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Axial Flow Compressor Design Computer Programs Incorporating Full Radial Equilibrium

Part Radial Distribution of Total Pressure and Flow Path or Axial Velocity Ratio Specified (Programs 111)

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Axial Flow Compressor Design Computer Programs Incorporating Full Radial Equilibrium

Part II — Radial Distribution of Total Pressure and Flow Path or Axial Velocity Ratio Specified (Program III)

by

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Prepared for

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AXIAL FLOW COMPRESSOR DESIGN COMPUTER PROGRAMS INCORPORATING FULL RADIAL EQUILIBRIUM PART II—RADIAL DISTRIBUTION OF TOTAL PRESSURE AND FLOW PATH OR AXIAL VELOCITY RATIO SPECIFIED (PROGRAM III)

by

H. F. Creveling and R. H. Carmody

SUMMARY

The technical objectives of the contract included generating a computer programmed compressor aerodynamic design system which accounts for full radial equilibrium of the flow, including streamline curvature and radial gradients in total enthalpy and entropy. It was desired that the design system have the capability of producing design information for given annulus geometry or, alternatively, computing annulus geometry along with aerodynamic design information. These capabilities are available as alternative options in the computer program described herein. The option in which design is performed for given annulus geometry is designated as Modification I; the option designated as Modification II requires input of axial velocity ratio at the mid-streamline for each rotor and stator, and establishes annulus geometry subject to certain limitations described later in this report. The resulting design-point computation is iterative, with efficiencies determined through the use of correlated blade element profile loss data and the loss associated with a normal shock in the blade passages, where appropriate. The computer program is written with "buffer" storage capacity for up to ten sets of profile loss parameter data, each set including hub, mean, and tip data for diffusion factor values between 0 and 1.0. These profile loss data sets are elected by the program user for any given design calculation from a master file of up to 999 profile loss parameter sets. In this program, energy addition is determined through specification of the profile of total pressure at each rotor exit, and through specification of limiting values on five aerodynamic parameters for each stage. These aerodynamic parameters are:

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1. Rotor tip diffusion factor

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- 2. Stator hub diffusion factor
- 3. Stator hub Mach number
- 4. Rotor hub relative exit angle
- 5. Rotor tip exit whirl velocity

The program accepts design input data for a specified maximum number of stages and, barring any error messages from the calculation, computes aerodynamic performance until either the maximum number of stages is reached or the specified overall pressure ratio is attained. The design computations may be based on 5, 7, 9, or 11 streamlines, at the user's option. Hub and tip blockages are input separately, at each axial station, as the unblocked fraction of local geometric annulus area. The program user has the capability of specifying the total mass flow at each axial calculation station. Any changes in mass flow are distributed proportionally among all streamtubes involved in the design computation.

The computation and the corresponding program logic are developed in detail in Appendix A (System of Equations and Computations) and Appendix C (Program Flow Charts). 'The Fortran IV Source Deck listing of the computer program is shown in Appendix B.

Input format and the preparation of required input data are presented in Appendix D, along with the data set describing two sample design problems. Appendix E illustrates the format of program output, through presentation of the computed results for both sample design problems.

INTRODUCTION

As a part of Contract NAS3-7277 for the NASA-Lewis Research Center, four axial flow computer programs were developed. The first (Reference 1) assumed simple radial equilibrium of static pressure and constant efficiency radially—limits are specified on hub and tip ramp angles, axial velocity ratio across blade rows, rotor hub and stator tip loadings, rotor exit relative flow angle, and stator hub Mach number; the velocity diagram and stageby-stage performance are calculated.

The second program (Reference 2) accounts for complete radial equilibrium of flow. Losses are evaluated on the basis of blade element loss prediction methods. Radial distribution of energy is specified as a polynomial variation of whirl velocities at the exit of each rotor blade row; rotor tip loadings are specified as are limiting values of rotor hub relative exit angles, stator hub Mach numbers, stator hub load:ngs, and the compressor flow path.

A third program, Arial Flow Design Program III, was developed under this contract and is reported herein. Program III differs from Program II in that the radial distribution of energy is established by specifying the polynomial variation of total pressure at the exit of each rotor blade row, and there is the option of specifying either the flow path or the axial velocity ratios and calculating the resulting flow path. Frogram III also offers the option of specifying as blade element data either the flow angle at the shock or the ratio of supersonic to total turning, to calculate values of shock loss coefficient.

SYMBOLS

運動語言

Note: The primary symbols are illustrated schematically in Figure 1.		
а	sonic velocity, ft/sec	
A, B, C, D, E	constants in total pressure profile and whirl velocity poly- nomials	
b	axial spacing of computational stations, in.	
с _р	specific heat at constant pressure,BTU/lb _m -R°	
D	diffusion factor; total derivative	
F	blade force on gas, lb_f/lb_m	
F, G, K, W	constants, variously defined in Equations (A-38) through (A-40) and in Equations (A-43) through (A-45)	
⁺ g _c	universal gravitational constant, 32.174 ft-lb _m /lb _f -sec ²	
Н	enthalpy, BTU/lb _m	
J	conversion factor, 778 ft-lb _f /BTU	
L	overall compressor axial length, in.	
M	Mach number	
m	molecular weight, lb _m /mole	
n	axial station index	
Ν	number of axial stations	
p	fraction of blade height, $\frac{R - R_{H_g}}{R_{T_g} - R_{H_g}}$	
P	pressure, $lb_f/in.^2$ abs	
ୟ	heat transfer rate, BTU/lb _m -sec	
R	radius, in.	
Rc	total pressure ratio	
R _i	i th rotor	

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	K	gas constant, ft-lb _f /lb _m -R°	
	S	entropy, BTU/lb _m -R°	1
	Si	i th stator	1
	t	time, sec	
	Т	temperature, °R	7
	U	wheel speed, ft/sec	1
	v	fluid velocity, ft/sec]
	W	mass flow rate, lb _m /sec	1
	x	fraction of blade span	- 68-4
	Z	axial coordinate, in.	
	Greek		
	a	ramp angle, degrees	200
Ĵ	β	air angle, measured from engine axis, degrees	Apple of the second second
	γ	ratio of specific heats	詩
	δ	blockage; unblocked fraction of annulus area	
	Δ	change; final value minus initial value	
	η	adiabatic efficiency	
	0	circumferential coordinale, radians	đ.
	ν	Prandtl-Meyer angle, degrees	
	ρ	density, lb _m /ft ³	
	σ	solidity	£. T
	ø	air turning angle, degrees	A DECK
	ω	angular speed, radians/second	
	ល	blade total pressure loss coefficient	, i

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Subscripts

1	rotor entrance station		
2	rotor exit station		
3	stator exit station		
е	effective value (of hub or tip radius)		
g	geometric value (of hub or tip radius)		
H	hub section		
i	ideal		
j	designates value of variable at reference streamline		
L	limiting value		
max	maximum value		
p	profile		
R .	rotor, radial component		
S	stator; stage		
S	shock		
SS	supersonic		
Т	tip section		
t	total		
θ	whirl component		
Z	axial component.		
Superscript			

relative value of a variable





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TECHNICAL DISCUSSION

The Modification I/II program, bearing Allison identification Q-45, accounts for full radial equilibrium including radial gradients in total enthalpy and entropy. Specific heat is treated as a function of temperature with the exception of the computation of shock loss, where c_p is assumed constant; elsewhere in the calculation, all integrations involving c_p in the integrand are performed for variable c_p . The program will not calculate supersonic axial flows; a check is made at the mean streamline of each axial station and the computation is terminated whenever an axial Mach number greater than 1.0 is encountered in three consecutive passes of the calculation. For use of Mod I, the program requires description of the flow path geometry, including location of all axial stations, plus hub and tip blockages at all stations. The computation of adiabatic efficiencies uses blade profile loss parameter data input as a function of diffusion factor for hub, mean, and tip sections. This profile loss data is interpolated and extrapolated to any point along the blade length by means of a second degree curve fit. Shock loss is computed at each streamline position by means of the shock model of Reference 3, using the ratio of supersonic turning to total turning input as a function of blade span for each blade row, or alternatively using input-specified values of flow angle at the shock.

For use of Mod II, where stage flow path geometry is established by computation, the inlet geometry is input as for Mod I. For each blade row, limits on hub and tip ramp angle must be given, along with an initial value of aspect ratio (difference in inlet geometric radii, divided by axial length) and the ratio of exit axial velocity to inlet axial velocity for the row at the midstreamline. Hub and tip ramp angles (a_H and a_T) are shown in Figure 1. The computation of annulus geometry for any given blade row begins with the specified initial value of aspect ratio and a_{T} = 0. In any required reduction of annulus area at the exit of a blade row, a_H is first increased to its limit value, if necessary. Next, a_{T} is increased to its given limit value, and, if necessary, the aspect ratio is finally reduced by an appropriate amount, to achieve the required level of exit axial velocity. Under no circumstances is a positive value of a_T permitted. Inasmuch as Mod II car jield irregular geometry, depending upon input constraints, the curvature of streamlines can produce severe gradients in flow properties and result in failure of the calculation with appropriate error messages printed out. Input of reasonable constraints is discussed further in Appendix D. Adiabatic efficiencies are computed as in Mod I.

As mentioned in the summary, the program draws its input-specified profile loss data sets from a master file or library of up to 999 loss-data sets. This master file appears as permanent data and is located at the rear of the program deck; this library of loss data sets is the only information

stored as permanent data. Up to ten of the profile loss-data sets may be selected for use in any one compressor design calculation. Each loss-data set consists of 20 values of profile loss parameter $(\overline{\omega}_p \cos \beta'_2)/2\sigma$ for each of the hub (10% span), mean (50% span), and tip (90% span) sections. These 60 values of loss parameter appear on 5 cards; each card consists of 12 fields of 6 columns each. The values of loss parameter for the hub section are entered first; next the values for the mean and tip sections. At each blade section, values are entered corresponding to increasing values of diffusion factor. The program automatically assigns the 20 loss-parameter values at any blade section to the 20 diffusion factor values 0, 0.1, 0.15, 0.20, 0.25, ..., 1.0.

Acrodynamic design of each stage is governed by specified limiting values for each of five cerodynamic design parameters. These parameters are:

1. Rotor tip diffusion factor

2. Stator hub diffusion factor

3. Stator hub Mach number

4. Rotor hub exit relative flow angle

5. Rotor tip exit whirl velocity

The program provides two alternative logic paths ensuring that the input-specified limiting values of these parameters are not violated in any stage. The program user may elect to: (1) drive the calculation to satisfaction of the most restrictive of its aerodynamic limits at each stage or (2) adjust the calculation at each stage so that all aerodynamic design parameters for that stage are less than or equal to their specified limiting values.

PROGRAM DESCRIPTION

The basic equations of motion which govern the three-dimensional flow of an inviscid compressible gas through a turbomachine have been derived in many reports such as Reference 4.

The pertinent equations for steady axisymmetric flow in cylindrical coordinates are:

 $\frac{1}{R} \frac{\partial(\rho R V_R)}{\partial R} + \frac{\partial(\rho V_Z)}{\partial Z} = 0$

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(1)

Radial Equation of Motion

$$g_{c}J\frac{\partial H_{t}}{\partial R} = g_{c}F_{R} + g_{c}JT\frac{\partial S}{\partial R} + \frac{V_{\theta}}{R}\frac{\partial(RV_{\theta})}{\partial R} + V_{Z}\left(\frac{\partial V_{Z}}{\partial R} - \frac{\partial V_{R}}{\partial Z}\right)$$
(2)

Circumferential Equation of Motion

$$0 = g_{c}F_{\theta} - \frac{1}{R} \left[V_{R} \frac{\partial(RV_{\theta})}{\partial R} + V_{Z} \frac{\partial(RV_{\theta})}{\partial Z} \right]$$
(3)

Axial Equation of Motion

$$g_{cJ}\frac{\partial H_{t}}{\partial Z} = g_{c}F_{Z} + g_{c}JT\frac{\partial S}{\partial Z} + \frac{V_{\theta}}{R}\frac{\partial(RV_{\theta})}{\partial Z} - V_{R}\left[\frac{\partial V_{Z}}{\partial R} - \frac{\partial V_{R}}{\partial Z}\right]$$
(4)

Energy Equation

$$\frac{DH_t}{Dt} = Q + \frac{\omega}{g_c J} \frac{D(RV_{\theta})}{Dt}$$
(5)

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(6)

Gradient of Entropy

$$\frac{DS}{Dt} = \frac{Q}{T}$$

Condition of Integrability

$$\frac{\partial}{\partial \mathbf{R}} \left(\frac{\mathbf{F}_{Z}}{\mathbf{RF}_{\theta}} \right) = \frac{\partial}{\partial Z} \left(\frac{\mathbf{F}_{R}}{\mathbf{RF}_{\theta}} \right)$$
(7)

Equations (1) through (7) relate eight unknowns in F_R , F_{θ} , F_Z , V_R , V_{θ} , V_Z , S, and H_t .

The compressor design analysis considered for this study considers full radial equilibrium and radial gradients in total enthalpy and entropy. The simplifying assumptions are:

- 1. Only stations between blade rows are to be considered; therefore, F_R , F_{θ} , and F_Z are zero.
- 2. Heat transfer is zero therefore Q is zero.
- 3. Consideration need be given only to the radial equation of motion.

With these assumptions, Equations (3), (4), (6), and (7) are eliminated. Equation (1) is then rewritten for convenience as

$$w = 2\pi \int_{R_{\rm H}}^{R_{\rm T}} \rho V_Z R dR$$

and Equation (2) is then written as:

$$v_{Z}^{2} - v_{Z_{j}}^{2} = 2g_{c}J \int_{T_{t_{j}}}^{T_{t}} c_{p} (T) dT - (v_{\theta}^{2} - v_{\theta}^{2}) - 2 \int_{R_{j}}^{R} \frac{v_{\theta}^{2}}{R} dR$$

$$- 2g_{c}J \int_{R_{j}}^{R} T \frac{\partial S}{\partial R} dR + 2 \int_{R_{j}}^{R} V_{Z} \left(\frac{\partial V_{R}}{\partial Z} \right)_{R} dR, \quad (9)$$

where the subscript j here refers to the reference streamline used in the integration. The energy equation becomes

$$g_{A}J(\Delta H_{+}) = \omega \Delta (RV_{\theta})$$

As outlined earlier, the program user may elect to solve this system of equations by specifying flow path geometry or, alternatively, by computing the annulus geometry for each designed stage using specified mid-streamline axial velocity ratio plus specified constraints on flow path. Energy addition for a stage is established using a profile of total pressure at the rotor exit, given in the form

$$\frac{P_t}{P_{t_{r_t}}} = \frac{A}{B+p} + C + Dp + Ep^2, \qquad (11)$$

and limiting values for the aerodynamic design parameters of each stage. Adiabatic efficiencies are computed through use of input profile loss data and the shock loss across a normal shock in the blade passage (Reference 3).

With blade inlet conditions known, exit velocity conditions are then computed iteratively through Equations (8) and (9) for Mod I. For Mod II, where exit axial velocity at the mid-streamline is established through the given ratio for a blade row and the known inlet axial velocity, Equations (8) and (9) are used to establish the exit annulus area required to satisfy continuity and radial equilibrium at the blade row exit. Hub and tip ramp angles and aspect ratio are varied in the sequence outlined earlier.

(8)

(10)

The primary objective of this computer program is to calculate design parameters and performance in accordance with full radial equilibrium and with efficiencies determined from input blade element profile loss data, while ensuring that the specified limiting values of the five aerodynamic stage design parameters are not violated in any stage. During iterative solutions of Equations (8) and (9), efficiency and energy addition are revised as required to achieve this objective.

The detailed procedure to accomplish the objectives of this program and the development of the program logic to automate this design performance analysis are discussed in the following subsection. A detailed summary of the calculations is given in Appendix Λ .

DEVELOPMENT OF PROGRAM LOGIC

The given functional form for total pressure at the rotor exit and the specified limiting values for the five aerodynamic design parameters combine to control the energy addition in any given stage. The limiting values of the aerodynamic parameters each represent a corresponding limiting value of rotor exit whirl velocity at the streamline where the parameter is specified. One of these five values of whirl velocity is most restrictive on stage design and is used in conjunction with efficiency and with the specified form for rotor exit total pressure to establish stage energy addition.

At a point in the stage design computations, limiting values of the aerodynamic parameters may be used to establish stage energy addition, using current axial and radial velocities and current efficiency. Using the given limiting values of D_{SH} , M_{SH} and β'_{2H} , it is possible to compute three values for rotor effective hub exit tangential velocity. On the assumption that all aerodynamic parameters increase monotonically with one another and with local tangential velocity, the lowest of the three values of tangential velocity just computed is used to compute a rotor hub total temperature rise. With rotor entrance conditions and current rotor effective hub efficiency, this is used to compute rotor effective hub exit total pressure. The polynomial describing P_t/P_{tT} for this rotor is used to establish a value for P_{tT} directly.

Now, separately, the limiting value for D_{RT} is used to compute a value for tangential velocity at the rotor effective tip exit. This value is compared with the fifth aerodynamic design parameter, the given maximum value of rotor effective tip exit tangential velocity, and the smaller of the two values used along with the current rotor effective tip efficiency to establish a second value of P_{tT} . The smaller of the two computed values of P_{tT} is taken, and the given total pressure profile is used to establish a distribution of P_t at the rotor exit. The current distribution of efficiency yields the distribution of total temperature and the associated rotor exit tangential velocity distribution directly. The methods of rewriting the expressions for the limiting values of stage aerodynamic parameters to solve for rotor exit values of V_{θ} are developed in Appendix A.

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1. The expression for the rotor tip diffusion factor is

$$D_{R_{T}} = 1.0 - \frac{V_{2_{T}}}{V_{1_{T}}} + \frac{U_{1_{T}} - V_{\theta_{1_{T}}} - U_{2_{T}} + V_{\theta_{2_{T}}}}{2\sigma_{R_{T}} V_{1_{T}}'}$$

which rearranges to

$$V_{\theta_{2_{T}}}^{2} + G V_{\theta_{2_{T}}} + W = 0$$
 (12)

where

$$G = \left[\frac{-2 (U_{2T} + KF)}{1.0 - K^{2}}\right]$$
$$W = \left[\frac{V_{Z_{2T}}^{2} + U_{2T}^{2} + V_{R_{2T}}^{2} - F^{2}}{1.0 - K^{2}}\right]$$
$$K = \frac{1}{2\sigma_{R_{T}}}$$
$$F = \left[(1.0 - D_{R_{T}}) V_{1_{T}}' + \frac{U_{1T} - V_{\theta_{1T}} - U_{2T}}{2\sigma_{R_{T}}}\right]$$

Therefore,

$$V_{H_{2_{T}}} = \frac{-G \pm \sqrt{G^{2} - 4W}}{2}$$
(13)

where the calculation is restricted to positive, real roots. When the limiting value of rotor tip diffusion factor is used to evaluate F, the chosen solution of Equation (13) represents a critical value of rotor tip exit whirl velocity, satisfying the limiting value specified for rotor tip diffusion factor.

2. The expression for the stator hub diffusion factor is

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$$D_{S_{H}} = 1.0 - \frac{V_{3_{H}}}{V_{2_{H}}} + \frac{V_{\theta_{2_{H}}} - V_{\theta_{3_{H}}}}{2\sigma_{S_{H}} V_{2_{H}}}$$
(14)

which rearranges to

$$V_{\theta_{2_H}}^2 + G V_{\theta_{2_H}} + W = 0$$

where

$$G = \frac{-2 \text{ KF}}{\text{F}^2 - 1.0}$$

$$W = \frac{\text{K}^2 - \text{V}_{22_{\text{H}}}^2 - \text{V}_{R_{2_{\text{H}}}}^2}{\text{F}^2 - 1.0}$$

$$K = \frac{\left[\text{V}_{23_{\text{H}}}^2 + \text{V}_{\theta_{3_{\text{H}}}}^2 + \text{V}_{R_{3_{\text{H}}}}^2\right]^{1/2} + \frac{\text{V}_{\theta_{3_{\text{H}}}}}{2\sigma \text{S}_{\text{H}}}}{1.0 - \text{D}_{\text{S}_{\text{H}}}}$$

$$F = \frac{1}{2\sigma \text{S}_{\text{H}}} \frac{(\text{D}_{\text{S}_{\text{H}}} - 1.0)}{1.0}$$

Hence,

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$$V_{\theta_{2_{H}}} = \frac{-G \pm \sqrt{G^{2} - 4W}}{2}$$
(15)

where the calculation is again restricted to positive, real roots. Using the limiting value of D_{S_H} to evaluate K and F, the resulting solution of Equation (15) represents a critical value of $V_{\theta_{2_H}}$, based on the specified limit for D_{S_H} in the given stage.

3. The expression for the stator hub Mach number is

$$M_{S_{H}} = \frac{V_{2_{H}}}{a_{S_{H}}}$$

where

$$a_{S_{H}} = \sqrt{\gamma} g_{c} \mathcal{R} T_{S_{H}}$$

This rearranges to

$$V_{t'2_{H}} = \left[M_{S_{H}}^{2} \quad a_{S_{H}}^{2} - (V_{Z_{2_{H}}}^{2} + V_{R_{2_{H}}}^{2}) \right]^{1/2}$$
(16)

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If the limiting value of stator hub entrance Mach number is used in Equation (16), there results the corresponding critical value of $V_{\theta_{2_H}}$.

4. The relative exit flow angle at the rotor hub is expressed as

$$\theta'_{2_{\rm H}} = \tan^{-1} \left[\frac{v'_{\theta}}{v_{2_{\rm H}}} + v_{{\rm R}_{2_{\rm H}}}^2 \right]^{1/2}$$

it follows that

$$V_{\theta}'_{2_{H}} = \left(V_{Z_{2_{H}}}^{2} + V_{R_{2_{H}}}^{2}\right)^{1/2} \tan(\beta_{2_{H}}')$$
 (17)

and

$$V_{\theta}_{2_{\rm H}} = U_{2_{\rm H}} - V_{\theta}'_{2_{\rm H}}$$
 (18)

The limiting value of $\beta'_{2_{\text{H}}}$ may be used to solve for the corresponding critical value of $V_{\theta_{2_{\text{H}}}}$.

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The computer program satisfies the stage aerodynamic design parameters in either of two optional ways. The user may elect to: (1) reduce the energy addition for any stage whenever necessary to avoid violation of any of the limiting values specified for the five aerodynamic parameters or (2) use the most critical of the five limiting aerodynamic parameters to establish the energy addition for each calculation pass in each stage of the compressor. The latter or "drive" option ensures that each stage of the final compressor design will satisfy the critical one of the five specified limiting values of design parameters. The "no drive" option ensures only that no designed stage will exceed any of its specified limits. The radial profile of axial velocity at an axial station is obtained by using the tangential velocity distribution in the radial equilibrium equation (9), and carrying out the integration from a reference streamline j to all other streamlines. For inlet and Mod I stage design computations, the term $V_{z_j}^2$ serves as the constant of integration and must be adjusted to satisfy con- Z_j

tinuity; V_{Z_i} is established by trial and error at each axial station, for each

pass of the design computation. For use of Mod II, the reference streamline j in any blade row is also taken as the mid-streamline, where axial velocity ratio is given. Thus, the inlet axial velocity and the given ratio fix the exit axial velocity at the mid-streamline, and the blade row exit annulus dimensions are established iteratively according to the previously described sequence of ramp angle and aspect ratio adjustment seeking simultaneous satisfaction of radial equilibrium and continuity.

The program begins a design computation by reading in the specified data on which the design is to be based, including: (1) the coefficients describing c_p variation with temperature, (2) the loss data sets elected from the master file, and (3) data basically describing the machine to be designed, including relative error tolerances to be used in the iterative computations, and the design data for each of the maximum number of stages. The stage data includes:

- Limiting values for the aerodynamic parameters
- Specific loss data sets to be used for rotor and stator
- Flow increments in rotor and stator
- Polynomial coefficients describing exit total pressure distribution for rotor and exit whirl velocity distribution for stator
- Blade solidity distributions
- Distributions of the ratio of supersonic turning to total turning or of flow angle at the passage shock in rotor and stator
- For Mod II, limiting values for hub and tip ramp angles and initial values for rotor and stator aspect ratio

The program considers ten axial stations at any one point in its iterative design computations. The first five axial stations of the flow path represent the inlet, and the program computes three exit stations behind the last stage being designed. Hence, the program initially considers only the first stage, with the inlet ducting and the program-computed exit ducting making up the remaining eight axial stations initially considered.

The program begins its computation by evaluating T_t , P_t and c_p (T) in the inlet. Setting V_R and V_g in the inlet to zero, and assuming dR/dZ and d^2R/dZ^2 both zero at the front of the machine, the program then sets mass flow rate throughout the inlet equal to the flow rate at the first station. Using flow increment data specified at each blade row for which data is input, total flow rate at each of the maximum number of blade rows is then computed.

Having established the number of streamtubes and the midstream index streamline to be used in axial velocity computations, the program next establishes a simple radial equilibrium solution of the flow equations for the inlet only; to initially establish flow conditions in the first rotor, the program either picks up the input geometry or computes a first approximation to rotor annulus geometry, depending upon whether the Mod I or the Mod II option has been selected by the user. (In the case of Mod II design computations, the second stage and subsequent rotors are first taken as a copy of the last upstream rotor.) The initial approximation of rotor one flow conditions is obtained using a loading based on the given limiting value of D_{R_T} and a mid-

streamline axial velocity ratio of 0.9, assuming free vortex flow and $\eta_{\rm R} = 0.90$. Next the first stator exit geometry is either picked up from input data or estimated as required, and stator exit flow conditions are initially established using the given stator exit tangential velocity distribution and $\eta_{\rm S} = 0.89$. Next, flow properties in the outlet are established and the limiting values of the aerodynamic parameters are checked; any necessary adjustments in the temperature and pressure profiles are made. Next, the program establishes the current outlet ducting and computes the flow properties there. To this point, only simple radial equilibrium has been employed in flow calculations. Next, the program establishes the full radial equilibrium solution to the flow equations for the ten stations initially considered. Streamline curvature effects and radial gradients in total enthalpy and entropy are included.

Next, the stage aerodynamic limits for the stage(s) among the ten axial stations currently considered are checked and any necessary iteration on the design of these stage(s) is performed, accounting for full radial equilibrium. This iteration may be accomplished with either the "drive" option or "nodrive" requested by the program user. Continuity is satisfied at every pass and convergence is established on efficiency.

When convergence is fully established, the desired pressure ratio input for this design is compared with the cumulative pressure ratio at the exit of the last stage in the current converged design. If the desired pressure ratio has not been met, and if the specified maximum number of stages allows, another stage is added to the design at this point. Two stations from the front of the design flow path are deleted, fully converged, at this point and the exit ducting is re-established in the "new" ten-station design flow path.

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When a new stage is added, the current values of slopes, curvatures and axial velocities from the immediately preceding stage are used in the first pass on the new stage, and the design is redone (i.e., convergence is reestablished) for all ten stations currently considered by the computer. The check of cumulative pressure ratio is made, and another stage added as before if needed and if available. The design computation may stop at numerous points and produce one of a number of error messages if difficulty is encountered for physical or numerical reasons. The stopping points and corresponding error messages are shown in the program flow charts and in the source deck listing, Appendices C and B, respectively.

PROGRAM RESTRICTIONS

It has been pointed out already that use of the limiting values of the aerodynamic stage design parameters D_{R_T} , D_{S_H} , and M_{S_H} , to establish corresponding critical values of tangential velocity, is subject to restrictions on the choice of roots in establishing $V_{\theta 2}$ values at hub or tip.

A further restriction applies to the specification of limiting values for rotor tip diffusion factor and stator hub diffusion factor in a stage. If a maximum value of diffusion factor is exceeded in either case, both the corresponding roots for V_{θ_2} are complex, and physical meaning is lost. The program has error messages imbedded in the logic so that this condition may be readily determined:

The maximum level of rotor tip diffusion factor for the inlet flow conditions, tip speed, axial velocity ratio, and solidity can be easily established. The diffusion factor is

$$D_{\rm R} = 1 - \frac{V_2'}{V_1'} + \frac{V_{\theta_1}' - V_{\theta_2}'}{2\sigma_{\rm c}V_1'}$$
(19)

 \mathbf{or}

$$D_{R} = 1 - \frac{V_{Z_{2}}}{|\cos \beta_{2}'|V_{1}'} + \frac{(U_{1} - V_{\theta_{1}}) - V_{Z_{2}} \tan \beta_{2}}{2\sigma V_{1}'}$$
(20)

Since with established inlet conditions and V_{Z_2} the rotor diffusion factor is dependent only on V'_{θ_2} or β'_2 , Equation (20) can be solved for its maximum value. Differentiating, with β'_2 considered to be in the first or fourth quadrant,

$$\frac{d(D_R)}{d\beta_2'} = -\frac{V_{Z_2}}{\cos^2\beta_2' V_1'} \sin\beta_2' - \frac{V_{Z_2}}{2\sigma V_1'} \frac{1}{\cos^2\beta_2'}$$
(21)

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Setting the right hand side to zero and solving for β_2' , it is found that

$$(\beta'_2)_{D_{R} \max} = \arcsin\left(-\frac{1}{2\sigma}\right)$$
 (22)

and that D_R is at its maximum value. Substitution of Equation (22) into Equation (20) yields

$$D_{R \max} = 1 - \frac{V_{Z_2}}{\left(\frac{\sqrt{4\sigma^2 - 1}}{2\sigma}\right)V_1'} + \frac{(U_1 - V_{\theta_1}) + \frac{V_{Z_2}}{\sqrt{4\sigma^2 - 1}}}{2\sigma V_1'}$$
(23)

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Similarly, the maximum level of stator hub diffusion factor for given flow conditions and solidity may be established. The stator diffusion factor is

$$D_{S} = 1.0 - \frac{V_{3}}{V_{2}} + \frac{V_{\theta_{2}} - V_{\theta_{3}}}{2\sigma V_{2}}$$
(24)

or

$$= 1.0 - \frac{V_3 \left| \cos \beta_2 \right|}{V_{Z_2}} + \frac{\left| \cos \beta_2 \right| \left\{ V_{Z_2} \tan \beta_2 - V_{\theta_3} \right\}}{2 \sigma V_{Z_2}}$$
(25)

Considering β_2 to lie in the first or fourth quadrant, it is possible to establish the following derivative:

$$\frac{\mathrm{dD}_{\mathrm{S}}}{\mathrm{d}\,\beta_{2}} = \sin\beta_{2} \left[\frac{\mathrm{V}_{3}}{\mathrm{V}_{Z_{2}}} + \frac{\mathrm{V}_{\theta_{3}}}{2\,\sigma\,\mathrm{V}_{Z_{2}}} \right] + \frac{1}{2\,\sigma} \left[\frac{1 - \sin^{2}\beta_{2}}{\cos\beta_{2}} \right]$$
(26)

It follows that

$$(\beta_2)_{\text{DS max}} = \arctan\left\{\frac{\frac{-1}{2\sigma \left[\frac{V_3}{V_{Z_2}} + \frac{V_{\theta_3}}{2\sigma V_{Z_2}}\right]}\right\}$$
(27)

Substituting Equation (27) into Equation (25) results in the expression

$$D_{S \max} = 1.0 - \frac{\cos(\beta_2)_{D_{S \max}}}{V_{Z_2}} \left[V_3 + \frac{1}{2\sigma} \left[\frac{V_{Z_2}}{2\sigma \left[\frac{V_3}{V_{Z_2}} + \frac{V_{\theta_3}}{2\sigma V_{Z_2}} \right]} + V_{\theta_3} \right] \right]$$
(28)

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APPENDIX A

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SYSTEM OF EQUATIONS AND COMPUTATIONS

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The system of equations and computations presented in this appendix constitute an iterative design system for computing performance of multistage axial-flow compressors. It has been pointed out that the computation considers only stations between blade rows, in addition to inlet and exit stations. Full radial equilibrium of the flow is computed, including radial gradients of total enthalpy and entropy. Flow is assumed axisymmetric and the gas is considered ideal, with c_p taken as a function of temperature.

The computer-programmed design system will handle a maximum of 12 stages, with the design of individual stages limited by input-specified maximum values of five aerodynamic parameters in each stage. These parameters are: rotor tip diffusion factor, stator hub diffusion factor, stator hub inlet Mach number, rotor hub exit relative flow angle, and rotor tip exit whirl velocity. As described under Development of Program Logic and in Appendix D, the program user may elect to design all stages such that, in each stage, the converged design satisfies the most critical of the five aerodynamic limits. Alternatively, the program user may elect to design with only the assurance that no aerodynamic limits are violated anywhere in a converged design.

In summary, the following information is given:

- Specific heat at constant pressure, as a function of temperature
- Molecular weight of the gas
- Maximum number of stages in the planned design
- Minimum mass-averaged overall pressure ratio
- Total mass flow rate

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- Number of streamlines to be considered in the design computation (5, 7, 9, 11)
- Fraction of the total flow passing between the hub and each successive streamline

Furthermore, in the inlet ducting and at the compressor entrance, the following items are given:

- Inlet total pressure
- Inlet total temperature
- Axial location of all inlet stations
- Hub radius and blockage at each axial station
- Tip radius and blockage at each axial station
- Radial variation of inlet guide vane loss coefficient (input by streamline)
- Radial variation of inlet guide vane-exit whirl velocity
- Tip speed at the inlet of the first rotor

For each of the maximum number of stages in the design, the following items are given:

- Blockages at hub and tip and geometry information for Mod I or Mod II
- Radial distribution of solidity (rotor, stator)
- Radial distribution of rotor exit P_t/P_{t_T}
- Radial distribution of stator exit whirl velocity
- Profile loss parameter correlations at hub, mean, tip (rotor, stator)
- Radial distribution of the ratio of supersonic turning to total turning (rotor, stator) or of the relative flow angle at the passage shock
- Limiting values for rotor tip and stator hub diffusion factors
- Limiting value of stator hub inlet Mach number
- Limiting value of rotor hub exit relative flow angle
- Limiting value of rotor tip exit tangential velocity

The basic equations employed in this design system are displayed in the description of computations presented here. The equations are presented in cylindrical coordinates, assuming axisymmetry and neglecting body forces. The solution is necessarily an iterative one, proceeding to the satisfaction of several error tolerances specified as input and described in Appendix D.

CONTINUITY EQUATION

$$w = 2\pi \int_{R_{H_e}}^{R_{T_e}} V_Z K dR$$

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(A-1)

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From geometric input dimensions and blockage, aerodynamic hub and tip radii are determined at each axial station. From the definitions

$$\delta_{\rm H} = \frac{R_{\rm T}^2 - R_{\rm H}^2}{R_{\rm T}^2 - R_{\rm H}^2} = \text{hub blockage factor}$$
(A-2)
$$\delta_{\rm T} = \frac{R_{\rm T}^2 - R_{\rm H}^2}{R_{\rm T}^2 - R_{\rm H}^2} = \text{tip blockage factor}$$
(A-3)

where blockage factor is the decimal portion of geometric area not blocked, there results the expressions

$$R_{H_{e}} = \left[\delta_{H}R_{H}^{2} + (1 - \delta_{H})R_{T}^{2}\right]^{1/2}$$

$$R_{T_{e}} = \left[\delta_{T}R_{T}^{2} + (1 - \delta_{T})R_{H}^{2}\right]^{1/2}$$
(A-4)
(A-5)

The annulus is subdivided into (j-1) streamtubes, where j is input as the number of streamlines considered in the design. The fraction of the total mass flow passing between the hub and each of the j streamlines is given as input and

DELM (j) = $2\pi \int_{R_{H_e}}^{R_j} \rho V_Z R dR$ (A-6)

ENERGY EQUATION

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$$H_{t_2} - H_{t_1} = \frac{1}{g_c J} \begin{bmatrix} U_2 & V_{\theta_2} - U_1 & V_{\theta_1} \end{bmatrix}$$
(A-7)

 T_{t_2} is determined by an iterative solution of the equation

$$H_{t_2} - H_{t_1} = \int_{T_{t_1}}^{T_{t_2}} c_p(T) dT$$
 (A-8)

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(A-9)

solving for the upper limit of the integral.

The exit total temperature for the rotor at any streamline is determined using exit total pressure and efficiency. The adiabatic efficiency is then redetermined by calculating an isentropic temperature rise from an iterative solution of

$$P_{t_2} = P_{t_1} e^{\frac{J}{\mathcal{R}} \left[\int_{c_p(T)}^{t_2} \frac{dT}{T} \right]}$$

and solving Equation (A-8) for $H_{t_{2,i}}$. Efficiency is then found from

$$\bar{n} = \frac{H_{t_2, i} - H_{t_1}}{H_{t_2} - H_{t_1}}$$
(A-10)

RADIAL EQUILIBRIUM EQUATION

$$V_{Z}^{2} - V_{Zj}^{2} = 2g_{c}J \int_{T_{t_{j}}}^{T_{t}} c_{p}^{c}(T)dT - \left(V_{\theta}^{2} - V_{\theta_{j}}^{2}\right) - 2\int_{R_{j}}^{R} \frac{V_{\theta}^{2}}{R} dR$$
(A-11)

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$$-2g_{c}J \int_{R_{j}}^{R} T \frac{\partial S}{\partial R} dR + 2 \int_{R_{j}}^{R} V_{Z} \left(\frac{\partial V_{R}}{\partial Z} \right)_{R} dR$$

The entropy gradient term of the radial equilibrium equation is evaluated \cdot from the following expression

$$2g_{c}J \int_{R_{j}}^{R} \frac{\partial S}{\partial R} dR = 2g_{c}J \int_{R_{1}}^{R_{2}} T \frac{\partial}{\partial R} \left[\int_{T_{t_{1}}}^{T_{t_{2}}} c_{p}(T) \frac{dT}{T} - \frac{R}{J} \ln \frac{P_{t_{2}}}{P_{t_{1}}} \right] dR \quad (A-12)$$

The streamline curvature term is evaluated from

$$\sum_{R_{j}}^{2} \int_{R_{j}}^{R} v_{Z} \left(\frac{\partial V_{R}}{\partial Z}\right)_{R} dR = 2 \int_{R_{j}}^{R} v_{Z} \left(\frac{\partial V_{R}}{\partial Z}\right)_{\psi} dR - 2 \left[\frac{V_{R}^{2} - V_{R_{j}}^{2}}{2}\right]$$
(A-13)

where the subscript ψ designates a derivative taken along a streamline.

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$$F = \frac{P}{RT}$$
(A-14)

STATIC-TO-TOTAL AND RELATIVE-TO-ABSOLUTE CONVERSIONS

From the definition of total enthalpy, the relationship

$$H_{t} - H = \frac{V^{2}}{2g_{c}J}$$
 (A-15)

is established.

