=N	10600860
		ISN 0087	440 IF(M-ISTEP(J))450.46C.450	10600870
· · · · ·		ISN 0088	450 J=J+1	10600880
		ISN 0089		10600890
 Contract (1999) Contract (1999) 		ISN 0090	400 ISIEP(J)=1 470 IE(N=N)480-400-400	10600900
1		ISN 0091	470 IF(M=N)40094901490	10600910
		ISN 0092	GD TD 410	10600930
•		ISN 0094	490 DO 500 J=1.N	10600940
		ISN 0095	500 ISTEP(J)=A(NP1,J)	10600950
		ISN 0096	530 M=1	10600960
		ISN 0097	540 I=ISTEP(M)	10600970
		ISN 0098	IF(I-M)550,570,550	10600980
18 18 18 18 18 18 18 18 18 18 18 18 18 1		ISN 0099	550 DD 560 J=1.N	10600990
		ISN 0100	TEMP=A(J,I)	10601000
11 A 4		ISN 0101	A(J,I)=A(J,M)	10601010
		ISN 0102	560 A(J,M)=TEMP	10601020
		I SN 0103	J = LS1EP(M)	10601030
tubel Alter		ISN 0104		10601040
		15N 0105		10501050
		ISN 0100	570 TE(M-N)580.610.610	
		ISN 0107	580 M=M+1	10601070
		ISN 0109	GO TO 540	10601090
		ISN 0110	610 RETURN	10601100
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FZLIM = 20.0 Frad(5.1001)54Mic (64Moc Betic Jetoc	EAD(5,1001)HPH1,HTH1,HPSI	¢ FAD(5,1001)VMIMI	READ(5.712) DUM 712 FORMAT(78)	JE(DUM)213,713,714	714 CALL ROMIN(DUM) 713 CONTINUE		RI FORMAI (7H VMINT= F14.7)	PI= 3.1415925	PI2 = PI/2. ATA - DI/150	GAMIC = GAMIC + DIR	GAM2C = GAM2C * DTP	BETIC = RETIC * DTR				D0 201 T=1,23	201 [HFTA(1) = 0.	DO 2.02 I=1.8	202 PHIV(I) = 9.0	UU 203 1=1.9 XIMX(T) = 1.0	X(1) = 1.0	203. XLAM(1)= 1.0	IF(NSKIP-E0.0) GG TC 9295	READ(5,1001).(XLAM(I).1F1.9).(THETA(J).J=1.28).(FHIV(K1.K=1.8). 		03 444 J=1.N	ATP(L(,U)=0.0	446 PA(I.4)=0.0		6009 EX(1) = DLOG(XLAM(1))	DU 420 I=1, 4	420 XLAMP(I) = XLAM(I)	D0 430 [=1,29		0.4 140 1110 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	C) 8:1=[,)[(FVIHP(.) A2.1=[,)](PTEHT(.)3.1=[,)](PMAIX())A5.4(ETT PW	SGIC = SIN(GAMIC)	CGIC = CDS(GAMIC)	SG2C = SIN(GAM3C)	COPT = COS(GAMET)		x12 = (<pre>x // clistically of for stity() (-14) w(2x) (x) (-14) (-10) (-0) (-2x) (-</pre>	× 7F = (0+1 = (X(1)+X10)/0T3
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158 0113 Call AFXLOSC 158 0112 DO 700 JE11 158 0112 DO 700 JE11 158 0112 Callulation DF ARI (LAD) 158 0112 DO 700 JE11 158 0112 Callulation DF ARI (LAD) 158 0112 DO 20 JE11	15N 011A C.LL. AFCUSH 15N 011A C.LL. AFCUSH 15N 011A 0.LL. AFCUSH 15N 012A 0.LL. AFCUSH 15N 012B 0.L	153.0114 C.LL. FKU351 153.0115 J.C.L. DERN(IPFTA.PHIV.K.M.) 153.0117 J.F.L. DERN(IPTA.PHIV.K.M.) 153.0117 J.F.L. DERN(IPTA.PHIV.K.M.) 153.0117 J.F.L. DERN(IPTA.PHIV.K.M.) 153.0117 DOT 0.0.1.1.1.1 153.0117 DOT 0.0.1.1.1.1 153.0112 DOT 0.0.1.1.1.1 153.0122 DOT 0.0.1.1.1.1 153.0123 DOT 0.0.1.1.1.1 153.0123 DOT 0.1.1.1.1 153.0123 DOT 0.1.1.1 153.0123 DOT 0.1.1.1 153.0123 DOT 0.1.1.1 153.0133 DOT 0.1.1.1 153.0133 </td <td>ISN 0113</td> <td>LAY=0</td> <td>a na an ann an an an an an an an an an a</td>	ISN 0113	LAY=0	a na an ann an an an an an an an an an a
[58] 0115 C.d.L. DGFUTFFAJ-DHTV-KLMD [58] 0117 057 = 1:0 [58] 0117 057 = 1:0 [58] 0117 057 = 1:0 [58] 0112 051 = 1:0 [58] 0112 051 = 1:0 [58] 0112 051 = 1:0 [58] 0112 051 = 1:0 [58] 0112 051 = 1:0 [58] 0112 051 = 1:0 [58] 0122 061 = 1:0 [58] 0122 061 = 1:0 [58] 0122 061 = 1:0 [58] 0122 061 = 1:0 [58] 0122 061 = 1:0 [58] 0122 061 = 1:0 [58] 0122 061 = 1:0 [58] 0122 061 = 1:0 [58] 0122 061 = 1:0 [58] 0122 061 = 1:0 [58] 0123 061 = 1:0 [58] 0123 061 = 1:0 [58] 0123 061 = 1:0 [58] 0123 061 = 1:0 [58] 0123 061 = 1:0 [58] 0123 061 = 1:0 [58] 0123 061 = 1:0 [58] 0123 061 = 1:0 [58] 0123 061 = 1:0 <	[58] 0115 ζ (ALL AFKL3PHUV.LAW)[58] 0117 ζ (ALL AFKL3PHUV.LAW)[58] 0117 0.770 (T = 1.0[58] 0117 0.770 (T = 1.0[58] 0119 0.771 = 4.14[58] 0119 0.770 (T = 1.0[58] 0112 0.704 (T = 0.0[58] 0125 704 (T = 1.0[58] 0126 704 (T = 1.0[58] 0127 0.0000 (T = 0.0[58] 0128	[53 0115] 3 CkL AFKLSPHIV.KLAN [53 0117] 0 Tra 1:10 [53 0117] 0 Tra 1:10 [51 0128] 0 Tra 1:10 [51 0128] 704 (111) = AGK(1) + AVK(1) [51 0128] 0 Tra 1:11 [51 0128] 0 T	ISN 0114	CALL CLOCK	
	$ \begin{bmatrix} 580 & 0117 & 0117 & 051 &$	$ \begin{bmatrix} 58 & 0117 & 3 & 511 & 624 & 0264 & 0744 & 124 & 0.0 \\ \hline \begin{bmatrix} 58 & 0117 & 3 & 511 & 511 & 544 & 0.0 \\ \hline \begin{bmatrix} 58 & 0112 & 0174 & 124 & 0.0 \\ \hline \begin{bmatrix} 58 & 0123 & 0174 & 124 & 0.0 \\ \hline 58 & 0122 & 0074 & 124 & 0.0 \\ \hline 58 & 0122 & 0074 & 124 & 0.0 \\ \hline 58 & 0122 & 0074 & 124 & 0.0 \\ \hline 58 & 0122 & 0075 & 124 & 0.0 \\ \hline 58 & 0122 & 0075 & 124 & 0.0 \\ \hline 58 & 0122 & 0075 & 124 & 0.0 \\ \hline 58 & 0122 & 0075 & 124 & 0.0 \\ \hline 58 & 0122 & 0075 & 124 & 0.0 \\ \hline 58 & 0122 & 0075 & 124 & 0.0 \\ \hline 58 & 0122 & 0075 & 124 & 0.0 \\ \hline 58 & 0122 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 124 & 0.0 \\ \hline 58 & 0123 & 0075 & 0.0 \\ \hline 58 & 0123 & 0075 & 0.0 \\ \hline 58 & 0123 & 0075 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.070 & 0.0 \\ \hline 58 & 0124 & 0.070 & 0.$	ISN 0115	CALL AFX(JSW)	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	[580 0117] 011 = "	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	ISN 0116	3 CALL DGEN(THFTA, PHIV, XLAM)	· · · · · · · · · · · · · · · · · · ·
[540 017] 011 = m(1,1) [540 012] 7 01 (1,1) = 01(1,1) [540 012] 7 01 (1,1) = 01(1,1) [540 012] 7 01 (1,1) = 01(1,1) [540 012] 00 (1,1) = 01(1,1) [540 012] 00 (1,1) = 01(1,1) [540 012] 00 (1,1) = 01(1,1) [540 012] 00 (21,1) = 01(1,1) [540 012] 00 (21,1) = 01(1,1) [540 012] 00 (21,1) = 01(1,1) [540 012] 00 (21,1) = 01(1,1) [540 012] 00 (21,1) = 01(1,1) [540 012] 00 (21,1) = 01(1,1) [540 012] 00 (21,1) = 01(1,1) [540 012] 00 (21,1) = 01(1,1) [540 012] 00 (21,1) = 01(1,1) [540 012] 00 (21,1) = 01(1,1) [540 012] 00 (21,1) = 01(1,1) [540 012] 00 (21,1) = 01(1,1) [540 012] 01 (21,1) = 01(1,1) [540 012] 01 (21,1) = 01(1,1) [540 012] 01 (21,1) = 01(1,1) [540 012] 01 (21,1) = 01(1,1) [540 012] 01 (21,1) = 01(1,1) [540 012] 01 (21,1) = 01(1,1) [540 012] 01 (21,1) = 01(1,1) <td>$\begin{array}{cccccccccccccccccccccccccccccccccccc$</td> <td>$\begin{bmatrix} 53, 0 & 10 & 0 & 0 & 10 \\ 153, 0 & 10 & 0 & 0 & 11 \\ 153, 0 & 10 & 0 & 0 & 11 \\ 153, 0 & 10 & 0 & 0 & 11 \\ 153, 0 & 10 & 0 & 0 & 11 \\ 153, 0 & 10 & 0 & 0 & 11 \\ 153, 0 & 10 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 \\ 153, 0 & 0 \\ 153, 0 & 0 \\ 153, 0 & 0$</td> <td>ALLO NCI</td> <td></td> <td></td>	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{bmatrix} 53, 0 & 10 & 0 & 0 & 10 \\ 153, 0 & 10 & 0 & 0 & 11 \\ 153, 0 & 10 & 0 & 0 & 11 \\ 153, 0 & 10 & 0 & 0 & 11 \\ 153, 0 & 10 & 0 & 0 & 11 \\ 153, 0 & 10 & 0 & 0 & 11 \\ 153, 0 & 10 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 11 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 153, 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 $	ALLO NCI		
[500 0020 [07 used det (1)] [500 0122 [00 7 used det (1)] [500 0122 [01 10 1 = 0.01.4)] [500 0122 [01 10 1 = 0.01.4)] [500 0122 [01 10 1 = 0.01.4)] [500 0122 [01 10 1 = 0.01.4)] [500 0122 [01 10 1 = 0.01.4)] [500 0122 [01 00 26 1 = 1.0] [500 0122 [01 00 26 1 = 1.0] [500 0122 [01 00 26 1 = 1.0] [500 0122 [01 00 26 1 = 1.0] [500 0122 [01 00 26 1 = 1.0] [500 0123 [01 00 26 1 = 1.0] [500 0123 [01 00 26 1 = 1.0] [500 0133 [01 00 26 1 = 1.0] [500 0133 [01 00 26 1 = 1.0] [500 0133 [01 00 26 1 = 1.0] [500 0133 [01 00 26 1 = 1.0] [500 0133 [01 00 26 1 = 1.0] [500 0133 [01 00 26 1 = 1.0] [500 0133 [11 0 1.0] [500 0133 [11 0 1.0] [500 0133 [11 0 1.0] [500 0133 [11 0 1.0] [500 0133 [11 0 1.0] [500 0133 [11 0 1.0] [500 0134 [11 0	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	[5N 0120] 077 a Jar (L1) [5N 0122] 70 (11.3) = 0(1.4) [5N 0122] 70 (11.3) = 0(1.4) [5N 0123] 6 (C.U.L.10) of ATP (L TRANSPOSE B) [5N 0123] C.A.CULATION OF ATP (L TRANSPOSE B) [5N 0123] C.A.CULATION OF ATP (L TRANSPOSE B) [5N 0123] C.A.CULATION OF ATP (L TRANSPOSE B) [5N 0125] 0.0 20 111 N [5N 0126] 0.0 20 111 N [5N 0126] 0.0 20 111 N [5N 0126] 0.0 27 11.1 [5N 0126] 0.0 27 11.1 [5N 0126] 0.0 27 11.1 [5N 0128] 0.0 27 11.1 <td>[SN 0119</td> <td></td> <td>1. φ. από το εντάρεια από μαριλικό το της που γελαληθητάς ματό ματά ματά ματά ματά ματά ματά ματά ματά</td>	[SN 0119		1. φ. από το εντάρεια από μαριλικό το της που γελαληθητάς ματό ματά ματά ματά ματά ματά ματά ματά ματά
[5N 012] 00 (1,0) = 0(1,0) [5N 012] 704 01:0) [5N 012] 705 01:0) [5N 012] 705 71:0) [5N 012] 707 11:0) [5N 012] 207 11:0) [5N 012] 207 74:10 [5N 013] 27 74:10 </td <td></td> <td>$\begin{bmatrix} 180 & 012 \\ 1$</td> <td>ISN 0120</td> <td></td> <td></td>		$ \begin{bmatrix} 180 & 012 \\ 1$	ISN 0120		
ISN 0122 Tag (1) = AQ(1) ISN 0123 Tag (1) = AQ(1) ISN 0123 C. CALCUATION OF AP (A TRANSOCSE P) ISN 0125 COLATION OF PA (F-MATRIX X A) ISN 0125 D0 26 J=1N ISN 0127 APT(1) EAT(1) ISN 0127 D0 26 J=1N ISN 0127 D0 26 J=1N ISN 0127 D0 26 J=1N ISN 0127 D0 27 J=1N ISN 0128 D0 27 J=1N ISN 0129 D0 27 J=1N ISN 0139 CO 701 J= ATC(1) PA(I) ISN 0139 D0 27 J=1N ISN 0139 D0 27 J=1N ISN 0139 D0 27 J=1N ISN 0139 D0 705 J=10 N/LL ISN 0139 D0 705 J=10 N/LL<			ISN 0121		A COMPANY OF A COMPANY AND A
158 0123 7 dd c(1,1) = Atafi(1,1) 180 0126 0 2 cutuation of Pa (F-MATGIX X A) 180 0126 0 2 cutuation of Pa (F-MATGIX X A) 180 0126 0 2 cutuation of Pa (F-MATGIX X A) 180 0127 0 2 cutuation of Pa (F-MATGIX X A) 180 0127 0 2 cutuation of Pa (F-MATGIX X A) 180 0127 0 2 cutuation of Pa (F-MATGIX X A) 180 0127 0 2 cutuation of Pa (F-MATGIX X A) 180 0127 0 2 cutuation of Pa (F-MATGIX A) 180 0127 0 2 cutuation of Pa (F-MATGIX A) 181 0127 0 2 cutuation of Pa (F-MATGIX A) 181 0128 0 2 cutuation of Patto 183 0133 27 0(1,1) = Left (-0.0) 60 T 766 183 0133 27 0(1,1) = Left (-0.0) 60 T 766 183 0133 27 0(1,1) = Attinute of T 766 183 0135 705 feduction of Patto		$ \begin{bmatrix} 13N 0123 \\ C \\ $	ISN 0122	DW(1, 1) = 0(1, 1)	
SN 0122 C CACULATION OF AN (FAMSDOSE P.) SN 0122 D C CACULATION OF AN (FAMSDOSE P.) SN 0122 D C 20 1:10 SN 0123 D C 20 1:10 SN 0123 D C 27 1:10 SN 0123 D C 1010 SN 0123 D C 1010 SN 0123 D C 1010 SN 0133 D C 1010 SN 0133 D C 100 SN 0133 D C	$ \begin{array}{c} C = Calcutation of AIP (A TRANSPOSE P) \\ C = Calcutation of PA (F-AATFIX X A) \\ SN 0125 = 00 26 1=1.N \\ SN 0125 = 00 26 1=1.N \\ SN 0125 = 00 26 3=1.N \\ SN 0125 = 00 26 3=1.N \\ SN 0125 = 00 27 3=1.N \\ SN 0125 = 00 27 3=1.N \\ SN 0125 = 00 27 3=1.N \\ SN 0123 = 00 77 1=1.N \\ SN 0123 = 00 77 1=1.N \\ SN 0123 = 00 76 17 1.0 = AATT1, J = PA(1,J) = PA(1,J) \\ SN 0123 = 00 76 17 1.0 = 1.0 \\ SN 0123 = 00 76 17 1.0 = 1.0 \\ SN 0123 = 00 76 17 1.0 \\ SN 0123 = 1.0 \\$	18. 0125 C. CALCULATION OF PATE (A. TRANSDOSE P.) 18. 0125 00 05 4=11N 18. 0125 00 05 7 1=1N 18. 0126 00 07 7 1=1N 18. 0129 00 07 7 1=1N 18. 0120 00 07 7 1=1N 18. 0120 00 27 1=1N 18. 0120 00 27 1=1N 18. 0120 00 27 1=1.9 18. 0120 00 27 1=1.9 18. 0120 00 27 1=1.9 18. 0120 00 27 1=1.9 18. 0120 00 27 1=1.9 18. 0130 705 1=1.9 18. 0130 17 (11.9 FG ATAL 18. 0130 706 FG ATAL 18. 0130 705 1=1.9 18. 0130 17 (11.0 FG ATAL 18. 0130 17 (11.0 FG ATAL 18. 0130<	ISN 0123	704 C(1, j) = AAR(1, j)	
[58] 0126 C. C.LCULTION OF P.A. (F-MATRIX X.A.) [58] 0126 D0 26 J=1.N [58] 0127 D0 26 J=1.N [58] 0128 D0 27 J=1.N [58] 0123 D0 27 J=1.N [58] 0123 D0 705 J=1.N [58] 0123 J31 F[0(11)	SN 0125CCALCUTION OF PA(F-MATRIX X A)SN 0125002 55 131.N002 55 131.NSN 0125002 55 131.NSN 0125002 55 131.NSN 0125002 57 131.NSN 0125002 27 131.NSN 0125002 27 131.NSN 0125002 27 131.NSN 0130002 77 131.NSN 0133007 551 141.0SN 01350151 1.1.CSN 01350151 1.1.CSN 01350151 1.1.CSN 0135017 0.70SN 0135017 0.70SN 0135124 1.1.1.NSN 0135124 1.1.1.NSN 0135124 1.1.1.NSN 0135124 1.1.1.NSN 0135124 1.1.2.1.NSN 0145121 1.1.2.1.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.	158 0125 C GLULATION OF PA (F-MATRIX X A) 158 0125 D0 25 J=1.N 158 0125 D0 25 J=1.N 158 0127 D0 27 J=1.N 158 0128 D0 27 J=1.N 158 0130 D1 27 J=1.N 158 0130 D1 705 158 0130 D1 705 158 0131 27 05 f1.1.J 158 0133 27 05 f1.1.J 158 0133 705 f1.1.J <t< td=""><td>any or in the descent states of the base of the second of the second of the second of the second of the second</td><td>C CALCULATION OF ATP (A TRANSPOSE P)</td><td></td></t<>	any or in the descent states of the base of the second	C CALCULATION OF ATP (A TRANSPOSE P)	
15% 0125 D0 26 J=1.N 15% 0126 D0 27 J=1.N 15% 0127 D0 27 J=1.N 15% 0128 D0 27 J=1.N 15% 0128 D0 27 J=1.N 15% 0129 D0 27 J=1.N 15% 0129 D0 27 J=1.N 15% 0123 D0 70 F=1.0 15% 0133 D1 70 F=1.0	15.9 0125 D0 26 J=1.N 15.8 0125 D0 27 J=1.N 15.8 0125 D0 27 J=1.N 15.8 0125 D0 27 J=1.N 15.9 0125 D0 27 J=1.N 15.0 0125 D0 27 J=1.N 15.0 0123 D0 27 J=1.N 15.0 0133 D0 27 J=1.N 15.0 0133 D0 705 J=1.0.00 60 T0 766 15.0 0133 D0 705 J=1.0.01 60 T0 766 15.0 0133 D0 705 J=1.0.01 60 T0 766 15.0 0133 D0 705 J=1.0.01 766 15.0 0133 D0 705 J=1.0.01 766 15.0 0133 Matrix (./. V. KATATHETA, PULVA, LAW./ 15.0 0133 D0 701 J=1.0.01 766 15.0 0133 Matrix (./. Mat	<pre>134 0125 00 26 J=1M 154 0125 00 26 J=1M 158 0126 00 26 J=1M 158 0126 00 27 J=1M 158 0127 26 Act(1) = AP(1:J) & DA(1:J) + PA(1:J) & DA(1:J) + AP(1:J) = AP(1:J) & DA(1:J) = AP(1:J) =</pre>		C CALCULATION OF PA (P-MATRIX A)	(c) The second s second second sec
153 0127 25 KF11.0 5 KK11.0 5 KK11.0 <t< td=""><td>158 0127 ATP(1.J) = ATP(1.J) E ATP E ATP</td><td>153 0127 ATTOLUD = ANTILUD: EAKLAD 153 0127 ATTOLUD = ANTILUD: EAKLAD 153 0128 25 ATLOD = ANTILUD: EAKLAD 153 0129 00 27 J=10 153 0133 27 0(1:1) = ANTOLY 153 0133 00 755 1:10 153 0133 10 706 153 0133 10 706 153 0133 10 706 153 0133 10 706 153 0133 10 706 153 0133 10 706 153 0133 10 70 445 153 0133 10 70 445 153 0133 10 70 445 153 0133 10 70 445 153 0133 10 70 445 153 0133 10 70 45 153 0133 10 70 45 153 0133 10 70 45 150 0134 10 70 45 150 0133 10 70 45 150 0134 10 70 45 150 0133 10 70 45 150 0134 10 70 45 150</td><td>15N 0124</td><td></td><td></td></t<>	158 0127 ATP(1.J) = ATP(1.J) E ATP	153 0127 ATTOLUD = ANTILUD: EAKLAD 153 0127 ATTOLUD = ANTILUD: EAKLAD 153 0128 25 ATLOD = ANTILUD: EAKLAD 153 0129 00 27 J=10 153 0133 27 0(1:1) = ANTOLY 153 0133 00 755 1:10 153 0133 10 706 153 0133 10 706 153 0133 10 706 153 0133 10 706 153 0133 10 706 153 0133 10 706 153 0133 10 70 445 153 0133 10 70 445 153 0133 10 70 445 153 0133 10 70 445 153 0133 10 70 445 153 0133 10 70 45 153 0133 10 70 45 153 0133 10 70 45 150 0134 10 70 45 150 0133 10 70 45 150 0134 10 70 45 150 0133 10 70 45 150 0134 10 70 45 150	15N 0124		
ISN 0127 76 FULLU) = ATP(I.J.) = ATP(I.J.) [5 A(K.J.) *PU(K.J.) ISN 0128 26 27 J=1.N ISN 0133 20 765 J=1.9 D 705 J=1.9 ISN 0133 20 776 FUETAPHIV.KLMT.Y. [ATA-THETA.PHIV.KLMT.Y. ISN 0133 20 27 J=1.0 ISN 0135 20 247 ISN 0135 20 247 ISN 0135 20 245 ISN 0135 20 247 ISN 0142 20 247 ISN 0142 2471 01(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2471 01(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2471 01(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2437(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2437(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2437(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2437(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2437(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2437(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2437(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2437(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2437(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2437(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2437(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2437(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2447(101(1) NEG - NO. OF NES MATRICS = •.IS) ISN 0142 2412 2412 2412 2412 2412 2412 2412	15N 0127 50 ATF(1.J) = ATF(1.J) E A(K.J) 15N 0128 00 27 J=1N 15N 0130 00 27 J=1N 15N 0133 01 27 J=1N 15N 0133 02 705 J=10 15N 0133 03 71 J=1 15N 0133 10 710 J=1 15N 0135 warteral putty xLM 15N 0135	158 0127 27 0121 ATP(1.J) = ATP(1.J) E A(K.J) 158 0129 00 27 1=1.0 158 0123 00 27 1=1.0 158 0123 00 27 1=1.0 158 0123 00 27 1=1.0 158 0123 00 27 1=1.0 158 0123 00 27 1=1.0 158 0123 00 705 1=1.0 158 0123 00 705 1=1.0 158 0123 05 706 1=1.0 158 0123 05 706 1=1.0 158 0123 05 706 1=1.0 158 0123 05 706 1=1.0 158 0123 05 706 1=1.0 158 0123 705 706 1=10.1 158 0123 706 70 445 158 0123 706 70 445 158 0123 706 70 445 158 0123 706 70 445 158 0123 707 707 1011.1 158 0124 707 707 1011.1 158 0124 707 707 1011.1 158 0124 707 708 1011.0 158 0124 707 708 1011.0 158 0124 707 708 1011.0 158 0124 707 708 1011.0 158 0124 707 708 1011.0 158 0124 707 708 1011011.1 <td>ISN 0126</td> <td></td> <td></td>	ISN 0126		
ISN 0128 25 pattu) = pattu) saturation ISN 0129 01271=1.4 ISN 0131 27 J=1.4 ISN 0133 00271=1.4 ISN 0133 7051+1.4 ISN 0135 7.4 ISN 0135 7.4 ISN 0135 1.4 ISN 0141 1.4 ISN 0142 1.4 ISN 0143 1.4	<pre>ISN 0128</pre>	ISN 0128 25 put(1.1) = put(1.1) Put(1.1)<	ISN 0127	ATP(I,J) = ATP(I,J) & A(K,I) *PW(K,J)	
ISN 0120 00 27 J=IN ISN 0131 27 0(1.1) = -AF0(1.0) - PA(1.0) ISN 0132 20 705 J=149 ISN 0132 705 FF10(1.1) - E ISN 0135 705 FF00(1.1) - E ISN 0137 706 FF0457) ISN 0137 706 FF0457) ISN 0141 667 0455 ISN 0142 707 FF04471 ISN 0143 707 FF04471 ISN 0143 707 FF04411 ISN 0143 707 FF04411 ISN 0143 707 FF04411 ISN 0143 707 FF04411 ISN 0143 701 FF04411 ISN 0143 707 FF04411 ISN 0143 701 FF04411 ISN 0143 707 FF04411 ISN 0143 707 FF04411 ISN 0144 50142 ISN 0145 7014 <	<pre>15M 0120 00 27 1=1.N 15M 0130 00 27 1=1.N 15M 0132 00 27 J=1.N 15M 0133 27 0(1.1) = -ATP(1.1) - PA(T.J) 15M 0133 20 27 J=1.N 15M 0133 20 20 20 20 20 20 20 20 20 20 20 20 20</pre>	<pre>15N 0125 001 27 1=1.N 15N 0132 00 27 1=1.N 15N 0133 27 0017.J = -AFP(1.J) - PA(1.J) 15N 0133 705 1=1.0 15N 0140 705 15N 0133 705 1=1.0 15N 0140 705 15N 0140 70 45 15N 0140 70 45 15N 0140 70 45 15N 0140 70 45 15N 0140 70 70 70 15N 0140 70 15N 0000 70 15N 0000 70 15N 0000 70 15N 0000 70 15N 0000 70 15</pre>	ISN 0128 .	26 PA(I, J) = PA(I, J) SPM(I, K) * A(K, J)	
ISN 0130 27 01.0 27 J=1.N ISN 0131 27 01.0 = AF0(1.J) = PA(F.J) ISN 0133 707 705 FF(0.1.J) = PA(F.J) ISN 0135 707 76 FF(0.1.J) = PA(F.J) ISN 0135 707 71 (14.5E14.7) ISN 0135 708 71 = 1.9 (14.5E14.7) ISN 0135 708 71 = 1 (14.5E14.7) ISN 0135 707 707 71 (14.5E14.7) ISN 0135 707 707 71 (14.5E14.7) ISN 0142 71 (14.7) ISN 0147 71 (14.7)	158 0130 27 01.1) = Jetu: 158 0133 00.705 = 1.9 158 0133 70 705 158 0133 70 705 158 0133 70 705 158 0133 70 705 158 0133 70 705 158 0133 70 705 158 0133 70 705 158 0135 70 705 158 0135 70 705 158 0135 12 704 158 0135 12 707 158 0135 14 707 158 0135 706 706 012 013 14 705 158 0135 706 701 400 707 701 400 707 701 401 11.1 701 401 11.1 158 0136 707 701 400 707 701 400 701 701 400 707 701 400 707 158 0144 60 701 400 707 701 400 707 701 400 707 701 400 707 701 400 707 <td><pre>158 0130 20 27 J=1.0 158 0131 20 075 J=1.0 158 0133 705 J=1.0 17 (17.5E14.7) 706 17 (17.5E14.7) 707 18 0133 706 17 (17.5E14.7) 707 18 0133 706 17 (17.5E14.7) 707 18 0143 706 18 0143 706 18 0143 706 18 0143 707 18 0143 706 18 0143 707 18 0143 707 18 0143 706 18 0143 707 18 0143 706 18 0143 707 18 0143 706 18 0143 706 18 0143 707 18 0143 707 18 0143 706 18 0143 707 18 0144 707 18 0144 707 18 007 18 00</pre></td> <td>ISN 0129</td> <td>D0 27 1=1.N</td> <td>and a second s</td>	<pre>158 0130 20 27 J=1.0 158 0131 20 075 J=1.0 158 0133 705 J=1.0 17 (17.5E14.7) 706 17 (17.5E14.7) 707 18 0133 706 17 (17.5E14.7) 707 18 0133 706 17 (17.5E14.7) 707 18 0143 706 18 0143 706 18 0143 706 18 0143 707 18 0143 706 18 0143 707 18 0143 707 18 0143 706 18 0143 707 18 0143 706 18 0143 707 18 0143 706 18 0143 706 18 0143 707 18 0143 707 18 0143 706 18 0143 707 18 0144 707 18 0144 707 18 007 18 00</pre>	ISN 0129	D0 27 1=1.N	and a second s
[58 013] 27 0(1.0) = -ATO(1.0) - PA(1.0) [58 0133] 705 F(0(1.1) .LE .0.0) GD T05 [58 0133] 705 F(0(1.1) .LE .0.0) GD T05 [58 0135] 705 F(0(1.1) .LE .0.0) GD T05 [58 0135] 3344 FP3441 (TestAPHIV.XLAM [58 0135] 3344 FP3441 (TestAPHIV.XLAM [58 0135] 1 / (1x.9614.7)) [58 0136] 705 F0441 (TestAPHIV.XLAM [58 0139] 705 F07 0455 [58 0139] 706 F07 0455 [58 0139] 707 F0741 (Total) FG - ND. 0F NE3 MATRICES = •.15) [58 0142] 707 F0741 (Total) FG - ND. 0F NE3 MATRICES = •.15) [58 0142] 707 F0741 (Total) SAL [58 0142] 707 F0741 (Total) FG [58 0142] 701 10 SG [58 0142] 705 F0441 (Total) SAL [58 0142] 741 CLOCK [59 0142] 741 CLOCK [50 0142] <td< td=""><td>15N 0131 27 0(1.1) = -APO(1) - PA(1) 15N 0133 705 FF(0(1.1)E* 0.0) 60 T0 706 15N 0133 705 FF(0(1.1)E* 0.0) 60 T0 706 15N 0133 705 FF(0(1.1)E* 0.0) 60 T0 706 15N 0135 705 FF(0(1.1)E* 0.0) 60 T0 706 15N 0135 710 (17.9)E* 0.0) 60 T0 MATRIX './' EATA-THETA.PHIV.XLAW'.' 15N 0135 706 MC1 = NCT + 1 15N 0140 601 M45 15N 0140 601 M1 M41 0(1.1) NEG - NO. OF NEG MATRIX './ EATA-THETA.PHIV.XLAW'.' 15N 0140 601 T0 9 15N 0140 6110 NEG - NO. OF NEG MATRIX './ EATA-THETA.PHIV.XLAW'.' 15N 0140 601 T0 9 15N 0140 61110 NEG - NO. OF NEG MATRIX './ EATA-THETA.PHIV.XLAW'.' 15N 0140 707 FERMATIN './ EATA-THETA.PHIV.XLAW'.' 15N 0140 707 FERMATIN './ EATA-THETA.PHIV.XLAW'.' 15N 0140 6110 NEG - NO. OF NEG MATRICES = '.15) 15N 0140 6110 NEG - NO. OF NEG MATRICES = '.15) 15N 0140 611</td><td>15.0 0131 27 0(1.0) = -ATO(1.0) - PA(1.0) 15.0 0133 705 15:0 050 170 706 15.0 0133 705 15:0 050 170 706 15.0 0135 705 15:0 050 170 706 15.0 0135 1344 70 9441(1 - 544 40 706 050 70 706 15.0 0135 17 (17-9614.7)) 17 (17-9614.7)) 15.0 0135 17 (17-9614.7)) 17 (17-9614.7)) 15.0 0137 17 (17-9614.7)) 17 (17-9614.7)) 15.0 0137 17 (17-9614.7)) 17 (17-9614.7)) 15.0 0137 160 7045 18 (17-011.1) 15.0 0139 706 Mort = NOT 41 18 (17-011.1) 15.0 0140 707 700 447 10 (11.1) 15.0 0142 707 700 447 10 (11.1) 15.0 0142 707 700 447 10 (11.1) 15.0 0142 701 70 (11.1) 10 (11.1) 15.0 0142 701 70 (11.1) 10 (11.1) 15.0 0142 707 700 447 10 (11.1) 15.0 0142 708 7011 10 (11.1) 15.0 0142 701 70 (11.1) 10 (11.1) 15.0 0142 701 70 (11.1) 10 (11.1) 15.0 0142 701 7</td><td>ISN 0130</td><td>00 27 J=1.N</td><td></td></td<>	15N 0131 27 0(1.1) = -APO(1) - PA(1) 15N 0133 705 FF(0(1.1)E* 0.0) 60 T0 706 15N 0133 705 FF(0(1.1)E* 0.0) 60 T0 706 15N 0133 705 FF(0(1.1)E* 0.0) 60 T0 706 15N 0135 705 FF(0(1.1)E* 0.0) 60 T0 706 15N 0135 710 (17.9)E* 0.0) 60 T0 MATRIX './' EATA-THETA.PHIV.XLAW'.' 15N 0135 706 MC1 = NCT + 1 15N 0140 601 M45 15N 0140 601 M1 M41 0(1.1) NEG - NO. OF NEG MATRIX './ EATA-THETA.PHIV.XLAW'.' 15N 0140 601 T0 9 15N 0140 6110 NEG - NO. OF NEG MATRIX './ EATA-THETA.PHIV.XLAW'.' 15N 0140 601 T0 9 15N 0140 61110 NEG - NO. OF NEG MATRIX './ EATA-THETA.PHIV.XLAW'.' 15N 0140 707 FERMATIN './ EATA-THETA.PHIV.XLAW'.' 15N 0140 707 FERMATIN './ EATA-THETA.PHIV.XLAW'.' 15N 0140 6110 NEG - NO. OF NEG MATRICES = '.15) 15N 0140 6110 NEG - NO. OF NEG MATRICES = '.15) 15N 0140 611	15.0 0131 27 0(1.0) = -ATO(1.0) - PA(1.0) 15.0 0133 705 15:0 050 170 706 15.0 0133 705 15:0 050 170 706 15.0 0135 705 15:0 050 170 706 15.0 0135 1344 70 9441(1 - 544 40 706 050 70 706 15.0 0135 17 (17-9614.7)) 17 (17-9614.7)) 15.0 0135 17 (17-9614.7)) 17 (17-9614.7)) 15.0 0137 17 (17-9614.7)) 17 (17-9614.7)) 15.0 0137 17 (17-9614.7)) 17 (17-9614.7)) 15.0 0137 160 7045 18 (17-011.1) 15.0 0139 706 Mort = NOT 41 18 (17-011.1) 15.0 0140 707 700 447 10 (11.1) 15.0 0142 707 700 447 10 (11.1) 15.0 0142 707 700 447 10 (11.1) 15.0 0142 701 70 (11.1) 10 (11.1) 15.0 0142 701 70 (11.1) 10 (11.1) 15.0 0142 707 700 447 10 (11.1) 15.0 0142 708 7011 10 (11.1) 15.0 0142 701 70 (11.1) 10 (11.1) 15.0 0142 701 70 (11.1) 10 (11.1) 15.0 0142 701 7	ISN 0130	00 27 J=1.N	
150 0133 705 FG0111 -LE 0.00 60 T0 706 150 0133 34 FG0441(1) -LE 0.00 60 T0 706 12 (17, 2614.7) 12 (17, 2614.7) 13 (17, 11, 2614.7) 13 (17, 11, 2614.7) 14 (17, 2614.7) 13 (17, 11, 2614.7) 15 (13) 14 (17, 2614.7) 15 (13) 14 (17, 2614.7) 15 (13) 14 (17, 2614.7) 15 (13) 15 (10, 245 15 (13) 15 (10, 245 15 (13) 17 (17, 2614.7) 15 (13) 16 (11) NEG - NO. OF NEG MATRICK 15 (13) 16 (11) NEG - NO. OF NEG MATRICK 15 (13) 16 (11) NEG - NO. OF NEG MATRICK 15 (13) 16 (11) NEG - NO. OF NEG MATRICK 15 (14) 17 (10) 15 (14) 10 (11) NEG - NO. OF NEG MATRICK 15 (14) 10 (11) NEG - NO. OF NEG MATRICK 15 (14) 10 (11) NEG - NO. OF NEG MATRICK 15 (14) 10 (11) NEG - NO. OF NEG MATRICK 15 (14) 10 (11) NEG - NO. OF NEG MATRICK 15 (14) 10 (11) NEG - NO. OF NEG MATRICK 15 (14) 10 (11) NEG - NO. OF NEG MATRICK 15 (14) 10 (11) NEG - NO. OF NEG MATRI	158 0133 705 FG(0(1) -LE* 0.0) 6D T0 706 158 0133 33440 THETA, PHIV, XLAM 158 0133 33440 THETA, PHIV, XLAM 158 0133 33440 THETA, PHIV, XLAM 168 0133 33440 THETA, PHIV, XLAM 178 0133 33440 THETA, PHIV, XLAM 188 0133 500 TO 445 188 0133 500 TO 445 188 0133 706 FG*43(1) 188 0133 706 TO 445 188 0133 706 FG*43(1) 188 0133 706 FG*43(1) 188 0133 706 FG*43(1) 188 0134 706 FG*43(1) 188 0143 706 FG*43(1) 181 16(6, 707)NG 707 FG*441(1) 181 141 701 11 181 141 445 V11N = V111 181 0143 707 FG*441(1) 181 0143 701 FG*441(1) 181 0144 445 V11N = V111 181 0144 445 V11N = V111 181 0144 441 CLOK 183 0144 FG-441 (1) 184 0144 441 CLOK 184 0144 FG-441 (1) 184 0144 JS*04 (1) 184 0144	705 FG(1(1): J.E. 0.00 50 15N 0135 3345 FG(1(1): J.E. 0.00 50 15N 0135 3345 FG(1(1): J.E. 0.00 50 15N 0137 3345 1 (1x; 9614.2)) 50 15N 0137 3345 1 (1x; 9614.2)) 50 50 15N 0137 10 1 (1x; 9614.2)) 50 50 50 15N 0137 706 60 TO 435 1 1 1 50 50 15N 0138 706 FOT 445 01 1 1 1 1 15N 0140 706 FOT 445 01 1	151 0131	27 0(1, -1) = -ATP(1, -1) - PA(1, -1)	· · · · · · · · · · · · · · · · · · ·
150 0135 WAITE (6:334.0) THE TAUNUY, KAM 150 0135 334.7 FORMATE RS OF P.WATRIX *./ CATA-THETA, PHIV, KLAW./ 150 0137 00 481 17 (17.9614.7)) 17 (17.9614.7)) 150 0137 00 481 17 (17.9614.7)) 17 (17.9614.7)) 150 0139 01 481 150 0139 WOT = NCT + 1 150 0140 O(10.1) NEG NO. OF NEG MATRIX *./ CATA-THETA, PHIV, KLAW.// 150 0140 O(10.1) NEG NO. OF NEG MATRIX *./ CATA-THETA, PHIV, KLAW.// 150 0140 O(10.1) NEG NO. OF NEG MATRIX *./ CATA-THETA, PHIV, KLAW.// 150 0140 O(10.1) NEG NO. OF NEG MATRIX *./ CATA-THETA, PHIV, KLAW.// 150 0140 O(10.1) S. 150 0142 CALL CLOCK 150 0142 CALL DSPCH(VWINH: S.C.JSUE) 150 0142 CALL CLOCK 150 0142 CALL CLOCK 150 0142 CALL CLOCK 150 0142 CALL CLOCK 150 0142 CALL CLOCK </td <td>158 0135 WATEF(6:334.1 THETA, PHLV, KLAW.) 158 0135 11 (113.9614.71) DAAMTRIX (DATA-THETA, PHLV, KLAW.) 158 0135 12 (113.9614.77) D SAAMTRIX (DATA-THETA, PHLV, KLAW.) 158 0135 12 (113.9614.77) D SAAMTRIX (DATA-THETA, PHLV, KLAW.) 158 0135 12 (113.9614.77) D SAAMTRIX (DATA-THETA, PHLV, KLAW.) 158 0136 706 MCT = NCT + 1 WATEF(6.707)NCT 158 0143 707 FORMAT(01(11) NEG NO. OF NEG MATRICES = •.15) Material Research of Research of</td> <td>150 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res ATA 150 0135 Warte (A. Savatere Res ATA 150 0141 Barte (A. Savatere Res ATA 150 0142 Call Clock 150 0142 Call Clock 150 0143 Call Clock 150 0143 Call Clock 150 0144 Josoff (FT JW 150 0145 Call Clock 150 0145 Call Clock 150 0144 Josoff (FT JW 150 0145 Call Clock 150</td> <td>SETO NST</td> <td></td> <td></td>	158 0135 WATEF(6:334.1 THETA, PHLV, KLAW.) 158 0135 11 (113.9614.71) DAAMTRIX (DATA-THETA, PHLV, KLAW.) 158 0135 12 (113.9614.77) D SAAMTRIX (DATA-THETA, PHLV, KLAW.) 158 0135 12 (113.9614.77) D SAAMTRIX (DATA-THETA, PHLV, KLAW.) 158 0135 12 (113.9614.77) D SAAMTRIX (DATA-THETA, PHLV, KLAW.) 158 0136 706 MCT = NCT + 1 WATEF(6.707)NCT 158 0143 707 FORMAT(01(11) NEG NO. OF NEG MATRICES = •.15) Material Research of	150 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res OF P. WATRIX *./* CATA-THETA.PHIV.KLAW*/ 150 0135 Warte (A. Savatere Res ATA 150 0135 Warte (A. Savatere Res ATA 150 0141 Barte (A. Savatere Res ATA 150 0142 Call Clock 150 0142 Call Clock 150 0143 Call Clock 150 0143 Call Clock 150 0144 Josoff (FT JW 150 0145 Call Clock 150 0145 Call Clock 150 0144 Josoff (FT JW 150 0145 Call Clock 150	SETO NST		
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2552 FOUMAT(* WE HAVE AN IMPROVEMENT AT NCUE = 1,157). #Rite(6,5300) ((a(1,J),J=1,9),(I=1,0) 5000 Foumat(iH / 1x,1iH - A-MATRIX /(1x,5F13,6.))	WRITE(6.5001) (F(1).1=1.9) 5001 FORMAJT(1H / 1X,12H F(X)-VECTJP / 1X,9ELZ.¢) worte(6.004) off of (1) (1 / 1X,0ELZ.¢)	9061 FORMATCH-10X, DETERMINANI_DE_P-MATRIX =1.514.771) WRITE(6,9756 0766 FORMATCH / IV.364 - 0 FORM DUTING D INIC -ATD-DA = 0 - 771	241 WRITE(6,2263) (2(1,J),J=1,N)	<pre>2955 FUXMAT(IF / LX+VEL4+/) / J=L49) / L=L49) / (C(L+J),J=L49) / (CLAA) / (C(L+J),J=L49) / (CLAA) / (CLAA)</pre>	100 FORMAT(IH /IX, 16H LIAPUNGV FCT = E14.7 // 1 1 IX:X:16H LIAPUNGV FCT = E14.7 // 1 IX:X:1 IX:X:1 IX:X:X:X:X:X:X:X:X:X:X:X:X:X:X:X:X:X:X:	WRITE(6,560) P.PSP.	SBO FURMAIN PETELASKASONAPSHE FELASKAND C 2600 IS THE SIZE DUNCH 375 FERNIFERD S5000 GC TO DOCH		BUNCH(NOUE (2) = VCL	BUNCH(NCUE, 2) = DET BUNCH(NCUE, 5) = P		376 IF(NCUE = NCUE = 1 NCUE = NCUE = 1	IF(NUKEY•NE.e.) 60 TC 4	ο 13 μ = 13 ο. Λοιτ - 13 ο.	WRITE(6,570) PSP	570 FURMAT(* P-STAR = *,E14.7/) e erro - erroteet	A 2192 2 900 107 381	2503 FOPMAT(' \$IGMA-SQUARED = ',EI4.Z/Z)	$P_{X}(I) = P_{O}M(GM)$	XLUV # 114.4.8.48X(I) IEXXIIV-JE-0.01 GD TO 3415	$\mathbf{NUTU}(\mathbf{I}) = \mathbf{I}$		5413 NOTOLI 2 =−1 .9 @U(1) =0EXP(-RX([)**2/SIG2) * NUTU(1)	C)54,1=1,)1(UD()055,6(ET 560 FORMAT(* DU = * //(1X.9E13.6/))	905 CONTINUE	MOVF = MOVE + 1	TE (NOUE-45F NSW) COTTO 2005 Ferminy Structure 10 2055		MUVE H () Te verter for very five to occurrence of the	IT (UIVIELE-CORTEDIVE - VORS AD TO DISE
ISN 0152 ISN 0153 ISN 0153	15N 0155 15N 0155 15N 0156	ISN 0158	ISN 0161	152 0165 152 0164	ISN 0167	ISN 0168	15N 0170	ISN 0172	ISN 0174	ISN 0175 ISN 0176	ISN 0177	ISN 0178	IS10 NSI	ISN 0183	1 ISN 0185	ISN 0186	SOTO NET	ISN 0189 ISN 0190	1510 NS1	ISN 0142	15N 0195	10 NSI	2610 NSI	15N 0100	ISN 0200	15N 0201	15N 0202	ISN 0200	15N 0207	107 0700 101 0010