Static temperature is evaluated iteratively from

$$H_{t} - H = \int_{T}^{T_{t}} c_{p}(T) dT$$
 (A-16)

and static pressure is calculated from

$$P = P_{t}e^{\int_{t}^{T} \frac{c_{p}(T) dT}{T}}$$
(A-17)

Relative total enthalpies are determined from

$$H'_{t} - H_{t} = \frac{1}{2g_{cJ}} \left[{v'}^{2} - v^{2} \right]$$
 (A-18)

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Relative total temperature is found iteratively from

$$H'_{t} - H = \int_{T} \int_{c_{p}(T)dT} T'_{t}$$
 (A-19)

and relative total pressure is evaluated using the expression

$$P'_{t} = P e \begin{bmatrix} J & J^{T'_{t}} & c_{p}(T) \\ \mathcal{R} & T & T \end{bmatrix}$$
(A-20)

LOSS CALCULATION

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The total pressure loss coefficient is defined for rotors as

$$\overline{\omega}'_{t} = \frac{P'_{t_{2,1}} - P'_{t_{2}}}{P'_{t_{1}} - P_{1}}$$
(A-21)

and for stators as

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$$\bar{\omega}_{t} = \frac{P_{t_2} - P_{t_3}}{P_{t_2} - P_2}$$
(A-22)

The total loss coefficient is taken as the sum of profile and shock loss coefficients

$$\overline{\omega}_{t} = \overline{\omega}_{p} + \overline{\omega}_{s} \quad (A-23)$$

The shock loss coefficient is calculated on the basis of the normal-shockin-passage model presented in Reference 3 (See References in report). In this computation, the specific heat of the gas is evaluated at local temperature but is not treated rigorously as a variable. For each stage in a design calculation, the computer program receives as input a radial distribution of either: (a) the ratio of supersonic turning to total turning for both rotor and stator or (b) the distribution of flow angle at the shock for rotor and stator. Supersonic turning is computed as

(a)
$$\phi_{ss} = \left(\beta'_1 - \beta'_2\right) \frac{\phi_{ss}}{\phi_{total}}$$
.
or
(b) $\phi_{ss} = \left(\beta'_1 - \beta'_2\right)$
(A-24)

For stators, the absolute air angles are substituted. If the relative inlet Mach number is equal to or greater than 1.0, the inlet Prandtl-Meyer angle is calculated from

$$v_1 = \sqrt{\frac{\gamma+1}{\gamma-1}} \tan^{-1} \sqrt{\frac{\gamma-1}{\gamma+1}} \left(M_1'^2 - 1 \right) - \tan^{-1} \sqrt{M_1'^2 - 1}$$
 (A-25)

The Prandtl-Meyer angle at the intersection of the assumed normal shock with the suction surface is calculated from

$$\boldsymbol{v}_{ss} = \boldsymbol{v}_1 + \boldsymbol{\varphi}_{ss} \quad . \tag{A-26}$$

The Mach number at this location is then determined from an iterative solution of the expression

$$v_{ss} = \sqrt{\frac{\gamma+1}{\gamma-1}} \tan^{-1} \sqrt{\frac{\gamma-1}{\gamma+1} \left(M_{ss}^{\prime 2} - 1 \right)} - \tan^{-1} \sqrt{M_{ss}^{\prime 2} - 1}$$
 (A-27)

The effective shock upstream Mach number, from which the pressure ratio across the shock is computed, is

$$M'_{e} = \frac{1}{2} (M'_{1} + M'_{ss})$$
.

(A-28)

A-6

: د ____ Using the normal shock relationship, Equation (99), Reference 5 (in report),

$$\begin{pmatrix} P_{t_{2}} \\ P_{t_{1}} \end{pmatrix}_{\substack{\text{normal} \\ \text{shock}}} = \begin{bmatrix} (\gamma + 1) M_{e}^{\gamma 2} \\ (\gamma - 1) M_{e}^{\gamma 2} + 2 \end{bmatrix}^{\gamma/\gamma - 1} \begin{bmatrix} \gamma + 1 \\ 2\gamma M_{e}^{\gamma 2} - (\gamma - 1) \end{bmatrix}^{1/\gamma - 1}$$
(A-29)

the shock total pressure ratio is determined. The shock loss coefficient is then evaluated as

$$\overline{\omega}_{s} = \frac{1 - \left(\frac{P_{t_{2}}}{P_{t_{1}}}\right) \text{ normal shock}}{1 - \left(\frac{P_{1}}{P_{t_{1}}}\right)}$$
(A-30)

where

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$$\frac{P_{1}}{P_{t_{1}}^{'}} = \left[1 + \frac{\gamma - 1}{2} M_{1}^{'}\right]^{-\gamma/\gamma - 1}$$
(A-31)

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Now, if the inlet relative Mach number is less than 1.0, the effective upstream shock Mach number is calculated as

$$M'_{e} = \frac{M'_{1}}{2} (1 + M'_{ss})$$
 (A-32)

where M_{ss} ' is a function of ϕ_{ss} determined by iterative solution of the equation

$$\phi_{ss} = \sqrt{\frac{\gamma + 1}{\gamma - 1}} \times \tan^{-1} \sqrt{\frac{\gamma - 1}{\gamma + 1}} \left(M_{ss}^{\prime 2} - 1 \right) - \tan^{-1} \sqrt{M_{ss}^{\prime 2} - 1}$$
(A-33)

If M'_e is greater than 1.0, $\overline{\omega}_s$ is evaluated using Equations (A-29), (A-31) and (A-30) as before.

The profile loss coefficient is determined from blade element loss data, input as profile loss parameter $\frac{\overline{\omega}_p \cos\beta' 2}{2\sigma}$ correlated as a function of diffusion

factor for hub, mean and tip sections as described earlier and in Appendix D. The hub and tip loss data sets are associated with 10% span and 90% span, respectively. Blade diffusion factor is calculated as

$$D_{R} = 1.0 - \frac{V_{2}'}{V_{1}'} + \frac{V_{\theta_{1}}' - V_{\theta_{2}}'}{2\sigma V_{1}'}$$
 (For rotors) (A-34)

and

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$$D_{S} = 1.0 - \frac{V_{3}}{V_{2}} + \frac{V_{\theta 2} - V_{\theta 3}}{2\sigma V_{2}}$$
 (For stators) (A-35)

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where solidity, σ , is determined at the average radius associated with a stream surface in the blade passage.

When the diffusion factor is established for the flow along a given streamline in a given blade row, the average percent span for that streamline in the passage is used to establish a profile loss parameter value associated with the given streamline. The loss parameter is established using a circular interpolation along the blade span, using the mean section loss parameter value and the hub or tip section value, as appropriate. Both loss parameter values are taken at the diffusion factor level computed for the subject streamline. The interpolation takes the form

$$\left[\frac{\overline{\omega}_{p}\cos\beta_{2}^{'}}{2\sigma}\right]_{x} = \left[\frac{\overline{\omega}_{p}\cos\beta_{2}^{'}}{2\sigma}\right]_{0.5}^{+r} - \frac{r^{2}}{\sqrt{(x-0.5)^{2}+r^{2}}}$$
(A-36)
where $r = \frac{(0.16+d^{2})}{2d}$ and $d = \left[\left(\frac{\overline{\omega}_{p}\cos\beta_{2}^{'}}{2\sigma}\right)_{0.9,0.1} - \left(\frac{\overline{\omega}_{p}\cos\beta_{2}^{'}}{2\sigma}\right)_{0.5}\right]$

The profile loss coefficient is then computed directly, using solidity and streamplane relative exit flow angle at the subject streamline.

The total loss coefficient is used to establish an actual exit total pressure using Equation (A-21) or Equation (A-22), as appropriate. This exit total pressure is used to re-establish adiabatic efficiency through the use of Equations (A-9), (A-8) and (A-10), as described earlier.



ENERGY ADDITION--Determined by Stage Aerodynamic Design Parameters

As described earlier, and in Appendix D, the computer program user may elect to design each compressor stage to satisfy the critical one of the five limiting values specified for its aerodynamic design parameters, or the user may elect to design only with the assurance that all converged stage designs will not violate any of the prescribed aerodynamic limits. Satisfaction of the critical one of five aerodynamic limits in each converged stage design occurs in the so-called "drive" option, where the rotor exit total pressure level is adjusted to satisfy the critical aerodynamic limit at each re-assessment of loading in each stage during design computations. By contrast, the "nodrive" program option merely adjusts the rotor exit total pressure level sufficiently to avoid a violation of an aerodynamic limit each time such a violation is encountered during re-assessment of loading. It is possible and likely that during design computations prior to convergence in any given stage, the rotor exit total pressure in this program option will be reduced to a level such that none of the five design-limiting criteria are equalled in the converged design.

Summarizing, each of the five design criteria may be used to establish a corresponding level of rotor exit total pressure; that is, each aerodynamic limit may be used to determine a level of the rotor exit total pressure at a given point in the design computations. In the "drive" program option, the lowest of these five levels is chosen and used to define the rotor exit whirl velocity distribution at that point in the calculation. In the "no-drive" program option, the rotor exit total pressure level is changed to correspond to the lowest of the five limiting values only if one or more of the aerodynamic design parameters is found to be greater than its corresponding limit value. Expressions for the tangential velocity in terms of aerodynamic parameters are developed as follows.

1. Tangential velocity in terms of rotor tip diffusion factor

The diffusion factor at the rotor tip is given by

$$D_{RT} = 1.0 - \frac{V'_{2T}}{V'_{1T}} + \frac{V'_{\theta_{1T}} - V'_{\theta_{2T}}}{2\sigma_{RT} V'_{1T}}$$
(A-37)

or

$$D_{RT} = 1.0 - \frac{V'_{2T}}{V'_{1T}} + \frac{U_{1T} - V_{\theta_{1T}} - U_{2T} + V_{\theta_{2T}}}{2\sigma_{RT} V'_{1T}}$$

This may be rearranged as

$$V'_{2T} = \frac{V_{\theta_{2T}}}{2\sigma_{R_T}} + \left[\left(1.0 - D_{R_T} \right) V'_{1T} + \frac{U_{1T} - V_{\theta_{1T}} - U_{2T}}{2\sigma_{R_T}} \right]$$

or as

$$V'_{2T} = K V_{\theta 2T} + F$$
 (A-38)

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where

$$K = \frac{1}{2\sigma_{RT}}$$

and

$$F = \left[(1.0 - D_{R_{T}}) V'_{1_{T}} + \frac{U_{1_{T}} - V_{\theta_{1_{T}}} - U_{2_{T}}}{2\sigma_{R_{T}}} \right]$$

now

$$V'_{2T} = \left[\left(U_{2T} - V_{\theta 2T} \right)^2 + V_{R2T}^2 + V_{Z2T}^2 \right]^{1/2}$$
 (A-39)

Squaring and equating (A-38) and (A-39) results in

$$U_{2_{T}}^{2} - 2U_{2_{T}} V_{\theta 2_{T}} + V_{\ell 2_{T}}^{2} + V_{R_{2_{T}}}^{2}$$

+ $V_{Z_{2_{T}}} = K^{2} V_{\theta 2_{T}}^{2} + 2KF V_{\theta 2_{T}} + F^{2}$

which reduces to

$$V_{\theta 2_{T}}^{2} + \left[\frac{-2 \left(U_{2_{T}} + KF\right)}{1.0 - K^{2}}\right] V_{\theta 2_{T}} + \left[\frac{V_{Z_{2_{T}}}^{2} + U_{2_{T}}^{2} + V_{R_{2_{T}}}^{2} - F^{2}}{1.0 - K^{2}}\right] = 0$$

or

$$V_{\theta 2_{\mathrm{T}}}^{2} + GV_{\theta 2_{\mathrm{T}}} + W = 0 \qquad (A-40)$$

where

$$G = \left[\frac{-2\left(U_{2T} + KF\right)}{1.0 - K^2}\right]$$

and

$$W = \left[\frac{V_{Z_{2T}}^2 + U_{2T}^2 + V_{R_{2T}}^2 - F^2}{1.0 - K^2}\right]$$

The absolute tangential velocity at the rotor tip may be obtained by solving Equation (A-40).

$$V_{\theta_{2_{T}}} = \frac{-G \pm \sqrt{G^{2} - 4W}}{2}$$
 (A-41)

The calculation is restricted to positive real roots.

2. Tangential velocity in terms of stator hub diffusion factor

The stator hub diffusion factor is expressed as

$$D_{S_{H}} = 1.0 - \frac{V_{3_{H}}}{V_{2_{H}}} + \frac{V_{\theta_{2_{H}}} - V_{\theta_{3_{H}}}}{2\sigma_{S_{H}} V_{2_{H}}}$$
(A-42)

This equation may be arranged as

$$V_{2_{H}} = -K + FV_{\theta_{2_{H}}}$$
(A-43)

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where

$$K = \frac{\left[V_{Z_{3H}}^{2} + V_{\theta_{3H}}^{2} + V_{R_{3H}}^{2} \right]^{1/2} + \frac{V_{\theta_{3H}}}{2\sigma S_{H}}}{1.0 - D_{S_{H}}}$$

and

$$\mathbf{F} = \frac{1}{2\boldsymbol{\sigma}_{\mathrm{S}_{\mathrm{H}}} \left(\mathbf{D}_{\mathrm{S}_{\mathrm{H}}} - 1.0 \right)}$$

Now, expressing $V_{2_{\text{H}}}$ in terms of its components and squaring Equation (A-43), there results

$$V_{\theta_{2_{H}}}^{2} + V_{\theta_{2_{H}}} G + W = 0$$
 (A-44)

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where

$$G = \frac{-2KF}{F^2 - 1.0}$$
$$W = \frac{K^2 - \frac{V_{Z_{2H}}^2 - V_{R_{2H}}^2}{F^2 - 1.0}$$

Hence,

$$V_{\theta 2_{\rm H}} = -G \pm \sqrt{G^2 - 4W}$$
 (A-45)

where the calculation is again restricted to positive, real roots. Using the limiting value of D_{S_H} to evaluate K and F, the resulting solution of

Equation (A-45) represents a critical value of V_{θ_2} .

3. Tangential velocity in terms of stator hub Mach number

The sonic velocity at a stator hub is

$$a_{S_{H}} = \sqrt{\gamma g_{c} R T_{2_{H}}}$$
 (A-46)

and

$$\frac{V_{2_{H}}}{a_{S_{H}}} = M_{S_{H}}$$
(A-47)

This may be written as

$$M_{S_{H}} = \frac{\left[v_{\theta 2_{H}}^{2} + v_{R2_{H}}^{2} + v_{Z2_{H}}^{2} \right]^{1/2}}{a_{S_{H}}}$$
(A-48)

Squaring and rearranging results in

$$V_{\theta_{2_{H}}} = \left[M_{S_{H}}^{2} a_{S_{H}}^{2} - \left(V_{Z_{2_{H}}}^{2} + V_{R_{2_{H}}}^{2} \right) \right]^{1/2}$$
(A-49)

Note that where the quantity shown in parentheses here is negative, the limiting value of M_{SH} cannot be satisfied by adjusting $V_{\theta 2H}$. The program produces an error message when this condition is encountered.

4. Tangential velocity in terms of rotor hub exit relative flow angle

The relative exit flow angle at the hub is

$$\beta'_{2H} = \tan^{-1} \left[\frac{v'_{\theta 2_{H}}}{\left(v^{2}_{Z_{2_{H}}} + v^{2}_{R_{2_{H}}}\right)^{1/2}} \right]$$

Thus,

$$V_{\theta_{2_{H}}}^{\prime} = \left(V_{Z_{2_{H}}}^{2} + V_{R_{2_{H}}}^{2}\right)^{1/2} \tan\left(\beta_{2_{H}}^{\prime}\right)$$

A-13

(A-50)
and

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$$v_{\theta_{2_{H}}} = U_{2_{H}} \left(v_{Z_{2_{H}}}^{2} + v_{R_{2_{H}}}^{2} \right)^{1/2} \tan \left(\frac{\beta'}{2_{H}} \right)$$
 (A-51)

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APPENDIX B

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FORTRAN IV SOURCE DECK LISTING

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ANEXT. - EFN SOURCE STATEMENT - IFN(S) -

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11/02/67

11/02/67 SOURCE STATEMENT Q45. EFN IFN(S) MAIN 104 NBLADE = 2115 IPASS= 1MAIN 105 GCOUNT = 0 MAIN 105 **MAIN 107** 120 CONTINUE MAIN 109 DAMP = 1.0MAIN 109 LC6=0 С *** SET UP THE ROTOR **MAIN 110** MAIN 111 CALL ROTOUT MAIN 112 I = I + 1C ******* SET UP THE STATOR **MAIN 113** MAIN 114 130 CALL STADUT **MAIN 115** Lc **MAIN 116 ***** CALCULATE CONDITIONS AT THE OUTLET MAIN 117 **MAIN 119** CALL OUTLET *** CHECK THE FLOW PARAMETERS AND MAKE ADJUSTMENTS IN THE **MAIN 119** TEMPERATURE AND PRESSURE PROFILES AS REQUIRED MAIN 123 CALL DRIVE MAIN 121 ******* SET THE ITERATION COUNTER TO ZERO MAIN 122 139 LC6 = 0MAIN 123 MAIN 124 - C *** PRINT OUTPUT AT THIS POINT, TRANSFER TO A NEW DATA SET **MAIN 125** MAIN 120 140 IF (LC6.GT.50) CALL ERROR(19) MAIN 127 **MAIN 129** C ******* CALCULATE THE AXIAL VELOCITIES INCLUDING CURVATURE EFFECTS MAIN 129 MAIN 130 LC5=0**MAIN 131** 142 CALL CAXIAL MAIN 132 LC5= LC5+1 **MAIN 133** MAIN 134 135 IF (LC5.GT.50) CALL ERROR (18) C ******* TURN THE LOADING ITERATION TRIGGER ON. NO FAIL= .TRUE. MATN 135 IPASS = 4MAIN 136 C ******* CHECK THE LUADING PARAMETERS AGAINST THEIR DESIRED LIMITS. 137 IF THEY ARE NOT CLOSE MAKE APPROPRIATE CHANGES IN THE ROTOR C C TEMPERATURE PROFILE. CALL DRIVE MAIN 137 C ******* HAVE ALL OF THE FLOW PARAMETER REQUIREMENTS BEEN MET **MAIN 138** MAIN 139 IF (.NOT. NO FAIL) GO TO 142 IPASS= 2 **MAIN 140 *** CALCULATE THE LOSSES MAIN 141** CALL LOSS MAIN 142 MAIN 143 146 LC6=LC6+1 I=LSTAGE-1 MAIN 144 **MAIN 145** *** IPASS WILL BE EQUAL TO 3 IF THE LOSSES DO NOT CORRELATE MAIN 146 **g** C C WITH THE EFFICIENCIES **MAIN 147** MAIN 148 IF (IPASS.EQ.3) GO TO 140 MATN 149 MAIN 150 MAIN 151 GCOUNT = GCOUNT +1 ******* CHECK THE GEOMETRY ITERATION COUNTER C **MAIN 152** MAIN: 153 IF (GCOUNT.GT.100) CALL ERROR (35) MAIN 154 MAIN 155 IERROR= .FALSE. ******* IS THE GEOMETRY TO BE CALCULATED C

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11/02/67 IFN(S) SOURCE STATEMENT -- EFN Q45. **MAIN 155** [F (FPATH) CALL GEOM MAIN 157 ***** IS THE GEOMETRY CORRECT** MAIN 158 GO TO 139 IF (IERKUR) MAIN 159 *** CHECK THE AXIAL VELOCITIES MAIN 160 ONE MORE TIME С MAIN 161 CALL CAXIAL MAIN 162 MAIN 163 *** CALCULATE THE MASS AVERAGED PRESSURE RATIO С MAIN 164 MAIN 165 DO 155 J=1, NLINES **MAIN 165** TERMB(J) = TO(LSTAGE, J) **MAIN 167** MAIN 168 *** SCLVES FOR TERMB(J) IN GASK*ALOG(PO(LSTAGE,J)/PO(1,1) = С **MAIN 169** INTEGRAL FROM TO(1,1) TO TERMB(J) OF (CP/T) DT С MAIN 170 MAIN 171 CALL THERM2(PO(LSTAGE, J)/PU(1, 1), T ERMB(J), TO(1, 1)) MAIN 172 TERMB(J)=TERMB(J)/TO(1,1) MAIN 173 155 DEPV(9,J)= RHO(LSTAGE,J)*CX(LSTAGE,J)*R(LSTAGE,J) MAIN 174 I=LSTAGE MAIN 175 L=9 MAIN 175 CALL INTEG(DEPV, 2) MAIN 177 SUM= RINT(NLINES)-RINT(1) MAIN 178 L=8 MAIN 179 DO 157 J=1+NLINES MAIN 180 157 DEPV(8,J)= (TERMB(J)-1.)*DEPV(9,J) **MAIN 181** CALL INTEG(DEPV, 2) MAIN 182 V= RINT(NLINES)-RINT(1) MAPR≠EXP(JOULE*(THERM3((V/SUM+1.0)*TO(1.1))-THERM3(TO(1.1))/GASK)MAIN 193 MAIN 184 **MAIN 185** *** IF THE MASS AVERAGED PRESSURE EXCEEDS THE PRESSURE C **MAIN 186** RATIO DESIRED THE CALCULATION IS COMPLETE С MATN 187 **MAIN 185** IF (MAPR.GE.TOTPR) GO TO 175 **MAIN 189** *** SINCE THE MASS AVERAGE PRESSURE RATIO HAS NOT BEEN MET WE **MAIN 190** С MAIN 191 CHECK TO SEE IF ANOTHER STAGE MAY BE ADDED. IF NOT THE C **MAIN 192** C FLOW PARAMETERS WILL BE PRINTED MAIN 193 **MAIN 194** IF ((LSTAGE-5)/2.GE.MSTAGE) GD TO 170 MAIN 195 MAIN 196 *** INITIALIZE THE CALCULATION TO ADD ONE MORE STAGE С MAIN 197 **MAIN 198** IFIRST=MAXO(IFIRST+LSTAGE-3) MAIN 199 I = LSTAGE + 1MAIN 200 IB = IB + 2MAIN 201 IB1= IB1+2 MAIN 202 NX = NX + 2MAIN 203 NX1= NX1+2 MAIN 204 NX2= NX2+2 **MAIN 205** NBLADE = MINO(NBLADE +2, 6) MAIN 205 LSTAGE=LSTAGE+2 MAIN 207 *** SINCE THE CALCULATION AND CHECKING IS TO BE CONTINUED MAIN 208 C C C UPSTREAM FOR NO MORE THAN 3 WHOLE STAGES, IT IS ASSUMED MAIN 209 THAT DR/DX, C2P/DX2 AND DICX / DX AT STAGES PREVIOUS TO MAIN 210 THESE WILL NOT BE AFFECTED BY THE ADDITION OF ONE MORE **MAIN 211** C

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11/02/67 SOURCE STATEMENT IFN(S) -CAX. EFN 353 *** SAVE THE AXIA! VELOCITIES. С CAXI 353 BETA(L,J)= CX(I,J) CAXI 354 1 CONTINUE CAXI 355 DAMP= 10.0 CAX1 355 CAXI 357 *** INITIALIZE THE ITERATION COUNTER С CAXI 359 CAXI 359 LOGPY=0 CAXI 360 5 CONTINUE 361 *** TURN THE CONVERGENCE TRIGGER ON. С CAXI 361 YES= .FALSE. CAXT 362 LOOPY=LOOPY+1 CAXI 63 *** ERROR WILL PRINT THE RESULTS OF THE LAST ITERATION CAXI 364 С CAXI 365 AND TRANSFER TO A NEW DATA SET C CAXI 365 CAXI 367 1F (LOOPY.GT.250) CALL ERRUR(4) CAXI 369 00 125 J=1, NLINES CAXI 359 *** GET FIRST AND SECOND DERIVATIVES OF R WITH RESECT TO X CAXI 370 C CAXI 37 i CAXI 372 125 CALL XDERIV(R,RSLOPE, RCURVE) CAXI 373 CAXI 391 L=0CAXI 382 00 130 I=IB+NX LAXI 383 L=L+1CAXI 384 CM2=CX(1,JM)**2 CAXI 385 DO 120 J=1.NLINES CAXI 385 CAXI 387 С *** SAVE THE AXIAL VELUCITIES CAXI 389 CAXI 389 CX(I,J)= (4.0*BETA(L,J) +CX(1,J))*0.2 C.A.X.I 390 BETA(L,J)=CX(1,J)CAXI 391 **CU2(J)**=CU(1,J)**2 CAXI 302 120 DEPV(L,J)=CU2(J)/R(I,J) CAXI 393 CALL INTEG (DEPV.2) CAXI 394 A = THERM1(TO(1, JM))CAX1 395 CO 130 J=1, NLINES *** CALCULATE THE ENTHALPY AND CENTRIFUGAL FORCE TERMS AS WELL AS C 395 THE RADIAL VELOCITY TERM. C CAX1 395 130 TERM1(L,J)= (GJ*(THERM1(TO(1,J))-A) X+CR(1,JM)**2 -CR(1,J)* 2 CAXI 397 -(CU2(J) -CU2(JM)) -2.0*RINT(J)) CAX1 398 X CAXI 399 X /CM2 CAXE 400 *** FIND ENEROPY GRADIENT TERM IN AXIAL-VELOCITY EQUATION С CAXI 401 OBTAIN FIRST DERIVATIVE OF DEPV WITH RESPECT TO RADIUS, C * * * CAXI 402 С RESULT IS IN CO. CAXI 403 CAXI 404 CAXI 405 *** NOTE ... THE REFERENCE TERMS HAVE BEEN LEFT OUT OF THIS CAXI 405 C EQUATION SINCE THEIR DERIVATIVES ARE ZERO CAXI 407 C CAXI 408 L=0 CAXI 409 00 235 1-18 NX CAXI 410 L=L+1 CAXI 411

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- - -"REPROJUTION: ILITY OF THE ORIGINAL PAGE IS POOR; . # 11/02/67 EFN IFN(S) · CAX. SOURCE STATEMENT -CAXI 412 DO 233 J=1, NLINES 41? *** DETERMINE PART OF THE ENTROPY TERM. С CAXI 413 DEPV(L,J)= THERH 3(TO(1,J))/DCP -ALOG(PO(1,J)) CAXI 414 H= -(CX(I+J)**2 +CR(:+J)**2 +CU(I+J)**2)/GJ CAXI 415 T = T((I,J))CAXI 414 SHT AL P CALL CAX1 417 233 CONTINUE CAXI 419 ALPHA(L,1) = 0.0CAXI 420 DO 235 J=2, NL INES CAXI 421 *** INTEGRATE FE STATIC TEMPERATURE WITH RESPECT TO ENTROPY. 427 C CAX1 423 235 ALPHA(L,J)= ALPHA(L,J-1) +0.5*GR*(TSTAT(J) +TSTAT(J-1)) CAX1 474 CAXI 425 x *(DEPV(L,J) -DEPV(L,J-I)) 210 DO 220 J=1.NLINES CAXI 426 CAXI 477 *** OBTAIN THE FIR T DERIVATIVE OF RADIAL VELOCITY WITH RESPECT 428 C С TO AXIAL LENGTH. CAXI 430 220 CALL XDERIV(CR,CSLOPE,CD) CAXI 431 CAXI 432 L=0 DO 490 1=19,NX CAXI 433 ILL = 0CAXI 434 CAXI 435 Ċ *** HELP IS ALTERED TO PEDUCE THE EFFECT OF CURVATURE WHEN CAXI 435 C THE ITERATION IN NO. NEAR THE SOLUTION CAXI 437 CAXI 439 HELP=1.0 CAXI 439 L=L+1 CAXI 447 225 DO 240 J=1, NLINES CAXI 441 C ******* COMPUTE RADIAL VELUCITIES. 441 CAXI 442 240 CK(I,J)=CX(I,J)*RSLUPE(L,J) CM=CX(1,JF) CAX1 447 CM2= HELP+CM++2 CAXI 449 245 00 250 J=1.NL TIES CAXI 449 CAXI 450 C *** 1 TO STREAMLINE-CURVATURE TERM IN AXIAL-VELOCITY EQUATION CAXI 451 CAXI 452 250 DEPV(L,J,- CX(1,J)*CSLUPE(L,J)/CM2 CAX1 453 CALL INTEG (DEPV,2) CAXI 454 365 ILL= ILL +1 CAXI 455 370 DO 400 J=1, NLINES CAX1 455 CAX1 457 r *** COMEINE THE TERMS IN THE AXIAL VELOCITY EQUATION. 45 A CAXI 459 TERMD= (RINT(J) +RINT(J) +(ALPHA(1,JM) -ALPHA(L,J))/CM2 - CAXI 460 X +TERM1(L, J))/HELP CAXI 461 IF (TERMC) 381,385,383 CAX1 462 385 TERMD=1.0 CAXI 463 GO TO 400 CAXI 464 CAXI 465 *** CHECK VALUES OF VELOCITY RATIC AGAINST REASONABLE LIMITS CAX1 466 CAX1 457 381 IF (TERMD.GT .-. 79) 60 TO 390 CAXE 469 CAXI 467 *** ALTER HELP TO REDUCE CURVATURE EFFECTS (TEMPORARILY) -CAX1 473

CAX. IFN(S) CAXI 471 HELP= HELP*1.1 CAXI 472 IF (ILL.LT.25) GU TO 365 CAXI 473 TERMD=0.1 CA/1 474 GO TO 400 CAXI 475 383 IF (TERMD.LT.TEST) GU TC 390 CAX1 475 HELP= HELP*1.1 CAXI 477 IF (ILL.LT.25) GO TO 365 CAXI 478 TERMD= LIMIT CAXI 479 GO TO 400 CAXI 480 C *** CALCULATE NEW, AXIAL VELOCITY. 481 390 TERMD=SQRT(1.0+TERMD) CAXI 481 400 CXNEW(L, J)=TERMD+CM CAX1 482 410 CONTINUE CAXI 483 **CAXI 484** *** CUMPARE VELOGITIES INTO CURVATURE EQUATION WITH THOSE OUT C CAXI 485 **CAXI 485** DO 440 J=1, NL INES CAXI 487 IF (ABS((CXNEW(L,J)-CX(I,J))/CX(I,J)).GT.TOLCX) GO TO 450 **CAXI 489** 440 CONTINUE CAXI 489 GO TO 455 CAXI 493 **CAXI 493** С ******* UNSUCCESSFUL CONVERGENCE ON CX CAXI 494 CAXI 495 450 YES= .TRUE. CAXI 491 455 DO 460 J=1, ALINES CAXI - 92 CX(I,J) = (CX(I,J) + CXNEW(L,J)) * 0.5CAXI 495 460 CR(I,J)= CX(I,J)*RSLOPE(L,J) CAX1 497 CAXI 498 C ******* SATISFY CONTINUITY CAXI 499 CAXI 500 CALL STREAM CAXI 501 CAXI 502 c *** MAKE AN ADJUSTMENT ON THE STREAMLINE POSITIONS. 503 CAXI 504 CALL MOVE CAXI 505 490 CONTINUE CAXI 505 CAXI 507 C ******# CHECK CONVERGENCE OF AXIAL VELOCITIES CAXI 509 **CAXI 509** 1010 L=0 CAXI 510 DO 700 [= IB,NX CAXI 511 L=L+1 CAXI 512 DO 700 J=1, NLINES CAXI 513 IF (ABS((BETA(L,J)-CX(I,J))/CX(I,J)).GT.TOLCX) GO TO 1020 CAXI 514 700 CONTINUE CAXI 515 L= 0 CAXI 516 CAXI 517 CAXI 518 GO TO 1021 CAXI 519 1020 YES= .TRUE. CAXI 520 1021 L= 0 CAXI 521 L=L+1 CAXI 522 *** MOVE THE LIMITS ON AXIAL VELOCITY. C 523 $TEST = 1.02 \times TEST$ CAXI 523 LIMIT= SQRT(1.0 +TEST) CAX1 524

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SOURCE STATEMENT -EFN

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CAX.	- EFN	SOURCE STA	TEMENT -	[FN(S)	-	11/0?/	67	T
IF (YES) GO TO IT= O RETURN	5		•			CAXI CAXI CAXI	525 525 527	1
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SUBROUTINE	COPY						COPY	529
LOGICAL FPATH		-					COPY	530
COMMON /VGEOM/	ALH(29)	•	ALT(29)	,	ALTER.		COPY	531
X ASPECT(29),	FPATH,		SAVEA(2	91			COPY	532
DOUBLE PRECISION	TITLE						COPY	533
REAL MACH. MAP	R. MOLE	WT. JOU	F				COPY	534
DIMENSION ATAS(2	9.111.	EL () W (32)					COPY	5 3 5
	YES	12011321			-		CODY	526
COMMON /MATRIX/	163	0 111	A TAD (20		0.2(20)		CORV	270
V DETA(10 111	ALFRATIS	0+11+	A 14K 129	+ 6 / +	82(29)		COPT	231
A DETALLUTITT	DH(321+	• •	BLADETZ	41 •	81(32)		CUPY	238
	CP(32+1	111	CPSU(6)	•	CR(32+1	1),	CUPY	539
X USLUPE(10,11),	CU2(11)	•	CU(32,1	1),	CUCD(29	,5),	COPY	540
X CX(32,11),	CXM(10,	11),	CXNEW(1	0,11),	CXRATO(291,	COPY	541
X CXS(10,11),	DA(10),		DELM(11	} •	DEPV(10	,11),	COPY	542
X DF(20),	DFACT12	9,11),	DFL(29)	•	DFLOW(3	2),	COPY	543
X EMACH(29,11),	FOUND(2)	0,3,10),	FRDEL(1)	0,11),	GAMMA (3	2,11),	COPY	544
X HMN(29),	HUB(32)	•	IKK(10)	•	MACH(29	.11).	COPY	545
X OBAR(29,11),	PU(32.1	ί).	R(32.11).	RCURVE	10.11).	COPY	546
X RH(32).	RH0(32.	111.	RINT(11).	ROSTAGE	11).	COPY	547
X 85(32).	RSLOPEL	10.1	R TRATI (11).	5000129	-5).	COPY	548
X SOL 10(29,111,	SSC0129	.5).	TERMITI	0.111.	TEDMA / 1	11.	CODV	540
¥ TERMR/111.	TEENCII		TTD(22)	UVIIV	TITIE	1/ 7 2\	CORV	554
X TO(22 11)	TCTATA1	L / Q 1 L	117(22)	•	1111212	21 9	COPT	220
× ×(22)	ISTALL	L J +	0132,11	,,	WILLE		CUPT	221
	•	• •					CUPY	272
CLEMUN SLALEK/	A ,	AA .	ALUAU,	A202A0,	A 303A0,	A40440+	COPY	553
X ADUDAU, E,	88.	ίς,	C M ₁	CMEAN,	CMEANP,	COINTG,	COPY	554
X CP12, CP13,	CP14,	CPI 5.	CP16,	CP02,	C PO3+	CP04,	COPY	555
X CPO5, DAMP,	DCP,	CD,	DIFCM,	DT,	D'UMMY .	ERAS1,	COPY	555
XG, GASK,	GJ,	GR,	GR2,	JOULE,	MAPR,	MOLEWT,	COPY	557
X PGCO, C,	RPM,	TĆP 🖡	TERMD,	TESTBH,	TFSTDS,	TESTMS.	COPY	558
X TOCO, TOL,	TOLAT,	TOLB2,	TOLMIN,	TOLMS,	TOLTIP,	TOLCP,	COPY	559
X TOLCX, TOLR,	TOTINT,	TOTPR .	V.	VMI		•	COPY	560
COMMEN /INTEGR/	Ι,	IB,	IB1.	IDUMP.	IERRUR.	IFIRST.	COPY	561
X G. IOUTTR.	IPASS.	IS.	11.	J.	JIN.		COPY	562
X JM • JM1 •	К.	K1.	KK.		I TMIT.	ISTACE.	CODV	562
X MSTAGE. NLINES.	NTUBE S.	NX.	-12 2.3	VES	2	2314027	COPY	566
EQUIVALENCE LAT	AR (1 . 1) . /	TAS(1.1)		12.2 14(1).0EI	04(11)		C007	ELE
							CORV	505
1= 1=2							COPT	203
	-				-		CUPT	707
16 (EDATH) CO T	CINI 0611	IO CALCUL	AIEU.					707
AF IFPAINI GU II							COPY	568
THE PICK UP THE	HUB AND	LIN RADI	05.					569
KH(1) = H(1)		•					COPY	569
RS(I) = TIP(I)							COPY	570
GO TO 30							COPY	571
. *** SET THE TIP	, ESTIMAI	TE THE HU	IB (LOW)	AND COMP	PUTE THE	SPACING.		572
20 RS(1) = RS(1-1)							COPY	572
DT= (RS(I-1) -R)	H(I-1))/#	SPECT(I)					COPY	573
RH(I)= `MIN1(RH()	I), RH(I-	1) +DT#A	LH(T)				COPY	576
X(I)= X(I=1) +OT							COPY	575
*** ESTIMATE TH	E AXIAL V	ELOCITIE	S. SET 1	THE EFFIC	LENCY L	DN THE		576
HIGH SIDEL	AND ESTIN	ATE THE	TEMPERAT	URE AND	PRESCIP	F_		
30 CALL RSTART			- 107777 565799				CUDA	671
DO 50 JELANTINES								270 877
		M 1 1 #0 . E					CORV	2/1
WATETV/= 164169V							GUMA	218

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		11/02/67
	COPY EFN SOURCE STATEMENT - IFN(S) -	
	ATAR([,J]=SQRT(ATAR(L,J))	COPY 579
-	PO(I,J) = PO(I-1,J) + PO(L,J) / PO(L-1,J)	COPY 580
	TO([,J) = TO([-1, J) + TO([, J) / TO([-1, J))	COPY 581
	CALL THERMP	COPY 582
	CU(I,J) = CU(L,J)	COPY 583
50	CR(1,J) = CR(L,J)	COPY 584
	L= 2	COPY 585
	CALL STREAM	COPY 585
	CALL MOVE	COPY 587
	RETURN	COPY 588
	END	COPY 589

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- EFN SOURCE STATEMENT - IFN(S)