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ISN 0213		DIVI = d.+ DIVIO		
ISN 0214		O I V I O = O I V I		
ISN 0215		MOVE = 0		an a shara na ta ta ta an an-Anda a
ISN 0216		IF (DIVI.GT.64.) DIVI = 64.		
ISN 0218	2166	CONTINUE		
	c	IVID)2332,6(ETI RW (5612	
ISN 0219	2332	FORMAT(• DIVI = • • E20+7 /)	xx	
ISN 0220			XX	
ISN 0221	10	DU(T) = XUTM * DU(T)/DTVT	TIT	
ISN 0222	······································		111	na na an a
ISN 0222	12		111	
15 4 0225				
15N 0224	1.6			
151 0225		DO(1) = PREIM + DO(1)/DIVI	111	and a second
	C C	754,1=1,71(UU(7005,0(E)1 KW		
ISN 0226		<u>50 20 1=1,9</u>		
ISN 0227	665	X INC(I) = EX(I) + DU(I)	III	
ISN 0228		IF(XINC(I).LT.XLLIW) GD TC 209	I LL	and the second
ISN 0230		OU(I) = 0.5 * OU(I)	III	
ISN 0231		GO TO 665	111	and the second
ISN 0232	209	IF(XINC(I).LT9.2) XINC(I)=-9.2		
ISN 0234	20	XLAM(I) =DEXP(XINC(I))	III	
ISN 0235	665	D0 30 I=1.28	III	
ISN 0235		IP = I+9	III	
ISN 0237	52	THETA(I) = THETP(I) + DU(IP)		a a constant a strandit a
ISN 0238		IE DABS(THETA(I)), IT PI) GD TO 30		
ISN 0240		THETA(1) = THETA(1) = $DU(1D)$		a sana kan sa
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ISN 0242	70		1.1.1	
ISN 0243	.50			the second se
15N 0244			111	
ISN 0245			111	and the second
ISN 0246	62	PHIV(I) = PHIVP(I) + DU(IP)	111	
ISN 0247		IF(DABS(PHIV(I)).LT.PI) GC TO 40	••••••••••••••••	بالتحاف ومستحسر المحامة المتعول عيوا المحاد موسمحسون المحاد المردان
ISN 0249		PHIV(I) = PHIV(I) - DU(IP)		
ISN 0250	5,4	OU(IP) = 0.5 * DU(IP)	III	ana ang ang ang ang ang ang ang ang ang
ISN 0251		GD TO 62	111	
ISN 0252	40	CONTINUE	III	
	c)54.1=1.)1(UD()065.6(ETI RW		
ISN 0253		IF{KIKIT.GT.0) GD TC 50	III	
ISN 0255	- marine	DO 71 I=1,5	III	nan ina oraș colorăși - acteră completa cample a - cample entre di aceleratana cample entre de ac
ISN 0255		$PHIV(\mathbf{I}) = 0.0$	111	
ISN 0257	71	THETA(I) = 0.0	111	
ISN 0258		DD 72 I=8.12	8 5 5	
ISN 0250	70	THETA(1) = 0.0	111	• ··· · · · · · · · · · · · · · · · · ·
15N 0259			111	
13N 0200				a a a a a a a a a a a a a a a a a a a
151 0201	13	$\frac{1}{1} = \frac{1}{1} = 0$	111	
ISN 0262		$(FE(\mathbf{A}(23)=0,0)$	111	and the second se
ISN 0263		THETA(24) = 0.0	111	
ISN 0264		D0 74 I=26,27	III	
ISN 0265	74	TFFTA(I) = 0.0	TTT	
ISN 0264		P+IV(6) =0.0	TII	
ISN 0267		THÊTA(28) = THETA(22)	IÌI	
ISN 0268		PHIV(7) = THETA(21)	III	
ISN 0269		PHIV(9) =THETA(26)	111	· · ·
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3433 FONT(1 · VS1 =: E[1,7, 1, PSR =: E[1,7, 1) 11 1.V* = 1,VI VY1 = 0,VI 0.VY1 = 0,VI 11 0.VY1 = 0,VI 11 1.V* = 1,VI 11 0.0 31 = 1,0 11 1.0 11 = 0,VI(1) 11 1.0 0,011 = 0,VI(1) 11 1.0 0,011 = 0,VI(1) 11 1.0 0,011 = 0,VI(1) 11 1.1 0,011 = 1,VI(1) 11 1.1 0,011 = 1,V	3433 #FEGGG SACATVSSLEER #.E.E.E.A.7. NER #.E.E.A.7. N	2 300 PSP # P 2 VOI		2		<u>٢</u>
343 5000471(* VS* =*.E14.7.*. PSR = *.E14.7.7.) 11 1007 1007 10 1010 11 11 1011 1007 10 1011 11 11 1011 11 11 111 11 11 </td <td>343 FOMAT(1) VYS • ElA+7.1. PSR = • ELA+7.0. III 20VE = 0.01 0.010 = 10.01 XX XX 1310 = 11.9 0.101 = 0.01 XX XX 1310 = 11.9 0.001 = 0.01 XX XX 1310 = 11.9 0.001 = 0.000 XX XX 130 Abstrib = XX(1) 111 111 111 131 Abstrib = XX(1) 111 111 111 130 Duptoil = 1.8 111 111 111 130 PUTOIL = 1.8 111 111 111 130 PUTOIL = 1.8 111 111 111 130 PUTOIL = 1.8 111 111 111 131 PUTOIL = 1.8 111 111 111 130 PUTOIL = 1.8 111 111 111 111 131 PUTOIL = 1.8 111 111 111 111 111 141 PUTOIL = 1.8 111 111 111 111 111 151 PUTOIL = 1.8 111 111 111 111 111 151 PUTOIL = 1.8 111 111 111 111</td> <td>9 WRITE(6,3443)V9</td> <td>SR+PSR</td> <td></td> <td>nan an ann ann ann ann ann ann ann ann</td> <td>ander of the state of the state</td>	343 FOMAT(1) VYS • ElA+7.1. PSR = • ELA+7.0. III 20VE = 0.01 0.010 = 10.01 XX XX 1310 = 11.9 0.101 = 0.01 XX XX 1310 = 11.9 0.001 = 0.01 XX XX 1310 = 11.9 0.001 = 0.000 XX XX 130 Abstrib = XX(1) 111 111 111 131 Abstrib = XX(1) 111 111 111 130 Duptoil = 1.8 111 111 111 130 PUTOIL = 1.8 111 111 111 130 PUTOIL = 1.8 111 111 111 130 PUTOIL = 1.8 111 111 111 131 PUTOIL = 1.8 111 111 111 130 PUTOIL = 1.8 111 111 111 111 131 PUTOIL = 1.8 111 111 111 111 111 141 PUTOIL = 1.8 111 111 111 111 111 151 PUTOIL = 1.8 111 111 111 111 111 151 PUTOIL = 1.8 111 111 111 111	9 WRITE(6,3443)V9	SR+PSR		nan an ann ann ann ann ann ann ann ann	ander of the state
Image: Sector State Image: Sector State<	LAVE = LAV1 LAVE = LAV1 L1 LAVE = LAV1 L1 L1 <tdl1< td=""> L1 L1</tdl1<>	0 3443 FORMAT(• VSR =	:••E14.7. * PSR = *•E14.7 /)	a a a a a a a a a a a a a a a a a a a	To the set to defend a second set of the second second set of the second se	
3 DVVI = DVVI 1 SVI = DVV	11V1 = 0V10 11V1 = 0V10 110 XLAND101 = XLAND1 111 XLAND101 = XLAND101 111 XLAND101 = XLAND101 111 XLAND101 <td>21 LAY = LAY+1 22 MAVE - 0</td> <td></td> <td>111</td> <td></td> <td>Ļ</td>	21 LAY = LAY+1 22 MAVE - 0		111		Ļ
10 Luiva = 1. 11 Luiva = 1. 12 Studefil = buods(xLAM(1)) 13 Studefil = huta(1) 14 Studefil = huta(1) 15 Studefil = huta(1) 16 Studefil = huta(1) 17 Studefil = huta(1) 18 Studefil = huta(1) 19 Studefil = huta(1) 11 Studefil = huta(1) 11 Studefil = huta(1) 12 Studefil = huta(1) 13 Studefil = huta(1) 14 Studefil = huta(1) 15 Studefil = huta(1) 16 Studefil = huta(1) 17 Studefil = huta(1) 18 Studefil = log 19 Studefil = log 10 Studefil = log 11 Studefil = log 12 Studefil = log 13 Studefil = log 14 Studefil = log 15 Studefil = log 16 Studefil = log 17 Studefil = log 18 Stu	1 U(M) = 1, 30 310 F1.9 310 F.X.MOT) = PLOK(M.AM(1)) 310 F.X.MOT) = PLOK(1) 311 F.X.MOT) = PLOK(1) 312 F.X.MOT) = PLOK(1) 313 F.X.MOT) = PLOK(1) 314 F.X.MOT) = PLOK(1) 315 F.X.MOT) = PLOK(1) 310 F.X.MOT) = PLOK(1) 310 F.X.MOT) = PLOK(1) 311 F.X.MOT) = PLOK(1) 312 F.X.MOT) = PLOK(1) 313 F.X.MOT) = PLOK(1) 314 F.X.MOT) = PLOK(1) 315 F.X.MOT) = PLOK(1) 316 F.X.MOT) = PLOK(1) 317 F.X.MOT) = PLOK(1) 318 F.X.MOT) = PLOK(1) 319 F.X.MOT) = PLOK(1)	$\frac{1}{3} \qquad DIVI = DIVIO$	Van	YY		
5 501310 [=1:9] 111 7 310 23:0 [=1:9] 111 9 320 [=1:9] 111 9 320 [=1:9] 111 130 PHYPE(1) = THETA(1) 111 111 130 PHYPE(1) = PHYCH PHI-EPHYE(1):1=1.29)(THETP(1):1=1.29)(THETP(1).1:1.1,0) 111 130 PHYPE(1) = PHYCH PHI-EPHYE(1):1=1.29)(THETP(1):1=1.29)(THETP(1).1:1.1,0) 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 111 </td <td>D D D D LUC (KLAMIL) I EX(1) = bLOG(KLAMIL) D S20 [H1701] = HE[AC(1) D S20 [H1701] = HE[AC(1) D S20 [H1701] = HE[AC(1), [H1,29], [H1Y2(1), [H1,29], [H1Y2(1), [H1,9]] D S20 [H1701] = 1.8 D S20 [H1701] = 1.8 D S20 [H1701] = 1.13 S50 FORMATT 'KLAMPID) S00(1) + 01VT /ALLW H1101 [H1702] = 1.13 D D0101 = [L+14/A-1) S00(1) + 01VT /ALLW H111 [H1702] = 1.13 D D0101 = [L+14/A-1) S00(1) + 01VT /ALLW H111 [H1702] = 1.13 D D0101 = [L+14/A-1) S00(1) + 01VT /ALLW H111 [H1702] = 1.13 D D0101 = [L+14/A-1) S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0100 = 05 D D0100 = 1.14 H111 [H1702] = 1.14 D D0100 = 05 D D0100 = 05 D D0100 = 05 D D0100 = 1.14 H111 [H1702] = 1.14 D D0100 = 1.14 H111 [H1702] = 1.14 H111 [H170</td> <td>$4 \qquad \qquad LMIN = 1$</td> <td></td> <td>111</td> <td></td> <td></td>	D D D D LUC (KLAMIL) I EX(1) = bLOG(KLAMIL) D S20 [H1701] = HE[AC(1) D S20 [H1701] = HE[AC(1) D S20 [H1701] = HE[AC(1), [H1,29], [H1Y2(1), [H1,29], [H1Y2(1), [H1,9]] D S20 [H1701] = 1.8 D S20 [H1701] = 1.8 D S20 [H1701] = 1.13 S50 FORMATT 'KLAMPID) S00(1) + 01VT /ALLW H1101 [H1702] = 1.13 D D0101 = [L+14/A-1) S00(1) + 01VT /ALLW H111 [H1702] = 1.13 D D0101 = [L+14/A-1) S00(1) + 01VT /ALLW H111 [H1702] = 1.13 D D0101 = [L+14/A-1) S00(1) + 01VT /ALLW H111 [H1702] = 1.13 D D0101 = [L+14/A-1) S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0101 = [L+14/A-1] S00(1) + 01VT /ALLW H111 [H1702] = 1.14 D D0100 = 05 D D0100 = 05 D D0100 = 1.14 H111 [H1702] = 1.14 D D0100 = 05 D D0100 = 05 D D0100 = 05 D D0100 = 1.14 H111 [H1702] = 1.14 D D0100 = 1.14 H111 [H1702] = 1.14 H111 [H170	$4 \qquad \qquad LMIN = 1$		111		
31 51 51 51 51 51 51 51 51 53 51 53 54 54 54 54 54 54 54 55 55 55 55 55 55 55 55 55 55 55 56 56 56 56 56 56 57 56 56 56 57 56 56 56 56 56 57 56 56 56 56 56 56 57 56 57 56 56 56 56 57 56 57 57 57 57 57 57 57 57 57 57 57 57 57 57 57 57 57 57 <td< td=""><td>310 KANF(1) = ALAM(1) 320 FFEP(1) = LAG(1) 330 FFEG(1) = LAG(1) 330 FFEG(1) = LAG(1) 330 FFEG(2) = LAG(1) 310 EQU(1) = LAG(1) 310 DO(2) = LAG(1) 310 DO(2) = LAG(1) 310 DO(3) = LAG(1) 310</td><td>5 DG 310 I=1,9</td><td></td><td>11</td><td>n e veneral e se a companya de la co</td><td>\bigcirc</td></td<>	310 KANF(1) = ALAM(1) 320 FFEP(1) = LAG(1) 330 FFEG(1) = LAG(1) 330 FFEG(1) = LAG(1) 330 FFEG(2) = LAG(1) 310 EQU(1) = LAG(1) 310 DO(2) = LAG(1) 310 DO(2) = LAG(1) 310 DO(3) = LAG(1) 310	5 DG 310 I=1,9		11	n e veneral e se a companya de la co	\bigcirc
0 320 T=1.28 1 330 THE (0:1 = 1+8 1 330 FHT (0:1 = 1+8 1 330 FHT (0:1 = 1+8 1 350 FGWATT * XLAM-PATHE • THETA-PATHE • PHI-PATHE • //IX.0E13.6/1) 1 355 FGWATT * XLAM-PATHE • THETA-PATHE • PHI-PATHE • //IX.0E13.6/1) 1 555 FGWATT * XLAM-PATHE • THETA-PATHE • PHI-PATHE • //IX.0E13.6/1) 1 10 0 1 = 1.9 1 00 0 1 = 1.9 1 10 0 1 = 1.9 1 01 0 1 = 1.9 1 11 1 1 11 1 1 11 1 1 11 1 1 12 2.**(LAY-1))*DU(1) * DIVI //LLW 1 11 1 1 12 2.**(LAY-1))*DU(1) * DIVI //LLW 1 11 1 10 0 20 1 1 = 10.37 10 0 320 1 = 10.37 10 0 320 1 = 10.37 10 0 320 1 = 10.37 10 0 10 1 = (2 **(LAY-1))*DU(1) * DIVI //LLW 11 0 0 0 1 1 = (2 **(LAY-1))*DU(1) * DIVI //LLW 11 0 0 0 1 1 = (2 **(LAY-1))*DU(1) * DIVI //LLW 11 0 0 1 1 = (2 **(LAY-1))*DU(1) * DIVI //LLW 11 0 0 0 1 1 = (2 **(LAY-1))*DU(1) * DIVI //LLW 11 0 0	00 320 1=1.28 1 330 1=1.16 1 330 1=1.16 1 330 1=1.16 1 330 1=1.16 1 330 1=1.16 1 300 10.11 1.11 1 300 10.01 1.11 1 300 10.01 1.11 1 10.011 2.4*4(LA'-1))*0U(1) * 01V1 XLIN 1 11.1 11.1 11.1 1 11.1 11.1 11.1 1 11.1 1.11 11.1 1 11.1 1.11 1.11 1 11.1 1.11 1.11 1 1.11 1.11 1.11 1 1.11 1.11 1.11 1 1.11 1.11 1.11 1 1.11 1.11 1.11 1 1.11 1.11 1.11 1 1.11 1.11 1.11 1 1.11 1.11 1.11	$\frac{1}{2} = \frac{1}{2} = \frac{1}$	(1))		a de la companya de l	
320 THEFP(I) = THETA(I) 111 330 PHIVE(I) = PHIV(I) 111 350 PHIVE(I) = (1 + 1) 111 350 PHIVE(I) = (2 + 4(LAV-1))*DU(I) * DIVI / XLLIW 111 710 D0 320 I = 10, 37 110 V / XLLIW 711 PHIVE 1 = 2 + 4(LAV-1))*DU(I) * DIVI / YLLIW 712 PHIVE 1 = 2 + 4(LAV-1))*DU(I) * DIVI / YLLIW 713 DU(I) = (2 + 4(LAV-1))*DU(I) * DIVI / YLLIW 111 714 PHIVE 1 = 2 + 4(LAV-1))*DU(I) * DIVI / YLLIW 715 DU(I) = (2 + 4(LAV-1))*DU(I) * DIVI / YLLIW 111 715 DU(I) = (2 + 4(LAV-1))*DU(I) * DIVI / YLLIW 111 715 DU(I) = (2 + 4(LAV-1))*DU(I) * DIVI / YLLIW 111 715 DU(I) = (2 + 4(LAV-1))*DU(I) * DIVI / YLLIW 111 715 DU(I) = (2 + 4(LAV-1))*DU(I) * DIVI / YLLIW 111 715 DU(I) = (2 + 4(LAV-1))*DU(I) * DIVI / YLLIW 111 716 DU(I) = (2 + 4(LAV-1))*DU(I) * DIVI / YLLIW 1	320 THEFA(1) 111 330 PHYVE(1) = PHYVE(1) 111 550 POINT(5:5) = NHYC(1) 111 510 DU(1) = (2.**(LAY-1))*DU(1) * DI(1/THL1W 111 510 DU(1) = (2.**(LAY-1))*DU(1) * DU(1) 111 510 DU(1) = (2.**(LAY-1))*DU(1) 111	8 DO 320 I=1,28				
330 PHUPG(1) = PHUC(1) 111 111 550 PHUPG(1) = PHUC(1) 111 + PHUC(1) 111 550 DO MAD (1 × LAW-PRIME • THETA-PRIME • PHI-PRIME • /(1×,9613.6/1)) 111 550 DO MAD (1 = (2,**(LAY-1))*BU(1) * DIVI //HILW 111 550 DU (1) = (2,**(LAY-1))*BU(1) * DIVI //HLLW 111 550 DU (1) = (2,**(LAY-1))*BU(1) * DIVI //HLLW 111 570 DU (1) = (2,**(LAY-1))*BU(1) * DIVI //HLLW 111 530 DU (1) = (2,**(LAY-1))*BU(1) * DIVI //HLLW 111 530 DU (1) = (2,**(LAY-1))*BU(1) * DIVI //HLLW 111 530 DU (1) = (2,**(LAY-1))*BU(1) * DIVI //HLLW 111 530 DU (1) = (2,**(LAY-1))*BU(1) * DIVI //HLLW 111 530 DU (1) = (2,**(LAY-1))*BU(1) * DIVI //HLLW 111 530 DU (1) = (2,**(LAY-1))*BU(1) * DIVI //HLLW 111 540 DU (1) = (2,**(LAY-1))*BU(1) * DIVI //HLLW 111 590 CU (1) = (2,**(LAY-1))*BU(1) * DIVI //HLLW 111 590 DU (1) = (2,**(LAY-1))*BU(1) * DIVI //HLLW 111 715 FOPMAT(1)O ZA) X X 715 FOPMAT(1)O ZA) BU (1 O ZA) X 800 CONTRUE 102 X X 801 FE (6,191) ALP (1), J=1,18) 111 X 111	330 PHYP(I) = JATV(I) 111 550 FORMAT(I) XLAMPRILI).1=1.9D.ITHETE(I).1=1.2B).EFHYPE(I).1=1.9D.III 111 550 FORMAT(I) XLAMPRILI).1=1.9D.ITHETE(I).1=1.2B).EFHYPE(I).1=1.9D.III 111 610 DU(1) = (1.2.44(-1)).4DU(1) & DIVI / XLL/W FHI-PPRIME_Y/(IX.9E13.6/1) 111 7 90 00 20 1 = 10.7 XLAMPRILI 111 7 90 00 20 1 = 10.7 XLLIP 111 7 90 300 1 = 10.7 XLAL 111 80 0010 1 = (2.44(-1))+DU(1) & DIVI / FHLIN 111 111 80 0011 1 = (2.44(-1))+DU(1) & DIVI / FHLIN 111 111 80 0011 1 = (2.44(-1))+DU(1) & DIVI / FHLIN 111 X 80 0011 1 = (2.44(-1))+DU(1) & DIVI / FHLIN 111 X 80 0011 1 = (2.44(-1))+DU(1) & DIVI / FHLIN X X 80 0011 0 = (2.44(-1))+DU(1) & DIVI / FHLIN X X 80 011 0 = (2.44(-1))+DU(1) & DIVI / FHLIN X X 80 011 0 = (2.44(-1))+DU(1) & DIVI / FHLIN X X 80 011 0 = (2.44(-1))+DU(1) & DIVI / FHLIN X X 80 011 0 = (2.44(1)/2)-J-J+1(2) X X X 80 011 0 = (2.44(1)/2)-J+1(2) X X X	9 320 THETP(I) = THET	(I) V	III		
w71TE(6:550)(X.AMP(I).I=1.9).(THEIP(I).I=1.29).(EHIVP(I).I=1.9) III 550 FGNART(* XLAM-PRIME THETA-PRIME PHI-PPINE'/(IX.9EI3.6/1) 510 D0(1) = (2 + *(LAY-1))*DU(I) * DIVI /XLLIW III 520 D0(1) = (2 + *(LAY-1))*DU(I) * DIVI /XLLIW III 570 D0(1) = (2 + *(LAY-1))*DU(I) * DIVI /XLLIW III 570 D0(1) = (2 + *(LAY-1))*DU(I) * DIVI /XHLIW III 570 D0(1) = (2 + *(LAY-1))*DU(I) * DIVI /XHLIW III 570 D0(1) = (2 + *(LAY-1))*DU(I) * DIVI /YHLIW III 570 D0(1) = (2 + *(LAY-1))*DU(I) * DIVI /YHLIW III 570 D0(1) = (2 + *(LAY-1))*DU(I) * DIVI /YHLIW III 570 D0(1) = (2 + *(LAY-1))*DU(I) * DIVI /YHLIW III 570 D0(1) = (2 + *(LAY-1))*DU(I) * DIVI /YHLIW III 570 D0(1) = (2 + *(LAY-1))*DU(I) * DIVI /YHLIW X 715 GPNATICON X X 715 GPNATICON X X 715 GPNATICON X X 716 GPNATICON X X 717 GPNATICON X X 718 GPNATICON X X 719 GPNATICON X X 710 GPNATICON X X 8600 FORMATICON <td>w Pire(1,550)(KLAMP(I),I=1,9), THETP(I),I=1,29), (EHTVP(I),I=1,8) III 550 FONATI (* XLAM-PRIME • THETAPRIME • PHI-ERIME'//(IX.9E13.6/1)) III 500 01 01 1 = (2.**(LAY-1))*DU(I) * DIVI / XLLIV III 710 00 01 1 = (2.**(LAY-1))*DU(I) * DIVI / THLIV III 720 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV III 730 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV III 730 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV III 730 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV III 730 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV III 730 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV X 730 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV X 731 0005 X X 735 00005 X X 735 0005</td> <td>310 230 1= 118 330 DHIVD(11 = DHIV</td> <td>and the second second</td> <td>TTT</td> <td></td> <td></td>	w Pire(1,550)(KLAMP(I),I=1,9), THETP(I),I=1,29), (EHTVP(I),I=1,8) III 550 FONATI (* XLAM-PRIME • THETAPRIME • PHI-ERIME'//(IX.9E13.6/1)) III 500 01 01 1 = (2.**(LAY-1))*DU(I) * DIVI / XLLIV III 710 00 01 1 = (2.**(LAY-1))*DU(I) * DIVI / THLIV III 720 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV III 730 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV III 730 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV III 730 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV III 730 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV III 730 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV X 730 0U(I) = (2.**(LAY-1))*DU(I) * DIVI / THLIV X 731 0005 X X 735 00005 X X 735 0005	310 230 1= 118 330 DHIVD(11 = DHIV	and the second	TTT		
550 FORMAT(* XLAM-PRIME • THETA-PRIME • PH1-BRIME • V(11X:9E13.5/1) 111 610 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 111 750 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 111 820 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 111 830 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 111 830 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 111 840 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 111 830 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 111 840 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 111 860 DO OSONTINUE X X 1000 CONTINUE 110 ZN) X X 1111 CONTINUE 111 CONTINUE X X 1000 CONTINUE 111 CONTINUE X X 1111 CONTINUE 111 CONTINUE X X <tr< td=""><td>50 FGRAAT(*XAM-PRIME • THETA-PRIME • PHI-DETIME*//(IX.9E13.6/1) 111 61 00 310 1 = 10.37 12.**(LAV-1))*DU(1) * DIVI /THLIN 111 70 00 10 2 1 = 2.**(LAV-1))*DU(1) * DIVI /THLIN 111 82 00 10 32 1 = 38.45 13.36.7 111 83 00 11 = (2.**(LAV-1))*DU(1) * DIVI /THLIN 111 83 00 11 = (2.**(LAV-1))*DU(1) * DIVI /THLIN 111 83 00 11 = (2.**(LAV-1))*DU(1) * DIVI /THLIN 111 83 00 11 = (2.**(LAV-1))*DU(1) * DIVI /THLIN 111 83 00 11 = (2.**(LAV-1))*DU(1) * DIVI /THLIN 111 83 00 11 = (2.**(LAV-1))*DU(1) * DIVI /THLIN 111 84 00 10 905 1**(LAV-1))*DU(1) * DIVI /THLIN 84 00 10 905 1**(LAV-1))*DU(1) * DIVI /THLIN 89 01 10 905 1**(LAV-1))*DU(1) * DIVI /TLLIN 80 10 10 20 1**(LAV-1))*DU(1) * DIVI /TLLIN 80 11 905 1**(LAV-1))*DU(1) * DIVI /TLLIN 80 11 905 1**(LAV-1))*DU(1) * DIVI /TLLIN 80 11 905 1**(LAV-1))*DU(1) * DIVI /TLLIN 80 11 91 1**(LAV-1) 80 11 91 1**(LAV-1) 80 11 91 1**(LAV-1) 80 11 91 1**(LAV-1) 80 11 91 1**(</td><td>WRITE (5+550) (XL</td><td>AMP(I), I=1,9), (THETP(I), I=1,28), (FHIVP(I), I=1,8)</td><td>न हैन हर हैन स</td><td> A set of the set of</td><td></td></tr<>	50 FGRAAT(*XAM-PRIME • THETA-PRIME • PHI-DETIME*//(IX.9E13.6/1) 111 61 00 310 1 = 10.37 12.**(LAV-1))*DU(1) * DIVI /THLIN 111 70 00 10 2 1 = 2.**(LAV-1))*DU(1) * DIVI /THLIN 111 82 00 10 32 1 = 38.45 13.36.7 111 83 00 11 = (2.**(LAV-1))*DU(1) * DIVI /THLIN 111 83 00 11 = (2.**(LAV-1))*DU(1) * DIVI /THLIN 111 83 00 11 = (2.**(LAV-1))*DU(1) * DIVI /THLIN 111 83 00 11 = (2.**(LAV-1))*DU(1) * DIVI /THLIN 111 83 00 11 = (2.**(LAV-1))*DU(1) * DIVI /THLIN 111 83 00 11 = (2.**(LAV-1))*DU(1) * DIVI /THLIN 111 84 00 10 905 1**(LAV-1))*DU(1) * DIVI /THLIN 84 00 10 905 1**(LAV-1))*DU(1) * DIVI /THLIN 89 01 10 905 1**(LAV-1))*DU(1) * DIVI /TLLIN 80 10 10 20 1**(LAV-1))*DU(1) * DIVI /TLLIN 80 11 905 1**(LAV-1))*DU(1) * DIVI /TLLIN 80 11 905 1**(LAV-1))*DU(1) * DIVI /TLLIN 80 11 905 1**(LAV-1))*DU(1) * DIVI /TLLIN 80 11 91 1**(LAV-1) 80 11 91 1**(LAV-1) 80 11 91 1**(LAV-1) 80 11 91 1**(LAV-1) 80 11 91 1**(WRITE (5+550) (XL	AMP(I), I=1,9), (THETP(I), I=1,28), (FHIVP(I), I=1,8)	न हैन हर हैन स	 A set of the set of	
810 DU(1) = (2.**(LA'-1))*DU(1) * DIVI /XLLIW 100 820 I = 10.37 100 820 I = 10.37 111 111 111 111	<pre>810 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /XLIW II 0 0 320 1 = 10.37 720 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW III 930 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW III 940 CL RAMOUT DUM 950 CL RAMOUT DUM 715 FOPMATTING (10 21) 715 FOPMATTING (10 21) 717 FOPTORANCE (12 2) (10 200 718 FIE(6.1991) (ALL/1) -11.10 719 FOPMATTING (10 21) 711 FIE(6.1991) (ALL/1) -11.10 711 FIE(6.1991) (A</pre>	S SSO FORMAT(* XLAM-	PRIME • THETA-PRIME • PHI-PRIME*//(1X,9E13.6/	111 (Ļ
D0 820 I = 10.37 THLIW D0 01(I) = [2.**(LAY-1))*DU(I) * DIVI /THLIW III D0 30 I = 38.45 III D0 01(I) = [2.**(LAY-1))*DU(I) * DIVI /THLIW III D1 00 30 I = 38.45 III S0 01(I) = [2.**(LAY-1))*DU(I) * DIVI /FHLIW III S9 GLL RDMOUT(DUM) III S9 GLL RDMOUT(DUM) III S9 GLL RDMOUT(DUM) X WRITE(6.713) UUK X 100 CONTINUE X 100 CONTINUE X 100 CONTINUE X 111 X.PERFORMACE*.12X.UIVENE X 111 X.PERFORMACE*.12X.UIVSON*.1/1 X 111 X.PERFORMACE*.12X.UIVSON*.1/1 X 200 FULMEXTINE*.114.7.00X.FI4.7.00X.F14.7.7.00X.F14.7.00X	D0 820 I = 10.37 111 820 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 111 0 330 I = 384.5 111 830 DU(1) = (2.**(LAY-1))*DU(1) * DIVI / THLIW 111 990 GL D 905. 12.**(LAY-1))*DU(1) * DIVI / THLIW 111 990 CAL POMOUT DUM) 111 111 991 CANTING 1102 111 991 CANTING 111 111 991 CANTING 1102 1112	6 810 DO(1) = (2,***(1)	AY-1))*DU(I) * 01VI /XLLIN	III		
7 820 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 111 830 DU(1) = (2.**(LAY-1))*DU(1) * DIVI / PHLIW 111 830 DU(1) = (2.**(LAY-1))*DU(1) * DIVI / PHLIW 111 830 DU(1) = (2.**(LAY-1))*DU(1) * DIVI / PHLIW 111 840 DU(1) = (2.**(LAY-1))*DU(1) * DIVI / PHLIW 111 850 CALL RDMDUT (DUM) × × 8715 FORMAT(1H0 ZR) × × 8716 FO TO 10Z × × 8717 FO TO 1100 ZR) × × 8718 FO FO TO 12Z × × 8717 FO FO TO 10Z × × 8717 FO FO TO 10Z × × 8717 FO FO FO TO 10Z × × 8717 FO FO FO TO 10Z × × 8600 FO FORMANCE * 12X**LIAFUNOV FCT**2X**INVEFSE VOL**11X**0FT(P)* × 8610 FO FORMANCE * 12X**ED VOLY FO * F14.7*6X*F14.7*6X*F14.7*6X*F14.7*6X*F14.7*0 × 8610 FO FORMANCE * 12X**ED VOLY FO * F14.7*6X*F14.7*6X*F14.7*0 × 8610 FO FORMAT(1.3).514.7*6X*F14.7*6X*F14.7*0 × 8610 FO FORMANCE * 12X**ED VOLY FO * F14.7*0 × 8610 FO FORMANCE * 12X**ED VOLY FO * F14.7*0 × 861111X**PERFORMANCE * 11X**ED * F14.7*0 × <td>820 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 111 830 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /PHLIW 111 990 GL ROMOUTOUM) 810 LAY -1))*DU(1) * DIVI /PHLIW 111 990 CLL ROMOUTOUM) 810 LAY -1) 810 LAY -1) 990 CLL ROMOUTOUM) 810 LAY -1) 810 LAY -1) 990 CLL ROMOUTOUM) 811 LAY -1) 811 LAY -1) 991 CLL ROMOUTOUM) 811 ELG - 190 LAY -10 811 LAY -10 LAY -10 991 CLL ROMOUTOUM) 811 ELG - 190 LAY -10 811 LAY -10 LAY -10 991 CLL ROMOUTOUM) 811 ELG - 190 LAY -10 811 LAY -10 LAY -10 991 CONTINUE 811 ELG - 190 LAY -10 811 LAY -10 LAY -10 991 CONTINUE 910 LAY -11 810 LAY -11 991 CONTINUE 910 LAY -11 910 LAY -11</td> <td>5 DO 820 I.= 10</td> <td></td> <td></td> <td></td> <td></td>	820 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /THLIW 111 830 DU(1) = (2.**(LAY-1))*DU(1) * DIVI /PHLIW 111 990 GL ROMOUTOUM) 810 LAY -1))*DU(1) * DIVI /PHLIW 111 990 CLL ROMOUTOUM) 810 LAY -1) 810 LAY -1) 990 CLL ROMOUTOUM) 810 LAY -1) 810 LAY -1) 990 CLL ROMOUTOUM) 811 LAY -1) 811 LAY -1) 991 CLL ROMOUTOUM) 811 ELG - 190 LAY -10 811 LAY -10 LAY -10 991 CLL ROMOUTOUM) 811 ELG - 190 LAY -10 811 LAY -10 LAY -10 991 CLL ROMOUTOUM) 811 ELG - 190 LAY -10 811 LAY -10 LAY -10 991 CONTINUE 811 ELG - 190 LAY -10 811 LAY -10 LAY -10 991 CONTINUE 910 LAY -11 810 LAY -11 991 CONTINUE 910 LAY -11 910 LAY -11	5 DO 820 I.= 10				
<pre>830 Du(I) = (2.**(LAY-1))*Du(I) * DIVI /PHLIV 1</pre>	<pre>330 Du(I) = [2.**(LAY-1))*Du(I) * DIVI /PHLIV</pre>	7 820 DU(I) # {2•#*(I 8 DD 330 I = 38.	.AY-1))*DU(I) * DIVI /THLIN 45	III		
0 G0 T0 905 [11] 1 999 CALL RDMOUT (DUM) x 5 WRITE(6.715) JUM x 6 000 001TUHO ZA) x 5 1000 CONTINUE x 6 0000 CONTINUE x 7 9600 F02401)(ALP(J)J=1,10) x 7 WRITE(6.191)(ALP(J)J=1,10) x 8 000 CONTINUE x 8 WRITE(6.9600) x 9 111X: PERFORMANCE*.12X.FLIAEDUNOV FCT.90X.*INVERSE VDL*.11X.*0ET(P)* 1 11X: PERFORMANCE*.12X.*DIVISOR*.///) 8 8600 F03MANCE*.12X.*DIVISOR*.///) 8 8605 F07MAT(16X,*TIME*.12X.*DIVISOR*.///) 8 8605 F07MAT(13X.#E14.76X.#E14.76X.#E14.76X.#E14.70 8 8605 F07MAT(13X.#E14.76X.#E14.76X.#E14.70 8 8 8 8 8 8 8 8 8 8 8 8 9 8 9 8 9 8 9 8 111X.*PERFORMANCE*114.76X.F14.76X.F14.776X.F	<pre>GD T0 905 GD T0 905 WRITE(6.715) JUK % CALL FXUNT(1H0 ZM) 50 T0 102 1000 CONTINUE % WRITE(6.1991)(ALP(J).J=1.1E) % GD T0 102 % WRITE(6.9600) % WRITE(6.9600) % WRITE(6.9600) % WRITE(6.9600) % T1 X: PPERFORMANCE '12X, UNVERSE VOL' 11X, OET(P) % WRITE(6.9600) ((GUNCH(I.J).J=1.6).I=1.NXCUE) % CALL FXIT % CALL FXIT % END</pre>	6 930 DO(I) = (2***(I	.AY-1))*DU(I) * 01 VI /PHLIN	III		
<pre>1 999 CALL RDMUT(DUM) 2 WBITE(6.715) JUM 5 F0PMAT(1H0 ZA) 5 715 F0PMAT(1H0 ZA) 5 1000 CONTINUE 6 WBITE(6.191)(ALP(J)J=1.12) 7 WRITE(6.8600) 7 WRITE(6.8600) 7 WRITE(6.8600) 7 WRITE(6.8600) 7 WRITE(6.8500) 7 S500 F02MAT(1FX, TIME*12X, UNVEFSE VDL*11X, OFT(P)* 7 B500 F02MAT(1FX, TIME*12X, TIME*12X, OFT(P)* 7 B500 F02MAT(1FX, F14, 7, 6X, F1</pre>	<pre>1 999 CAL RDMUT (DUM) 2 715 FEPMOT (DUM) 3 715 FEPMOT (HO ZN) 4 03 T0 102 5 1000 CONTINUE 5 WRITE(6.89600) 7 WRITE(6.86600) 7 0 0111X.PERFORMANCE'.12X.*LLAPUNOV FCT'.9X.*INVERSE VOL'.11X.*OET(P)* 7 0 0111X.PERFORMANCE'.12X.*ULAPUNOV FCT'.9X.*INVERSE VOL'.11X.*OET(P)* 7 0 005 FERMET(13X.FILA-7).6X.FILA.7.6X.FILA.7.6X.FILA.7) 7 0 005 FIRMAT(13X.FILA.7).6X.FILA.7.6X.FILA.7.6X.FILA.7) 7 0 005 FIRMAT(13X.FILA.7).6X.FILA.7.6X.FILA.7.6X.FILA.7) 7 0 005 FIRMAT(13X.FILA.7).6X.FILA.7).6X.FILA.7)</pre>	0 GO TO 905		III		
<pre>7 75 FOPMAT(1H0 ZR) 6 70 102 8 1000 CONTINUE 7 WRITE(6.191)(ALP(J).J=1.1E) 7 WRITE(6.8600) 8 00 F02MAT(1EX.*TIME*.12X.FLAPNOV FCT*.9X.*INVEFSE VOL*.11X.*DET(P)* 1.11X.*PERFORMANCE*.12X.FLAPNOV FCT*.9X.*INVEFSE VOL*.11X.*DET(P)* 1.11X.*PERFORMANCE*.12X.FLAPNOV FCT*.9X.*INVEFSE VOL*.11X.*DET(P)* 8 00 F02MAT(1EX.*TIME*.12X.FLAPNOV FCT*.9X.*INVEFSE VOL*.11X.*DET(P)* 1.11X.*PERFORMANCE*.12X.FLA.7.6X.FL4.7.7.6X.FL4.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7</pre>	715 FOPMAT(1H0 ZR) 50 TO 102 1000 CONTINUE WEITE(6:191)(ALP(J;J=1,1E) WEITE(6:6:0600) 7 3600 FO2MAT(1EX:TIME:12X:LIAFUNOV FCT:.9X:TINVEFSE VOL:11X:0ET(P). 8 9600 FO2MAT(1EX:TIME:12X:0IUTSON:.//) 8 1.11X:PERFORMANCE:12X:0IUTSON:.//) 8 1.11X:PERFORMANCE:12X:0IUTSON:.//) 9 0005 FORMANCE:12X:0IUTSON:.//) 9 0005 FORMANCE:12X:0IUTSON:.//) 9 0005 FORMANCE:12X:FI4.7:6X:FI4.7.7.6X:FI4.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7.7	1 999 CALL RDMDUT (DUN 2 WRITF(6.715)		×		Ĺ
<pre>4 G3 T0 102 5 1000 CONTINUE 6 wgITE(6.191)(ALP(J}.J=1.1E) 7 wgITE(6.191)(ALP(J}.J=1.1E) 7 g600 F03MAT(1EX,*TIME*.12X.LIAPUNOV FCT*.9X.*INVERSE V0L*.11X.*DET(P)* 1.11X.*PEFF0RMANCE*.12X.*ULAPUNOV FCT*.9X.*INVERSE V0L*.11X.*DET(P)* 1.11X.*PEFF0RMANCE*.12X.*ULAPUNOV FCT*.9X.*INVERSE V0L*.11X.*DET(P)* 8 00 F03MAT(1EX,*TIME*.12X.*ULAPUNOV FCT*.9X.*INVERSE V0L*.11X.*DET(P)* 1.11X.*PEFF0RMANCE*.12X.*ULAPUNOV FCT*.9X.*INVERSE V0L*.11X.*DET(P)* 8 00 F03MAT(1EX,*TIME*.12X.*ULAPUNOV FCT*.9X.*INVERSE V0L*.11X.*DET(P)* 1.11X.*PEFF0RMANCE*.12X.*ULAPUNOV FCT*.9X.*INVERSE V0L*.11X.*DET(P)* 8 00 F03MAT(1EX,*TIME*.12X.*ULAPUNOV FCT*.9X.*INVERSE V0L*.11X.*DET(P)* 9 00 E605 F1RMAT(13X.*E14.7.6X.*E14.7.6X.*E14.7.6X.*E14.7.6X.*E14.7.5 1 END 2 END</pre>	<pre>60 T0 102 8 1000 CONTINUE 8 1000 CONTINUE 8 weitE(6:101)(ALP(J1.J=1.1E) 8 0 POPAAT(15K.TIME.112X.ELLAPUNOV FCT9X.INVEESE VDL.11X.OET(P). 9 weitE(6.8500) ((GUNCH(I.J).J=1.6).I=1.NXCUE) 9 weitE(6.8500S) ((GUNCH(I.J).J=1.6).I=1.NXCUE) 9 weitE(6.8500S) ((GUNCH(I.J).J=1.6).I=1.NXCUE) 1 Call EXIT 2 END 3 END 4 Call EXIT 4 Call EXIT 5 END 5</pre>	3 715 FOPMAT(1H0 ZR)		< ×	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	
<pre>5 1000 CONTINUE 6 WRITE(6.191)(ALP(J}.J=1.1E) 7 B600 MRITE(6.8600) 8 0 PQ-MAT(18X,*THE*,12X,*LIAPUNOV FCT'.9X,*INVERSE VOL*,11X,*DET(P)* 1.11X,*PERFORMANCE*,12X,*DIVISOR*,///) 8 MRITE(6.8605) ((BUNCH(I.J).J=1.6).1=1.NXCUE) 9 8605 FDRMAT(13X,E14.7,6X,E14.7,6X,E14.7,6X,E14.77,6X,E14.77) 1 CALL EXIT 6 ND</pre>	<pre>5 1000 CONTINUE 6 WFITE(6:400) 7 WFITE(6:460) 7 Paint(6x:010) 8 Paint(6x:010) 9 Paint(6x:010) 9 WFITE(6:8505) (GUNCH(1.4).4=1.000 FCT.95x.FI4.7,05X.FI4.7) 9 WFITE(6:8505) (GUNCH(1.4).4=1.0XCUE) 9 Content(13X.FI4.7,6X.FI4.7,6X.FI4.7,6X.FI4.7,6X.FI4.7) 1 Call FXIT 2 END</pre>	4 GO TO 102		×		
<pre>2 WEILL(5.191)(ALP(J1.J=1.1E) 7 WEITE(6.8600) 8 8600 FQPMAT(1RX,*THE*,12X,*LLAPUNOV FCT*,9X,*INVERSE VOL*,11X,*DET(P)* 1.11X,*PERFORMANCE*,12X,*DIVISOR*,///) WENTE(6,8605) ((BUNCH(I.J),J=1,6),1=1,NXCUE) 0 8605 FDRMAT(13X,E14.7,6X,F14.7,6X,F14.7,6X,E14.7) 1 CALL EXIT END 2 END</pre>	<pre>x weilt(sity1)(aLP(J1.J=1.1E) weilt(sity1)(aLP(J1.J=1.1E) weilte(sienon) i.11x.PERFORMANGE*.12x.PIVISOR*.//) weilte(sienon) ((gUnch(I.J).J=1.6).I=1.NXCUE) weilte(sienon) ((gUnch(I.J).J=1.6).I=1.NXCUE) weilte(sienon) ((gUnch(I.J).J=1.6).I=1.NXCUE) coll Exit call Exit END </pre>	5 1000 CONTINUE				
<pre>8600 F02MAT(18X, VIME*,12X, LLAPUNOV FCT'.9X, 'INVERSE VOL' .11X, 'DET(P). 1.11X, PERFORMANCE'.12X, PIVISOR///)</pre>	<pre>8600 FULL CONTINE '.12x.LLAPUNOV FCT9x,'INVEFSE VDL'.11X.'DET(P). 1.11X.PERFORMANCE '.12X.PIVISOR.///) WRITE(6.8605) ((GUNCH(I.J).J=1,6).I=1,NXCUE) 0 E605 FORMAT(I3X.E14.7,6X.F14.7,6X.F14.7,6X.F14.7,6X.F14.7) 1 Call EXIT 2 END </pre>	WEILE(0+191) (AL			• • • • • • • • • • • •	<u> </u>
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OS/350 FORTRAN H	NS - NAMG= \$MAIN.CPT=02.LINECNT=56.SGURCH.HCD.LIST.NODECK.LDAD.M	ROUTINE DSRCH(VMIN.H.C.JSUE) - ICIT DEM #A (A-H-G-7)	HENSION 6(3), H(5), 66(9), XX(9), C(9,9), PX(5)	(9),0X(9),0EL(9) PNSTON X7EPD(6),E7EPD(9)	LT.4.4 B, C, R1, R2	WDN/BLK 11/DP1.CB2.D61.062	MMON/BLK77/X(15)	MUN ZERSZ ALYFYJAUNYYYIMMETYYIMLETYTYYY MNNZARGRIZ DET. VSR -VCL	= SORT(DET)		2 =100	0 =			1050 I = 1+9	()= \M/N/B(I)	1)= SORT(G(1))	NN +L. 0000 NNN 60 10 000	1=NNN 5-1	= NN & 1	NN \$61. 30007 90 10 11 101 12 10 10 10 10 10 10 10 10 10 10 10 10 10	.L 80XND(R1, R2)	(1) = R1	NN →EI→ 1000)XX(I)= 66(I)*XX(I)/€. NN →65→ 1000)XX(I)= 66(I)*XX(I)/3.	IT IN UE	1) ARE THE EIGENVECTOR COORDINATES			935 Jeleo	[]= X([] & C([,J)*XX(J)	VERATE VL	260 [=1,9	0•0≠(1)	261 [=1,9 22: 1=1,9	261 J=1.9 11-Diverti - E. Diverti - 11-2011		=vL & X(I)*PX(I)	IVL .GE. VMIN)GG TC 103	d≠l I AFX(JSw)	· 1、 、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、、	
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	ISN 0109	##11E(5,1200) (P2EPU(1),1=1,4),(XZER(J),J=1,4) (0,0) (P2EPU(1),1=1,4),(XZER(J),J=1,4)	
• •	ISN 0110	1200 FORMAI(LOH FZROUL)=,9212.4/10H XZERU(L)=,9-12.4)	
	ISN 0111	WPITE(6.1201)NNZERC, VDBIZ,VMIN	
	-15N 0112	1201 · GRMAT(3H NNZERU=+15712H VU112+VMIN=+2514+7)	

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		ISN 0003	IMPLICIT REAL #3 (A-	-H,0-Z)	
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	•	ISN 0004	COMMON /BLK1/ PHI,	VEHI, WPHI, THT, VTHT, WTHT, PSI, VPSI, WPSI	n an
· ·		ISN 0005	COMMON /BLK2/ TM +T1	1,T2,XKM,XKC,A11,A13,D12,AITREN,F2LIM	
		LSN 0006	COMMON /BLK3/ GAM10	C, GAM2C, BETIC, BET2C	ուն։ Արդ հայ է ուս է ուս , ու մասի դու է հայ հայու է հատությունը հատությունը հարցերիններին է հար և չնունքներին հայտե
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		ISN .0009	COMMON/BLK 11/DB1.0	DB2.DG1.DG2	
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		ISN 0014	WRITE(6,1070)PHI: VE	OHT.WOHT.THT.VTHT.WTHT.DST.VDST.WDST.TM.T1.T2.	
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the state		ISN 0015	1070 FORMAT(1H /10X,14H	INITIAL STATE / 9E13.6 / 10X,13H INPUT CONSTS /	
			110X, 29H TM, T1, T2,	*KM, XKC, All, A13, D12 / 6E14.7 / 10X, 30H GAM1C, GA	
			2M2C, BET1C, BET2C, (RA	AD) / 4E14.7 / 10X.10H INERTIA = E14.7 ./10X.	
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		ISN 0016	PI = 3.1415926		
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		15N 0019	0000 - 006(05120)	от на во страто на село, укон в неовется совержали держание восто состоять права у сто с	e e e e e e e e e e e e e e e e e e e
•		ISN 0020	TB2C = SB2C/CB2C		
		ISN 0022	SGIC = SIN(GAMIC)	and the Constant and the constant and approximate statement of the constant and the constant of the constant and the constant	 A second sec second second sec
		ISN 0023	CG1C = C1S(GAW1C)		
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		ISN 0025	CGPC = COS(GAM2C)		
		ISN 9026	SB1C = SIN(3ET1C)	n na na Prananden de Encode ya Banan, i dan na katangan na na na na na	 A March 1
		ISN 0027	CB1C = COS(BETIC)		
		ISN 0028	TBIC = SBIC/CBIC		
		ISN 0029	SGAM1C = SG1C		
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		ISN 0032	CGAM2C = CG2C		
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	ISN 0034	SDIF = SIN (DTF) C **###################################	
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	ISN 0035 ISN 0035 ISN 0037	$\begin{array}{c} 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & -1 & 9 \\ 0 & 0 & 1 & 0 & -1 & 9 \\ 1 & 0 & A(1, J) & = 0 & 0 \end{array}$	
	9500 NSI 9500 NSI	C A(1,2) = -XKM*XKC/AITREN A(7,8)=A(1,2)	
158 0000 158 0000 158<	ISN 0040 ISN 0041	A(2,1) = (T16T2)/(TM*T2) A(2,1)=1.0/TM A(2,2)=-1.0/TM	na manananan marana atau atau atau atau atau atau atau a
158.0004 400.013-0.078 158.0004 400.013-0.078 158.0004 400.013-0.078 158.0004 400.013-0.078 158.0004 400.013-0.078 158.0004 400.013-0.078 158.0004 400.013-0.078 158.0004 400.013-0.078 158.0004 400.0110-0.018 158.0004 400.0110-0.018 158.0005 400.0110-0.018 158.0005 400.0110-0.018 158.0005 400.010-0.018 158.0005 400.010-0.018 158.0005 400.010-0.018 158.0005 400.010-0.016 158.0005 400.010-0.016 158.0005 400.010-0.016 158.0005 400.010-0.016 158.0005 400.010-0.010-0.01 158.0005 400.010-0.01 158.0005 400.010-0.01 158.0005 400.010-0.01 158.0005 400.010-0.01 158.0005 400.010-0.01 158.0005 400.010-0.01 158.0005 400.010-0.01 158.0005 400.010-0.01 <t< td=""><td>ISN 0042 ISN 0043</td><td>A(5,5)=A(2,2) A(6,8)=A(5,5) A(6,8)=A(5,5)</td><td> A second strategy state of the second strategy strate</td></t<>	ISN 0042 ISN 0043	A(5,5)=A(2,2) A(6,8)=A(5,5) A(6,8)=A(5,5)	 A second strategy state of the second strategy strate
150 (100000 (10000 (10000	ISN 0045 ISN 0045	A(3.3)=-1.0/T2 A(6.6)=A(3.3)	
[50 0046] X(5+0)=4(2.3) (5*0 005) X(5+0)=4(2.3) (7*4)) X(5+0)=4(2.3) (7*4)) [51 005] X(5+0)=4(2.3) (7*4)) X(5+0)=4(2.3) (7*4)) X(5+0)=4(2.3) (7*1)=4(2.3) (7*1)=4(2.3) [51 005] X(5+0)=4(2.3) (7*1)=4(2.3) X(5+0)=4(2.3) (7*1)=4(2.3) X(5+0)=4(2.3) (7*1)=4(2.3) [52 005] X(5+0)=4(2.3) X(5+0)=4(2.3) X(5+0)=4(2.3) [53 005] X(5+0)=4(2.3) X(5+0)=4(2.3) X(5+0)=4(2.3) [53 005] X(5+0)=4(2.3) X(5+0)=4(2.3) X(5+0)=4(2.3) [53 005] X(5+0)=4(2.3) X(6-1)=4(2.3) X(6-1)=4(2.3) [54 005] X(5+1)=4(2.3) X(6-1)=4(2.3) X(6-1)=4(2.3) [53 005] X(5+1)=4(2.3) X(6-1)=4(2.3) X(6-1)=4(2.3) [54 005] X(6-1)=4(2.3) X(6-1)=4(2.3) X(6-1)=4(2.3) [55 005] X(6-1)=4(1.3) X(6-1)=4(1.3) X(6-1)=4(1.3) [58 0050] X(6-1)=4(1.3) X(6-1)=4(1.3) X(6-1	ISN 0045 ISN 0047	A(9,9)=-1/T2 A(2,3) = T1/(TM*T2) AFX	no management server a sub- management of an and and
TSN 0055 A(7/2) =	ISN 0048 ISN 0049	A(5,6)=A(2,3) A(8,9)=A(2,3)	
13000 130000 130000	ISN 0050 ISN 0051	A(2,4) = A(2,1) *(-TB1C*CG1C) A(2,2)=A(2,1)*TB1C*CG1C)	
158 0005 AG (1) A(1,2)) AG (1) A(1,2)) 158 0005 AG (2) A(1,2)) AG (1) A(1,2)) 158 0005 AG (2) A(1,2)) AG (2) A(1,2)) 158 0005 AG (2) A(1,2)) AG (2,1) 158 0005 AG (2) A(1,2) AG (2,1) 158 0005 AG (2) A(1,2) AG (2,1) 158 0005 AG (2,1) AG (2,1)	ISN 0052	A(3,1) = -1.0/72 A(3,1) = -1.0/72	(1) A second s second second s Second second secon second second sec
1281 0055 A(C+3) = 4(C+3) 1281 0055 A(C+1) = 4(C+3) 1281 0056 A(C+1) = 4(C+1) 1281 0056 A(C+1) = 4(C+1) 1281 0056 C+1 = 2(C+1) 1281 0056	ISN 0054	A(3,7)=A(3,1)*A(2,7)/A(2,1)	
15N 00057 A(4:-) A(1:)) A(5:4) A(2:1) 15N 00556 A(4:-) T) A(1:) 15N 00556 A(1:) T) A(5:4) 15N 00556 A(1:) T) A(5:4) 15N 00556 A(1:) T) A(5:4) 15N 00556 A(1:) T) A(1:0) 15N 0056 A1: T 16 A1: T 17 A1: T 18N 0056 A1: T	ISN 0055	A(4.5)=A(1.2) A(5.4) = A(2.1) * D12 * SDIF	
15 N 0005 A(0.) = A(0.1) 0 ************************************	15N 0057	A(6,4)=A(3,1)*A(5,4)/A(2,1)	
C4L CULĂTION OF DELESENDIIOGE C4L CULĂTION OF DELESENCIENCE C4L CULĂTION OF C4L CULĂTION OF C4N 0006 312 PHE X(1) + XEE 15N 0006 C4L E SIN(H1) 15N 0005 15N 0005 C4LTI E SIN(H1) 15N 0005 15N 0055 15N 0056	15N 0059	A(5,7)=A(5,4) A(9,7)=A(5,4)	
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			1		ISN 0071	_	PUP = 1.0/(XKC*TM)	AFX	
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	11 - 11 - 11 - 11 - 11 - 11 - 11 - 11 -				ISN 0073				
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•					ISN 0078	•	GL1= CPST#CTHT#SB2C-SPST#CTHT#CG2C#CB2C=STHT#SG2C#CB2C		
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	197 - S					c			
				-	ISN 0080		DG2 = -GAM2C & ATAN((SB2C*(SPSI*SPHI & CPSI*STHT*CPHI) & CG2C*)		
							1 CB2C*(CP5I*SPH1-SP5I*STHT*CPH1) 6SG2C*CB2C*CTHT*CPH1)/ (SB2C*		•,
				•			2 (SPSI*CPHI-CPSI*STHT*SPHI) & CC2 C+C3 2C+(CPSI*CPHI & SPSI*STHT*SPHI)	· · · · · ·	ران در به معناصین است. اس
	e e e e e e e e e e e e e e e e e e e	1					3 - CTHT*SPHI*SG2C*CB2C))		
					ISN 0081		IF(BET1C+EQ+ 0+0) GQ TQ 850	anna channa an an anna an anna an anna anna	is not to apply a product theorem is not considered by $\mathcal{T}_{i}^{(0)}$
	$(\gamma_{i_1,i_2},\ldots,\gamma_{i_l})$				ISN 0083		APE1 = ABS(DB1/BET1C)		
					ISN 0084		IF(APE1 .LT. 1.D-1C)DB1= SG1C*THT + CG1C*PS1		
					ISN 0086	850	IF(GAM1C .EQ. 0.0) GC TO 851		
			· · ·		ISN 0088		APE2= ABS(DG1/GAM1C)	• · · · · · · · · · · · · · · · · · · ·	
				x	ISN 0089		IF(APE2 .LT. 1.D-10)DG1= FHI - TB1C*CG1C*THT + TB1C*SG1C*PSI		
Cally and a state					ISN 0091	851	1F(BET2C .EQ. 0.0) SO TO 852		B. K. M. C. S. Stankovski and Environment Annalisis of Annalisis and An Annalisis and Annalisis a
				2	ISN 0093		APE3= ABS(DB2/BET2C)		
				2	ISN 0094		IF(APE3 .LT. 1.D-10)DB2= -SG2C*THT - CG2C*PSI		
in the second	1 A. A.			S	ISN 0096	852	IF(GAM2C .EQ. 0.0) GC TO 653		
1				6	ISN 0098		APE4= ABS(DG2/GAM2C)		
				<u></u>	ISN 0099		IF(APE4 .LT. 1.0-10)DG2= PHI + TE2C*CG2C*THT - TE2C*SG2C*PSI		
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	17 J.A.					Ç		**	
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•		. <u>,</u> .				c	CALCULATION OF NONLINEAR F(X)		
	<u>.</u>	1.53				с			
	•	Śr.		•		<u>` c</u>			
					ISN 0101	853	SUM3 = A(2,4)/A(2,1)		
					ISN 0102		SUM4 = A(2,7)/A(2,1)		•
	Sec.	. 4 ma			ISN 0103		SUM5 =(COS(DG2&GAM2C))* DE1 & (COS(DG1 & GAM1C)) * DB2		
	28. y 1	14			ISN 0104		SUM6 =(SIN(DG2&GAM2C)) * DB1 & (SIN(DG1 & GAM1C)) * DB2	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
		12 ¹³			ISN 0105		GAIN = XKC * (T1ST2)/T2	4FX	
					ISN 0106		F(1) = (TTHT * A(1,2))*(X(5)*SPHI & X(8)*CPHI)	AFX	anda. Araba araba arab
	-64					с			
					ISN 0107		ARGE2= -(T1/T2)*AITEEN*HPHI/XKM + GAIN*CG1 + XNORW*X(3)	e en	
	- '				ISN 0105		IF (ABS(ARGF2).LE.F2LIM) F2 = ARGF2		
	1.12				ISN 0110		IF $(ARGF2 \cdot GT \cdot F2LIM) F2 = F2LIM$		
					ISN 0112		IF (ARGE2.LTF2LIM) F2= -F2LIM		
					15N 0114		F(c) = -(-F2 & GA IN + (X(1)) & SUM + X(4) & SUM + X(7)) & AITREN + HPHI		the second se
						-	1 / XKM) # PUP - A(2.3) * X(3)	AFX	
						ç			
					ISN 0115		F(3)=A(3,1)*(DG1-(X(1)+SUM3*X(4)+SUM4*X(7)))-HPFI/(T2*A(1,2))		
				÷	ISN 0116		$F(4) = -A(1,2)*(X(5)*(1,0 - CPHI) \in SPHI *X(B))$	AFX	
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Ne.	ISN 0117 AF	GF5= GAIN*SUM5*D12 -(T1/T2)*AITREN*HTHT/XKM + XNORW*X(6)			\mathcal{O}
	ISN 0113 I	(ABS(ARGE5).LT.F2LIM) F2 =ARGE5			
	ISN 0120 II	(ARGF5.GT.F2LIM) F2=F2LIM			
	ISN 0122 II	$(ARGF) \bullet (1) = F(2LIM)F2 = -F2LIM$			<u> </u>
	15N 0124	= -(-+2) 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2		na kana ana ang sana	
98 ¹	C I				
	ISN 0125 FI	(-1) = A(3,1)*D12*(SUM5 - SDIF*X(4)) - HTHT/(T2*A(1,2))	· · · · · · · · · · · · · · · · · · ·		 A state of the sta
	C				\sim
	ISN 0126 F	7) = A(1,2) * (X(5)*SPHI & X(3)*(CFHI-CTHT))/CTHT	a record of a submatrix and a submatrix of a sub		\sim
	с				
	ISN 0127 AF	GFB= -GA[N*D12*SUME-(T1/T2)*AITREN*HPSI/XKM + XNORW*X(9)			
	ISN 0128	(ABS(ARGF8).LE.F2LIM) F2 = ARGF8	·· ·		$\hat{\mathbf{C}}$
	ISN 0130 II	(ARGF3.GT.F2LIM) F2 = F2LIM			\sim
	ISN 0132 II	(ARGFR.LTF2LIM) F2=-F2LIM		- در ایک ایک ایک سور در این اینیون در این ایران این ایران در در این ایران در این ایران در ایران در ایران در ای	· · · · · · · · · · · · · · · · · · ·
	ISN 0134 F(8) =-{-F2&GAIN*D12*SDIF*X(7) & XNORW*X(9) &AITREN*HPSI/XKM}*PUP			-
					······································
	15N 0135 F	9 = -A(3, 1)*012*(SUM6+SUTF*A(7))-HPS1/(12*A(1,2))			\smile
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	ISN 0138 602 CC	NTINUE			
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15N 0002 15N 0003	SUPROUTINE OGEN(TFFTA, PHIV, XLAM) IMPLICIT REAL*8 (A-H, O-Z)	· ·	
ISN 0004	GENERATION OF POSLITVE DEFINITE Q MATRIX Pouble Precision Aamco,P,QV,A,E,AM,C,PV,ATP,FA,QP		
ISN 0005 ISN 0006	COMMON /BLK5/ A(9.5).Q(9.51.PM(9.9).F(5).DE(9.9) COMMON/BLK 70/ AAR(5.9).BM(9.9).PA(9.9).ATP(5.9) N=9		
15N 0008	DIMENSION THETA(28),PHIV(E),XLAM(9),ZTHEIA(28),ITHEIA(28). 94(20,20),SS(20,20),CC(20,20),Z(20,20), 2 SM(9,9),G(5,5),OO(9,9)		4
ISN 0009	<pre>C</pre>	· · · · · · · · · · · · · · · · · · ·	
ISN 0010	PI = 3.1415526 DI2 = D1/20		:
15N 0012	NN= (N-1)/2 NN= (N-1)/2 NN= (N-1)/2	· · · · · · · · · · · · · · · · · · ·	
ISN 0014			
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	- ROPERAN CUMINNER FRUNKL UT SELLEJEL FUR LEREIEN E	· .	
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ISN 0018	00 8 1=1+N		
ISN 0019 ISN 0020	00 9 J=1.N 8 RA(1,J)=0.0		
ISN 0021	D0 99 I=1. N	a	
I N DOZZ	0•1={1•1 \vec 66		:
15N 0023	KK=KE1 DC + 2 - 1/7 N		•
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ISN 0025 ISN 0026	00 15 J=1.N 00 15 J=1.N	and and another the second of th	
ISN 0027	15 SS([,J,+L)=0.0	•	
ISN 0029	98 55(1.1.1.)=1.0 WE DEVELDE SSTITIA SETUCITION THETACL K.NI FOR 1 4.1.0		•
	AND SS(1, J, L) FUNCTION OF PHIV(K) FOR L=N		
ISN 0030 ISN 0031	IF(L-N)25,23,23 25 m=((2*N -K+2)*(K+1)/2)5N-L		
ISN 0032	SS(K+K+L)=COS(TTHETA(M))		
ISN 0033 ISN 0034	SS(L+L+L)=COS(TTHETA(M)) SS(K+L+L)=-SIN(TTHETA(M))		-
ISN 0035	SS(L+K+L)=SIN(TTHETA(M)) G0 TO 45		
ISN 0037 ISN 0038	23 SS(K+K+L)=CUS(PHIV(K)) 3S(L+L+L)=CUS(PHIV(K))		
ISN 0039 ISN 0040	SS(K+L+L)=-SIN(PHIV(K)) SS(L+K+L)=SIN(PHIV(K))		
ISN 0041	N+1=1 02 1:G be		
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[50 006] D0 75 1=1.N [51 0066] 75 31(1.1.5) [58 0066] D0 55 1=1.N [58 0067] D0 10 1.N [58 0075] D0 40 1=1.N [58 0076] D0 40 1=1.N [58 0077] D1 10 10.N [58 0077] D1 10.N [58 0077] D1 11.N [58 0077] D1 11.N [58 0077] D1 11.N [58 0077] D1 11.N [58 0077] D1 20.N [58 0077] D1 20.1 [58 0077] D1 20.1 [58 0077] D1 20.1 [58 0077] D1 20.2 [58 0078 D1.	ISN 0001 00 75 I=1.N ISN 0005 75 J=1.N ISN 0005 75 J=1.N ISN 0005 00 55 J=1.N ISN 0005 00 55 J=1.N ISN 0005 55 M 10 55 J=1.N ISN 0005 55 M 10 55 J=1.N ISN 0005 55 M 10 15 S M 1.1 × EW(I.J) FOGV K=1 TO N-1 ISN 0005 00 40 J=1.N ISN 0007 0 40 J=1.N ISN 0071 10 40 J=1.N ISN 0072 10 40 J=1.N ISN 0072 11 F(FP) 41.41.19 ISN 0075 78 AAR(I.J) IS TRANSFCSE BM(I.J) ISN 0075 78 AAR(I.J) IS TRANSFCSE BM(I.J) ISN 0075 0 82 J=1.N ISN 0075 0 82 J=1.N ISN 0075 0 82 J=1.N ISN 0075 0 82 J=1.N ISN 0075 0 85 J=1.N ISN 0075 0 82 J		}
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58 0004 D0 55 Jai.N 58 0005 D0 52 Jai.N 58 0005 D0 40 Jai.N 58 0007 S 84(1.J)554(1.J) 58 0071 D1 40 Jai.N 58 0072 J 54(1.J)554(1.J) 58 0073 J 5001Ali.J 58 0073 J 5601Ali.J 58 0073 J 5001Ali.J 58 0073 J 5017Ali.J 58 0073 J 5018Ali.J 58 0073 J 5018Ali.J 58 0074 J 5018Ali.J 58 0075 J 51.N 58 0075 J 51.N 58 0076 J 51.N 58 0077	<pre>ISN 0064 D0 55 H=1.N ISN 0065 D0 55 J=1.N ISN 0065 S5 SW(M.J)=Z(K.M.I)BEW(I.J)ESM(M.J) ISN 0065 D0 40 J=1.N ISN 0066 D0 40 J=1.N ISN 0070 40 J=1.N ISN 0071 IF(PP)41:19 ISN 0077 00 78 J=1.N ISN 0077 00 78 J=1.N ISN 0077 00 78 J=1.N ISN 0077 00 78 J=1.N ISN 0077 00 82 J=1.N ISN 0078 D0 82 J=1.N ISN 0078 D0 85 J=1.N ISN 0078 D0 85 J=1.N ISN 0078 D0 85 J=1.N ISN 0078 D0 85 I=1.N ISN 0078 D0 85 J=1.N ISN 0078 D0 85 J=1.N ISN</pre>		
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[N 0000 00	[5N 0068] D0 40 1=1.N [5N 0069] D0 40 1=1.N [5N 0070] 40 BM(1.J)58 (CONTINUED PRODUCT OF 2(K.I.J) FROW K=1 TO N-1 [5N 0071] [5 BM(1.J)58] [5N 0072] [9 CONTINUE [5N 0073] [19 CONTINUE [5N 0073] [19 CONTINUE [5N 0073] [19 CONTINUE [5N 0073] [19 CONTINUE [5N 0074] [10 78 1=1.N [5N 0075] 78 AAR(1,J) 15 TRANSPCSE BM(1,J) [5N 0076] 78 AAR(1,J) 15 TRANSPCSE BM(1,J) [5N 0077] 00 32 1=1.N [5N 0078] 00 32 1=1.N [5N 0078] 00 32 1=1.N [5N 0088] 00 45 1=1.N	- A second se second second second second second sec	1
IN 0070 40 B4(1,J) IS CONTINUED PROUCT OF Z(K.I.J) FROW K=1 TO N=1 ISN 0071 IF(FD) A1 A1 (1) ISN 0073 IF(FD) A1 A1 (1) ISN 0075 IF(FD) A1 A1 (1) ISN 0075 ISN 0075 ISN 0075 ISH A1 (1) ISN 0077 ISH A1 (1) ISN 0078 ISH (1) ISH 0077 ISH A1 (1) ISN 0077 ISH A1 (1) ISN 0078 ISH (1) ISH 0077 ISH A1 (1) ISH 0078 ISH (1) <td< td=""><td>ISN 0070 40 BM(I:J)=SM(I,J) ISN 0071 IF(PP)41.41.9 ISN 0071 IF(PP)41.41.9 ISN 0072 IF(PP)41.41.9 ISN 0073 IF CONTINUE ISN 0073 IP CONTINUE ISN 0073 IP CONTINUE ISN 0073 IP CONTINUE ISN 0074 41 DR 78 II.N ISN 0075 78 AAR(I.J)FBM(J.I) ISN 0077 DD 78 J=I.N ISN 0077 DD 82 J=I.N ISN 0078 B2 G(I.J) IS FHE LAMEA WATRIX ISN 0083 PA 611.1) ISN 0083 PA 611.1) ISN 0083 PA 611.1) ISN 0083 PA 611.1) ISN 0084 PA 611.1) </td><td></td><td></td></td<>	ISN 0070 40 BM(I:J)=SM(I,J) ISN 0071 IF(PP)41.41.9 ISN 0071 IF(PP)41.41.9 ISN 0072 IF(PP)41.41.9 ISN 0073 IF CONTINUE ISN 0073 IP CONTINUE ISN 0073 IP CONTINUE ISN 0073 IP CONTINUE ISN 0074 41 DR 78 II.N ISN 0075 78 AAR(I.J)FBM(J.I) ISN 0077 DD 78 J=I.N ISN 0077 DD 82 J=I.N ISN 0078 B2 G(I.J) IS FHE LAMEA WATRIX ISN 0083 PA 611.1) ISN 0083 PA 611.1) ISN 0083 PA 611.1) ISN 0083 PA 611.1) ISN 0084 PA 611.1)		
5 BM(1.J) IS CONTINUED PRODUCT OF Z(K.1.J) FROW K=1 TO N-1 5N 0071 IF (PP) 41.41.19 5N 0072 19 CONTINUE 5N 0075 10 CONTINUE 5N 0075 78 ART(1.J)FM(1.1) 5N 0075 78 ART(1.J)FM(1.1) 5N 0076 78 ART(1.J)FM(1.1) 5N 0077 00 R2 J=1.N 5N 0077 00 R2 J=1.N 5N 0077 00 R2 J=1.N 5N 0078 00 R2 J=1.N 5N 0079 00 R2 J=1.N 5N 0077 00 R2 J=1.N 5N 0078 00 R2 J=1.N 5N 0079 00 R2 J=1.N 5N 0071 00 R2 J=1.N 5N 0072 00 R2 J=1.N 5N 0081 35 G(1.1)=5K.AW(1.) 5N 0082 00 R2 J=1.N 5N 0084 97 G(1.1)=50.0 5N 0084 97 G(1.1)=50.0 5N 0084 97 G(1.1)=50.0	[SN 007] [C BM(1.J) IS CONTINUED PRODUCT OF Z(K.I.J) FRGW K=1 T0 N-1 [SN 007] 19 CONTINUE [SN 0073] 18 FDUMAT(SH SM(1.J))/(FE15.7)) [SN 0073] 18 FDUMAT(SH SM(1.J)) [SN 0076] 78 AR(1.J)=BM(J.1) [SN 0077] 78 AR(1.J)=BM(J.1) [SN 0077] 78 AR(1.J)=BM(J.1) [SN 0078] 78 AR(1.J)=STANSPCSE BM(1.J) [SN 0077] 50 S2 J=1.N [SN 0078] 82 G(1.J)=SOO [SN 0079] 95 G(1.1)=KLAW(1) [SN 0082] 90 AS I=1.N [SN 0084] 91 AS I=1.N [SN 0084] 91 AS I=1.N [SN 0084] 91 AS I=1.N	roomaanaanaanaa ahaanaa ahaa ahaa ahaa ahaa	
<pre>[5N 007] [F(PD)41.41.4] [5N 0073 [9 CONTINUE [5N 0075 19 CONTINUE [5N 0075 79 1=1.N [5N 0075 79 1=1.N [5N 0075 70 78 1=1.N [5N 0075 78 AAR(1,J)=BM(1,J) [5N 0073 78 AAR(1,J)=1.N [5N 0073 78 12] [5N 0073 78 12] [5N 0074 78 12] [5N 0074 78 12] [5N 0075 78 12] [5N 0078 7</pre>	<pre>ISN 0071 [F(PD)41.41.19 [SN 0072 19 CONTINUE [SN 0073 18 FDPMAT(9H PM(I.J))/(FEI5.7)) [SN 0075 00 78 J=1.N [SN 0075 78 AAR(I.J)=BM(J.I.) [SN 0077 78 AAR(I.J)=BM(J.I.) [SN 0077 78 AAR(I.J)=BM(J.I.)] [SN 0077 8 20 78 J=1.N [SN 0077 8 20 78 J=1.N [SN 0077 8 22 G(I.J) 15 TRANSPCSE BM(I.J)] [SN 0077 9 20 82 J=1.N [SN 0079 95 G(I.J)=2.0.0 [SN 0079 95 G(I.J)=SLAW(I)] [SN 0082 00 65 I=1.N [SN 0082 00 65 I=1.N [SN 0083 00 45 J=1.N] [SN 0083 00 45 J=1.N] [SN 0083 00 45 J=1.N] [SN 0084 00 45 J=1.N] [SN 0084 00 45 J=1.N] [SN 0084 00 45 J=1.N] [SN 0084 00 45 J=1.N]</pre>	e - Maria Anna - Anna Anna - Anna - Anna Anna An	
5N 0073 10 78 1=1.N 5N 0074 41 07 78 1=1.N 5N 0075 78 410.1 1 5N 0075 78 440.1 1 5N 0075 78 440.1 1 5N 0075 82 41.J 15 TRANSFCEE EM(1.J) 5N 0075 82 61.J 15 TRANSFCEE EM(1.J) 5N 0075 82 61.J 15 0.0 1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	5N 0073 18 FURMAT(3H Pw(I.J)/(fE15.7)) 5N 0074 41 07 78 I=1.N 5N 0075 78 AAR(I.J)=BM(J.I) 5N 0076 78 AAR(I.J)=BM(J.I) 5N 0076 78 AAR(I.J) IS TRANSPCSE BM(I.J) C AAA(I.J) IS TRANSPCSE BM(I.J) SN 0079 B2 G(I.J)=0.0 SN 0079 B2 G(I.J)=0.0 SN 0081 B5 G(I.J)=0.0 SN 0082 D0 A5 I=1.N SN 0083 D0 A5 I=1.N SN 0084 D0 A5 I=1.N SN 0083 D0 A5 I=1.N SN 0084 D0 A10.J)=0.0	n na shina mana na mahamana a maranamana kan a kan sana sa a samananana a ana sa a samanana sa a sa	We in an an a second
SN 0074 41 78 J=1.N SN 0075 78 AR(1.J)=B.(J.1) SN 0075 78 AR(1.J)=B.(J.1) SN 0076 7 AAP(1.J)=SM(J.1) SN 0077 D0 R2 SN 0079 B2 S=1.N SN 0079 B2 S=1.N SN 0079 B2 S=1.N SN 0079 B2 G(1.J)=0.0 SN 0070 B3 G(1.J)=1.2.N SN 0082 D0 A5 I=1.N SN 0083 D1=1.N M7RIX SN 0084 D1=1.N S D1 SN 0083 D1=1.N S D1=1.N SN 0084 D1=1.N S D1 SN 0084 D1=1.N S D1 SN 0084 D1 J=1.N S SN 0084 D1 J=1.N S	SN 0074 41 DT 78 I=1.N SN 0075 D0 78 J=1.N SN 0075 78 AAR(I.J) EBM(J.1) C C AAR(I.J) IS TRANSPCSE EM(I.J) SN 0077 D0 82 J=1.N SN 0079 B2 G(I.J) =0.0 SN 0079 B2 G(I.J) =0.0 SN 0079 B2 G(I.J) =0.0 SN 0080 B3 G(I.J) =0.0 SN 0081 B5 G(I.J) =1.N SN 0082 D0 65 I=1.N SN 0082 D0 85 I=1.N SN 0083 D0 85 I=1.N SN 0084 B0 36 I=1.N SN 0084 B1 30(I.J)=0.0		```
C AA4(1.J) IS TRANSPOSE EM(1.J) SN 0077 DD A2 I=1.N ISN 0078 B2 J=1.N ISN 0079 B2 G(1.J)=0.0 ISN 0079 B2 G(1.J)=0.0 ISN 0079 B2 G(1.J)=0.0 ISN 0079 B3 G(1.J)=1.N ISN 0083 DD A5 I=1.N ISN 0083 DD A5 I=1.N ISN 0083 DD A5 I=1.N ISN 0084 DD A5 I=1.N ISN 0085 DD A5 I=1.N	C AAP(I.J) IS TRANSFCSE EM(I.J) SN 0077 C DD A2 I=1.N (SN 0079 B2 J=1.N (SN 0079 B2 G(I.J)=0.0 (SN 0079 B2 G(I.J)=0.0 (SN 0080 B3 G(I.J)=0.0 (SN 0081 B3 G(I.J)=2.N (SN 0082 C G(I.J)=1.N (SN 0082 C DD A5 I=1.N (SN 0082 C DD A5 I=1.N (SN 0084 B3 DD A5 J=1.N (SN 0084 B3 DD		
C DD R2 I=1.N ISN 00778 B2 6(1.0) 2 = 1.N ISN 0079 B2 6(1.0) 2 = 1.N ISN 0080 DD R5 I=1.N ISN 0081 B3 6(1.1)=XLAW(I) C G(1.1)=ISAMDA WATRIX C DD R5 I=1.N ISN 0082 DD R5 I=1.N ISN 0082 DD 85 J=1.N ISN 0084 B7 12 0.0 ISN 0085 B7 12 0.0 ISN 0085 B7 12 0.0 ISN 0084 B7 12 0.0 ISN 0084 B7 12 0.0 ISN 0085 B7 12 0.0 ISN 0087 B7 12 0.0 I	C DD R2 I=1.N ISN 0077 DD R2 I=1.N ISN 0079 B2 G(1.J)=0.0 ISN 0076 DD R5 I=1.N ISN 0080 DD R5 I=1.N SN 0081 B5 G(1.1)=KLAW(I) ISN 0082 DD R5 I=1.N ISN 0082 DD R5 I=1.N ISN 0083 DD A5 J=1.N ISN 0084 B1 A7RIX ISN 0084 B1 A7RIX	And the second of the second sec	
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[SN 0082 DÜ 36 1=1.N [SN 0082 DD 36 J=1.N [SN 0084 39]	ISN 0082 00 36 J=1.N ISN 0083 00 36 J=1.N ISN 0084 8h 20(1.J)=0.D		Anna a susan conta
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			COMPIL	ER OPTIONS - NAME=	\$MAIN, OPT=02, LINECNT=55, SCUPCE	, BCD,LIST,NODECK,LOAD,MAP,	NGEDIT, ID	
			ISN 0002 ISN 0003 ISN 0004	SUBROUTINE BOX T1 = SORT(-2. T2 = 6.283185	(NO (R1,R2)) *ALOG(RDM (DUM))) 33 * RDM (DUM)			C
18		ş %	ISN 0006	R2 = T1 * SIN	I(T2)			· · · · · · · · · · · · · · · · · · ·
	n ¹⁸ R		ISN 0008	END		-		
and for the second	4 1			in and and and the second s		namanako unangen namanako hardeken nyananako kon uru ya ya ya unananan nyanyeko na ku uru kana k	· · · · · · · · · · · · · · · · · · ·	
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LEVEL 2 FEB 07

LISTINGS FOR PICK-A-Q (6D) 05/360 FORTRAN H

DATE 69.167/22.00.17

CUMPILEW OPTIONS - NAME= \$MAIN,UPT=02,LINECNT=56,SOURCE,BCD,LIST,DECK,LOAD,MAP,NOEDIT,ID

ZS	2005	IMPLICIT REAL*8 (A-H,O-Z)	101000101
	-	C G + OPTIMIZATION PROGRAM 8-20-68 INITIATE	10100020
SN	2003	DIMENSION THETA(28), PHIV(8), XLAM(9), RHV(9), SLUF(9)	10100030
z zs	0004	DIMENSION XL4X(9)	10100040
ISN	0002	DIMENSION B(6).C(6.6)	10100050
l sn	0006	DIMENSION ABC(6.6), PRM(6.6)	1 01 00 060
ZS Z	0007	REAL*4 B.C.DUM.GUM	10100070
zs	0008	DIMENSION ALP(18)	10100080
	5000	ULMENSION UU(45),KX(45),NU(U(45),XLAMP(9),IHEIP(28),PHIVP(8)	06000101
z s	1100		10100110
Z	2100		MAIN
- NS	0013	COMMON /BLK1/ PHI.VPHI.WPHI.THT.VTHT.WIHT.PSI.VPSI.WPSI	10100130
2 Z S I	0014	CUMMON /BLK2/ TM.T1,T2.XKM,XKC.A11.413,D12.AITREN.F2LIM	10100140
ISN	0015	CUMMON /BLK3/ GAMIC.6GAM2C.BETIC.BET2C	10100150
ISN	0016	COMMON /BLK4/ HPHI,HTHT,HPSI	10100160
ISN	0017	CUMMON/B4KS/A(6.6),Q(6.6),PM(6.6),F(6),DF(6.6)	10100170
I SN	0018	COMMON/BLK 11/D81,052,061,062	10100180
2 VS	6100	CCMMON/BLK77/X(15)	00100101
l SN	0750	COMMON/BLK78/X1E,X3E,X5E	1 01 00200
[SN	021	COMMON/GEURGE/INIT	MAIN
I SN	0022	COMMONI ABORTI DET. VSR. VOL	10100210
ISN	0023	CUMMON/ BLK68/ T	10100220
[SN	0024	CUMMON/BLKDS/VDOT2,XZERO(6),FZERO(6),NNZERO	10100230
CSN -	0025	CALL SETCLK	N I N
[SN	0026	1001 FURMAT(5E14.7)	10100240
I SN	0027	102 READ(5,1101,END=1000)ALP	10100250
	-	C K∦ITURBELYAKIN	10100260
ISN	0028	1101 FURMAT(1844)	10100270
l SN	0029	₩RITE(6.191)(ALP(J}.J.,J=1.18)	10100280
ISN	0200	191 FURMAT(1H / 10X.1844)	10100290
I SN	1500		10100300
I SN	0032	751 TM = 76.8	10100310
I SN	0033	Z=C	10100320
NS I	0034	T1 = 4.5	10100330
I SN	0035	T2 = 0.5	10100340
ISN	0036	XKM = 1.0/13.0	10100350
zs	0037	XKC = 2*685 E+CS	10100360
ISN	0038		10100370
N N	5500		10100380
I SN	0040		10100390
	0.041	1711 1 1 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10100400
z			
N N	0043		10100420
Z	***		
			10100440
		11 TURMATIZO Jeonora 1100 Mento 1410 Mikev Vivit, Avcir 1004 Mento 2004	10400 TO'T
220			
			10100460
NS N	0050	714 CALL MONIN (OUM)	10100470
NS N	0.051	713 CUNTINUE	10100480
ISN .	0052	WKITE(6.01)VMINI	10100490
NS)	2053	81 FÜRMAT (7H VMINT= E14.7)	10100500
N N	0054	P1= 3.1415926	10100510

ISN 00	155	PI2 = PI/2.	10100520
	56	UTH = PI/190.	10100530
ISN OC	157 152	GAMIC = GAMIC * DTR	10100540
	200	GAMEC = GAMEC + DIR	10100550
ISN 00	159	JETIC = BETIC * CTR	10100560
TON OC	100		10100570
	101		1010050
		UIX - DIY * X+O Y DAUSIOIT / COTE-CENTLIFE	10100500
ISN 00	164 164		
ISN 00	165 20 26		
	202 202		
ISN 00)68 168		10100650
ISN 00	500		
ISN 00	70		10100670
ISN 00	71 20	D3 XLAM(I)= 1.0	10100680
ISN 00	172	IF(NSKIP .EQ. 0) GO TO 9299	
ISN OC	074	READ(S+1001)(XLAM(I)+I=1.6)+(THETA(J),J=1.10)+(PHIV(K),K=1.5),	
		I PSR.VSR	
ISN OC	175 529	99 DU 420 I=1.6	
ISN 00	176 42	20 XLAMP(I) = XLAM(I)	10100810
ISN 00	77	DU 6009 I=1.6	10100750
ISN 00	078 600	05 EX(I) = DLOG(XLAM(I))	10100760
15N 00	179	DU 430 I=1,10	10100820
ISN 00	980 43	50 THETP(I) = THETA(I)	10100830
JO NST	181	DO 440 I=1.5	10100840
ISN 00	182 44	() H(V) = (I) H(V) = (I) H(V)	10100850
ISN 00	83	<pre>#KITE(6,550)(XLAMP(I),I=1,6),(THETP(I),I=1,10),(PHIVP(I),I=1,5)</pre>	10100360
ISN OC	184	SGIC = SIN(GAMIC)	10100870
ISN OC	185	CGIC = CDS(GAMIC)	10100880
ISN 00	186	SG2C = SIN(GAM2C)	10100890
ISN 00	187	CG2C = COS(GAM2C)	10100900
15N 00	386	TBIC = SIN(BETIC)/COS(BETIC)	10100910
ISN 00	189	X1E = (AITREN)/(XKM*XKC)*(HPHI-HTHT*(AI1*SGIC-AI3*SG2C-CGIC*TBIC	10100920
		<pre>-I)/(D12*SDIF) +HPSI*(A11*CG1C-A13*CG2C+SG1C*TB1C)/(D12*SDIF))</pre>	10100930
ISN OC	060	X3E = (AITREN)/(XKM*XKC)*(HTHT/(DI2*SDIF))	10100940
ISN 00	161	X5E = (-AITREN)/(XKM*XKC)*(HPSI/(DI2*SDIF))	10100950
I SN 00	260	PHI = {X(1)+X1E)/DTR	10100960
ISN 00	193	VPHI = X(2)*(XKM*XKC)+ HPHI*AITREN	10100970
ISN 00	94	THT= (X(3)+X3E)/DTR	10100980
ISN 00	95	VINTE X(4) *XXM*XXC + HINT*AITREV	10100990
ISN 00	96	PSI= (X(5)+ X5E)/DTR	10101000
ISN 00	197	VPSI = X(6)*XKM*XKC + HPSI*AITREN	10101010
ISN 00	96	0 • 0 = 0 × 0	10101020
ISN 00	66(C = SSJAN	10101030
ISN 01	00	JSW = 0	10101040
ISN 01	.01	KARP = 1	10101050
ISN 01	50	MOVE = 0	10101060
ISN 01	503	XLLIM = 6.9	10101070
ISN 01	40 1		10101080
ISN 01	0.6		10101000
ISN OI	06		10101100
	20.	DIVI = UIVIO DMIN - 30	01110101
4.2 2.0 4	00	TH VAD AND DAD ADD THEN THEN NUKEYEM INTO	
	,	T A DE MAG I DIE VIA DIE VIA DIE VIA DIE VOI DAE VOI T	

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ISN	0109		NCUE = 1	10101190
ISN	0110		LAY=0	10101200
ISN	0111		CALL AFX(JSW)	10101250
ISN	0112	3	CALL QGEN(THETA, PHIV, XLAM)	10101270
ISN	0113		CALL PEAIQ(KEEP)	10101290
ISN	0114		KEEP = 1	10101300
		c		10101310
ISN	0115		DC 703 I=1.6	10101330
ISN	0116		00 703 J=1.6	10101340
ISN	0117		$ABC(I \cdot J) = PM(I \cdot J)$	10101350
ISN	0118	703	$PRM(\mathbf{I}_{\bullet},\mathbf{I}) = PM(\mathbf{I}_{\bullet},\mathbf{I})$	10101360
ISN	0119	100	CALL DEIGN(ABC-B-C)	10101380
ISN	0120			10101400
TSN	0121	6	PHV(I) = 0.0	10101410
TEN	0122	0	Riv(1) = 0.0	10101420
TCN	0122		VOET- INCODIE E I DOM DEV. DET SLUE)	10101420
LON	0123		WOITELE DOGINGUE DET	101014-0
LON	0124	6041	WRITEROJOVOLINCUEJDEL	10101480
ISN	0125	9001	FURMARY NUCLETING TO THE	10101470
TON	0106	C	NEGATIVE EIGENVALUE ABURT	10101480
15N	0120			10101490
ISN	0127	21	$\frac{1}{1} \frac{1}{1} \frac{1}$	10101500
ISN	0129		VMIN = VMINI	10101510
ISN	0130	700/	CALL DSRCH(VMIN,B.C.JSUE)	10101530
ISN	0131	3990	FURMAI("JSUE=",15//)	10101540
ISN	0132		VL= VMIN	10101550
ISN	0133		P=DL0G10(V0L)/20.	10101560
ISN	0134	580	FORMAT(* P =*,E14.7,20X,*PSR=*,E14.7//)	10101570
ISN	0135		WRITE(6,580) P.PSR	10101580
ISN	0136		BUNCH(NCUE,1) = T	10101590
ISN	0137		BUNCH(NCUE,2) = VL	10101600
ISN	0138		BUNCH(NCUE,3)= VCL	10101610
ISN	0139		BUNCH(NCUE,4)= DET	10101620
ISN	0140		BUNCH(NCUE,5)= P	10101630
ISN	0141		BUNCH(NCUE,6) = DIVI	10101640
ISN	0142		IF(NCUE.EQ.NXCUE) GO TO 999	10101650
ISN	0144		NCUE = NCUE + 1	10101660
ISN	0145		IF(NUKEY.NE.O) GO TO 4	10101670
ISN	0147		PSR = P	10101680
ISN	0148		VSR = VOL	10101690
ISN	0149		WRITE(6,570) PSR	10101700
ISN	0150	570	FORMAT(' P-STAR = ',E14.7/)	10101710
ISN	0151	8	SIG2 = DLOG10(PSR)	10101720
ISN	0152		WRITE(6,2503) SIG2	10101730
ISN	0153	2503	FORMAT(• SIGMA-SQUARED = •,E14.7//)	10101740
ISN	0154	22	D0 9 I=1,21	10101750
ISN	0155		RX(I) = RDM(GUM)	10101760
ISN	0156		XLUV = -1.+ 2.*RX(I)	10101770
ISN	0157		IF(XLUV.LE.0.0) GO TO 3415	10101780
ISN	0159		$NUTU(\mathbf{I}) = 1$	10101790
ISN	0160		GO TO 9	10101800
ISN	0161	3415	NUTU(I) =-)	10101810
ISN	0162	9	DU(I) =DEXP(-RX(I)**2/SIG2) * NUTU(I)	10101820
2.7		¢ -	WRITE(6,560)(DU(I),I=1.21)	10102340
ISN	0163	560	FORMAT(* DU = * //(1X,9E13.6/))	10101850
ISN	0164	505	CUNTINUE	10101860
ISN	0165		MUVE = MOVE + 1	10101870

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10101900 10101900 10101910 10101920 10101950 10101950 10101960 10101980	10102000 10102010 10102010 10102030 10102030 10102030 10102050 10102050	10101840 10102100 10102120 10102120 10102120 10102150 10102150 10102150 10102170	10102180 10102200 10102220 10102220 10102220 10102230 10102250 10102250 10102250 10102280 10102280 10102280 10102280	10102300 10102320 10102320 10102360 10102350 10102350 10102410 10102410 10102420 10102440 10102440 10102440
<pre>IF(NCUE -55. NSW)GG TO 2039 IF(MOVE -LE. NSW1)GD TO 2166 DIVI = 0.5 * DIVI MUVE = 0 IF(DIVI -LT25) DIVI= .25 GG TO 2166 2039 IF(MOVE.LE.NSW2)GC TO 2166 2039 IF(MOVE.LE.NSW2)GC TO 2166 DIVI = 2.* DIVIO DIVI = 2.* DIVIO DIVI = 2.* DIVI MOVE = 0 IF(DIVI -GT. 64.)DIVI = 64. C2166 MRITE(6.2332)DIVI</pre>	<pre>2166 CGNTINUE 2332 FORMAT(*DIVI=*,E20.7/) 2332 FORMAT(*DIVI=*,E20.7/) 2010 12 1=1.6 10 012 1=7.16 12 DU(1) = XLLIM * DU(1)/DIVI 00 12 1=7.16 12 DU(1) = THLIM * DU(1)/DIVI 14 DU(1) = PHLIM * DU(1)/DIVI</pre>	<pre>C WRITE(6.560)(DU(1),1=1.21) DD 20 1=1.6 665 XINC(1) = EX(1) + DU(1) IF(XINC(1) .LT. XLLIM) GD TD 209 DU(1) = 0.5 * DU(1) GD TD 665 209 IF(XINC(1) .LT9.2) XINC(1) = -9.2 20 XLAM(1) =DEXP(XIND(1)) 666 DD 301=1.10 IP=1 + 6</pre>	<pre>IP=I + 6 52 THETA(I)= THETP(I) + DU(IP) IF(DASS(THETA(I)).LT.PI2) GO TO 30 THETA(I) = THETA(I) - DU(IP) 44 DU(IP) = 0.5* DU(IP) 60 TO 52 30 CONTINUE DO 40I=1.5 IP=16 + I 62 PHIV(I) = PHIVP(I) + DU(IP) 1F(DASS(PHIV(I)).LT.PI) GO TO 40 PHIV(I) = PHIV(I) = 00(IP) 54 DU(IP) = 0.5 * DU(IP)</pre>	C write(6:560)(Du(1),1=1.21) IF(KIKIT.6T.0) GG TO 50 DG 71 [=1.3 PHIV(1)=0.0 71 THETA(1)=0.0 72 THETA(1)=0.0 PHIV(4)=0.0 PHIV(5)= THETA(9) 50 NUKEY = 1 60 TO 3
ISN 0166 ISN 0168 ISN 0170 ISN 0171 ISN 0171 ISN 0172 ISN 0175 ISN 0177 ISN 0178 ISN 0178 ISN 0178 ISN 0179 ISN 0179	ISN 0182 ISN 0163 ISN 0184 ISN 0184 ISN 0186 ISN 0186 ISN 0187 ISN 0187 ISN 0188	ISN 0191 ISN 0191 ISN 0191 ISN 0194 ISN 0194 ISN 0195 ISN 0198 ISN 0198	ISN 0200 ISN 0201 ISN 0204 ISN 0204 ISN 0205 ISN 0205 ISN 0206 ISN 0206 ISN 0209 ISN 0211 ISN 0211 ISN 0211 ISN 0211	ISN 0215 ISN 0216 ISN 0216 ISN 0219 ISN 0221 ISN 02221 ISN 02221 ISN 0222 ISN 0223 ISN 0225 ISN 0225 ISN 0225 ISN 0225 ISN 0225

ISN	0220	Â	IE(9-1 T-PSP) (0 TO 300	10102480
TCN	0231	•		10102490
I C M	0232			10102500
TEN	0233			10102510
ISN	0234			10102510
ISN	0235			10102520
ISN	0236		GD TU 8	10102530
ISN	0237	305	D0 840 1=1,6	10102540
ISN	0238	840	DU(I) = -DU(I) * 1.* DIVI / XLLIM	10102550
ISN	0239		D0 850 I=7,16	10102560
ISN	0240	850	DU(I) = -DU(I) * 1.* DIVI / THLIM	10102570
ISN	0241		DO 860 I=17,21	10102580
ISN	0242	860	DU(I) = -DU(I) * 1 * DIVI / PHLIM	10102590
ISN	0243		LMIN = 1	10102600
ISN	0244		CALL CLOCK	10102610
ISN	0245		GD TO 905	10102620
ISN	0246	300	PSR = P	10102630
ISN	0247		LAY = LAY+1	10102640
ISN	0248		VSR = VOL	10102650
ISN	0249		MOVE = 0	10102660
ISN	0250			10102670
TCN	0251			10102680
TCN	0252			10102600
TCN	0252	100	$\frac{1}{2} \frac{1}{2} \frac{1}$	10102090
ISN	0253	100	FURMATUR / 1X, IOP LIAPONDY FUT = EI4.7	10102700
		1	$1 \qquad 1X,23H INVERSE VOL ESTIMATE = E14.7.77$	10102/10
ISN	0254		$WRITE(6,93)$ ({ Q(I,J),J=1,N},I=1,N}	10102720
ISN	0255	93	FORMAT(1H /1X,7H Q(1,J)/(1X,6E14.7))	10102730
ISN	0256		WRITE(6,11)((PM(I,J),J=1,6),I=1,6)	10102740
ISN	0257	11	FORMAT(*0 PN*/(1P6E18.7))	10102750
ISN	0258	1020	WRITE(6,1030)(B(I),I=1,6)	10102760
ISN	0259	1030	FORMAT(13H1 EIGENVALUES//(1P6E20.7))	10102770
ISN	0260		WRITE(6,700)((C(I,J),J=1,6),I=1,6)	10102780
ISN	0261	700	FORMAT(13H EIGENVECTORS/(6E12+4))	10102790
ISN	0262		WRITE(6,1200)(FZERQ(I),I=1,6),(XZERQ(J),J=1,6)	10102800
ISN	0263	1200	FORMAT(10H FZERD(I)=,6E12.4/10H XZERD(I)=,6E12.4)	10102810
ISN	0264		WRITE(6,1201)NNZEFO,VDOTZ,VMIN	10102820
ISN	0265	1201	FORMAT(8H NNZERO=, 15/12H VDOTZ, VMIN=, 2E14,7)	10102830
ISN	0266		D0 310 I=1.6	10102850
ISN	0267		$E_X(T) = DLOG(XLAM(T))$	10102860
ISN	0268	310	$X \cap A \cap C$	10102870
ÍŚN	0269		D0 = 120 [=1.10	10102880
TON	0270	120	$T_{\text{H}} = T_{\text{H}} $	10102890
TCAL	0271			10102000
TCN	0271	330		10102910
LON	0212	330	$\frac{1}{2} \frac{1}{2} \frac{1}$	10102910
ISN	0273	EE A	$write(0,050)/(\lambdaLAMP(1))(1-1)(0)(1-1)(1)(1-1)(0)(P(1))(1-1)(1-1)(1)(1-1)(1)(1-1)(1-1)(1)(1-1)($	10102930
ISN	0274	550	FURMATIC * ALAM-PRIME ; INCLA-PRIME ; PHI-PRIME*//(IA+9213+0/))	10102940
ISN	0275		00 810 1=1.6	10102960
ISN	0276	810	DU(1) = (2.**(LAY-1))*DU(1) * DIVI / XLLIM	10102970
ISN	0277		DU = 820 = 1 = 7,16	10102980
ISN	0278	820	DU(I) = (2.**(LAY-1))*DU(I) * DIVI /THLIM	10102990
ISN	0279		DU 830 I=17,21	10103000
ISN	0280	830	DU(I) = (2.**(LAY-1))*DU(I) * DIVI /PHLIM	10103010
ISN	0281		CALL CLOCK	10103020
ISN	0282		GO TO 905	10103030
ISN	0283	999	CALL RDMOUT(DUM)	10103040
ISN	0284		WRITE(6,715) DUM	10103050
ISN	0285	715	FORMAT(1H0 Z8)	10103060