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				DATA 590
BLUCK DATA	T . T . E	I I		DATA 591
DOUBLE PRECISION		E		DATA 592
REAL MACH, MAPR,	MULEWIJ JOOL	L		DATA 593
DIMENSION ALASI29	III FLUNISZ;			DATA 594
LOGICAL IERROR, Y	ES	ATA0 (20 11)	82(29).	DATA 595
COMMEN /MATRIX/ A	LPHA(10,11),	A 1AR (27117)	RT(32).	DATA 595
X BETA(10,11), B	H(32),	BLADE(29);	C(1/22, 1, 1)	DATA 597
x co(10,11), C	;P(32,11),			DATA 598
X CSLOPE(10,11), C	CU2(11)+	CU(32,11),		DATA 599
x CX(32,11), (XM(10,11),	C XNEW(10,11).		DATA 600
X CXS(10,11), E	DA(10),	DELM(11),		DATA 600
X DF(20),	FACT(29+11)+	DFL(29),	DFLUW (32)	DATA DUL
X FMACH(29.11). F	=OUND(20,3,10),	FRDEL(10,11),	GAMMA (32,111,	DATA 602
x HMN(29).	HUB(32),	[KK(10)+	MACH(29,11),	DATA 605
X (1PAR(29.11).	0(32,11),	k(32,11),	RCURVE(10,11),	DATA 604
Y PH(32).	RHD(32.11),	RINT(11).	RUSTAG(11),	DATA 605
x ps(32).	RSLOPE(10.11).	RTRAIL(11),	soco(29+5)+	DATA 605
	SCO(29.5).	TERM1(10,11),	TERMA(11)+	DATA 607
× TEDNO (111)	TERMC(11).	TIP(32).	TITLE (12) •	DATA 608
X (EKMD(11))	TCTAT(11).	U(32.11).	W(11),	DATA 609
	131411111	019210011		DATA 610
	A Å Å Å Å	A10A0. A202A0.	A303A0, A404A0,	DATA 611
COMMON / SCALER/		CM. CMEAN.	CMEANP. COINTG.	DATA 612
X A505A0+ E+		CD16 CD(12	CP03. CP04.	DATA 613
X CPI2, CP13,	LP14, $LP12$,	DIECH DT.	DUMMY . FRASI.	DATA 614
X CPO5, CAMP,			MADR. MOLEWT.	DATA 615
XG, GASK,	GJ, GK,		FESTIS, TESTINS.	DATA 616
X POCO, Q,	RPM, ICP,	TERMUN TESTON		DATA 617
X TOCO, TOL,	TOLAT, TULB2,	IULMIN, IULMS+		DATE 618
X TELEX, TOLR,	TOTINT, TOPP,			DATA 619
COMMON /INTEGR/	I, IB,	IBL+ IUUMP+	TERRUR, IFINST	DATA 620
X IG, IOUTTR,	IPASS, IS,	IT, J,		DATA 020
X JM _y JM1.	K., Kl.	KK, L,	LIMII, LSTAGE,	DATA 021
X MSTAGE, NLINES,	NTUBES, NX,	NX1, YES		DATA 022
EQUIVALENCE (ATA	R(1,1),ATAS(1,1)), (FLOW(1),DF		UATA 025
COMMON /VMIN/ VO(291		' <u>-</u>	UAIA 524
	-			UA1" 027
DIMENSION ZZ(171)	, ZX(171), ZY(4	5), Z(387)		DALK 070
FOULVALENCE (CO.Z	.22), (2(172),2	X), (Z(343),ZY)		DATA 627
DATA G. GJ. JOULE	/ 1545.44, 5007	0.47, 778.12 /		DATA 628
DATA DE /0.0. 0.1	. 0.15. 0.2. 0.	25, 0.3, 0.35, 0	.4. 0.45, 0.5,	DATA 629
Y 0-55. 0.6. 0.6	5. 0.7. 0.75. 0	.8, 0.85, 0 0	•95, 1.0/	DATA 630
DATA 77 /				DATA 631
V ALL ALL THISAH	S PR. 4HOGRA .4HM	MU.4HST B.4HE U	S,4HED W,4HITH .	DATA 632
	ARIE- 4H CAR - 4HE	AN. 4HD TH. 4HOUG	H.4HT. ,4HSTEE.	DATA 633
	DADA . AHMETE . AHR	PR. 4HOFIL . 4HES.	.4HRUUG.4HH FL.	DATA 634
		IN. 4HCONS. 4HIST	F. 4HNT W.4HITH .	DATA 635
X 4HUWPA, 4HI H3, 14F		SSUL AHMETT AHONS	. 4HWI LL .4H USU.	DATA 635
X 4HIHE + 4HPRUG + 4F	IN TO 44 EAT.441	HREAH OF AHTHE	AHITER AHATIO.	DATA 637
X 4HALLY, 4H LEA, 4H	ען וטוּאָה דאווּאָה. גע גע גע	.44 .44	• 4H • 4H •	DATA 639
X 4HN. , 4H , 4H	1 9471 9471 1 All All		<u>, 6H</u> <u>, 6H</u> <u>,</u>	DATA 639
X 4H • 4H • 4H	1 9411 9411			DATA 640
X-4H +4H +4H		177 177 177 177 177 177 177 177 177 177		DATA 641
X 4H IF ,4HTHE ,4H	PROG , 4HRAM , 4HC	AN 94MNUT 94MMIN	N AUECCA AUGE -	DATA 447
X 4HION ,4HIT W,4H	HILL , 4HPRIN, 4HT	ANS 4H EKK 4HUK		DATA 642
X 4H ,4HFOLL,4H	HOWED, 4H BY , 4HT	HE , 4HSTAN, 4HUAH		DATA 444
X 4H TH.4+IS I.4+	HS TO,4H BE,4HU	ISED, 4H TU , 4HDE	P+498011+4975 +	UNIN 044

																										11/02	67
		D	ATA	•			-	Ε	FN		S	DU	RCE	S	TAT	EME	ENT	-	IF	W (5)	-					
X	4H		, 4	н		, (4H		•	4H	TH	E	, 4H		us,	4H8	E OF	• • 4H	71	1E ,	4H	FÅI	•4H	ILUR	RE,	DATA	645
X	4H.		,4	H		•	4H		,	4 H			• 4H		,	4H		,4H			4H		,4H	ł		DATA	645
X	4H		,4	Н			4H		•	4H			,4H		,	4H		•4H		,	4H		,4H	1	•	DATA	647
X	4H		•4	F		, 4	4H		,	4H			,4H		,	4H		•4H		•	4H		•4H	i	•	DATA	648
X	4H		,4	F		• 4	4H		1	4 H			,4H		,	4H		•4H		+	4H		• 4	I AT		DATA	647
X	4HT	HE	.4	HF	I R S		4H1	r A	N.	4H	D	L	•4H	AS	T,	4H	AXI	•4H	AL	S,	4H1	A	.+	IONS	5 /	DATA	650
	DATA		ZX	1	-	•					-		-													DATA	651
X	4H	11	.4	HIS	S A		4 HS	รรบ	Μ.	4H	ED	T	•4H	HA	τ.	4H1	THE	,4H	FLC	JW,	4H		,4H	1		DATA	652
X	441	S I	, 4	HAI	RAL		++L	EL		4H	TO	T	4H	HE	Α.	4H)	(IS	•4H	OF	R,	4H(DTAT	,41	1101		DATA	653
X	4H	-11	N. 4	HL I	ET		4H4	ND)	4н	EX	ĪŤ	•4H	G	EO.	4H	4E TR		Y S	SH.	4H(JULO	,4⊦	I BE	.,	DATA	654
X	4H	•	•4	Н		. 4	4 HC	ON	S.	4H	15	TE	. 4H	NT		4H1	TH	.4H	TH	ls.	4H	ASS	,41	IUMP	ΡΤ,	DATA	655
X	4HI	ON.	4	h	TH	1.4	4 HE	S	ρ.	4H	AČ	ĪŇ	• 4H	G	OF.	4H	THE	• 4H	Δ)	(1)	4H/	AL S	.4+	IT A1	•11	DATA	656
X	40	NS	.4	KS I	ной		4 HL	ົດີ		4H		••••	-4H	Br		4H	EGUL	•4H	AR .		4H	BUT		INEE	0.	DATA	657
X	4H	NO 1	r 4	Ηí	36		4 HF	ΞΩU	Δ.	4H	۱.		• 4H			4H		•4H			- d		.4+	1	•	DATA	658
X	4H		.4	 F			4 H			4H			.4H			4H		• 4H		` 9	4H		•4+	1	•	DATA	659
x	4H		. 4	H			6H			4H			-4H			4H		-4H			4H		.4+	4	•	DATA	66)
x	4H		. 4	Н			4H			4 H			-4H			4H		.4H			4H		.4+	4		DATA	661
x	4H	D-6	= . 4	ΗΔ (стс		- H6	2 1	τ.	4H	MI	TS	-4H		нг.	4H(сн 4	4 H	RF	ີບ	4H		41	150N	IA.	DATA	662
Ŷ	448	ĨF			งก		5 F N		н.	4H	N	IM	-44	RE	2	4 H	TM	-4H	TS	Ψ.	411	HO IF	-41	4	•	DATA	663
Ŷ	4H		. 4	HAG	2 F		L HI	rno		41	ı n	<u>ы</u>	.4H	WT		4H	1151	1. 4H	Δ1 I	Ÿ.	4H	CAU	1.41	ISË	F.	DATA	664
X.	444	TEI	1. 4	HQ I	ະັດ	1.4	H	: T	้ ผ.้	4H	F	Î T	- 4H	ED.	ΔΤ.	411		. 4H		- • •	44	•	-41	4	•	ΔΔΤΔ	665
Ŷ	411		. 4				4 H	•		41	•••	•••	-4H	<u>, 111</u>		4 H		. 4H			4H		.4+	4		DATA	665
Ŷ	41		. 4	L	-		<u>к</u> н			21						41		. 44			44		· . 4 F	4		DATA	667
Ŷ	41		. 4	Li I			. н			4H			. 44		,	411		. 44	TH	45 .	44	AYI	-41-	•	v.		668
Ŷ	440		•	с. 6 т. 1	rv		*** 66/	Υ	5.	411	۸C	ц	. 44	C TI		411	MI 1	4H	NE	1.	411	s ra	1.41	181	re.	ΠΔΤΔ	669
Ŷ	444		5,4 5.4	FU.	τc	1.4		 . I	5.	4H	40 A	FT.		UC I	ric.y ⊑N.	44	-	. 44			411	1 M T	.41	115	W /	DATA	670
^	A T A O		L 7 7 7 V	/	1.0		***		6.4		0		y - y ()	HC.							711			113		DATA	671
¥				, L 1				٨D	D	در x	D M	¥ 1		MA	TC		v 1		n c	DE	444	or'e M		IT /	N.		672
Ŷ		1.5	19 19	ר' <i>ו</i> גה	מאק ממ		т. К ШВ	47 9 7 6	77 7 N	411	RU) 7 (7 417 	1917'' M	16) 16		- T - 1 - C T -	L # 99 171 D		- E 9 41	70		. 4 -	,, ,, ,			673
Ŷ	~~~	V 1 4	394 8 /	FU Li	70		7 8798 1. k.uk		19.9 1		TV	ur	11 FF 7	- m	1 U) 1 U)	411-	-3+"		6 AP T'36	76.V 2	410	1911. 1911 - 19	975 - 4 -	, 1 	אר.		676
Ŷ	- 4 11 A - 7 Li	1 1 1	4 4 4 5 / 1	г ц ц 1	20		• 		1.4	411	11 10	•	1777	2		411		חדי 14.2	ם היו ה ה	= † 76	71) 71	シリヒリ	. <u>.</u>	11 I.L 1			675
×.	1911 7. Lu		- 1 4	ուլ Ե	1 3 6	• •	• T U		, •	411		23	9 411 		ГА; Ц 1	*11		\ ∳%[1] \	נו הרי	10 7 2	411	100	רו די ין: א ב		;	0 A 1 A	1215 1292 -
X	4H		+ 4	r		, 4	+ ŭ l	115	K,	4H	AI	10	94H	N.	W 1 +	411	ιι	J # 4 M	ιιι	JK +	411	•	• 4 1	٦	1		010
	END																									UATA	011

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IFN(S) SOURCE STATEMENT -DATAL. EFN --

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÷ 11/02/67

4	SUPROUTINE CATAL							DATA	1
I							-	DAT 4	2
C	*** THIS SUBR	OUTINE PRE	PARES A	MASTER	TAPE OF	LOSS DA1	Α.	DATA	3
Ĩ.	IF A PERM	IANENT FILE	IS USE	D THIS R	OUTINE I	S TO BE		DATA	4
	D I SC AR DEL) (THE	SENTRY	MUST BE	CHANGED	ALSO).		DATA	- 5
•. /								DATA	5
	DOUBLE PRECISION	TITLE						DATA	7
2	REAL MACH. MAP	R. MOLEWT	. JOUL	E				DATA	- 8
ź	DIMENSION ATAS(2	9.111. FI	NW(32)	-		·		DATA	9
		VES	0					DATA	10
ŧ		ALPHA/10.	111.	ATAR (29 .	.11).	82(29).		DATA	11
1	V DETAILO 111	ALF HATLOF		RIADE(29		BT(32)		DATA	12
:	X CO(10 11)	CP122.111		C PC D (6) .		CR132.11	1.	DATA	13
			•	CH(32.11		CUC0129	5).	DATA	14
Ğ.		CVM(10, 11)	•	C VNIE W/1(CXRATOC	291.	ΠΔΤΔ	15
1.			· •			DERVIIO	111.	DATA	16
• ·	X CX5(10+11)+			DEL (20).	•	DELOWIS	21.	DATA	17
		EDUND(20	2 101	57612711 59561 <i>1</i> 10	, , , , , , , ,	CAMMA (3)	2.111.	DAT A	18
\$	X EMACH(29)11/1		211011	- KUEL(I(1997)	,,,,,,	MACHIZO.		DATA	10
Ľ	X HMN(29)+			14411011		DCUDVE1			20
-	X UBAR(29+111+	PU(32+11)	•	K () Z 9 I I I D INT ())	•	A DETACIÓ	LU 9 L I 7 9	DATA	20
1	X 9H(32)+	RHU(32+11	1.	K IN I (1 1 1		KUSTAGTI	5)	DATA	22
	X RS(32)+	RSLOPETIO	.11).	KIKALLII Teomitii		2000129	1211		22
4	X SOL 1D(29,11),	SSC0(29,5) ,	TERMICIC	,,,,,,,	TERMALL.	L7 •	DATA	23
•	X TERMB(11),	TERMC(11)	•	110(32)		111LEVIA	2) •		24
C	X TO(32,11),	TSTAT(11)	•	0(32,11)	•	M(TT)+			27
	X X(32)							DATA	20
	COMMON /SCALER/	A, A	Α,	A10A0,	A202A0+	A 303A0,	A4U4AU+	DATA	21
	X A505A0, P,	BB, C	ς, (C M ,	LMEAN,	CMEANP,	CUINIG		20
Ľ.	X CP12, CP13,	CPI4, C	PI5.	CP16,	CPUZ,	0.903+	CPU4,	DATA	29
4 .0	X CPOS, DAMP	DCP, D	D,	DIFCM.	DT.	DUMMY ,	ERASL	DATA	- 30
	XG, GASK,	GJ, G	R,	GR2,	JOULE,	MAPR	MULEWI,	DATA	31
E	X POCO, Q,	RPM+ T	CP,	TERMD,	TESTBH,	TESTOS,	IESIMS,	DATA	- 32
Ľ	X TOCO, TOL,	TOLAT, T	OLB2,	TOLMIN	TOLMS.	TOLTIP	TOLCP,	DATA	33
	X TOLCX, TOLR,	TOTINT, T	OTPR ,	۷,	VMI			DATA	34
	COMMCN /INTEGR/	1, I	в.	181,	I DUMP +	IFRROR,	IFIRST.	DATA	35
	X IG, IOUTTR,	IPASS I	S,	11,	J.	JIN,	JJ.	DATA	35
1 , 3	X JM, JMl,	К. К	1,	KK.	L. #	LIMIT,	LSTAGE	DATA	-37
	X MSTAGE, NLINES,	NTUBES, N	х,	NX1.	YES			DATA	- 38
£°	EQUIVALENCE (AT	[AR(1,1),AT	AS(1,1)), (FL()W(1),DFI	LOW(1))		DATA	39
								DATA	40
٤.	DIMENSION Z(387)							DATA	41
. .	EQUIVALENCE (CD)	Z)						DATA	42
[WRITE (6,333) Z							DATA	43
{	333 FORMAT (1H1////	(12X20A4))						DATA	44
	READ (5,910)IG							DATA	45
	910 FORMAT (2413)							DATA	45
	REWIND 2							DATA	47
ł	DO 920 [=1,[G							DATA	-48
	READ (5,925) ((CX(K,J),K=	1,20),J	=1,3)					
ť	920 WRITE (4) ((CX)	(K,J),K=1,2	(U),J=1,	3)					
ŀ	960 END FILE 4								
•	REWIND 4								
	925 FORMAT (1266.0)							DATA	-51
į	CALL 045							DATA	53
Ls	RETURN							DATA	54



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PAGE 168 DER 1. EFN SOURCE STATEMENT - IFN(S) --SUBROUTINE DERIV(R.RSLOPE.RCURVE.x) COMMON /INTEGR/ I, IB, IB1, IDUMP, IERROR, IFIRST , X IG, IDUTTR, IPASS, IS, IT, J, JIN, JJ, JM, JM1, K, K1, KK, L, X LIMIT, LSTAGE, MSTAGE, NLINES, NTUBES, NX, NX1, YES 1=1 DO 5 I=181,N¥1 L= L+1 AA = (R(I-1,J) - R(I,J))/(X(I-1) - X(I))BB = (R(I+1, J) - R(I, J))/(X(I+1) - X(I))RSLOPE(L,J) = (R(I+1,J) - R(I-1,J))/(X(I+1) - X(I-1))5 RCURVE(L,J) = (AA -BB)/(X(I-1) -X(I+1))*2.0 RETURN

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DRIV	Ë• -	- EFN	SOURCE	STATEMENT	- 160	1151 -			
UBROUTIN	E DRIVE							DRIV	673
								DRIV	674
*** OF	TIMIZES	TO ONE C	F FIVE	LIMITS				DRIV	491
									692
OUBLE PP	EC IS ION	TITLE							683
EAL MAC	IF, MAPI	R, MULEW		LF					684
IMENSION	ATAS(2)	9,11), *						DRIV	685
OGICAL		YES ALDUATI		A TAR (29.	111.	B2(29).		DRIV	685
UMMUN ZM		ALPHALL	****	ALADEL29		BT(32).		DRIV	687
BEIALIUI	(11)+ 	(9132.1)	1.	CPC0(6)		CR(32,11	L),	DRIV	689
	1	CU2(11)		CU(32+1)		CUC0(29)	51,	DRIV	687
CX(32,1)		C.xM(10.1	1).	CXNEW(10),11),	C XRATO(2	29).	ORIV	690
CXS(10.1	111.	DA(10),		DELM(11)	•	DEPV(10	,11),	DRIV	691
DF(20).		DFACT (25	9,11),	DFL(29)	,	DFLOW(32	2),	DRIV	69?
EMACH(29	; ,11),	FOUNDIZE	3,10),	FRDEL(10),11),	GAMMA (32	2,11),	DREV	693
HMN (29)	,	HUB(32)	1	IKK(10)	,	MACH(29	11),	ORIV	694
064R(29	,11),	PO(32+11	.) •	P(32,11)	•	RCURVET	0,11),		645
RH(32),		PHD(32+1	11),	RINT(11	•	RUSTAGE	L1)+	DRIV	690
RS(32),		RSLOPEL	10,11),	RTRAIL	L1),	SUCUL29	, 5 / ,		691
SOLID(29	}!!!!!	SSC0(29)	51.	1EKM1(1)]+[[]+	TITIC/1	L i 🕈		600
TERMB(1)	13.	TERMC(1)	L J 🛊	110(32)	•	- / 1 / L = (1 / - W / 1 1) .	21 •	DRTV	700
TU(32,1)	1).	ISTALL.	L # •.	0132+11	,	WILLY			701
X(32)				A16A0.	A202A0.	A303A0.	A404A0.	DRIV	702
UMMON /:	SCALER/	A 7 E 0	AA) CC.	CM-	CMEAN.	CMEANP.	COINTG.	DRIV	703
ASUSAU:	Cu f 2	C D T 4 .	CP15.	CPI6.	CP02.	C P03.	CP04.	DRIV	704
CP124	CAMP.		00.	DIFCM.	DT.	DUMMY .	ERAS1,	DRIV	705
G	GASK .	GJ.	GR,	GR2.	JUULE,	MAPR,	MOLEWT,	DRIV	706
POCO.	6,	RPM.	TCP.	TERMD,	TESTBH.	TESTDS,	TESTMS+	DRIV	707
TOCO,	TOL	TULAT.	TOLB2.	TOLMIN.	TOLMS,	ΤΟΙΤΙΡγ	TOLCP.	DRIV	708
TOLCX+	TOLR,	TOTINT,	TOTPR,	V,	VMI			DRIV	709
COMMON /	INTEGR/	ι,	ιΒ .	181,	IDUMP,	IFRROR,	IFIRST.	DRIV	710
20,	ICUTTR,	LPASS,	IS,	11,	J.	JIN,	JJ,		711
JM.	JM1+	к,	К1,	KK•		L1M1)+	L 31 462+		712
MSTAGE.	NLINES.	NTUBES,		NXI +	185 04411 DE	10.4111			714
QUIVALE	NCE TAT	AR (1 + 1) + .	AIASII+1	. 11 , (rt	UWL11.0r			DRIV	715
OMMON /		170 L 13/1	MMER					DRIV	715
UMMUN /	AWTIN'S AC	(29)						DRIM	717
DAMEN /	SDECALL	MERMILLA)	NX 2 NOF	ΔTI				DRIV	718
DCICAL	NO FATI	NO NO A P	111121101					DRIV	719
FAL MSH	NOR	м						DRIV	720
E LISTA	GF.GT.11) GO TO	8					DRIV	721
	••••••							DRIV	722
*** CAL	CULATE I	NEET GUI	DE VANE	EXIT QUA	NTITIES			DRIV	723
								DRIV	724
= TUCO								DRIV	725
E THERM	3(T)							DRIV	725
U 5 J=1	NLINES							DB I A	727
U15,J}=	1000015	5,1)/R(5,	J) +CUC	1(5,2))/R	(5,J) +C	060(5,31		0814	725
+ (CUCUI5.4	+CUCO(5,5)*R(>+J}]₹R[5	4 J F			- UKIV	727
1= −(CX(5,J}**2	+CR(5+J)	**2 +000	(5,J)#«2)	/63			DRLV	130
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		11/02/67
	DRIVE EFN SOURCE STATEMENT - IEN(S) -	
	8 CONTINUE	DRIV 733
	DO 50 I= IEIRST, ISTAGE, 2	DRIV 734
		DR1V 735
C.	*** COMPUTE PERTINENT QUANTITIES	DPIV 735
Č		DRIV 737
	.1=1	DRIV 738
	K = 1/2	DRIV 739
	A = (R(I, NLINES) + R(I-1, NLINES) - (RH(I) + RH(I-1,))/ (RS(I) + RS(I-1))	DRIV 740
	X = (RH(1)+RH(1-1))	DRIV 741
	SOLID(1,NLINES) = SOCO(1,1)/(SOCO(1,2)+4)+SOCO(1,3)+(SOUD(1,4)	LRIV 742
	X +SUC)(I,5)*A)*A	DRIV 743
	A= (R(I,1) +R(I+1,1)-RH(I)-RH(I+1))/(RS(I)+RS(I+1)-RH(I)-RH(I+1))	DPIV 744
	SULID(I+1,1)= SUCO(I+1,1)/(SUCO(I+1,2)+A) +SUCC(I+1,3)	DR(V 745
	X +(SPCD(I+1,4) +SUCC(I+1,5)*A)*A	DRIV 745
	<pre>v= SQ((CX(I-1,NLINES)**2 +CR(I-1,NLINES)**2</pre>	DRIV 747
	X +(CU(I+1,NLINES)-U(I-1,NLINES)) **2)	DRIV 748
		DRIV 749
С	*** IS THIS AN UPDATE WITH NEW EFFICIENCIES	DRIV 750
		DRIV 751
	IF (IPASS-EQ-3-OR-IPASS-EQ-2) GO TO 15	DRIV 752
	A= SQRT(CX(1,NLINES)**2 +CR(1,NLINES)**2	DRIV 753
	X +(CU(I,NLINES) -U(.NLINES))**2)	DRIV 754
	DRT = 1.0 - A/V + (U(I-1, NLINES) - CU(I-1, NLINES) - U(I, NLINES) + CU(I, N	DRIV 755
	X NLINES) / V/SULID(I, NLINES)/2.0	DR1V 755
	A= SGRT(CX(I+1,1)**2+CR(I+1,1)**2+CU(I+1,1)**2)	URIV 757
	B= SQRT(CX(1,1)**2 +CR(1,1)**2 +LU(1,1)**2)	DKIV 755
	DSH= 1.0 -A/B + (CU + 1, 1) - CU(1+1, 1))/B/SULID(1+1, 1)/0	DRIV 759
	H=-8=8/6J	DRIV 741
	$\mathbf{I} = \{\mathbf{U}(1, 1)\}$	DRIV 761
		DOIN 762
		DRIV 765
	MSHF 5/5WKI(6K2*6AMMER*15IA)(3/7 DEF ELD- ATANI/11(1 1)_CULT 1)/COUTICY(1,1)xx2 4CE(1,1)xx2))	DRIV 765
	$REL FL^{I} = A I A I I I I I I I I$	
r	AND THE FOR STATE VIOLATIONS	DRIV 767
C	THE GILGE FOR LIPIT TICENTIONS	DRIV 769
	TE ((DRT -DEL(I))/DEL(I),GT, TOLB2	GRIV 769
	$X = OR_{1}$ = $DEL(T+1)/DEL(T+1) = GT_{1}$ TOLB2	DRIV 773
	$X = DR_{A}(MSH - HMN(I))/H(N(I)).GT_{A} TOLB2$	DRIV 771
	X .OR.(CU(I.NLINES) -VO(I))/VO(I) .Gf. TOL82	DRIV 772
	X .UR. HMN(I+1) -REL FLO.GI. TOLB2) GO TO 10	DRIV 773
		DRIV 774
С	*** IS CAL OF THE LIMITS TO BE MET	DRIV 775
-		DRIV 775
	IF (LIMIT.NE.)) GO TO 50	DR14 777
		DRIV 773
C	*** HAS ENE OF THE LIMITS BEEN MET	DRIV 773
		DRIV 783
	IF ((ABS((ORI-DEL(I))/DEL(I)).LT.TOLB2 .OR.	DRIV 781
	X ABSI(DSH-DEL(I+1))/DEL(I+1)).LT.TOLR2 .OR.	DRIV 782
	X ABS((MSH-HMN(1))/HMN(I)).LT.TOLB2 .DR.	DRIV 783
	ABSI(CULI, NLINES) -VO(I))/VO(I)).LT.TULB2 .CR.	DRIV 784
	X ABS(REL FLO -HMN(I+1)).LT.FULB2) .AND. NO FAIL) GO TO 50	DRIV 785
	10 NU FAIL= .FALSE.	DRIV 785
~		DRIV 787
~	www.cxtcla.cc.testestestestestestestestestestestestest	NDIV 700

DRIVE EFN SCURCE STATEMENT - IFN(S) ·	11/02/67.
	-
THE RUTUR TTP U-FACTUR	UKLV 107 011 703
	0814 773
= U.775LLIU(1)NLINES/ -V-41 0-05(1)NLINES/	URIV 91
###11#U~U~UFL(1//#(U(1-1#NLINE)/~UV1+1#NLIME3/~UV1#NLIME3//#W 0/1 1/- 2 #///// N//N/ES//A#0//// _0#0/	UKIV 792
UI 1 0 1 1 = ~ 20 4 1 UI 1 0 NLINE 31 + A FW // 1 0 FWFW/ DI 1 - 33 - 10 D/ 1 - NI TNES 1 + 43 ACY/1 - NI TNES 1 + 43 AU/1 - NI TNES 1 + 43 - A 4A 1/	UKIV 195
Ulij2/== \UKiljNLINES/**2*UK(IjNLINES/**2*U(IjNLINES/**2*A*A// 1_00*0\	
100 -WTWF DAS1- CC(1,11++3,, / #CO(1,3)	01V 706
C / CD 2C1 1 / 1 / CALL CD () 221	001V 173
F (CNAJI)[]0007 GALL ERROR(JD7 0401- CNDT/EDAC11	NPTV 798
± _CO(1.1) _EUAS1	0814 793
= 0.5±R	DRIV 801
= AMTN) (V) (I), R)	
= (II(I.NITNES)+P -U(I-).NITNES)+CU(I-).NITNES))+ATAR(I.NITNES	DRTV 803
*2. A/G.I	DRIV 804
= TC(1-).NI INFS)	DRIV 805
ALL ENTAL P	DRIV 805
[IP= PO(1-1.NLINES)*FXP((THEEN3(TSTAT(J)) - THERM3(T))/DCP)	DRIV 807
	DRIV 809
*** CALCULATE THE TANGENTIAL VELOCITY FROM	DRIV 809
THE HUB ABSOLUTE MACH NUMBER	DRIV 812
	DRIV 811
QCO=CX(I+1)**2 +CR(I+1)**2	DRIV 812
= SOC0 +(U((+1)**2	DRIV 813
= -V/GJ	DRIV 814
= TO(1.1)	DRIV 815
ALL ENTAL P	DRIV 815
ALL GAM	DRIV 817
MI= GR2+GAMMER+TSTAT(J)	DRIV 819
= VM[*HMN(])**2 - SGCO	DRIV 819
F (A.LE.O.O) CALL ERPOR(3C)	DRIV 823
JHMN≈ SQRT(A)	DRIV 821
	DRIV 822
*** CALCULATE THE TANGENTIAL VELOCITY FROM	DRIV 823
THE HUB RELATIVE FLOW ANGLE	DRIV 824
	DRIV 825
JBETA= U(1,1) -SWRT(CX(1,1)**2 +CR(1,1)**2)*TAN(HMN(1+1))	DRIV 825
	DRIV 827
*** CALCULATE THE TANGENTIAL VELOCITY FROM	DRIV 828
THE STATUR HUB D-FACTOR	DRIV 829
	DRIV 830
A= (-SQRT(CX(I+1,1)**2 + CU(I+1,1)**2 + CR(I+1,1)**2) -	DRIV 831
CU(I+1,1)/2./SOLID(I+1,1))/(DFL(I+1)-1.)	DRIV 832
3=.5/(DFL(1+1)-1.)/SOLID(1+1.1)	DRIV 833
C= 44*88/(B6*88-1.)	DRIV 834
A=((CX(I,1)**2+CR{I,1)**2)-AA*AA)/(]BB*BB)	DRIV 835
A= CC+CC - AA	DRIV 835
	DRIV 837
*** ERROR TRANSFER TO A NEW DATA SET	DRIV 839
• ·	DRIV 839
- (AA.LT.O.) CALL ERROR(11)	DRIV 840
A= SORT(AA)	DRIV 841
	DRIV 842
*** CHECK FUR MULTIPLE POSITIVE ROOTS	DRIV 843
	00 T 11 0 / /

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and a second a second and the second 11/07/67 SOURCE STATEMENT EFN IFN(S) DRIVE. DRIV 845 **DRIV 845** IF. (CU(I, 1).LE.O.U) CU(I, 1)=AA-CC DRIV 847 *** SELECT THE MINIMUM OF THE HUB TANGENTIAL VELOCITIES **DRIV 848** С DRIV 847 DRIV 853 CU(I+1)= AMIN1(CU(I+1)+ CUHMN+ CUBETA) DRIV 851 H= (CU(I,1)+U(I,1' -CU(I-1,1)+U(I,1))+ATAR(I,1)+2.0/GJ **DRIV 852** T = TO(1-1,1)**DKIV 853** CALL ENTALP **DRIV 854** A = (R(I,1) - RH(I))/(RS(I) - RH(I))DRIV 855 A = NORM(K) + (CUCO(1,1)/(CUCO(1,2) + A) + CUCO(1,3)DRIV 855 X + (CUCO(1,4) + CUCO(1,5) + A) + A)DRIV 857 *** CALCULATE THE REQUIRED TIP TOTAL PRESSURE DRIV 859 C DRIV 859 **DRIV 860** PU(I,NLINES) = AMIN1(PTIP, PO(I-1,1)*EXP((THERM3(TSTAT(J)) **DRIV 861** DRIV 862 X -THERM3(T))/ DCP) /A) **DRIV 863 DRIV 864** *** DETERMINE FLOW PARAMETERS C **DRIV 865** DRIV 865 15 DO 20 J=1,NTUBES **DRIV 867** *** DETERMINE THE TOTAL PRESSURES FROM THE PROFILE **DRIV 869** С **DRIV 869** DRIV 870 ~A= (R(1, J)-RH(1))/(RS(1)-RH(1)) 20 PO(I,J)= PO(I,NLINES)*NORM(K)*(CUCU(I,1)/(CUCO(I,2)+A)+CUCO(I,3)DRIV 871 +(CUCL(1,4) + CUCD(1,5)*A)*A) -**DRIV 872** X DRIV 873 DO 30 J=1,NLINES DRIV 874 IF (PO(I,J).LE.PO(I-1,J)) CALL ERROR (22) DRIV 875 **DRIV 875 ***** GET THE TOTAL TEMPERATURE PROFILE C DRIV 877 CALL THERM2(PO(I,J)/PO(I-1,J),TO(I,J))TO(I-1,J)) DRIV 878 DRIV 879 H= THERM1(TO(I,J)) - THERM1(TO(I-1,J))DRIV 880 H= H/ATAR(I,J)DRIV 881 ***** COMPLTE THE CORRESPONDING TANGENTIAL VELOCITY DRIV 882** C **DRIV 883 DRIV 884** CU(1,J)= (0.5*H*GJ +CU(1-1,J)*U(1-1,J))/U(1,J) **DRIV 885** T = TO(I-1,J)**DRIV 885** CALL ENTALP DRIV 887 TO(I,J) = TSTAT(J)**DRIV 889** H= ATAS(I+1,J)*H **DRIV 889** CALL ENTALP PO([+1,J)= PU([-1,J)*EXP((THERM3(TSTAT(J)) -THERM3(T))/DCP) DRIV 893 DRIV 891 CALL THERMP **DRIV 892** TO(I+1+J) = TO(I+J)CP(I+1,J) = CP(I,J)**DRIV 893 DRIV 894** GAMMA(I+1,J) = GAMMA(I,J)DRIV 895 *** DETERMINE THE TANCENTIAL VELOCITY AT THE STATOR EXIT С **DRIV 895 FRIV 897** 30 CU(I+1,J)= (CUCO(I+1,1)/R(I+1,J) +CUCC(I+1,2))/R(I+1,J) D (IV 898 DRLV 897 +CUCO(I+1,3) X X +(CUCD(I+1,4) +CUCO(I+1,5)*R(I+1,J))*R(I+1,J) DRIV 900

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DRIVE EFN SQURCE STATEMENT - IFN(S) -	11/02/67
· ·	DRIV 901
50 CONTINUE	DRIV 902
	ORIV 903
*** U. JATE THE EXIT	DRIV 90
	DEIA 00
$DU = 60 I = N \times 2 + N \times 10^{-10}$	DRIV 90
DC 60 J=1,NLINES	DRIV 90
PO(I,J) = PO(I-1,J)	DRTV 90
$CU(I_{J}) = CU(I_{J}) * R(I_{J}) K(I_{J})$	DRIV 90
CP(I,J) = CP(I-1,J)	DRTV 91
TO(I,J) = TO(I-I,J)	DRTV 91
O GAMMA(I,J)= GAMMA(I-1,J)	DRIV 91
RETURN	
	10011 11

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IFN(S)

	SUBROUTINE ENT	ΔΙΡ						н.	914
	COURSE PRECISIO						-	н.	915
	COMMEN /ENERGY	/ H. T. CAN	AMER					н.	916
								н.	917
	*** CALCULATES	5 THE TEMPE	RATURE	RISE CORF	RESPONDIN	IG TO AN	-	H∉	919
	ENTHAL PY (HANGE						H.	917
	REAL MACE. M	APR. MOLEI	NT. JOU	LE				Η.	920
	DIMENSION ATAS	29.11).	=LGW(32)					н.	921
	INGICAL TERROR	R. YES:					-	н.	922
	COMMEN /MATRIX	ΛΙΡΗΔ()	0.11).	A TAR (29	11).	82(29).		11.	923
>	AFTA(10.11).	BH(32).		BLADE(29	· · · · · · · · · · · · · · · · · · ·	BT(32).		Н.	924
Ś		CP(32-1	1).	CPCO(6)	•	CR(32.1	1),	н.	925
Ś	CSIGPEL10.111.	CU2(11)	•	CU(32+1)		CUCU129	,5),	н.	926
Ś	(CX(32,11),	C XM(10.	11).	CXNEW(10).11).	CXRATOL	291,	H.	927
Ś	C C X S (1 0 , 1 1) .	DA(10).		DELM(11)	•	DEPV(10	.11),	H.	928
Ś	(DE 201.	DEACT(2)	9.11).	DFL(29)		DFLOW(3)	2),	Н.	929
Ś	(FMACH(29.11)).	EDUND(2)	0.3.10).	FROEL (10	5.117.	GAMMA (3)	2,111,	H.	.930
Ś	(HMN[29].	HUB(32)	•	1KK(10)		MACH(29	.11),	н.	931
5	(NBAR(29.11) .	PD132-1	11.	K (32.11		RCURVEL	10,11),	H.	932
,	(RH(32).	RH0132+	11).	RINTII	· · · · · · · · · · · · · · · · · · ·	RESTAGE	11),	Η.	933
Ś	(RS(32).	RSLOPEL	10.11).	RTRAIL	11).	S0C0(29	,5),	H.	934
2	(SOLID(29.11).	SSC0(29	•5)•	TERM1(1)	0,111,	TERMA(1	1),	H.	935
· ,	(TERMB(11).	TERMC(1	1).	TIP(32)	•	TITLE(1	21 +	н.	935
,	(TO(32.11).	TSTAT(1	1).	0132,11) .	w(11),		H.	937
,	(X(32)							H.	939
	COMMON /SCALER	/ Δ.	AA.	A 10A 0.	4202A0+	A303A0.	A404A0,	н.	939
3	(A505A0. 8.	BB.	CC.	CM,	CMEAN,	CMEANP+	COINTG.	Н.	940
,	CP12. CP13.	CPI4.	CPI5.	CP16,	CP02,	C PD3.	CP04.	H.	941
,	CPUS. CAMP.	DCP.	DD,	DIFCM,	DT,	DUMMY .	ERAS1,	H.	942
	G. GASK.	6.1.	GK,	GR2,	JOULE .	MAPR,	MOLEWT,	H.	943
2	K PUCO. C.	RPM.	TCP.	TERMD.	TESTBH.	TESTOS,	TESTMS,	н.	944
5	K TOCU. TOL.	TOLAT,	TUL B2,	TOLMIN,	TOL 45,	TOLTIP,	TOLCP,	н.	945
1	K TOLCX. TOLR.	TCTINT,	TOTPR .	۷,	VMI			H.	945
	COMMON /INTEGR	/ 1.	IB .	181,	LDUMP,	/ERROR+	IFIRST,	H.	947
;	CIG. ICUTTR	, IPASS,	15,	17,	J.	JIN.	JJ.	н.	949
2	KJM, JM1,	K,	K1.	KK,	L,	LIMIT,	LSTAGE,	H.	949
2	K MSTAGE, NLINE	S, NTURES,	NX.	NX1.	YES			H.	950
	EQUIVALENCE (AT AR (1,1),	ATAS(1.1)), (FL	0W(1),DF	LOW(1))		H.	951
	HOT= THERM1(T)							H.	952
	TSTAT(J) = H/CP	(1,1) +T						н.	953
	DO 10 ITER=1.2	5						H.	954
	HIT= THERML(TS	TAT(J))						H.	955
	E=H-HIT +HOT							H.	955
	TSTAT(J) = E/CP	(1,1) +TST	AT(J)					H.	957
	IF (ABS(E).LE.	0.01) GO	TÚ 20	,	0			H.	958
10	CONTINUE			_				H.	958
	CALL ERROR(S)							H.	957
20	RETURN -							H.	960
	END							Η.	961