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ISN	0286	GG TO 102	10103070
ISN	0287	1000 CUNTINUE	10103080
ISN	0288	WRITE(6,8600)	10103090
ISN	0289	8600 FURMAT(18X, "TIME", 12X, "LIAPUNDV FCT", 9X, "INVERSE VOL", 11X, "DET(P)"	10103100
		1,11X, °PERFORMANCE*,12X, °DIVISOR*,///)	10103110
ISN	0290	WRITE(6,8605) ((BUNCH(I,J),J=1,6),I=1,NXCUE)	10103120
ISN	0291	2605 FURMAT(7X,6(6X,E14.7)/)	10103130
ISN	0292	CALL EXIT	10103140
ISN	0293	END	10103150

e ...
•	0.0		0	0					0	0	0	0	50	0	20				50	30	0.4	20	70		90 56		50.	06	0	50	70			Ú I	50	30	50	60	40	80	06			· · ·
	10300010		10300040	10300060		1020201			10300110	10300120	10300130	10300140	10300150	1030016(10300170	103501	0200E01	1030021	1030022	1030023	1030024	1030026	1030027	-	6200501	100001	1030032	RECORCE	1030035	1030036	1030037	1030038	1030040	1030041	1030042	1030043	1030045	1030046	10300047	1030049	1030049	1030050	10300501	
	RCH(VMIN+B+C+JSUE)	*8 (A-H.O+Z)	6) • 810) • 6610 • • × × 10 • • • • • • • • • • • • • • • • • •	1.42	VDOTZ+XZERO(5)+FZERO(6)+NNZERO	/DB1.DB2.DG1.CG2	A (5,6),0(5,6),FM(0,0),F(0),UF(0,0)	(cl)X			-									((1))	0*NNN) GO TO 800	z•16)		E+05) GO TO 311			00)xx(I)= GG(I)*Xx(I)/6.	00)XX(I)= @@(I)*XX(I)/3•	<pre>= FIGENVECTOR COURDINATES</pre>	W TO X(I) COORDINATES				([',]) *XX(')						(ſ)X*(ſ'1)Wd +			MIN)60 10 103	
IONS - NAME	SUBROUTINE DS	IMPLICIT REAL	DIMENSION 6(2	PEAL*4 B.C.F	COMMON/BLKDS/	COMMON/BLK 1	COMMON /BLKS	COMMON/BLK/	COMMON BLK6		VZZ NFAIL = U Sn = SDRT(DF'		IFLAG = 0	KAM = 0	XK12 =100	O II NN	I =NNN	100 DA 1050 L=1 .		1050 GG(1)= SQRT(103 IF (NN .LT. 5	705 FORMAT(4H NN:	I + NN = NN OOA	IF (NN .GT. 1	DO 101 I=1.6	XX(I) = RI	IF (NN .LT. 1	IF (NN .GE. 1	101 CONTINUE	NOW TRANSFOR	00 930 I=1 •6	0°0=(1)X 066	DO 935 IF1.6		GENERATE VL	255 VL=0.0	00 Z00 I=1 •0	20 PX (1) P0.0	01 251 J=1.5	251 PX(1)=PX(1)	DD 262 I=1.5	262 VL=VL + X(I)		
CPT																	1	υ											ļ	ט נ	•				υ									

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250 CX(11:0.0) CX(11:0.0) CX(11:0.0) CX(11:0.0) CX(11:0.0) CX(11:0.0) CX(11:0.0) CX(11:0.0) CX(11:0.0) CX(11:0.0) FF(MIN LT: VL00 T0 103 FF(MIN LT: VL00 T0 103 FF
250 0x(1)=0.0 0 251 J=1.6 0x(1)= 0x(1) + 0(1,J)*x(J) 251 PF(1)=PF(1) + PM(1,J)*r(J) 252 V00T = V00T - X(1)* (0X(1)-2.0 1F(VD0T .LT. 0)60 T0 103 1F(VD0T .LT. 0)60 T0 103 1F(VD1 .LT. VL)60 T0 103 1F(XL=1 512 D0 515 I=1.6 512 D0 515 I=1.6 513 CL(1)= 0.5*X(1) 512 D0 513 I=1.6 514 X(1) + DEL(1) 515 CL(1)= DEL(1) *.5 520 D0 530 I=1.6 530 EGRMAT(7H VDT.V/1X.2E14.7)) 550 FORMAT(7H VDT.V/1X.2E14.7)) 560 FORMAT(7H VDT.V/1X.2E14.7)) 570 FORMAT(7H VDT.V/1X.2E14.7)) 571 F(KFALL - 00 GO TO 315 571 F(KFALL - 00 GO TO 315 572 FORMAT(7H VDT.VIX.2C 571 F(KFALL - 00 GO TO 315 571 F(KFALL - 00 GO TO 315 572 FORMAT(7H VDT.VIX.2C 571 F(KFALL - 00 GO TO 315 572 FORMAT(7H VDT.ER C= 0 FORMAT(7H VDT.ER C= 0]GO TO 315 573 FO

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OS/360 FORTRAN H

COMPILER OPTIONS - NAME= \$MAIN.OPT=02.LINECNT=56.SOURCE.BCD.LIST.DECK.LOAD.MAP.NOEDIT.ID

ISN	0002	FUNCTION IMEQD(MID+M+N+A+Y+D+SCALE) 108	00010
		C THIS FORTRAN 4 PROGRAM SOLVES AX = Y BY TRIANGULAR DECOMPOSITION. 108	00020
		C THE ARGUMENTS HAVE THE SAME MEANING AS THOSE OF XSIMEQ. 108	00030
ISN	0003	REAL*8 DOTPR 108	00040
ISN	0004	DOUBLE PRECISION SUM,A,Y,SCALE,D 108	00050
ISN	0005	DIMENSION A(MID,1),Y(MID,1),SCALE(1) 108	000060
ISN	0006	CUMMON /INFO/ SUM,NUMBER,INCR,INCC 108	100070
ISN	0007	INTEGER SPILL 108	08000
		C SET OVERFLOW INDICATOR. 108	100090
		C TAMPER OVERRIDES STANDARD HANDLING OF SPILL INTERUPTIONS. ITS ARGU- 108	300110
		C MENT IS SET TO ZERO AND THEREAFTER THE VALUES 0.1.2.3 INDICATE NO 108	300120
		CSPILL, UNDERFLOW GNLY, OVERFLOW GNLY, AND BOTH, RESPECTIVELY. 108	300130
ISN	0008	INCR = MID 108	100140
ISN	0009	INCC = 1 108	100150
ISN	0010	DO 120 I = 1.M 108	300160
ISN	0011	x = 0. 108	100170
ISN	0012	$DO \ 100 \ J = 1 \cdot M $ 108	300180
 ISN	0013	$\underline{GETZ} = \underline{ABS}(A(I,J)) $ 108	300190
ISN	0014	100 x = AMAX1(X,GETZ)	100200
ISN	0015	IF (X) 105,490,105 108	300210
ISN	0016	105 X = POW16(X) 108	300220
		C POW16(X) IS THE POWER OF 16 NEXT LARGER THAN ABS(X) 108	300230
ISN	0017	D = D * X 108	300240
ISN	0018	<u>X = 1./ X</u> 108	300250
ISN	0019	DO 110 $J = 1.M$ 108	300260
ISN	0020	110 A(I,J) = A(I,J) + X 108	300270
ISN	0021	DO 120 J = 1.N	300280
ISN	0022	120 Y(I,J) = Y(I,J) * X	300290
ISN	0023	DO 140 $J = 1.M$ 108	300300
ISN	0024	X = 0.	300310
ISN	0025	DO 130 $I = 1,M$ 108	300320
ISN	0026	GOTZ = ABS(A(I,J)) 108	300330
ISN	0027	130 X = AMAX1(X,GOTZ) 108	300340
ISN	0028	IF (X) 135,490,135	300350
ISN	0029	135 X = POW16(X) 108	300360
LSN	0030	D = D * X	300.570
ISN	0031	SCALE(J) = x 108	300380
ISN	0032	$\mathbf{x} = 1 \cdot \mathbf{/} \mathbf{x} $ 108	300390
ISN	0033	$DU 140 I \approx 1.M$	300400
ISN	0034	140 A(1,J) = A(1,J) * X	00410
		C MAJUR LUUP, IRIANGULAR DECUMPUSITIUN WITH D.P. ACCUM UF INNER PRODUCTS 108	200420
ISN	0035	100 310 K = 1,M	00430
LSN	0036	KI = K - I 108	300440
ISN	0037	150 NUMBER = KI 100	900450
ISN	0038	$\mathbf{X} = \mathbf{U} \mathbf{A} \mathbf{A} \mathbf{A} \mathbf{A} \mathbf{A} \mathbf{A} \mathbf{A} A$	00400
ISN	0039	L = K 100	00470
ISN	0040		200400
LSN	0041		200420
1 5 N	0042	ALINT - DUIPKLALIJIJALIJNI IVO	200500
		C TANUMBER, TINUMBER, THERE A AND T HAVE THE STURAGE INCREMENTS 100	800520
		C DUIFREASTS STRESS THE CONTRACTION ADEA TAKEN ACTIVITIES THE	200520
TCH	0043	$ \begin{array}{c} \text{C} \text{INCC} \text{DUTER USES COMMUNAREALING} \\ \text{IGE TE} \left(\mathbf{v} = A \Theta (\operatorname{COM}) \right) (7 - 18 - 18 - 18 - 18 - 18 - 18 - 18 - 1$	800540
TCN	0043	100 if (A = ABS(S)(M)) if (0.1200 if 0.1200 if 0.12000 if 0.12000 if 0.12000 if 0.12000 if 0.12000	800550
1 SN	0045		800560
1 2 1 4			

	1.02	0046	JAO CONTINUE	10800570
	I SN	0047	IF (L + K) 490,220,190	10800580
			C ROW INTERCHANGES TO INSURE LARGE PIVOTS	10800590
	I SN	0048	100 D = - D	1080060(
	L SN	0049	DD 200 J=1,M	1080061
	I SN	0050	× = A(L, J)	10800620
	ISN	0051	A(L,1) = A(K,1)	10800630
	I SN	0052	200 A(K.J) = X	1080064(
	NS 1	0053	D0 210 J=1 V	1080065
	ISN	0054	$\mathbf{x} = \mathbf{Y}(\mathbf{L}, \mathbf{J})$	1080066
	NSI	0055		1080067
	ISN	0056	210 Y(K+J) = X	1080068
	ISN	0057	220 X = -A(K,K)	1080069(
	ISN	0058	IF (M-K) 490.275,230	1080070
	ISN	0059	230 KD II K + 1	1080071
	ISN	0060	DU 240 I = KD.M	10800720
	ISN	0061	240 A(I•K) = A(I•K) / X	1080073
	TSN	0062	250 DU 270 L = KD+M	1080074
	ISN	0063	SUM # A(K,L)	1080075
	ISN	0064	270 A(K.L) = DUTPR(A(K,1),A(1,L))	1080076
	ISN	0065	275 DU 290 L=1.N	1080077
	ISN	0066	SUM = Y(K+L)	1080078
	ISN	0067	290 Y(K,L) = DJTPR(A(K,1),Y(1,L))	1080079
			C UNDULY SMALL PIVOT INDICATES A IS SINGULAR	10800801
	ISN	0068	300 IF (ABS(X) - 2•384186E-7) 490.490.310	1080081
	ISN	0069	310 CONTINUE	1080082
			C BACK SOLUTION	1080083
	ISN	0070		1080084
1	ISN	1700	DO 345 K=1.4 X	1080085
75	ISN	0072		1080086
5	ISN	0073	NUMBER = M - I	1080087
	ISN	0074	DO 340 L = 1.N	1080088
	ISN	0075	SUM = -Y(I+L) .	1080089
	ISN	0076	340 Y(I,L) = -D0TPR(A(I,I+I),Y(I+I,L)) / A(I,I)	1080090
	ISN	2200	1→1=1 345	1080091
	I SN	0078	DO 350 I = 1,M	1080092
	ISN	0079	x = 1. SCALE(I)	1080093
	ISN	0080	D = D * A(I,I)	1080094
	I SN	0081	DO 320 7 = 1*N	1080095
	ISN	0082	350 A(I+J) = Y(I+J) * X	1080096
	ISN	0083	IMEQD = 1	IMEOD
	ISN	0084	480 CONTINUE	IMEOD
			C STNDRD ZEROS THE ARG OF TAMPER AND RESTORES STANDARD SPILL ACTION.	1080090
	ISN	0085	RETURN	1080100
	ISN	0086	490 m d 0.	1080101
	Z'S I	0087		1080102
	ISN	0088		1080105
	ISN	0089	END	1080104

OS/360 FORTRAN H

DATE 69.167/22.00.53

COMPILER UPTIONS - NAME= \$MAIN, OPT=02, LINECNT=56, SOURCE, BCD, LIST, DECK, LOAD, MAP, NOEDIT, ID

ISN	0002	SUBROUTINE CLOCK	10200010
ISN	0003	COMMON/GEORGE/INIT	
ISN	0004	COMMON/BLK 68/T	CLOCK
ISN	0005		10200020
ISN	0006	CALL CLOCKS(NEW)	CLOCK
ISN	0007	T = FLOAT(NEW - INIT) * .01	CLÓCK
ISN	0008	WRITE (6,1) T	1 0 2 0 0 0 4 0
ISN	0009	1 FURMAT(*0*,90X,*CLOCK TIME*,F16.2,5X,*SECONDS*)	10200050
ISN	0010	I = 0	1 02 00 060
ISN	0011	RETURN	10200070
ISN	0012	END	10200080

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OS/360 FORTRAN H

DATE 69.163/11.55.14

COMPILER OPTIONS - NAME = \$MAIN,OPT=02.LINECNT=55,SOURCE,BCD,LIST,DECK,LOAD,MAP,NDEDIT,ID

10400010	10400020	10400030	10400040	10400050	104000 60	10400070	10400080	10400050	10400100	10400110	10400120	104001 30	10400140	10400150	10400160	104001 70	10400180	104001 50	10400200	10400210	10400220	10400230	10400240	10400250	10400260	10400270
SUBROUTINE DEIGN(PM, B, C)	IMPLICIT REAL*8 (A-H,O-Z)	C THIS SUBROUTINE FINDS THE EIGEN VALUES AND VECTORS OF PM	REAL*4 AA.B.C	DIWENSION AA(60)*8(6)*07(6)*U(6)*C(6*6)*W(6)*PM(6*6)	DOUBLE PRECISION P(6)	IK=1	DD 1000 K=1.6	DO 1000 I=K+6	AA(IK) = PM(I *K)	3000 IK = IK + 3	Z I Q	X =Ω 1	LEAD = 1	CALL SYMBIG(AA,N,LEAD,N,M,B,P,QV,U,V,MISS)	IF(MISS)1010,1020,1010	101C WRITE(6,104C)	1040 FORMAT(17H ERROR IN BIGSYM)	G0 T0 60	C FIND FIGENVECTORS OF PM(1,J)	102C LOW = 1	KOUNT = 6	MID = 6	CALL SECURE(C,LOW,KOUNT,MID,W)		60 RETURN	END
00 02	0003		4000	0005	0000	0001	9000	60 00	00 10	1100	0012	0013	0014	0015	2016	2100	0018	0010		00 20	0021	00 22	0023		0024	00 22
ISN	I SN		NSI	ISN	NSI	ISN	I SN	NSI	NSI	NS I	ISN	NS I	ISN	NSI	NST	NSI	ISN	I SN		ISN	ISN	NSI	NS I	i	ISN	ISN

DS/360 FORTRAN H

DATE 69.163/11.55.17

COMPILER OPTIONS - NAME = \$MAIN.OPT=02.LINECNT=56.SOURCE.BCD.LIST.DECK.LDAD.MAP.NJEDIT.ID

			1	
ISN	0002	SUBROUTINE AFX(JSW)	10500010	
ISN	0003	IMPLICIT REAL*8 (A-H.D-Z)	1 050 00 20	
		C ************************************	10500030	
ISN	0004	COMMON /BLK1/ PHI,VPHI,WPHI,THT,VTHT,WTHT,PSI,VPSI,WPSI	10500040	
ISN	0005	COMMON /BLK2/ TM,T1,T2,XKM,XKC,A11,A13,D12,AITREN,F2LIM	10500050	
ISN	0006	COMMON /BLK3/ GAM1C,GAM2C,BET1C,BET2C	10500060	
ISN	0007	COMMON /BLK4/ HPHI,HTHT,HPSI	10500070	
ISN	0008	COMMON/BLK5/A(6,6),Q(6,6),PM(6,6),F(6),DF(6,6)	10500080	
ISN	0009	CDMMON/BLK 11/DB1,DB2,DG1,DG2	10500090	
ISN	0010	COMMON/BLK77/X(15)	10500100	
ISN	0011	COMMON /BLK78/X1E + X3E + X5E	10500110	
	0011	c	10500120	
••••		C FXACT MODEL STATE EQUATIONS	10500130	
			10500140	
TON	0012	IE(ISW-GT-0)G0 TD 312	10500150	
134	00.2	C = (TPACKEDS = A (AMES = 1-2) + 1)	10500160	
			10500170	•
		C FOUNTIONS ADD IN THE SORM Y-DOT - A Y + F(Y)	10500180	
		C EQUATIONS ARE IN THE FORM ABOUT - A A CONTACT	10500100	
		C STREAM A CAN COMPONENT COLUMN VECTOR AS IS S(Y)	10500200	
		C WHERE X IS A SIX COMPONENT COLOMN VECTOR AS IS FIAT	10500210	
			10500210	
		C AND A IS 6X6 MATRIX	10500220	
		c	10500230	
		C X-VECTOR IS(PHI, VPHI, THI, VTHI, PSI, VPSI)	10500240	
		c	10500250	
		C ************************************	10500260	
		c · · ·	10500270	
ISN	0014	WRITE(6,1070)PHI, VPHI, THT, VTHT, PSI, VPSI, TM, 11, 12,	10500280	
		1 XKM, XKC, A11, A1 3, D12, GAM1C, GAM2C, BETIC, BET2C, ALTREN, HIHI, HPHI, HPSI	10500290	
ISN	0015	1070 FORMAT(1H /10X.14H INITIAL STATE / 6E13.6 /10X.13H INPUT CONSTS/	10500300	
		110X, 29H TM,T1,T2,XKM,XKC,A11,A13,D12 / 8E14.7 / 10X; 30H GAMIC,GA	10500310	
		2M2C.BET1C.BET2C.(RAD) / 4E14.7 / 10X.IOH INERTIA = E14.7 ./10X.	10500320	
		$317H$ HTHT, HPHI, HPSI = $3E14 \cdot 7//$	10500330	
		C *** ** *** *** *** *****************	10500340	
ISN	0016	PI = 3.1415926	10500350	
ISN	0017	DTR = PI/180.0	10500360	
ISN	0018	RTD = 180.0/PI	10500370	
		C *** *** *** *** *** *** ************	10500380	
		c	10500390	
ISN	0019	KK=0	10500400	
ISN	00 20	SB2C = SIN(BET2C)	10500410	
ISN	0021	CB2C = CDS(BET2C)	10500420	
ISN	0022	TB2C = SB2C/CB2C	10500430	
ISN	0023	SG1C = SIN(GAM1C)	10500440	
ISN	0024	CG1C = CDS(GAM1C)	10500450	
ISN	0025	SG2C = SIN(GAM2C)	10500460	
ISN	0026	CG2C = COS(GAM2C)	10500470	
ISN	0027	SB1C = SIN(BETIC)	10500480	
ISN	00.28	CB1C = CDS(BETIC)	10500490	
TCN	00.29	TB1C = SB1C/CB1C	10500500	
TCN	00 30	SGAMIC = SGIC	10500510	
TCN	00.31	SGAM2C = SG2C	10500520	
TCN	00 32		10500530	
1 214	00 32	$c_{GAM2C} = c_{G2C}$	10500540	
120	00.35		10500550	

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	· \$P\$ \$P\$ \$P\$ \$P\$ \$P\$ \$P\$ \$P\$ \$P\$ \$P\$ \$P	* 10500560
TCN OD 34	CIF = GAMIC - GAMIC	10500570
SEOO NSI	SDIF = SIN(DIF)	10500560
		10500590
	· \$P\$** \$P\$*****************************	* 10500600
		10500610
	C CALCULATION OF THE A-MATRIX	10500620
	U	10500630
ISN DO 36	D0 10 1=1.6	10500640
1500 NS1		
15N 00 35		10500670
		10500680
100 00 101	A(10.00)=	10500690
	A(2,3)= -TBJC*C61C/TM	10500700
150 00 VS1	A (2,4) = (4,5*XKM*XKC/(TM*AITREN)) *T B1 C*CG1 C	10500710
ISN 0044	- A(2,5)= TBIC*SGIC/TM	10500720
ISN 0045	A(2,6)= -4.5*XKM*XKC*TB1C*SG1C/(TM*AITREN)	10500730
ISN 0046	A(3.4)= -XKM*XKC/AITREN	10500740
15N 0047	A(S.6)= -XKM*XKC/AITREN	10500750
ISN 0048	A(6.5) = D12*SDIF/TM	10200100
ISN 0040	A(6.6)=-(1.+ 4.5*XKC*XKM*D]2*SDIF/AITREN)/TM	0//00561
ISN 0050	A (4*3) = A (6*5)	10500750
1500 NSI		10500800
		10500810
	5000 FORMAT(1H / 1 x 1) + A-MATRIX (1 x 6E13.6)	10500820
		10500830
	C	* 10500840
	U	10500850
	C CALCULATION DF DB1,DB2,DG1,DG2	10500860
		10500870
	C NEEDS ANGLES FROM STATE VECTOR AND COMMAND ANGLES AS INPUT	105500201
		10500900
		10500910
I CN OD 54	312 PHI= X(1) + XIE	10500920
		10500930
ISN 0056	PSI = x(5)+x5E	10500940
ISN 0057	(IHd)NIS = IHdS	10500950
ISN 0058	CPHI = COS(PHI)	02600501
ISN 0059		10500980
ISN OCA		10500990
ISN 0062		10501000
15N 0063	THT = STHT/CTHT	10501010
ISN 0064	PUP = 1.0/(XKC*TM)	10501020
	U	10501030
ISN 0165	GR1 = CPSI+CTHT+SB1C	10501040
15N 00 56	GR2= SPSIKTH*CIDCC01C*CB1C	10501050
1000 NS1	0.131 + 0.01 + 6.07	10501070
15N 0069	DB1 = ARSIN(GRA) - BETIC	10501080
		10501030
15N 0070	DG1 = ATAN((-SB1C*(SPS1*)) - CONTRACTOR - C	10501100
	· ····································	>1 770017

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		2 +SG1C*CB1C*CTHT*CPHI) / (SB1C *(-SPSI*CPHI + CPSI*STHT*SPHI)	10501120
		3 +CG1C*CB1C*(CPSI*CPHI + SPSI*STHT*SPHI) -CB1C*SG1C*CTHT*SPHI))	10501130
		4 – GAM1C	10501140
		c	10501150
	ISN 0071	GL1 = CPSI*CTHT*SB2C-SPSI*CTHT*CG2C*CB2C-STHT*SG2C*CB2C	10501160
	ISN 0072	DB2= ARSIN(GL1) - BET2C	10501170
		c	10501180
	ISN 0073	DG2 = -GAM2C + ATAN((SB2C*(SPSI*SPHI + CPSI*STHT*CPHI) + CG2C*	10501190
		1 CB2C*(CPSI*SPHI-SPSI*STHT*CPHI) +SG2C*CB2C*CTHT*CPHI)/ (SB2C*	10501200
		2 (SPST*CPHI-CPST*STHT*SPHI)+CG2C*CB2C*(CPST*CPHI+SPSTHT*SPHI)	10501210
		3 - CTHT + SPHI + SG2(*(R2C))	10501220
	TEN 0074		10501230
	13N 0074		10501240
	ISN 0070		10501250
	ISN 0077		10501260
	ISN 0079	BSC IF(GAMIC -ECC - COV) GU TO OSI	10501230
	ISN 0081		10503270
	ISN 0082	$IF(APE2 \bullet LI \bullet I \bullet U - I 0) DGI = PHI - I BIC+CGIC+I HI + I BIC+SGIC+PSI$	10501260
	ISN 0084	851 IF(BET2C -EQ. 0.0) GU 10 852	10501290
	ISN 0086	APE 3= ABS(DB2/BET2C)	10501500
	ISN 0037	IF(APE3 .LT. 1.D-10)DB2= -SG2C*THT - CG2C*PSI	10501310
	ISN 0089	852 IF(GAM2C .EQ. 0.0) GO TO 853	10501320
	ISN 0091	APE4= ABS(DG2/GAM2C)	10501330
	ISN 0092	IF(APE4 .LT. 1.D-10)DG2= PHI + TB2C*CG2C*THT - TB2C*SG2C*PSI	10501340
		c	10501350
		C ************************************	10501360
		c	10501370
		C CALCULATION OF NONLINEAR F(X)	10501380
	en som alla same som		10501390
		c.	10501400
	TSN 0094	453 SUM5=(COS(DG2+GAM2C))*DB1 + (CDS(DG1+GAM1C))*DB2	10501410
ò	TSN 0095	SIM6=(SIN(DG2+GAM2C))*DB1 + (SIN(DG1+GAM1C))*DB2	10501420
0	TSN 0096	EPHIE DG1	10501430
	ISN 0090		10501440
	15N 0097		10501450
	13N 0096	D = (-1) + (-1	10501460
	ISN 0099	$D_{1} = (A + A + A + A + B + A + A + B + A + A + $	10501470
	ISN UIUU	$P_{2} = (A \cap A $	10501470
	ISN 0101	$P_{J3} = (XKM + XKC) A (1 KEN) + (-X(2) - 1 AN(DB2 + DE(2C) + (CUS) (DG2 + GAM2C) + X(4))$	10501400
		1 - SIN(DG2+GAM2C) + X(O))	
	ISN 0102	PJ4 = (XKM*XKC/AITREN)*(-X(2)+IAN(DBI+BETIC)*(CUS(DGI+GAMIC)*X(4))	10501500
		1 - SIN(DG1+GAMIC) * X(6))	10501510
	ISN 0103	EPHID= PJ4	10501520
	ISN 0104	ETHTD= D12*(COS(DG2+GAM2C)*PJ1+COS(DG1+GAM1C)*PJ2-SIN(DG2+GAM2C)	10501530
		1 *DB1*PJ3-SIN(DG1+GAM1C)*DB2*PJ4)	10501540
	ISN 0105	EPSID=-D12*(SIN(DG2+GAM2C)*PJ1+SIN(DG1+GAM1C)*PJ2+DB1*COS(DG2+	10501550
		1 GAM2C)*PJ3 + DB2*COS(DG1+GAM1C)*PJ4)	10501560
	ISN 0106	F(1)= -XKM*XKC/AITREN*(TTHT*SPHI*X(4)+TTHT*CPHI*X(6))	10501570
		c	10501580
	ISN 0107	ARGF2 =XKC*(EPHI + 4.5*EPHID)	10501590
	ISN 0108	IF(ABS(ARGF2).LE.F2LIM)F2= ARGF2	10501600
	ISN 0110	IF((ARGF2).GT.F2LIM)F2= F2LIM	10501610
	ISN 0112	IF(ARGE2, IT, -F2, IM)F2=-F2, IM	10501620
	TON ATTA	$F(2) = 1 \cdot / (XC + TM) \times (F2 - AT TREN + HPHT/XKM) - 1 - / TM + (X(1)) - (TR1C + CG1C)$	10501630
	130 0114	+ y(3) + z(2) + z(2) + z(3) + A + T + D + D + T + (X + C + X + D) + (A + Z + C + Z + Z + Z + Z + Z + Z + Z + Z	10501640
		=	10501650
			10501660
			10501670
	ISN 0115	F(3) = -XKM + XKC/A(1KL) + X(C) + 1 = 1 + 3 + X(4) + 5 + 11 + X(0)	10201010

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		C 1	0501680
ISN	0116	ARGF4= XKC*(ETHT+4.5*ETHTD)	0501690
ISN	0117	IF(ABS(ARGF4).LE.F2LIM)F2= ARGF4	0501700
ISN	0119	IF((ARGF4).GT.F2LIM)F2= F2LIM	0501710
ISN	0121	IF(ARGF4.LTF2LIM)F2=-F2LIM	0501720
ISN	0123	$F(4) = 1 \cdot / (XKC * TM) * (F2 - AITREN*HTHT/XKM)$	0501730
		1 -1./TM*(D12*(SDIF*X(3)+AITREN*HTHT/(XKC*XKM)- 4.5*XKM*XKC/ 1	0501740
		1 AITREN*(CG2C*SG1C*X(4)~CG1C*SG2C*X(4))) 1	0501750
		C 1	0501760
ISN	0124	F(5)= -XKM*XKC/AITREN*(SPHI*X(4)/CTHT+(CPHI/CTHT-1.)*X(6)) 1	0501770
ISN	0125	ARGF6= XKC*(EPSI + 4.5*EPSID)	0501780
ISN	0126	IF(ABS(ARGF6).LE.F2LIM)F2=ARGF6	0501790
ISN	0128	IF((ARGF6).GT.F2LIM)F2=F2LIM	0501800
ISN	01 30	IF(ARGE6.LTF2LIM)F2=-F2LIM	0501810
ISN	0132	F(6)=1/(XKC*TM)*(F2-ALTREN*HPSI/XKM)+1/TM*D12*(-SDIF*X(5)	0501820
		1 +AITREN*HPSI/(XKC*XKM)-4.5*XKM*XKC/AITREN*X(6)*	10501830
		1 (SG2C*CG1C-SG1C*CG2C))	0501840
		C ************************************	0501850
ISN	01 33	κκ=κκ+1 3	0501860
ISN	0134	IF(KK+EQ+2)G0 TO 700	0501870
ISN	01 36	GO TO 702	0501880
ISN	0137	700 WRITE(6,5002)DB1+DB2+DG1+DG2	10501890
ISN	0138	5002 FORMAT(6H DB,DG/1X,4E13.6)	10501900
ISN	0139	702 CONTINUE	10501910
		C	0501920
ISN	0140	IF(JSW.GT.0)GD TO 602	10501930
ISN	0142	WRITE(6,5001)(F(I),I=1,6)	10501940
ISN	0143	5001 FORMAT(1H /1X+12H F(X)+VECTOR/1X+6E13+6)	10501950
ISN	0144	602 CONTINUE	10501960
		c	10501970
		C	10501980
		C ************************************	10501990
ISN	0145	RETURN	10502000
ISN	0146	END	10502010

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COMPILER OPTIONS - NAME= \$MAIN.OPT=02.LINECNT=56.SOURCE.BCD.LIST.DECK.LOAD.MAP.NJEDIT.ID

	TSN	00 02		SUBROUTINE GGEN (THETA, PHIV, XLAM)	10600010
	TSN	0003		IMPLICIT REAL*8 (A-H,Q-Z)	10600020
			с		10600030
			ċ	GENERATION OF POSITIVE DEFINITE & MATRIX	10600040
	ISN	0004	•	DOUBLE PRECISION AAMOD P.QV.A.E.AM.Q.PM.ATP.PA.QP	10600050
	ISN	0005		COMMON/BLK5/A(6,6), Q(6,6), PM(6,6), F(6), DF(6,6)	10600060
• • •	TSN	0006			10600070
			с		10600080
	ISN	0007		DIMENSION THETA(28), PHIV(8), XLAM(9), ZTHETA(28), TTHETA(28),	10600090
		• • •		BA(20,20), SS(20,20,20), CC(20,20), Z(20,20,20),	10600100
			;	BM(20,20),SM(20,20),AAR(20,20),G(20,20),QQ(20,20)	10600110
			с)9,1=K,)K(MALX(,)8,1=J,)J(VIHP(,)82,1=I,)I(ATEHT()3601,5	(DA 10600120
	ISN	0008	1063	FORMAT(6E12.4)	10600130
	ISN	00 09		EXTERNAL DMOD	QGEN
	ISN	0010		PI = 3.1415926	10600140
	ISN	0011		PI2 = PI/2.	10600150
	ISN	0212		NN = (N-1) * (N-2)/2	10600160
	ISN	0013		DQ 6I=1.NN	10600170
	TSN	0014		BAD=THETA(I)	10600180
	ISN	0015	6	$TTHETA(I) = DMOD(BAD \cdot PI2)$	QGEN
			c	WE HAVE NOW INDEXED THETA.	10600200
			c	NOW WANT CONTINUED PRODUCT OF SS(I,J.) FOR L=K+1.N .	10600210
			c	FOR EACH K=1.N-1 OBTAIN Z(K.I.J).	10600220
	ISN	0016		NNI = N-1	10600230
	ISN	0017	69	DD 20 K=1,NNI	10600240
			c		10600250
	ISN	0018		DC 8 I=1,N	10600260
	ISN	0019		DO 8 J=1.N	10600270
	ISN	00 20	8	BA(I,J)=0.0	10600280
	ISN	00 21		DO 99 I=1.N	10600290
	ISN	00 22	99	BA(I,I)=1.0	10600300
			с		10600310
	ISN	0023		KK=K+1	10600320
	ISN	00 24		D0 10 L=KK.N	10600330
			с		10600340
	ISN	00 25		DO 15 I=1.N	10600350
	ISN	00 26		00 15 J=1.N	10600360
	ISN	0927	15	SS(I+J+L)=0+0	10600370
	ISN	00 28		DO 98 I=1.N	10600380
	ISN	0029	98	SS(I+I+L)=1+0	10600390
			с	WE DEVELOP SS(I,J,L) AS FUNCTION THETA(L,K,N) FOR L L.T. N	10600400
			с	AND SS(I,J,L) FUNCTION OF PHIV(K) FOR L=N	10600410
	ISN	00 30		IF(L-N)25,23,23	10600420
	ISN	0031	25	M=((2*N -K-2)*(K-1)/2)+N-L	10600430
	ISN	0032		SS(K+K+L)=CDS(TTHETA(M))	10600440
	ISN	00 33		SS(L+L+L)=COS(TTHETA(M))	10600450
	ISN	00 34		SS(K+L+L)=-SIN(TTHETA(M))	10600460
	ISN	00 35		SS(L,K,L)=SIN(TTHETA(M))	10600470
	ISN	00 36		GO TO 35	10600480
	ISN	00 37	23	SS(K,K,L)=COS(PHIV(K))	106004 90
	ISN	00 38		SS(L+L+L)=COS(PHIV(K))	10600500
	ISN	00 39		SS(K.L.L)=-SIN(PHIV(K))	10600510
	ISN	00 40		\$S(L,K,L)=SIN(PHIV(K))	10600520
			с	· · · · ·	10600530
	ISN	00.41	35	DO 70 I=1.N	19600540

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10601230 10601240 10601250 10601250 10601120 10601130 10601150 10601150 10601150 10601170 10601190 10601190 10601210 10601220 10601110 D0 95 I=1.N D0 95 J=1.N D0 95 M=1.N S Q([,J]=AAR([,M)*QQ(M,J)+Q([,J) RETURN END D0 88 I=1.N D0 88 J=1.N D0 88 M=1.N 88 Q0([..])=G([.M)*BM(M.J)+Q0([.,J) QQ(I.J)=LAMDA MATRIX *BM(I.J) 95 00 υυυ 0085 0086 0087 0088 16 00 68 00 E6 00 00 94 00 95 00 96 00 97 00 92 I SN I SN I SN I SN

CONTRACT:

COMPILER OPTIONS - NAME= \$MAIN, OPT=02, LINECNT=56, SOURCE, BCD, LIST, DECK, LOAD, MAP, NOEDIT, ID

	ISN 0002	SUBROUTINE PEALQ(KEEP)	10700020
	ISN 0003	IMPLICIT REAL*6 (A-H,O-Z)	10700020
	ISN 0004	COMMON/BLK5/A(6,6),Q(6,6),PM(6,6),F(6),UF(6,6)	10700030
		c	10700040
	ISN 0005	N=6	10700050
		C	10700020
		c	10700070
	ISN 0006	DOUBLE PRECISION AAMOD, P. QV, A, E, AM, Q, PM, ATP, PA, QP	10700080
	ISN 0007	DIMENSION AAMOD(37,37),P(36),QV(36),E(5.6),AM(6.6)	10700090
		1 • I STEP(37) • A TP(6 • 6) • PA(6 • 6) • QP(6 • 6)	10700100
		c c c c c c c c c c c c c c c c c c c	10700120
		C N = DIMENSION OF A - MATRIX (INPUT UN CARD NU.2)	107001 30
		C A = INPUT MATRIX	10700130
		C	10700140
		c	10700150
		C	10700100
		c	10700170
		C INITIALIZE PM , QP, ATP , PA , AM , E	10700180
		c	10700190
		c	10700200
		c	10700210
	ISN 0008	NN = N*N	10700220
	ISN 0009	DO 37 I=1.N	10700230
	ISN 0010	00 37 J=1.N	10700240
and the second second	ISN 0011	$PM(1,\mathbf{J})=0,0$	10700250
	ISN 0012	QP(I,J) = 0.0	10700260
œ	ISN 0013	$0.0 = (\mathbf{I}, \mathbf{J}) = 0$	10700270
Ú,	ISN 0014	PA(I,J) = 0,0	10700280
	ISN 0015	$AM(I,J) = G \cdot O$	10700290
	ISN 0016	$37 \ E(1,J) = 0.0$	10700300
		C)N,1=I,)N,1=J,)J,I(A(()3692,6(ET	1 10700310
	ISN 0017	2963 FORMAT(1H /(1X,9E14.7))	10700320
		c ·	10700330
		c	10700340
		C MAKING Q PERFECTLY SYMMETRIC	10700350
	ISN 0018	NK = 2	10700360
	ISN 0019	42 D0 76 JJ=1,5	10700370
	ISN 0020	Q(NK,JJ) = Q(JJ,NK)	10700380
	ISN 0021	$NODK \approx NK-1$	10700390
	ISN 0022	IF (NOOK .EQ.JJ) GO TO 77	10700400
	ISN 0024	76 CONTINUE	10700410
	ISN 0025	77 IF(NK+EQ+6)GD TO 87	10700420
	ISN 0027	NK = NK + 1	10700430
	ISN 0028	GO TO 42	10700440
	ISN 0029	87 CONTINUE	10700450
		c	10700460
		C SETTING Q-MATRIX TO Q-VECTOR	10700470
			10700480
	15N 00 70	IA = 1	10700490
	100 00 30		10700500
	15N 00 31		10700510
	10N 0002	$OV(1A) = O(1 \cdot J)$	10700520
	15N 00 35		10700530
	154 0034		10700540
			10700550

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ISN	00 57			$DO 55 LT = 1 \cdot N$	10701120
ISN	0058			0.055 LM = 1.0	107011 30
ISN	0059			ILT = IP+LT	10701140
ISN	0060			IPM = IP+LM	10701150
ISN	0061		55	AAMOD(ILT,IPM)≈ AAMOD(ILT,IPM)+ A(LM,LT)	10701160
ISN	00 62		60	CONTINUE	10701170
		C			10701180
		Ċ		THAT FINISHES THE CALCULATION OF AMOD .NOW WE MUST	10701190
		č		PRINT IT OUT BECAUSE SREVNI WIPES OUT AAMOD	10701200
		Č			10701210
		- -) NN.1 = I.) NN.1 = J. J.I.I (DOMAA() 3692.6(ETI	10701220
		č		NOW FOR A-INVERSE	10701230
					10701240
TCN	0067				10701250
1.214	0003	~			10701260
	000	L L		AND NEW AND TOEN NO TOES TERDY	10701230
ISN	0064	-		CALL MINVD (AAMUD) IDEM (NN) IS (EP) IERN)	10701290
		C		and the second	10701280
		C			10701290
		C		NOW AAMOD INVERSE HAS REPLACED AAMOD	10701300
		C			10701310
		c		J192.6(ET1	10701320
ISN	0065		291	FORMAT(1H / 1X,22HAAMOD-INVERSE MATRIX , //)	10701330
		c		NN, 1=1 371	10701340
		c)NN,1=J,)J,I(DOMAA()3692,6(ETI	10701350
ISN	00.66		66	DO 70 IB =1,NN	10701360
ISN	0067			P(IB) =0.0	10701370
ISN	00 68			DO 70 IC = 1,NN	10701380
ISN	00 69		70	P(IB) = P(IB) - AAMOD(IB, IC) * QV(IC)	10701390
		c		SET P-VECTOR TO P-MATRIX TO GET Q-PRIME FROM-ATP-PA =QP	10701400
ISN	0070			K=1	10701410
ISN	0071			N = 1 + N	10701420
ISN	0072			D025 J=1,N	10701430
ISN	0073			$PM(I_{J}) = P(K)$	10701440
ISN	0074	5 G	25	K=K+1	10701450
		c		CALCULATION OF ATP (A TRANSPOSE P)	10701460
		c	:	CALCULATION OF PA (P-MATRIX X A)	10701470
ISN	00 75			DO 26 I=1.N	10701480
ISN	00.76	• • •		D0 26 J=1.N	10701490
ISN	00.77				10701500
TSN	0078			ATP(I,J) = ATP(I,J) + A(K,I) *PM(K,J)	10701510
ISN	0070		26	$PA(T_{\bullet},I) = PA(T_{\bullet},I) + PM(T_{\bullet},K) + A(K_{\bullet},I)$	10701520
TCN	0080		20	DO(27, L=1, N)	10701530
TCN	00.00				10701540
1 SIN	00.51			DO(L) = ATO(L, D) = BA(L, D)	10701550
1.5N	00.02		21	GETLIGN - CALENTING - FALLIGN DETLIGN	10701560
1.5N	0083				10701670
ISN	0084				10101010

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05/360 FORTRAN H COMPILER OPTIONS - NAME= \$MAIN.OPT=02.LINECNT=56.SOURCE.BCD.LIST.DECK.LOAD.MAP.NDEDIT.ID

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ISN	0092	FUNCTION SCAPR(X+Y+SUM+L+IX+IY)	10900010
ISN	00.03	$REAL*8 \times (IX \cdot 1) \cdot Y (IY \cdot 1)$	10900020
ISN	0004	REAL*8 SUM+SCAPR	10900030
ISN	00.05	IF (L .EQ. 0) GD TO 110	10900040
ISN	0007	DO 100 $J = 1 + L$	10900050
ISN	0008	100 SUM = SUM + $X(1,J) * Y(1,J)$	10900060
ISN	0009	110 SCAPR = SUM	10900070
ISN	0010	RETURN	10900080
ISN	0011	END	10900090

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COMPILER OPTIONS ~ NAME= \$MAIN.OPT=02.LINECNT=56.SOURCE.BCD.LIST.DECK.LOAD.MAP.NOEDIT.ID

ISN 0002	FUNCTION DOTPR(X,Y)	11000010
ISN 0003	IMPLICIT REAL+A (A-H,O-Z)	1 1 0 0 0 0 20
ISN 0004	REAL*8 X(1).Y(1)	11000030
ISN 0005	COMMON /INFO/ SUM,NUMBER,INCR,INCC	11000040
ISN 0006	DDTPR = SCAPR(X, Y, SUM, NUMBER, INCR, INCC)	11000050
ISN 0007	RETURN	11000060
ISN 0008	END	11000070

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COMPILER OPTIONS - NAME= \$MAIN,OPT=02,LINECNT=56,SOURCE,BCD,LIST,DECK,LOAD,MAP,NDEDIT,ID

Ten DODO	J	BOOLTINE WINVO (A TOTULA' TEED)	11100010
SARA NET	í L	OUTOULNE MINYO ATTUTATOIETTIERAJ MATDIY INVEDSION DANALOIETTIERAJ	11100020
15N 0003	,	DUBLE PRECISION A ABSAL TEMP FAC ABS A DABS	111000 30
ISN 0004	J	IMENSION A(IDIM,1), ISTEP(1)	11100040
ISN 0005	×	=1	11100050
15N 0006		ERR=0	11100060
1000 NSI	1		0/ 000 111
ISN 0008 ISN 0009	30 5		11100050
15N 0010	35.4		11100100
ISN 0011	401		11100110
ISN 0012	ب		11100120
15N 0013	45 4	BSAI = DABS(A(I,1))	11100130
15N 0014			
150 N216	20	r (ad SAI + A d SAL / SU + SS + SS ■L	1100160
ISN 0017	52	F(L-N)60,56,56	11100170
ISN 0018	56	F(A(I.1))65,85,65	11100180
6100 NSI	1 05	±L+1	11100190
12N 0021	65.1	0 10 45 F(K-1)70.90.70	11100210
ISN 0022	101		11100220
ISN 0023	75 1	F(I-ISTEP(M))80.84.80	11100230
ISN 0024	80	F(M-K+1)81.82.82	11100240
ISN 0025	81 k		11100250
ISN 0026		0 10 75	11100260
ISN 0027	2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		11100270
8200 NS1	5		11100200
15N 0030	84.1	F(LL-N)86.85.85	11100300
TE 00 NSI	85		11100310
I SN 00 32		0 TO 610	11100320
15N 00 33	86 L		11100330
ISN 00 34	*	(1.1)=0.00	11100340
ISN 00 35			11100350
15N 00 37	36		11100370
TEN DO 28	1001		OFFOOT F
6200 NSI	110 4		11100390
ISN 0040	J	0 TO 130	11100400
ISN 0041	120 /	001 = (1 d. r.	11100410
15N 00 42	1.001		02400111
ISN 0043	140	E4+1 D TD 100	11100440
ISN 00 45	150		11100450
ISN 0046	~	EMP=A (I.1)	11100460
ISN 0047	160 4	([,J)=A([,J)/TEMP	11100470
ISN 0048	7	F(J-NP1)170.180.180	11100480
ISN 0049	170		11100490
15N 0050		0 TU: 160	11100500
ISN 0052	1901	F(J-1)200.290.200	11100520
ISN 0053	202	F(A(J.1)-1.D0)230,210,230	11100530
ISN 0054	2 J J Z	0 220 M=1 .NP1	11100540
154 0.155	*	(H+T) = (H+T) = (H+T)	11100550

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ISN 0056	2 35 C	DN TINUE	11100560
ICOD NOT	9 U F C	J 13 290 - 1411-1141-D01960-940-260	11100580
	240	2 250 M=1 -NPT	11100550
15N 00 60	•	(W, I) = (M, T) + (M, T) = (M, T)	11100600
ISN 0061	250 C	DNTINUE	11100610
ISN 0062	U	D TO 290	11100620
ISN 0063	260 I	={ < (· 1)) 279 · 290 · 270	11100630
ISN 0064	270 F	AC = A (J, 1)	11100640
ISN 00 65	٥	D 280 M=1.NP1	11100650
ISN 00.66	280 A	(J * M) = A (J * M) + A (I * M) * FAC	11100660
ISN 0067	290 I	=(]-N) 300+34 C+34 0	11100670
ISN 0068	300		11100680
150 0040			11100700
1200 NS1			11100710
ISN 0072	Σ	P1=M+1	11100720
ISN 0073	350 A	(J+W)=V(J+WDI)	11100730
ISN 0074	-	F(K-N) 360,390,390	11100740
ISN 0075	360 K		11100760
22 00 NSI	390 D		11100770
ISN 0078	400 A	(NP1.J)=1 STEP(J)	11100780
1SN 0079	Σ		11100750
ISN 0080	410 I	=I STE P(M)	11100800
ISN 00.81	H	F(I-M)420,470,420	11100810
ISN 0082	42C D	0 430 J=1,N	11100820
ISN: 0083	- <		11100830
15N 0085	4 024		11100850
ISN 0086			11100860
ISN 0087	44C I	F(M-ISTEP(J))450,460,450	11100870
1SN 2088	450 J		11100980
ISN 0089	5	D TO 440	11100890
15N 0090	460 I	STEP(J)=I =/w_w//#80.400.400	11100910
15N 0092	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		11100920
ISN 0093	. 0	0 T0 410	11100930
ISN 0094	490 D	0 500 J=1,N	11100940
150 00 NSI	500 I	STEP(J)=A(NP1,J)	11100950
ISN 0096	530 M		11100960
ISN 0097	540	=ISTEP(M)	11100970
ISN 0098			11100960
15N 0099	ם ויי אכב	U 000 J 1 4 1	06600111
15N 0101			11101010
ISN 0102	560 A		11101020
ISN 0103	ר : 	=I STEP(M)	11101030
15N 0104	H	STEP(M)= STEP(J)	11101040
ISN DICE	1	STEP(J)=J	11101050
ISN 0106	U	0 TO 540	11101060
15N 0107	570 I	F(M-N)530.6%0.6%0	11101070
15N 0108	580 1		11101080
	י י י		
112N 0111	r o o		
TYYN NCT			} # # # # # # #

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COMPILER OPTIONS - NAME= \$MAIN,OPT=02,LINECNT=56,SOURCE,BCO,LIST,DECK,LOAD,MAP,NDEDIT,ID

0010	000	0050	00 60	
11200	1120(11200	11200	10211
SUBROUTINE BOXNO (R1,R2)	11 = SURTITES * ALLUCINUM (DOM) 12 = 6.2831853 * ROM (DUM)	R1 = T1 * COS(T2) D2 - T1 * SIN(T2)	RELURN I THE PARTY OF A PARTY OF	END
ISN 0002	ISN 0004 ISN 0004	ISN 0005	15N 00.07	ISN 0008

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COMPILER OPTIONS - NAME= \$MAIN,OPT=02,LINECNT=56,SOURCE,BCD,LIST,DECK,LOAD,MAP,NJEDIT,ID

CODO NEL	FUNCTION RDM(IX)	11300010
		11300020
0100 NC1		11300030
ISA 0004	I Y=I Y* 65539	
1 SN 0005	IF(IY.GE.0) GD TO 6	11300040
	1 V = 1 V + 21 & 7 4 B 3 F 4 7 + 1	11300050
		11300060
150 0000		11300070
ISN 0005		
ISN 0010	RETURN	
15N 0011	ENTRY RDMIN(IX)	11300050
rev 0019	1 / = 1 ×	11300100
		11300110
ISN 0013		11200120
ISN ONIA	RETURN	
ISN 0015	ENTRY RDMOUT (IX)	11300130
TCN 0015	T X= T Y	11300140
		11300150
100 NC1		11300160
ISN 0018	RETORN	
15N 0019	END	A TOOLT

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LUCI 2 68 1 D0/30 FIRSTAN H D0/30 FIRSTAN				
Left. 2 fb. 67 05.700 Foreaw H 2.410 05.700 Foreaw H 2.410 0 05.700 Foreaw H 2	11.56.20			
LEVEL 2 FB 01 CO-DILE @ PTIONS - MARE # #4414.0PT020.11NECMTEA.1204EE.ECD.1131.0ECMTEA.12040EE.ECD.12040ED.12040EE.ECD.12040E	69.163/			
1941 194	DATE DIT, ID			
Level 2 FE 07 05/366 Farrent H Cuollea Dariova - Luke = SMIN.OPT-02.11NECVT-56.500.055 - BOLLET - 0265.10 Tax 0003 5000000 5000000 500 000000 500 0000 500 000 500 0000 5000000	CN. AAM.OA			
ILUCEL 2 FEB 67 100,200,000 100,000 00,000	1, DECK,LD			
LEVEL 2 FEI 67 15.100 FORTRAN - ANRE #M.IN.OPT-02.LINECNT-55.5004 15.8 0003 COMPACEDRETTINT 15.8 0003 END 15.8 0005 END 1	t CE, BCD, L IS			
Level 2 FB 67 19 0000 19 1000 19 1000 10 100	FORTRAN F			
LEVEL 2 FEB 67 COMPILER OPTIONS - MAVE = SMINHOPT SUBOUTER SETCING ISSN 0003 REFURN TISN 0003 REFURN 138 0006 REFURN 138 0006 RE	02 +LI NECN			
LEVEL 2 FEB 67 LEVEL 2 FEB 67 158 00013 158 0000 158 000 158 000 158 000 158 000 158 000 158 000 158 00 158 000 158 000000000000000000000000000000000000	MAIN.0PT=	LK LIT		
Level 2 Fab 5 Level	S U U V V V V V V V V V V V V V V V	UTINE SETC UGEORGE/I UCCCKS(INI		
194	S OP T IONS	SUBROU COMMON CALL (RETURN END	4	
	EB 67 COMPILE	02 05 05 05		
	LEVEL 2 F	00 NSI 00 NSI 00 NSI 00 NSI		194

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COMPILER OPTIONS - NAME: \$MAIN.OPT=02.LINECNT=56.SOURCE.BCD.LIST.DECK.LOAD.MAP.NOEDIT.ID

- ISN 0002
 FUNCTION DARSIN(X)

 ISN 0003
 IMPLICIT REAL*8 (A-H,O-Z)

 ISN 0004
 DARSIN=ATAN(X/SQRT(1.0-X**2))

 ISN 0005
 RETURN
- ISN 0006 END

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DATE 69.163/11.56.25

COMPILER OPTIONS - NAME = \$MAIN, OPT=02.LINECNT=56.SOURCE.BCD.LIST.DECK.LOAD.MAP.NOEDIT.ID

SUBROUTINE SYMBIG (A, NO, INDEX1, INDEX2, ASIZE, B, P, Q, U, V, MISS) ISN 0002 C HOUSEHOLDER TRI-DIAGONALIZATION ROUTINE FOR REAL SYMMETRIC MATRICES. C FOLLOWED BY STURM-SEQUENCE COMPUTATION OF THE EIGENVALUES. PROGRAM C SHOULD WORK FOR ORDERS UP TO 1000 AT LEAST, INCLUDING 1 AND 2, BUT IT C IS AIMED PRIMARILY AT LARGE ORDERS. AN ATTEMPT IS MADE TO USE SCRATCH C TAPES ABOUT AS ECONOMICALLY AS POSSIBLE, AND INNER PRODUCTS ARE ACCUM-ULATED IN D.P. TO ACHIEVE HIGH ACCURACY. C C С С С DIMENSION A(1),Q(1),U(1),V(1),B(1),P(1) ISN 0003 DOUBLE PRECISION P.SUM.PI ISN 0004 ISN 0005 INTEGER ASIZE ISN 0006 EQUIVALENCE (SUM, SUN) С C INITIALIZE. С NUMBER = INDEX2 ISN 0007 ISN 0008 CALL OVERFL(I) ISN 0009 N = IABS(NO)ISN 0010 NI = N - IISN 0011 N2 = N - 2С C TEST TO SEE IF MATRIX IS ALREADY IN CORE. С IF (NUMBER) 70,2000.80 ISN 0012 С NO. REWIND TAPES, SET THE INDICATORS INCORE AND KEY, AND READ IN THE С FIRST ROW OF MATRIX. THE ARRAY A IS USED TO HOLD AS MANY ROWS AS С POSSIBLE. AT EACH STEP THE FIRST ROW IN CORE IS ELIMINATED AND ONE C c OR MORE NEW ROWS BROUGHT IN UNTIL ALL REMAINING ROWS ARE IN CORE. C ISN 0013 70 REWIND 2 REWIND 3 ISN 0014 REWIND 4 ISN 0015 INCORE = 1 ISN 0016 ISN 0017 KEY = 0READ (2) (A(1), I = 1, N) ISN 0018 ISN 0019 GO TO 90 С C YES. SET THE INDICATOR INCORE AND DEFINE THE INDICES WHICH DESIGNATE FIRST AND LAST ELEMENTS OF FIRST ROW IN CORE. THE ARRAY A ALWAYS C HOLDS THE ENTIRE MATRIX AND AS EACH ROW IS ELIMINATED. IT IS RE-С PLACED BY THE CORRESPONDING V. С ISN 0020 80 INCORE = 0 K2K2 = 1ISN 00 21 K2N = NISN 0022 ISN 0023 90 NUMMER = IABS(NUMBER) С C DISPOSE OF TRIVIAL CASES. С ISN 0024 IF (ASIZE - N - N1) 100,110,110 ISN 0025 100 MISS = 1ISN 0026 RETURN

	ISN 0027	110 IF (N2) 120,125,130
	ISN 0028	120 B(1) = A(1)
	ISN 0029	GO TO 750
	ISN 0030	125 U(2) = 0.
		C INCURE = U MEANS THE (REMAINING) MATRIX FITS IN CURE. INCURE = I MEANS
		C THAT SUME RUWS ARE STILL UN TAPE.
		C IF KEY = 3 (K EVEN) KEAD 12 AND WRITE 13 KEVERSE IF KEY \approx 1 (K UDD).
-		C M 15 NUMBER UP RUBS (STARTING WITH KT) WHICH FIL IN GUNGE LIM IS THE
		C INDEA OF LAST SUCH RUMB EVENTUALET EIM REACHES IN AND THEREAFTER
		C READING AND WRITING ARE SUFFRESSED.
	TCN 00 31	
	TEN 0032	
	ISN 0033	
	ISN 00 34	NK1 = N
	ISN 0035	
	TSN 0036	
	134 9636	
		C MAJOR LOOP, EXCEPT FOR K = 0 AND K = N-2, THE KTH STEP COMPLETES STAGE
		C K OF THE HOUSEHOLDER ALGORITHM AND BEGINS STAGE K+1. $K = 0$ PREPARES
-		C FOR STAGE 1, AND K = N-2 (VIRTUALLY) COMPLETES THE ALGORITHM.
		C IF K IS G.T. 0, THE LOOP STARTS WITH P UPPER K AND V UPPER K STORED IN
		C Q(K+1)Q(N) AND U(K+1)U(N). THE 1ST K DIAGONAL ELEMENTS ARE IN
		C Q(1) Q(K), WITH DEFDIAG ELEMENTS IN U(1) U(K) AND THEIR SQUARES
		C NECESSARY, ON TAPE. IF, L IS THE 1ST K-VALUE FOR WHICH ROWS L&1
	ann fai spinister an	C IN V(1)V(K). ROWS K+1N OF A UPPER K ARE STORED IN CORE AND. IF
		C FIT IN CORE, THEN A UPPER K STARTS IN A(1) FOR K L.T.E. L. AND IN
يسو		C A((K-L)(N-L) - (K-L)(K-L-1)/2 + 1) FOR K G.T. L.
97		c
		C NIX = 0, BUT A POINTLESS PROVISION OF FORTRAN IV PROHIBITS EXPLICIT 0.
		c ·
	ISN 00.37	NIX = O
	ISN 0038	$DD 690 \mathbf{K} = \mathbf{NIX} \cdot \mathbf{N2}$
	ISN 0039	KI = KZ
	ISN 0040	K2 = K3
	ISN 0041	$\mathbf{K3} = \mathbf{K} + 3$
	ISN 0042	NK = NKI
	ISN 0043	NK1 = NK - 1
	ISN 0044	M = NEXIM
		C C C TECT TO SEE IN ENTIDE (DEMAINING) MATRIX ETTS IN CORS
		C LEST TO SEE IF ENTIRE (REMAINING) MATRIX PITS IN CORE
	101 00 AF	
	15N 0045	
		C VES. TE K G.T. O. FORM TAUL O. AND NEW A. TE K = O. SKIP.
	ISN 0046	140 KiK1 = K2K2
	ISN 0047	
	ISN 0048	IE (K) 2000-250-200
		c c c c c c c c c c c c c c c c c c c
-		C ND. TRY AGAIN NEXT TIME
		c c c c c c c c c c c c c c c c c c c
	ISN 0049	150 INCORE = N - LIM
	ISN 0050	$\kappa_{1N} = N\kappa$

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		PAGE 003
	C	
	C IF K = 0, READ IN (AT LEAST) EARLY RUWS INTO UPPER TRIANGULAR ARRAT.	1
TCN AAES		• • • • •
15N 0051		
15N 0057		e see a se se se
ISN 0055		
ISN 0054		
15N 0055		
15N 0050		
15N 0057		
	C NOW SKID TO CORMATION OF NEW SUM, V. ALE, AND P.	
	C NOW SKIP TO FORMATION OF NEW SOME VY ALLY AND TH	
•	C IE K IS G. T.O. FORM TAU AND GET Q (FROM OLD & AND V. NOW IN Q AND U.)	· · · ·
	C II K IS GELEVE SUCH THU HID GET G CERUN DED F HID VE HUM IN G HUD DES	
	C IE MATRIX EITS, DON'T ERET AROUT TAPES 2 AND 3.	
	C OTHERWISE GET SET FOR MORE READING AND WRITING.	
ISN 0058	180 IF (INCORE) 2000.200.190	
TSN 0059	190 REWIND 2	
ISN 00.60	REWIND 3	
TSN 0061	200 SUM = 0.00	
ISN 0062	$D(210) I = K1 \cdot N$	
ISN 0063	210 SUM = SUM + Q(1) + U(1)	
15N 0064	TAU = S + ALF + SUM	
ISN 00.65	$DQ 220 I = KI \cdot N$	
ISN 0066	220 Q(I) = Q(I) - TAU*U(I)	
	c .	
	C CONVERT ROWS K+1LIM TO ROWS OF A UPPER K+1	
	<u>C</u>	
ISN 0067	II = K1K1	
ISN 0068	IN = K1N	and the second
ISN 0069	$DO 240 I = K1 \cdot LIM$	
ISN 0070		
ISN 0071	$DO 230 IJ = II \cdot IN$	
ISN 0072	A(IJ) = A(IJ) - Q(I) + U(J) - Q(J) + U(I)	and the second
ISN 0073	230 J = J + 1	
ISN 0074	II = IN + 1	•
ISN 0075	240 IN = IN + N - I	
		the second se
	C IF K = N-2, NO NEW SUM, V, ALF, ETC. ARE NEEDED. KICK OUT AND MOP UP.	
ISN 0076	250 SUM = 0.00	
ISN 0077	KIKZ = KIKI + 1	1
ISN 0078	IF(N - K2) 2000,690,250	
ISN 0079	$260 \text{ DU } 270 \text{ IJ} = KIKZ \cdot KIN$	
ISN 0080	2/C = SUM + A(IJ) * A(IJ)	
ISN 0081	Q(K+1) = A(K K1)	
ISN 0082	V(K+1) = SUN	
ISN 0083	U(K+1) = SORT(SUN)	
	c	
	C IF SUM = 0, ROW K+1 ALREADY CONFORMS TO TRI-DIAG FORM. MAKE SPECIAL	
	C DEFINITION OF V AND ALF.	

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	c
TSN 0084	IE (SUM) 2000-280-290
ISN 0085	
130 0085	
ISN 0086	
ISN 0087	GO TO 320
	c
	C ORDINARY DEFINITION OF V AND ALF.
	c
ISN 0088	290 IF (A(K1K2)) 310,310,300
ISN 0089	300 U(K+1) = -U(K+1)
TSN 0000	310 V(K+2) = A(K+2) - H(K+1)
TEN 0005	$A = -1 - (V(V_{1}) + A = (A(V_{1}) + A) = (V(V_{1}) + (V_{1}) + $
130 0091	
ISN 0092	32U J - NINI T G
ISN 0093	DD 330 $I = K_3 N$
ISN 0094	V(I) = A(J)
ISN 0095	330 J = J + 1
	c ·
	C IF MATRIX WAS INITIALLY IN CORE, STORE V UPPER K+1 IN K+1 ST ROW DF A.
	c
TSN 0006	TE (NUMBER) 336-2000-333
ISN 0097	
134 00 97	
151 0098	$A(\mathbf{x}) = \mathbf{y}(\mathbf{x})$
ISN 0099	
	C .
	C OTHERWISE, WRITE V UPPER K+1 ON TAPE 4.
	c
ISN 0100	336 WRITE (4) ALF, (V(I), I = K_2 ,N)
	C C
	C IF MATRIX FAIL TO FIT, ELIMINATE ROW K+1 (NOW SUPERFLUOUS) AND MOVE
	C DTHER ROWS FORWARD TO MAKE ROOM FOR 1 OR MORE NEW ROWS.
	C
ISN 0101	IE (INCORE) 2000-440-340
ICN 0101	
134 0102	
ISN ULUS	
ISN 0104	J = LKI
ISN 0105	DO 350 I = 1, MOVE
ISN 0106	$A(I) \approx A(J)$
ISN 0107	J = J + 1
ISN 0108	II = MOVE + 1
ISN 0109	IN = NK + MOVE - M
	c .
	C UPDATE LIM. BRING IN NEW ROWS AND CONVERT TO ROWS OF A UPPER K+1.
	c
ISN 0110	NEXTM = (IMIT/NK1 ASTZE)
TEN 0111	1 M FW = 1 M + 1
15N 0112	
ISN 0113	DU 430 I = LIMINC.LIM
ISN 0114	360 IF (KEY) 2000,370,380
ISN 0115	370 READ (2) (A(1J), IJ = II, IN)
ISN 0116	GO TO 390
ISN 0117	380 READ (3) (A(IJ), $IJ = II \cdot IN$)
ISN 0118	390 IF (K) 2000.420.400
TSN 0110	400 J = I
TON ASOA	
ISN UIZU	$\frac{\partial (f_{1},f_{2})}{\partial (f_{1},f_{2})} = \frac{\partial (f_{1},f_{2})}{\partial (f_{1},f_{2})}$
15N 0121	A(1) =
ISN 0122	$\mathbf{J} = \mathbf{J} + \mathbf{I}$

199

.

	TEN OI	22	420		
	IGN 01	24	420		
	150 01	27	400		
	ISN UI	23			
	ISN 01	20		$k \ge n = nkI$	
	ISN 01	27			
	ISN 01	28	440	$2 K_2 K_2 = K_1 N_1 + 1$	
	ISN 01	29			
		c			
·			COM	IP LTE POSITIONS K+2LIM OF AV AND SUM UP TO LIM FOR THE LATE POSI-	and the second second
		C	: т	TIONS. IF ANY. AT STEP I, ITH ELEMENT OF AV IS COMPLETED, AND EFFECT	
			c 01	DF COLUMN I ON ELEMENTS I+1N IS TAKEN INTO ACCOUNT.	
		Ċ	:		
	ISN 01	30	450	$\mathbf{II} = \mathbf{K}2\mathbf{K}2$	
	TSN 01	31		IN = K2N	
	ISN 01	32		$D_{1} = K_{2} \cdot N$	
	ISN 01	33	460		
	TEN OI	34	400		
	TEN 01	36			
	150 01	30			
	150 01	30			a
	15N 01	37	. 70	P(1) = P(1) + A(1) + V(3)	
	ISN UI	30	- 479		and the second sec
	15N 01	39		1 + (N - 1) = 2000,500,480	
	ISN 01	40	480		
	15N 01	41			
545 S. 1	ISN 01	42		00.490 i $J = 111.91N$	
	ISN 01	43		P(J) = P(J) + A(IJ) * V(I)	
· ·····	ISN 01	44	490		
 en 	15N 01	45			
		A.F.			
7 7	ISN 01	46	500	D I I = I I + N + I	
-	ISN 01	46	500	D = IN + N - I	
20	ISN 01	46 (500	D IN = IN + N - I Some Rows are still on Tape, read them IN. 1 AT A TIME. EACH ROW IS	1.14 1
200	ISN 01	<u>45</u> (500 1F	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0), THEN USED IN CALCULATION OF AV. THEN PUT DN THE OTHER THE AFFE FOR HER THE NEXT FOR	
200	ISN 01	<u>46</u> (500 IF C	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. O), THEN USED IN CALCULATION OF AV, THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW.	· · · ·
200	ISN 01	<u>46</u> () () ()	500 IF C	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. O). THEN USED IN CALCULATION OF AV. THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW.	
200	ISN 01	46 () () () () () () () () () () () () ()	500 IF C	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0), THEN USED IN CALCULATION OF AV, THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000,660,510	
200	ISN 01 ISN 01 ISN 01	46 () () () () () () () () () () () () ()	500 IF C T 510	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0), THEN USED IN CALCULATION OF AV, THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1	
200	ISN 01 ISN 01 ISN 01 ISN 01 ISN 01	46 (((((((((((((((((((500 IF C T 510	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0), THEN USED IN CALCULATION OF AV, THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = I IN = N - LIM	
200	ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01	46 () () () () () () () () () () () () ()	500 1F C T 510	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0). THEN USED IN CALCULATION OF AV. THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.6660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1	
200	ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01	46 () () () () () () () () () () () () ()	500 IF C T 510	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0). THEN USED IN CALCULATION OF AV. THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N	
200	ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01	46 (0) (0) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	500 IF C T 510	D IN = IN + N - I SDME ROWS ARE STILL DN TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0). THEN USED IN CALCULATION OF AV. THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520.530	
200	ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01	46 () () () () () () () () () () () () ()	500 IF C T 510	D IN = IN + N - I SDME ROWS ARE STILL DN TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0), THEN USED IN CALCULATION OF AV, THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520.530 D READ (2) (B(IJ), IJ = II.IN)	
200	ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01 ISN 01	46 () () () () () () () () () () () () ()	500 IF C T 510	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0), THEN USED IN CALCULATION OF AV, THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520.530 D READ (2) (B(IJ), IJ = II.IN) GO TO 540	
200	ISN 01 ISN 01	46 (0) 47 48 49 50 51 52 53 54 53 54 55	500 IF C T 510 520 530	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0), THEN USED IN CALCULATION OF AV. THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520.530 D READ (2) (B(IJ), IJ = II.IN) GO TO 540 D READ (3) (B(IJ), IJ = II.IN)	· · · · · · · · · · · · · · · · · · ·
200	ISN 01 ISN 01	46 (47 48 49 50 51 52 53 54 55 55 55 56	500 IF C 510 520 530 540	D IN = IN + N - I SDME ROWS ARE STILL DN TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0), THEN USED IN CALCULATION OF AV, THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520.530 C READ (2) (B(IJ), IJ = II.IN) GO TO 540 D READ (3) (B(IJ), IJ = II.IN) C IF (K) 2000.570.550	
200	ISN 01 ISN 01	46 47 48 49 50 51 52 53 54 55 55 56 57	500 IF C 510 520 530 540 550	D IN \pm IN $+$ N $-$ I SDME ROWS ARE STILL DN TAPE, READ THEM IN. 1 AT A TIME. EACH RDW IS CONVERTED (IF K G.T. 0). THEN USED IN CALCULATION OF AV. THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN \equiv N - LIM LIMINC $=$ LIM $+$ 1 DO 640 I $=$ LIMINC.N IF (KEY) 2000.520.530 D READ (2) (B(IJ), IJ $=$ II.IN) GO TO 540 D READ (3) (B(IJ), IJ $=$ II.IN) C IF (K) 2000.570.550 D J $=$ I	· · · · · · · · · · · · · · · · · · ·
200	ISN 01 ISN 01	46 (0) 47 48 49 50 51 52 53 54 55 55 56 57 58	500 IF C 510 520 530 540 550	D IN = IN + N - I SDME ROWS ARE STILL ON TAPE. READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. O). THEN USED IN CALCULATION OF AV. THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000,660,510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000,520,530 D READ (2) (B(IJ), IJ = II.IN) GO TO 540 D READ (3) (B(IJ), IJ = II.IN) C IF (K) 2000,570,550 C J = I DD 560 IJ = II.IN	· · · · · · · · · · · · · · · · · · ·
200	ISN 01 ISN 01	46 () () () () () () () () () () () () ()	500 IF C 510 520 530 540 550	D IN = IN + N - I SDME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0). THEN USED IN CALCULATION OF AV. THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660,510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520,530 O READ (2) (B(IJ), IJ = II.IN) GO TO 540 O READ (3) (B(IJ), IJ = II.IN) C IF (K) 2000.570,550 O J = I DO 560 IJ = II.IN B(IJ) = B(IJ) - Q(J)*U(I)	
200	ISN 01 ISN 01	46 47 48 49 50 51 52 53 54 55 55 55 56 57 58 59 60	500 IF C 510 520 530 540 550 560	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0). THEN USED IN CALCULATION OF AV. THEN PUT ON THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520.530 D READ (2) (B(IJ), IJ = II.IN) GO TO 540 D READ (3) (B(IJ), IJ = II.IN) C IF (K) 2000.570.550 D J = I DO 560 IJ = II.IN B(IJ) = B(IJ) - 0(I)*U(J) - Q(J)*U(I) D J = J + 1	· · · · · · · · · · · · · · · · · · ·
200	ISN 01 ISN 01	46 47 48 49 50 51 52 53 54 55 55 55 55 55 56 57 58 59 60 61	500 IF C 510 520 530 540 550 560 570	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0), THEN USED IN CALCULATION OF AV, THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520.530 O READ (2) (B(IJ), IJ = II.IN) GO TO 540 O READ (2) (B(IJ), IJ = II.IN) C IF (K) 2000.570.550 O J = I DO 560 IJ = II.IN B(IJ) = B(IJ) - 0(I)*U(J) - Q(J)*U(I) O J = J + 1 O J = I	· · · · · · · · · · · · · · · · · · ·
200	ISN 01 ISN 01	46 47 48 49 50 51 52 53 54 55 55 55 56 57 58 59 60 61 62	500 IF 510 520 530 540 550 570	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0), THEN USED IN CALCULATION OF AV, THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520.530 O READ (2) (B(IJ), IJ = II.IN) GO TO 540 O READ (3) (B(IJ), IJ = II.IN) C IF (K) 2000.570.550 O J = I DO 560 IJ = II.IN B(IJ) = B(IJ) - Q(I)*U(I) O J = J + 1 O 580 IJ = II.IN	· · · · · · · · · · · · · · · · · · ·
200	ISN 01 ISN 01	46 47 48 49 50 51 52 53 54 55 55 56 57 58 59 60 61 62 62 63	500 IF C C 510 520 530 540 550 560 570	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0). THEN USED IN CALCULATION OF AV. THEN PUT DN THE DTHER TAPE TO MAKE ROOM FOR THE NEXT. ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520.530 O READ (2) (B(IJ), IJ = II.IN) GO TO 540 O READ (3) (B(IJ), IJ = II.IN) C IF (K) 2000.570.550 O J = I DO 560 IJ = II.IN B(IJ) = B(IJ) - O(I)*U(J) - O(J)*U(I) C J = J + 1 O J = I DO 580 [J = II.IN P(I) = P(I) + B(IJ)*V(J)	· · · · · · · · · · · · · · · · · · ·
200	ISN 01 ISN 01	46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64	500 IF C 510 520 530 540 550 560 570 580	<pre>D IN = IN + N - I Some Rows ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0). THEN USED IN CALCULATION OF AV, THEN PUT ON THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520.530 O READ (2) (8(IJ), IJ = II.IN) GO TO 540 O READ (3) (B(IJ), IJ = II.IN) C IF (K) 2000.570.550 O.J = I DO 560 IJ = II.IN B(IJ) = B(IJ) - O(I)*U(J) - Q(J)*U(I) O J = J + 1 DO 580 [J = II.IN P(I) = P(I) + B(IJ)*V(J)</pre>	
200	ISN 01 ISN 01 IS	46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65	500 IF C 510 520 530 540 550 560 570 580	<pre>D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0), THEN USED IN CALCULATION OF AV, THEN PUT ON THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KeY) 2000.520.530 D READ (2) (B(IJ), IJ = II.IN) GO TO 540 D READ (2) (B(IJ), IJ = II.IN) C IF (K) 2000.570.550 D J = I DO 560 IJ = II.IN B(IJ) = B(IJ) - 0(I)*U(J) - Q(J)*U(I) D J = J + 1 D D 58C IJ = II.IN P(I) = P(I) + B(IJ)*V(J) D J = J + 1 IF (N - I) 2000.610.590</pre>	
200	ISN 01 ISN 01 IS	46 47 48 49 50 51 52 53 54 55 55 55 55 55 55 55 56 57 58 59 60 61 62 63 64 65 66	500 IF C C 510 520 530 540 550 560 570 580 580	D IN = IN + N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0). THEN USED IN CALCULATION OF AV. THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D I = 1 IN = N - LIM LIMINC = LIM + 1 DO 660 I = LIMINC.N IF (KEY) 2000.520.530 D READ (2) (B(IJ), IJ = II.IN) GO TO 540 D READ (3) (B(IJ), IJ = II.IN) C IF (K) 2000.570.550 D J = I DD 560 IJ = II.IN B(IJ) = B(IJ) - O(I)*U(J) - O(J)*U(I) O J = J + 1 DD 580 IJ = II.IN P(I) = P(I) + B(IJ)*V(J) O J = J + 1 IF (N - I) 2000.610.590 O J = I + 1	
200	ISN 01 ISN 01	46 47 48 49 50 51 52 53 54 55 55 55 56 57 58 59 60 61 62 63 64 65 66 66 67	500 IF C T 510 520 530 540 570 580 590	<pre>D IN = IN.+ N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0). THEN USED IN CALCULATION OF AV. THEN PUT DN THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520.530 O READ (2) (B(IJ), IJ = II.IN) GO TO 540 O READ (2) (B(IJ), IJ = II.IN) C IF (K) 2000.570.550 O J = I DO 560 IJ = II.IN B(IJ) = B(IJ) - O(I)*U(J) - O(J)*U(I) O J = J + 1 DO 580 [J = II.IN P(I) + B(IJ)*V(J) O J = J + 1 IF (N - I) 2000.610.590 O J = I + 1 III = II + 1</pre>	
200	ISN 01 ISN 01	46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 66 66 68	500 IF C 510 520 530 540 550 560 570 580 590	<pre>D IN = IN.+ N - I SOME ROWS ARE STILL ON TAPE, READ THEM IN. 1 AT A TIME. EACH ROW IS CONVERTED (IF K G.T. 0). THEN USED IN CALCULATION OF AV. THEN PUT ON THE OTHER TAPE TO MAKE ROOM FOR THE NEXT ROW. IF (N - LIM) 2000.660.510 D II = 1 IN = N - LIM LIMINC = LIM + 1 DO 640 I = LIMINC.N IF (KEY) 2000.520.530 C READ (2) (B(IJ), IJ = II.IN) GO TO 540 O READ (3) (B(IJ), IJ = II.IN) C IF (K) 2000.570.550 O. J = I DO 560 IJ = II.IN B(IJ) = B(IJ) - 0(I)*U(J) - 0(J)*U(I) O J = J + 1 DO 580 IJ = II.IN P(I) = P(I) + B(IJ)*V(J) O J = J + 1 IF (N - I) 2000.61C.590 O J = I + 1 III = II + 1 DO 600 IJ = III.IN</pre>	

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	ISN	01 69		P(J) = P(J) + B(JJ) * V(J)				
	ISN	01 70	600	J = J + 1				
	ISN	01 71	61 0	IF (KEY) 2000+620+630				
	ISN	0172	620	WRITE (3) $(B(IJ) \cdot IJ = II \cdot IN)$		· · · · · · · · · · · ·		
	ISN	0173	- /	GO TO 640				
	ISN	0174	630	WRITE (2) $(B(IJ) \cdot IJ = II \cdot IN)$		· · · -		
	ISN	0175	640	IN = IN - 1				
	ISN	0176	650	KEY = 1 - KEY				
	ISN	0177	660	CONTINUE				
•			c	The second seco second second sec			a a construir constru	
			C PLA	CE NEW V AND P IN U AND Q.				
			с	a construction of the second sec				
	ISN	0178	670	DO 680 I = $K2$,N				
	ISN	0179		U(I) = V(I)				2 4 5 MART
	ISN	0180	680	Q(I) = ALF + P(I)				
	ISN	0181	690	CONTINUE	the second s	and a second of the second	and a set of the set o	
			с					
			C MOF	UP BY COMPLETING ARRAYS OF DIAGONAL	. OFF-DIAG AND S	QUARE ELEMENTS.	- is the action of the second second	
			с					
	ISN	0182		Q(N-1) = A(K1K1)			•	
	ISN	01 83		U(N-1) = A(K1K1+1)	•			
	ISN	0184		V(N-1) = U(N-1) + U(N-1)	n a se ban hanne anna anna 1998 anna anna anna anna anna anna anna a			
	ISN	0185		Q(N) = A(K1K1+2)				
	ISN	0186	700	IF (NO) 710,2000,720				
	ISN	01 87	710	WRITE $(6,10)$ $(Q(I), I = 1,N)$	•			
	ISN	0188	10	FORMAT (////18H TRI-DIAGONAL FORM/	///5X+18H DIAGON	AL ELEMENTS//(6		
				1X,1P8E15.7))				
	ISN	0189		WRITE (6_{20}) (U(I), I = 1,N1)	and the second			
	ISN	0190	20	FORMAT (///5X,22H SUB-DIAGONAL ELEM	ENTS//(6X,1P8E15	.7))	۰	· · · · · · · · · · · · · · · · · · ·
20	ISN	0191	720	CALL OVERFL(I)				
س	ISN	01 92		GO TO (730,740),I				a second contract of the second contract of t
	ISN	0193	730	MISS = 2		r		
	ISN	01 94		GO TO 1000	**************************************		» الدريو مدينا موج (1994 هـ دروموهم ار	
	ISN	0195	740	CALL GROPER (N . INDEX1 . NUMMER, Q.U., P.V	',B)			
	ISN	0196	750	MISS = 0				en a servera del frances del servera del servera
	ISN	0197		GO TO 1000				
	ISN	0198	2000					and the second second
	ISN	0199	1000	RETURN				
	ISN	0200		ENTRY SECURE(X,LUW,KUUNT,MID,W)	and a set of the set o			a construction of the second
	ISN	0201		DIMENSION X(MID 1) W(1)				
	15N	0202		CALL TRIVECTA $_{3}Q_{4}U_{5}V_{5}W_{4}P_{4}P(N/2 + 1)_{5}$	NI			•
	ISN	0203						
	ISN	0204		DU = BUV = I = I + KUUN1				•
	ISN	0205		CALL VLANDI(B(K)+X(1+1))				
	ISN	0206	800					
	ISN	0207		RETURN			* ^	
	ISN	0208		END		a second	1 44-	

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DATE 69.163/11.56.39

COMPILER OPTIONS - NAME: \$MAIN.OPT=02.LINECNT=56.SOURCE.BCD.LIST.DECK.LDAD.MAP.NJEDIT.ID

ISN 0002 SUBROUTINE GROPER(N+LIM1+NUMB+D+OFFD+PFFD+SEC+SIGMA) ISN 0003 DIMENSION PEED(1) ISN 0004 DIMENSION D(1), OFFD(1), SEC(1), SIGMA(1) ISN 0005 $LIM2 \approx LIM1 + NUMB - 1$ ISN 0006 CALL PREP(N,D,SEC,ROOT,LORD) ISN 0007 N1 = N = 1ISN 0008 BOUND = AMAX1(ABS (D(1))+ABS (OFFD(1)),ABS (OFFD(N1))+ABS (D(N)))ISN 0009 IF (N - 2) 16,200,100 ISN 0010 100 DO 1 I = 2.NI ISN 0011 1 BOUND = $AMAX1(BOUND_ABS(OFFD(I-1)) + ABS(D(I)) + ABS(OFFD(I)))$ ISN 0012 200 DO 2 I = LIM1, LIM2 ISN 0013 SIGMA(I) = -BOUNDISN 0014 2 PFFD(I) = BOUNDISN 0015 LORD = 0ISN 0016 RUTE = 1.0ISN 0017 L = LIM1 - 1ISN 0018 3 K = L + 1ISN 0019 IF (K - LIM2) 4.4.13 ISN 0020 4 ROOT = .5 * (SIGMA(K) + PFFD(K))ISN 00 21 5 DO 6 I = K.LIM2 ISN 0022 IF (PFFD(K) - PFFD(1)) 7.6.7 ISN 0023 6 L = I ISN 0024 7 IF (ROOT - RUTE) 8,3.8 ISN 0025 8 CALL DET(LORD) ISN 0026 DO 11 I = K.L ISN 0027 IF(I -LORD) 9.9,10 9 SIGMA(I) = ROOT ISN 0028 ISN 0029 GO TO 11 ISN 0030 10 PFFD(I) = ROOT ISN 0031 11 CONTINUE ISN 0032 RUTE = ROOTISN 0033 IF (ROOT) 4,12,4 ISN 0034 12 KING = LORD ISN 0035 GO TO 4 ISN 00 36 13 IF (KING - LIM1) 16.14.14 ISN 0037 14 DO 15 I = LIM1.KING 15 SIGMA(I) = PFFD(I)ISN 0038 ISN 0039 16 RETURN ISN 0040 END

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1.4.1

COMPILER OPTIONS - NAME = \$MAIN,OPT=02,LINECNT=56,SOURCE,BCD,LIST,DECK,LOAD,MAP,NDEDIT,ID Ð Þ OF A REAL SYMMETRIC MATRIX A, AND GIVEN A GOOD APPROXIMATE ROOT OF B (AND A) THIS FORTRAN 4 SUBROUTINE COMPUTES A UNIT EIGENVECTOR X OF B. THEN TRANSFORMS IT TO A UNIT VECTOR OF A. USING THE VECTORS STORED IN THE A ARRAY. DIMENSION A(1),D(1),OFFD(1),P(1),Q(1),R(1),S(1),X(1) DOUBLE PRECISION SUM GIVEN THE ENTRIES (D AND OFFD) OF THE HOUSEHCLDER TRI-DIAGONAL FORM SYMMETRIC MATRIX EIGENVECTOR CALCULATION. SUBROUTINE TRIVEC (A, D. OFFD, P. Q. R.S.N) = TOL RIGHT SIDE MODIFICATION. = (TOL + 1.E-15) * 1.E-15 2 d U = ABS (OFFD(I)) IF (T + U - TOL) 110.120.120 $(I)_{0*}(I) = C(I+I) = C(I)_{0*}(I)$ MATRIX DECOMPOSITION. = AMAX1 (TOL,ABS(D(I))) COMMON /INFO/ SUM,M.IX.IA = TEMP - S(I) * Q(I)(ABS(P(N)) .LT. TOL) IF (T - U) 130,140,140 S(I) = P(I)/OFFD(I) ENTRY VLANDT (RODT.X) PRELIMINARIES. S(I) = OFFD(I) / P(I)= -S(I) * R(I)ASSIGN 170 TO KOUNT S(I) = AND(S(I) - 2)P(I) = D(I) - ROOTX(I) = RDM(X) + .1S(I) = OR(S(I), I)IN + I = IN•1 = 1 = OFFD(I)= 0FFD(I)T = ABS (P(I))(1+1)d = (1)0R(I) = Q(I+1)P(I) = TOL T = P(I) 0(1) Q. GO TO 150 TO 210 R(1) = 0.CON TINUE ŧ • 00 150 00100 (î+1)D (1+1)d z RET URN Ð PART 1. TEMP PART 2. PART 3. Ħ п (I)d Ħ 0(1) I ᄓ ToL þ ų. 00 х Z ŝ ž 120 140 100 110 150 υυ υυυ υυυ υ υυυ υ υ LEVEL 2 FEB 67 0034 00 36 SE 00 00 38 00 39 00002 0015 00 25 0028 00 32 00 33 **7E 00** 00 03 0000 00100 0013 0014 00 20 0.0 23 0024 00 27 00 31 0040 00 43 0000 2000 00 08 6000 0012 0016 7100 0018 0010 00 21 0022 00 26 0029 00 30 0041 1100 ISN 0002 NS I SN ISN ISN I SN SN SN I SN SN S [SN SZ [SN SN [SN 2 S

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OS/360 FORTRAN H

69.163/11.56.44

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		No no na presidente de la construcción de la manadadad na construcción de la construcción de la construcción de
	ISN 0044	170 ASSIGN 330 TO KOUNT
	ISN 0045	DO 200 $I = 1 \cdot N1$
	TSN 0046	TFMP = AND(S(I), 1)
£* ,	ISN 0047	IE (TEMP) 180-190-180
	131 0048	
	15N 0049	X(1) = X(1+1)
	ISN 0050	X(I+1) = T - S(I) * X(I)
	ISN 0051	GO TO 200
	ISN 0052	$190 \times (1+1) = \times (1+1) - S(1) \times X(1)$
	ISN 0053	200 CONTINUE
		c
		C PART 4. TRIANGULAR SYSTEM SOLUTION.
	TEN 0054	210 Y(N) = Y(N)/P(N)
	Ten ODEE	642, 0.017 , -0.0177 , 0.011 , -0.011 , 0.011 ,
	15N 0055	$X(\mathbf{N}) = (X(\mathbf{N}) - Q(\mathbf{N}) + X(\mathbf{N})) / P(\mathbf{N})$
	ISN 0056	DU 220 1 = 2, N1
	ISN 0057	K = N - I
	ISN 0058	220 X(K) = (X(K) - Q(K) * X(K+1) - R(K) * X(K+2)) / P(K)
		c
		C PART 5. SCALING TO UNIT VECTOR.
		c
	ISN 0059	230 SUM = $0 \cdot D0$
	TSN 00.60	M = N
	ISN 00.61	$S(A A = S(A (O \cap TPRO(X \cdot X)))$
	TEN 00.62	D = 250 I = 1.0
	TSN 0063	
-	13N 0005	
	1214 00.04	 An analyzing and an analyzing the standard sta Standard standard s Standard standard stand Standard standard stand
	N	
	04 4	C PARI D. IRANS-URMAIIUN BY URIHUGUNAL MAIRICES.
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	ISN 0065	330 L = (N*(N+1))/2 - 4
	ISN 0066	DO 360 I = $1.N2$
	ISN 0067	NI = N - I
	ISN 0068	SUM = 0.DO
	ISN 0069	M = I + 1
	ISN 0070	SCALAR = -A(L-1) * DOTPRO(X(NI),A(L))
	ISN 0071	IJ = L
	ISN 0072	$DQ_{350} J = NI \cdot N$
	ISN 0073	X(1) = X(1) + S(1) AB * A(11)
	ISN 0073	
	130 0074	
	15N 0075	
	ISN 0076	ASSIGN 370 10 KUUNI
	ISN 0077	GO TO 230
	ISN 0078	370 RETURN
	ISN 0079	END

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·	COMPILER C	PTIONS - NAME = \$MAIN,OPT=02,LINEC	NT=56,SDURCE,BCD,LIST,D	ECK,LOAD,MAP,NJEDIT, ID	n an
	ISN 0002 ISN 0003 ISN 0004	FUNCTION LIMIT(N,M) K = N	· · · · · · · · · · · · · · · · · · ·		
	ISN 0004 ISN 0005 ISN 0006 ISN 0007	L = 0 DO 100 I = 1.N L = L + K K = K - 1		· · · · · · · · · · · · · · · · · · ·	ann a la a a an a
• •	ISN 0008 ISN 0009 100 ISN 0010 ISN 0011	IF (M - L) 120,110,100 CONTINUE LIMIT = N RETURN			
	ISN 0012 110 ISN 0013 ISN 0014 120 ISN 0015) LIMIT = 1 RETURN) LIMIT = 1 - 1 RETURN	· · · · · · · · · · · · · · · · · · ·		
	ISN 0016	END			
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DIAGNOSTIC MESSAGE DIRECTORY

IEW0132 ERROR - SYMBOL PRINTED IS AN UNRESOLVED EXTERNAL REFERENCE.

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MODULE MAP

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	CONTROL S	ECTION	· ···· ···· · ···· ·	ENTRY	·						· · · ·
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•••				DPOWI 6	68		·····				
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	INFO	FO	1 4								
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				SHAIN	38480						
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	GEORGE	30850	10								
	ABOOT	30850	10		*********						
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				SCAPR	36498						
	AFX=	356A0	1540								
				AFX	3E988						
	DEIGN=	3F950	4C 2								
	1271-21-1-1-1			DEIGN	3F890		· · · · · · · · · · · · · · · · · · ·				
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SYM3IG=	685F0	1 56C	SYMBIG	63740	SECURE	6 C9 C8				
GROP TR =	5CB 60	4B.6	GROPER	6CBB0						
TRIVEC=	60013	3 QL	TRI VEC	60088	VLANDT	6 D2 E0				
LIMIT=	607F8	۲. ۲. ا	LIMIT	6D818						
IHCFEXIT*	50930	U F	EXIT	60930						
IHCFIOSH*	60950	D30	FIOCS	60950						
THCUATBL #	68680 4840									
		2 A A	IBCOM=	6E7C8	FDI0CS=	65834	=IBXOUT	SF5AC	=BUFLOC	6F79C
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)			SYSERR	6FDC8						
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SYSOPT *	70430	U								
SYSRXT= *	70440	¢,	SYSRXT	70440						
IHCLEXP *	70448	C C	DEXP	70443				1		
IHCLSCN *	70613	16 C	DCOS	70618	NISO	70636				
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1HCLL0G *	70780	378	DL061.0	70780	0 L 0 6	707 CC				
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IHCL SQR <b>T</b> *	709C0	ए) C	DSQRT	70900						
FINAGL *	70A58	ΨC	TAMPER	70 A58	ACT ION	70484	STNDRD	70AA 2		
THCL ATN 2*	70AC8	B S C	DATAN2	70 AC8	DATN	70AE4	DATAN	70AFE		
NAME	ORIGIN	LENGTH	NAME	LOCATION	NAME	LOCAT ION	NAME	LOCATION	NAME	LOCATION
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IHCL TNC T*	70CF8	188								
			DCOTAN	70CF8	DTAN	70014	QDTAN	70E2C		
IHCSSCN *	70E80	110	COS	70580	SIN	70590				
IHCSSORT*	70FA0	AC	603	1000	3114	TULIC		*		
			SORT	70FA0						
IHCSLOG *	71050	100		7.050		71060				
THOEQVER	71160	50	ALUGIO	/1050	ALUG	71060		· · · ·	a	
			OVERFL	71160						
IHCFCVT H*	71180	107C								
			ADCON=	71180	FCVZO	712FC	FCVAD	71 3A 2	FCVLU	71432
			FCVIO	71768	FCVED	71C5A	FCVCO	71E5C	INTOSW	72211
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## APPENDIX II

## SIMULATION PROGRAM

This appendix contains a flow chart and listing of the simulations of the various models of the Ames system. The flow chart (Fig. II-1) is of the MAIN program, which is suitable for all simulations. The only change to accommodate the simulations occurs in the equations of motion in subroutine AFX.