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EFN

SOURCE STATEMENT

			11/02/67
ERROR EF	N SOURCE STATEMENT	- IFN(S) -	
	- . .		
SUBROUTINE ERROR (IER			ERRO 962
DOUBLE PRECISION TIT	LE		ERRO 963
REAL MACH. MAPR, M	IDLEWT, JOULE		ERRI 964
DIMENSIUN ATAS(29,11)	, FLOW(32)		EPRO 965
LOGICAL IERROR, YES	÷		ERR() 966 -
COMMEN /MATRIX/ ALPH	(10, 11), ATAR(29)	11), B2(29),	EPRC 967
X BETA(10,11), BH(3	32), BLADE(29), BT(32),	EPRO 969
X CO(10,11), CP(3	(2,11), CPCO(6),	CR(32,11),	ERPD 969
X CSLOPE(10,11), CU2(11), CU(32,11), CUCU(29,5)	• FRRD 970
X CX(32,11), CXM(10,11), CXNEW(10	+11)+ CXRATG(29)	• ERRO 971
X CXS(10,11), DA(1	0), DELM(11)	• DEPV(10,11), ERR- 972
¥ DF(20)+ DFAC	T(29,11), DFL(29),	D.FLOW(32);	ERRU 973 -
X EMACH(29,11), FOUN	D(20,3,10), FRDEL(10	+11), GAMMA(32+1	11, ERRD 974
X HMN(29), HUB(32), IKK(10),	MACH(29,11), EPPD 975 -
X OBAR(29,11), PO(3	2,11), R(32,11)	RCURVE(10)	11), ERR7 976
X RH(32), RHO(32,11), RINT(11)	ROSTAG(11)	• ERRO 977
X RS(32), RSLO	PÉ(10,11), RTRAIL(1	1), SOCO(29,5)	• ERKO 978
X SCLID(29,11), SSCC	(29,5). TERM1(10	,11), TERMA(11),	ERRO 979
X TERMB(11), TERM	C(11), TIP(32),	TITLE(12).	FRR0 980
X TO(32,11), TSTA	T(11), U(32,11)	• W(11).	ERRO 981
X X(32)		· · · · ·	ERRO 982
COMMON /SCALER/ A,	AA, A10AO,	A202A0. A303A0. A4	0440. FRR0 983
X A505A0, 8, BB,	CC+ CM+	CMEAN . CMEANP. CO	INTG. FRRD 984
X CP12, CP13, CP14	• CP15• CP16•	CP02 . CP03 . CP	14. FRRD 985
X CPOS. DAMP. DCP.	DD. DIFCM.	DT. DUMMY. FR	
XG. GASK. GJ.	GR. GR2.	JOULE. MAPR. MO	LEWITA ERRO 987
X PUCO. C. RPM.	TCP. TERMD.	TESTRHA TESTOS. TE	STMS. EPPN ORR
X FOCO. TOL. TOLA	T. TOLB2. TOLMIN.	TOLMS. TOLTR. TO	
X TOLCX. TOLR. TOTI	NT. TOTPR. V.	VMI	
COMMEN /INTEGR/ 1.	tea teta	TOUMP. TERROR, TE	1851, EDO 001
X IG. ICUTTR. IPAS	S. IS. IT.	La ITNA II	
X JM. JM1. K.	K1. XK.	- ITMT. IS	• ERRO 376 [Ace. 6000 003
X MSTAGE, NEINES, NTUR	ES. NX. NXI.	VEC 2101114 23	
FOULVALENCE (ATARIL.	11.ATAS(1.11). (ELO	4(1).DELOW(1))	
CCMMON /ENERGY/ H. T.	GAMMER		EPPD 006 -
COMMEN /VMIN/ VO(29)			
INTEGER ALTER			
COMMON / SPECAL / NORME	14). NX2. NO FALL		EPDD 000
COMMON /VGEUM/ ALH(29). AIT(29).	AL TERS	EPDD1000
X ASPECT(29) . FPAT	H. SAVEA(29		EPPOIOO
CATA LER /0/		,	
WRITE (6.5) IERR			
5 FCRMAT (/// 13H ERROR	NUMBER 13/////	,	E801003
1FR = 1FR + 1			
IF (IFR.GT.25) GO TO	1050		
GO TO (10, 20, 30,	40, 50, 60, 70,	80. 80. 100. 110	- 120 - EPDD1007
X 130, 140, 150, 160,	170, 180, 190, 200,	307 - 307 - 1007 - 110	250, EPHD1000
X 260, 270, 280, 290,	300, 310, 320, 330, 3	109 2209 2309 2409 140. 350) tebp	
10 WRITE (6.11)		TOT POULTRR	CRKUIUUY
11 FORMAT LOX ASHTHE LOS	S DATA SET PLOUESTED	FROM THE MASTED P	CRKJ101J "
XNOT AVALLARIA A	S UNIN SEE NEWUESTED	TRUP TE MASIEK P.	LEF IS ERKULUII
Ki zi			EKKUTOIS
60 TO 1040			
20 WRITE (6,21) I			5KKU1014
21 FORMAT /OF SPUTUE AVE			EKRO1015
WE CONTRACTOR AND	AL MALT NUMBER UP IN	: MINDLE SIKEAMLINE	AT STERRO1016
			ä

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	11/02/67
ERROR EFN SOURCE STATEMENT - IEN(S) -	
MATICA IN CONTRACTOR 1 0 1	ERR01017
XATION 13 / 9X LIPEXCEEDS 1.0 1	CP201018
GU TU 1900	EPPOIOIO
30 WRITE (6,51) I	
31 FURMAL (9X 44H-UNIINUINT CUULD NUT BE SATISFIED AT STATION 13	EPP01020
GU TU 1000	EDD11022
40 WKIIE (6:41)	E0001022
41 FORMAT (9X 40HIFE AXIAL VELUCITY TIERATION HAS FALLED.)	EPD01025
GO TO 1000	CD201025
50 WRITE (6,51) DELM	CRN 31023
51 FURMAL (9X 44HIHE FRAUTIUNAL MASS FLUWS ARE NUT INGREASING 7 7)	Eppn1023
X IIFIU-3 / 9X 24HIHEY WILL BE CHANGED 10+ 7	ERROIOZA
$A^{\pm} I \bullet 0 / FL GAT(N) (DES)$	ERR01020
UELM(I)= U.U.	E8831030
LU DE JEZONLINES	E8801030
DZ DELMIJIE UELMIJEII EA	FRR 11032
WRIIC (0+537 DELM)	E8801033
23 FUKMAI (9X 11F10+37	E001034
	EPP01035
- DU WELLE (0+CL) - (1 COMMAN LOW FOUTUR ANDER OF STREAMLINES MUST BE FITHER 5.7.9 Å	P 1168801036
OL FURMAL (94 DZHIFE NUMBER OF SIREAMLINES MUSI DE ELINEN DITATO	ERR01037
CO TO 1020	FRRM103R
	E8811039
TV WELLE TOTILISS TT FOUNAT LOY DENNO MODE THAN TO STACES FAN HE TNDU? T	ERROIDAD
AL PURMAR 198 JOHNU MURE THAN 12 STADES CAN BE INPUT T	ERRITION
MSTAUE = 12 CO TO 1040	ERRO1042
00 TU 1040 00 HDITE (6 91)H ()	E8801043
OU WELLE LOTOLINITIAL AT CODALL LOV DEAK CHANCE IN ENTHALDY DE ELA 5, 200 HAS LEAD TO A	EATERRO1044
VIDE TO EIND 70Y 24UA TEMPERATURE NEAR STATION 13, 15H AND STR	EAMLERRD1045
VINE TO FIND 77% ZONA TEMPERATURE NEAR STATEON TOT IN AND STA	ERR01045
	ERR 11047
00 10 1020 00 WDITE (6.01)	ERRD1048
ON WRITE (01777)	NINGERRO1049
Y ONLY))	FRR01050
	ERR01051
100 WPITE (6.101)	FR801052
101 FORMAT (9X AREFITHER A NON-POSITIVE INLET TEMPERATURE OR PRESS	URE ERRD1053
XHAS HEEN READ IN)	ERR01054
TOCO= ABS(TOCO)	ERR01055
PGCO = ABS(POCO)	ERR01055
IE (TOCO*POCO.E0.0.0) GO TO 1010	ERR01057
GU TU 1040	ERR01058
110 WRITE (5.111) I	ERR31059
111 FORMAT (9X 34HTHE STATOR HUB D-FACTOR AT STATION 13, 16H IS UN	ATTAERRO1060
XINABLE)	ERR01051
GO TO 1000	FRR01062
120 WRITE (6,121) I	ERR 01063
121 FORMAT (9X 60HA NEGATIVE STATIC TEMPERATURE HAS BEEN CALCULATE	D ATERRO1054
X STATION 13, SHCHECK /9X 33HTHE INLET CONDITIONS AND THE AREA) ERR01065
GO TU 1020	FRR01065
130 WRITE (6,131) ALTER	ERR01067
131 FORMAT (9X 36HA NEGATIVE AREA IS NEEDED AT STATION I3)	ERR01068
GO TO 1000	ERR01069
140 WRITE(6,141)	ERR01070
141 FORMAT (9X 44HA NON-POSITIVE ASPECT RATIO HAS BEEN READ IN)	ERR01071
ASPECT(I)= 2.5	ERROIOTZ

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11/02/67 EKROR. - LFN SOURCE STATEMENT - IFN(S) GO TO 1040 ERR01073 150 WRITE (6,151) ERR51074 1 151 FORMAT (9X 58HA NON-POSITIVE TOTAL TEMPERATURE HAS BEEN FOUND AT SERRD1075 XTATION 13) FRR01075 IER= 1ER +5 ERR01077 GO TO 1020 FRR01079 160 WRITE (0,161) ERRJ1079 J • I 161 FORMAT (9X 13HON STREAMLINE 13, 13H NEAR STATION 13, 52H & NON-POSERRD1080 XITIVE STATIC TEMPERATURE HAS BEEN DETECTED ERR01091) GO TO 1020 ERR01082 170 WRITE (6,171) BLADE(I) EPR01083 171 FURMAT (9X 15, 44H IS AN ILLEGAL SELECTION OF A LOSS DATA SET. / ERR01084 X 9X 24HIT WILL BE CHANGED TO 1. 1 ERR01085 1ER= 1ER +5 ERR01085 BLADE(1) = 1ERR01087 GO TO 1040 ERR01088 180 WRITE (6,181) ERR01089 181 FORMAT (9X 64HNCNE OF THE AERODYNAMIC LIMITS COULD BE MET AT ONE GERRO1090 XF THE STAGES) EPR01091 GU TO. 1000 ERR01092 190 WRITE (5,191) ERR01093 191 FORMAT (9X 38HTHE ITERATION ON EFFICIENCY HAS FAILED) ERR01094 GO TO 1000 ERR01095 200 WRITE (6,201) ICUTTR ERRD1096 201 FORMAT (112, 29H IS AN ILLEGAL OUTPUT TRIGGER) ERR01097 IOUTTR = 1ERR01099 GO TO 1040 ERR01099 210 WRITE (6,211) ERR01100 211 FORMAT (9X 45HAN UNREASONABLE HUB BLOCKAGE HAS BEEN READ IN) ERR01101 BH(I) = 1.0ERR01102 GU TO 1040 ERR01103 220 WRITE (6,221) I ERR31104 221 FORMAT (9X 58HTHE TOTAL PRESSURE HAS DROPPED ACROSS THE ROTOR AT SERRO1105 XTATION 13) ERR01105 GO TO 1000 ERR01107 230 WRITE (6+231) 1 ERR01109 231 FORMAT (9X 44HTHE HUB AND TIP RAMP ANGLE LIMITS AT STATION 13 /9X ERRO1109 X 25HHAVE BEEN READ IN AS ZERO) ERR01113 RH(I) = 20.0EPR01111 GO TO 1040 ERR01112 240 GO TO 1010 EPR01113 250 WRITE (6,251) ERR01114 251 FORMAT (9X 45HAN UNREASONABLE TIP BLCCKAGE HAS BEFN READ IN) ERR01115 3T(I) = 1.0**ERRJ1115** GO TO 1040 ERR01117 260 WRITE (6,261) ERR01119 261 FORMAT (9X 44HTHF ITERATION ON TEMPERATURE RISE HAS FAILED) ERR01117 GO TU 1000 ERR01120 270 WRITE (6,271) ERRO1121 271 FORMAT (9X 13HON STREAMLINE I3, 11H AT STATION I3, 54H A NON-POSITERRO1122 XIVE STATIC TEMPERATURE HAS BEEN CALCULATED 1 EPR01123 IER= IER +9 ERR01124 GO TO 1000 ERR01125 280 WRITE (6,281) I ERR01126 281 FURMAT (9X 58HAN UNREASONABLE D-FACTOR LIMIT HAS BEEN READ IN AT SERRO1127 XTATION 13) ERR01123

11/02/67 SOURCE STATEMENT -IFN(S) ERROR. EFN ERR01129 DFL(1)= 0.3 ERR01137 GO TO 1040 ERR 31131 290 WRITE (6,291) I + J 291 FORMAT (9X 57HTHE PRANDLE-MEYER ANGLE ITERATION HAS FAILED NEAR STERRO1132 FRRD1133 XATION 13, 14H ON STREAMLINE 13) FRR01134 GO TO 1000 ERR01135 300 WRITE (6,301) 1 301 FORMAT (9X 33HTHE FUB MACH NO. LIMIT AT STATION 13, 49H IS TOO LOWERRO1135 THE MERIDICNAL MACH NO. IS GREATER 19X 15HTHAN THE LIMIT.) ERR01137 Χ. ERRO1138 GO TO 1)00 ERR 31139 310 GO TO 1010 ERR01140 320 WRITE (6,321) 1 321 FORMAT (9X 83HEITHER A PRESSURE DROP OR A NON-POSITIVE TEMPERATUREERRO1141 ERRJ1142 X HAS BEEN CALCULATED AT STATION 13) ERR01143 IER= 1ER +9 FRR01144 GO TO 1000 FRR 31145 330 WRITE (6,331) I 331 FORMAT (9X 33HTHE ROTUR TIP D-FACTOR AT STATION 13, 15H CAN NOT BEERRO1146 FRR01147 X MET 1 ERR01148 GU TO 1000 ERR01149 340 WRITE (6,341) ALTER 341 FORMAT (9X 55HTHE EXIT AREA REQUIRED BY THE VELOCITY RATIO AT STATERRO1150 ERR 01151 XION 13,19X 21HCAN NOT BE DETERMINED) ERR01152 GO TO 1000 ERR01153 350 WRITE (6,351) 351 FORMAT (9X 36HTHE ITERATION ON GEOMETRY HAS FAILED) ERR01154 ERR01155 OUTPUT 1000 CALL ERR01156 Q45 1010 CALL PDU: P(ALPHA, X(32), 1, A, VMI, 1, I, YES, 2, NORM, NOFAIL, 1, VO, VO(29) ERRO1157 1020 CALL ERR01159 X ,1, ALH, SAVEA(29), 1) ERR01159 GO TO 101C ERR01160 1030 CALL EXIT ERR01161 1040 RETURN ERR 31162 1050 WRITE (6,1051) 1051 FORMAT (9X 56HTOC MANY EPROR HAVE BEEN DETECTED. EXECUTION TERMINERRO1163 ERR01164 XATED) ERR01165 GO TO 1030 ERR01165 END

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G A	M •	- 56 M	SOURCE	STATEMEN	T - IFM	1(5) -		11/02/67
SUPPOUT								GAME1167
3000000	TIME GAM							GAME1168
sistex τ₁-i	TS SURPOU		ULATES "		DE SPEC	LEIC HE	ATS	GAME1169
4.4.4. 1.1	13 300000	TINE OAL						GAME1170
DOURL F	PRECISION	TITLE	-					GAME1171
REAL M	ACH. MAP	R. MOLE	NT. JOUL	E				GAME1172
DIMENSI	UN ATAS(2	S· 11) ·	FLOW(32)					GAME1173
LUGICAL	IEPROR.	YES						GAME1174
COMMON	/MATRIX/	ALPHA(1	0,11),	ATAR (29	,11),	82(29),		GAME1175
X BETALL	0.11).	BH(32),		BLADE(29) ,	BT(32),		GAME1175
X CC(10,	111,	CP(32,1	1),	CPC0(6)	,	CR(32.1	1).	GAME1177
X CSLOPE	(10,11),	CU2(11)	•	CU(32,1)	L),	CUC0(29	,5),	GAME1178
X CX(32.	11),	CXM(10.	11),	CXNEW(10),11),	CXRATO	29),	GAME1179
X CXS(10	,11),	DA(10),		DELM(11)),	DEPV(10	.11),	GAME1180
X DF(20)	•	DFACT(2	9,11),	DFL(29)	,	DFLOW(3	21,	GAME1181
X EMACH(29,111,	FOUND(2	6,3,10),	FRDEL(1)),11),	GAMMA (3	2,11),	GAME1182
X HMN(29),	HUB(32)	•	IKK(10)	•	MACH(29	, 11) ,	GAME1183
X OBAR(2	9,11),	PU(32,1	1),	R(32,11),	RCURVE(10,11),	GAME1184
X RH(32)	,	RH0(32,	11),	RINT(11),	ROSTAGE	11),	GAME1185
X RS(32)	•	RSLOPE	10,11),	RTRAIL	11),	SOCO(29	,5),	GAMF1185
X SOLIDI	29,11),	SSC0129	151.	TERM1(1)	0,11),	TERMA(1	1),	GAME1187
X TERMB(11),	TERMCII	1),	TIP(32)	•	TITLE(1	2),	GAME1188
X TU(32,	11).	TSTAT(1	1),	U(32,11),	W(11),		GAME1189
X X(32)								GAME1190
COMMON	/SCALER/	Δ,	ΔΑ,	A10A0,	420240.	A 30 3A 0 +	A404A0,	GAME1191
X A50540	• 8•	BB,	CC,	CM,	CMEAN +	CMEANP,	COINTG,	GAME1192
X CPI2,	CP I 3 ,	CPI4,	CPI 5,	CP16,	CP 02+	C PO3+	CP04+	GAMF1193
X CP05,	DA MP +	DCP,	DD,	DIFCM,	DT;	DUMMY,	ERAS1,	GAME1194
X G.	GA SK 🖡	GJ,	GR,	GR2,	JOULE.	MAPR,	MOLEWT,	GAME1195
X POCO,	ς,	RPM.	TCP,	TERMD.	TESTBH,	TESTDS,	TESTMS,	GAME1196
X TUCO,	TOL,	TGLAT,	TOLB2,	TOLMIN,	TOLMS,	TOLTIP,	TOLCP,	GAME1197
X TELCX.	TOLR,	TOTINT,	TOTPR .	V ,	VMI			GAME1198
COMMON	/INTEGR/	1,	18,	181,	TOOMA4	LERKUR .	1618514	GAMEIL99
X IG,	IOUTTR,	IPASS,	IS.	11,	J,	JIN,	JJ.	GAME 120J
X JM.	JM1.	K,	Kl.	K K 🛊		C1011+	LSTAGF,	GAMEIZUI
X MSTAGE	NLINES,	NIUBES,		 \ \	765 2001 2 250	0.000		GAME 1202
EQUIVAL	ENCE LAT	AK(I)I),	A (A 5 (1 + 1 MMCD	774 (PL)	JM(T)+D+I	LOW(I))		GAME12U3
	/ENERGY/	F , 1, GA		(CDCO 14)	. In provi		14.5	CAME1205
A= UPU-] V →TCTA	1111 +16P6 7/11 +470		200131 + *******	1 1	TUPUU	> / +℃ ₽℃Ŭ	101	CAME1202
x #151A	1 ()) × 1 2	TATEJI I	+121411J	, ,				CAMEIZUD
A TISTA	- X/(A =00 A (J) J≁(2	1A11JJ						CAME1202
DETUDN	A71A -00	r 1						GAME1203
								CAME1217
ENU								VAMEILI

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57. * POOR: REPRODUCIBILITY OF THE ORIGINAL PAGE IS 1 • ••• • • • • • • • • • • 11/02/67 TFN(S) SUURCE STATEMENT GEGM . EFN GEOM1211 SUBROUTINE GEOM GE0M1212 COMMON /VANE/ NBLADE GF0M1213 DOUBLE PRECISION TITLE GF0M1214 MOLEWT, JOULE REAL MACH. MAPR. GF0M1215 DIMENSION ATAS(29,11), FLOW(32) GEOM1215 LOGICAL IERROR, YES GE0M1217 B2(29), ATAR (29,11), ALPHA(10,11), COMMEN /MATRIX/ GEOM1219 BT(32). BLADE(29). X BETA(10,11), BH(32), GEOM1217 CR(32,11). CPC0(6). CP(32,11), X CC(10,11), GEOM1220 CUCO(29.5). CU(32,11), CU2(11), X CSLOPE(10,11). GEOM1221 C XRAT0[29]+ CXNEW(10,11), CXM(10,11), X CX(32,11), GEOM1222 DEPV(10,11), DELM(11), DA(10), x cxs(10,11), DFLOW(32); GEOM1223 DFACT(29,11), DFL(29), X DF(20), GE0M1224 FRDEL 10,111, GAMMA(32,11). FOUND(20,3,10), X EMACH(29,11). GEOM1225 MACH(29,11), IKK(10), HUB(32), X HMN(29), GEOM1225 ACUPVE(10,11), F(32,11), PO(32,11), X OBAR(29,11), GEOM1227 RESTAG(11), RINT(11), RH0(32,11), X RH(32), GEOM1228 \$000(29,5), RTRAIL(11), X RS(32), RSLOPE(10,11), GEOM1229 TERMA(11), TERM1(10,11), SSC0(29,5), X SCLID(29,11), TITLE(12), GE0M1230 T1P(32), TERMC(11). X TERMB(11), GE041231 W(11), U(32,11), TSTAT(11) + X TC(32,11), GEDM1232 X X (32) A202A0, A303A0, A404A0, GEOM1233 ΔΔ, A10A0, Α, CUMMON /SCALER/ CMEANP, CUINTG, GEOM1234 CMEAN+ ίς, CM. X A505A0, B, 88. C P03+ CP04+ GEOM1235 CP02 . CP16. CP15, X CP12. CP 13, CPI4. DUMMY . ERAS1. GEOM1236 DIFCM. DT. X CP05, DAMP. DCP. DD. GE' M1237 JOULE. MAPR. MOLEWT, GR2, GR: XG, GASK. GJ, GEOM1238 TESTBH, TESTDS, TESTMS, TCP, TERMD. X PUCO, C. RPM, GE041239 TOLMS, TOLTIP, TOLCP, TOLB2, TCLMIN, TOLAT. х TOCO, TOL, GEOM1243 VMI TOTPR . ۷. TOLR, TUTINT. TOLCX, х IERROR, IFIRST, GE0M1241 181, IDUMP, COMMCN /INTEGR/ Ι, 16. JJ, GF0M1242 JIN. J, 11, ICUITR, IPASS. 15, X IG, LIMIT. LSTAGE, GEOM1243 K1, L, JM1 . KK, Κ. X JM. GEOM1244 NX1. YES X MSTAGE, NLINES, NTUBES, NX, GEOM1245 (FLOW(1), DFLOW(1))EQUIVALENCE (AT AR (1, 1), ATAS(1, 1)), GEOM1245 INTEGER ALTER GEDM1247 COMMON /SPECAL/ NORM(14), NX2, NO FAIL GEOM1248 ALT(29). ALTER, ALH(29), COMMON /VGEDM/ GE041249 FPATH, SAVEA(29) X ASPECT(29), GEOM1253 NORM REAL GECM1251 GEDM1252 ***** ITERATION DAMPING FACTOR** GEDM1253 / 0.4 / DATA RETARD GE041254 GEOM 1255 *** SET THE BLADE ROW COUNTER TO ZERO GEOM1256 GE0H1257 NTRY= () GEOM1258 *** AFTER ONE BLADE ROW HAS BEEN ALTERED THE PROGRAM WILL GEOM1259 LOCK AT ALL OF THE OTHER BLADE ROWS BEFORE CHECKING GEOM1260 GE041261 OR ALTERING THIS ONE AGAIN GEOM1262 GE0M1263 10 ALTER= ALTER +1 GE041264 *** IF THE BLADE ROW JUST CHECKED OR ALTERED WAS PHYSICALLY GED 41265

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	GECM.	– EFN	SOURCE STATEMENT - IFN(S) -	
				CEOM1266
	THE LA	ST BLADE RO	W IN THE COMPRESSOR RETURN TO THE	0041267
	FIRST	UNE BEING C	CNSIDERED	CEOM1268
I	E CALTER.GT.	LSTAGE) AL	_TER= IFIRST	CEOM1201
•				GEUN1207
	*** CALCUL	ATE THE VEL	LUCITY RATIO	GEU 1270
v	TO $J = CX(A)$	TFR .JMJ/CX	(ALTER-1,JM)	GEUM1271
•				GEUM1272
	*** CHFCK	THE ACTUAL	VELOCITY RATIO AGAINST THE DESIRED RATIO	GEUM1273
T	E (ABSIV TO	V -CXRATGI	ALTERI).GT.TOLTIPI GO TO 30	GEUMI274
	F THUST TU	• •		GEUM1275
	AAA INCOES	IENT THE BL	ADE ROW COUNTER	GEUM1276
	TOV- NTOVAL			GE041277
N	$\Pi KI = J \Pi KI + I$			GEOM1273
	· · · ·		OKS REEN CHECKED	GENM1279
_	*** HAVE 4	IDIADES CO		GEOM1280
	E INIKY.Lt.	DLAUE / GU		GEOM1281
F	RETURN			GEDM1292
			CHOCKLOARLE RATIO HAS REEN FOUND	GEOM1293
	*** INEIC	AIE IHAN AN	UNVESTRADEL VALLO HAS STOLE STOLE	GE0M1284
	LERROR= TRUI	E.		GECM1285
	-			GEOM1286
	*** SAV2	THE HUBTIP	AND AXIAL LUUKUINATES	GEOM1287
(SLD HUB= RHI	ALTERI		GED41283
(DLD TIP= RS'	ALTERI	· · · ·	GEOM1289
(CLD X= X(A)	LTER)		GEO 1293
				CECH1221
	*** CALCU	LATE THE TI	P AND HUG LIMITS .	0001271
-	TTP LIM= RS(ALTER-1) +(X(ALTER) - X(ALTER-1)) + ALT(ALTER)	0001272
1	HUB LTH= RH(ALTER-1) +(X(ALTER) -X(ALTER-1))*ALH(ALTER)	00041299
				GEUM1294
	*** DETER	AINE THE EX	LIT AR EA -	GEUM1295
	ADEA= IRSIAI	TER) -RH(AL	TER))#(RS(ALTER) +RH(ALTER))	GEUMIZAO
	MALA- 1.131-2		· · · ·	GE0M1297
	*** (////	EATE AN ARE	A CHANGE	GEOM1298
	- ADIA- ADEA	±((V TO V/	(CXKATO(ALTER)) ** F. TARD -1.0)	GEOM1299
	L AREA- AREA			GEOM1303
	*** ****	CEAC IN THIT	OF THE AREA CHANGE	GE0M1301
	· ###· 1 231	LEW210101.	D AREA-GE-DLD HUB**2) CALL ERROR (34)	GE0M1302
	IF (-) AKEA.	VE+AFEA+UF	D DECREVETORS NOT TO THE PARTY	GEOM1303
		-		GEOM1304
	### IS [H	T O OL CO		GE0M1305
	IF (D AREA.G	1.U.U. U. GU		GE0M1305
				GEOM1307
	*** DETER	MINE THE N	CN 1999 _0 ADEA1	GE041308
	RH(ALTER) = S	QRITCH (ALTI	CKITTC TU ANCAI	GE041309
			TA AN THE FINIT	GED 1310
	*** [S TH	E HUB LESS		GEOM1311
	IF (RH(ALTER	().L".HUB L	TWJ OD ID ADA	GEOM1312
			THE TO BE STATIST FUCH THE TID	GEOM1313
	*** CALCU	JLATE THE A	REA TO BE UBIAINED FRUM IME TIP	GEOM1314
	D AREA= (HUE	N LIM -RH(A	LTER))*(HUB LIM +RHIALIFKI)	- CEUAIJIE
•			с с	05031313
-	*** S.ET	THE HUB ON	ITS LIMIT	02071310
	RH(ALTER) =	HUB LIM		UCUM131/
		-		GEUM1518
	*** DETE	RMINE THE T	IP RADIUS	GFUM1319
	RS(ALT FR)=	SURTIRSIALT	ER) ##2 +D AREA)	GEUMI32J
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		11/02/67
	GEGM EFN SOURCE STATEMENT - IFN(S) -	
C	*** IS THE TID AROVE ITS ITMIT	GEDM1322
•	TE (RS(ALTER), GETTIP (IN) GO TO 90	GEON1323
		GEON1324
C	*** CALCINATE THE ANNIHUS AREA	GE041325
÷	AREA= (RS(A) TER) -RH(A) TER))*(RS(A) TER) +RH(A) TER))	GEDM1325
		GE041327
C.	*** DETERMINE THE ASPECT RATIO FROM THE REQUIRED AREA	GE041323
•		GE041329
	40 AA= (ALT(ALTER) -ALH(ALTER)) *(ALT(ALTER) +ALH(ALTER))	GEOM1330
		GE0M1331
C	*** CHECK HOR TWO POSITIVE BOOTS	GEOM1332
•	IF (AA.EQ.Q.Q) GO TO 50	GEOM1333
	$BB = \{RS(AUTER-1) \neq AUT(AUTER) - RH(AUTER-1) \neq AUH(AUTER)\} / AA$	GEDM1334
	CC = ((RS(ALTER-1) - RH(ALTER-1)) + (RS(ALTEK-1) + RH(ALTER-1)) - AREA)	GE0M1335
	Х /АА	GEOM1336
	AA = -BB + SQRT(BB * 2 - CC)	GEOM1337
	GO TO 60	GEOM1338
	50 AA= ((RS(ALTER-1) -RH(ALTER-1))*(RS(ALTER-1) +RH(ALTER-1)) -AREA	GEOM1339
	X /(2.0*ALH(ALTER)*(RS(ALTER-1) +RH(ALTER-1)))	GE0M1340
	60 ASPCT= (RS(ALTER-1) -RH(ALTER-1))/AA	GEOM1341
C	<b>***</b> RETARD THE ASPECT RATIO CHANGE	GEOM1342
		GEDM1343
	IF (ABS((ASPECT(ALTER)-ASPCT)/ASPECT(ALTER)).GT.0.1)	GENM1344
	X ASPCT = ASPECT(ALTER)*(1.0 +SIGN(0.1.ASPCT -ASPECT(ALTER)))	GE0M1345
		GEOM1346
С	*** CHECK THE LIMIT	GEOM1347
	ASPECT(ALTER)= AMIN1(ASPCT, SAVEA(ALTER))	GE041348
		GEOM1349
С	*** CALCULATE THE AXIAL LENGTH	GEDM1350
	DT= (RS(ALTER-1) -RH(ALTER-1))/ASPECT(ALTER)	GEOM1351
	X(ALTER)= X(ALTER-1) +CT	GEOM1352
	·	GEOM1353
C	*** SET THE HUB AND TIP ON THEIR LIMITS	GEOM1354
	RH(ALTER)= RH(ALTER-1) +DT*ALH(ALTER)	GEOM1355
	RS(ALTER) = RS(ALTER-1). +DT*ALT(ALTER)	GEDM1355
	GO TO 90	GEOM1357
		GEOM1359
C	*** IS THE ASPECT RATIO ON ITS LIMIT	GEOM1359
	70 IF (ASPECT(ALTER).EQ.SAVFA(ALTER)) GO TO 80	GEUM1360
	AREA= AREA +D AREA	GF0M1361
	GO TO 40	GEDM1362
		GEOM1363
С	*** DETERMINE THE TIP RADIUS	GEOM1364
	80 RS(ALTER) = SQRT(RS(ALTER) + 2 + 0 AREA)	GEOM1365
-		GEOM1366 -
С	*** IS THE TIP ABOVE ITS LIMIT	GEOM1367
	IF (RS(ALTER).LE.RS(ALTER-1)) GO TO 90	GEOM1368
	U AKEA= (KS(ALIEK)-KS(ALTER-1))*(RS(ALTER) +RS(ALTER-1))	GEOM1369
~		GEDM1373
G	THE SET THE TIP HUKIZUNIAL	GEOM1371
	KOLALIEKJE KOLALIEK-11	GEOM1372
~	WAY DETEDMINE THE NEW WUD	GEUM1373
5	TTT DEFERMINE FREN MUD Dufattering Cortobiattering - D Aucai	GEUM1374
	KNIALICKJE SWRIIKNIALICKJETZ TU AKCAJ	GEUMI375
	JU I- ALIEN	URUM1375 CEON1377

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	GEOM EFN SOURCE STATEMENT - IFN(S) -		;
-		CE041370	د.
C	TTT MUVE THE STREAMLINES	GEU~1373	
	CALL RADIUS	CENN1393	Ť
<i>c</i>	ATT THAT THE DECCHOE NORMAL STING EACTOR IE THIS	GEOM1381	-4
L C	TE A DUTOD EVIT	GEOM1382	
6	IS A RUIUR EALL	GEON1383	*
	K- 1/2	GEOW1384	1
	N- 176 TE (KAK NE T) CO TO 95	GEOM1385	
	A = (P(T   N  T N   S) - PH(T))/(PS(T) - PH(T))	GEOM1386	7
	M = 1((1)(1)(1)(1)(1)(1)(1)(1)(1)(1)(1)(1)(1	GE0M1387	
	$x = \{(1)(0)(1,4) + (0)(1,5) + 4\} + 4\}$	GE0M1389	-5
		GE0M1387	
C	*** IS THIS THE LAST BLADE ROW	GE0M1390	1
Č 9	5 IF (ALTER-EQ-LSTAGE) GO TO 130	GEUM1391	
	K = AITER + 1	GFDM1392	
		GE0M1393	1
С	*** UP-DATE THE DOWN STREAM BLADE ROWS	GEOM1394	•
-		GE0M1395	
	DU 120 I=K,LSTAGE	GEOM1395	-
	DT = (RS(I-1) - RH(I-1)) / ASPECT(I)	GEOM1397	
	HUB LIM= RH(I-1) +CT*ALH(I)	GEOM1398	
	TIP LIM= $RS(I-1) + DT + ALT(I)$	GEUM1399	
	A= RH(I-1) +(RH(I) -OLD HUB)*DT/(X(I) -OLD X)	GE0M1400	1
	B= RS(I-1) +(RS(I) -OLD TIP)*DT/(X(I) -OLD X)	GEOM1401	
	OLD HUB= RH(1)	GEDM1402	
	OLD TIP= PS(1)	GEOM1403	-
	OLD X= X(I)	GEOM1404	1
	X(I) = X(I-1) + DT	GE0M1405	
	RH(I) = A	GEOM1405	
	RS(I) = B	GE041407	1
		GEOM1408	
<b>C</b> ,	*** CHECK THE LIMITS	GE0M1409	
		GE041413	1
	IF (RS(I).LI.IP LIM) GU IU IOU	- GEUM1411	
	IF (RH(I).GI.HUB LIM) GU IU IIU	GEUM1412	-
• •	GU TU IZU	GEUMI413	_
10	0 RS(1)# 118 LIM	GELIMI414	
11	U KHIIJ= HUD LIM	GEUM1415	
12	D CALL KAUTUS	GEUM1415 CEUM1417	
13	O CALL AN EALT	(CEOM1417	3
r	ATT THE COMPRESSOR FYIT	CEOMIAID CEOMIAID	
C	THE COMPRESSOR LAIT	GEOM1417	-
	DD 140 [=NX2•NX	GFN41423	•
14	O CALL RADIUS	GEOM1422	
• •	GU TO 20	GEOM1422	
	END	GEOM1424	
		12° της 12° 1' φ. Τ΄ δης 'Τ΄	1
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		PA	GE 146					
	INEST.	- EFN	SOURCE	STATEMEN	r – 1fi	N(S) -		
	SUBROUTINE INEST	r -						1HE51402
	*** MAKES IN	TTAL EST	MATES O	E AXTAL V		ES FOR		INES1484
	STATIONS	RETWEEN I	ALADE RO	M.S.				INES1485
		DETHELM						INES1486
	DOUBLE PRECISIO							<b>INES1487</b>
	REAL MACH. MAI	PR. MOLE	at. Jou	I F				<b>INES1488</b>
	DIMENSION ATASL	29.11).	=L()W(32)					INES1489
	LOGICAL IERROR	• YES	2011/22/					INES1490
	COMMEN /MATRIX/	ΔΕΡΗΔΕΙ		ATAR (29	.11).	82(29).		INES1491
)	( BETA( 10 . 11 ).	BH(32).	- , ,	BLADE(2)	9).	B1(32).	-	<b>INES1492</b>
,	K CC(10.11).	CP(32.1	11.	C PC0 (6)	•	CR(32+1	1).	INES1493
1	K CSI (PF(10,11).	CU2(11)		CU[32.1	, 	CUC0(29)	.5).	<b>INES1494</b>
,	K CX(32.11).	CXM(10.	í1).	CXNEW(1)	0.11).	CXRATOC	29)	INES1495
1	CXS(10.11).	DA(10).		DELM(11	) <b>.</b>	DEPV(10	.11).	INES1496
,	(DF(20).	DFACI(2	9.11).	DFL (29)	•	DELOWI3	21.	INES1497
1	( FMACH(29.11).	FOUND (2)	0.3.101.	FROEL (1)		GAMMA (3)	2.11).	<b>INES1498</b>
1	K HMN(29).	HUB(32)		IKK(10)	•	MACHI 29	.111.	INES1499
1	( <b>OBAR(29.11</b> ).	PD(32.1	11.	R132-11	, ) .	RCURVE	10.11).	INES1500
,	K RH(32).	RH0(32.	11.	RINTII	).	ROSTAGE	11).	INES 1501
,	x RS(32).	R SLOPE(	10.11).~	RTRAIL	11).	SOCO(29	.5).	INES1502
	<b>K</b> SOL ID(29.11).	S SC0 ( 29	.5).	TERM1(1	0.11).	TERMA(1)	1).	INES1503
3	X TERMB(11).	TERMC(1	1).	TIP(32)	•	TITLE (1)	2).	INES1504
3	K TO(32.11).	TSTAT(1	1).	U(32.11	).	W(11).		INES1505
5	X X (32)				•••			<b>INES1506</b>
-	COMMON /SCALER/	Α.	ΔΑ,	A10A0.	A202A0.	A 303A0.	A404A0,	INE\$1507
1	K A505A0. B.	88.	.23	CM.	CMEAN .	CMEANP.	COINTG.	<b>INES1508</b>
	K CP12. CP13.	CPI4.	CPI 5.	CPI6.	CP02.	C PO3.	CP04.	INES1509
2	K CPOS. DAMP.	DCP.	DD.	DIFCM.	DT.	DUMMY .	ERAS1.	INES1510
	KG. GASK.	GJ.	GR.	GR2.	JOULE.	MAPR.	MOLEWT.	INE\$1511
3	K POCO . Cr	RPM.	TCP.	TERMD.	TESTBH.	TESTDS.	TESTHS.	INE\$1512
	K TOCO. TOL.	TOLAT.	TOLB2.	TOLMIN.	TOL 15.	TOLTIP.	TOLCP.	INES1513
5	K TOLCX. TOLR.	TOTINT.	TOTPR.	V.	VMI			INES1514
-	COMMON / INTEGR/	Ι.	18.	181.	IDUMP.	I ERROR .	IFIRST.	INES1515
1	KIG. ICUTTR.	IPASS.	IS,	IT.	J.	JIN.	JJ.	<b>INES1516</b>
1	X JM. JM1.	κ.	K1.	KK.	L.	LIMIT.	LSTAGE.	INES1517
	X MSTAGE. NLINES	. NTUBES.	NX.	NX1.	YÉS			<b>INES1518</b>
	EQUIVALENCE (A	TAR (1,1),	ATAS(1.1	)), (FL)	DW(1).DF	LOW(1))		INES1519
	-			•	•			INES1520
	HELP=1.0							INES1521
	-							<b>INES1522</b>
	*** ESTIMATE	MID-STRE.	AM VELOC	ITIES				INES1523
								<b>INES1524</b>
	ROSTAG(JM)=PO(I	, JM )/(TO(	I, JM)+GA	SKI				<b>INES1525</b>
	CX(I,JM)=FLOW(I	/ ROSTAG	(JM)*(RS	(I)**2-R	H(I)++2)	)/3.1415	92 7	INES1526
	V=(CX(I,JM) ++2+	CU(I,JM)*	#2)/GJ/C	P(I,JM)				<b>INES1527</b>
-	ERAS1= 1.0-V/TO	(I,JM)						INES1528
								INES1529
	*** ERROR TR	ANSFER TO	A NEW D	ATA SET				INES1530
								INES1531
	IF (ERAS1.LE.O.	O) CALL E	RROR (12)					INES1532
	CX(I,JM) = CX(I,	JM)/(ERAS	1**(1./(	GAMMALI,	((.1-(ML	)		INES1533
70	CONTINUE							INES1534
	CM2=CX([+JM)++2							INES1535
	CM2=CM2+HELP							INES1536