The listings given are suitable for all four models, and the AFX subroutine for: 1) AN, 2) MV, 3)error limited, and 4) 6D are also given. ANL simply has limits  $e_{\phi}$ ,  $e_{\theta}$ ,  $e_{\psi}$  using three pairs of statements of the form:

IF ( $e_{\phi}$  .GT. V2)  $e_{\phi} = V2$ 

IF ( $e_{\phi}$  .LT. -V2)  $e_{\phi} = -V2$ 



Fig. II-1 Generic Simulation Program Flow Chart

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# AN & MV LISTING OS/360 FORTRAN H

DATE 69.179/68.13.38

COMPILER OPTIONS - NAME= \$MAIN, DPT=02, LINECNT=56, SOURCE, BCD, NOL IST, NODECK, LDAD, MAP, NOEDIT, ID

ISN 0040 XKM = 1.0/13.0 ISN 2041 хкс = 2.685 E&05 ISN 0.042 = 0.0 A13 ISN 0043 A11 = 0.0 ISN COA4 AITREN= 1500.0 F2LIM = 26.0 ISN 0045 ISN 0046 ICNT=9 ISN 0047 READ(5,1001)GAM%C,GAM2C,BET1C,BET2C ISN 0048 READ(5,1001)HPHI,HTHT,HPSI ISN 0149 PI= 3.1415926 DTR = PI/180. ISN 0050 ISN 0951 GAM1C = GAM1C * DTRGAM2C = GAM2C * DTR ISN 0052 ISN 0^ 53 BETIC = BETIC * DTR ISN 0054 BET2C = BET2C * DTR ISN 0055 DIF = GAM1C - GAM2C ISN 0056 Di2 = 2.0 * DIF / ABS(DIF)ISN 0157 SDIF=SIN(DIF) ISN 0058 SG1C = SIN(GAM1C)ISN 0059 CGLC = COS(GAM1C) SG2C = SIN(GAM2C)ISN 00.60 ISN 00.61 CG2C = COS(GAM2C) SB1C = SIN(BET1C) ISN 0262 CB1C = COS(BET1C)ISN 00.63 ISN 0064 TB1C = SB1C/CB1CС DEFINE STATE VECTOR TO BE USED AS INITIAL STATE ISN 0065 X1E = ( AITREN)/(XKM*XKC)*(HPHI-HTHT*(A11*SG1C-A13*SG2C-CG1C*TB1C 1 )/(D12*SDIF) EHPSI*(A11*CG1C-A13*CG2CESG1C*TB1C)/(D12*SDIF)) ISN 0066 X4E = ( AITREN) / (XKM*XKC) * (HTHT/(D12*SDIF))ISN 0067 X7E = (-AITREN)/(XKM*XKC)*(HPSI/(D12*SDIF))IF(ICNST(10).GT.0) GO TO 1999 ISN 0068 ISN 0070 X(1) = PHI*DTR-X1EISN 9071 X(2)=(VPHI-AITREN*HPHI)/10.0 X(3)= WPHI+T1*AITREN/(T2*XKM)*HPHI ISN 0072 ISN 0073 X(4) = THT * DTR - X4EISN 9074 X(5)=(VTHT-AITREN*HTHT)/10.0 ISN 0275 X(6) = WTHT+T1 *AITREN/(T2*XKM)*HTHT ISN 0076 X(7) = PSI*DTR-X7EISN 2077 X(8)=(VPSI-AITREN*HPSI)/10.0 ISN 0078 X(9) = WPSI+T1 *AITREN/(T2*XKM)*HPSI ISN #779 5999 WRITE(6,2000)(X(I),I=1,9) 2000 FORMAT(1H /10X,15H INITIAL STATE ,/(1X,5E20.7)) ISN 0080 ISN 0081 IF(ICNST(10).EQ.0) GO TO 4377 PHI = (X(1) + X1E) / DTRISN 00.83 ISN D184 VPHI=10.0*X(2)+AITREN*HPHI WPHI=X(3)-T1 *AITREN/(T2*XKM)*HPHI ISN 0085 ISN 0086 THT = (X(4) + XAE)/DTRISN 0387 VTHT=%C.G*X(5)+AITREN*HTHT WTH T=X(6)-T1*AITREN/(T2*XKM)*HT HT ISN 6088 ISN 0089 PSI = (X(7)+X7E)/DTRISN 0090 VPSI=10.0*X(8)+AITREN*HPSI ISN 06-91 WFSI=X(9)-T2*AITREN/(T2*XKM)*HPSI 4377 YZRO(1) = PHIISN 0092 ISN 00.93 YZRO(2) = VPHIISN 31 94 YZRC(7) = WPHIYZRD(A) = THTISN 0195

PAGE 012

XZERO(I) = X(I) IF ICNST(9) IS GT ZERD Q-MATRIX MUST BE SPECIFIED.OTHERWISE IT'S R ANDOM IF(ICNST(9).ΕΩ.Ω.) GD TD A43 NOI SE WSI)0003.6(ETI RW 10TH ORDER OF OUTPUT. THIS FORMAT ONLY GOOD FOR FORMAT( 6H ISW= , I5,19H JUST OUT OF JINPG ///) •(SE20.8)) TRUE , (5E20.8)) FORMAT(1H /10X. 7H YZRO =./(1X.5E20.7)) JINPG (Y.DY.T.ILIW.H.ISW.K.EMAX) IF( Y(IAT) .GT. FCNST(5) ) GD TD 1000 READ(5,88) (( Q(I,J),J=1,9),I=1,9) TRUE If(ICNT.NE.ICNST(20)) G0 T0 901
WPITE(6.241) (V(J).J=1.L) IF(ICNT.NE.ICNST(20)) GO TO 900 FORMAT(1H /.30X,5H TIME FI0.5) WRITE(6+2500)(YZRU(I)+I=1,9) [F(ICNST(15).GE.1)GC TC 900 IF(ICNST(15).6E.1)G0 T0 901 #RITE (6,232) (Y(J),J=1,K) FORMAT(8H CONTROL, / 10H IF (ISW.EQ.2) GO TO 1000 DERIV (DY.Y. U. T) FORMAT(6H STATE / 10H IF(ISW-1)300, 200,200 XZERO(J) OR LOWER 1=1•K WRITE (6,201) T CALL CNTRL(V.T) INI TI ALI ZATION DO 11 I = 1, L F URMAT(5E16.7) = VTHT YZRD(6) = WTHT= VPS1  $\gamma ZRO(7) = PSI$ YZRO(9) = WPSI CALL AFX(JSW) DC 36 I=1 15 DO 10 I=1.K = FCNST(4)  $\chi(I) = \chi(I)$ ICNT=ICNT+1 (1) = (1)CALL PEATQ CALL QGEN GC TO 844 CONTINUE CONTINUE Y ZRO(5) Y 2RO(8) WRI TING SYSTEM ດ ທ C= MSP C=LNDI Y(J) CALL CALL Q 00 2500 36 88 844 944 200 202 ್ಷ ೧೫೭ ೧೫೭ 101 e: S 106 eri eri 305 3066 04¢ 243 ្លីខ្ល υ υ υυ υ 01 05 01 07 2115 2116 0120 0130 0130 0132 6600 ê î î û 2010 0103 4010 01.08 6134 0117 9118 0118 0120 61 23 0124 0125 0126 73.27 01 28 SE 10 11 37 6E 30 01 40 01 43 11 44 n146 0147 3148 0096 1000 0100 1110 01.38 9149 00 98 0110 0121 1 42 20202 0141 I SN NS I

PAGE 003

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		СОМРІІ	LER O	PTIONS - NAME= \$MAIN,OPT=02,LINECNT=56,SOURCE,BCD,NO	LIST.NODECK .LOAD.MAP.NO	EDIT,ID	
	ISN 000 ISN 000	3		SUBROUTINE JINPG(QN,GNM, TIME, TLIM, STEP, ISW, K IMPLICIT REAL*B (A-H,C-Z)	• EMAX )		
		4	с с	FORTH ORDER RUNGE-KUTTA SUBROGRAM DIMENSION OF STATE SPACE CANNOT EXCEED 15			
			c	NOMENCLATURE			
			5	QNM = CURRENT VALUE OF STATE DERIVATIVE			
	ISN 00-	۰ <u>م</u>	<b></b>	K = DIMENSION STATE SPACE	NCSS		
	ISN 30	15		$IF(ISW_{\bullet}GE_{\bullet}0)$ GO TO 100			
		-	с	FIRST TIME			
	ISN 000	7	1	ISW= 0			
	ISN 000	38		TZERO =TIME			
	ISN ONG	9		EMAX= EMAX			
	ISN 001	0		ICNTR=1			
	ISN COS	11		$H_2 = 0.5*STEP$			
	ISN 001	2		DO 25 I=1,K			
	ISN 001	3		SUM(I) = QNM(I)			•
	ISN 007	4		QN(I) = QN(I)			
	ISN 001	.5		$QN(I) = QN(I) \in H2* QNM(I)$			
	ISN 001	6	25	CONTINUE			
	ISN 001	7		TIME = TIME & H2			
	ISN CON	.8	-	GO TO 999			
	104 004	· ^ ·	3 66	IEST FOR ERROR			
	ISN DOA	19	100	IF ( ISWECUEL ) GU (U L IF ( ISWECUEL ) GU (U L			
	1.511 0.028	α. <u>Δ</u>	~	TEST EOD EINAL ENTRY			
2	ISN 000	22		IE(ICNTR-E0.3) of to 200			
•	ISN 002	25					
	ISN 002	26		$SUM(I) = SUM(I) \in 2 \cdot 0 \times 0 \times 0 \times 10^{-1}$			
	ISN 002	27	125	$QN(I) = QNI(I) \in H2*QNM(I)$			
	ISN CHA	28		TIME = TZEROSH2			
	ISN 002	29		ICNTR = ICNTRE1			
	ISN 003	30		$H_2 = H_2 $			
	ISN 001	31	999	RETURN			
			с	ERROR IN SETTING INPUT TO PROGRAM			
	ISN 000	32	° 999	WRITE(6,800)			
	ISN 000	33	500	FORMAT(40H INTEGRATION ERROR, ISW AT ENTRY =1,2	)		
	ISN 003	34		CALL EXIT			
			5	LAST TIME THRU			
	ISN 003	35	200	H6 = STEP/6.0			
	ISN C'S	56 	• •	D[0] = 210  I = 1, K			
	15N 01	27 70	2.1	$QN(1) = QNR(1) \in HC = (SOM(1) \in QNM(1))$			
	15N 072	30		15W= 1 IE(TIME.CT.0.0) CC TO 68			
	13N 000	J9 19					
	ISN 024	12		ATLIM =DABS(TLIM)			
	ISN 014	+3		IF(ATIME.GE.ATLIM) GO TO 777			
	ISN 004	15		GD TO 999			
	ISN OF	16	68	IF(TIME.GE.TLIM)GO TO 777			
	ISN 014	48	-	GO TO 309			
	ISN ADA	ho	777	I SW = 2	NCSS		
	ISN 00F	56.		GC TO 999			
	ISN OF	51		É ND			

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OS/360 FORTRAN H

DATE 69.179/08.14.66

LEVEL 2 FEB 67

COMPILER OPTIONS ~ NAME= \$MAIN.OPT=22.LINECNT=56.SOURCE.BCD.NOLIST.NO DECK.LOAD.MAP.NOEDIT.ID

ISN 0002	SUBROUTINE CNTRL(V.T)	
ISN 0003	IMPLICIT REAL*8 (A-H,O-Z)	
ISN 0004	REAL*4 N1 N2 NA NA NA KA KA KA NRSS	
ISN 0005	DIMENSION N1 (1060) + N2 (1000)	
ISN 0016	DIMENSION ICNST(24),FCNST(28),PX(9),V(15),ALP(12)	
ISN 0007	COMMON/A/ XCOM(1000,13)	
ISN 0008	CCMMON/BLKX/YZRO(9)	
ISN COOS	DIMENSION YCOM(12), BUFFER(512)	
ISN DOLC	DIMENSION TITLE(12)+VA(13)+DVA(13)	
ISN 0011	DIMENSION PF(9),QX(9)	
ISN 0112	COMMON ICNST,FCNST,ALP	
ISN 0033	COMMON /BLK5/ A(9,9),Q(9,9),FM(9,9),F(9),DF(9,9)	
ISN 0014	COMMON/BLK77/X(15)	
ISN 0015	DATA TITLE/*X1*,*X2*,*X3*,*X4*,*X5*,*X6*,*X7*,*X8*,*X9*,*V*,	
	1 * VD 9T • , • NORM• /	
ISN 0016	DATA ITEST/1/	
ISN 0017	DATA ICOUNT/0/	
ISN 0018	KAT = 1000.	
ISN 0019	ISW=1	
ISN 0020	600 FORMAT(2F10+4)	
ISN 0021	ICOUNT = ICOUNT + 1	
ISN 0722	IF(T.EQ.FCNST(4))JSW=Q	
ISN 0024	IF(T.EQ.FCNST(4)) K=1	
15N 0026	N=K	
ISN 0027	$\mathbf{v}(1) = 9 \cdot 0$	
ISN 0028	T=T	
ISN 0029	CALL AFX(JSW) CN	TRL
	C 99+1=1+)1(F(-)1005+6(ET1 RW	
ISN 0030	C 99,1=1,)1(F( )1005,6(ET1 RW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13,6)	
ISN 0030 ISN 0031	C )9,1=1,)1(F( )1005.6(ET1 RW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13.6) CALL VLAP(PX,VL)	
ISN 0030 ISN 0031 ISN 0032	C	
ISN 0030 ISN 0031 ISN 0032	C (99.1=1.)I(F( )1005.6(ET1 RW 5001 FORMAT(1H / 1X.12H F(X)-VECTOR / 1X.9E13.6) CALL VLAP(PX.VL) CALL VDOTA(PF.QX.VDOT) C PLOTTING ROUTINES	
ISN 0030 ISN 0031 ISN 0032	C (9,1=1,)((+( )1005,6(ET1 RW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13.6) CALL VLAP(PX,VL) CALL VDOTA(PF.QX,VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS	
ISN 0030 ISN 0031 ISN 0032	C (9,1=1,)((F( )1005,6(ET1 RW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13.6) CALL VLAP(PX,VL) CALL VDOTA(PF,0X,VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C LIAPUNOV FCT	
ISN 0030 ISN 0031 ISN 0032	C (9,1=1,)((+( )1005,6(ET1 RW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13,6) CALL VLAP(PX,VL) CALL VDOTA(PF,0X,VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C LIAPUNOV FCT C DERIVATIVE OF LIAPUNOV FCT	
ISN 0030 ISN 0031 ISN 0032	C (9,1=1,)((+( )1005,6(ET1 RW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13.6) CALL VLAP(PX,VL) CALL VDOTA(PF.QX,VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C (14) C	
ISN 0030 ISN 0031 ISN 0032	C (9,1=1,)((+( )1005,6(ET1 RW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13.6) CALL VLAP(PX,VL) CALL VDOTA(PF.QX,VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C (1005,6(ET1 RW) CALL VLAP(PX,VL) CALL VLAP(PX,VL	
ISN 0030 ISN 0031 ISN 0032	C (9,1=1,)((+( )1005,6(ET1 RW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13,6) CALL VLAP(PX,VL) CALL VDOTA(PF,QX,VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C (14000 FCT C (14000 FCT	
ISN 0030 ISN 0031 ISN 0032	C (9,1=1,)((+( )1005,6(ET1 RW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13.6) CALL VLAP(PX,VL) CALL VDOTA(PF,0X,VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C (14PUNOV FCT C (14PUNOV FCT	
ISN 0030 ISN 0031 ISN 0032	5001 FORMAT(1H / 1X+12H F(X)-VECTOR / 1X+9E13+6) CALL VLAP(PX,VL) CALL VDOTA(PF+QX+VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C LIAPUNOV FCT C DERIVATIVE OF LIAPUNOV FCT C THE MATRIX XCOM CONTAINS UP TO 1000 SETS OF THE 12 ITEMS ABOVE C NCRM OF THE STATE CALC	
ISN 0030 ISN 0031 ISN 0032	5001 FORMAT(1H / 1X.12H F(X)-VECTOR / 1X.9E13.6) CALL VLAP(PX.VL) CALL VDOTA(PF.QX.VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C LIAPUNOV FCT C DERIVATIVE OF LIAPUNOV FCT C NORM OF THE STATE COMPONENTS ABOVE C NCRM OF THE STATE CALC C	
ISN 0030 ISN 0031 ISN 0032	C (9,1=1,)((+( )1005,6(ET1 RW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13.6) CALL VLAP(PX,VL) CALL VDOTA(PF.QX,VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C (14000) FCT C (14000)	
ISN 0030 ISN 0031 ISN 0032 ISN 0033 ISN 0034	C (9,1=1,)((+( )1005,6(ET1 KW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13,6) CALL VLAP(PX,VL) CALL VDOTA(PF,QX,VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C (10000 FCT C (10000 FCT	
ISN 0030 ISN 0031 ISN 0032 ISN 0033 ISN 0034 ISN 0035	C (9,1=1,)((+( )1005,6(ETT RW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13,6) CALL VLAP(PX,VL) CALL VDOTA(PF,QX,VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C (14PUNOV FCT C (14PUNOV FCT	
ISN 0033 ISN 0033 ISN 0032 ISN 0033 ISN 0034 ISN 0035 ISN 0036	<pre>Soli FORMAT(1H / 1X+12H F(X)-VECTOR / 1X+9E13+6) CALL VLAP(PX,VL) CALL VDOTA(PF+QX+VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C LIAPUNOV FCT C DERIVATIVE OF LIAPUNOV FCT C THE MATRIX XCOM CONTAINS UP TO 1000 SETS OF THE 12 ITEMS ABOVE C NCRM OF THE STATE CALC C XNORM = 0+3 DC 375 I=1+9 375 XNORM = XNORM + X(I)**2 IF(T+GT+FCNST(4)) GO TO 380</pre>	
ISN 0033 ISN 0033 ISN 0032 ISN 0033 ISN 0034 ISN 0035 ISN 0036 ISN 0038	<pre>Soli FORMAT(1H / 1X+12H F(X)-VECTOR / 1X+9E13+6) CALL VLAP(PX,VL) CALL VDOTA(PF+QX+VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C LIAPUNOV FCT C DERIVATIVE OF LIAPUNOV FCT C THE MATRIX XCOM CONTAINS UP TO 1000 SETS OF THE 12 ITEMS ABOVE C NCRM OF THE STATE CALC C XNORM = 0+3 DC 375 I=1+9 375 XNORM = XNORM + X(I)**2 IF(T+GT+FCNST(4)) GO TO 380 DC 379 I=1+9</pre>	
ISN 0033 ISN 0033 ISN 0033 ISN 0033 ISN 0034 ISN 0036 ISN 0038 ISN 0038	C (9,1=1,)((+( )1005,6(ET1 KW 5001 FORMAT(1H / 1X,12H F(X)-VECTOR / 1X,9E13.6) CALL VLAP(PX,VL) CALL VDOTA(PF.QX,VDOT) C PLOTTING ROUTINES C THE FOLLOWING ARE PLOTTED THE INDIVIDUAL STATE COMPONENTS C (14000) FCT C (14000)	
ISN 0033 ISN 0033 ISN 0032 ISN 0033 ISN 0034 ISN 0038 ISN 0038 ISN 0038 ISN 0038 ISN 0038	<pre>C</pre>	
ISN 0033 ISN 0033 ISN 0032 ISN 0032 ISN 0034 ISN 0036 ISN 0036 ISN 0039 ISN 0039 ISN 0039 ISN 0039	<pre>C</pre>	
ISN 0033 ISN 0031 ISN 0032 ISN 0032 ISN 0034 ISN 0036 ISN 0036 ISN 0039 ISN 0039 ISN 0039 ISN 0039 ISN 0039 ISN 0039	<pre>C</pre>	
ISN 0030 ISN 0031 ISN 0032 ISN 0032 ISN 0033 ISN 0034 ISN 0038 ISN 0038 ISN 0038 ISN 0038 ISN 0044	<pre>C</pre>	· · · · · · · · · · · · · · · · · · ·
ISN 0033 ISN 0033 ISN 0032 ISN 0032 ISN 0033 ISN 0034 ISN 0038 ISN 0038 ISN 0038 ISN 0038 ISN 0038 ISN 0044 ISN 0044 ISN 0044 ISN 0046	<pre>C</pre>	· · · · · · · · · · · · · · · · · · ·
ISN 0033 ISN 0033 ISN 0032 ISN 0033 ISN 0034 ISN 0038 ISN 0038 ISN 0038 ISN 0038 ISN 0038 ISN 0038 ISN 0044 ISN 0044 ISN 0046 ISN 0047	<pre>C</pre>	
ISN 0033 ISN 0033 ISN 0032 ISN 0032 ISN 0034 ISN 0034 ISN 0038 ISN 0038 ISN 0038 ISN 0038 ISN 0038 ISN 0038 ISN 00443 ISN 00443 ISN 00447 ISN 0048	<pre>C</pre>	

WRITE(6,630)(N1((I1),1I=1,100) WRITE(6,630)(N1,01,11=1,100) Call Scale(N1,N,60,4411ME,4,10,00,00,00) Call AXIS(0,0,0,0,0,4411ME,4,10,00,00,00,00) Call AXIS(0,0,0,0,0,111LE(J),4,60,900,4A3,K0,0) CALL NUMBER(5.25,6.5.62,EXP.0.0,-1) NRSS = YZRD(J) Call Number(6.25,6.5,.2,NRSS,0.0,3) CALL SYMBL4(5.75,6.5,.2,*=',0.0,1) CALL NUMBER(3.,6.5,2,NXA,0.0,5) CALL SYMBL4(5。,6°5,•2,*E',0°0,2) FORMAT(1H /1X, 7H NORM = .E14.7/) CALL LINE(N2,N1,N,1,1,-3,1,.05) CALL EFORM(YCOM(J),NXA,EXF) CALL SCALE(N2, N.10. NA, ND.1, 0) ^ FCRMAT( * YZRO(J) = * ,E14.7) 99 FORMAT( 4H0 K= I5 , 4H N= I5) % XCOM(I + J)=XCOM(I + J)/YCOM(J) FORMAT( * NRSS = *,E14.7) XCOM(K,12) = SQRT (XNORM) FORMAT( * A = *,E14.7) FORMAT(14H0EPLOT CALLED WRITE (6,779) N1 (1), N2(1) WRI TE (6.403) XCOM (K.12) IF(K.NE.KAT)GO TO 1000 CALL PLOTS(BUFFER,512) XCOM(1.1) WRITE(6.327) YZRO(J) CALL PLOT(12.00..-3) FORMAT( 2H0 2520.7) IF(J.GT.9) GO TO 9 WRITE(6.222) NRSS xcom(K,11) = vbotWRI TE (6,326) NXA N2(I)=XCOM(I,133)  $xCOM(K_{I}) = x(I)$ N1(I)=XCOM(I,J) XCOM(K,10) = VL WRITE(6,99)K.N XCOM(K.13) = 1 00 779 I=1.50 DC 10 J=1,12 DC 10 I=1.KAT 00 777 J=1,12 DO 71 I=1.KAT DO 72 I=1.KAT DO 5 I=1,12 #RITE(6,98) YCOM(I) = CALL EPLOT CONTINUE CONTINUE RETURN X || X + 4 END 385 326 4 10 n 2 25 327 222 777 98 778 279 00000 0000 C 00 80 00 90 0059 02-00 06700 00.75 00.75 00 79 00 60 00.86 10.87 0^ 88 00.92 00.95 9500 0010 51 53 51 54 51 54 00556 12-6 0061 00.62 50.53 9064 3768 00.69 0072 0073 0-74 0078 0081 10 40 20.55 00 65 0066 0071 2203 0-0-82 28.00 0 × 84 40.00 00.08 56 v G 01.01 51.02 00.50 01 52 00 53 00 54 00 67 E0 00 0001 1540 I SN I SN z zs SZ SN Z S N N N N NS. S SZ Х С SZ 2 S 2 S

PAGE L'B

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## LEVEL 2 FEB 67

## 05/360 FORTRAN H

COMPILER OPTIONS - NAME: \$MAIN, OPT=02, LINECNT=56, SOURCE, BCD, NOL IST, NO DECK, LOAD, MAP, NOEDIT, ID

ISN 0003 IMPLICIT REAL*8 (A-H,0-Z) ISN 0004 DIMENSION ICNST(24),FCNST(28),Y(15),V(15),DY(15),ALP(18	8)
ISN 0004 DIMENSION ICNST(24),FCNST(28),Y(15),V(15),DY(15),ALP(18	8)
ISN 0005 COMMON ICNST,FCNST,ALP	
ISN 0006 COMMON /BLK5/ A(9.9),Q(9.9),PM(9.9),F(9),DF(9.9)	
ISN 0007 JSW = 1	
C THIS PROGRAM INTEGRATES THE AMES EQUATIONS OF MOTION IN	TIME
ISN 2008 IF(T_E0_ECNST(4)) G0 T0 58	
ISN 0010 CALL AFX(JSW)	
ISN 4011 58 DO 25 I=1.9	
15N 0052 25 DY(1) = 0.0	
C )9,1=I,)I(YD(	( )11,6(ETI RW
ISN 0013 DO 45 I=1.9	
1SN 3D14    45 DY(I) = DY(I) + F(I)	
C )9,1=I,)I(YD(	( )01.6(ETI RW
ISN 0015 10 FORMAT( * DY 1 THRU 9 * / (1X,9E13.6) //)	
ISN 0016 11 FORMAT( ' DY 1 THRU 9 ' / (1X,9E13.6) //)	
ISN 0017 T=T	
C $(9,1=1,1)(F(,1),1=1,1)(Y(,1))$	)001,6(ETI RW
ISN 0018 10C FORMAT( * Y = */ 9E13.6 / * F(X) = * / 9E13.6/)	
ISN 0019 RETURN	
ISN 0020 END	

LEVEL 2 FEB 67

## OS/360 FORTRAN H

DATE 69.179/(8.14.24

COMPILER OPTIONS - NAME: \$MAIN, OPT=02,LINECNT=56,SOURCE, BCD, NOL IST, NODECK, LOAD, MAP, NOECIT, ID

TSN	00.32	SUBDOUTING AFY ( ISW)
ISN	0003	
10/1		$\mathbf{f} = \mathbf{f} \left\{ \mathbf{f} \in \mathcal{F} \right\} = \mathbf{f} \left\{ \mathbf{f} \in \mathcal{F} \left\{ \mathbf{f} \left\{ \mathbf{f} \in \mathcal{F} \left\{ \mathbf{f} \in \mathcal{F} \left\{ \mathbf$
TSN	0004	
TSN	0065	
TCN	0006	COMMON / DERZ/ IMPIETZANDYANCHALIAZISHIZAATIREN,FZEIM.
TEN	0007	COMPONE / DERA/ GRANIC, GRANZC, DETIC, EETZC
TON	0000	
LON	0000	COMMON /DECO/ A(343); ((343); PM(343); PT(3); DF(3;3)
TCN	0009	
15N	0010	
ISN	0011	
150	0015	
		C ************************************
		c
I SN	0015	WRITE(6.1070)PHI,VPHI,WPHI,THT,VTHT,WTHT,PSI,VPSI,WPSI,TM,T1,T2,
		1 XKM, XKC, A11, A13, D12, GAM1C, GAM2C, BET1C, BET2C, AITREN, HTHT, HPHI, HPSI
t SN	0116	070 FORMAT(1H /10X+14H INITIAL STATE / 9E13-6 / 10X+13H INPUT CONSTS /
	• • •	110X. 29H TM.T1.T2.XKM.XKC.A11.A13.D12 / 8E14.7 / 10X. 30H GAM1C.GA
		2M2C BETIC BET2C (RAD) / 4E14.7 / 10X,10H INERTIA = E14.7 //10X,
		$317H$ HIHT. HPHI. HPSI = $3E14 \cdot 7/()$
		· ************************************
T SN	0017	PI = 3.1475926
	0010	

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C ISN 0015 WRITE (6.1070)PHI,VPHI,WPHI,THT,VTHT,WTHT,PSI,VPSI,WPSI,TM,T1,T2, IXKM,XKC,A11,A13,D12,GAM1C,GAM2C,BET1C,BET2C,AITREN,HTHT,HPHI,HPSI ISN 0016 D7C FORMAT(1H /10X,14H INITIAL STATE / 9E13.6 / 10X,13H INPUT CONSTS / 110X, 29H TM,T1.T2,XKM,XKC,A11,A13,D12 / 8E14.7 / 10X, 30H GAM1C,GA 2M2C,BET1C,BET2C,(RAD) / 4E14.7 / 10X,10H INERTIA = E14.7 ,/10X,	
ISN 0015 WRITE (6.1070) PHI, VPHI, WPHI, THT, VTHT, WTHT, PSI, VPSI, WPSI, TM, T1, T2, IXKM, XKC, A11, A13, D12, GAM1C, GAM2C, BET1C, BET2C, AITREN, HTHT, HPHI, HPSI ISN 0016 D7C FORMAT(1H /10X, 14H INITIAL STATE / 9E13.6 / 10X, 13H INPUT CONSTS / 110X, 29H TM, T1, T2, XKM, XKC, A11, A13, D12 / 8E14.67 / 10X, 30H GAM1C, GA 2M2C, BET1C, BET2C, (RAD) / 4E14.67 / 10X, 10H INERTIA = E14.67 / 10X,	
IXKM,XKC,A11,A13,D12,GAM1C,GAM2C,BET1C,BET2C,AITREN,HTHT,HPH1,HPSI ISN 0016 FORMAT(1H /10X,14H INITIAL STATE / 9E13.6 / 10X,13H INPUT CONSTS / 110X, 29H TM,T1,T2,XKM,XKC,A11,A13,D12 / 8E14.7 / 10X, 30H GAM1C,GA 2M2C,BET1C,BET2C,(RAD) / 4E14.7 / 10X,10H INERTIA = E14.7 //10X,	
ISN 0016 FORMAT(1H /10X,14H INITIAL STATE / 9E13.6 / 10X,13H INPUT CONSTS / 110X, 29H TM,T1,T2,XKM,XKC,A11,A13,D12 / 8E14.7 / 10X, 30H GAM1C,GA 2M2C,BETIC,BET2C,(RAD) / 4E14.7 / 10X,10H INERTIA = E14.7 //10X,	
110X, 29H TM,T1.T2,XKM,XKC,A11.A13.D12 / 8E14.7 / 15X, 3CH GAM1C,GA 2M2C,BET1C,BET2C.(RAD) / 4E14.7 / 10X,10H INERTIA = E14.7 ,/10X,	
2M2C, BETIC, BET2C, (RAD) / 4E14.7 / 10X, 10H INERTIA = E14.7 ,/10X,	
	a analysis in a second a second in
$317H$ HTHT, HPHI, HPSI = $3E14 \cdot 7//$	
C ************************************	
ISN 0017 PI = 3.1415926	
ISN 0018 DTR = PI/180.0	
ISN 2019 RTD = 180.0/PI	
C ************************************	
ISN 0020 $SB2C = SIN(BET2C)$	
(SN 0.021) CB2C = CDS(BET2C)	
ISN $0022$ TB2C = SB2C/CB2C	
ISN 0023 SGIC = SIN(GAMIC)	
ISN 0024 CG1C = CDS(GAM1C)	
ISN 0.025 $SG2C = SIN(GAM2C)$	
ISN DC26 CG2C = CDS(GAM2C)	
ISN 0027 SB1C = SIN(BET1C)	
ISN 0C28    CB(C = COS(BETLC))	
ISN 0029 TBIC = SBIC/CBIC	
ISN 0230 SGAMIC = SGIC	

ISN 0032		CGAM1C = CG1C
ISN 0033		CGAM2C = CG2C
134 0750	c	
	è	
	C	
ISN 0034		DIF = GAMIC - GAMZC
ISN 0035		SDIF = SIN(DIF)
	с	
	с	*******
	č	
	č	CALCHLATION OF THE A-MATRIX
	C .	CALCULATION OF THE A POINTS
	C	
ISN 0036		DC 10 I=1,9
ISN 0037		DO 10 J=1.9
ISN 0038	1.0	$0 \bullet 0 = (I \bullet I) A$
	c	
TCN 00 70	-	A(1,2) = -10.0/AITREN
15N 0239		
ISN 0040		A(1)(0) - A(1)(2)
ISN 0041		
ISN 0042		A (2,2) = -1.0/TM
ISN 0043		A (5,5) = A (2,2)
ISN 0044		
ISN 0045		$A(3,3) = -1 \cdot 0/T2$
104 6046		A (6 , 6 ) = A (3 , 3 )
ISN 0040		
ISN 0047		
ISN 9048		A (3 • 1) = - XKC + 11 / 12 + + 2
ISN 0049		A (2,3)=XKM/(10+0+TM)
ISN 0050		A (5 •6) =A (2 •3)
TSN 00 51		A (8,9) = A (2,3)
TSN 0052		A(2,4) = A(2,1) * (-TB1C*CG1C)
100 0053		A (2 - 7) = A (2 - 1) + T H C + SG1 C
154 0955		A(2, A) - A(2, 1) + A(2, A) / A(2, 1)
ISN 0054		
ISN 0055		A(3,7) = A(3,1) + A(2,7) / A(2,3)
ISN 0056		A (4,5) = A (1,2)
ISN 0057		A(5,4) = A(2,1) * D12 * SDIF
ISN 0058		A (6 ,4) = A (3 ,1) * A (5 ,4) / A (2 ,1)
TSN 00.59		A (8,7) = A (5,4)
TSN 00.60		A (9 • 7) = A (6 • 4 )
134 46.00	~	
	C	NOT TE (6, 5000) ( (6 (1, 1), 1=1,9), I=1,9)
ISN 0251		
ISN 00 62	5000	FORMATCH / 1X-118 ATMATRIX / 18/4 9213-00 //
ISN 2063		VIC=XKC*T1/T2
	c	
	с	*****************
	c	
	č	CALCULATION OF DEL-DB2-DG1-DG2
•	C	
	C	THE TO THE TATE VECTOR AND COMMAND AND ES AS INDUT
	с	NEEDS ANGLES FRUM STATE VECTUR AND COMMAND ANGLES AS ANO.
	с	
	с	
	с	
TEN AGAA	~ 71	2  PH = X(1) + XIE
150 0204	511	
ISN 0065		
ISN 0066		PSI= X(7) T X/E
ISN 0767		SPHI = SIN(PHI)
ISN 0068		CPHI = COS(PHI)
ISN 0069		STHT = SIN(THT)
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							na na calana haranananan an a										H ] H 3 + 1 3 0 3 - 1 ] 0 H + 1 3 0 J		G1+EALF)*TG1))		CPSI*TPHI-SPSI*STHT	T*CPSI)*R2-TPHI*CIHT*T62		GRADAL FATGU) &	フラロフキフラン ひを引き 早い	フォロチャラックト・ニーク			2 C o & 1 o O 1	STHT*SG2C*CB2C				2C1.0)			************						1 6 GAMIC)) * DB2	1 & GAMIC)) * DB2				(((8)))			
	<pre>= COS(THT) = SIN(PSI)</pre>	= COS(PSI)	= STHT/CTHT	₩ = XKC*1%/12 = 1.60/(XKC*TM)		B1 C/CG1 C	B2 C/ CG2 C	SGIC/CGIC	=SPHI/CPHI	ABS(X(4))-0.15)9991,9991,9992	○ ◎ 2 ★ X ( 4 ) ★ ¥ // ¥ ( ] ◎ □ − X ( 4 ) ★ ¥ 2 / 4 2 • 0 )	£666 D.	THT-1.00	ABS(X(7))-0.15) 9994,9994,9995	S●SKK(/)**AAF(Ne⊡K(//)**A//Nage) Cocce	U 4446 DSI-1 - D	- 0. xex - D0 + TC3 - (SDS1 + TDH1 + CDS1 + STUT ) + D3 +	****/	ATAN((EALF-EBET*TG1)/(1.0.0.4EBET*(T	G2 4GAM1C	=B4*TG2+(SPS1*TPH1+CPS1*STHT)*R2+	HISHINDL VOS ALLANDIA COSTA COSTA CONTRACTOR	SG2C/CG2C	A ANA (HACK-HUDH / W-CM)/ (Job + UDH - + C)	G2+6AM2C S1*CTHT*SE9 C+SBS1*CHTF*CG9 C+CB9 C+			ABS(DB1)-0.1) 9597,9998,9998	DRFT(B4 .B7 .TB1C .STHT.SPS1.CG1C.SG	SI *CTHT*SB2C-SPSI *CTHT*CG2C*CB2C-	ASIN(R)	DB2-BET2C	ABS(DB2)-0.1) 9999.10009.10009	OBET(84,87,TB2C,STHT,SPSI,CG2C,SG	INUE		法法 学家学校学校 法法政法 本本 林林 林林 林林 法 林林 林林 林林 林林	ULATION OF NUNLINEAR FLAD		=SUM4/T2	=AITREN/(1000+TM)	=AITREN*T2/(T2*XKM)	= (COS(DG26GAM2C)) * DE1 6 (COS(DG	=-(SIN(DG2EGAM2C))* DB1 - (SIN(DG		FLAG) 10019.10019.10029		=4(],2)*(X(2)+TTHT*(SPH1*X(5)+CPH		2=GAIN*DG3+X(3)-SUN4*HPHI	
	CTHT SpSI	CPSI	THT	ANUK PUP	υ	RI=T	R2=T	TG1 =	IHdI		-=₩8 3666	60 1	9992 B4=C	9993 IF (					061 =	G1=D	EALF	EBET	11 00 F					し 王 王	9997 DB1 =	9998 R=CP	DB2 =	D 62 =	15 (	5399 DB2=	1 4000 CON1	U	* * * * * * * * * * * * * * * * *		ט נ	SUM2	SUM3	SUMA	SUMS	SUMS	GAIN	IF(I	10719 CCNT	F (1)	U	ARGF	
	150 0070 150 0071	ISN 0072	15N 0073	9200 NS1		15N 0076	15N 0077	ISN 0078	1 SN 7579	15N 0080	ISN 0081	ISN 0382	ISN 0083		CD DD DD NOT	Lange Not	age Not	15N 0389	0600 NS1	1600 NSI	I SN 0092	M600 ZSI	I SN 2004	0500 Z01	15N 0090 15N 3204		15N 0000	ISN 0100	15N 9131	15N 0102	ISN DIDE	ISN 0104	ISN DITE	ISN 0106	LUTU NSI					1 SN 0108	15N 0109	OLEO NSI	ISN PAIR	ISN 6112	ELLU USI	ISN PIC A	ISN 3115	ISN ALLE		ISN 0137	

F(4) = A(1,2) * (CPHI * X(5) - SPHI * X(8))ARGF5=GAIN*D12*SUM5+X(6)-SUM4*HTHT IF(ABS(ARGE5).LE.F2LIM) F2 =ARGE5 IF(ARGF5.GT.F2LIM) F2=F2LIM IF(ARGF5 .LT. -F2LIM)F2 = -F2LIM F(5) = A(2,2) * X(5) + A(2,3) * F2 - SUM3 * HTHTF(6) = A(3,3) * X(6) + A(3,1) * D12 * SUM5 + SUM2 * HTHTF(7) = A(1,2) * (SPHI * X(5) + CPHI * X(8)) / CTHTARGF8=+GAIN*D12*SUM6+X(9)-SUM4*HFSI IF(ABS(ARGE8).LE.F2LIM) F2 = ARGE8 IF(ARGF8.GT.F2LIM) F2 = F2LIMIF(ARGE8.LT.-F2LIM) F2=-F2LIM F(8) = A(2,2) * X(8) + A(2,3) * F2 - SUM3 * HPSIF(9)=A(3,3)*X(9)+A(3,1)*D12*SUM6+SUM2*HPSI . . . ..... IF( JSW.GT.0) GO TO 10030 WRITE (6,5003) IFLAG 5003 FORMAT(* IFLAG=*, 15, 10X, * ALL NONLINEARLITIES*/) 10030 GO TO 10039 19029 CONTINUE ARGE2=GAIN*EPHI+X(3)-SUM4*HPHI IF  $(ABS(ARGF2) \bullet LE \bullet F2LIM) F2 = ARGF2$ IF (ARGE2.GT.F2LIM) F2 = F2LIM IF (ARGF2.LT.-F2LIM) F2= -F2LIM F(2)=A(2,2)*X(2)+A(2,3)*F2-SUM3*HPHI F(3)=A(3,3)*X(3)+A(3,1)*EPHIARGF5=GAIN*ETHT+X(6)-SUM4 #HTHT IF(ABS(ARGF5).LE.F2LIM) F2 = ARGF5 IF(ARGF5.GT.F2LIM) F2=F2LIM IF(ARGES .LT. -F2LIM)F2 = -F2LIM F(5) = A(2,2) + X(5) + A(2,3) + F2 - SUM3 + HTHTF(6) = A(3,3) * X(6) + A(3,1) * ETHTARGF8=GAIN*EPSI+X(9)-SUM4*HPSI IF (ABS (ARGES) . LE. F2LIM) F2 = ARGE8

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ISN 0118

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10039 CONTINUE

F(8)=A(2,2)*X(8)+A(2,3)*F2-SUM3*HPSI and elements

5002 FORMAT("IFLAG="+15+10X,"MCTOR VOLTAGE ONLY NONLINEARITY"/)

IF(ARGF8.GT.F2LIM) F2 = F2LIM

IF(ARGF8.LT.-F2LIM) F2=-F2LIM

F(9)=A(3,3)*X(9)+A(3,1)*EPSI

IF( JSW.GT.0) 60 TO 10039

WRITE (6.5002) IFLAG

IF (ABS(ARGF2).LE.F2LIM) F2 = ARGF2

F(2) = A(2,2) * X(2) + A(2,3) * F2 - SUM3 * HPHI

F(3)=A(3,3)*X(3)+A(3,1)*DG1+SUM2*HPHT

IF (ARGE2.GT.F2LIM) F2 = F2LIM

IF (ARGF2.LT.-F2LIM) F2= -F2LIM

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ارد. دفه مشیده باشد شده میه مهمه الدین از دارد. از منابع از منابع میشود دست میرد مواد از در از دارد. از دارد از ا and a second and a second and a second a se

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	ISN 0184	IF(JSW.GT.O)GO TO 652	
	ISN 0186	WRITE(6.5001) (F(I),I=1.9)	
	ISN 0187	5001 FCRMAT(1H / 1X+12H F(X)-VECTOR / 1X+9E13+6)	
~	ISN 0188	602 CONTINUE	
		******	
	ISN 0189		
	ISN 0190	END	
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G2		R*8	000000	PI		R*8	0000C8	PM	с	R*8	N + R+	R1		R*8	000000
R2		R*8	0000D8	тм	с	R*8	000000	T1	С	R#8	000068	T2	C	R*8	000010
AFX		R*8	Ne Re	AII	с	R*8	000028	A13	С	R* 8	000030	DBL	C	R*8	000000
DB2	с	R*8	80 000	DG1	c	R#8	000910	DG2	C	R*8	000018	DIF	•	R*8	DOCCEC
DTR		R*8	0000E8	D12	с	R*8	000038	JSW		I*4	000090	PHI	с	R*8	00000
PSI	с	8*9	000030	PUP		R*8	0000F0	RTD		R* 8	0000F8	TG1		R*8	000100
TG2		R*8	0001 08	тнт	с	R*8	000018	VIC		R*8	000110	ХКС	с	R*8	000020
XKM	с	R*8	000018	X1 E	с	R*8	000000	X4E	C	R*8	800000	X7E	с	R*8	000610
ASIN	XF	R*8	000000	CB1 C		R*8	000118	CB2C		R*8	000120	CG1C		R *8	000128
CG2C		R*8	0001.30	CPHI		R*8	000138	CPSI		R*8	000140	СТНТ		R*8	000148
DBET	XF	R*8	000000	EALF		R*8	000150	EBET		R*8	000158	EPHI		R*8	000160
EPSI		R*8	000168	ETHŤ		R*8	000170	GAIN		R*8	000178	HPHI	с	R#8	000000
HPSI	с	R*8	000910	нтнт	С	R*8	000068	SB1C		R*8	000180	SB2C		R*8	000188
SD IF		R*8	0.001 90	SGIC		R*8	000198	SG2C		R*8	000 1AG	SPHI		R#8,	0001 A8
SPSI		R*8	0001 BO	STHT		R*8	000188	SUM2		R*8	000100	SUM3		R *8	801700
SUM4		R*8	0001 D0	SUM5		R*8	0001D8	SUM6		R*8	0001E0	TBIC		R#8	0001 E8
TB 2C		R#8	0 001 FD	TPHI		R*8	0001F8	TTHT		R*8	000 200	VPHI	с	R*8	000008
VPSI	с	R*9	000038	VTHT	с	R*8	000020	WPHI	с	R* 8	000010	WPSI	с	R*8	0 000 46
WTHT	с	R*8	000028	XNORW		R*8	000208	IFLAG	с	I* 4	000000	GAMIC	с	R*8	0000000
GAM2C	с	R*8	80000	F2LIM	с	R*8	000048	BET1C	С	R*8	000010	BET2C	с	R*8	000018
ARGF2		R*8	0 0 0 2 1 9	ARGE5		R*8	000218	ARGF8		R*8	000220	IBCOM=	XF	I *4	000000
SGAM1C		R*8	000228	SGAM2C		R*8	000230	CGAM1C		R*8	000238	CGA M2C		R*8	000240
AITREN	с	R*8	0 0 0 0 4 0	DSIN	IF		000000	DCOS	IF		000000	DATAN	IF		000000

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## 05/360 FORTRAN H

DATE 69.179/08.14.39

COMPILER OPTIONS - NAME: \$MAIN,OPT=92,LINECNT=56,SOURCE,BCD,NOLIST,NCDECK,LDAD,MAP,NOEDIT,ID

ISN 0002 FUNCTION DBET(84,87,TE,STHT,SPSI,CG,SG,SIGN) XKAP=(B7+B4+B7*B4)*TB+((1.0+B4)*SPSI*CG+STHT*SG)*SIGN ISN 0003 ISN 0064 XMU=XKAP ISN 0005 2 SQ=XMU*XMU ISN 0006 XF=XMU-XKAP-TB*0.5*SQ*(1.0+0.25*SQ*(1.0+0.5*SQ)) ISN 0007 IF (XF*XMU.EQ.0.0) GO TO 1 ISN 0009 XMU=XMU-XF/(1.0-TB*XMU*(1.0+0.5*SQ*(1.0+0.75*SQ))) ISN 2010 IF (ABS(XF/XMU).GE.1.0E-06) GD TO 2 ISN 0012 1 CONTINUE ISN 0013 DBE T=ASIN(XMU) ISN CO14 RETURN ISN 0015 END

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	DATE	DAD , MAP , NDEDIT, ID				1			-	:			•	3					- - -				•				
		CD , NOL IST , N CDECK , L		6		•2 ·· ) · · · · · · · · · · · · · · · · ·			•	•			2				a d 101. Anno 1000 1000 1000 − 1000 1000 1000 1000 1		•								• •
	60 FORTRAN H	ECNT =56, SOURCE, BC		(0,9),F(9),DF(9,9	E, AM, Q, PM, ATP, PA, V (81), E(9,9), AM(9 P(9,9)	INPUT ON CARD NO.		AM . E					· ·			- - - -		-		• • • • • • • • • • • • • • • • • • •							
	05/3	AME= \$MAIN.OPT=02.LIN	E PEAIC Real*8 (A-H.C-Z)	LK5/ A(9.9).Q(9.9).PM	ECISION AAMDD+P+QV+A+ AAMOD(82+82)+P(81)+Q	NSION OF A - MATRIX ( T Matrix		E PM , QP, ATP , PA		Z	Z.	0 • 0 0 • 0			/(1×,9E14.7) )	DEDEECTI V SVMMETDIC		= 1,8 = 0(11.NK)		• Ede JJ) GO TO TY	0.9) GU TU 87 2.1		-MATRIX TO Q-VECTOR		ZZ	([''])D	96) / ]x, ]2H Q-VECTOR
		PILFR OPTIONS - NA	SUBROUTINE IMPLICIT F	COMMON /BL	C DOUBLE PRE DIMENSION		υυυ	C INITIALIZE	000	NN = N*N DO 37 I=1	= (7°1)#d	= (['])dD = (['])dI	⇒ ([, ]) = → ([, ])	37 E(1,J) =	2963 FORMAT(1H			42 DO 76 JJ = O(NK - 11)	NCOK = NK-	76 CONTINUE	77 IF (NK•E) NK = NK	GO TO 42 87 CONTINUE	C SETTING O	C IA=1	DO 62 J=1 DO 62 J=1	0v(IA) = ( 62 ta=ta£t	MRITE (6,2'
	LEVEL 2 FEB 67	COME	15N 0002	15N 2004 15N 0014	1000 NS1					6000 NSI 8000 NSI	1100 NS1	SICO NOIS		124 0216 ISN 0016	11:0 NS1		ISN NOTB	OLOU NSI	ISN 0.21	ISN 0022 ISN 0024	ISN 0025 ISN 0027	15N 0020		ÚE CO NSI	TELO NSI	ISN 9033	15N 07 35
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-	WRI TE (6,2963) (0)	(IP), IP=1.NN)		
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	C THIS SECTION CAL	CULATES THE AA	AMOD MATRIX	
	C WHICH IS GIVEN E	34		
	C XXXX		XXXX	,
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	C X ATE ALL	I A21 • I	A31.0I X	e e e e e e e e e e e e e e e e e e e
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	с <u>х</u> ххх		****	
	C ANNA		· · · · · · ·	n a tra an an an an an ann an ann an ann ann
	c			
•	C INITIALIZATION	OF AAMOD	· · · · ·	
	c			
	c			
N 0038	DC 10 L = 1.NN			
N 0039	DO 10 LA= 1.NN		, ·	
N 0040	10  AAMOD(L.LA) = 0.	, Q		
	C DEFINE UNIT MATH	ALX OF ORDER I	N CALL IN E	and the second
N 00 41	DC 30 MAA = 1.N			
N 0342	30 E(MAA, MAA) = 1.0	<b>š</b>	an a	ngana shi kawa kata a na wakaza kana ana shika a kata na kana waka waka na kata kata kata kata kata kata kat
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N 0043	C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = -N	CULATES THE SE	ECTION OF THE AMOD A(J,I) * E	na n
N 0043 N 0044	C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = -N DO 50 MR=1.N	CULATES THE SE	ECTION OF THE AMOD A(J,I) * E	
N 0043 N 0044 N 0045 N 0045	C C C C C C C C C C C C C C C C C C C	CULATES THE SE	ECTION OF THE AMOD A(J.I) * E	
N 0043 N 0044 N 0245 N 0245 N 0245	C C C C C C C C C C C C C C C C C C C	CULATES THE SE	ECTION OF THE AMOD A(J.I) * E	
N 0043 N 0044 N 0045 N 0046 N 0047 N 0048	C C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = $-N$ DO 50 MR=1.N IP = IP & N IPP = $-N$ DO 50 JR =1.N IPP = LPP & N	CULATES THE SE	ECTION OF THE AMOD A(J,I) * E	
N 0043 N 0044 N 0245 N 0245 N 0246 N 0247 N 0248 N 0249	C C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = $-N$ DO 50 MR=1.N IP = IP & N IPP = $-N$ DO 50 JR =1.N IPP = IPP & N IPP = IPP & N IPP = IPP & N IPP = IPP & N IPP = IPP & N	CULATES THE SE	ECTION OF THE AMOD A(J,I) * E	
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N 0043 N 0044 N 0045 N 0046 N 0046 N 0047 N 0048 N 0049 N 0050 N 0051	C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = $-N$ DO 50 MR=1.N IP = IP & N IPP = $-N$ DO 50 JR =1.N IPP = IPP & N DO 40 K= 1.N OO 40 KA = 1.N AM(K,KA) = A(JR)	_CULATES THE SE CCMPRISED OF MR) * E(K,KA)	ECTION OF THE AMOD A(J,I) * E	
N 0043 N 0044 N 0045 N 0045 N 0046 N 0046 N 0048 N 0049 N 0050 N 0051 N 0052	C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = $-N$ DO 50 MR=1.N IP = IP & N IPP = $-N$ DO 50 JR =1.N IPP = IPP & N DO 40 K= 1.N OD 40 KA= 1.N AM(K,KA) = A(JR,K)	-CULATES THE SE CCMPRISED OF MR) * E(K,KA)	ECTION OF THE AMOD A(J.I) * E	
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N 0043 N 0044 N 0045 N 0045 N 0046 N 0046 N 0049 N 0049 N 0051 N 0051 N 0052 N 0052 N 0055	C C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = $-N$ DO 50 MR=1.N IP = IP & N IPP = $-N$ DO 50 JR =1.N IPP = IPP & N DO 40 K= 1.N OO 40 KA = 1.N AM(K,KA) = A(JR KPIP = KAEIPP 40 AAMOD(KPIP,KAP)= 50 CONTINUE	-CULATES THE SE CCMPRISED OF MR) * E(K,KA)	ECTION OF THE AMOD A(J.I) * E	
N         00.43           N         00.44           N         00.45           N         00.46           N         00.47           N         00.49           N         00.49           N         00.49           N         00.50           N         00.51           N         00.52           N         00.53           N         00.53           N         00.55	C C C C C C C THIS SECTION CAL MATRIX WHICH IS IP = $-N$ DO 50 MR=1.N IP = IP & N IPP = IP & N DO 50 JR =1.N IPP = IPP & N DO 40 K= 1.N OD 40 KA = 1.N AM(K,KA) = A(JR KAP = KABIPP 40 AAMOD(KPIP,KAP)= 50 CONTINUE	_CULATES THE SE CCMPRISED OF ,MR) * E(K,KA)	ECTION OF THE AMOD A(J,I) * E	
N         00.43           N         00.44           N         00.45           N         00.46           N         00.55           N         00.52           N         00.53           N         00.54           N         00.55	C C C C C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = $-N$ DO 50 MR=1.N IPP = IP & N IPP = IPP & N IPP = IPP & N DO 50 JR = 1.N OO 40 K= 1.N OO 40 K= 1.N OO 40 K= 1.N AM(K,KA) = A(JR,KAP)= KAP = KA&IPP 4@ AAMOD(KPIP,KAP)= 50 CONTINUE C	-CULATES THE SE CCMPRISED OF MR) * E(K,KA) AM(K,KA)	ECTION OF THE AMOD A(J.I) * E	
N 0043 N 0044 N 0045 N 0046 N 0046 N 0047 N 0048 N 0649 N 0649 N 0651 N 0052 N 0052 N 0055 N 0055 N 0055	C C C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = -N DO 50 MR=1.N IP = IP & N IP = IP & N IP = IP & N DO 50 JR = 1.N DO 40 K = 1.N OO 40 KA = 1.N OO 40 KA = 1.N AM(K,KA) = A(JR,KAP) = KABIPP KAP = KABIPP KAP = KABIPP AAMOD(KPIP,KAP) = 50 CONTINUE C	-CULATES THE SE CCMPRISED OF ,MR) * E(K,KA) -AM(K,KA)	ECTION OF THE AMOD A(J,I) * E	
N 0043 N 0044 N 0045 N 0046 N 0047 N 0048 N 0049 N 00550 N 00551 N 00552 N 00553 N 00555	C C C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = $-N$ DO 50 MR=1.N IP = IP & N IPP = $-N$ DO 50 JR =1.N IPP = P & N DO 40 K= 1.N OO 40 KA = 1.N OO 40 KA = 1.N AM(K,KA) = A(JR KPIP = K&IP KAP = KA&IPP 40 AAMOD(KPIP,KAP)= 50 CONTINUE C C	-CULATES THE SE CCMPRISED OF MR) * E(K,KA)	ECTION OF THE AMOD A(J,I) * E	
N 0043 N 0045 N 0045 N 0046 N 0047 N 0049 N 0050 N 0051 N 0052 N 0055 N 0055	C C C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = $-N$ DO 50 MR=1.N IP = IP & N IPP = IP & N DO 50 JR =1.N OD 40 K= 1.N OD 40 KA= 1.N AM(K,KA) = A(JR, KPIP = K&IP KAP = KA&IPP 4G AAMOD(KPIP,KAP)= 50 CONTINUE C C C C C C C C C C C C C	-CULATES THE SE CCMPRISED OF MR) * E(K,KA) AM(K,KA)	ECTION OF THE AMOD A(J,I) * E	
N 0043 N 0044 N 0045 N 0045 N 0046 N 0049 N 0050 N 0051 N 0052 N 0052 N 0055 N 0055	C C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = $-N$ DO 50 MR=1.N IP = IP & N IPP = IP & N IPP = IP & N DO 40 K= 1.N OD 40 K= 1.N OD 40 K= 1.N AM(K,KA) = A(JR, KPIP = K&IP KAP = KA&IPP 46 AAMOD(KPIP,KAP)= 50 CONTINUE C C C C C THIS SECTION ADD C C C C C C C C C C C C C	-CULATES THE SE CCMPRISED OF MR) * E(K,KA) =AM(K,KA)	CTION OF THE AMOD A(J,I) * E	
N 0043 N 0044 N 0045 N 0046 N 0047 N 0049 N 0051 N 0051 N 0051 N 0051 N 0055 N 0055	C C C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = $-N$ DO 50 MR=1.N IP = IP & N IPP = IP & N IPP = IPP & N DO 40 K= 1.N OO 40 K= 1.N OO 40 K= 1.N AM(K,KA) = A(JR, KPIP = K&IP KAP = KA&IPP 40 AAMOD(KPIP,KAP)= 50 CONTINUE C C C THIS SECTION ADD C ELEMENTS OF AAMOD	CULATES THE SE CCMPRISED OF MR) * E(K,KA) AM(K,KA) DS THE A MATRIX	ECTION OF THE AMOD A(J,I) * E	
N 0043 N 0044 N 0045 N 0046 N 0047 N 0048 N 0049 N 0051 N 0051 N 0051 N 0051 N 0052 N 0055 N 0055	C C C C C C C THIS SECTION CAL C MATRIX WHICH IS IP = $-N$ DO 50 MR=1.N IP = IP & N IPP = IPP & N DO 50 JR =1.N IPP = IPP & N DO 40 K= 1.N AM(K,KA) = A(JR, KPIP = KAEIPP 40 AAMOD(KPIP,KAP)= 50 CONTINUE C C C C C C C C C C C C C	CULATES THE SE CCMPRISED OF MR) * E(K,KA) AMR(K,KA) STHE A MATRIX	CTION OF THE AMOD A(J,I) * E	

I SN I SN	0056 0057 0058		DO 60 K = $1 \cdot N$ IP = $(K-1) * N$ DO 55 IT = $1 \cdot N$
ISN	00.59 00.60		D0 55 LM = 1 •N ILT = IP6LT
ISN	00 61		IPM = IP6LM
I SN I SN	00 62 20 63	55 50	AAMOD(ILT,IPM)= AAMOD(ILT,IPM)& A(LM,LT) CONTINUE
		с	and the second
		c	THAT FINISHES THE CALCULATION OF AMOD .NOW WE MUST PRINT IT OUT BECAUSE SREVNI WIPES. OUT AAMOD
		c	1002.6/ETI DW
TON	00.64	200	FORMAT(1H / 1X-16H AAMOD - MATRIX // )
1.014	<b>v</b> v+	c	)NN,1=I,)NN,1=J,)J,I(DQMAA(()3692,6(ETI RW
		č	NOW FOR A-INVERSE
		c	
I SN	<b>0</b> 0.65		IDE M=NN&1
		с	and the second
ISN	<u>90</u> 66		CALL MINVD (AAMOD+IDEM+NN+ISTEP,IERR)
		c	
		c	NOW AANOD THEFTER HAC DEDLACED AANOD
		Č	NUW AAMUD INVERSE HAS REPLACED AAMUD
		Č	)192.6(ETI RW
I SN	00 67	291	FORMAT(1H / 1X,22HAAMOD-INVERSE MATRIX , //)
		c	NN.1=I 371. OD
		C	)NN.1=J.)J.I(DDMAA()3692.6(ETI RW 371
ISN	00.68		
ISN	00 69		P(IB) =0.0
ISN	9970		DO 70 IC = $1 \cdot \mathbf{N}$
1 SN	0073	70	P(1B) = P(1B) - AAMUD(1B, 1C) + UV(1C)
TON	0072	205	
ISN	0074		WRITE(6.2963) (P(IR), IR=1.NN)
		с	SET P-VECTOR TO P-MATRIX TO GET Q-PRIME FROM-ATP-PA =QP
I SN	0075		K=1
ISN	0976		D025 I=1•N
I SN	0077		D025 J=1 •N
ISN	0278		PM(I+J) = P(K)
ISN	0079	25	0 = 1 = 10
		c	CALCULATION OF DA (D_NATOIY / A)
TSN	00.80	ς.	
ISN	00.81		DO 26 J=1 •N
ISN	09 82		DC 26 K=1.N
I SN	00.83		$ATP(I,J) = ATP(I,J) \in A(K,I) *PM(K,J)$
ISN	00.84	26	PA(I,J) = PA(I,J) EPM(I,K) * A(K,J)
I SN	4085		DC 27 I=1,N
I SN	00.86		$DC 27 J=1 \cdot N$
ISN	©087	27	(P(1,J) = -A(P(1,J) - PA(1,J))
1 SN	00.88	0765	NELICO(9700) E ERDMATINE / 11.36H O EDON DUTTING D INTO -ATD-DA = 0 - //)
ISN	00.07	9105	$\frac{1}{1} = \frac{1}{1} = \frac{1}$
TCN	00 99	QAI	WRITE(6.2963) (QP(I.J).J=1.N)
ISN	00.92	<u>, , , , , , , , , , , , , , , , , , , </u>	RETURN
	• • • •		· · ·

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COMPILER OPTIONS - NAME= \$MAIN.OPT=02.LINECNT=56.SOURCE.BCD.NOLIST.NODECK.LOAD.MAP.NOEDIT.ID

15N 0002	SUBROUTINE MINVD(A.ICIM.N.ISTEP.IERR)	
ISN DCOG	IMPLICIT REAL*8 (A-H.O-Z)	
	MATRIX INVERSION DOUBLE PRECISION	
	ULUGLE TARCISION A, ABSAI, ABSAL, TEMP, FAC, ABSA, DABS Diunensida altoina, i. teteratara	
15N 0006		
15N 0007	IFR=0	
8000 NSI		
6000 NSI	30 LL=1	
ISN DOLO	DO 35 J=1 .N	
ILU NSI	35 A(J,NP1)=A(J,1)	
I SN 012		
15N 0013		
	45 AB524 EDAB52 AC 1 *1 )	
CONCI SIN DO SI	JACVATENDACIATI'+1.) I	
LICO NCI		
ISN OF19	56 IF(A(I,1))65,85,65	
UZCU NSI	ون ۲=۲3	
IZUO NSI	GD TO 45	
I SN 0022	65 IF(K-1)70,900,70	
15N 0123	1-W 12	
ISN 00 24	75 IF(I-ISTEP(M))80.84.80	1
15N 0325	95 IT (M-K51)91,92,82	
ACCC NOT		
150 00081		
15N 0029	83 A(J,1)=A(J,NP1)	
OE GC NSI	GD TO 90	
IE UN NSI	84 [F(LL-N)86.85.85	
22 00 NS1	85 IERR=1	
1 SN 07 33	GG 10 910	
400 001		
15N 0335		
9610 NSI		
15N 0339	304 IF(J-I)110,120,110	
1 SN 0040	110 A(J.ND1)=3-03-	
150 0041	GD TO 130	
15N 0042	26 A(J;NP1)=1.00	
15N 0743	730 IF(J-N)140.150.150	
1 SN 3044	145 J=J61	
15N 0745		
1 SN 1348		
154 Chi NSI		
15N 9050		
1540 NSI		
15N 0752		
15N 71 55		
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		

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PAGE CO2 IF(A(J,1)61.00)260.240.260 IF (M-ISTEP(J)) 450,460,450 A(J.M)=A(J.M)-A(I.M)*FAC IF(J-N)300.340.340 IF(A(J.1)270.290.270 A(J+M) =A(J+M) EA(I+K) IF(M-N)580.61 ^.61 0 IF(I_M)420.470.420 GO TO 440 ISTEP(J)=I IF(M-N)480.490.490 IF(I-M)550,570,550 IF(K=N)360,390,390 390 DC 400 J=1.N 400 A(NP1.J)=ISTEP(J) ISTEP(J)=A(NP1 .J) [STEP(W)=ISTEP(J) A(J,M)=A(J,MP1) DO 280 M=1.NP1 00 250 M=1 .NP1 60 T0 190 D0 350 J=1.N D0 350 M=1.N A(J.I)=A(J.M) TEMP=A(M,J) A(M,J)=A(I,J) DO 560 J=1.N Nº 1=1 - 005 DO N. 1=1 054 00 A(I .J) =TEMP TEMP=A(J.1) A(J.M)=TEMP I=I STEP(M) I =I STEP(M) ISTEP(J)=J J=I STEP(M) FAC=A(J.1) GO TO 549 GO TO 410 GO TO 540 GO TO 290 GO TO 290 GO TO 30 CONTINUE CONTINUE 13W= 1dW RETURN M=M51 J=J61 360 K=KE1 1=15] 13 M= M NII iii M II N 410 540 5. 1 420 430 450 550 560 Sec. 340 480 490 500 532 085 042 0 2 2 2 2 2 2 260 520 280 362 300 320 440 470 575 225 450 00.85 0086 68.00 0110 0076 £6 00 01 00 5103 01.04 ちじいや 01.06 23 67 1110 0056 7057 0.959 00 60 00 51 30.62 00 63 00 64 00.65 00 66 00 67 00.68 **9**0 69 00.70 17 00 00 72 E1 00 00.74 00.75 0077 62 00 06.90 00.81 00.32 00 93 90.84 0087 00.88 06 00 1000 2000 00.94 00 95 00.96 70 0 C 0098 6600 1010 50.02 0108 01 10 3058 84 00 SN NS NS N N NS N NS ß zs NS NS NS NS NS N N S N N N N N N N N N N N N 2 2 2 2 Z S ŝ NS NS SN N N N N N N ZS ŝ NS S ŝ S S

COMPILER OPTIONS - NAME= \$MAIN, OPT=32, LINECNT=56, SOURCE, BCD, NOL IST, NO DECK, LOAD, MAP, NOEDIT, ID

I SN	0002		SLBROUTINE AGEN
<b>TSN</b>	00/03		IMPLICIT REAL*8 (A-H.G-Z)
	-	c	
		ě	
		C	GENERATION OF POSITIVE DEFINITE & MATRIX
ISN	G0104		DOUBLE PRECISION AAMOD, P, QV, A, E, AM, Q, PM, ATP, PA, QP
ISN	0005		COMMON /BLK5/ A(9,9),Q(9,9),PM(9,9),F(9),DF(9,9)
ISN	0006		N=9
		с	
T SN	0097	-	COMMON/A/ THETA(28)-PHIV(8)-XIAN(9)-7THETA(28)-
10/1			
			2 BM(20,32)) SM(20,20), AAR(20,20), G(20,20), UU(20,20)
			3 TTHETA(28)
		с	)9,1=K,)K(MALX(,)8,1=J,)J(VIHP(,)82,1=I,)I(ATEHT()3601,5(DA ER
ISN	0208	1063	FORMAT(6E12+4)
ISN	0009		$PI = 3 \cdot 1415926$
I SN	0010		PI2 = PI/2
TSN	0011		D0 206 J=1-28
TCN	0010		
1 314	0002		
1.5N	9933	200	$\frac{1}{2} = -\frac{1}{2} + \frac{1}{2} + 1$
ISN	0314		
ISN	0015		PHIV(I) = RDM(DUM)
ISN	0016	207	PHIV(I) = -PI + PHIV(I) + 2 + PI
ISN	0017		DC 208 I=1,9
I SN	0018		XLAM(I) = RDM(DUM)
TSN	0019	208	XLAM(I) = 0 + XLAM(I) + 100 +
TSN	00.20		WRITE(6.3) THETA.PHIV.XLAN
TCM	0421	-	$ = \left[ -\frac{1}{2} + \frac{1}{2} + \frac{1}{2}$
TON	0020		
ISN	0022		
ISN	0323		DC 61=1,NN
ISN	0024		BAD = THE TA (I)
I SN	0025	e	TTHETA(I)= AMOD(BAD,PI2)
		с	WE HAVE NOW INDEXED THETA.
		с	NOW WANT CONTINUED PRODUCT OF SS(I,J,L) FOR L=K&1.N .
		с	FOR EACH K=1.N-1 OBTAIN Z(K,I,J).
I SN	0026		NNI = N-1
TSN	0027	69	DO 20 K=1 • NNI
		۰ ۲	
TON	05.00	C	
LON	0020		
ISN	0.929		
I SN	00 30	8	BA(1,J)=U•₩
ISN	00.31		DC 99 I=1.N
ISN	r 32	99	BA(I,I)=1.0
		c	
ISN	00 33		KK=K61
ISN	ac 34		DO 10 L=KK,N
		c	
TCN	07 35	0	
TCH	0.00		
1 211	0000		
150	en ar	( 5	
ISN	0338		98 1=1 •N
ISN	0039	98	\$\$(I,I,L)=1.0
		с	WE DEVELOP SS(I,J,L) AS FUNCTION THETA(L,K,N) FOR L L.T. N
		с	AND SS(I,J,L) FUNCTION OF PHIV(K) FOR L=N
I SN	0040		IF(L-N)25,23,23
I SN	0 41	29	5 W={(2*N ~K-2)*(K-1)/2)8N-L

							PAGE CO.	2
ISN 0042			SS(K.K.L)=COS(TTHETA(M))		· •		and the second	
ISN 0143			SS(L,L,L)=COS(TTHETA(M))					
ISN 0044			SS(K.L.) =- SIN(TTHETA(M))					
ISN 0045			SS(L,K,L)=SIN(TTHETA(M))					
ISN 0046			GO TO 35				••	
ISN 0047		23	SS(K,K,L)=COS(PHIV(K))					
ISN 0048			SS(L,L,L)=COS(PHIV(K))					
ISN 0049			SS(K,L,L)=-SIN(PHIV(K))					
ISN 0050			SS(L,K,L)=SIN(PHIV(K))					
	с			•				
ISN 0451	-	35	00 70 I=1.N					
ISN 0052			D0 70 J=1 N					
ISN 00.53		70	CC(I,J)=0.0					
150 60 55	c							
ISN 0054	÷		DC 50 M=1.N					
ISN 0055			D0 50 (=1-N					
ISN 0056			00 50 I-I-N					
ISN 0057		50	CC(M. 1)-BA(M. I)*SS(I. L.I.) E	CC(M.1)				
TEN ARES		~~	DOSTO I-I-N					
15N 0050						· ·	•	
1.214 00:33								
ISN OUOU	4	1210	CONTINUE		an a		a, anna agus an	an and an
ISN UPOL		5.43	CONTINUE DC 00 I-I N	·				
ISN 0002					and a second	· · ·		
ISN 0083		0.¢						
ISN 0004		2.2	$Z(K_{1}, J) = DA(I_{1}, J)$	#			····	
	C		00 7 1-1 N					
ISN 0005				<ul> <li>A second sec second second sec</li></ul>	an analah sa mara aran aran aran aran aran aran ara		······································	
ISN 0000		-						
ISN 0067		. (	BM(I+J)=V+9	and a state of the second s				
ISN 0068			DU 16 1=1+N					
ISN 0069	-	10	BM(1+1)=1+1		an a na a a statement			
	C		00 40 V-1 NNT					
1 SN 9070	-		DU 40 K=1 NNI	• • • • • •	and the second sec	<ul> <li>A second sec second second sec</li></ul>	at a second second	
	C							
ISN 0071				- 20				
ISN 0972				. · ·				
ISN 0073	_	75	SM(1+J)=0+0	· · · · · · ·				
	С							
ISN 0074			DU 55 M=1.N		and the second		المتر والموسور الم	
ISN 0075			DU 55 J=1.N					
ISN 0176			DO 55 I=1.N			•		•
ISN 0077		55	SM(M,J)=2(K,M,1)#0M(1,J)65	1( M. J. J.				
ISN 0078			DO 49 I=1.N		· · · · · · · · ·		a second second second	
ISN 0079			D0 40 J=1.N					
ISN 0080		40	BM(I,J)=SM(I,J)		• •	se	······	
	c							
	c		BM(I.J) IS CONTINUED PRODUC	I OF Z(K, I, J) FRUM P	=1 10 N-1			
	с							
ISN 0081			IF(PP)41,41,19					
ISN 0982		39	CONTINUE					
ISN 0083		3 <b>8</b>	FORMAT(8H BM(I,J)/(6E15.7))					
ISN 0084		41	DO 78 I=1.N					
ISN 0085			DO 78 J=1.N					
ISN 0086		78	AAR(I,J) = BM(J,I)					
	с							
	с		AAR(I.J) IS TRANSPOSE BM(I	(J)				

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		C			
I SN	0087			DC 82 I=1,N	
ISN	00.88			00 82 J=1 .N	
ISN	C0 89		82	G(I,J)=9.0	
ISN	00.90			DO 85 I=1 .N	
I SN	0091		85	G(I,I)=XLAM(I)	
		с		G(I,J) IS THE LAMDA MATRIX	
		с			
I SN	0092			DD 86 I=1.N	
ISN	00.93			00 86 J=1.N	
I SN	00 94		86	QQ(I,J)=0.0	
I SN	0095			DO 88 I=1,N	
I SN	00.96			DC 88 J=1.N	
ISN	1097			DO 88 M=1,N	
I SN	00.98		88	QQ(I,J)=G(I,M)*BM(M,J)&QQ(I,J)	
		c		· · · · · · · · · · · ·	
		с		QQ(I,J)=LAMDA MATRIX *8M(I,J)	
		с			
I SN	0099			DC 90 I=1.N	
I SN	0100			DO 90 J=1.N	
ISN	01 01		90	Q(1,J) = 0.0	•
ISN	0102			DO 95 I=1.N	
I SN	0103			DO 95 J=1 .N	
ISN	0104			DC 95 M=1 .N	
I SN	0105		95	G(I,J) = AAR(I,M) * QQ(M,J) EQ(I,J)	
I SN	0106			WRITE(6,93) (( Q(I,J),J=1,N),I=1,N)	
ISN	0107		93	FORMAT(1H /1X,7H Q(I,J)/(1X,9E14.7) )	
ISN	01 08			RETURN	
I SN	0109			END	
				••••	

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COMPILER OPTIONS - NAME= \$MAIN.OPT=92.LINECNT=56.SOURCE.BCD.NOLIST.NODECK.LOAD.MAP.NOEDIT.ID

ISN	0062		SUBROUTINE VLAP(PX,VL)		
ISN	00.13		IMPLICIT REAL*8 (A-H.O-Z)		
ISN	0004		DOUBLE PRECISION AAMOD, P, QV, A, E, AM	I.Q.PM,ATP,PA,QP	
ISN	0005		COMMON /BLK5/ A(9,9),Q(9,9),PM(9,9	),F(9),DF(9,9)	
ISN	0016		COMMON/BLK77/X(15)		
ISN	00:07		COMMON/BLKV/ SL		
ISN	0008		DIMENSION PX(9)		
I SN	0009		VL=9.0		VL 40
I SN	0020		DC 250 I=1,9		VL 50
ISN	0211	250	PX(I)=0.0		VL 60
ISN	0012		DO 251 I=1.9		VL 70
ISN	0013		DO 251 J=1.9		VL B¢
ISN	0014	251	$PX(I) = PX(I) \in PM(I,J) * X(J)$		VL 90
ISN	0015		DO 252 I=1,9		VL100
ISN	0016	2.52	$VL = VL \delta X(I) * PX(I)$		VL110
		с		LV )352,6(ETI	RW
ISN	0217	253	FORMAT(1H 10X, 5H VL = ,E14.7 )		•
I SN	0018		SL = VL		and a second of the second
ISN	0019		RETURN		VL1 2 0
ISN	0020		END		VL1 30

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DATE 69.179/08.15.40

COMPILER OPTIONS - NAME= \$MAIN.OPT=32,LINECNT=56,SOURCE,BCD,NOLIST,NODECK,LOAD,MAP.NOEDIT.ID

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		SN 0226	1
VDUT 60	RETURN	SN 0025	H
•E14•7 )	2350 FORMAT(1H & X.26H LIAPUNCV FCT DERIV =	5N 0024	2
	355 FORMAT( 6H X0X= 1E14.7)	5N 00.23	10
EPS )5531+6(E11 KW	U		
TODY J0531+O(EIL KW			
	EPS = 05*ABS(SPE)	SN 00 22	Ľ
-	253 SPE = X(I)*QX(I) + SPE	SN 00.21	5
	DO 253 I=1.9	5N 00 20	5
	252 VDOT = VDOT - X(I)*(QX(I) - 2.0 * PF(I))	5N 0019	5
ST TOON	DO 252 I=1.9	SN 0018	5
VD 1 1 1 0V	251 PF(I)=PF(I) & PM(I.J)*F(J)	5N 2017	0
	0X(I)= 0X(I) 8 0(I•1)*X(7)	5N 0016	22
	DO 251 J=1.9	5N 0015	20
	DO 251 I=1,9	SN 0034	5
	25C QX(I)=0.0	ETCO NS	S
	D = (1) = 0	5100 NS	0
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	VDDT =0.0	SN 0010	S
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	COMMON/BLK77/X(15)	SN 0007	S
	COMMON /BLK17/ EPS.XK12	9130 NS	S
(5.)	COMMON /BLKS/ A(9,9),0(9,9),PM(9,9),F(9),DF(9	SN 00.05	S.
PA. QP	DOUBLE PRECISION AAMOD.P.QV.A.E.AM.Q.PM.ATP.P	\$0.00 NS	S
	IMPLICIT REAL *8 (A-H.O-Z)	5000 NS	S
	SUBROUTINE VDOTA (PF, QX, VDCT)	SCOO NS	ŝ

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	ISN 0011		COMMON/BLK78/X1E,X3E,X5E
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		с	EXACT MODEL STATE EQUATIONS
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2	ISN 0014	•	WRITE(6,1070)PHI,VPHI,THT,VTHT,PSI,VPSI,TM,TI,T2,
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	15N 0019		SBZC = SIN(BETZC)
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	ISN 0021		
	ISN 0022		SG1C = SIN(GAM3C)
	ISN 0023		CGIC = CDS(GAMIC)
	ISN 0024		SG2C = SIN(GAM2C)
	ISN 0025		CG2C = COS(GAM2C)
	ISN 0026		SBIC = SIN(BETIC)
	ISN 0027		CB1C = COS(BETIC)
	ISN 0028		TB1C = SB1C/CB1C
	ISN 0029		SGAM1C = SG1C
	ISN 0030		SGAM2C = SG2C
	ISN,0031		CGAM1C = CG1C
	ISN 0032		CGAM2C = CG2C
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x*************************************	LATION OF THE A-MATRIX I=1.5 J=1.6 ) = 0.0	)=-10.0/AITREN )=XKM*XKC/(10.0*TM) )=-(1.0/TM-A(2.1)*45.0/AITREN) )=-(1.0/TM-A(2.1)*45.0/AITREN) )=-A(2.1)*TB1C*CG1C )= 4.5*A(1.2)*A(2.3) )=4.5*A(1.2)*A(2.5) )=4.5*A(1.2)*A(2.5) )=4.5*A(1.2)*A(2.5)	<pre>1=4(2:1)*D12*SDIF 1=4(2:1)*D12*SDIF 1=4(2:1)*D12*SDIF 1=4(2:1)*D12*SDIF 1=4.5*4(6.5)*4(1.2)-1./TM 5= +4.5*4(6.5)*4(1.2)-1./TM 1(1H / 1X,10H A-MATRIX /(1X, 5E13.6) 1(1H / 1X,10H A-MATRIX /(1X, 5E13.6)) 1(1H / 1X,10H A-MATRIX /(</pre>	<pre>X(1) + XIE X(1) + XIE X(5) + X3E X(5) + X3E X(5) + X5E X(5) +</pre>
**************************************	CALCULATION DO 10 1=1.5 DO 10 J=1.6 A(1.J) = 0.0	A(1,2)=-10.( A(2,1)=XKM*X A(2,2)=-(1.0 A(2,3)=-(1.0 A(2,3)=-A(2. A(2,4)= 4.5 A(2,4)= 4.5 A(2,4)= 4.5 A(2,4)=A(2.) A(2,4)=A(2.)	A(4.3)=A(4.2) A(6.5)=A(4.2) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(6.5)=A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(1.4) A(	PHI= X(1) + THT= X(1) + FHT= X(2) + PSI= X(5) + PSI= X(5) + PSI= X(5) + PSI= X(5) + CPHI = COS(1 SPHI = SIN(1 SPSI = SIN(1 SPSI = SIN(1 SPSI = SIN(1 SPSI = SIN(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1 COS(1
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ISN	0071	9991	B4=-0.5*X(4)**?*(1.0-X(4)**2/12.0)	
ISN	0072		GD TO 9993	
ISN	0073	<u>8885</u>	84=CTHT-1.0	
ISN	0074	9993	IF (ABS(X(7))-0.15) 9994,9994,9995	
ISN	0075	9994	B7=-0.5*X(7)**2*(1.0-X(7)**2/12.0)	
ISN	0076		GD TO 9996	
ISN	0077	9995	B7=CPSI-1.0	
ISN	0078	9996	EALF=B4*TG1-(SPSI*TPHI+CPSI*STHT)*R1+CPSI*TPHI-SPSI*STHT	
ISN	0079		EBFT=B7+SPSI*STHT*TPHI-(SPSI-TPHI*STHT*CPSI)*R1-TPHI*CTHT*TG1	
ISN	0080		DG1=ATAN((EALF-EBET*TG1)/(1.0+EBET+(TG1+EALF)*TG1))	
ISN	0081		G1=DG1+GAM1C	
ISN	0082		EALF=B4*TG2+(SPSI*TPHI+CPSI*STHT)*R2+CPSI*TPHI-SPSI*STHT	
ISN	0083		EBFT=B7+SPSI*STHT*TPHI+(SPSI-TPHI*STHT*CPSI)*R2-TPHI*CTHT*TG2	
ISN	0084		DG2=ATAN((FALF-EBET*TG2)/(1.0+EBET+(TG2+FALF)*TG2))	
ISN	0085		G2=DG2+GAM2C	
ISN	0086		R=CPSI*CTHT*SB1C+SPSI*CTHT*CG1C*CB1C+STHT*SG1C*CB1C	
ISN	0087		DB1=ASIN(R)	
TSN	0088		DB1=DB1=BET1C	
TSN	0.089		IF (ABS(DB1)~0.1) 9997.9998.9998	
TSN	0090	9997	DB1=DBET(B4,B7,TB1C,STHT,SPSI,CG1C,SG1C,+1,0)	•
TSN	0091	9998		
TSN	0092		DB2=ASIN(R)	
TSN	0093			
ISN	0094		IF (ABS(DB2)-0.1) 9999.10009.10009	
TSN	0095	9999	DB2=DB5T(B4.B7.TB2C.STHT.SPSI.CG2C.SG2C1.0)	
ISN	8000	10009	CONTINUE	
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		Ċ		
ISN	0097		B1=DB1+BET1C	
ISN	0098		B2=DB2+BET2C	
ISN	0099		SG1=SIN(G1)	
ISN	0100		CG1=C05(G1)	•
ISN	0101		TB1=SIN(B1)/COS(B1)	
ISN	0102		TB2=SIN(B2)/COS(B2)	
ISN	0103		SG2=SIN(G2)	
ISN	0104		CG2=CO5(G2)	
ISN	0105		SUM2=SUM4/T2	
ISN	0106		SUM3=AITREN/(10.0*TM)	
ISN	0107		SUM4=AITREN*T1/(T2*XKM)	
TSN	0108		SUM7=CG2*DB1+CG1*DB2	
TSN	0109		SUM8=SG1*DB2+SG2*DB1	
ISM	0110			
TSN	0111		SUM9=-SG2*CG2*TB2*DB1+SG1*CG1*TB1*DB2	
TCN	0112		$G_{A,T,N} = XKC * (T_16T_2)/T_2$	x
TON	0113		F(1) = A(1,2) * (X(2) + TTHT*(SPHI*X(4) + CPHI*X(6)))	
TCAL	0114		$A_{1} = A_{1}$	
TCN	0115		□→□ →< +== AUCE2→	
TCN	0116		$F = (ABC(ABCF2)_{A}) F_{A}F(A) F_{A} = ABCF2$	
1.314	0110		$\mathbf{f} = (\mathbf{A} \mathbf{A} \mathbf{C} \mathbf{C}_{\mathbf{A}}, \mathbf{C}_{$	
· • •			しし しからい しきいちょう ししょうし レイ 一分 してしまめ	

IF (ARGE2.LT.-F2LIM) F2= -F2LIM

F(3)=A(1,2)*(CPHI*X(4)-SPHI*X(6))

F(2)=A1*X(2)-SUM3*HPHI+A(2,1)*F2/XKC

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ISN 0120

ISN 0122 ISN. 0123

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	161 01 24	
	150 0124	ARGE ==ARC+792+T0400001474(2)140000048(2)T(301FT30049)48(4)T(3024424102
	TEN 0125	
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-	ISN 0120	
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	15N 0131	
	ISN 0152	F())=A(();)+()=F()+A()+()+F()+A())+()()+()+()+()+()+F()+F()+F()+F()+F()
	15N 0155	1000/FV/A/1/_CD/ECHINO/FV/E/A/E/F/COM/FA/E/F/CG2+A/E/F/CG1+F/C4161+
	TCN 0174	
	15N 0134	IF (ADS(ARGE)) EESFZEIM) FO - ARGES
•	ISN 0120	
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## APPENDIX III

## TIME SHARE COMPUTER LISTINGS

This appendix contains computer listings of three separate routines as they existed on June 12, 1969. The first is a variable step size simulation package for the OAO with zero initial momentum. It is written in FORTRAN IV for the GE Mark II time sharing service.

The second routine is a P-generation search routine for a quadratic Liapunov function for the nine-dimensional OAO. It is in FORTRAN IV for the PDP-10 time sharing service. These time share routines have been used largely to experiment, test ideas, and check; this routine, as presently written, will not perform a search but will always set  $x_i = 1$ , i = 1,9. Modification of line 860 to read "GØ TØ 5" and deletion of lines 1621 and 1622 will change it back into a search routine.

The third routine illustrates a typical session at the teletype. It presents a typical run for the Faulkner equation, and is explained by the flow chart (Fig. III-1). The program is written for the Davis AL/COM system in FORTRAN IV. The entire session at the teletype is presented. It begins with a list of the routines to be executed, followed by a listing of the main routine, the logic of which is shown in Fig. III-1.

The listing is next edited to demonstrate the ease with which the case n = 2 can be changed to n = 9, and the program is run. It finds the quadratic estimate of the domain  $3.5 x^2 + .25 xy + 2.0 y^2 \le .05$  after examining 95 matrices. The corresponding volume is  $(.139)^2 = .019$ , which is not as good as reported in Table 2 after 3102 trials, but this routine



 $N_{\rm X}$  Is the Number of Points x Searched to Date, LL the Total Number to be Searched, V Is the Liapunov Function, V =  ${\rm x}^T P {\rm x}$ ,  $\Lambda$  Is the Matrix of Eigenvalues of P =  $S\Lambda S^T$ ,  $\Lambda$  = det P, Np Is the Number of P Matrices Since the Last Best, VOLUME =  $Ln/2/\sqrt{\Delta}$ , Where L =  ${\rm x}^T P {\rm x}$  for the Present x and VOL Is the Best Volume So Far, VOL =  $L^{n/2}/\sqrt{\Delta}$  with L =  ${\rm w}^T P {\rm w}$ , w the "Worst Point."

Fig. III-1 Flow Chart for the Logic of the Main Routine

stops after 2100 trials. The times printed out are dummy values, because subroutine CHARGE, although shown here, had not yet been implemented. Following the run, the various subroutines are listed.

## OAO SIMULATION

## (1 of 3 pages)

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R, G2CR, F(S), T, D12, A, B, XK -0.12414654-04;X(S)=-0.41382165-04 Antien STEPS Between Printbuts Cenv;Gicregiod/Cenv;G2Ca=62CD/Cenv TF AND N"			
R, G2CR, F(S), T, D12, A, B, XK -0.12414626-04;X(S)=-0.4138216E-04 AATLAN STEPS BETWEEN PRINTBUTS CENVIGICREGICD/CENVIG2CREG2CD/CENV TF AND N [*]			이가 같은 것은 것을 알려졌다. 것은
R,G2CR,F(9),I,D12,A,B,XK -0.12414656-04;X(9)=-0.4138216E-04 AATIEN STEPS BETWEEN PRIMIEUTS CENV;G1CR=G1CD/CENV;G2CR=G2CD/CENV TF AND N ⁺			· 그는 것은 모양이 가슴이 같은 것은 것이 있는 것이 같이 있는 것이 있다. 같은 것이 같은 것이 같은 것이 같은 것이 같은 것이 같이 있는 것이 같이
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R, G2CR, F(S), T, D12, A, B, XK -0.12414652-04; X(S)=-0.41382165-0 ATIEN STEPS BETWEEN PRINTØUTS CENV;GICR=G1CD/CENV;G2CR=G2CD/CGN TF AND N TF AND N			
R, G2CR, F(S), T, D12, A, B, XK -0.1241465±-04;X(S)=-0.4138216 ATILN STEPS BETWEEN PRINTØUTS CENV;GICR=G1CD/CENV;G2CR=G2CD/C TF AND N TF AND N		<b>O</b>	
R, G2CR, F(9), T, D12, A, B, XK -0.1241465E-04; X(9)=-0.41382 ATIEN STEPS BETWEEN PRINTOUT RATIEN STEPS BETWEEN PRINTOUT TF AND N TF AND N		e E	
R.G2CR,F(9),T,D12,A,B,XK -0.12414656-04;X(9)=-0.413 Adilen Steps Between Print Cenuggicr=Gicd/cenv;G2CR=6 T ft AND M ⁻ T ft K n tound mitter		88 10 10	
R, G2CR, F(S), T, D12, A, B, XK -0.1241465E-04; X(S)=-0.4 RATIEN STEPS BETWEEN PRI CENV; G1CR=G1CD/CENV; G2CR TF AND N ^T	- 1995년 1월 20일 - 1997년 1월 20일 - 199 1997년 1월 20일 - 1997년 1 1997년 1월 20일 - 1997년 1	- <b> </b>	
R, G2CR, F(9), T, D12, A, B -0.1241465E-04; X(9)=- AATIEN STEPS BETWEEN F FAND R TF AND R T DT X F N TOUND	이 방문을 가지 않는 것을 알려 있다.		
R, G2CR, F(9), T, D12, A -0.1241465E-04; X(9) RATIEN STEPS BETWEE RATIEN STEPS BETWEE TF AND N TF AND N			
R. G2CR. F(S). T. D12 -0.1241465E-04;XC CENV;GICR=GICD/CE T DT X F M TCEU			
R. G2CR. F (9). T. -0.1241465E-04 -0.1241465E-04 -01 F AND N - T DT X F M 10	$\sum_{i=1}^{n}  A_i  \leq  A_i  \leq \frac{2}{n} \sum_{i=1}^{n}  A_i  <\frac{2}{n} \sum_{i=1}^{n}  $		
R. G2CR, F(9). -0.12414654. Сему; G1CR=G1( Сему; G1CR=G1( ХБРЗ		n ≪ara filosofia de la construcción de la della del Non della della Non della	이 이상 이번 동안에 가장 가슴이 이 가슴이 가지 않는 것이 아니는 유민이 가지 않는 것이 아니는 것이 같이 나라 가지 않는 것이 아니는 않는 것이 아니는 것이 아니. 않아 아니는 것이 아니는 것이 아니는 것이 아니는 것이 아니는 것이 아니. 않아 아니는 것이 아니. 것이 아니는 아니 아니는 것이 아니. 않아 아니는 것이 아니는 것이 아니는 것이 아니. 않아 아니는 것이 아니는 것이 아니는 것이 아니는 것이 아니. 않아 아니는 것이 아니는 것이 아니는 것이 아니는 것이 아니는 것이 아니. 아니는 것이 아니. 아니는 것이 아니는 것이 아니. 아니 아니 아니. 아니는 아니
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L A NE CENV.		41	
	$\sum_{i=1}^{n} \sum_{j=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{j=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i=1}^{n} \sum_{i$		
$\mathbf{M}_{\mathbf{M}}$	에는 특히 아이지, 모양 이지 수 <b>다</b> 2013년 1월 1일 - 이지 아이지, 2014년 1월 1일 - 이지 아이지, 2	• • • • • • • • • • • • • • • • • • •	
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$			VD VB 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2
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NAFUEL AUCOAN SAULAN SAULAN AVANA AV	A S S S S S S S S S S S S S S S S S S S	N 24 X47238	ມີ • • • ອີລາມ ມີ ອີລະມີ, ອີລະມີ, ອີລະມີ, ອີລະມີ, ອີລະມີ,
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## OAO SIMULATION

(2 of 3 pages)

	490 IF(K-M)3.2.2	
	- 500 2 K=-1	
	510 PRINT TIME" T	
	530 PRINT AD $(\mathbf{X}(\mathbf{I})   \mathbf{I} - \mathbf{I}   \mathbf{A})$	
	540 $0$ $1$ $1$ $1$ $0$ $($ $($ $1$ $)$ $1$ $-5$ $0$ $1$	
• a	「「クロレー」では、ロームは、「ハーン」、シーン、ジノーン、シーン、シーン、シーン、シーン、シーン、シーン、シーン、シーン、シーン、シ	
ġ,	560 IF (T-TF)20,30,30	
	370 20 CALL AMPB2(IND.DER.TEMP,T.DT.X.F.N.ICCUNT.NITER.MTS	[)
	580 IF(L-5)91.92.92	
	≥ 590 92 L=0:L1=9:L2=0	
	600 DØ 95 TOTA=1 9	
	= 610  REPCH(IGTA) = 685 (68 (IGTA) - 7 (IGTA)) / 7 (IGTA))	
	$\mathcal{L} = \mathcal{L} = $	
	$c_{10} \circ c_{11} \circ c$	
. •	640 95 Z(ICIA)=X(IZIA)	
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1	5 670.60 TO 10	
	680 97 IF(11)98 98 99	
	690.98 TND=1	
	700 GG TG 10	
	710 99 DU 100 101A=1,9	
	720 IF (RELCH (101A) - HALF )100, 102, 102	
	/30 102 L2=L2+1	
	※ 740 100 CDNTINUE	
	750 IF(L2)10.10.103	
	760 103 IND=1	
	770 GØ TØ 20	
	800 40 FORMAT(14H X-VECTOR	
	$\sigma_{10} \lambda_1 = \sigma_{0} + \sigma_{10} $	
	010 41 FUMMAI (JE14.6)	
	820 END	
	BOUC EVALUATION OF FIY DOI	
	<b>840 SUBRUUTINE DER</b> das de la companya de la company	
	850 COMMON X(9), BICR, B2CR, GICR, G2CR, F(9), T, D12, A, B, XK, B02, C	
	860 C1=C&S(X(1));C4=C6S(X(4));C7=C&S(X(7))	
	$\frac{1}{870}$ S1=SIN(X(1)):S4=SIN(X(4)):S7=SIN(X(7))	
	880 CGT=CKS(GICR):SGI=SIN(GICR)	
	890.022-002(4909).000-014(6002)	
	000 001-0/0 (0400).0.1-010(0400)	
	$500.051 \pm 0.05(510R); 551 \pm 510(510R)$	
	910 UBZ=ULS(JZ0R);SBZ=SIN(B2UR)	
1	역· <b>9</b> 20 Q1=(57*31+C7*54*C1)*SB1	
	0.930 Q2=(C7*S1-S7*S4*C1)*C61*CB1	
	940 Q3=C4*C1*C01*CB1	
	950 Q4=(S7*C1-C7*S4*S1)*SB1	
	960 05=(C7*C1+S7*S4*S1)*CG1*C51	
	970 06=C4*31*S01*C81	
	$\mathbf{S}$	
	COO PETHUCALISE CALLS	
	- フラジールはよるではないてはり、ことであったとうとなってものです。これではためになっていた。 パーパーパー ひとうしょう (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	
	UNITED DOITERIANULAER *COIFBEI*SOI)/(BEI*COIFAER*SOI))	
	TUIU GI=AIAN(ALP/BLI)	
. •	1020 K=C7*C4*SB1+S7*C4*CG1*CB1+S4*SG1*CB1	1996
14	1030 DB1=ATAN(R/(1R*R)↑C.5)	
	1040 DB1=9B1-B1CR	
	in a memory was a state which is a state of the second state of the se	(a) (a) (a) (b) (b)

1050 Q1=(\$7*\$1+67*\$4*61)*\$68
# OAO SIMULATION

# (3 of 3 pages)

	1060	02#(C7*31-57*54*C1)*C62*CB2
	1070	Q3=C4+C1+362+C62
	1080	Q4=(57+01-07+S4+S1)+SB2
	1090	Q5=(C7+C1+S7+S4+S1)+CG2+CB2
	1100	06=04+51+562+0B2
	0111	ALF=Q1+Q2+U3
	1120	19日1 = Q.4 + Q.5 + & 6 「 」
	1130	G2=ATAN(ALF/BET)
¢.	1140	R=C7*C4*SB2-S7*C4*C02*CB2-S4*S62*CB2
	1150	DB2=AIAN(R/(1R*R)r0.5)
• •	1160	UB2 #082.43 20R
۰.	1180	Z2=10.*XK*D01+9.*XK*K(3) ************************************
	1190	Z5=20.*XK*(DB1*0.5(62)+DB2*C&S(61)+.45*X(6))
	1200	Z5=,5*D12*Z5
÷.	1210	28#20.*XK*(-DB1*SIN(G2)-DB2*SIN(G1)+.45*X(9))
	1220	28=.5*1.12*28
	1230	F(1)=-A*(X(2)+(X(5)*S1+X(8)*C1)*S4/C4)
	1240	F(2)=-B*(X(2)-SAT(22)/XK)
	1250	F(3)=-2.0*(X(3)+DG1)
• •	1260	F(4)=-A*(X(5)*01-X(8)*S1)
an i	1270	F(5) =-D×(X(5)-SHT(25)/XN)
	1280	F(6)=-2.0*X(6)-2.0*D12*(CES(G2)*DB1+C@S(G1)*D32
	1290	F(7)=+A*(X(5)*S1+X(8)*C1)/C4
÷.,	1300	F(8) = -B*(X(8) - SAT(28)/XK)
	1310	F(9) =-2.0*X(9) +2.0*D12*(SIN(62)*DB1+SIN(61)*DB2
	1350	RETURN
	1400	END
	1410	FUNCTION SAT(2)
	1420	IF(Z-26.)5.Z.Z.
	1430	2 SAI=26.
	1440	GOTE 1 CONTRACTOR OF A CONTRACTOR OF
	1450	5 IF(2+25;)3,3,4
	1460	
	1470	
	1480	4.SATEZ
	1490	ALARIUNA ALARIANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANANA ALARAMANANA ALARAMANANA ALARAMANANA ALARAMANANANANANANANANANANANANANANANANANAN
	1500	
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	DDD 12-JUN-69	) 14:21
	00100	COMMON X(9) F(9)
	00101	COMMON D12 A B XK GICR G2CR BICR B2CR TB1 TB2 CG1 CG2 SG1
	S62	
	00102	CUMMUN TOL TO2 R1 R2 SB1 SB2 CB1 CB2
	00130	DIMENSIUN P(9,9), PZ(9,9), PX(9), D(9), EIG(9,9), TEMPI(9).
	00140 4	- TEMP2(9)
	00150	DIMENSION PI(9,9), Y(9), Z(9), EL(9,9)
	00200	A=2685./195.
	00210	B=1./76.8
	00220	XX = 268500.
	00280	G1CR=0.05017822
K.	00290	G2CR=-G1CR
	00300	B1CR=0.0
	00310	B2CR=-0.5235988
	00320	CGI=CUS(GICR)
	00330	CG2=CUS(G2CR)
	00340	SG1=SIN(G1CR)
s with a	00350	SG2=SIN(G2CR)
N	00360	TGI=SGI/CGI
	00370	TG2=SG2/CG2
	00380	D12=SIGN(2GlCD-G2CD)
	00390	D12=10.0*D12
1. 1. 1.	00400	CB1=COS(BICR)
	00410	CB2=CVS(B2CR)
	00420	SB1=SIN(B1CR)
	00430	SB2=SIN(B2CR)
14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14 14	00440	TB1=SB1/CB1
	00450	TB2=SB2/CB2
	00460	R1=TB1/CG1
	00470	R2=TB2/CG2
	00480	. DØ 1. I=1,9
	00490	De 2 J=1,9
	00500	PZ(I,J)=0.0
	00510 2	P(I,J)=0.0
	00520	PZ(1,1)=1.0
	00530 1	aP(I,I)=1.0 A A A A A A A A A A A A A A A A A A A
en e	00540	P(1,1)=.4352277E+02
	00550	P(1,2)=.8029531E+01
	00560	P(2,1)=P(1,2)
	00570	P(2,2) = .3393061E+02
4	00580	P(1,3)=.1009517E+02
	00590	P(3,1)=P(1,3)
	00600	P(3,3)=.2354561E+01
	00610	P(2,5)=.1674426E+U1
	00620	(4(3,2)=2(2,3)
	00630	P(4,4)=.113381/E+UZ
	00640	P(4, ))=・/8U91/3E+U1
	00650	- イレフ,4ノ=アレ4,フノ
	00660	
	00670	$\Gamma(4,0)=.4/340/00+01$
		「アイロ・4ノニア(4・2)」「「「「」」」「「」」」」「「」」」「「」」」」「「」」」「「」」」「「

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00690		P(6,6) = .2547270E + 01
00700		P(5,6)=.2397112E+01
00710		P(6,5)=P(5,6)
00720		P(7,7) = .7626979E + 01
00730		P(7   8) = .8563903E+00
00740		P(8,7) - P(7,8)
00750	an a	$D/\sigma \sigma = 1 A 2 1 \sigma 3 \sigma E 1 A 3 1 \sigma 3 \sigma E 1 A $
00100		P(7, 0) = CORABOPTOL
00760		P(1,9)=.6084420E+01
00770		P(9,7) = P(7,9)
,00780		P(9,9) = .1100106E + 02
00790		P(8,9)=8632137E+01
00800-		P(9.8)=P(8.9)
00810		VH=.4506492E+00
00811		$V_{1} = 10$ .
nngen		11 = 5000
00020		
00000		
00840		SU= UZ
≥ 00850.	$p = \frac{1}{2}p^{2} + \frac{1}{2}$	VH = 0 . U
00855 🔩		G=XNØRM1(-1.,0.0,1.0)
00856	a di se	NN=O
00860		-GØ TØ 753
00870	8	K=0
00880	80 ·	
00000	6 6	$D(1) = 0.5 \times Y(1)$
00000	110	
00900	110	
00910		
00920	20	$\mathbf{K} = \mathbf{K} + 1$
00930		IF (K-15) 35, 36, 36
00940	35	CALL DER
00950		VD=0.0
00960		DØ 12 I=1.9
00970		PX(I)=0.0
00980	di kara	DE 13 JEL 9
00000	13	PX(I) = PX(I) + P(I = I) * X(I)
01000	10	
01010	میک <b>لا</b> ر د	
01010	1.57	IF (VD) 17, 18, 18
01020	11	D0 19 1=1.9
01030		D(1)=0.5*D(1)
01040	19	X(I) = X(I) + D(I)
01050		GØ TØ 20
01060	18	DB 201 I=1.9
01070	201	D(I)=0.5*D(I)
01080		G& TØ 110
01090	3.6	W = 0
01100	00	
01110		
01110		
01120	·.	DL 52 J=1,9
01130	52	PX(1) = PX(1) + P(1, J) * X(J)
01140	51	VL = VL + X(I) * PX(I)
01142		TYPE 631.VL
01145		CALL RTIME (IT)
01150	1000	ENRMAT(56)
01160		TYPE GOOD N UN MI IT
01100	6000	
V-4-1 V C+	2000	I DULINIX V-ACOIDU 1



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ورواحيا والمحافية المحافظة والمحافظة	and a second		
01165		TYPE 9800	
01167		TYPE 9895.X	
01170		XPZX=0.0	
01180		DØ 38 I=1.9	
01190		PX(I)=0.0	
01200		$D_{0}$ 37 $J=1.9$	영이
01210	37	$P_X(I) - P_X(I) \perp P_Z(I - I) + Y(I)$	
01220	3.8	$\mathbf{Y}\mathbf{D}74 - \mathbf{Y}\mathbf{D}771711\mathbf{C}11077171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717171717\mathbf$	
01230	00	$\frac{1}{1} \frac{1}{1} \frac{1}$	
01240	50	$\frac{1}{2} \left( \frac{1}{2} \left( \frac{1}{2} \right) - \frac{1}{2} \left( \frac{1}{2$	
01240	10		
01055		에 바뀌는 것 같은 것 같	
01000		n de NNTUres de la construcción de Notas de la construcción de la const	
01260		VL=10.0	
01270	99	DU 973 1=1,9	
01280	973	P(I,I)=0.0	
01290	$\frac{g_{\rm eff}}{g_{\rm eff}} = \frac{g_{\rm eff}}{g_{\rm eff}} = \frac{g_{\rm eff}}{g_{\rm eff}} = \frac{g_{\rm eff}}{g_{\rm eff}}$	DØ 100 I=1.8.	
01300		- II=I+I D. Here The Content of C. M. P. P. Market Street and Street Stree	
01310	an a	DØ 100 J=II.9	
01320		G=XNCRM1(0.0.0.0.1.0)	
01350		$P(1, J) = P7(T, J) + G + SC \Delta I F$	
01360	100	P(J   T) = P(T   J)	
0.1370		DØ 102 T=1 9	
01390	<b>,</b>	G=XMRPM1(0,0,0,0,1,0)	30
01410	102	$P(T = T) = P^{2}(T = T) + C = C = C = C$	
01/20	5	D(1,1) - FL(1,1) + G + D(ALE)	
01420	<b>)</b>	DU / 2 = 1, 9	
01430	90	$\frac{DU}{I} \frac{1}{I} I$	
01440	14		
01420	<u>् । २</u>	CALL EIGI(P1, EIG, 9, 1.0E-08, TEMP1, TEMP2, 9, 9)	
01421	1. 1	DE1P=1.0	
01452		DØ 632 I=1,9	
01453	632	DETP=DETP*P1(I,I)	
01454		TYPE 633, DETP	
01455	9898	FORMAT(9H P NATRIX)	
01456	63,5	FØRMAT( DET P = ,G)	<u>,</u>
01465	9897	FORMAT(9(5E14.6/4E14.6//))	
01485	9895	FØRMAT(5E14.6/4E14.6)	
01500	77	DE 71 I=1.9	
01510		IF(P1(I.I).LE.0.0) GU TU 99	
01515	71	D(I)=(VL/P1(I.I))**0.5	
01520	⊳5001 <i>∛</i>	BØ 74 I=1.9	
01560		$Y(I) = X \otimes (0, 1, 0,, 3)$	
01561	74	Y(I)=Y(I)*I(I)	
01590		D = 753 T = 1 G	
01595		$R = R + 7(1) \times 7(1)$	381 s
01600		$X(\mathbf{I}) = 0.0$	
01610			걸음
01620	753	X(1) = X(1) + T(1) + T(1) + T(1) + T(1)	
DISOL			i ju tič Vist
A1000	701A	$ = \frac{\partial \omega}{\partial t} \frac{1}{\partial t}$	
01024	1014		
01000	901	Trun-NHA 800, 801, 800 and a statistic	
01040	SUL		
UCOLU OCCOLU	a daha Marina dari kara	UALL RIIME (LT)	
	the second second second	- ウマリム 内川内には てや たくりに ゴーニー しょうかいしゃ 一分 気がらもの作用	1 A.J. (A.A.