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			INES 1537	26
		AND CALCULATE VALUES OF CUSTO AND SETUNATE STATIC TEMDEDATURES	INESISAR	
		THE CALCULATE VALUES OF COTTZ AND ESTIMATE STATIC TEMPERATORES	INES 1530	-
			INES1540	l l
			INES 1541	گ ا
			INES1542	
			INES1542	-,
1	.00	121A1(J)=1U(1,J)=V	INES 1544	
		THE CHICK ATT MALUTE OF TERMA AND DADIAL DEDINATIVE TERM	INES1545	
		*** CALCULATE VALUES OF TERMA AND RADIAL DERIVATIVE TERM	INESISAS	
			INES 1540	*
		$\frac{10}{10} = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 = 1 + 1 +$	INESISAD	4
		TERMA(J) = GJ = (CP(I) J) = (U(I) J) = (P(I) JM) = (U(I) JM) = (U(I) J) = (U(I) JM) = (U	INES 1540	
		IF TUTTAJALIATUCUALE ERROR (15)	INES 1569	<b>'</b>
			1NES 1551	
1	10	CUNTINUE	INES1551	
			INES 1552	-
		*** CALCULATE DERIVATIVE OF DEPA WITH RESPECT TO RADIUS;	LNES1333	7
		RESULT IS IN CU	INCSISE	Ŀ
			INCCIEC	
			LNES 1990	3
			LNC31337	
		*** CALCULATE VALUES OF TERMB	INES 1550	
		DO 120 J=1, NLINES	INES 1557	
			1NE51500	
1	120	DEPVIL JJ=CU2(JJ/K(I+J)	INE31301	3
		DO 200 J=1, NL INES	INCS 1002	
		$TERMB(J) = 2 \cdot O + R IN I I J I$	1 NES 1 564	
		AND CLICH ATT CHICH AND CH DISTOIDITIONS	1NES 1565	1
		THE CALCULATE CAVER AND CA DISTRIBUTIONS	INC31303	2
		NUMMY-11 TENMO 11 TENMO 111 (CM214) 0	INES 1547	
		DUMMY=(([E((MA(J)-)EKMB(J))/CM2)+1+0	INES 1507	3
		IF (DUMMT)150,140,140	INES1505	1
1	130		INES 1573	~~~
			INESISTS	-
			INC31371	1
	140	IF (DUMMY-1.0/105,100,100	1NES1372	
1	150		10031373	
			LNC31314	3
	155	CXM(L)J)=SQK((UUMM))	INC31373	
1	160		LNE31975	-
4	200		INES 1577	-
		AAF (XII)JM/F100	114E31270	1
		DD= 64119 JMJ *V+* DD 400 1-1 NJ \$NES	1NES 1 690	3
		UU HUU JELINEJ TE ACVAT IN CT AAN CYAT, NEAA	INESISOU	
		17 (UK(1))/00(0AA) UK(1)/7AA 18 (88/1)       AR) 88/1,   =RR	INEC 1602	2
		17 \UA\[\$J]*EI*DDF UA\[\$J/TDD CONTINUE	1NEC1692	
	4UU 21 A		1NES1584	
•	C I U		INESISAS	-
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IFN(S) INLE1425 SUBROUTINE INLET INLE1425 INLE1427 *** YIELDS INITIAL ESTIMATE OF FLUID FLOW IN THE INLET **INLE1429** INLE1429 DOUBLE PRECISION TITLE INLE1430 REAL MACH. MAPR. MOLEWT, JOULE INLE1431 FLOW(32) DIMENSION ATAS(29,11), INLE1432 IERROR, YES LOGICAL **INLE1433** B2(29), ALPHA(10,11), ATAR (29,11), COMMON /MATRIX/ **INLE1434** BLADE(29), BT(32), BH(32), X BETA(10,11), **INLE1435** CR(32,11), CP(32,11), CPCO(6), X CO(10,11), **INLE1436** CUCO(29,5), CU(32,11), X CSLOPE(10,11), CU2(11), INLE1437 CXNEW(10,11), C XRAT0(29), CXM(10,11), X CX(32,11), **INLE1438** DEPV(10,11), DELM(11), DA(10), x CXS(10,11), **INLE1439** DFLOW(32), DFACT(29,11), DFL(29), X DF(20), **INLE1440** GAMMA (32,11), FOUND (20,3,10), FRDEL(10,11), X EMACH(29,11), INLE1441 MACH(29,11), X HMN(29), HUB(32), IKK(10), RCURVE(10,11), INLE14/2 X OBAR(29,11), PO(32,11), R(32,11), **INLE1443** ROSTAG(11), RINT(11), RHO(32,11), X RH(32), **INLE1444** SOCO(29,5), RSLOPE(10,11), RTRAIL(11), X RS(32), **INLE1445** TERMA(11), TERM1(10,11), X SGLID(29,11), SSC0(29,5), **INLE1445** TITLE (12), X TERMB(11), TERMC(11), TIP(32), **INLE1447** W(11). TSTAT(11), U(32,11), X TO(32,11), **INLE1448** X X(32) **INLE1449** A202A0, A303A0, A404A0, AA, A10A0, COMMON /SCALER/ Α, CMEANP, COINTG, **INLE1450** CM, CMEAN. X A505A0, B, 88, CC. CP04, **INLE1451** C PO3. CP02, X CPI2, CP I 3. CPI4. CP15, CPI6. ERAS1. **INLE1452** DUMMY . DIFCM, DT, X CP05. DAMP. DCP, DD, INLE1453 GR2, JOULE. MAPR, MOLEWT, 5 GASK, GJ, GR, X G, INLE1454 TESTBH, TESTUS, TESTMS, TERMD, RPM. TCP, X POCO. ς, **INLE1455** TOLTIP, TOLCP. TOLAT, TOLB2, TOLMIN, TOLMS, TOL, X TOCO. INLE1455 VMI TOTINT. TOTPR . ۷. X TOLCX, TULR. IERROR, IFIRST, INLE1457 LOUMP . 181, COMMON / INTEGR/ Ι, 18, IT, J, JIN, JJ, **INLE1458** IS, IOUTTR. IPASS, X IG. **INLE1459** LIMIT, LSTAGE. K, K1. KK. L. X JM. JM1. INLE1460 X MSTAGE, NLINES, NTUBES, NX. NX1. YES (FLOW(1),DFLOW(1)) INLE1461 (ATAR(1,1),ATAS(1,1)), EQUIVALENCE **INLE1462 INLE1463** DO 10 l=1,5 **INLE1464 ***** GET INITIAL STREAMLINE RADIUS ESTIMATE **INLE1465 INLE1465** INLE1467 CALL RSTART **INLE1468** *** GET INITIAL ESTIMATE OF FLUID FLOW **INLE1469** INLE1472 INLE1471 IF (1.NE.5) GU TO 5 **INLE1472** DO 4 J=1, NL INES 4 CU(5,J)= (CUCD(5,1)/R(5,J) +CUCD(5,2))/R(5,J) +CUCD(5,3) **INLE1473** (CUCD(5+4) +CUCD(5+5)*R(5+J))*R(5+J) **INLE1474** ÷ X INLE1475 **5 CALL INEST INLE1476 ***** SOLVE CONTINUITY EQUATION **INLE1477** INLE1478 **INLE1479** 10 CALL STREAM PETUNY INLE1460 INLE1481 END

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PAGE 152 EFN INPUT. SOURCE STATEMENT IFN(S) 11,201648 SUBROUTINE INPUT **INPU1649** INTEGER BLADE INPU1650 LOGICAL FPATH ALT(29), ALTER, INPU1651 ALH(29), COMMON /VGEOM/ INPU1652 SAVEA(29) FPATH, X ASPECT(29), INPU1653 COMMON /SPECAL/ NORM(14), NX2, NO FAIL **INPU1654** DOUBLE PRECISION TITLE INPU1655 MOLEWT MAPR, JOULE MACH REAL INPU1655 FLOW(32) DIMENSION ATAS(29,11), INPU1657 IERROR, YES LUGICAL INPU1658 ALPHA(10,11), ATAR(29,11), B2(29), COMMEN /MATRIX/ INPU1659 BH(32), BLADE(29), BT(32). Y BETA(10,11), INPU1660 CPC0(6). CR(32,11), CP(32,11), x co(10,11), CUCD(29,5), INPU1661 CU2(11), CU(32,11), X CSLOPE(10,11), INPU1662 CXRATO(29), CXNEW(10,11), CXM(10,11), x CX(32,11). DEPV(10,11), [NPU1663 DELM(11), X CXS(10,11). DA(10). DFLOW(32), INPU1664 DFACT(29,11), DFL(29), X UF(20), INPU1665 X EMACH(29,11), FOUND(20,3,10), FRDEL(10,11), GAMMA(32,11), **INPU1666** MACH(29,11), X HMN(29), HUB(32), IKK(10), RCURVE(10,11), INPU1667 PO(32,11), R(32,11), X OBAR(29,11), INPU1668 ROSTAG(11), RINT(11), RH(32). RH0(32,11), х INPU1667 SOCO(29,5), RSLOPE(10,11), RTRAIL(11), X RS(32), INPU1670 TERMA(11), SSC0(29,5), TERM1(10,11), X SGLID(29,11), INPU1671 TITLE(12), TIP(32), X TERMB(11), TERMC(11), [NPU1672  $W(11)_{,}$ X TO(32,11), TSTAT(11), U(32,11), INPU1673 X X(32) INPU1674 A202A0, A303A0, A404A0, ALOAC, COMMON /SCALER/ Α, AA, cc, CHEAN. CMEANP, COINTG, INPU1675 CM. X A505A0, B, 88, INPU1676 CP14. CP02. C PO3, CP04, CP I 3, CPI5. CP16, X CPI2. INPU1677 X CP05, CAMP, DCP, DIFCM, DT, DUMMY . ERAS1, DD. **INPU1678** MAPR, MOLEWT, GR, GR2, JOULE . X G. GASK, GJ, **INPU1679** TESTDS, TESTMS, TERMD, TESTBH, X POCO. ۵. RPM, TCP. TOLTIP, TOLCP, **INPU1680** TOLMIN, TOLMS, X TOCO, TOL, TOLAT, TOLB2, INPU1681 X TOLCX, TOTPR, VMI TOLR. TOTINT. ۷, IERROR, IFIRST, I8, 181, IDUMP. INPU1682 COMMON / INTEGR/ 1, INPU1683 IPASS. IT, JIN. 11. IS. J, X IG, IOUTTR, INPU1684 LIMIT, LSTAGE, JML. Κ, KK. L, X JM. K1. **INPU1685** NX1, YES X MSTAGE, NLINES, NTUBES, NX, (FLOW(1), DFLOW(1)) **INPU1686** (ATAR (1, 1), ATAS (1, 1)), EQUIVALENCE **INPU1687** COMMON /VMIN/ VO(29) INPU1688 DIMENSION TIL(6) TIL / 4H--- IN. 4HLET . 4H , 4H--FL, 4HOW P, 4HATH / INPU1689 DATA INPU1690 *** READ THE JOB TITLE, NECESSARY FOR JOB DESCRIPTION INPU1691 **INPU1692** INPU1693 10 READ (5,11) (TITLE(1), 1=1,12) READ (5,5) (CPCO(1), 1=1,6) INPU1694 **INPU1695 ***** CALCULATE THE COEFFICIENTS NEEDED IN THE VARIOUS INPU1696 INPUT697 OPERATIONS INVOLVING CP INPU1698 INPU1699 WRITE (6,12) INPU1700 FORMAT (1HO) 12 INPU1701 CP02=CPC0(3)/2. INPU1702 CP03=CPC0(4)/3.

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	INPUT EFN SOURCE STATEMENT - IFN(S) -	
		NPU1703
	CP05=CPC0161/5.	NPU1704
	A10A0±CPC0(2)/CPC0(1)	NPU1705
		NPU1705
		NPU1707
		NPU1708
		NPU1709
	ADUDAU-GPUD/GPUULI COINTC- THEDMALEIO 4881	NPU1710
	CD1010= IFERM2(210+000)	NPU1711
	CD12=CDC0(2)/20	NPU1712
	CP16=CPCU151/5.	NPU1713
	CP14=CPC0141/40 CP15=C0C0161/6	INPU1714
	CP17=CPCU(37/3)	INPU1715
	LT10=LF6U(01/0.	INPU1716
	II FURMAN VIZADA	INPU1717
	KK=1	INPU1718
~	AND TARGET TO INDICATE HUICH LOSS DATA SETS TO USE	INPU1719
C	*** INPUT INDEX TO INDICATE WHICH LUSS DATA SETS TO USE	INPU1720
		INPU1721
	KEAU ()/9107 (INN/J/7J=1/107	INPU1722
	$K_{L} = IKK(1)$	INPU1723
~	ATA OCUTINO MACTED TADE OF LOSS DATA	INPU1724
Ç	*** KEWIND MASIEK TAPE OF LOSS DATA	INPU1725
	935 REWIND 4	1 MD111727
	DO 950 L=1,IG	1 NFUL 727
_		
C	*** READ LUSS DATA FRUM MASTER TAPE	INPU1/27
	$PEAD (4) (EQUND(K_{0}, I_{0}, K_{0}), K=1, 20), J=1, 3)$	INPUTIO
		INPU1732
r	ARE IS THIS SET DESIRED	INPU1733
U	+++ 10 1112 0C1 0C211C0	INPU1734
	TE (KILLT-1-DR-K)-GT-1G1 CALL ERROR(1)	INPU1735
	937 IE (K) NE () GD TO 950	INPU1736
	337 II (KICHCAC) 00 10 220	INPU1739
r	*** STORE LOSS DATA FROM MASTER TAPE INTO PROPER ALLOCATION	INPU1740
č	TO BE USED IN LOSS SUBROUTINE	INPU1741
6		INPU1742
	TE TRA E0.101 GO TO 960 -	INPU1744
	The Christ de La Son	INPU1745
	KJ=1KK(KK)	INPU1746
	TE (K) EQ_0) CO TO960	INPU1747
		INPU1748
		INPU1749
	040 PEWIND 4	
		INPU1751
	010 ENEMAT (2413)	INPU1752
		INPU1753
r	*** READ THE SCALER QUANTITIES	INPU1754
6	· · · · · · · · · · · · · · · · · · ·	INPU1755
	READ (5.15) MSTAGE, NLINES, IOUTTR, FPATH, IDUMP, LIMIT,	INPU1756
	X FLOW(1), MOLEWT, TOCO, POCO, TO TPR. TOLCX. TOLR. TOLCP. RPN.DAMP	INPU1757
	X . TOLMIN. TOL 82. TOL AT . TOL MS. TOL TIP. AT AR (1.1) . AT AR (1.2). AT AR (1.3)	INPU1758
	U Araminitian nebiamu transatian si tururreteri urreteri urreteri urreteri tururreteri urreteri	INPU1759
r	*** FRROR WILL SET THE TEMPERATURE OR PRESSURE TO THE ABSOLUTE	INPU1760
č	VALUE OF SAME AND WILL GO TO A NEW DATA SET IF ONE OF THE	INPU1761

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	PAGE 154		
~		INPU1763	***
	IF (POCU+LE+0+0+UR+IUCU+LE+0+0) CALL ERRUR(10)	1591764	1
		INPUL765	
C	*** THE NUMBER OF STREAMLINES MUST BE 5,7,9 OR 11, ERROR	INPU1766	
C	WILL TERMINATE EXECUTION	INPU1767	
	•	INPU1768	. 1
	IF (NLINES.LT.5.OR.NLINES.GT.11.OR.MCD(NLINES,2).EQ.0)	INPU1769	
)	K CALL ERRCR(6)	INPU1770	· •
		INPU1771	1
С	<b>***</b> ERROR RESETS THE NUMBER OF STAGES TO BE CONSIDERED TO 12.	INPU1772	
C	NOTENEXT DATA SET MAY NOT EXECUTE PROPERLY	INPU1773	
		INPU1774	7
	IF (MSTAGE.GT.12) CALL ERROR(7)	INPU1775	É
15	FORMAT (315+L5+215+4F10+5/7F10+5/7F10+5)	INPU1776	- 5
	NX=2+MSTAGE + 8	INPU1777	
		INPU1775	1
C	*** READ THE INLET GEOMETRY AND BOUNDARY LAYER BLOCKAGE FACTORS.	INPU1779	1
•		INPU1782	-
	READ (5.35) (X(1), RH(1), RH(1), RS(1), RT(1), ASPECT(1), I=1.NX)	INPU1781	
	$T = \{ E P A T M \}$ $C P T P = 1002$	IND:11787	
		INDU11782	3
		111901104 1ND111785	7
2001		1NPU1702	1
TOOT			-
1003			
1002	NX = NX = 3	1NPU1788	7
	DU 1003 L=6,NX	INPUL/89	
	CXKAIU(1) = X(1)	INPU1793	
	IF (ASPECT(I) LE 0.0) CALL ERROR (14)	INPU1791	-
	SAVEATI)= ASPECTII)	INPU1792	I
	IF (RH(1).EQ.0.0.AND.RS(I).EQ.0.0) CALL ERROR (23)	INPU1793	3
	ALT(I) = -ABS(TAN(RS(I)/57.29578))	INPU1794	
1003	ALH(I) = ABS(TAN(RH(I)/57.29578))	INPU1795	3
	NX= NX+3	INPU1796	1
		INPU1797	-
C	*** READ THE FRACTION MASS FLOW BETWEEN THE HUB AND THE J-TH	INPU1798	
C	STREAMLINE. THESE NUMBERS MUST INCREASE MONDTONICALLY	[NPJ1799	7
		INPU1800	
1004	READ (5,2C) (DELM(J),J=1,NLINES)	INPU1801	
	NTUBES= NLINES-1	INPU1802	-73
	DO 3 I=1,NTUBES	INPU1803	
	IF (DELM(I).GE.DELM(I+1)) CALL ERROR (5)	INPU1804	
3	CONTINUE	INPU1805	
		INPU1806	
С	*** READ THE 'USS FACTORS ACROSS THE INLET GUIDE VANE	INPU1807	1
Ċ	FOR THE J-TH STREAMLINE	INPU1808	<b>ال</b> ند
-		INPU1809	
8	READ (5.20) (W(I).I=1.NLINES)	INPU1810	1
-	READ (5.35) (CUCD(5.J).J=1.5)	INPUIRII	<u>}</u>
	REAU (5.20) (ATAR(6.J).J=1.NLINES)	INPU1912	
	READ (5.20) (ATAR(7.1).1=).NI INES)	INDUIAIA	<b>37</b> 4
		TNDII1014	
		INDINGIA	1
E	ENDMAT (3620.8)	1ND:11012	
20	EUDNAT /7E10.51	14601010	77
20		1001911	Ð

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PAGE 155 INPUT. EFN SOURCE STATEMENT -IFN(S) 35 FORMAT (6F10.5) **INPU1818** INPU1821 **INPU1822** CALL DATE(DA) **INPU1823** WRITE (6,39) (TITLE(1),I=1,12),(DA(I),I=1,2) WRITE (6,40) MSTAGE, TOTPR, NLINES, POCO, FLOW(1), TOCO, MO'LEWT, RPM, IN+U1824 X TOLCX, TOLB2, TOLAT, TOLR INPU1825 IF (FPATH) WRITE(6,21) TOLTIP **INPU1826 INPU1827 INPU1828** 21 FORMAT (/9% 37HTHE AXIAL VELOCITY RATIO TOLERANCE IS \$7.4 /) INPU1829 WRITE (6,38) (DELM(J), J=1, NLINES) **INPU1830** 38 FORMAT (/9X 79HTHE FRACTION OF THE TOTAL MASS FLOW BETWEEN THE HUBINPU1831 X AND THE J-TH STREAMLINE IS. // 9X 11F7.3 ) **INPU1832** WRITE (6,41) NLINES, (W(I),I=1,NLINES) **INPU1833 INPU1834 *** WRITE OUT INLET GEGMETRY INPU1835 INPU1835** 39 FURMAT (1H124X14A6) INPU1837 **INPU1838** 40 FORMAT(////29X63H****---*** ADVANCED MULTISTAGE AXIAL-FLOW COMPRESINPU1839 XSOR ***---**** //38X43H**--** ANALYSIS AT DESIGN CONDITIONS **--**INPU1840 X ///47 X26H----I N P U T D A T A---- /// 9X35HTHE MACHINE IS TO HAINPU1841 XVE NO MORE THAN 13,7H STAGES15X25HA TOTAL PRESSURE RATIO OF F7.3, INPU1842 X11H IS DESIRED //9X35HCALCULATIONS ARE TO BE PERFORMED AT I3, INPU1843 X 12H STREAMLINES 10X 27HTHE INLET TOTAL PRESSURE IS F9.2, 11H LBS/INPU1844 XSQ IN.//9X 27HTHE INLET MASS FLOW RATE ISF7.2,7H LB/SEC19X30HTHE INPU1845 XINLET TOTAL TEMPERATURE IS F7.2, 7H DEG. R // 9X 32HMOLECULAR WEIGINPU1846 XHT OF THE FLUID IS F7.2, 21X 16HTHE TIP SPEED IS F7.1, 9H FT./SEC.INPU1847 X // 9X 27HAXIAL VELOCITY TOLERANCE IS F7.4, 26X 30HTHE LOADING LIMINPU1848 XIT TOLERANCE IS F7.4, // 9x 27HTHE EFFICIENCY TOLERANCE IS F7.4, INPU1849 X 26X 27HTHE CONTINUITY TOLERANCE IS F7.4 1 **INPU1850 INPU1851** 41 FORMAT 1//9X46HTHE INLET GUIDE VANE LOSS COEFFICIENTS FOR THE 13, INPU1852 X 34H STREAMLINES ARE (FROM HUB TO TIP) // 10X 11F7.4 //) INPU1853 **INPU1854** 42 FORMAT ( 9X 85HTHE RATIO OF THE AREAS OF THE LAST 3 STATIONS TO THINPU1855 XE AREA OF THE LAST STATOR EXIT ARE F7.4, 2(1H.F7.4), 2H .) **INPU1856** INPU1857 45 FORMAT (1H1 //// 45X 2H-- 3A4, 15HDESCRIPTION----///23X7HSTATION5XINPU1858 X5HAX[AL11X3HHUB6X]2HHUB BLOCKAGE7X3HT[P7X12HT[P BLOCKAGE / 25X INPU1859 X 3HN0.5X10HCDORDINATE 6X6HRADIUS8X6HFACTOR 8X6HRADIUS 8X6HFACTOR/ INPU1860 X 35X5H(IN.) 10X 5H(IN.) 23X5H(IN.) //) **INPU1861** INPU1862 46 FORMAT (20X17, 5F14.3) **INPU1863 INPU1864 INPU1865** WRITE (6,57) (CUCO(5,J),J=1,5) **INPU1865** 57 FORMAT ( 9X 61HTHE INLET GUIDE VANE EXIT TANGENTIAL VELOCITY IS SPINPU1867 XECIFIED BY / 9X 3HA = E15.6, 3X 3HB = E15.6, 3HC = E15.6, 3X 3HD = INPU1868 X = 15.6, 3X = 215.6 //)**INPU1869 INPU1870** WRITE (6,58) CPCC INPU1871 **INPU1872** 58 FORMAT (1H033X53HTHE SPECIFIC HEAT POLYNOMIAL IS IN THE FOLLOWING INPU1873

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XFORM // 3X 4HCP = E12.5,3H + E12.5,5H*T + E12.5,8H+T#*2 + E12.5, **INPU1874** X 8H*T**3 + E12.5,8H*T**4 + E12.5,5H*T**5 // ) INPJ1875 **INPU1876** WRITE (6,42) ATAR(1,1), ATAR(1,2), ATAR(1,3) **INPJ1877** . . . DA(1) = TIL(1)INPU1875 CA(2) = TIL(2)INPU1879 DA(3) = TIL(3)**INPU1879** . . NN= 5INPU1880 IF (FPATH) GO TO 36 INPJ1881 CA(1) = TIL(4)**INPU1882** DA(2) = TIL(5)**INPU1883** - * DA(3) = TIL(6)**INPU1883** NN= NX **INPU1884** - 5 36 WRITE (6,45) DA(1), DA(2), DA(3) INPU1885 00 37 J=1, NN **INPU1886** WRITE (6,46) J, X(J), RH(J), BH(J), RS(J), BT(J) **INPU1887 37 CONTINUE INPJ1888** NN = NX - 3INPU1889 IF (FPATH) WRITE (6,22) (I,X(I),ASPECT(I),RH(I),BH(I),RS(I),BT(IINPU1890 X ), [=6,NN) INPU11891 22 FORMAT (1+6 44X 30H*--* GEOMETRIC PARAMETERS *--* /// 10X 9HBLADEINPU1892 X ROW 5X10HAXIAL VEL. 5X 12HASPECT RATIO 6X 8HHUB RAMP 6X 12HHUB BLINPU1893 XOCKAGE 4X BHTIP RAMP 6X 12HTIP BLOCKAGE / 107 9HEXIT STA. 5X 11HRAINPU1894 XTIO (0/I) 21X 11HANGLE LIMIT 7X 6HFACTOR 6X 11HANGLE LIMIT 7X INPU1895 X 6HFACTOR //(116,4F16.3,2F15.3)) **INPU1895** N=2*MSTAGE + 4 **INPU1697** INPU189B ******* READ THE STAGE CATA **INPU1899 INPU1900** DO 60 1=5,N,2 **INPU1901** RLAD (5,25) DFL(I+1), HMN(I+1), HMN(I+2), DFL(I+2), VO(I+1), **INPU1902** X BLADE(I+1), BLADE(I+2), DFLOW(I+1), DFLOW(I+2), INPU1903 X (CUCO(I+1, J), J=1, 5),INPU1904 X (SSCO(I+1, J), J=1, 5),**INPU1905** X (SOCO(I+1, J), J=1, 5),INPU1906 X (CUCO(I+2, J), J=1, 5),**INPU1907** X (SSCO([+2, J], J=1, 5),**INPU1905** X (SOCO(I+2, J), J=1, 5)**INPU1909 60 CONTINUE INPU1910 INPU1911** 25 FORMAT (5F10.4/215,2F10.4/(5E10.4)) INPU1912 INPU1913 *** CHECK THE BLOCKAGE FACTORS **INPU1914 INPU1915** NN = N+1INPU1916 DO 61 I=1,NN **INPU1917 INPU1918** *** ERROR SETS THE BLOCKAGE FACTOR TO 1.0 INPU1919 INPU1920 IF (BT(I).GT.1.0.OR.BT(I).LE.0.5) CALL ERROR (25) INPU1921 IF (BH(I).GT.1.0.DR.BH(I).LE.0.5) CALL ERROR (21) **INPU1922** 61 CONTINUE INPU1923 DO 70 I=5,N **INPU1924** B2([+1)=CUCO([+1,2) INPU1925 **70 CONTINUE** INPU1926 NX=N+4 INPU1927

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	INPUT EFN SOURCE STATEMENT - IFN(S) - 90 FORMAT (1H1,/////43X 25H.« LOSS DATA SET NUMBERI3,5H//// X 9X 8HD-FACTOR 10X 13HAT 10 PERCENT 10X 13HAT 50 PERCENT 10X X 13HAT 90 PERCENT 5X 21H(OF BLADE HEIGHT FROM / 91X 21HTHE GEOMETR	INP J1930 INPU1931 INPU1932	
	XIC HUB. ) / 2C(F17.3,F18.4,2F23.4/))	INPU1933	
C	*** CALCULATE THE GAS CONSTANT	INPU1935	
		INPU1730	
	GASK= G/MCLEWT	INPU1937	
	DCP= GASK / JOULE	INPUI733	-
	$GR = 64.348 \pm GASK$	INPU1707	
	GKZ= GR*•5	INPU1940	•
		INPU1741	
C	*** CALCULATE THE TUTAL TEMPERATURE, TUTAL PRESSURE, AND	INPU1742	
C	SPECIFIC PEAT IN THE INLET	INPU1745	
	• ·	1NPU1747	-
		INPU1745	
	10(1,1) = 1000	TN011049	
	CALL THERMP	TND:11040	- 34
	DU 101 J#1, NLINES		1
	DO 99 [=1,5	INP/71750	
	TO(I,J) = 10CO	INPU1751	
	PU(I,J) = PU(U)	INPUL752	1000
·	CP(1,J) = CP(1,1)	INPU1933	
	99  GAMMA(1,J) =  GAMMA(1,1)	INPU1704	
_	AND COT THE MADIAL AND WHIPE WELCCLIFES TO TERD		- 20
C	THE SEL THE KADIAL AND WHIKE VELOCITIES TO ZERU	11011057	-5,7 - 4
		1NP01907	
	DU LUU I=1,NX	IND:11950	- 25°
	$\bigcup_{i=1}^{I} \bigcup_{j=1}^{I} \bigcup_{i=1}^{I} \bigcup_{i=1}^{I} \bigcup_{i=1}^{I} \bigcup_{j=1}^{I} \bigcup_{i=1}^{I} \bigcup_{j=1}^{I} \bigcup_{i=1}^{I} \bigcup_{i$	INPU1939	
	100 CK(1+J)= 0.	IND:11061	, 7 di
~	THE DRINK AND DODING AND DICKLING ARE ASSUMED TERD AT	1: 201961	4
C C	THE THEET TO THE NACHINE	INDUIDAS	-174 1946-1
L	THE INLET TO THE MACHINE	INDUIDAL	
		INDUIGAS	
	P(1)P(1) = 0	INDUIGAG	1
	$\mathbf{K}_{U} \mathbf{K}_{U} \mathbf{K}$	INPU13067	٦. الأرار
		INPHIGAR	1.57
		INPH1969	
	15 (DE)(1) (E.O.C.OR.DE)(1),GE.O.9) (A), ERRO ¹ 28)	INPU1970	15
	105 IE (BLADELLI, I.T. 1. OR. BLADELLI, GT.KK) CALL ERROR(17)	INPU1971	12
	TOP IN TOENDELTINGTON DERDELTINGTON ONCE ENROLTIN	INPU1972	1
r	*** CONVERT THE RELATIVE FLOW ANGLES TO RADIANS	INPU1973	
U	Contral the uterists ( con protect () appendix	INPU1974	
	DO 106 J=7.NX.2	INPU1975	
	106 HAN(1) = HMN(1)/57,2957795	INPU1975	
		INPU1977	
r	*** SET THE MASS FLOW RATE THROUGH THE INLET TO THE VALUE	120011978	
č	AT THE FIRST STATION	[NPU1979	· · · · · · · · · · · · · · · · · · ·
Ŭ		INPU1980	
	FLOW(2)= FLOW(1)	INPU19A1	
	FLOW(3) = FLOW(1)	INPU1982	1997
	FLGW(4) = FLOW(1)	INPUIGAN	
			, san xan ∫
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			ŧ

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INPUT. EFN SOURCE STATEMENT - IFN(S)  $FLOW(5) \Rightarrow FLOW(1)$ **INPU1984** INPU1985 *** CALCULATE THE TOTAL FLOW RATE AT EACH STATION C **INPU1986 INPU1987** DO 110 I=5.N **INPU1988** 110 FLOW(I:1) = FLOW(I)+DFLOW(I+1) **INPU1989** INPU1993 *** SET THE FLOW RATE AT THE LAST 3 STATIONS EQUAL TO THE С INPU1991 FLOW RATE AT THE LAST STATOR EXIT C **INPU1992 INPU1993** FLOW(N+2) = FLOW(N+1)**INPU1994** FLOW(N+3)= FLOW(N+1) **INPU1995**  $FLOW(N+4) \approx FLOW(N+1)$ **INPU1996** INPJ1997 C ******* CALCULATE THE NUMBER OF STREAMTUBES **INPU1998 INPU1999** NTUBES= NLINES-1 INPU2000 JM1= NLINES/2 **INPJ2001 INPU2002** С ******* CHECK AND CALCULATE THE OUTPUT TRIGGER... **INPU2003** C 1 = ALL STREAMLINES INF '2004 C 2 = EVERY OTHER ONE INP: 2005 С  $3 = MEAN_{+}$  HUB_{+} AND TIP **INPU2006** : C 4 = HUB AND TIP **INPU2007 INPU2008** 2 IF (IOUTTR.LT.1.OR.IOUTTR.GT.4) CALL ERROR(20) **INPU2009** IF (IOUTTR.LT.3) GO TO 113 **INPU2010** IF (IOUTTR.EQ.4) GG TO 112 INPU2011 JOUTTR=JH1 **INPU2012** C GO TO 113 **INPU2013** 112 IOUTTR=NTUBES **INPU2014** 113 IFIRST=6 INPJ2015 INPU2016 C ******* CALCULATE THE NID-STREAMLINE INDEX [NPU2017 **INPU2018** JM= JM1+1 INPU2019 **INPU2020** ia C C *** INITIALIZE THE INDICES (THE FIRST ROTOR INLET INPU2021 IS AT STATION NUMBER 5) **INPU2022** ė **INPU2023** LSTAGE=7 **INPU2024** NX=10 **INPU2025** - L= 1 **INPU2026** NX1=9 **INPU2027 INPU2028** C *** CALCULATE THE STNPLE RADIAL EQUILIBRIUM SOLUTION **INPU2029** 1B= 1 INPU2033 181 = 2INPU2031 NX 2=8 INPU2032 С OF THE FLOW EQUATIONS IN THE INLET INPU2033 **INPU2034** [PASS=1 **INPU2035** RPM= RPM/RS(5) INPU2036 . 5 CALL INLET INPU2037 I= 6 **INPU2038** RETURN INPU2039

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INTE1585

INTE1587

INTE1588

INTE1589

INTE1590 INTE1591

INTE1592

# INTEG. - FFN SOURCE STATEMENT - IFN(S) -

SUBROUTINE INTEG (VDEP, IFCUN)

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. Sarahara *** PERFORMS NUMERICAL INTEGRATIONS OF THE VDEP VS. R CURVE *** TRAPEZOIDAL RULE INTEGRATION DIMENSION VDEP(10,11) DOUBLE PRECISION TITLE

)

		RECISION	TITLE						INTE159	15	
4 (			R. MOLEW	T. JOUL	.E				INTE159	94	
		N ATACIZ	9.111. F	( fiw( 32)					INTE159	95	
1	UTHENSIU		YES	2011/2/2/					INTE159	96	
	COMMON /	MATOTY			ATAR (29.	11).	B2(29),		INTC159	77	
	DUMMEN /	11.1	- ALFIA(10	, ,	BLADE(29	•	BT(32),		INTE159	<del>9</del> 8	
X	BELACIO	****	01(32)	۱	CPC0(6)-	••	CR(32.11	),	INTE159	99	
X		14		. , ,	CHE32.11	١.	CUC0(29.	5),	INTE160	00	
X	CSLUPE	10,117,		1.	CVNEWIIG		C XRATO ( 2	9).	INTE160	01	
X	CX(32,1	1),		. 1 7 9			DEPV(10.	11).	INTE16	02	
X	CXS(10,	11),	DALIUI			-	DELOW(32	2	INTE16	03	
X	DF(20),		DFACILZY	,117,	UFL(2711	, ,,,	CAMMA (32	2.111.	INTE16	04	•
X	EMACH(2	9,11),	FOUND(20	3,3,101,	FRUELCIC	,,,,,,	MACH(20.	111	INTE16	05	è
X	HMN(29)	•	HUB(32)		IKK ( IU):				INTE16	05	•
X	<b>OBAR(29</b>	,11),	PO(32,11	L) •	R(32,11)	•	RUCKVELI		INTEIA	07	÷
X	RH(32),		RH0(32,1	[1],	RINT(11	•	RUSTAGU	1111 El	INTE16	08	
Х	RS(32),		RSLOPE	10,11),	RTRAIL	[]],	SUCUIZA	, , , , , , , , , , , , , , , , , , , ,	INTEL	0.9 0.9	100
X	SOL ID (2	(9,11),	SSC0(29)	,5),	TERM1(1)	],11),	TERMALL		INTELO	10 1	
X	TERMB(1	1),	TERMC(1)	L) -	TIP(32)	•	TITLELLA	21+	INTEIG	1J 11	
X	TO(32.)	1),	TSTAT(1)	L) +	U(32,11	),	W(11),		INTEIO	11	
X	X(32)								INTEIG	12	
~	COMMON /	SCALER/	Δ.	ΔΔ,	A10A0,	A202A0,	A 3034C .	A404A0,	INTE16	13	
¥	A50540.	B.	88.	cc.	CM,	CMEAN.	CMEANP,	CDINTG,	INTE16	14	
0	CD12.	CP13.	CPI4.	CPI5.	CPI6,	CP02,	C PO3+	CP04,	INTE16	15	•
- 0	C005	DAMP.	DCP.	20.	DIFCM.	DT,	DUMMY ,	ERAS1+	INTE16	15	1
0		CASK		GR.	GR2.	JOULE.	MAPR.	MOLEWT.	INTE16	17	
		CA SK +	DDM.	TCP.	TERMD.	TESTBH,	TESTDS,	TESTMS.	INTE16	18	
				TOL 82.	TOL VIN.	TOLMS.	TOLTIP,	TOLCP.	INTE16	17	Ì
X		1969	TOLAT	TOTOP.	V.	VMT			INTE16	20	
)	( TELCX -	IULK,		101561	181.	TOUMP .	I FRROR.	IFIRST.	INTE16	21	
	COMMON	INTEGR/		101		1.	JTN.	J.J.•	INTE16	22	
X	LC.	ICUITR,	IPASS+	13,	1 I V	1.	I IMIT.	I STAGE.	INTE16	23 ·	
>	(JM.	JM1.	K.	KL.				2011021	INTE16	24	
)	( MSTAGE	, NLINES	NIUBES		NALT C	163 04 <b>(1) DE</b>	104(1))		INTE16	25	
	EQUIVAL	ENCE (AI	AR(1,1),	AIAS(1.1	.)]+ (FG	UNILIADE			INTE16	25	
									INTEL	527	
	RINT(1)	=0.0							INTEL	28	
	GO TO (	50 <b>,</b> 90 <b>),</b> If	= CON						INTEIG	23	
									TNTEI	127	
	* * *	CALCULATE	ES INTEGR	AL OF VO	EP * R	DR			INTEIS	21	
	U								LINTEIA	221	
50	DO 15 J	=1,NTUBE	S					~		222	
10	DA(J) = (	VDEP(L,J	)*R(I,J)+	VDEP(L,J	]+1)*R([,	J+1))*(8	([,J+1)-	K(1+J))=	JINIEI		
15	RINT(J+	1)=RINT(	J) +DA(J)						INTEL	534	
	GO TO 1	50							INTEL	035	
									INTE1	535	
	***		E NTUBES	VALUES C	DF INCREM	IENTAL IN	NTE GRAL S	FOR CURVI	E INTEL	637	
	* * *	VDEP VS-	R (R(J)	TO R(J+)	L 🕽 👌				INTEL	639	
					-				INTE1	639	
		1-1 1110	E (C						INTEI	640	