(4 of 6 pages)

01670	802	FØRMAT( N= 15, CLUCK TIME IS G, MILLISECUNDS)
01710	800	_ N=W+1
01720		CALL DER
01725		PRINT 631 F
01726	631	FARMAT(OC)
01720	001	
01730		
01740		DD 180 1=1,9
01750		PX(1)=0.0
01760 .		DØ 6 J=1,9
01770	6	PX(I)=PX(I)+P(I,J)*X(J)
01780	186	VD=VD+F(I)*PX(I)
01785		TYPE 8000.VD
01786	8000	FØRMAT( VD AT VICS X IS G)
01787		GD T036
01790		IF (VD) 7.8.8
01800	7	TE (N-11) 5001 61 61
01810	61	NH-NI ,
01010	0004	FORMAT (2014 CCALE CC N/A OF D)
01012	3034	TYDE OROA
01820		
01825		RAIIDESUALL/SU
01830	۰.	TYPE 9900, SCALE, SC, RAILD
01840		D6 52 J=1,9
01850		DC 62 I=1,9
01860	62	PZ(1,J)=P(1,J)
01865		TYPE 9899
01866	••• . 	TYPE 9897.PZ
01870		CALL EIGI(P.EIG.9.1.0E-08.TEMP1.TEMP2.9.9)
01874	0282	FERMAT( ELGENVALUES)
01875	••••	PRINT 9890
01876		$TYP_{1} = 9895 (P(I   I)   I - 1   Q)$
04877	· · ·	TVPE 0201
01070	0001	TADAAT ( FICENHECTED RATDIV )
01070	9891	TYDE CODE EIGENVEUION PHININ /
01879		11rL 9897, L10
01880		
01890		SU=0.0
01900		Du 932 1=1,9
01910		SC=SC+P(I,I)
01920	932	DET=DET*P(1,1)
01930		SC=1.0/SC
01940	No.	SCALE=0.0
01960	9899	FURMATCHH . NEW P ZERO MATRIX )
01975	9893	FERMATCIN VH. DETP: SQRI(VØL)
01980		TYPE 9893
01985		SORTV=VH**2,25/DET**0,25
01988		$V_{01} = 1.7 (S_{0} R T V) * * 0.5$
01990	, i de	TVPL QOOD WE DET SURTY VAL
02000 -		
02000		
02010		LEND ANTINO NODE AND
00000		DUDARUIIRE UEN
02040		
02041		COMMENDIZ, A, B, XK, GICA, G2CR, BICR, B2CR, TB1, TB2, CG1, CG2, SG1, C
562		
02042		COMMONIGI, TG2, R1, R2, SE1, SB2, CB1, CB2
02070		C1=C2S(X(1))

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	02080	C4 = C0S(X(4))
	02090	C7 = COS(X(7))
1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 1917 - 19	02100	S1=SIN(X(1))
	02110	SA + STN(X(A))
	02120	
	02120	
	02130	
	02140	$11^{\circ}$ (ADS(X(4))-0.17) 1, 1, 2
	1 02120	D4=-0.0*X(4)*X(4)*(1.0-X(4)*X(4)/12.0)
	02160	, uu 10 3
[관망 문	02170 2	L/4 = C 4 - 1 • O
	02180 3	IF (ABS(X(7))-0.15) 4, 4, 5
	02190 4	B7=-0.5*X(7)*X(7)*(1.0-X(7)*X(7)/12.0)
d set	02200	Gu To 6
	02210 5	B7=C7-1.0
	02220 6	EALF=B4*TG1-(S7*T1+C7*S4)*R1+C7*T1-S7*S4
	02230	EBET= 7+57*54*T1-(S7-T1*54*C7)*R1-T1*C4*TG1
	02240	DG1=ATAN((EALF-EBET*TG1)/(1.0+EBET+(TG1+EALF)*TG1))
	02250	G1=DG1+G1CR
x	02260	FALF=64*TG2+(S7*T1+C7*S4)*R2+C7*T1-57*S4
	02270	FBFT = R7 + S7 * S4 * T1 + (S7 - T1 * S4 * C7) * R2 - T1 * C4 * T62
	02280	$DG2 - \Delta T \Delta M ((F\Delta) F - FBFT * TG2) / (1, O+FBFT + (TG2 + FA) F) * TG2))$
	02200	69-69001160
	02230 Mozan	
	00200	
	02010 Dozoo	
	02520	TE (AOC(DOI) = 0 I) = 7 C Q
	02000 7	IF (HOD(DDI) = 0.17 TO 1 CA C7 CC1 CC1 L1 C)
	02330 8	
	02360	
1111	02370	
	023.80	1F (AB5(DB2)-0.1) 9, 10, 10
	02390 9	DB2=DB21(B4, B7, 1B2, S4, S7, CG2, SG2, -1.0)
1	02400 10	CONTINUE -
	02410	Z2=10.0*X(*)G1+9,0*X(*X(3)
I	02420	Z5=D12*XA*(DB1*CDS(G2)+DB2*CDS(G1)+.45*X(6))
	02430	Z8=D12*XK*(-DB1*SIN(G2)-DB2*SIN(G1)+.45*X(9))
	02440	F(1)=-A*(X(2)+(X(5)*S1+X(8)*C1)*S4/C4)
	02450	F(2)=-B*(X(2)-SAT(Z2)/XK)
	02460	F(3) = -2.0 * (X(3) + DG1)
an a	02470	F(4)=-A*(X(5)*C1-X(8)*S1)
	02480	F(5)=-B*(X(5)-SAT(Z5)/XK)
ing Ann an A	02490	F(6)=-2.0*X(6)-0.2*D12*(C6S(G2)*DB1+C8S(G1)*DB2)
	02500	F(7)=-A*(X(5)*S1+X(8)*C1)/C4
an a∳. Ar a	02510	F(8) = -B * (X(8) - SAT(Z8) / XK)
	02520	$F(9) = -2.0 \times (9) + 0.2 \times D12 \times (SIN(G2) \times DB1 + SIN(G1) \times DB2)$
	02530	RETHEN
	02540	
	02550	FUNCTION SAT(7)
an sang Ang Karatan	02560	IF (7-26.) 5 2 2
	02570 9	SAT=26.
	02580	
	02500 5	$IF(7+26_{-}) = 3 + 3 + 4$
	02030	
	02600	$\Omega \Lambda I = -40$
فالتعاير بدالاطهي		- 「「「「「「「「「」」」」 「「」」 「「」」 「」」 「」」 「」」 「」

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02620 4	SAT=Z	
02630 1	RETURN	
02640	END	
02650	FUNCTION DEET (64, 87, TB, 54, 57, CG, SG, SIGN)	
02660	XKAP=(B7+B4+B7*B4)*TB+((1.0+B4)*S7*CG+S4*SG)*SIGN	
02670	XMU=XKAP	
02680 2	SQ=XMU*XMU	
02690	XF=XMU-XKAP-TB*0.5*SQ*(1.0+0.25*SQ*(1.0+0.5*SQ))	
02700	1F (XF*XNU.LQ.0.0) GU TU 1	
02710	XMU=XMU-XF/(1.0-TB*XMU*(1.0+0.5*SQ*(1.0+0.75*SQ)))	
02720	IF (ABS(XF/XMU).GE.1.0E-06) GØ TØ 2	
02730 1	CONTINUE	
02740	DBET=AS1N(XMU)	
02750	REIUKN SA ANTAL AND AN ANTAL AND A	and the second
02760		
CVCTEMO	에는 것이 있는 것이 같은 것이 있는 것이 있다. 같은 것이 같은 것이 같은 것이 같은 것이 같은 것이 있는 것이 같은 것이 있는 것이 같은 것이 있는 것	
ALLI G	에는 것이 같은 것이 있는 것이 있는 것이 있는 것이 있는 것이 있는 것이 있는 것이 같은 것이 있는 것이 가지 않는 것이 있다. 가지 않는 것이 많은 것을 가 있는 것이 같은 것이 있는 것이 있는 같은 것이 같은 것이 같은 것이 같은 것이 같은 것이 같은 것이 같은 것이 같이 있는 것이 같은 것이 있	
C/P HMITS	- 「「「」」、「」「」「」「」」」、「」」、「」」、「」」、「」」、「」」、「」	
OVI OBLID	에는 14 MIN 가지 않는 것이 있는 것이 있는 같이 있는 것이 같은 것이 있는 것이 있	
CONNECT TIME		

(1 of 10 pages)

tC .LØGI EINE 24 12-JUN-69 AL/COM JUB 9 12:51 TYPE COMPANY PROJECT NAME GRUMMAN DEMU ALL G-11: FØR CHANGED SYSTEM UNAVAILABILITY SCHEDULE TYPE SYS:SCHED. UPR EXIT 1C .TYPE LIST.CLM LIST.COM 6/12/69 1252 542-1-1 00100 VAN.FER 00110 PGGE.FOR 00120 PG2.FDR LIN.FOR 00130 00140 DER.FER 00150 INITAL FOR 00160 RAND.FOR RANDU.FOR 00170 CHARGE . MAC 00180 EXIT **↑**C .TYPE VAN.FER 6/12/69 1253 542-1-1 VAN. FØR CUMMUN XX(9,200), FF(9,200), P(9,9), SM(9,9), THETA(28), 00050 PHIV(8), XLAH(9), D(9), X(9), F(9), G(9), Y(9), PX(9) 00055 1 00060 WERST(9), VD, RZSRFG, DET, VEL, VEL1, XNU4, RXNU4, PI, VH; 2 VL', LL, N, NOP, NPH, NTH, NOPTS 00065 3 111=12 00090 00100 IGER=0 00110 CALL INITAL 00115 LLL=Z*LL 00120 ZSRFG=1 00130 XNU4=ZSRFG/4. 00140 RXNU4=1.0/XNU4 00150 RZSRFG=1./ZSRFG 00160 14 NOPTS=0 00170 IF (NEPTS-LL)20.20121 1 R=1.0 00180 21 00190 GØ TØ 22 00200 20 R=RAND(0.0)**RZSRFG 00210 22 SIZE=0.0 DØ 31 I=1.N 09220 00230 Y(I) = (2.*RAND(0.0)-1.)00240 31 SIZE=SIZE+Y(I)*Y(I)

1.5

EXPERIMENTAL P-GENERATION PACKAGE AND

### A TYPICAL RUN ON THE TIME SHARING TTY

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00250		SIZE=SURT(SIZE)
00260		DØ 32 I=1.N
00270	32	Y(I) = (Y(I)/SIZE) * R * G(I)
00280	<ul> <li>Constraints</li> <li>Constraints</li> <li>Constraints</li> </ul>	DØ 3 1=1 N
00290	2	X(I)=0.0
00300		
00310	3	X(I) = X(I) + Sn(I - I) + Y(I)
00320		CALL DER
00330		VN=0.0
00340		D = 0.0
0.0350		$P_X(1) = 0$
00360		$D_{\rm M}$ / $A-1$ M
00370	Δ	PX(I) - PX(I) + P(I - I) * X(I)
00380	5	$V_0 = V_0 + F(1) + P_X(1)$
00390		MCPTS=MCPTS+1
00400	548	TF(VD)6 6 7
00410	6	TF(NGPTS-11))1 11 11
00420	7	CALL VIN
00430		
00440		$TF(V_{2} 1-V_{2} ) 0  1  1$
00450	10	CATT PG2
00460		JSW=0
00470		- 200 (* = 0) - 新藤戸 - 新藤戸 - 1
00480		
00490	16	IGUR = IGUR + IOO
00510		
00520	15	FORMAT( TIME IIO MS IIO P MATDICEC)
00520	15	FORMAT( TIME 110, MS., 110, P MATRICES)
00520 00530 00540	15	FORMAT( TIME , 110, MS., , 110, P MATRICES ) IF(NUP-2000)14,14,17 IF(ISW NN 0)56 TG 40
00520 00530 00540 00560	15 11 74 11	FORMAT( TIME 110, MS., 110, P MATRICES) IF(NUP-2000)14,14,17 IF(JSW.LQ.O)G0 T0 40 TYPE 100 ((P(I 1) 1-1 N) I-1 N)
00520 00530 00540 00560 00565	15 11	FORMAT( TIME 110, MS., 110, P MATRICES) IF(NUP-2000)14,14,17 IF(JSW.LQ.O)GO TO 40 TYPE 100,((P(I,J),J=1,N),I=1,N) FORMAT(// NEW P ZERV MATRIX (2020/))
00520 00530 00540 00560 00565 00570	15 11 100	FØRMAT( TIME 110, MS., 110, P MATRICES) IF(NUP-2000)14,14,17 IF(JSW.LQ.O)GØ TØ 40 TYPE 100,((P(I,J),J=1,N),I=1,N) FØRMAT(// NEW P ZERØ MATRIX /2(2G/)) TYPE 101 (X)AM(I), I=1,N)
00520 00530 00540 00560 00565 00570 00575	15 11 100	FØRMAT( TIME 110, MS., 110, P MATRICES) IF(NDP-2000)14,14,17 IF(JSW.LQ.O)GØ TØ 40 TYPE 100,((P(I,J),J=1,N),I=1,N) FØRMAT(// NEW P ZERØ MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) FØRMAT( FIGENVALUES 2G)
00520 00530 00540 00560 00565 00570 00575 00580	15 11 100 101	FORMAT( TIME 110, MS., 110, P MATRICES) IF(NUP-2000)14,14,17 IF(JSW.LQ.O)GO TO 40 TYPE 100,((P(I,J),J=1,N),I=1,N) FORMAT(// NEW P ZERU MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) FORMAT( EIGENVALUES 2G) TYPE 110 ((SM(I,I),I=1,N),I=1,N)
00520 00530 00540 00560 00565 00570 00575 00580 00585	15 11 100 101	FORMAT( TIME 110, MS., 110, P MATRICES) IF(NUP-2000)14,14,17 IF(JSW.LQ.O)G0 T0 40 TYPE 100,((P(I,J),J=1,N), I=1,N) FORMAT(// NEW P ZER0 MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) FORMAT( EIGENVALUES 2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) FORMAT( FIGENVECTOR MATRIX /2(2G/))
00520 00530 00540 00560 00565 00570 00575 00580 00585 00580	15 11 100 101 110	FORMAT( TIME 110, MS., 110, P MATRICES) IF(NUP-2000)14,14,17 IF(JSW.LQ.O)GC TC 40 TYPE 100,((P(I,J),J=1,N),I=1,N) FORMAT(// NEW P ZERC MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) FORMAT( EIGENVALUES 2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) FORMAT( EIGENVECTOR MATRIX /2(2G/)) TYPE 111, V)
00520 00530 00540 00560 00565 00570 00575 00580 00585 00590 00595	15 11 100 101 110	FORMAT( TIME 110, MS., 110, P MATRICES) IF(NUP-2000)14,14,17 IF(JSW.LQ.O)GC TC 40 TYPE 100,((P(I,J),J=1,N),I=1,N) FORMAT(// NEW P ZERC MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) FORMAT( EIGENVALUES 2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) FORMAT( EIGENVECTOR MATRIX /2(2G/)) TYPE 111,VL FORMAT( DEMOLIN XTPX 1T, G)
00520 00530 00540 00565 00575 00575 00575 00580 00585 00590 00595 00600	15 11 100 101 110 141	FORMAT( TIME 110, MS., 110, P MATRICES) IF(NDP-2000)14,14,17 IF(JSW.LQ.O)GG TE 40 TYPE 100,((P(I,J),J=1,N),I=1,N) FORMAT(// NEW P ZERE MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) FORMAT( EIGENVALUES 2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) FORMAT( EIGENVECTOR MATRIX /2(2G/)) TYPE 111,VL FORMAT( DOMAIN XTPX.LT. G) TYPE 1000 VGL 1
00520 00530 00540 00565 00570 00575 00575 00580 00585 00590 00595 00600 00605	15 11 100 101 110 111 141	FORMAT( TIME 110, MS., 110, P MATRICES) IF(NDP-2000)14,14,17 IF(JSW.LQ.O)G0 T0 40 TYPE 100,((P(I,J),J=1,N),I=1,N) FORMAT(// NEW P ZER0 MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) FORMAT( EIGENVALUES 2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) FORMAT( EIGENVECTOR MATRIX /2(2G/)) TYPE 110,(SM(I,J),J=1,N),I=1,N) FORMAT( EIGENVECTOR MATRIX /2(2G/)) TYPE 111,VL FORMAT( DOMAIN XTPX.LT. G) TYPE 1000,V0L 1 FORMAT( SOFT WELLINE G)
00520 00530 00540 00565 00570 00575 00585 00585 00585 00590 00595 00600 00605 00600	15 11 100 101 110 111 1000	<pre>F@RMAT( TIME I10, MS., 110, P MATRICES) IF(NUP-2000)14,14,17 IF(JSW.LQ.O)G@ T@ 40 TYPE 100,((P(I,J),J=1,N),I=1,N) F@RMAT(// NEW P ZERE MATRIX /2(2G/)) TYPE 1G1,(XLAM(I),I=1,N) F@RMAT( EIGENVALUES 2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) F@RMAT( EIGENVECT&amp;R MATRIX /2(2G/)) TYPE 111,VL F@RMAT( D@MAIN XTPX.LT. G) TYPE 1000,V@L 1 F@RMAT( SQRT VELUME G) TYPE 1001 (M@RST(K) K-1,N)</pre>
00520 00530 00540 00565 00575 00575 00585 00585 00590 00595 00600 00605 00610 00615	15 11 100 101 110 141 1000	<pre>F@RMAT( TIME I10, MS., 110, P MATRICES) IF(NUP-2000)14,14,17 IF(JSW.LQ.O)G@ T@ 40 TYPE 100,((P(I,J),J=1,N),I=1,N) F@RMAT(// NEW P ZERW MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) F@RMAT( EIGENVALUES 2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) F@RMAT( EIGENVECTWR MATRIX /2(2G/)) TYPE 111,VL F@RMAT( D@MAIN XTPX.LT. G) TYPE 1000,V@L 1 F@RMAT( SQRT VELUME G) TYPE 1001,(W@RST(K),K=1,N) F@RMAT( W@RST(K),K=1,N)</pre>
00520 00530 00540 00560 00565 00570 00575 00585 00590 00595 00600 00605 00600 00615 00616	15 11 100 101 110 111 1000 1001	<pre>F@RMAT( TIME IIO, MS., IIO, P MATRICES) IF(NDP-2000)14,14,17 IF(JSW.LQ.O)G6 T6 40 TYPE 100,((P(I,J),J=1,N),I=1,N) F@RMAT(// NEW P ZERE MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) F@RMAT( EIGENVALUES 2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) F@RMAT( EIGENVECT&amp;R MATRIX /2(2G/)) TYPE 111,VL F@RMAT( D@MAIN XTPX.LT. G) TYPE 1000,V@L 1 F@RMAT( SQRT VELUME G) TYPE 1001,(W@RST(K),K=1,N) F@RMAT( W@RST P@INT 2G) TYPE 1010 N/P</pre>
00520 00530 00540 00560 00565 00570 00575 00580 00585 00590 00595 00600 00605 00600 00615 00616 00617	15 11 100 101 110 111 1000 1001	<pre>F@RMAT( TIME IIO, MS., IIO, P MATRICES) IF(NDP-2000)14,14,17 IF(JSW.LQ.O)G0 T0 40 TYPE 100,((P(I,J),J=1,N),I=1,N) F@RMAT(// NEW P ZER0 MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) F@RMAT( EIGENVALUES 2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) F@RMAT( EIGENVECTOR MATRIX /2(2G/)) TYPE 111,VL F@RMAT( DØMAIN XTPX.LT. G) TYPE 1000,VØL 1 F@RMAT( SQRT V0LUME G) TYPE 1001,(W0RST(K),K=1,N) F0RMAT( W0RST P0INT 2G) TYPE 1010,N2P FMRMAT( NU 0F P MATRICES G/(/))</pre>
00520 00530 00540 00565 00570 00575 00575 00580 00585 00590 00595 00600 00605 00610 00615 00616 00617 00620	15 11 100 101 110 111 1000 1001 1010	<pre>F@RMAT( TIME 110, MS., 110, P MATRICES) IF(NDP-2000)14,14,17 IF(JSW.LQ.O)G&amp; T&amp; 40 TYPE 100,((P(I,J),J=1,N),I=1,N) F@RMAT(// NEW P ZER&amp; MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) F@RMAT( EIGENVALUES 2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) F@RMAT( EIGENVECT&amp;R MATRIX /2(2G/)) TYPE 111,VL F@RMAT( D@MAIN XTPX.LT. G) TYPE 1000,V@L 1 F@RMAT( SQRT V&amp;LUME G) TYPE 1001,(W@RST(K),K=1,N) F@RMAT( W@RST P@INT 2G) TYPE 1010,N&amp;P F@RMAT( N&amp; @F P MATRICES G///) N#P=0</pre>
00520 00530 00540 00560 00575 00575 00575 00585 00585 00590 00595 00600 00605 00600 00605 00610 00615 00616 00617 00620 00630	15 11 100 101 110 111 1000 1001 1010	<pre>F&amp;RMAT( TIME ,110, MS., ,110, P MATRICES ) IF(NUP-2000)14,14,17 IF(JSW.LQ.O)G&amp; T&amp; 40 TYPE 100,((P(I,J),J=1,N),I=1,N) F&amp;RMAT(// NEW P ZER&amp; MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) F&amp;RMAT( EIGENVALUES ,2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) F&amp;RMAT( EIGENVECT&amp;R MATRIX /2(2G/)) TYPE 110,((SM(I,J),J=1,N),I=1,N) F&amp;RMAT( D&amp;MAIN XTPX.LT. ,G) TYPE 111,VL F&amp;RMAT( D&amp;MAIN XTPX.LT. ,G) TYPE 1000,V&amp;L 1 F&amp;RMAT( SQRT V&amp;LUME ,G) TYPE 1001,(W&amp;RST(K),K=1,N) F&amp;RMAT( W&amp;RST P&amp;DINT ,2G) TYPE 1010,N&amp;P F&amp;RMAT( NE. &amp;F P MATRICES ,G///) N&amp;P=0 V&amp;R = 0 V</pre>
00520 00530 00540 00560 00565 00570 00575 00580 00585 00590 00595 00600 00605 00600 00605 00610 00615 00616 00617 00620 00630 00640	15 11 100 101 110 141 1000 1001 1010	<pre>F&amp;RMAT( TIME ,110, MS., ,110, P MATRICES ) IF(NUP-2000)14,14,17 IF(JSW.LW.O)G&amp; T&amp; 40 TYPE 100,((P(I,J),J=1,N),I=1,N) F&amp;RMAT(// NEW P ZER&amp; MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) F&amp;RMAT( EIGENVALUES ,2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) F&amp;RMAT( EIGENVECT&amp;R MATRIX /2(2G/)) TYPE 110,((SM(I,J),J=1,N),I=1,N) F&amp;RMAT( DØMAIN XTPX.LT. ,G) TYPE 111,VL FØRMAT( DØMAIN XTPX.LT. ,G) TYPE 1000,V&amp;L 1 FØRMAT( WØRST(K),K=1,N) FØRMAT( WØRST(K),K=1,N) FØRMAT( NU. ØF P MATRICES ,G///) NØP=0 VØL=VØL1 IGØR=0</pre>
$\begin{array}{c} 00520\\ 00530\\ 00540\\ 00560\\ 00565\\ 00570\\ 00575\\ 00585\\ 00585\\ 00590\\ 00595\\ 00600\\ 00695\\ 00600\\ 00605\\ 00616\\ 00615\\ 00616\\ 00616\\ 00617\\ 00620\\ 00630\\ 00640\\ 00650\\ \end{array}$	15 11 100 101 110 111 1000 1001 1010	<pre>F@RMAT( TIME ,110, MS., ,110, P MATRICES) IF(NUP-2000)14,14,17 IF(JSW.LQ.O)G@ T@ 40 TYPE 100,((P(I,J),J=1,N),I=1,N) F@RMAT(// NEW P ZER@ MATRIX /2(2G/)) TYPE 161,(XLAM(I),I=1,N) F@RMAT( EIGENVALUES ,2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) F@RMAT( EIGENVECT@R MATRIX /2(2G/)) TYPE 111,VL F@RMAT( EIGENVECT@R MATRIX /2(2G/)) TYPE 1000,V@L 1 F@RMAT( SQRT V@LUME ,G) TYPE 1000,V@L 1 F@RMAT( W@RST(K),K=1,N) F@RMAT( W@RST P@INT ,2G) TYPE 1010,N@P F@RMAT( NE. @F P MATRICES ,G///) N@P=0 V@L=V@L1 IG@R=0 G@ T@ 10</pre>
$\begin{array}{c} 00520\\ 00530\\ 00540\\ 00560\\ 00565\\ 00575\\ 00575\\ 00580\\ 00585\\ 00590\\ 00595\\ 00600\\ 00695\\ 00600\\ 00605\\ 00610\\ 00615\\ 00616\\ 00617\\ 00620\\ 00620\\ 00650\\ 00660\\ 00650\\ 00660\\ 00650\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 00660\\ 0060\\ 0060\\ 0060\\ 0060\\ 0060\\ 0060\\ 0060\\ 0060\\ 0060\\ 0060\\ 0060\\ 0060\\ 0060\\ 0060\\ 0060\\ 0060\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 000\\ 0$	15 11 100 101 110 111 1000 1001 1010	<pre>F@RMAT( TIME ,110, MS., ,110, P MATRICES) IF(NDP-2000)14,14,17 IF(JSW.EQ.O)G&amp; T&amp; 40 TYPE 100,((P(I,J),J=1,N),I=1,N) F@RMAT(// NEW P ZER&amp; MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) F@RMAT( EIGENVALUES ,2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) F@RMAT( EIGENVECT&amp;R MATRIX /2(2G/)) TYPE 111,VL F@RMAT( EIGENVECT&amp;R MATRIX /2(2G/)) TYPE 1000,V@L 1 F@RMAT( SQRT V&amp;LUME ,G) TYPE 1001,(W@RST(K),K=1,N) F@RMAT( W@RST P&amp;INT ,2G) TYPE 1010,N&amp;P F@RMAT( NE. &amp;F P MATRICES ,G///) N&amp;P=0 V&amp;L=V&amp;L1 IG&amp;R=0 G&amp; T&amp; 10 </pre>
$\begin{array}{c} 00520\\ 00530\\ 00540\\ 00560\\ 00565\\ 00570\\ 00575\\ 00575\\ 00580\\ 00585\\ 00590\\ 00595\\ 00600\\ 00605\\ 00610\\ 00615\\ 00616\\ 00615\\ 00616\\ 00617\\ 00620\\ 00620\\ 00620\\ 00650\\ 00660\\ 00650\\ 00660\\ 00670\\ \end{array}$	15 11 100 101 110 111 1000 1001 1010 1010 40 41	<pre>F@RMAT( TIME ,110, MS., ,110, P MATRICES) IF(NDP-2000)14,14,17 IF(JSW.EQ.0)G@ T@ 40 TYPE 100,((P(I,J),J=1,N),I=1,N) F@RMAT(// NEW P ZER@ MATRIX /2(2G/)) TYPE 161,(XLAM(I),I=1,N) F@RMAT( EIGENVALUES ,2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) F@RMAT( EIGENVECT@R MATRIX /2(2G/)) TYPE 110,((SM(I,J),J=1,N),I=1,N) F@RMAT( D@MAIN XTPX.LT. ,G) TYPE 100,(W@RST(WAINE ,G) TYPE 1000,V@L 1 F@RMAT( W@RST P@INT ,2G) TYPE 1010,N@P F@RMAT( NE. @F P MATRICES ,G///) N@P=0 V@L=V@L1 IG@R=0 G@ T@ 10 D@ 41 I=1,N G(J)=2.*G(L)</pre>
00520 00530 00540 00565 00570 00575 00575 00580 00585 00590 00595 00600 00605 00610 00615 00616 00615 00616 00617 00620 00630 00640 00650 00660 00670 00680	15 11 100 101 110 111 1000 1001 1010 1010 40 41	<pre>F@RMAT( TIME ,110, MS., ,110, P MATRICES ) IF (NUP-2000)14,14,17 IF (JSW.LQ.O)G@ T@ 40 TYPE 100,((P(I,J),J=1,N),I=1,N) F@RMAT(// NEW P ZER@ MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) F@RMAT( EIGENVALUES ,2G) TYPE 110,((SM(I,J),J=1,N),I=1,N) F@RMAT( EIGENVECT@R MATRIX /2(2G/)) TYPE 111,VL F@RMAT( EIGENVECT@R MATRIX /2(2G/)) TYPE 111,VL F@RMAT( DDMAIN XTPX.LT. ,G) TYPE 1000,V@L 1 F@RMAT( SQRT V&amp;LUME ,G) TYPE 1000,V@L 1 F@RMAT( W@RST(K),K=1,N) F@RMAT( W@RST PDINT ,2G) TYPE 1010,N@P F@RMAT( NE. @F P MATRICES ,G///) N@P=0 V@L=V@L1 IG@R=0 G@ T@ 10 D@ 41 I=1,N G(I)=2.*G(I) G@ T@ 14</pre>
$\begin{array}{c} 00520\\ 00530\\ 00540\\ 00560\\ 00565\\ 00570\\ 00575\\ 00575\\ 00580\\ 00585\\ 00590\\ 00595\\ 00600\\ 00695\\ 00600\\ 00605\\ 00610\\ 00615\\ 00616\\ 00615\\ 00616\\ 00616\\ 00615\\ 00616\\ 00650\\ 00680\\ 00680\\ 00680\\ 00690\\ \end{array}$	15 11 100 101 110 111 1000 1001 1010 1010 1010 1010	<pre>F&amp;RMAT( TIME ,110, MS., ,110, P MATRICES ) IF(NWP-2000)14,14,17 IF(JSW.LQ.O)G&amp; T&amp; 40 TYPE 100,((P(I,J),J=1,N),I=1,N) F&amp;RMAT(// NEW P ZER&amp; MATRIX /2(2G/)) TYPE 101,(XLAM(I),I=1,N) F&amp;RMAT( EIGENVALUES ,2G) TYPE 100,(SM(I,J),J=1,N),I=1,N) F&amp;RMAT( EIGENVECT&amp;R MATRIX /2(2G/)) TYPE 111,VL F&amp;RMAT( D&amp;MAIN XTPX.LT. ,G) TYPE 1000,V&amp;L 1 F&amp;RMAT( SQRT V&amp;LUME ,G) TYPE 1001,(W&amp;RST(K),K=1,N) F&amp;RMAT( W&amp;RST P&amp;DINT ,2G) TYPE 1010,N&amp;P F&amp;MAT( NE. &amp;F P MATRICES ,G///) N&amp;P=0 V&amp;L=V&amp;L1 IG&amp;R=0 G&amp; T&amp; 10 D&amp; 41 I=1,N G(I)=2.*G(I) G&amp; T&amp; 14 ST&amp;P </pre>
00520 00530 00540 00560 00565 00570 00575 00580 00585 00590 00595 00600 00695 00600 00605 00610 00615 00616 00615 00616 00617 00620 00630 00640 00650 00650 00650 00680 00690 00690	15 11 100 101 110 111 1000 1001 1010 1010 40 41 17	<pre>F@RMAT( TIME ,110, MS., ,110, P MATRICES ) IF (NUP-2000)14,14,17 IF (JSW.LQ.O)G&amp; T&amp; 40 TYPE 100, ((P(I,J),J=1,N),I=1,N) F@RMAT(// NEW P ZER&amp; MATRIX /2(2G/)) TYPE 101, (XLAM(I),I=1,N) F@RMAT( EIGENVALUES ,2G) TYPE 110, ((SM(I,J),J=1,N),I=1,N) F@RMAT( EIGENVECTWR MATRIX /2(2G/)) TYPE 111,VL F@RMAT( D@MAIN XTPX.LT. ,G) TYPE 1000,V@L 1 F@RMAT( SQRT V&amp;LUME ,G) TYPE 1001, (W@RST(K),K=1,N) F@RMAT( WERST P@INT ,2G) TYPE 1010,N&amp;P F@RMAT( NE. &amp;F P MATRICES ,G///) N&amp;P=0 V@L=VDL1 IG@R=0 G&amp; T&amp; 10 D&amp; 41 I=1,N G(I)=2.*G(I) G&amp; T&amp; 14 ST&amp;P END</pre>

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# (3 of 10 pages)

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EXIT tC	
SEDIT VAN.F&R &LD *MR560,615\$2\$\$\$52ARCH_ENDS*T560,615 OO560 TYPE 10C,((P(I,J),J=1,N),I=1,N) OO565 100 F&RMAT(// NEW P ZER& MATRIX /9(9G/)) OO570 TYPE 101,(XLAM(I),I=1,N) OO575 101 F&RMAT( EIGENVALUES 9G) OO580 TYPE 110,((SM(I,J),J=1,N),I=1,N) OO585 110 F&RMAT( EIGENVECT&R MATRIX /9(9G/)) OO590 TYPE 111,VL OO595 111 F&RMAT( D&MAIN XTPX.LT.,G) OO600 TYPE 1000,V&L 1 OO605 1000 F&RMAT( S&RT V&LUME,G) OO615 1001 F&RMAT( W&RST P&INT,9G) *MR560,615\$\$\$2\$\$EARCH_ENDS*E	
EXIT TC	40
.EXECUTE @LIST.COM COMPILING: VAN.FOR	
LØADING.	
CORE 8. START 000543	49 19 19
같이 있는 것은 가슴을 가지 않는 것이다. 가지 않는 것은 가지 않는 것은 것이 있는 것이다. 가지 않는 것이 있는 것이 있는 것이 있는 것은 것이 있는 것은 것이 있는 것은 것이 있다. 같이 있는 같이 있는 것이 같이 있는 것은 것은 것은 것이 있는 것이 같이 있는 것 같이 같이 있는 것이 같이 있는 것은 것은 것은 것은 것은 것은 것이 있는 것이 같이 있는 것이 없다. 것이 있는 것은 것은 것	6
NEW P ZERG MATRIX 1.0000000 0.0000000 0.0000000 1.0000000	13
EIGENVALUES 1.0000000 1.0000000 / EIGENVECTOR MATRIX 1.0000000 0.00000000 0.0000000 1.0000000	
DØMAIN XTPX.LT. 0.2440884E-25 SQRT VØLUME 0.1562332E-12 VØRST PØINT -0.1365368E-12 0.7593781E-13 NØ. ØF P MATRICES 0	

# (4 of 10 pages)

	TIME 12MS., 1 P MATRICES
	NEW P ZERØ MATRIX 2.8136173 0.3750980E-01 0.3750980E-01 1.6194153
	EIGENVALUES 2.8147944 1.6182383 EIGENVECTOR MATRIX Q.9995080 -0.3136356E-01 0.3136356E-01 0.9995080
	DØMAIN XTPX.LT. 0.3754065E-01 SQRT VØLUME 0.1326260 WØRST PØINT 0.1051866 0.6052599E-01 NØ. ØF P MATRICES 39
	TIME 12MS., 1 P MATRICES
•	NEW P ZERØ MATRIX 3.5033651 0.1267110 0.1267110 2.0193114
	EIGENVALUES 3.5141063 2.0085704 EIGENVECTØR MATRIX -0.9964264 0.8446520E-01 -0.8446520E-01 -0.9964264
	DØMAIN XTPX.LT. 0.5133801E-01 SGRT VØLUME 0.1390094 WØRST PØINT 0.1128978E-01 0.1580458 NØ. ØF P MATRICES 94
	TIME12MS.1 P MATRICESTIME1205.100 P MATRICESTIME1205.200 P MATRICESTIME12MS.200 P MATRICESTIME12MS.300 P MATRICESTIME12MS.400 P MATRICESTIME12MS.500 P MATRICESTIME12MS.600 P MATRICESTIME12MS.600 P MATRICESTIME12MS.800 P MATRICESTIME12MS.800 P MATRICESTIME12MS.900 P MATRICESTIME12MS.1000 P MATRICESTIME12MS.1000 P MATRICES
	TIME 12MS., 1100 P MATRICES TIME 12MS., 1200 P MATRICES TIME 12MS., 1300 P MATRICES

(5 of 10 pages)

TIME	12MS.,	1400 P MATRICES
1102	1205.,	IDUU P MATRICES
11ML	1205.,	1600 P WAIRICES
11ME	IZMS.,	I TOU P MATRICES
	12175.,	1800 P MATRICES
IIPE.	12115.	1900 P NATRICES
	12115.,	2000 P MATRICES
I L ME	12110.,	ZIUU F MAIRICES
6A11 AC		
10		
.TYPE PGG	S.FØR	
'PGGØ.FØR	6/12/69 13	08 542-1-1
00005	SUBRO	UTINE PGGU
00050	COMMO	N XX(9,200), FF(9,200), P(9,9), SM(9,9), THETA(28)
00055	1 PHIVO	8) XLAM(9) D(9) X(9) F(9) G(9) Y(9) PX(9)
00060	2 WERST	(9) VD .RZSRFG. DET . VOL . VGLI . XNU4 .RXNU4 .PI VH
00065	3 VL.LL	N.NUP.NPH.NTH.NUPTS
00100	DØ 4	
- 00110	D6 3	J=1 N. The second s
00120	P(I,J	)=0.0
00130 3	SM(I.	J)=0.0
00140 4	SM(I.	1)=1.0
00150	D0 2	K, JEI, NPH CONTROL CONTROL OF A CONTROL OF A STREET AND A STR
00160	KP1=K	
00170	0=005	(PHIV(K))
00180	S=SIN	(PHIV(K))
00190	00 1	N=1,N '이 가장에서 이 가장 등 이 제품 문화가 제품 전쟁을 가 있다.
00200	STEM=	Sm(K,M)
00210	SM(K,	M)=SM(K,M)*C-SM(N,M)*S
00220 1	SM(N,	M)=STEM*S+SM(N,M)*C
00230	IF(K.	GL.NPH) GO TO 5
00240	DØ 2	L =NPH, KP1,-1 Million Landstein Statistical Million and Statistical Statistics and the second statistics of the second statistics of the second statistics and the second
100250	Mu=((	2*(N-1)-K)*(K-1))/2+N-L
00260	C=CØS	(THETA (MU))
00270	S=SIN	(THETA (NU))
00280	D6/2	
00290	STEM=	SM(K,M)
00300	SM(K,	M)=SM(K,M)*C-SM(L,M)*S
00310 2	SM(L,	M)=514M*5+5M(L,M)*C
4 00320 5	DLIEI	
00330		1 = 1 , N The second se
00340 7		
00350	VL=(V	UL*(UL1**0.20)*30.)**(KXNU4)
00360		$1 - 1 \cdot N$
00310		(VL/ALAPIAL) オイレック しんしょう いっしょう いっしょう いっした (19) (19) (19) (19) (19) (19) (19) (19)
00380	0 UU 10 0	↓ - 1 → 1 · · · · · · · · · · · · · · · · ·
00000		y = 0 (1 ) + $dw$ (1 K) * $X$ ( $w$ (K) * $dw$ (1 K)
00400 8		1-1 (1,0), DU(1,1), V) + V - V - V - V - V - V - V - V - V - V
00410	E ND	
V V 1 4 V		그는 것 같은 것 같

A TYPICAL RUN EXPERIMENTAL 6 **P-GENERATION** of ON THE 10 pages) TIME PACKAGE SHARING TTY AND

00240 00210 00120 00120 00120 00120 00120 00120 00120 00120 00120 000050 EXIT 50d PC IT 20 00230 TYPE TYPE .FOR PG2.FØR LIN.FER 100 200 Ň 30 de-6/12/69 G N SUBRUUT COMMON ) PHIV(8) WERST 70  $\mathbf{C}$ <7 23 1> -1) T 27 1310 CF3 NE NOP N P C T < N S NU NE F 20 11 6) XX INE 14 5 г XLAM(9) 542-1-20 ** <N O H τ 7RAND(0.0) 500)G0 Te 000 00 • 500) C  $\bigcirc$ NPH.  $\bigcirc$ 00  $\bigcirc$ 0 Ċ 0 Ġ. G  $\sim$ 00 00 00 00 X +2.*RAND(0.0)) 5 70. NTH ゴロー ÷ 5 FF(9 1 - **- 1** © © 6 C 001. 300 20 20 20 +2.*RAND(0.0)) 22 [7].  $\times$  • ~ 200  $\mathcal{O}$ τ (n 6 Ø SS 6 × 6. 0 1 0 **___**} A(28) Ś -

## (7 of 10 pages)

LIN.FØR	6/12/69	1312 542-1-1	
00005 00050 00055 00060 00065	1 2 3	SUBROUTINE LIN COMMEN XX(9,200),FF(9,200),P(9,9),SM(9,9),THETA(28), PHIV(8),XLAM(9),D(9),X(9),F(9),G(9),Y(9),PX(9), WORST(9),VD,RZSRFG,DET,V0L,V0L1,XNU4,RXNU4,PI,VH, VL,LL,N,N0P,NPH,NTH,N0PTS	
00100	같아요. 가슴이 가슴이 가슴. 성장	<b>ΛΞU</b>	
00110	1		
00120	1		
00100	4		
00140	<b>3</b>	X(1)=X(1)-D(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	
00100	4		
00160			
00170		UALL DLK	
00180			일 : 전망 전 가 가 가 가 가 가 가 가 가 가 가 가 가 가 가 가 가
00190	- 1 ² -	UG 6 1=1,N shares and s	
00200			
	istan ista Laga	DVD フリーコート、N	
00220		$P_{A}(I) = P_{A}(I) + P_{A}(I) + P_{A}(I)$	
00230	0		
00240	н <b>у</b>		
002 <b>0</b>			
00200	6		
00270	0	▲(コノーへ(コノナジ(コ)) 「ククーサイト」は、「「「「」」」、「」、「」、「」、「」、「」、「」、「」、「」、「」、「」、「	and the
00280	6	(10, 10, 4) (10) $(10, 10, 10, 10, 10, 10, 10, 10, 10, 10,$	
00290	9	DW = 10 = 1, $W$	
00310	10	レスエノーし、ノキレスエノ」。 19月1日 - 19月	
1003.20	11	$\begin{array}{c} \mathbf{U}\mathbf{p}  \mathbf{I}\mathbf{p}  \mathbf{Z} \\ \mathbf{D}\mathbf{A}  \mathbf{I}\mathbf{Q}  \mathbf{J} - \mathbf{I}  \mathbf{s}_{\mathbf{I}} \\ \end{array}$	
00330	12	$\frac{1}{2} \frac{1}{1} \frac{1}$	
60340	<b>å</b> 6.4	V(-0, 0)	
00350		D B = 1 A = 1  N	
00360		PX(I)=0.0	
00370			
00380	13	PX(1) = PX(1) + P(1, 1) * X(1)	
00390	14	VL=VL+X(1)*PX(1)	
00400		DW 15 I=1 N	
00410	15	G(1)=(VL/XLAM(1))**0.5	
00420		Vol L=VL**XNU4/DET**0.25	
00.430		RETURN	2.4.2
00440			
		지방 그에서 그는 것이 같아. 그는 것이는 것이 같은 꽃은 것이 없을까? 것은 것이 같은 것이 같아.	
EXIT ↑C			

.TYPE DER.FGR

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DER.FOR 6/12/69	1315 542-1-1
00005 00050 00055 1 00060 2 00065 3 00100 00110 00120 00130	SUBROUTINE DER COMMON XX(9,200),FF(9,200),P(9,9),SN(9,9),IHETA(28), PHIV(8),XLAM(9),D(9),X(9),F(9),G(9),Y(9),PX(9), WORST(9),VD,RZSRFG,DET,V0L,V0L1,XNU4,RXNU4,PI,VH, VL,LL,N,NCP,NPH,NTH,NCPTS F(1)=2.*X(2)*(3.+X(2)) F(2)=X(1)*(-10.+4.*X(1)+2.*X(2))+X(2)*(-1.+4.*X(2)) RETURN LND
EXIT †C	
.TYPE INITAL /.F SWITCH ERRER	μR ,
EXIT fC	
.TYPE INITAL.FOR	
	>/60 1317 549-1-1
TWIINCOLDU, OVIC	, UJ 1011 /42-1-1
00005           00050           00055           1           00060           2           00065           3	SUBREUTINE INITAL CEMMEN XX(9,200),FF(9,200),P(9,9),SM(9,9),THETA(28), PHIV(8),XLAM(9),D(9),X(9),F(9),G(9),Y(9),PX(9), WERSI(9),VD,RZSRFG,DET,VEL,VEL1,XNU4,RXNU4,PI,VH, VL,LL,N,NEP,NPH,NTH,NEPTS
00100	PI=3.1415926536
00120	LL=200
00130	NPH=N-1
00140	DU = 1 I I I I
00160 1	XLAM(I)=1.0
00170	D6 2 I=1, NPH the set of the set
00180 2	PAIV(I)=U.U DA 3 I=1 NTH
.00210 3	THETA (1)=0.0
00220	CALL PGG6
00230	
00240	ZARK=RANL(-5.0)
00270	VL = 1000.0
00280	VØL=0.0
00290	DØ 4 I =1,N 的 的 的 的 的 的 计 计 计 计 计 计 计 计 计 计 计 计 计
00300 4	G(1)=(VL/XLAN(1))**0.5
. UUS IU -	RETURN I I I I I I I I I I I I I I I I I I I
EXIT tC	

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.TYPE RAND.FUR RAND.FOR 6/12/69 1318 542-1-1 00100 SUBROUTINE RAND(X) 00110 CALL RANDU(IX, IY, YFL) 00120 RAND=YFL 00130 IX=IY 00140 RETURN EXIT 1C .TYPE RANDU.FUR RANDU.FOR 6/12/69 1319 542-1-1 C C C C SUBROUTINE RANDU С C PURPUSE COMPUTES UNIFORMLY DISTRIBUTED RANDOM REAL NUMBERS BETWEEN Ċ C O AND 1.0 AND RANDEM INTEGERS BETWEEN ZERØ AND 2**35. EACH ENTRY USES AS INPUT AN INTEGER RANDOM NUMBER C. C AND PRODUCES A NEW INTEGER AND REAL RANDOM NUMBER. С C USAGE C CALL RANDUCIX.IY.YFLY C Ċ DESCRIPTION OF PARAMETERS С IX - FØR THE FIRST ENTRY THIS MUST CØNTAIN ANY ØDD INTEGER C NUMBER WITH NINE OR LESS DIGITS. AFTER THE FIRST ENTRY. С IX SHOULD BE THE PREVIOUS VALUE OF IY COMPUTED BY THIS C SUBREUTINE: IY - A RESULTANT INTEGER RANDOM NUMBER REQUIRED FOR THE NEXT C. Ć ENTRY TO THIS SUBROUTINE. THE RANGE OF THIS NUMBER IS С BETWEEN ZERO AND 2**35 C YFL- THE RESULTANT UNIFORMLY DISTRIBUTED, FLOATING POINT, С RANDOM NUMBER IN THE RANGE O TO 1.0 C C REMARKS C THIS SUBROUTINE IS SPECIFIC TO SYSTEM/360 C THIS SUBROUTINE WILL PREDUCE 2**35-1 TERMS C BEFORE REPEATING C С SUBROUTINES AND FUNCTION SUBPROGRAMS REQUIRED C CONDAE. C

(10 of 10 pages)

1

·LØGØ TIME ↑C°51 00100 00120 00120 00130 00140 IC EXI EXIT CHARGE 00000 3 C TYPE 0 Sec. CHARGE MAC SUBROUTINE F EQUIVALENCE ZER= 2000000 IY= 37777777 IYFL=IZER•ØR YFL=ZFL+ZER RETURN END SUBRØUTINE RANDUCIX, EQUIVALENCE CIZER,ZE ZER= 200000000000 IY= 3777777777.AND . MAC T1 ME Part ME THUD 6/12 RANDOM NUMBER G 5.60T ENTRY ICHAR: CALL JRA 16 END 697 ØR O. 1322 ICHAR Z 0,[SIXBIT/CHARGE/] ,U(16) AND.(IX*"200+IX+"3 400) E-GENERATUR H 7/29/68 A S U K 42-(,YFL) ,(IYFL --I . Dan-R ADAP ZFL) -E \$100ml ..... 715164025 FREM 7090 ÷ •T] P