90 DO 115 J=1, NTUBES

	INTEC.	- EFN	SOURCE	STATEMENT	-	IFN(S)	-	11/02/67
100	CA(J)=(VDEP(L,J))	+VDEPtL+J	(+1))*(R	R(I,J+1)-R(	[,J]	]*.5		INTE1641
115	RINT(J+1) = RINT(.	J) +CA(J)						<b>INTE1642</b>
150	B= RINT(JM)							INTE1643
	00 200 J=1+NLINES	S						<b>INTE1644</b>
200	RINT(J)= RINT(J)-	-8						INTE1645
	RETURN				-		-	INTE1645
	END						-	INTE1647

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LOSS.	EFN S		STATEMENT	- IFM	1(S) -		11/02/67
SUBROUTINE LOSS							LOSE21(
JODNEOTINE LOSS							LOSE210
#** MATCHES LU	ISS WITH A	CIABATI	C EFFICI	ENC Y			L05F210
							LOSE210
LOGICAL NO FAIL							
LUMMUN /SPECAL/ F	WRMI 141 M	XZ+NJF#	416				LOSE210
REAL LOSE							LOSE21
DOUBLE PRECISION	TITLE						LOSE210
DOUBLE PRECISION	TITLE						LOSE21
REAL MACH, MAPI	R, MOLEWT	, JOUL	-E				
DIMENSION ATAS(2)	9,11), FL	UW(32)		ı			
COMMEN /MATRIX/	TES ALPHATIO-	11).	ATAP ( 29	.11).	821297 -		LOSE21
( BETA(10.11).	BH(32).		BLADE(29	), ),	BT(32).		LOSE21
( CC(10,11),	CP(32,11)	•	CPC0(6)	,	CR(32,1	1),	LOSE21
CSLOPE(10,11),	CU2(11),		CU(32,1)		CUCN(29	,5),	LOSE21
CX(32,11),	CXM(10,11	1.	CXNEW(10	<b>`,</b> 11),	CXRATOL	29],	
(CXS(10,11), CSS(20))	DEACT/20	111	DEL (20)	•		1111 21.	
C EMACH(29.11).	FOUND(2C.	3.101.	FRDEI (1)	, ).11).	GAMMA (3	2.11).	LOSE21
( HMN(29),	HUB(32),	572077	IKK(10)	,	MACH(29	,11),	LOSE 21
COBAR(29,11),	PO(32,11)	•	R (32,11	•	RCURVE	10,11),	LOSE21
(RH(32),	RH0(32.11	),	RINT(11	•	PCSTAG	11),	LOSE21
( RS(32))	R SLOPE(10	,11),	RTRAIL	111,		5)) 1)	
K SULID(29,11), K TERMH(111,	550012913	· ·	TIP(22)		TITIE	2).	LOSE21
( TO(32.11).	TSTAT(11)	•	U(32,11	, ,	W(11),	_ ,	LOSE21
(X(32)		-					LOSF21
COMMON /SCALER/	Α, Α	Λ,	A10A0.	A202A0,	A303A0,	A +04A0 .	LOSE21
K A505A0, B,	88, C		CM,	CHEAN +	C MEANP,	CUINIG:	
К СРІ2, СРІ3, К СРП5, ГАМР,		P+2+	DIECM.		DUMMY.	ERASI.	
G. GASK.	GJ, G	R,	GR2,	JOULE.	MAPR,	MOLEWT.	LOSE21
K POCO, C,	RPM. T	CP,	TERMD.	TESTBH,	TESTDS,	TESTMS,	LOSE21
(TOCO, TUL,	TOLAT, T	OLB2,	TOLMIN,	TOLMS,	TOLTIP,	TOLCP,	LOSE21
K TOLCX, TULR,	TOTINT, T	OT PR ,	V,		TCODOD	TETOST	
CUMMUN /INIEGR/	1 - 1 1 - 22AQT	5.	IDL) IT.	100mpy	JIN.	1.1.	LOSE21
KJM, JM1.	K, K	1,	KK.	L,	LIMIT.	LSTAGE.	LOSE21
MSTAGE, NLINES,	NTUBES. N	X.	NXI.	YES	• •	· - •	LOSE21
EQUIVALENCE (AT	AR(1,1),AT	AS(1,1	)), (FL)	)W(1),DF	LCW(1))		LOSE21
COMMEN / ENERGY/	H, T, GAMM	ER	L.				LOSE 21
DATA RADIAN 757.	295787						
### OBAR CONT	ATNS THE	OSS EU	NCTION	-			LOSE21
	erartar titta ba					,	LOSE21
L=-1							LOSE21
DO 10 I=IFIRST.L	STAGE+2						LOSE21
				•			LOSE21
UU IU J≕I+NLINES			J				105221
		DELATI		***			105521
*** CALCULAIE	ADSULUIE	FELAIL	AC ACTOR				

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	LOSS LEN SOURCE STATEMENT - IEN(S) -	11/02/67
		LOSE2155
C	*** CALCULATE ABSOLUTE VELOCITY	LOSE2155
		LOSE2157
	CXM(L+1,J)=CX(I,J)**2 + CU(1,J)**2 + CR(1,J)**2	LOSE 2158
		L0SE2159
С	*** CALCULATE RELATIVE FLOW ANGLE	LOSE2160
	· · · · · · · · · · · · · · · · · · ·	
	BETA(L,J) = ATAN((U(I-1,J)-CU(I-1,J))/SORT(CX(I-1,J)**2 +	10552162
	X CR(1-1, 1) + + 2)	
C	*** (AICHIATE RELATIVE ELOW ANGLE	LOSE2104
•		
		LUSEZIOS
	$D_{(A(C+1))} = A(A((0(1))) = C((1)) =$	LUSEZIGI
r		LUSE2163
L	THE CALCULATE ADSOLUTE FLUW ANGLE	LOSE2169
		LOSE2173
	ALPHA(L+1,J) = ATAN(CU(1,J)/SQRT(CX(I,J) + 2 + CR(I,J) + 2))	LOSE2171
_		LOSE2172
C	*** CALCULATE ABSOLITE FLOW ANGLE	LOSE2173
		LOSF2174
	ALPHA(L+2,J)=ATAN(CU(I+1,J)/SQRT(CX(I+1,J)**2 + CR(I+1,J)**2))	LOSE2175
	CXS(L,J)=CX(I-1,J)**2 +CU(I-1,J)**2 +CR(I-1,J)**2	LOSE 2175
	H = -CXS(L,J)/GJ	LOSE2177
	$\mathbf{T} = \mathbf{T} \mathbf{O} (\mathbf{I} - 1_{\mathbf{J}})$	10552179
•	CALL ENTALP	
	CALL GAM	10552173
		10252101
C		LUSE2181
-	CALCOLATE ALEMITYL PAGE AUPOLA	LUSEZINZ
	MACHII, IN= SUBTICYMII	LUSE2183
	HACHTIJJ - SUNTCAML IJITIGKZ+GAMMER+ISIAI(JII)	LUSE2194
r		LUSE2185
~	THE CALCULATE ADSULCTE MACH NUMBER	LDSE2186
		LOSE2187
	$F = -(\lambda M(L+L)J)/GJ$	LOSE2189
	$I = IU(I_{1}J)$	LOSE2187
	CALL ENTALP	LOSE2190
	CALL GAM	LOSE2191
	MACH(I+1+J)= SQRT(CXM(L+1+J)/(GR2*GAMMER*TSTAT(J)))	LOS E21 92
1	O CUNTINUE	LOSE2193
	L=0	LOSE 2194
	DO 20 I=IFIRST,LSTAGE	LOSE2195
	L=L+1	LOSE2196
	DO 20 J=1+NLINES	LOSE2197
		LOSE 21 94
C	*** CONSTANT TERM USED IN LOSS	10562100
		10523303
	TERM1(L, J)= SURT((GAMMA(I-1.J)+1.)/(GAMMA(I-1.J)-1.))	10356603
2	O CUNTINUE	LUSEZZUI
-	L=-1	
	DO 30 I=IFIRST.I STAGE.2	LU2E2203
		LUSE2204
		LUSE2205
	$\Omega() = 30$ $I = 1$ NI INES	LOSF2206
		LOSE2207
r		LOSE2209
	THE CUMPUTE SUPERSUNIC TURNING ANGLE	LOSE2209
		LOSE2210

and the second The second second second REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR • 11/02/67 SOURCE STATEMENT -1-055 · FEN IFN(S) A= (R(I,J)+R(I-1,J)-RH(I)-RH(I-1))/(RS(I)+RS(I-1)-RH(I)-RH(I-1)) LOSE2211  $B = \frac{(R(I,J)+R(I+1,J)-RH(I)-RH(I+1))}{(RS(I)+RS(I+1)-RH(I)-RH(I+1))}$ LOSE2212 LOSF2213 A4 = (SSCC(1,1)/(SSCO(1,2) + A) + SSCO(1,3))LOSE2214 +(SSCO(1,4) +SSCO(1,5)*A)*A) X BB= SSCO(I+1,1)/(SSCO(I+1,2) +B) +SSCU(I+1,3) LOSE2215 +(SSCC(I+1+4) +SSCO(I+1+5)*8)*8 LOSE2215 X ÷ LOSE?217 IF (AND(IDUMP,4).NE.0.C) GO TO 25 LOSE2218 LOSE2219 1 FRDEL(L,J)= AA*(BETA(L,J) -BETA(L+1,J) LOSE2223 1 3 FRDEL(L+1,J)= BB*(ALPHA(L+1,J) -ALPHA(L+2,J)) LOSE2221 1 LOSE2222 GO TO 26 やいて *** CALCULATE THE SUPERSONIC TURNING ANGLE FROM THE SHOCK ANGLE. 2222 C L0SE2223 25 FRDEL(L, J)= BETA(L, J) -AA/RADIAN LOSE2224 FRDEL(L+1,J) = ALPHA(L+1,J) - BB/RADIANLOSE2225 **26 CONTINUE** LOSE2226 ******* TEST FOR SUPERSONIC VELOCITY LOSE2227 С LOSE2228 IF(MACH(I,J).LT.1.0) GC TO 28 LOSF2229 LOSE2233 A = (MACH(I,J) - 1.) * (MACH(I,J) + 1.0)LOSE2231 С *** IF FLOW IS SUPERSONIC ADD PRANDTL-MEYER ANGLE TO LOSE2232 С SUPERSONIC TURNING ANGLE LOSE 2233 LOSE2234 FRDEL(L,J)= FRDEL(L,J) + TERM1(L,J)*ATAN(SQRT(A)/TERM1(L,J)) -LOSE2235 X ATAN(SQRT(A)) LOSE2235 28 IF (MACH(I+1,J).LT.1.) GO TO 30 LOSE2237 A= (MACH(I+1,J)-1.)*(MACH(I+1,J)+1.0) LOSE2239 LOSE2239 *** IF FLOW IS SUPERSONIC ADD PRANDTL-MEYER ANGLE TO LOSE2240 SUPERSONIC TURNING ANGLE C LOSE2241 LOSE2242 FRDEL(L+1,J)= FRDEL(L+1,J) + TERM1(L+1,J)*ATAN(SQRT(A)/TERM1(L+1, LOSE2243 X J))- ATAN(SQRT(A)) LOSE2244 **30 CUNTINUE** LOSE2245 L=0 LOSE2245 DO 60 I=IFIRST, LSTAGE LOSE2247 L=L+1LOSE2248 DO 60 J=1,NLINES LOSE2249 LOSE2253 ******* INITIALIZE PROFILE SHOCK AND LOSS FUNCTION С LOSE2251 LOSE2252 OBAR(I,J)=0.0LOSE2253 LOSE2254 С *** CALCULATE PROFILE SHOCK LOSE2255 LOSE2255 S Q=0.1LOSE2257 CXS(L, J)=1.LOSE2258 IF (FRDEL(L,J).LT.U.O) GO TO 44 LOSE2259 DO 43 [S=1,100 LOSF2260 LOSE2261 *** CALCULATES DIFFERENCE BETWEEN PRANDTL-MEYER ANGLE FOR MACH LOSE2262 C NUMBER CXS(L, J) AND SUPERSONIC EXPANSION ANGLE LOSE2263 LOSE2264 · . VMI= SHOCK(CXS(L,J), FRDEL(L,J)) LOS 22265

	LOSS EFN SOURCE STATEMENT - IFF(S) -	11/02/67
	IF (ABS(VMI).LE.0.001) GO TO 44	LOSE2266
	IF (VMI.GT.0.0) GO TO 43	LOSE2267
	CXS(L,J)=CXS(L,J)-Q	LOSE2268
	Q = Q/3.0	LOSE2269
43	CXS(L,J) = CXS(L,J) + Q	LOSE2270
	CALL ERROR(29)	LOSE2271
44	IF (MACH(1, J).GE.1.0) GU IU 45	LUSE2272
		LUSE2213
	TTT CALCULATE SUBSUNIC SHUCK	10552274
	EMACH( 1. J)=MACH( 1. J) + ( ]. 0+CX S(1. J) 100-5	10552275
	IF (EMACH(1,J)-1.0) 60,60.50	LOSE2277
		LOSE2279
	*** CALCULATE SUPERSONIC SHOCK	LOSE2279
	-	LOSE2280
+5	EMACH(I,J)=(MACH(I,J)+CXS(L,J))*0.5	LOSE2281
		LOSE2282
	*** CCMPUTE SHOCK LOSS	LOSE2283
۔ م		LOSE2284
10	UBAR(I,J) = (1.0- (((GAMMA(1-1,J) +1.0)*0.5*EMACH(1,J)**2)	LOSE2285
	<pre>( / lloU +UoD*(GAMMA(I-1)J)-LoU)*EMACH(1)J)**2)) ( ++(CAMMA(I-1)L)(CAMMA(I-1)L)</pre>	LUSE2285
	<pre>/</pre>	LUSEZZBI
<i>.</i>	<pre>\ / (GAMMA(1=1,J) +1.0)*EMACH(1,J)**2 -(GAMMA(1=1,J) -1.0) </pre>	LUSE2288
,	(/ 11, 0 - 1, 0/(1, 0 + 1, 0)) + + (1, 0)(1, 0) - 0 AMMA(1-1, 0) + + (1, 0)) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) + (0, 0) +	
Ś	( ** (GAMMA[J-1,1])/(GAMMA[J-1,1]) -1,0)))	10562290
ົ	CONTINUE	10552291
5	L=-1	LOSE2293
-	DD 80 I=IFIRST,LSTAGE,2	LOS E2294
	L=L+2	LOSE2295
	CO 80 J=1+NLINES	LOSE2295
	A= (R(I,J)+R(I-1,J)-KH(I)-RH(I-1))/(RS(I)+RS(I-1)-RH(I)-RH(I-1))	LOSE2297
		LOSE2298
	*** CALCULATE ROTOR MEAN SOLIDITY	LOSE2299
		LOSE2303
•	$SULIV(1, J)^2 = SUUL(1, L)/(SUUU(1, 2) + A) + SUU(1(1, 3))$	LITSEZ301
7	+13ULUII1++1-+3ULUII1+51=A1=A	LUSEZ302
		LUSE2303
	THE GALOULATE NOTUR DEFAULUR	10552205
	AA=SORT((CX([-1, ])**2+(U([-1, ])-CU([-1, ]))**2+CR([-1, ])**2))	10552305
	DFACT([, J)= 1,0-SQRT((CX(I,J)**2+(U(I,J)+CU(I,J))**2+CR(I,J)**2))	LOSE2308
)	(/AA + (U(I-1,J)-CU(I-1,J)-U(I,J)+CU(I,J))/2./SOLID(I,J)/AA	LOSE2308
	A=RS(1) = RH(1)	LOSE2309
		LOSE2310
	*** COMPUTE ROTOR PROFILE LOSSES	LOSE2311
	<b>***</b> LOSE READS THE PROFILE LOSS FROM THE INPUT MAPS	LOSE2312
		LOSE2313
	OBAR(I,J)=OBAR(I,J)+LOSE(DFACT(I,J),(R(I,J)-RH(I))/A,	LOSE2314
,	<pre>&gt; DLAUC(1))*2+U*SUL1U(1+J)/ CUS(AMINI(8E1A(L+1+J)+1+2217)) A= (0/(1+) (1+1+1+ E</pre>	LUSEZ315
-	AT INIITEDE T NILDUTTER. R= {D{{},}}}=047141,}}=04714-0471410071440071414-04714-04714-04714-04714-04714-04714-04714-04714-04714-04714-04	LUSE2315
	n- ////////////////////////////////////	LU322311
	*** CALCULATE STATOR MEAN SOLIDITY	FOSE5510
		10552313
		- 5 いって 6 3 6 3
	SOLID([+],J) = SCCO([+],J) / (SOCO([+],2)+R) + SOCO([+],2)	10052221

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		11/02/67	
	LOSS EFN SOURCE STATEMENT - IFN(S) -		
	X +(SOCO([+1.4) +SOCO([+1.5]*B)*B	L05E2322	
		LOSE2323	
С	*** COMPUTE STATOR D-FACTOR	LOSE2324	
		LOSE2325	-
	$AA = SORT{(CX(I_{1}) + 2 + C)(I_{1}) + 2 + CR(I_{1}) + 2 + CR(I_{1}) + 2)}$	LOSE2326	
	DFACT([+1,.])=1.0-SORT([CX([+1,.])**2+C1]([+1,.])**2+CR[[+1,.])**2)]/	LOSE2320	
	X = A + (CU(1,1) - CU(1+1,1))/2 - SO(TU(1+1,1))/A = CU(1+1,1))/2 - SO(TU(1+1,1))/2 - SO(TU(1+1,1))/A = CU(1+1,1))/2 - SO(TU(1+1,1))/2 -	10562328	- 3 -
		105E2323	×.
C.	*** COMPUTE STATOR PROFILE LOSSES	10552330	
•		LOSE2331	-
	A=PS(1+1)=PH(1+1)	LOSE2332	4
		L 05E2332	
C	*** LOSE READS THE DROFTLE LOSS FORM THE INDUT MADS		-
•	LOSE REROD THE FROM LEE EDSD FROM THE INFOR THIS		•
	0848/141.11=0848/141.11=056/06467/141.11.(0/141.1)=04/141.1.4.		
	X BLADE( I+1) 1±2.0±501 [D(I+1.1)/ COS(AMINI/ALDHA(1+2.1).1.2.2217))		
		10552330	ر ور .
		10552333	
	DD 100 J=JEJOST_ISTACE_2	10553263	
	00 100 I=1. NI TNES	10552341	
		10552342	
r	*** CAICINATE THE STATIC ENTHALDY MINNE THE TOTAL		
ř	- ENTHALDY		
	H= ={CV(T=1, 1)**2 *CV(T=1, 1)**2 *CU(T=1, 1)**2\/C	10552345	
-	$T_{\pm} = TC(T_{\pm})_{\pm} 11$	10553349	in the second
		10562343	10 Million
r	XXX CET THE STATIC TEMPEDATIOE	10552349	3
5	TTT OLI THE STATIC TEMPERATORE		, inter-
		10552351	- 12 - 12
	R= THERMS(T)	10562352	
		10552356	ele Alteration
r	*** CAICHEATE THE STATIC PRESSURE AT THE ROTOR INLET	10562355	
Č.		10552356	1.4
	PSTAT = PO((1-1, 1) * EXP((THERM3(TSTAT(1)) - B)/OCP)	10552357	يد. عد
	$H_{=} = \{I_{1}^{T} = \{I_{1}, I_{1}\} \neq \{I_{1}^{T} = \{I_{1}, I_{1}\} = -2, 0 \neq C \mid I_{1}^{T} = \{I_{1}, I_{1}\} \neq I_{1}^{T} = I_{1}^{T} = 1, I_{1}^{T} = $	10562358	Ş
	CALL ENTALP	10552359	
		LOSE2360	1
C	*** COMPUTE THE TOTAL RELATIVE PRESSURE	LOSE2361	1
•		10562362	ېږد. درې
	P REL= $PO(I-1,J) \neq EXP((THERM3(TSTAT(J)) - B)/DCP)$	10562363	
	H= (U(I,J) - U(I-I,J)) + (U(I-I,J) + U(I,J))/GJ	10562364	÷.
	T= TSTAT(J)	LOSE2365	1.1.1
	CALL ENTALP	10552365	1
	B = THERM3(T)	10562367	
		L05E2368	ro-
C	*** CCMPUTE THE TOTAL IDEAL PRESSURE	LOSE2369	2. 2. 4. 4.
		LOSE2372	3
	P IDEAL= P REL *EXP((THERM3(TSTAT(J)) -B)/DCP)	LOSE2371	ii.
		LOSE2372	, L
C	*** CALCULATE THE FXIT RELATIVE TOTAL PRESSURE FROM THE	LOSE2373	<u>戦</u> 小
С	LOSS COEFFICIENT	LOSE2374	
		LOSE2375	
	P= P IDEAL -OBAR(I,J)+(P REL -P STAT)	LOSE2375	1 27
	H=-U(I,J)*(2.0*CU(I,J) -U(I,J))/GJ	LOSE2377	1 1
			1

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	LUSS EFN SOURCE STATEMENT - IFN(S) -	11/02/67	
	T= TO(I,J)	LOSE2379	
	CALL ENTALP	LOSE2379	T
		LOSE 2380	1
С	*** CALCULATE THE EXIT TOTAL PRESSURE	LOSE2381	
		LOSE2382	~7
	P= P*EXP((THERM3(T) -THERM3(TSTAT(J)))/DCP)	LOSE2383	
		LOSE2394	
C	*** GET THE ICEAL FXIT TOTAL TEMPERATURE	LOSE 2385	
		LOSE 2385	T
	CALL THERM2(P/PC(I-1,J),T,TO(I-1,J))	LOSE2387	1
		LOSE2383	
С	*** COMPUTE THE CORRESPONDING EFFICIENCY	LOSE2399	· - 7
		LOSE2393	l
	EFF = (THERM1(T) - THERM1(TO(I-1,J)))	LOSE2391	1
	X /(THERM1(TO(I,J))-THERM1(TO(I-1,J)))	LOSE2392	
	PO(1, J) = P	LOSE2393	1
		LOSE2394	1
С	*** CHECK THE CONVERGENCE	LOSE2395	
		LOSE2395	-
	IF (ABS((ATAR(I, J) - EFF)/ATAR(I, J)).GT, TOLAT) IPASS= 3	LOSE2397	
	ATAR(I,J) = EFF	LOSE2398	لكن
	H= -(CX(1,J)**2 +CR(1,J)**2 +CU(1,J)**2)/GJ	LOS E 2399	
	(= 10(1, J)	LOSE2403	4
	CALL ENTALP	LOSE2401	2
~		LOSE2402	
L	*** CALCULATE THE STATIC PRESSURE AT THE INLET TO THE STATOR	LOSE2403	1
		LOSE2404	
	P STATE PULLIJI+EXPLITER*SUISTATUJIT -THERMSUITI/UUP)		
r	WAR CALCHENTE THE CTATOR EVER DRESSING FTOTALL COM	10552405	
r	THE LOCE COECETCIENT	LUSC2407	
•		10552405	
	P = PC(1,1) - OBAR(1+1,1) + (PO(1,1) - P STAT)	10552409	
		10552410	ž
С.	*** GET THE IFEAL TOTAL TEMPERATURE	10552412	Ť
•		10562412	
	CALL THERM2(P/PO(I-1.J).T.TO(I-1.J))	LOSE2415	51
		10552415	1
С	*** COMPUTE THE EFFICIENCY	LOSE2416	21
	EFF = (THERM1(T) - THERM1(TO(I-1,J)))	L0SE2417	
	X /(THERM1(TO(I,J))-THERM1(TO(I-1,J)))	LOSE2418	1
		LOSE2419	
C	*** CHECK FOR CONVERGENCE	LOS E 2423	
	·	LOSE2421	1
	IF (ABS((ATAR(I+1+J) -EFF)/ATAR(I+1+J)).GT.TOLAT) IPASS= 3	LOSE2422	1
	ATAS(I+1, J) = EFF	LOSS2423	3 J
	100 CONTINUE	LOSS2424	f 1
	101 CONTINUE	L0552425	1
	NU FAILE "FALSE.	LOSS2425	1
	CALL UKIVE	LOSS2427	
		LOSS2429	
		LUSS2427	1

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LOSE2041 LOSE204?

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#### LOSE. SOURCE STATEMENT - IFN(S) EFN

# REAL FUNCTION LOSE(ARG, PERHT, TYPE)

С С С

*** YIELDS LOSS	PARAMETE	R FROM I	INPUT MAP	S AS A F	UNCTION	OF	2043	-
PERCENT BLA	CE HEIGHT	AND D-F	ACTOR AN	D CIRCUL	AR INTER	RPOLATION		
ALONG THE R	ADIUS).							
							LOSF2045	
INTEGER TYPE, FI	RST						LUSE2047	2
DOUBLE PRECISION	TITLE						LOSE2048	
REAL MACH, MAP	R, MOLEW	T, JOUL	.E				LOSF2049	4
DIMENSION ATAS(2	5,11), F	LOW(32)					LOSE2050	
LOGICAL IERROR,	YES						LOSE2051	
COMMEN /MATRIX/	ALPHA(10	,11),	ATAR (29)	11),	B2(29),		LOSE2052	*
X BETA(10,11),	BH(32),		BLADE(29	) <b>)</b> ,	BT(32),		LOSE2053	1.5
X CO(10,11),	CP(32,11		CPC9(6)	,	CR(32,11	L),	LOSE2054	1.12
X CSLOPE(10,11),	CU2(11),		CU(32+11	.) •	CUC 01 29	,5),	LOSE2055	د. بين
X CX(32,11),	CXM(10,1	.1),	CXNEW(10	),11),	C XRATO(3	29),	LOSE2055	E A
X CXS(10,11),	DA(10),		DELM(11)	•	DEPV(10	,11),	LOSE2057	Ē
X DF(20).	DFACT(29	.11).	DFL(29)	,	DFLOW(32	2),	LOSE2059	
X EMACH(29.11).	FOUND (20	.3.10).	FRDEL(10	.11),	GAMMA (3)	2,11),	LOSE2059	Ż
X HMN(29).	HUB(32)	• - • •	IKK(10)		MACH(29	,11),	LOSE2060	
X OBAR(29.11).	PD132-11	3.	P(32.11)	•	R CURVE (	0.11).	LOSE2061	
X RH(32).	RH0(32.1	1).	RINT(11)	•	ROSTAG	11).	LOSE 2062	2
X RS(32).	RSIDE	0.111.	RTRAIL	i > _	5000129	.5).	LOSE2063	题金
	SSC0129.	51.	TERM1(1)		TERMA(1)		LOSE2064	
$\mathbf{Y} = \mathbf{T} \mathbf{E} \mathbf{P} \mathbf{M} \mathbf{A} \mathbf{A} \mathbf{I} \mathbf{A} \mathbf{A}$	TEDMC [ 11		TID(32)		TITIELI	21.	LOSE2065	語の
$X = E K^{\mu} D X \pm 1 + 1 + 1$	TSTATI	.,,	11/32.11		W(11).	_ / •	LOSE2065	機構
	1 STATLE		0152111	•	W(11) 4		10562067	赤選
	•		A 1 D A D	420240	A 20240	A 4 0 4 A 0 .	10552007	読い
CUMMEN /SCALER/	49	AA,	A LUAU 7	AZUZAUT	C MEA	COINTC		i en com
X ASUSAU, B,	55, 601/			COOD			10552007	÷.
X (P12, (P13,	CP14,	UPID,				5P04+		<b>7</b>
X CPU5+ UAMP+	DLP,	00,	DIFCF,			ERASI		ALC: N
X Gy GASKy	GJy	GK,	GRZ,	JUULE	MAPK,	MULEWI		1.25
X POCO, C,	RPM,	TCP,	TERMD	IESIBH.	TESIDS,	152145,		
X TOCO, TOL,	TOLAT.	TOLB2,	TGLMIN,	TOLMS,	TOLITP,	IULCP.	LUSE 2074	貧惶
X TOLCX, TOLR,	TCTINT,	TOTPR,	V,	VMI			LUSE2075	1
COMMON /INTEGR/	Ι,	18,	181,	IDUMP,	LERROR,	IFIRST,	LUSE2075	纖
X IG, ICUTTR,	IPASS,	IS,	IT,	J,	JIN,	11.	LUSE2077	
XJM, JM1,	К.	К1,	KK,	L,	LIMIT,	LSTAGE,	LOSE2079	
X MSTAGE, NLINES,	NTUBES,	NX,	NX1,	YES			LOSE2079	
EQUIVALENCE (AT	AR (1,1),	ATAS(1,1	)), (FL)	DW(1),DF	LOW(1))		LOSE 2080	
							LOSE 2081	1
FIRST=1							LOSE 2082	
10 FIRST=FIRST+1							LOSE2083	
IF (DF(FIRST).LT	.ARG.AND	FIR ST .L	T.20) GC	TO 10			LOSE2084	
1=1							LOSE2085	
<pre>[F {PERHT.GT.0.5</pre>	1 JJ=3						LOSE2086	
DEL=(ARG-DF(FIRS	T-1))/(D)	F(FIRST)	-DF(FIRS	T-1))			LOSE 2087	
FCT1=((FOUND(FIR	ST,2,TYP	E)-FOUND	(FIRST-1	,2,TYPE)	)*DEL)		LOSE2088	
X +FOUND(FIRST-1,	2 ,TYPE)				-		LOSE2089	
FCT2=((FOUND(FIR	ST, JJ, TY	PE)-FOUN	D(FIRST-	1.JJ.TYP	E))*DEL)		LOSE2090	お茶さ
X +FOUND(FIRST-1.	JJ, TYPE)			-			LOSE2091	E W
DEL= FCT2-FCT1							LOSE2092	1.000
IF (ABS(DEL).GT.	C.001)	GO TO 20					LOSE2093	and the second
LOSE= FCT1	• <b>-</b> ·						LOSE2094	100
RETURN							LOSE2095	

LOSE	EFN SOURCE STATEMENT - IFN(S)	- 11/0?/67
20 RAD= 0.5*SQRT(DEL* LOSE= FCT1 +RAD*(1) RETURN END	<pre>#2 +0.16)/SIN(ATAN(2.5*DEL)) 50 -COS(ATAN(ABS(PERHT -0.5)/RAD)))</pre>	LOSE2096 LOSE2097 LOSE2098 LOSE2099

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PAGE IS POOR REPRODUCIBILITY OF THE ORIGINAL 11/02/67 TEN(S) EFN SOURCE STATEMENT MOVE. MOVE2433 SUBROUTINE MOVE MOVE 2431 "OVF 2432 *** CAUSES THE RELOCATION OF THE STREAMLINES BASED ON С MOVE2433 С FRACTIONAL MASS FLOW. (STREAM MUST BE CALLED FIRST) MOVE2434 MOVE2435 DOUBLE PRECISION TITLE MOVE 2436 MAPR, MOLEWT. JOULE MACH, REAL MOVE2437 FLOW(32) DIMENSION AFAS(29,11), MOVF2438 LUGICAL **IERROR**, YES MOVF2439 B2(29), ALPHA(10,11), ATAR (29,11), COMMON /MATRIX/ MOVE2443 BLADE( 19). BT(32)+ BH(32), X BETA(10,11), MOVE2441 (F(32,11), CP(32,11), CPCO(6), X CG(10,1)), MOVE2442 CUCC(29,5), CU(32,11), x CSLOPE(10,11), CU2(11), CYRATO(29), MOVF2443 CXNEW(10,11), CXM(10,11), X CX(32,11), DEPV(10,11), MOVE2444 DA(10), DELM(11), X CX5(10,11), DFLOW(32), MOVE2445 DFACT (29,11). DFL(29), X DF(20), GAMMA(32,11), MOVE 2446 FOUND(20,3,10), FRDEL(10,11), EMACH(29,11), X MACH(29,11), MOV52447 IKK(10), X HMN(29), HUB(32). RCURVE(10,11), MOVE 2448 R432,11), -02AR(29,11), PO(32,11), х RINT(11), POSTAG(11). MOVE 2449 RH0(32,11), х RH(32), SOCO(29,5), MOVE 2450 RSLOPE(10,11), R TRA I1 (11), X RS(32). MOVE2451 TERM1(10,11), TERMAIL11; X SOLID(29,11), SSC0(29.5). MOVE 2452 TITLE(12), TERMC(11), TIP(32), X TERMB(11), w(11). MOVE 2453 U(32,11), X TO(32,11), TSTAT(11), MOVE 2454 X X(32) MOVE2455 ΔΑ, A10A0. A202A0+ A30340, 440440, COMMEN /SCALER/ Α, CMEAN, CMEANP, COINTG. MOVE 2455 CC. CM. X A505A0, B, **BB**. CP04, MOVE2457 X CPI2, CPI5, CP16, CP02, C PO3, CPI3, CPI4. MOVE2458 DAMP . DCP, DUMMY, ERAS1, X CP05, ÜD, DIFCM, DT, JOULE . MAPR. MOLEWT, MOVE2459 GR2, X G, GASK, GJ, GR. TERMD. **FESTEH**, TESTOS, TESTMS, MOVE2463 RPM. T CP . X POCO, Q, TOL. TCLAY, TUL 82, TOLMS, TOLTIP, TOLCP, MOVE2461 X TOCO, TOLMIN. X TULCX, TOTPR . VMI MOVE 2462 TOLR. TCTINT. ۷, IDUMP, IERROR, IFIRST, MOVE2463 COMMON /INTEGR/ 18. IB1, Ι, MOVE2464 JIN. 11. ICUTTR, IPASS. IS, IT, J, X IG, KK. LIMIT, LSTAGE. MOVE2465 К, К1, JM1. L, X JM, X MSTAGE, NLINES, NTUBES, NX, YES MDV22466 NX1, (FLOW(1), DFLOW(1)) MDVE>467 EQUIVALENCE (AT AR (1, 1), AT AS (1, 1)), MOVE2469 MOVE2469 TERMC(1)=0.0 MOV 52470 TERMC(NLINES)=1.0 TERMA(1) = R(1,1)MOVE2471 MOVE2472 TERMA(NLINES) = K(I,NLINES) MOVE2473 TERMB(1) = CXM(1,1)MOVF2474 TERMB(NLINES)=CXM(L,NLINES) MOVE2475 DO 350 J=2, NTUBES TERMA(J) = R(I,J)MOVE2475 TERMB(J)=CXM(L,J) MOVE2477 TERMC(J) = TERMC(J-1) +CA(J-1)/TOTINT MOVE2479 *** CHECK THE MASS FLOW BETWEEN FACH STREAMLINE MOVE2473 C IF (ABS(TERMC(J) -DELM(J)).GT. 0.005) YES= .TRUE. MOVE 2480 350 CONTINUE MOVE: 491 MOVE2482 *** CALCULATE STREAMLINE RADII TO GIVE SPECIFIED MASS FLOW MOVE 2483 C MOVE 7484 C FRACTION THROUGH EACH STREAMTUBE

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MOVE EFN SOURCE STATEMENT - IEN(S) -	11/02/67
	MOV22495
00 505 1-2 NTURES	MOVE2485
CALL CLINELDELMIN, TERMO, TERMA, NI INÉS, RTRAIL (J)	MDVE2487
$\frac{1}{2} = \frac{1}{2} = \frac{1}{2} = \frac{1}{2} + \frac{1}$	MOVE2489
V4 KIKALLUJI- KUIJJI TUKIKHILUJI KULJUTILU	MOVE 2483
	MOVE2490
*** CALCHEATE VALUES OF CX AT NEW STREAMLINE RADII	MOVE2491
	MOVE2492
CALL SLINE RTRAIL(1). IFKMA. TERMB. NLINES, DEPV(L, J))	MOVE2493
CALL SERVICE AND A CONTRACT OF A	MOVE2494
CY(1.1)=CYM(1.1) +CWEANP	MOVE2495
CXII, NIINES = CXM (L. NIINES) + CMEANP	MOVE2495
$00.510$ $\pm 2.5$ NTURES	MOVE2497
CY ( I . 1)=DEPV( I . 1)*CMEANP	MOVE 2498
	MQVE2493
$x_1, y_2, z_3, z_4, z_5, z_6, z_6, z_6, z_6, z_6, z_6, z_6, z_6$	MOVE2500
	MOVE2501
	KOVE2502

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Section Section

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OUTL SUBRCUTINE OUTLET REAL MACH, MAPR, DIMENSION ATAS(29, LOCICAL TERROR	EFN SC	SURCE S	STATEMENT	r – tfi	(S) -		11/02/67
OUTL SUBRCUTINE OUTLET REAL MACH, MAPR, DIMENSION ATAS(29, LOCICAL TERROR	EEN SC	OURCE S	STATEMENT	F - IFM	(5) -		
SUBRCUTINE OUTLET REAL MACH, MAPR, DIMENSION ATAS(29,							
REAL MACH, MAPR, DIMENSION ATAS(29,							OUTL2503
REAL MACH, MAPR, DIMENSION ATAS(29)							JUTL 2504
DIMENSION ATAS(29)	MULEWIS	, յող	_£				PUTL2505
Ι ΟΓΤΓΑΙ ΤΕΘώΟΡ Ν	,11), FL(	JW (32)					00112505
LUGICAL (CKKUK)	ES -						001122507
COMMEN /MATRIX/ A	ALPHA(10,	11),	ATAR (29)	,11),	82(29)+		00112505
X BETA(10,11), E	3H(32),		BLADETZ	<del>}</del> }•	FI(32),		00122007
X CO(10,11), C	P(32+11)	•	CPUULEI	•		51	001E2513
X CSLOPE(10,11), (				LJ9 3 313		· · · · ·	0111 2512
X (X(32,11), U)	JXM(10+11)	1 +	DELVIT		DEPVID		OUTL 2513
	JALIUJ; NEACT(20 1		DEL 1111	•	DEL 04/33	2) .	OUTL 2514
	TOUND (20.3	$\frac{11}{3}$		,	GAMMA (3)	2.111.	OUTL 2515
	-UUND(20).	541074		-	MACH(29	.11).	OUTL 2515
X DRAR(29_111_	11(32,111)	•	R (32.11	).	PCURVET	10,11).	OUTL 2517
X RH(32).	RH0(32.11)	).	RINT(11	),	RESTAGE	11),	OUTI. 2513
X RS(32)	SLUPE(10	•11)•	RTRAIL	11),	\$000(29	,5),	OUTL 2519
X SOLID(29.11).	SSC0(29,5)	),	TERM1(1)	0,11),	TERMA(1)	ι),	OUTL 2520
X TERMB(11).	FERMC(11)	•	TIP(32)	•	TITLE (1)	2),	OUTL2521
X TG(32,11), 7	STAT(11)	•	U(32,11	),	W(11),		OUTL 2522
X X(32)	•						OUT L 2523
COMMON /SCALER/	Δ, Δ/	Α.	A10AC.	A202A0,	A303A0+	A404A0,	00112524
X A505A0, 8, 8	3 <b>3, C</b> (	С,	C M.	CMEAN,	C ME AN P 🖡	COINTG,	OUTI. 2525
X CPI2, CPI3, (	CPI4, CI	PI5+	CP16,	CPO2,	ር ቦር 3 ተ	CP04,	OUTL2526
X CP05, CAMP, [	DCP+ OI	D,	DIFCM,	DT,	DUMMY .	ERASI	OUTL2527
XG, GASK, (	GJ, Gi	Ř.	GR2,	JOULE.	MAPR,	MOLEWT,	- NUTL2523
X PUCO, C, F	RPM, T	CP 🕴 👘	TERMD,	TESTEH.	TESIDS,	IESIMS,	101L2529
X TOCO, TOL,	TOLAT, TO	OLB2.	TOLMIN,	IULMS,	TULITY,	IULLP+	001122330
X TULUX, TULK,	IULINI, IU		V, 101		T C D D D U	151051.	00122531
LUMMUN /INTEGR/		5 <b>1</b>		I DOMP I	ITN.	11.	00122332
	1PA324 I	a.		J +	I IMIT.	LSTAGE.	00122535
Y MSTACE, NITNES, 1	NTHRES. Nº	Υ.	NX1.	VES		LUTROLY	OUTL 2535
ENTIVALENCE (ATA	R(1.1).ΔT	^¥ 45(1.1	)). (F1)	DW(1).DF	IOW(1)		OUTL 2535
*** YTELDS IN 1	TIAL FLOW	ESTIM	ATE FOR	THE OUTL	ET		OUTL 2537
							OUTL 2538
DOUBLE PRECISION	LITLE .						OUTL2539
					•		<b>DUTL254</b> 0
*** INITIALIZE	OUTLET L	00 P					OUTL 2541
					•		OUTL 2542
K=I+1							10TL 2543
CALL AN EXIT							
DU TO I=K NX	-						00122343
WWW PLT TAITTA		ар стр	CAME THE	RADIT			00162345
WAA OCT INTITA	L VALUES -	01 314		- VII			0111 2549
CALL RSTART							OUTL 2549
DO 5 J=1.NLINES							OUTL 2550
						-	OUTL 2551
*** SET FLOW P	ROPERTIES	AS CO	NSTANT A	LONG STR	EAMLINE		OUTL 2552
			J				OUTL 2553
CP(I,J)=CF(LSTAGE	( L •						OUTL2554
GAMMA(I,J)=GAMMA(	LSTAGE, J}				-		NUTL2555
CU(I,J)=CU(LSTAGE	J)*R(LST	AGE, J)	/R(I,J)				OUTL 2556
TO(I+J)=TO(LSTAGE	• ] ]				-	~	OUTL2557

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GUTL EFN SOURCE STATEMENT - IEN(S) -	11/02/67
PO(I,J)=PC(LS)AGE,J)	<b>MUTI 255</b> 4
	OUTL 2559
*** GET INITIAL ESTIMATE OF AXIAL VELOCITY	OUTL2560
	OUTL2561
IF (LSTAGE-NE-7) GC TO 6	DUTL2562
CALL INFST	OUTL2563
GO TO B	OUTL 2564
DC 7 J=1. NL INES	OUTL2565
CX(I,J) = CX(I-1,J)	OUTL 2565
	DU1L2567
*** CALCULATE STOPLE RADIAL EQUILIBRIUM SOLUTION OF FLOW	I 0UTL2568
CONDITIONS	00712567
	0UTL2570
CALL STREAM	DUTL2571
LALL MUVE	OUTL2572
KETURN	0UTL2573
t NU	OUTL 2574

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# SUBROUTINE OUTPUT

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			PAU							
	SUBROUTI	NE OUTPUT	<b>r</b> -						OUT.25	75
									OUT.25	76
	DIMENSIO	N PNAL2	), PNÁB	(-29), Th	IA(29), T	MAB(29)	TMAEP(2	291	JUT . 25	77
	DOUBLE P	RECISION	TITLE	· - · ·					OUT.25	78
	REAL MA	CH. MAPI	R. NOLEN	IT. JOUL	.E				OUT.25	79
	DIMENS IO	N ATAS(2)	9.11). F	LOW(32)					OUT . 25	80
	LOGICAL	IERROR.	YES						OUT.25	81
~	COMMON /	MATRIX/	ALPHA(10	),11).	ATAR (29	11).	82(29),		OUT.25	82
X	BETA( 10	.11).	BH(32).	• • •	BLADE(29	),	BT(32),		OUT . 25	83
X	CG(10.1	1).	CP(32.1)		CPC0(6),		CR(32.1)	U .	OUT . 25	84
X	CSLOPE	10.11).	CU2(11)	•	CU(32,11	.) .	CUC0(29)	51,	OUT.25	85
X	CX(32.1	1).	CXM(10.1	11.	CXNEW(10	,11),	C XRATO(2	29),	OUT . 25	85
X	CXS(10.	11).	DA(10),		DELM(11)	•	DEPVILO	,11),	OUT - 25	87
X	DF(20).		DFACT(29	.11).	DFL(29)		DFLOW(32	21 •	OUT . 25	88 -
X	EMACH(2	9.11).	FOUND (20	3.10).	FRDEL(10	,11),	GAMMA (32	2,11),	OUT . 25	89
X	HMN(29)	•	HUB(32)	,	IKK(10)		MACH(29	,11).	OUT . 25	90
X	OPAR(29	.11).	PD(32.1)	1,	R(32,11)	•	R CURVE (	10,11),	OUT.25	91
X	RH(32).	• == • •	RH0(32.1	1),	RINT(11)	•	ROSTAGE	11),	UUT . 25	92
X	RS(32).		RSLOPEL	0.11).	RTRAIL	.1).	SOC0(29	5),	OUT . 25	93
X		9-11).	S SCO1 29	51.	TERM1(10	).11).	TERMA(1)	<b>D</b> •	-OUT.25	i94
x	TERMB()	11.	TERMC(1)		TIP(32)		TITLE (1)	2),	OUT . 25	95
X	TO(32.1	1).	TSTAT(1)		U(32.11)		W(11).	•	OUT . 25	96
, ,	(X(32)					•			OUT.25	i97
•	COMMON /	SCAL ER/	Α.	AA.	A10A0	A202A0.	A303A0,	A404A0,	OUT.25	i98
X	A50540.	B.	88.	CC.	CM.	CMEAN .	CMEANP.	COINTG.	OUT . 25	99
, j	CPI2.	CP 13.	CPI4.	CP15.	CPI6.	CP02.	C PO3.	CP04,	OUT.26	00
	CP05.	DAMP.	DCP.	DD.	DIFCM	DT.	DUMMY .	ERAS1.	OUT.26	501
ý	6.027	GASK.	GJ.	GR.	GR2.	JOULE.	MAPR.	MOLEWT.	OUT . 26	02
Ś	POCO.	Q.	RPN.	TCP.	TERMD.	TESTAH.	TESTDS.	TESTMS.	OUT . 26	503
ý		TOI -	TGLA1.	TOI 82.	TOLMIN.	TOLMS.	TOLTIP.	TOLCP.	OUT.26	504
ý		TOLR	LATINT.	TOTPR .	V.	VMI			OUT . 26	505
	COMMON /	INTEGR/	1.	18.	181.	LDUMP .	I ERROR .	IFIRST.	OUT . 26	506
,	16.	IOUTTR.	IPASS.	IS.	IT.	.1.	JIN.	JJ.	OUT . 26	507
, j	IM.	.1M1 .	К.	K1.	KK.	L.	LIMIT.	LST SE.	OUT.26	508
,	MSTAGE	M INES.	NTURES.	NX.	NX1.	YES	•••••		OUT . 26	509
•	FOUTVALE	NCE LAT	AR(1.1).	ATAS(1.1	)). (FI)	14(1).DF			OUT - 26	510
	COMMON /	VMINZ VO	(29)						OUT . 26	511
	COMMON	/FNERGY/	He Te (	GAMMER					OUT . 26	512
	00111011	/ 2//2//0///			-	<i>-</i> .			OUT . 26	513
	THAPP(5)	= THERM1	(TO(1.1)	)				-	OUT . 26	514
	R= TMAEP	(5)		•					DUT . 26	515
	T = TOCO		-						OUT . 26	516
	IB=1				-				DUT 26	517
	$10^{-1}$								OUT . 26	518
	NX1 = 5						•		OUT . 26	519
		1 NI INES	TOUTTR					-	DUT 2	520
	DOULD DE 11	. 1)=0.	1100111						DUT 2	521
	RCURVETI								OUT 2/	522
610	CALL DE	RIVIR_RS	I OPE-RCI	RVF.X1					OUT . 20	623
910	WRITE /A	. 2011							DUT . 2/	574
20.1	FORMAT /	1811							OUT : 24	525
CAT	N=0	<b>.</b>							OUT - 24	526
	00 58 I=	1.5							0UT 24	627
	DO 58 .1=	I NI INES	LOUTTR						DUT 2/	628
			,						NUT _ 2/	500
										- C. F

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PAGE 171 OUT. EFN SOURCE STATEMENT -IFN(S) ******* CALCULATE ABSOLUTE VELOCITY DUT. 2630 (INLET) C OUT.2633 ******* CALCULATE STATIC TEMPERATURE C (INLET) OUT . 2634 DUT. 2635  $H= -CXM(I_J) + 2/GJ$ OUT.2636 CALL ENTALP OUT . 2637 CALL GAM OUT. 2638 CXNEW(I, J)= TSTAT(J) OUT.2639 OUT.2640 С ***** CALCULATE ABSOLUTE MACH NUMBER (INLET)** OUT.2641 OUT.2642 CXS(I, J)= CXM(I, J)/SQRT(GR2+GAMMER+TSTAT(J)) OUT .. 2643 OUT.2644 C ******* CALCULATE ABSOLUTE FLOW ANGLE (INLET) OUT.2645 OUT.2646 A = SQRT(CX(I,J) + 2 + CR(I,J) + 2)DUT. 2647 ALPHA(I,J)= ATAN(CU(I,J)/A)+57.2957795 OUT.2648 OUT . 2049 RCURVE(I, J)=RCURVE(I, J)/(SQRT(1.+RSLOPE(I, J)++2)++3) RSLOPE(I, J) = ATAN(RSLOPE(I, J))*57.2957795 OUT. 2650 **58 CONTINUE** OUT . 2651 DO 71 I=1.5 OUT . 2652 IF (I.GE.5) GO TC 64 OUT.2653 OUT.2654 C ******* PRINT INLET DATA OUT. 2655 OUT.2656 WRITE (6,61) I OUT.2657 OUT.2658 61 FORMAT(1H0/10X18H----STATION NUMBER I3,5H ---- //5X70HS.L. STREAMLOUT.2659 XINE ABS. MACH ABS. VEL. AXIAL VEL. RADIAL VEL. 4X OUT.2660 **X39HSTREAMLINE** FLOW ANGLE/5X27HNO. RADIUS (IN.) OUT.2661 STREAMLINE X NUMBER 6X8H(FT/SEC) 6X8H(FT/SEC) 5X8H(FT/SEC) 5X12HSLOPE (DEGS) OUT.2662 X 4X9HCURVATURE 5X 9H(DEGREES) / 96X 5H1/IN. /) OUT.2663 OUT.2664 GO TO 265 OUT . 2665 OUT.2666 ******* PRINT INLET GUIDE VANE EXIT DATA C OUT.2667 OUT.2668 64 WRITE (6,264) I OUT.2669 - Strents OUT.2670 264 FORMAT (1+0/10X18H----STATION NUMBER 13,31H ----(INLET GUIDE VAOUT.2671 ABS. MACH AXIAOUT.2672 XNE EXIT! // 5X70HS.L. STREAMLINE ABS. VEL. RADIAL VEL. 4X38HSTREAMLINE XL VEL. STREAMLINE FLOW ANGLE / OUT. 2673 NUMBER 6X8H (FT/SEC) 6X8H (FT/SEC) 5X8H (FTOUT. 2674 X 5X27HNO. RADIUS (IN.) X/SEC)5X12HSLOPE (DEG) 4X9HCURVATURE 5X9H(DEGREES) / 96X 5H1/IN./) OUT.2675 OUT.2676 DO 67 J=1,NLINES,IGUTTR OUT.2677 CALL GAM OUT . 2679 ERAS1= GR2*GAMMER*TSTAT(J) DUT. 2679 OUT.2680 C ***** COMPUTE RELATIVE VELOCITY (FIRST ROTOR ENTRANCE)** OUT.2681 OUT.2682 CO(5+J)= CX(5+J)++2 + (CU(5+J)-U(5+J))++2 + CR(5+J)++2 OUT. 2683  $CD(5,J) \neq SQRT(CO(5,J))$ OUT.2684 OUT.2685

いっしょうになってきませんでいっていたいで、ここので、「ちょうになってきまた」である С ******* COPPUTE RELATIVE MACH NUMBER (FIRST ROTOR ENTRANCE) OUT.2686 OUT . 2687 kRITE (6,68) J,R(I,J),CXS(I,J),CXM(I,J),CX(I,J),CR(I,J), OUT.2698 X RSLOPE(I,J),RCURVE(I,J),ALPHA(I,J) OUT.2689 67 CXS(5, J) = CO(5, J)/SQRT(ERAS1) OUT.2690 WRITE (6,272) OUT . 2691 DUT.2692 272 FORMAT (1H0 4X15HS.L. STREAMLINE3X11HTOTAL PRES. 3X11HTOTAL TEMP. DUT.2693 X 3X 9HREL. VEL.3X10HWHIRL VEL. 6X8HRELATIVE 7X 9HREL. FLOW 4X OUT.2694 X 11HWHEEL SPEED / 5X29HNO. RADIUS (IN.) (LB/SQ IN.) 4X9H(DEGREES) OUT. 2695 X 4X 8H(FT/SEC) 5X8H(FT/SEC) 7X 8HMACH NO. 7X 9HANG.(DEG) 6X OUT.2695 X 8H(FT/SEC) QUT.2697 1 OUT.2698 00 273 J=1, NL INES, IOUTTR OUT.2699 DUT. 2703 С ******* CALCULATE RELATIVE FLOW ANGLE INTO THE FIRST ROTOR OUT.2701 OUT.2702 72 BETA(2,J)=ATAN((U(5,J)-CU(5,J))/SQRT(CX(5,J)*+2+CR(5,J)*+2)) OUT.2703 X *57.2957795 OUT.2704 1. 0.0Ex 273 WRITE (6,274) J,R(I,J),PO(5,J),TO(5,J),CO(5,J) CU(5, J), OUT.2705 X CXS(5,J),BETA(2,J),U(5,J) OUT.2705 ilini ar h OUT.2707 274 FORMAT (17, F11.4, F14.2, 3F13.2, F15.3, 2F15.3) OUT, 2708 OUT.2709 N. P.K. 68 FORMAT (17, F11.4, F13.3, 2F14.2, F14.4, F14.2, F14.5, F15.1) OUT.2710 . . . . . OUT.2711 GO TO 71 OUT.2712 A VENUS CARAGE 265 00 69 J=1, NL INES, IOUTTR OUT.2713 69 WRITE (6,68) J,R(I,J),CXS(I,J),CXM(I,J),CX(I,J),CR(I,J), OUT.2714 X RSLOPE(I,J), RCURVE(I, J), ALPHA(I, J) OUT.2715 WRITE (6,271) OUT.2716 DO 269 J=1, NLINES, IOUTTR ないたちのうちょうでんないというないない、ないないないないないないないないないないないない OUT.2717 269 WRITE (6+270) J+R(I,J),PG(I,J),TD(I,J) DUT.2718 OUT.2719 270 FORMAT (17, F11.4, F14.2, F13.2) OUT.2720 007.2721 271 FORMAT (140 4X43HS.L. STREAMLINE TOTAL TEMP. / 5X CUT.2722 TOTAL PRES. RADIUS (IN.) (LB/SQ IN.) X42HNO. OUT.2723 (DEGREES) / ) OUT.2724 **71 CONTINUE** OUT.2725 IF (LIMIT.EQ.0) WRITE (6,250) 001.2725 250 FORMAT (//// 41X 37HITERATION ON LOADING WAS TAKING PLACE ) OUT.2727 OUT.2728 С ******* INITIALIZE MASS AVERAGE ROUTINE OUT. 2729 OUT.2730 TMA(5) = 1.0OUT.2731 PMA(5)=1.0 OUT.2732 00 100 IS=6,LSTAGE,2 OUT.2733 OUT.2734 10 С ******* SET INDICES FOR DERIVATIVE ROUTINE OUT.2735 の語がのかか OUT.2736 IB=IS-1OUT.2737 181 = 15OUT . 2738 NX1=IS+1 DUT.2739 N=N+1DÚT. 2740 OUT.2741

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**PAGE 173** SOURCE STATEMENT - (FN(S) EFN OUT. OUT.2744 DEPV(5,1) = X(IS) - X(IS-1)OUT . 2745 DEPV(5,2) = X(IS+1)-X(IS)OUT.2746 OUT. 2747 ******* CALCULATE ROTOR HUB AND STATOR HUB RAMP ANGLE OUT.2749 ALPHA(3,1)= ATAN((RH(IS)-RH(IS-1))/DEPV(5,1))*57.2957795 OUT.2749 OUT.2753 ALPHA(4,1)= ATAN((RH(IS+1)-RH(IS))/DEPV(5,2))*57.2957795 OUT . 2751 ******* CALCULATE ROTOR TIP AND STATOR TIP RAMP ANGLE OUT.2752 OUT.2753 ALPHA(3,2)= ATAN((RS(IS)-RS(IS-1))/DEPV(5,1))*57.2957795 OUT.2754 OUT.2755 ALPHA(4,2)= ATAN((RS(IS+1)-RS(IS))/DEPV(5,2))*57.2957795 **NUT.2756** IX = IS + 1OUT.2757 00 35 JJ=IS,IX 00 10 J=1,NLINES OUT, 2758 OUT.2759 TERMB(J) = TO(JJ,J)OUT.2760 OUT.2761 ******* CALCULATE THEORETICAL TEMPERATURE RISE 3 OUT.2762 OUT.2763 CALL THERM 2(PO(JJ+J)/POCO +TERMB(J)+518+688) OUT.2764 TERMB(J)= TERMB(J)/518.688 OUT.2765 Ĵ ******* COMPUTE MASS FLOW RATE PER STREAMLINE OUT.2766 OUT.2767 OUT.2768 10 DEPV(9,J) = RHO(JJ,J) + CX(JJ,J) + R(JJ,J)OUT.2769 L=9 OUT . 2770 I=JJ OUT.2771 ******* INTEGRATE MASS FLOW RATE, RESULT IN RINT OUT.2772 3 OUT . 2773 OUT.2774 CALL INTEG DEPV, 2) SUM= RINT(NLINES)-RINT(1) OUT.2775 OUT.2776 DO 20 J=1,NLINES OUT.2777 20 DEPV(8,J)= (TERMB(J)-1.)*DEPV(9,J) OUT.2778 L=8 OUT.2779 CALL INTEG(DEPV, 2) OUT.2780 V=kINT(NLINES)-RINT(1) OUT.2781 ***** CALCULATE MASS AVERAGED TEMPERATURE AND PRESSURE** OUT.2782 Ç OUT.2783 TMA(JJ)= (V/SUM+1.)*518.688 OUT.2784 PMA(JJ)=EXP((THERM3(TMA(JJ)) -COINTG)/DCP) OUT.2785 OUT.2785 DU 30 J=1,NLINES OUT.2787 30 DEPV(8,J)= (TO(JJ,J)/518.688-1.)*DEPV(9,J) OUT.2788 CALL INTEGIDEPV, 2: V=RINT (NLINES)-RINT(1) OUT.2789 TMA(JJ)= (V/SUM+1.)*518.688/TO(1.1) OUT.2790 OUT.2791 OUT.2792 C ******* COMPUTE NASS AVERAGED EFFICIENCY OUT.2793 TMAEP(JJ)= THERM1(TMA(JJ)*TOCO) OUT.2794 **35 CONTINUE** OUY.2795 OUT - 2796 OUT.2797 С ******* DETERMINE MASS AVERAGE TEMPERATURES AND PRESSURES

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UUT. EFN SOURCE STATEMENT -IFN(S) OUT.2798 OUT.2799 TMAB(IS)=TMA(IS)/TMA(IS-1)OUT.2800 TMAB(IS+1) = TMA(IS+1)/TMA(IS-1)OUT.2801 PMAB(IS) = PMA(IS)/PMA(IS-1)OUT - 2802 AA = TNA(IS) + TO(1,1)OUT.2803 BB≓ AA OUT.2804 CC= TMA( IS+1)*TO(1,1) OUT.2805 **DD= CC** OUT . 2906 DUT-2807 ******* YIELDS THEORETICAL TEMPERATURE RISE CUT.2809 OUT 2809 CALL THERM2(PMA(IS),AA,TO(1,1)) OUT.2810 CALL THERM2(PMA(IS)/PMA(IS-1), BB, TMA(IS-1)+TO(1,1)) OUT.2811 CALL THERM2(PMA( IS+1), CC, TO(1,1)) OUT.2812 CALL THERM2(PMA(IS+1)/PMA(IS-1),DD,TMA(IS-1)*TOCO) OUT.2813 OUT.2814 ******* OVERALL MASS AVERAGE ROTOR EFFICIENCY OUT.2815 OUT.2816 CXS(6,1) = (THERM1(AA) - TMAEP(5))/(TMAEP(IS) - TAEP(5))OUT.2817 PMAB(IS+1)=PMA(IS+1)/PMA(IS-1)OUT.2818 OUT.2819 ***** MASS AVERAGE ROTOR EFFICIENCY** OUT.2820 OUT.2821 CXS(6,2) = (THERM1(BB) - TMAEP(IS-1))/(TMAEP(IS) - TMAEP(IS-1))OUT.2822 ******* OVERALL MASS AVERAGE STAGE EFFICIENCY OUT: 2823 OUT.2824 OUT.2825 CXS(7,1) = (THERM1(CC) - TMAEP(5)) / (TMAEP(IS(1) - TMAEP(5)))OUT.2826 *** MASS AVERAGE STACE EFFICIENCY OUT.2827 OUT.2828 CXS(7,2)=(THERM1(DD)-TMAEP(IS-1))/(TMAEP(IS+1)+TMAEP(IS-1))DUT.2829 OUT.2830 DO 40 J=1.NLINES OUT.2831 FRDEL(1,J)= THERM1(TO(IS-1,J)) OUT.2832 FRDEL(2,J)= THERM1(TO(IS,J)) FRDEL(3;J)= TFERM1(TC(IS+1,J)) DUT.2833 TERMD=TO(IS,J) OUT.2834 TERMA(1)=TO(IS,J) OUT.2835 CALL THERM2(PO(IS, J)/PO(IS-1, J), TERMD, TO(IS-1, J)) OUT.2836 OUT.2837 ***** YIELDS THEORETICAL TEMPERATURE RISE** OUT.2838 OUT.2837 CALL THERM2(PO(IS+1,J)/PO(IS-1,J), TERMA(1), TO(IS-1,J)) OUT.2840 OUT.2841 ******* DETERMINE ROTOR AND STAGE EFFICIENCY OUT. 2842 OUT.2843 ATAR(IS.J)= (THERM1(TERMD)-FRDEL(1.J))/(FRDEL(2.J)-FRDEL(1.J)) OUT.2844 ATAS(IS+1,J #= (THERM1(TERMA(1))-FRDEL(1,J))/(FRDEL(3,J)-FRDEL(1,J))OUT.2845 OUT.2846 ******* COMPUTE ABSOLUTE VELOCITY (ROTOR EXIT) OUT.2847 OUT.2848 CXM(1, J)=SQRT(CX(IS, J) ++2+CU(IS, J) ++2+CR(IS, J) ++2) OUT.2849 OUT.2853 ******* CALCULATE ROTOR STATIC TEMPERATURE OUT.2851 OUT .. 2852 H= -CXM(1,J)**2/GJ OUT.2853

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	PAGE 175		
	CALL ENTALP	OUT. 2855	ا <u>ب</u> ت 2
	CXNEW(1,J)= TSTAT(J) ~	OUT.2856	<u>_</u>
	CALL GAM	OUT.2857	
	ERAS1= GR2*GAMMER*TSTAT(J)	OUT.2858	
	CO(8,J)= PO(IS,J)*EXP((THERM3(TSTAT(J))-THERM3(T))/DCP)	OUT - 2859	
-		001.2860	
C	*** LALCULATE RUTUR RELATIVE VELOCITY	001.2861	
	CO15 11- CVIIC 11++2 + (CUIIC 11-UIIC 11++2 + CDIIC 11++2	001 • 2802	e e
	CO(5, 1) = COT(CO(5, 1))	DUT • 2005	- \$
		OUT - 2865	•
c	*** CALCULATE STATOR RELATIVE VELOCITY	OUT.2866	1
-		OUT . 2867	T
	CD(6,J)= CX(IS+1,J)**2+(CU(IS+1,J)-U(IS+1,J))**2+CR(IS+1,J)**2	OUT.2868	
	CO(6,J)=SGRT(CO(6,J))	OUT.2869	7
		OUT.2870	
C	<b>***</b> CALCULATE ROTOR RELATIVE MACH NUMBER	OUT.2871	-
		OUT . 2872	-1
	CXS(1,J) = CO(5,J)/SQRT(ERAS1)	OUT.2873	
~		OUT . 2874	
L	THE GET ATTS (RUIUK)	001.2875	-
	16 / EMACH/16 1) 17 1 0) EMACH/16 1)+1 0	UUI • 2875	
	AE CAMMAIIS, JILLOUI EMACHIIS, JI-100	001+2011	3
	BFTA(2, J) = BFTA(2, J)/57, 29578		
	EMACH(IS.J) = COS(BETA(2.J))/((0.5*(A+1.0))**(-0.5*(A+1.0)/(A-1.0	11	5
	X /MACH(IS,J)*(1.0 +0.5*(A-1.0)*MACH(IS,J)**2)**(0.5*(A+1.0)/(A-1	•0	
	X )) * ((A+1.0)*EMACH(IS,J)**2/((A-1.0)*EMACH(IS,J)**2 +2.0))		
	, X **{A/{A-1.0}}		1
	X *({A+1.0}/(2.0*A*EMACH(IS,J)**2 +1.0 -A)}**(1.0/(A-1.0)))		4
	BETA(2,J) = BETA(2,J) + 57.29578		-
	A=SQRT(CX(IS,J)**2+CR(IS,J)**2)	OUT . 2882	-
c		001.2883	
L	+++ CALCULATE ADJULUTE FLUW ANGLE	001 - 2884	
	AL RHA(1, 1)= ATAN(CH(15, 1)/A)+57 29578	UVI+2007	
	ACTINC 1907- ATAINCOULD 907787737827310	DUT - 2887	1
С	*** CALCULATE RELATIVE FLOW ANGLE	OUT . 2888	A.
_		OUT.2889	
	BETA(1,J)= ATAN((U(IS,J) -CU(IS,J))/A)*57.29578	OUT. 2890	<b></b>
		OUT.2891	<u>i</u>
C	<b>***</b> CALCULATE TOTAL TEMPERATURE RATIO (ROTOR)	OUT • 2892	
		DUT.2893	3
	$CC(1,J) = \{U(1S,J)/\{U(1S+1,J)\}$	OUT . 2894	Ĩ
r		001.2895	-
4	THE CALCULATE TOTAL PRESSURE RATIO (RUTUR)	UUI • 2890	7)
	CO(3,J) = PO(1S,J)/PO(1S-1,J)	OUT + 2898	
	and the second state of the second states and second states	DUT. 2899	21
C	*** CALCULATE TOTAL TEMPERATURE RATIO (STATOR)	OUT . 2900	<b>.</b>
		QUT.2901	Ň
	CC(2,J)= TO(IS+1,J)/TO(IS,J)	OUT . 2902	2
•		OUT . 2903	
l,	### CALGULATE TOTAL PRESSURE RATIO (STATOR)	OUT . 2904	តា
		OUT. 2905	¥1

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	DUT EFN SOURCE STATEMENT - IFN(S) -	
~	CO(4+J) = PO(IS+1+J)/PO(IS+J)	OUT.2906
L	TO AXIAL LENGTH, RESULTS ARE IN RSLOPE AND RCURVE	OUT • 2909
		OUT.2910
	CALL UERIVIKARSLUPEARLUKVEAXA	001.2911
C		001.2912
•	The Checkente Roton Contratore	001+2915
	RCURVE(2,J)= RCURVE(2,J)/(SORT(1.+RSL()PE(2,J)**2)**3)	OUT.2915
		OUT.2916
C	<b>***</b> CALCULATE STATOR CURVATURE	OUT.2917
		OUT.2918
	RCURVE(3,J)= RCURVE(3,J)/(SQRT(1.+RSLOPE(3,J)**2)**3)	OUT.2919
~		OUT • 2920
L	*** CALCULATE RUTUR SLUPE	OUT.2921
	PS1()P512, 1) - ATAN/PS1()P512, 1))+57 2057705	OUT . 2922
	KSLUPE(293) - ATAM(KSLUPE(29371+3762937193	001.2923
C	### CALCHEATE STATOR SLOPE	UUI + 2924 OUT 2025
•		001 + 2925
	RSLOPE(3,J)= ATAN(RSLOPE(3,J))*57.2957795	DUT. 2927
		OUT - 2928
C	*** GET A*/S (STATOR)	OUT . 2929
		OUT . 2930
	IF $(EMACH(IS+1,J))$ $LT \cdot 1 \cdot 0$ $EMACH(IS+1,J) = 1 \cdot 0$	OUT.2931
	A= GAMMA(IS,J)	
	ALPHA(1,J) = ALPHA(1,J)/5/.29578	•
	$\frac{1}{2} = \frac{1}{2} = \frac{1}$	
	$X = \frac{1}{(\Delta-1, 0)} = \frac{1}{(\Delta+1, 0)} = \frac{1}{(\Delta-1, 0)} = $	+1•U >
	$X + 2_0)$ ++ ( $\Delta/(\Delta - 1_0)$ )	2
	X *{(A+1.0)/(2.0*A*EMACH(IS+1.J)**2 +1.0 -A))**(1.0/(A-1.0)))	
	ALPHA(1, J)= ALPHA(1, J) +57.29578	
		OUT.2937
C	*** CALCULATE ABSOLUTE VELOCITY (STATOR)	OUT . 2938
		OUT.2939
	CXM(2,J)= SQRT(CX(IS+1,J)**2+CU(IS+1,J)**2+CR(IS+1,J)**2)	OUT.2940
~		OUT.2941
L	<b>***</b> CALCULATE STATIC TEMPERATURE (STATOR)	OUT.2942
	H= = - CXM/2, 11== 2/C1	DUT.2943
	T= TO(IS+1.1)	001.2944
	CALL ENTALP	UUI • 2945 DUT 2044
	CALL GAM	001+27+5
	CXNEW(2, J)= TSTAT(J)	OUT. 2948
	ERAS1= GR2+GAMMER+TSTAT(J)	OUT . 2949
	CO(9.J)= PO(IS+1,J)*EXP((THERM3(TSTAT(J))-THERM3(T))/DCP)	OUT.2950
•		OUT.2951
C	<b>### CALCULATE ABSOLUTE MACH NUMBER (STATOR)</b>	OUT. 2952
		QUT.2953
	UK312+J1= UKM12+J1/SUK1(EKAS1)	OUT. 2954
r	ARA CALCINATE STATOD DELATIVE MACH ANIMORD	OUT.2955
•	TT CALOVERIC STATUN NECATIVE MACH NUMBER	001.2956
		C 11 C 11 12 12 12 12 12 12 12 12 12 12 12 12
	CO(7,J) = CO(6,J)/SCRT(ERAS1)	DUT 2050

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~		001 - 2959
L	+++ CALCULA'E STATIC PRESSURES	UU1 • 290U
		001 + 2901
r		UU1 + 2902
L	+++ CALCULATE RELATIVE FLUW ANGLE (STATUR)	001 + 2903
	142119345##41 14211V3170021444 14211444 14211444 1421142	001 + 2794
	DEIA(2)JIAIAN((CU(I)TI)J)-U(I)TI)J/SURI(CA(I)TI)JITT2TCR(I)TI) V (I)++21)457 3057705	CUT 2044
	x J1+*211+3(623)(19)	001 . 2905
r		001+2707
C	THE CALCULATE ADJULUTE FEOR ANGLE (STATOR)	001 2909
	AL DUAL 2. 11- AT AN (CHI TC.). 11/SOD T/CYLTC.1. 11##24CD(TC.1. 11##21)	011 2070
	ALFRA(2)JI= ATAN(CUTISTI)JI/ SUNT(CATISTI)JI++2+CATISTI)JI++21; Y ±57.2957795	001 + 2 970
		OUT . 2972
		OUT . 2973
ſ	*** CONVERT INDUIT DATA RACK TO DECREES	001 2974
v	ter content theor being brok to bedkees	011.2975
	HMN(15+1)=HMN(15+1)=57,2557795	001 2976
		001.2977
ſ	*** WRITE STAGE DADAMETEDS	007.2978
v		DUT . 2979
	WRITE (6.50) N. DELLISI, HMNLISAII, HMNLISI, DELLISAII, VOLISI	DUT 2980
	WITE TOYSOF BY DECISIY HERTISTIY HERTISTY DECISITY VOTIST	OUT 2981
	50 FORMAT(1H)///30X47H****** FINAL FLOW PARAMETERS FOR STAGE NUMBER	2001.2982
	X 14. 9H ++++++ ////45X30H+++ STAGE INPUT PARAMETERS +++ /// 24X	OUT - 2983
	X 24HROTOR TIP D-FACTOR I INIT E33. 4/ 24X48HHUR RELATIVE FLOW ANGLE	OUT . 2984
	XLIMIT AT THE ROTOR EXIT F9.1 / 24X 33HSTATOR HUB MACH NUMBER LIMIT	OUT . 2985
	X (IN) F24.4/ 24X 25HSTATOR HUB D-FACTOR LIMIT F32.4/ 24X 31HMAXIMU	JOUT . 2985
	XM TIP TANGENTIAL VELOCITY F26.1 )	OUT . 2987
	IF (AND(IDUMP+4)-EQ.Q.O) GO TO 53	
	WRITE (6,51)	
	GO 10 54	
	53 WRITE (6,52)	
	54 CONTINUE	
	51 FORMAT (//24X 11HROTOR 48X 12HSTATOR /// 11X	
	X 8HPRESSURE 3X 16H FLOW ANGLE 3X 8HSOLIDITY 23X 5HWHIRL 5X	
	X 16H FÉCW ANGLE 3X 8HSOLIDITY / 11X 7HPROFILE 4X	
	X 16H AT THE SHOCK 33X BHVELOCITY 3X 16H AT THE SHOCK //)	
	52 FORMAT(//24X 11H-	-OUT.2989
	XROTOR 48X 12HSTATOR///11X8HPRESSURE3X 16HRATIO SUPERSO	NOUT . 2990
	XIC 3X 8HSOLIDITY 23X 5HWHIRL 5X 16HRATIO SUPERSONIC 3X 8HSOLIDITY	OUT.2991
	X / 11X THPROFILE 4X 16HTO TOTAL TURNING 33X BHVELOCITY 3X 16HTO 1	rou <b>t .</b> 2992
	XOTAL TURNING //)	OUT.2993
		OUT.2994
	WRITE (6,55) CUCC(IS,1), SCO(IS,1), SOCO(IS,1),	OUT.2995
	x CUCU(IS+1,1),SSCD(IS+1,1),SOCD(IS+1,1),	OUT.2996
	x = B2(15), SSCO(15,2), SOCO(15,2),	UUT.2997
	x CUCU(15+1,2), SSC0(15+1,2), SOC0(15+1,2),	UUT. 2998
	$\mathbf{x} \qquad (CUCU(1S,J), SSCO(1S,J), SOCO(1S,J), CUCU(1S,J), SCO(1S,J), SOCO(1S,J), SOCO(1S,J), SCO(1S,J), SOCO(1S,J), SOCO(1S,J)$	UUT. 2999
	x cucu(15+1+J)+55CU(15+1+J)+50CO(15+1+J)+J=3+5)	UUT.3000
	SE FORMAT LEVIULTERS / 1/VIULTERS //	UUF.3001
	DD FUKMAI 1071HAJE13.011471HAJE13.07	SOOS . 3002
		UUT.3003
		UUT.3004
		001.3005
	x	UUT. 3006

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PAGE 178 OUT. EFN SOURCE STATEMENT IFN(S) SUCO = CX(IS,JM)/CX(IS-1,JM)OUT. 3009 A= CX(IS+1,JM)/CX(IS,JM) UUT.3010 ۵= OUT.3011 (RS(IS) -RH(IS))/DEPV(5.2) AA= (RS(IS-1)-RH(IS-1))/DEPV(5,1) OUT. 3012 WRITE (6,56) AA, ALPHA(3,1), RH(IS), RS(IS). OUT.3013 X ALPHA(3,2), DEPV(5,1), FLOW(IS), CXS(6,2), Q, OUT.3014 RSIIS+1)+ ALPHA(4,1), DEPV(5,2), X RH(IS+1). ALPHA(4,2), OUT. 3015 X FLOW(IS+1), CXS(7,2), SQCO, BT(IS), BH(IS). DUT.3016 X PMAB(IS), TMAB(IS), PMA(IS), OUT.3017 TMA(IS), CXS(6,1), X A, BH( IS+1), BT(IS+1), PMAB(IS+1), TMAB(IS+1), 001.3019 X PMALIS+1), TMA(1S+1), CXS(7,1) OUT. 3019 0UT.3020 56 FORMAT (12X33HASPECT GEOMETRIC HUB GEOMETRIC 5X 8HHUB RAMP 5X OUT.3021 8HTIP RAMP 4X39HAXIAL LENGTH MASS FLOW X MASS AVE. / 12X OUT . 3022 X 61HRATIO RADIUS (IN.) TIP RAD.(IN.) ANGLE (DEG) ANGLE (DEG) OUT - 3023 X 6X 5H(IN.)6X26H(LB/SEC) ADIABATIC EFF. // 9H -ROTOR-- F8.3, OUT. 3024 X F13.4,F14.4,F13.3,F14.3,F13.4,F14.4,F15.4 // 9H -STA:OR- F8.3, OUT. 3025 X F13.4,F14.4,F13.3,F14.3,F13.4,F14.4,F15.4 /// OUT.3025 X 75X 2(10HCUMULATIVE 4X), 11H CUMULATIVE / 9X 10HVEL. RATIO 2 X OUT.3027 37HHUB BLOCKAGE TIP BLOCKAGE MASS AVE. 5X 9HMASS AVE. 3X X OUT.3028 3(9HMASS AVE. 6X), / 9X 11HAT THE MEAN 4X X DUT . 3029 X 6HFACTUR 8X6HFACTOR 5X 9HPR. RATIC 4X22HTEMP. RATIO PR. RATIO OUT. 3033 X 5X27HTEMP. RATIO ADIABATIC EFF. / 9H -ROTOR-- F8.3, F13.4, F14. X F13.4, F14.4, F13.4, F14.4, F15.4 // 9H -S1ATOR- F8.3, F13.4, F14.4, ., OUT. 3031 OUT.3032 X F13.4, F14.4, F13.4, F14.4, F15.4 ///) OUT.3033 OUT . 3034 WRITE (6,275) BLADE(IS), BLADE(IS+1) OUT.3035 OUT . 3036 275 FORMAT (11X 9HLOSS DATA / 11X 8HSET USED // 9H -ROTOR-- 17 11 OUT.3037 X 9H -STATOR- I7 ) OUT.3038 OUT.3039 OUT. 3040 OUT.3041 C ***** PRINT ROTOR EXIT QUANTITIES** OUY.3042 OUT.3043 WRITE (6,57) **DUT-3044** DUT.3045 57 FORMAT(1H1///41X36H**----** R O T O R E X I T **----**///2X4HS.L.OUT.3046 X 57H STREAMLINE AXIAL VEL. WHIRL VEL. RADIAL VEL. OUT . 3047 X 52HABS. VEL. ABS. MACH ABS. FLOW REL. FLOW /3X3HNO. OUT.3048 X 58H RADIUS (IN.) (FT/SEC) (FT/SEC) (FT/SEC) OUT. 3049 X 52H(FT/SEC) NUMBER ANGLE (DEG) ANGLE (DEG) / 1 OUT.3050 OUT.3051 in Rake DO 60 J=1.NLINES.IOUTTR 001.3052 WRITE (6,59) J,R(IS,J),CX(IS,J),CU(IS,J),CR(IS,J),CXM(1,J), OUT. 3053 X MACH(IS+1, J), ALPHA(1, J), BETA(1, J) OUT. 3054 007.3055 Stars we will we will 59 FORMAT(15,F11.4,F13.3,2F14.2,F14.3,F15.4,2F14.3) OUT.3055 OUT.3057 **60 CONTINUE** OUT.3058 WRITE (6,65) Rivers, with the OUT.3059 OUT. 3060 65 FORMAT/1HO/2X4HS .L.43H TOTAL TEMP. TOTAL PRES. **ADIABATIC** OUT.3061 X 38HDIFFUSION WHEEL SPEED SOLIDITY 8X 4HA#/S 6X R. . . . . . . . . . . . . . . OUT.3062

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	OUT EFN SOURCE STATEMENT -	IFN(S) -	
21160	NSS CREEF.	100	. 3063
X	//	3X 3HND 4X 5HRATIO 9X OUT	. 3064
X 5HR	AT INGXI OHEFE IC LENCYSX6HEAC TOR 7X 8H (ET/S	EC ) / ) OUT	.3065
			. 3066
00.7	O HE LANI INES, INUTTR	- 011	3067
	5 16.661 LCO(1.1).CO(3.1).ATAR(IS.1).DE		- 3068
V SOI	E (0,00) STCOLISTICCOSTATANTISTOTICS		C 3069
A SUL	TD(134114 CHACH(134414 DAW(13441		1.3071
	AT (15 EN) & END & DENA & END DENE 2 EN	5 Å 514 4) OUT	3071
30 FUKM	A1 1139 F11+ + + F 13+ 4 + 2 F 14+ 4 + F 13+ 2 + F 13+ 3 + F 1		3072
TO CONT	TAU16	100	1.3073
LO CONT	INUE E (4 20 %)		2074
MKII	E 10,2011		1 2075
SI FURM	AT LINU//2244FS-L-LIUH IUTAL TEMP. TUTAL	L PRECA STAFIG (EMPAUU)	1 3015
X ST	ATTL PRES. SLUPE CURVATURE	KEL. VEL. KEL. MUUI	
XACH	/3X3HNU.3X 9HLUEGREES/3X11H(LB/SQ IN.) 4	AMIDEGREESI SX DUT	8105018
X 11H	(LB/SC IN.) 2X9HIDEGREES)9X5H1/IN.8X8H(F	I/SEC) 7X6HNUMBER /1 OUT	- 5079
_			0802.
DO 2	82 J=1, NLINES, IOUTTR		.3081
B <u>2</u> WRIT	E (6,283) J, TC(IS, J), PO(IS, J), CXNEW(1, J),	CO(8+J)+RSLOPE(2+J)+ OU1	.3082
x RCU	RVE(2,J),CO(5,J),CXS(1,J)	001	.3083
		001	r•3084
83 FOKM	AT (15,F11.2,2F14.2,F15.2,F11.2,F15.5,F1	6.4,F13.4) OUT	r.3085
-		TUO	1.3085
*	<b>**</b> PRINT STATOR EXIT QUANTITIES	100	1.3087
		זעס	.3089
WRIT	E (6,75)	001	r.3089
·	- • • • • •	OUT	Ce06.1
75 FORM	AT (1+1///40X38H**** S T A T O R E	X I T **** /// 2X OUT	.3091
X4HS.	L.57H STREAMLINE AXIAL VEL. WHIRL	VEL. RADIAL VEL. OUT	r.3092
X 52H	ABS. VEL. ABS. MACH ABS. FLOW	REL. FLOW / 3X3HNO. OUT	<b>.</b> 3093
X 58H	RADIUS (IN.) (FT/SEC) (FT/SEC)	(FT/SEC) OUT	.3094
X 52H	(FT/SEC) NUMBER ANGLE (DEG)	ANGLE (DEG) / ) OUT	.3095
~ >2			- 3095
<b>6</b> 00	0 HE LANLINES JOUTTR	001	1.3097
	$E_{1} = \frac{6}{100} = 1000000000000000000000000000000000000$	U.CRITS+1.1). OUT	1.3098
X CAM 4071	[2.4] _C XS [2.4] _AI DWA '2.11. RETA/2.11		r_ 30 90
740 A 7407 A8	167977003767977867118467977067846797 18116		L 3100
דורטטיטט דומע			1.3101
	L 107077 5 i~1.ni incc.iniittd		1.3103
0 עע ( דו מוש	2 J-1916111639100118 6 46.461 1.6643.11.6644 11.8886618641 41 4		1.3102
WK E 8	E 107607 J96012737601493796176113113713319 C.1 18 COLTO/8641 88 EMACU/1641 88 00404		1 2102
A UIL	JATTA JIA JAF IN II JATTA JIA EWAPULI I JATA JIAAAKI	1341431	1 + J104 7 2105
03 LUNI			1.3104
WRIT	E (0,281)	001	1.5105
00 2	84 J=1+NLINES+10011K		
84 WRIT	E (6,283) J, TU(IS+1,J), PO(IS+1,J), CXNEW(	2, J], LU(9, J], KSLCPE(3, OUT	• 3108
XJ1,R	CURVE(3, J), CU(6, J), CU(7, J)	001	.3109
DO CONT	INUE	001	.3110
-			.3111
*	** PRINT OUTLET QUANTITIES	QUT	1.3112
		~ OUT	.3113
	E (6,110)	001	r.3114
WRIT	-		2116
WRIT			
WRIT	AT (1-140X40H++++++ OUTLET FLOW PARAME	TERS ****** /// 001	<b>5115</b>
WRIT	AT (1+140X40H****** OUTLET FLOW PARAME 3HSTA7X5HA ^y TAL7X9HGEOMETRIC5X9HGEOMETRIC	TERS ****** /// 001 4x12HH UB BLOCKAGE 3X 001	.3116 .3117
WRIT 10 FARM 2 13X 2 12H	AT (1+140X40H****** OUTLET FLOW PARAME 3HSTA7X5HA ^y TAL7X9HGEQMETRIC5X9HGECMETRIC TIP BLOCKAG. / 13X3HND.5X10HCOORDINATF4X	TERS ****** /// 001 4x12HH UB BLOCKAGE 3X 001 10HHUB RADIUS 4X 001	.3116 .3117 .3117

PAGE 180

	X / )	OUT.3123
		OUT.3121
	JJ=LSTAGE + 1	OUT.3122
	DO 120 J=JJ,NX	OUT.3123
	120 WRITE (6,115) J,X(J),RH(J),RS(J),BH(J),BT(J)	OUT.3124
		OUT. 3125
	115 FORMAT (10X15,F15.3,F14.3,F13.3,F15.3,F14.3)	OUT.3126
		OUT.3127
	WRITE (6,130) JJ	OUT.3128
		OUT.3129
	130 FORMAT (1+0//50X14HSTATION NUMBER 14 // 5H S.L. 3X10HSTREAMLINE 4X	OUT.3130
	X 10HAXIAL VEL. 3X10HWHJRL VEL. 4X11HRADIAL VEL. 4X 9HABS. VEL. 5X	OUT.3131
	X 9HABS. MACH 4X11HTOTAL TEMP. 3X11HTOTAL PRES. / 4H NO.4X11HRADIUS	50UT.3132
	X IN. 3X BHIFT/SEC   6XBHIFT/SEC   6XBHIFT/SEC   6XBHIFT/SEC   7X	OUT.3133
	X 6HNUMBER 7X 9H(DEG.S R) 4X11H(LB/SQ IN.) /)	OUT.3134
		OUT.3135
		OUT.3136
		OUT.3137
-	KJ=KJ+L	OUT.3138
	UU 140 J=1, NLINES	OUT.3139
r		OUT.3143
L	*** CALCULATE ABSULUTE VELOCITY (OUTLEY)	DUT.3141
		OUT . 3142
	$CAP(KJ_{1}J) = SQK((CA(LJ_{1}J) = 2 + CU(LJ_{1}J) = 2 + CR(LJ_{1}J) = 2)$	OUT.3143
~		OUT.3144
L	+++ CALCULATE STATIC TEMPERATURE (UUTLET)	OUT - 3145
		001.3145
	T = TO(31, 1)	001.3147
	CALL ENTALD	007.3148
	CYNEW (KI, H= TCTATIH)	001.5149
	CALL GAM	001.0151
	FRAS1 = GR2 + GAMMER + TSTAT(1)	001+2121
		001 - 5152
C	*** CALCULATE ABSOLUTE MACH NUMBER (OUTLET)	001+3155
-		OUT 3155
	$CXS(KJ \cdot J) = CXM(KJ \cdot J)/SORT(FRASI)$	OUT . 3156
	140 CONTINUE	001.3157
	KJ=0	OUT. 3158
	DO 150 IJ=JJ,NX	OUT. 3159
	IF(IJ.GT.JJ) WRITE (6,160) IJ	DUT.3160
	KJ=KJ+1	OUT-3161
	DO 150 J=1, NLINES, IOUTTR	OUT - 3162
	150 WRITE (6,165) J.R(IJ.J),CX(IJ.J),CU(IJ.J),CR(IJ.J),CXM(KJ.J),	OUT.3163
	X CXS(KJ+J),TO(IJ+J),PO(IJ+J)	OUT. 3164
		OUT. 3165
	160 FORMAT (1H050X14FSTATION NUMBER 14//)	OUT.3166
		OUT . 3167
	165 FURMAT (14,F12.4,F13.3,2F14.2,F13.2,F14.4,F14.2,F14.1)	OUT.3168
		OUT.3169
	IF (AND( IDUMP, 2), NE.0.0) WRITE (7,18) (X(I), RH(I), BH(I), RS(I),	OUT.3170
	X B((1), I=1, NX)	OUT.3171
	18 FURMAT (5FL0.5)	OUT.3172
	KETUKN	OUT.3173
		OUT.3174
	*** FINISHED AT LAST	OUT.3175

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	۹ AD •		- EFN	SOURCE S	STATEMENT	- IFN	I(S) -		
			c						RADI 3178
									<u>RANI3179</u>
1	1000EE PN 2500EE PN		R. MOLEI	T	F				PADI 3180
			C. 111.	FI DW (32)					RADI3191
	DIPENSION NETENSION	TEBROR.	YES		-				RADI3187
	COMMEN /V	ATRIX/	ALPHA (1)	0.11).	ATAR (29.	11),	82(29),		RADI 3193
, v	DETA(10)	11 }.	AH(32).		BLADE 129	•	B1(32),		RADI3184
Ŷ	CO(10.1)	1.	CP(32.1	1).	CPCU(6),		CP(32,11	1 .	- RADI 3185
Ŷ		0.111.	CU2(11)	•	CU(32,11	).	CUC0(29)	·5) •	RADI3185
x	CX(32-1)		CXM(10.	11),	CXNEW(10	.11).	C XRATO(2	(9),	RADI 3187
x	CXS(10-1	111.	DA(10).		DELM(11)		DEPV(10	11).	GAE 13188
x	DE(20).		DFACT(2	9,11),	DFL(29)		DFLOW(32	27 •	RADI 3187
x	EMACH129	9.11).	FOUND (2	0,3,10),	FRUEL(10	,11),	GAMMA (32	2,11),	RADI 3190
Ŷ	HMN(29)		HUB(32)	•	IKK(10),		MACH(29	,11),	RADI 3191
Ŷ	DEAR(29)		PO(32+1	i),	R(32,11)	•	RCURVEC	10,11),	PAD13192
x	RH(32).		RH0(32.	11),	RINT(11)		RESTAGE	11),	RADI 3193
x	85(32).		R SLUPE (	10,11),	RTRAIL	1).	SOC0129	,5),	RADI 3194
Ŷ	SGL10129	9.11).	SSCG129	,5),	TERM1(10	),11),	TERMA(1)	L) •	RADI 3195
x	TERMB(1)	1).	TERMC (1	1),	TIP(32)	,	TITLE(1)	2),	RADI 3195
x	TP(32.1)	1).	TSTAT(1	1),	U(32,11)	•	w(11)+		RADI 3197
x	x(32)				-	2			RADI 3198
	CCMMON /	SCALER/	Α.	ΔΔ,	A1040,	A202A0,	A303A0,	A404A0•	RADI 3197
x	Δ505Δ0.	P.	BB.	CC.	CM.	CMEAN.	C MEANP,	COINTG,	RADI 3200
X	CP12.	CP I3.	CPI4.	CPI5,	CPI6.	CP02,	C P03+	C°04,	RADI 3201
x	CP05.	CA 1P	DCP.	DD,	DIFCM.	DT,	DUMMY +	ERAS1.	RADI 3202
X	G.	GASK.	61.	GR.	GR2,	JOULE.	MAPR,	MOLEWT.	RAD13203
X	POCO.	Q.	RPM.	тср,	TERMD,	TESTBH,	TESTOS.	TESTMS+	RADI 3204
X	TOCO.	TOL.	TOLAT,	TOL82,	TOLMIN,	TOL 45,	TOLTIP,	TOLCP,	RADI 3205
X	TULCX.	TOLR,	TUTINT,	TOTPR.	۷.	VMI			RAD13205
-	CCMMCN /	INTEGR/	1,	18.	I B1 +	IDUMP .	IFRROR,	IF IRST.	RADI 3207
Х	IG.	ICUTTR,	IPASS.	IS,	IT,	J, 3	JIN,	JJ,	RAD13203
)	JM,	JM1.	κ,	К1.	KK.	L,	LIMIT,	LSTAGE,	RAU13209
>	MSTAGE.	NLINES,	NTUBES,	NX,	NX1 +	YES			KAD13210
	EQUIVALE	NCE (AT	AR(1,1),	ATAS (1.1	,)), (FL	DW(1).DF	LOM(1))		RA11 3211
	A= (RS(I	) -RH(I)	)*(RS(I)	+RH([))					KAU1 3212
	CC= RH(1	)**2 +A*	•BT(I)						KAU15215
	AA= RS(I	)**2 -4*	( <b>I)</b>		-			-	KAU13214
	BB= R(I,	1)**2							KAU1 2212
	DD= (CC-	AA)/(Ki)	INLINES	**2-BB)					KAU1 2210
	AX= RPM								KAU13211
	DO 100 J	=1.NLINF	÷ S						KAU13215
	R(I,j)=	SCRTIAA	+DD*(k()	[,J)**2 -	-BR))			~	KAI112717
0	U(I,J)=	R(I,J)*/	X						RAU1 3220
	RETURN							-	KAU1122
	END								KAU1 32.42

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A REAL PROPERTY AND A REAL EPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR; 11/02/67 ROTOR. EFN SOURCE STATEMENT IFN(S) SUBROUTINE ROTOUT R0T03223 いっているとう こう こう こうちょう しょうちょう ないない ないない ない REAL NORM R0T03224 COMMON / SPECAL/ NORM(14), NX2, NOFAIL R0103225 ALTER. RUT 03225 COMMON /VGEOM/ ALH(29), ALT(29), R0T03227 X ASPECI(29). FPATH. SAVEA(29) ROT 03229 LUGICAL FPATH LOGICAL NO FAIL R0T03223 R0103230 C ***** CEMPUTES RUTOR EXIT GEOMETRY** POT03231 ROT 3232 R0T(13233 DOUBLE PRECISION TITLE KEAL MACH, MAPR, MOLEWT, JOULE R0T03234 DIMENSION ATAS(29,11), FLOW(32) R0103235 R0103235 IERROR, YES LOGICAL ALPHA(10,11), ATAR (29,11), B2(29). R0T03237 COMMEN /MATRIX/ X BETA(10,11), BH(32), ROT03239 BLADE(29), BT(32), x CO(10,11), CP(32,11), CPCO(6), CR(32,11), R0T03239 X CSLOPE(10,11), CU2(11). CU(32+11)+ CUCO(29,5), ROT 03240 CXM(10,11), CXNEh(10,11), CXRATO(29). R0T03241 x CX(32,11), DEPV(10,11). X CXS(10,11). DA(10), DELM(11), R0T03242 DFACT(29,11), DFLOW(32), X DF(20), DFL(29), R0T03243 X EMACH(29,11), FOUND(20,3,10), FRDEL(10,11), GAMMA (32+11). R0T03244 MACH(29,11), X HMN(29). HUB(32), IKK(10), ROT 73245 PO(32,11), R(32,11), RCURVE(10,11), X OBAR(29,11), 90T03246 X RH(32), RH0(32,11), RINT(11), ROSTAG(11), RUT 33247 RSLOPE(10,11), RTRAIL(11), SOCO(29,5), R0T/13249 X RS(32), X SOLID(29,11), SSC0(29,5), TERM1(10,11), TERMA(11), R0T03249 X TERM3(11), TERMC(11), TIP(32), TITLE(12), R0T03250 ROT03251 TSTAT(11). U(32,11), W(11), X TO(32,11), X X(32) ROT03252 CCMMON /SCALER/ Α, A10A0, A202A0, A303A0, A404A0, R0T03253 ΔΑ, CMEANP, COINTG, X A505A0, 8, 88, CC, CM, CMEAN, R0T03254 C PO3, CP14, CP02, X CP12. CP I3, CP04. R0T03255 CPI5, CP16, DD, DUMMY, X CP05. DAMP. DCP. DIFCM. DT. ERAS1. R0T03255 CASK, X G. 61, GR, GR2+ JUULE. MAPR, MOLEWT. R0T03257 TESTMS, X PUCU, с. RPM, T CP . TERMD. TESTBH, TESTOS, R0T03258 X TOCO, TOL, TUL B2. TCLMIN. TOLMS, TOLTIP, TOLCP, TCLAT, POT03257 VMI TOTPR. X TLLCX. TOTINT, TOLR, ۷, R0T03260 IERROR. IFIRST. R0T03261 COMMON /INTEGR/ 18. 161. IDUMP. I, ICUTTR, J, 11. X IG, IPASS, 15. 11. JIN. R0T03262 JM1. К, K1, X JM, KK. LIMIT, LSTAGE. R0T03263 L. NX1. X MSTAGE, NLINES, NTUBES, NX, YES R0T03264 EQUIVALENCE (ATAR(1,1),ATAS(1,1)), (FLOW(1),DFLOW(1)) R0T03265 R0T03266 R0T03267 L = 1CAMP= 100.0 R0T03268 IF (LSTAGE.NE.7) GU TO 45 ROT03269 IF (.NUT.FPATH) GO TO 20 R0T03270 *** PICK UP ROTOR GECMETRY С R0T03271 . A RS(6) = RS(5)R0T03272 (RS(5) -RH(5))/ASPECT(6) DT =R0T03273 X(5) +DI R0T03274 X(6)= RH(6) = RH(5) +DT *AMIN1(C.6, 0.8*ALH(6)) ROT03275 GO TO 25 R0T03276 20 RH(1)¥ HU8(1) ROT03277

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	UUN, 🚌
	11/02/67
ROTOR EFN SOURCE STATEMENT - IFN(S) -	
RS(I) = TIP(I)	R0103279
CALL RSTART	R0103279
*** INITIALIZE THE FIRST RUTOR CALCULATION BY COMPUTING THE	ROT03280
LOADING FROM THE TIP D-FACTOR AND AN AXIAL VELOCITY RATIO	ROT03281
OF 0.9. USE FREE VORTEX AND AN EFFICIENCY OF 90 PERCENT	R0T03282
TO START	ROT 11 32 83
$V = 0.9 \neq CX(5, NLINES)$	ROT 03284
S= S0C0(6,1)/(S0C0(6,2) +1.0) +S0C0(6,3) +S0C0(6,4) +S0C0(6,5)	ROT03285
VMI= SQRT(CX(5,NLINES)**2 +(CU(5,NLINES) -U(5,NLINES))**2)	R0T03285
Q = 0.5/S	R0103287
A= VMI*(1.0 -DFL(6)) +(U(5,NLINES)-CU(4,NLINES) -U(4,NLINES))*Q	ROT03289
B= 2.0+(U(6+NLINES) +A+C)/(C+Q-1.0)	RNT73289
C= (V*V +U(6,NLINES)**2 - 4*A)/(1.0 -Q*Q)	R0T03293
ERAS1= B*E -4.0*C	R0T03291
IF (ERAS1.GE.U.D) GU TU 30	R0T03292
CU(6,NLINES) = 300.0	ROT03293
GD TO 35	R0T03294
ERASI= SQRT(ERASI)	R0T03295
CU(6,NLINES) = -B -ERASI	R0103295
IF (CU(6,NLINES).LE.O.O) CU(6,NLINES) = ERAS1 -B	R0T03297
CU(6,NLINES) = CU(6,NLINES) *0.5	ROT03298
DT= ((U(6,NLINES)+CU(6,NLINES)-U(5,NLINES)+CU(5,NLINES))/GJ/CP()	1,1R0T03299
1)*2.0	20103300
J= NLINES	R0T03301
TO(6,J)= TOCO +DT	R0T03302
CALL THERMP	R0T03303
DT = C.9 * 0T	R0T03304
CU(6,J) = CU(6,J) * R(6,J)	R0T03305
DO 40 L=1.NLINES	R0T03305
TO(6,L)= TU(6,J)	R0T03307
CP(6,L) = CP(6,J)	ROTD3309
GAMMA(5,L)= GAMMA(6,J)	R0T03309
PO(6,L) = FUCJ*(DT/TOCD +1.0)**(GAMMA(6,1)/(GAMMA(6,1)-1.0))	R0T03310
CU(6+L) = CU(6+J)/R(6+L)	ROT03311
L= 1	R0T03312
CALL INFST	R0T03313
CALL STREAM	R0T03314
CALL MOVE	ROT03315
GU TO 50	R0T03315
*** INITIALIZE SUCCEEDING ROTOR AS A COPY OF THE LAST	R0103317
CALL COPY	R0T3319
A= (R(I,NLINES)-RH(I))/(RS(I)-RH(I))	R0103319
K= 1/2	R0T03323
*** COMPUTE THE TOTAL PRESSURE PROFILE NORMALIZING FACTOR	R0T03321
NOTE. THE EQUATION MUST HAVE THE VALUE OF 1.0 AT THE	R0T03322
TIP STREAMLINE	R0T03323
NORM(K) = $1.0/(CUCO(1.1)/(CUCO(1.2)+A) + CUCO(1.3)$	KOT03-24
+(CUCO(1,4) +CUCO(1,5)*A)*A)	R0103325
RETURN	R0103324
	00703333

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		THE ORIC	SINAL P	AGE <b>SPROI</b>	
RSTAP	EEN SO	URCE STATEME	NT - IFM	1(5) -	11/02/67
	2	-			00747779
SUBROUTINE RSTART					RSIA 1325
		A ESTIMATE O	E STREAMI	INF POSTTION	RSTA3337
AND WHEFT	SPEED	A COLLIMITE C	51112402		RST43331
					RSTA3332
DOUBLE PRECISION	TITLE				R51 A3333
REAL MACH, MAPR	, MULEWT,	JOULE			RST 43335
DIMENSIUN ALASIZS	1111, FLU Vec	W1 371	-		RSTA3335
COMMEN /MATRIX/	ALPHA(10.1	1), ATAR (2	9,11),	ß2(27),	RSTA3337
X BETA(10+11)+	BH(32),	BLADE	291,	BT(32),	RSTA3338
X CG(10,11),	CP(32,11),	CPCU(6	1,	CR(32+11)+	RSTA3339
X CSLCPE(10,11),	CU2(11),	CU(32,		CUCU(29+5) + CVPATO(29)	RST4334J
X CX(32,11),	CXM(10).	, LANEWI DELMII	10,117,	DEPV(10.11).	RSTA3342
X DE(20).	DACI (29.1	1). DFL(29	),	DFL0W(32),	<b>RSTA3343</b>
X EMACH(29,11),	FOUND(20,3	,10), FRDEL(	10,11),	GAMMA (32,11),	RST 43344
X HMN(29),	HUB(32),	IKKIJO	),	MACH(29,11).	RSTA7345
x UBAR(29,11),	PO(32,11),	R (32+1	1),	RCURVE(10+11)+	RSTA3343
X RH(32),	RHG(32,11)	, RINILI 111. OTRAIL	()),	SOCO(29.5).	RST43348
X KS(327+ X SCLID(29-11)	SSC0(29.5)	TERM1(	10,11),	TERMA(11)	RSTA3347
X TERMB(11),	TERMC(11).	TIP(32	),	TITLF(12),	RSTA3350
X TU(32,11),	TSTAT(11).	U(32,1	1).	W(11)+	RSTA3351
X X(32)			420240	A 2 0 2 A 0 A 4 0 4 A 0	K5143372
COMMON /SCALER/	Δ, ΑΑ υρ (C	ALUAU	CMEAN.	CMEANP. COINTG	RSTA3354
X ADUDAVI, DI X CPI2. CPI3.	CP14. CP	15. CPI6.	CPO2.	CP03, CP04,	RSTA3355
X CPU5, DAMP,	DCP, DD	DIFCM	DT.	DUMMY, ERASI,	RSTA3355
X G, GASK,	GJ, GR	GR2.	JOULE,	MAPR, MOLEWT	• RSTA3357
X PC:CO, C,	RPM, TO	P, TERMD		TOUTID. TOUCD.	RST43335
	TOTINT, TO	ILDZA IULMIN ITPR. V.	VMI		RST43363
COMMEN /INTEGR/	I. I.	IB1,	I DUMP .	IFRROR, IFIRST	, RSTA3361
X IG, IOUTTR,	IPASS, IS	i, IT,	J +	JIN, JJ,	RSTA336?
X JM, JM1,	K, K1	• KK•	L.	LIMIT, LSTAGE	C RSTA3363
X MSTAGE, NLINES,	NIUBES, NX	(† <u>171</u> 7) 1871–1887 - 18	165 100111-06	104(1))	RSTA3365
EQUIVALENCE TAT	3K ( <u>1 † 1 / †</u> 4   A				RSTA3365
A= (RS(1) -RH(1)	)*(RS(1) +A	RH([))			RST A 3367
A4= RS(I) ** 2 - A*	3H(-1)				RST43368
BB= RH(I) ** 2 +A*1	3T(1)				R5144569 DCTA3371
CC=BB-AA		~			RSTA3371
DD = RPM			_		RST A3372
ERASI= AA +DELM(	J)*CC		-		RSTA3373
- · · - · · ·			-		RST 43374
. *** ERROR TRA	SFER 10 A	NEW DATA SE	ſ		RSTA3375
1		121121			RST 435 15
IM (CKASIOLEOUO)	, UALL FRRU 51 }	un ( 1 0 1			RSTA3379
LO U(I,J)=R(I,J)+00	•				RSTA3379
					RSTA3387

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								11/02/67
SHUCK	-	EFN	SUURCE	STATEMENT	- IFN	- (>)		
ETTAIC T TONE OF	1CK (7 . V	•						SH0C3382
FUNCTION SF	0011241	,						SHOC3383
*** CALC	ULATES :	SUPERSO	NIC EXPA	NSION AN	GLE MINU	S PRANDT	L-MEYER	SH0C3384
ANCL	Ē							SH0C3385
								SHOC3386
DOUBLE PREC	ISTON	TITLE						SHOC4387
REAL MACH	ΜΛΡR,	MOLFW	L 101	LF				SHUC 3385
DIMENSION #	T45(29,	11), F	LOW(32)					54061249
LOGICAL IN	RPOR, Y	ES				0.0.1.1		50053343
COMMON /MAT	RIX/ A	LPHA(10	,11),	A TAR (29	11).	821/91+		20002241
( BETA( 10, 1)	), B	H(32),		BLADE(29	1 5	013211	٠.	SHUL3315
CO(10+11)	С	P(32,11	.)+	CPCUT61			.) <b>;</b> 	SHUC 3307
K CSLOPE(10	11), C	U2(11),	• •	CU(32+1	*	C VDATO (		SHOC 3395
(CX(32,11))	C	XM(1C,1	1),		,11,,	ACRATULA	. 7 / 4	SH003395
CX\$(10,11	• D	A(10),		DELMU	• -	DELOWING	21.19	SHDC 3397
(57(20),	0	FACILZY	· · · · · · · · · · · · · · · · · · ·	UFL12 -		CAMMA (3)	2.111.	SHOC 3398
K EMACH(29)	1), F	CUNDIZO	1+3+101+	FRUEL	/ 11 / /	MACHI20		SHOC 3399
( HMN(29),	н н	08(32)		- IKK(10)	-	VEI		SHOC 3400
X OBART29+1	. <b>),</b> P	111 22+11	. / •	R122+11	•	POSTAGE	111.	SHDC 3401
(RH(32))	K	HU(22)1			11.	SPCD(29	51.	SH0C3402
X RS[32];	н к 11 (	SCORECT	51	TEPMILI		1 FR MA (1		SHOC 3403
X SULIDI29.	. 1.1 + 3	5501274		TID(32)		TITIF(1)	2).	SH0C3404
A TEKMOTITI V TO/22 111	' ' T	SEAT (1)	.,,	11(32-11)		¥(11).		SHOC 3405
X 10(36+11) X 7(30)	•	2141111		0122112	· ·			SH0C 3405
COMMENTSC			۸۸.	A10A0.	A202A0.	A 303A0.	A404A0,	SHOC 3407
V A505A0. 8	<u>ас ску</u> – А	8.	66.	C.M.	CMEAN.	CMEANP.	COINTG.	SH0C3408
X CPI2- C	, 	P14-	CPI5.	CP16.	CP02.	C PO3+	CP04,	SHOC 3409
X CP05. D	1MP. 0	CP.	00.	DIFCM.	DT,	DUMMY .	ERAS1,	SH0C3413
X G. 6	ASK. G	J.	GK.	GR2.	JOULE,	MAPR,	MOLEWT,	SHOC 3411
X POCO. C	R R	PM.	TCP.	TFRMD.	TESTBH.	TESTOS,	TESTMS.	SHOC 341?
X TUCO. T	iL, T	OLAT.	TOLB2,	TOL IIN,	TOL 45.	TOLTIP,	TOLCP,	SH0C3413
K TELEX. T	JLR, T	OTINT.	TOTPR,	V,	VMI		,	SHOC3414
COMMON / IN	TEGR/ I	•	18,	IB1,	IDUMP,	I ERRUR +	IFIRST,	SH0C3415
X IG, IC	JTTR. I	PASS.	IS,	IT.	J .	JIN,	JJ,	SH0C3415
K JM, JM	l, K		K1.	КΚ,	L,	LIMIT,	LSTAGE,	SH0C3417
X MSTAGE, N	LINES, N	ITUBES,	NX,	NX1,	YES			SHOC3419
EQUIVALENC	E (ATAR	(1,1),/	ATAS(1.1	. <b>)), (</b> FL	7W(1),DF	LOW(1))		SHOC3417
								SHUC3423
SHOCK= Y -	TERMILL	_,J}*AT	ANISQRTI	(Z-1.0)*	(Z+1.0)	/TERML(L	+J]} +	SHUC3421
X ATANESORT	((2-1.0)	¢(Z+1•)	0111					SHUG 3422
RETURN								50063423
								CU0C363

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SLINE. SUBROUTINE SOURCE STATEMENT IFN(S) -EFN SLINE(X,XT,YT,N,ANS) XT(500) + YT(500) DIMENSION IF (N-1) 3,3,11 11 IF (X-XT(1)) 3,3,4 2 RETURN 3 ANS=YT(1) GOTO 2 7,5,5 IF (X-XT(N))4 5 ANS=YT(N) GOTO 2 ANS=(YT(N)-YT(N-1))*(X-XT(N-1))/(XT(N)-XT(N-1))+YT(N-1) 6 GOTO 2 K=N-1 7 8 I=2,K DC (X - XT(I))9,10,8 1F CONTINUE 8 GOTO 6 ANS=(YT(I)-YT(I-1))*(X-XT(I-1))/(XT(I)-XT(I-1))+YT(I-1) 0 GOTO 2 10 ANS=YT(I) GOTO 2 END

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**SLIN3427** 

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**SLIN3433** 

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**SLIN3435** 

SLIN3436

**SLIN3437** 

**SLIN3438** 

**SLIN3439** 

SL[N3440

**SLIN3441** 

**SLIN3442** 

SLIN3443

SL N3444

SLIN3445

SLIN3446

STAOR.	- EFN	SOURCE	STATEMENT	r - IFM	4(S) -			Î
SUBROUTINE STACH	т						STA03447	
	STATOD EV		TOV				STA03449	
+++ COMPOTES	STATUR EN						STA03450	Ű
COMMON AVCEONA	AL HE 291		ALT( 29)	_	ALTER.		STA03451	L.
V ASDECT(20)	EDATH	1	CAVE A 1 20	, 2 1			STA03452	
	FPAID		JAVEALZ	,			STA03453	1
	TITLE						ST AD 3454	1
DEAL MACE NAD	A HILL		E				STA03455	
DIMENSION ATAS/2	NJ 110667		- L				STA03456	-
UTMENSION ATASIZ	-711111 F	CUW(521					STA03457	¥
COMMON /MATRIX/	163		ATAR (29.	.111.	B2(29).		STA03458	1
V DETA(10-11)	BU(22).	,,,,,,	RIADE/20	21.	BT(32)		STA03459	
× 60/10 11)	00(32.1)	1.	CPCOIS		CP132.1	n) .	STA03460	1
					CIC0(29	51.	STA03461	
		1.1	CVNEWII		CYDATOL	201.	STAD3462	-
			DELM(11)	/ L_ / /	OFEVILO	.11).	STA03462	_
A CASTINALITA	DEACTION		DELATI			21.	STA03466	
X UF(207) X ENACU/20 111	EGUND/20	7,11,7,	E00E1 / 1	, 	CAMMA (2)	2,11).	57403465	3
X EMACH(29,11),		, , , , , , , , , , , , , , , , , , , ,	FRUELII	,,,,,,	MACH(20	-11).	STA03466	
A HMN(29);		7   •	1KK1107	7	DCHOVE!	<b>11 1 7 7</b>	STA03400	1
X UCAR(29,117,	PU1 32 + 1 /	L J 9   1	R 1 3 2 9 1 1		POSTACI		STA03469	
X KR1327,			D TO A TL /	/ <del>/</del>	SOC OL 20	-5).	STA03460	-
A KS(327) Y SOLID(20 11)	KSLUPELI		TEDMICI		TED MA / 1		51403407	
X SULID(29,117,	- 33CU1271	1211	1EKM111	J+11/+	TITIC/1	21.	STA03471	
A TERMOLLIT	TERMUTI	L J 9	11/22 11	<b>7</b>	W(11).	C/ Y	57405471	j.
× 10(32)11/7	COLATI		0(92,11	,,		2	57803472	
A ALJZI CCNMCN (SCALED)	- A		A10A0.	A202A0.	A 202A0.	<b>A 4 0 4 A 0</b> .	57403474	
Y ASOSAO P			CM	CMEAN.	C ME AND	COINTG	51403475	
X ADUDAUT DI				CHEMN .	C DO2.	C PO4	51403475	<i></i>
A GPIZY GPIDY	000	00	DIECN.	DT.		CPUT	STA03477	_
		6 <b>0</b> .	01F5F1		MAGD.	NOLEWY.	57405477	4
		JAJ TCD.	TEDMO.	TESTRM.	TESTOS.	TESTMS.	57403470	3
	TOLAT	TOL 82.		TOINS.			STADJATS	
	TOTINT.	TOTOP	V.	VMI	IULIIF		STAD3481	
COMMON /INTECO/		TO IFN I	101.		TEDDOD.	1610CT.	57403482	
	19		1019	100mr 1	ITN.	11.	51403402	2
	174331	134	111		JINT.	ISTACE.	STAU3403	
A JMP JMLP V MCTACE ANTALES				L1 VEC	LIMIN	LJIAGE	STA03404	1
ENLIVELENCE IN	ADIN 10003	TACII I	1111	163 14/11.061	04/111		STA03485	1
CANTAVENCE (MI	ARILIII	AIMOLIAT	III (FL)	JWLITUP			STA03450	-
1 - 1							51403407	2
15 (ISTACE NG 7)		. 5					STA03480	
IF LUSIAGENNESS		<b>4</b> 2					STA03407	
IF LONGLOFFAITI	GU 10 20						57403490	
WWW ECTINATE TH			CONSTRV		ben.		57403491	1
TTT COLLEATE IT	ie Likol :	STATUR O	EUMETRI	LE NEWOI			STADJ492	1
46171- DC141				•	•		51403493	
NJ(1) - KJ(0) NT - 10(14) - 1		057777					STADZAOR	
DU(7) - DU(4) -01	CHI CII/A31	4. A 44					ST MU 3773	
V171- V121 - NT	THATINIC		METRI [ ] ]				ST MU 3770 St An 2407	
CO TO 35					-		57403477	
04 10 25							ST AU 3770	
							51 MJ 34 77 St 403800	
TTT FICK UP IN	STALUK	GEUMEINT		-			STA03500	
							JIAUJJUL	

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	STAD3502
	STA03503
RS(1) = TP(1)	STA03504
25 CALL RSTARI	57403505
DO 3 J=1.NLINES	STA03506
C *** INITIALIZE THE FLOW PARAMETERS	STA03507
G TTT INITIALIZE THE TEON PARAHETENS	STAD3508
	STA03509
	STA03510
$CP(I_{0}J)=CP(I-I_{0}J)$	STA03511
GAMMALL+J7= GAMMALT=1+J7 2 2011 11- 2010410 20417011 11-TOCO\/TOCO +1-01**	STA03512
3 PU(1, j) = PU(0+(0, 0+(1)(1, j)-(0, 0)))	STA03513
X [GAMMA(1,1)/(GAMMA(1,1) -1.0))	STA03514
CALL INEST	STARI3515
CALL STREAM	51403515
CALL MOVE	STA03210
RETURN	STA03211 STA02519
	STA03510
C *** ESTIMATE THE DOWN-STREAM STATOR PROPERTIES	STAU3319
	STAU 3520
45 CALL COPY	STAU3521
RETURN	STA03522
FND	STAD3523

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STRE3528 SUBROUTINE STREAM ł STRE3524 *** COMPUTES AXIAL VELOCITY DISTRIBUTIONS WHICH SATISFY STRE3525 STRE 3525 CONTINUITY AND LOCATES STREAMLINE POSITIONS STRE3527 ŧ STRE 3529 DOUBLE PRECISION TITLE STRE3530 JOULE MAPR. MOLEWT, REAL NACH. STRE3531 Ī DIMENSION ATAS(29,11), FLOW(32) STRE3532 LOGICAL IERROR, YES ..... **STRE3533** B2(29), ALPHA(10,11), ATAR (29,11), COMMON /MATRIX/ STRE3534 BT(32), BLADE(29). X BETA(10,11). BH(321, ۰. STRE3535 CPC0(6), CR(32,11), X CC(10,11), CP(32,11), and the second se CUCO(29,5), STRE3535 CU(32,11), CU2(11), Х CSLOPE(10,11), STRE 3537 C XRATO(29), CXM(10,11), CXNEW(10,11), X CX(32,11), STRE 3538 Transfer 1 DEPV(10,11), DELM(11), DA(10), X CXS(10,11), STRE3539 DFLOW(32), DFACT(29,11). DFL(29), X DF(20). GAMMA (32,11), **STRE3540** FRDEL(10,11), FOUND(20,3,10), EMACH(29,11), X MACH(29,11), STRE 3541 [KK(10), X HMN(29); HUB(32), STRE3542 RCURVE(10,11), R(32,11), X OBAR(29,11), PG(32,11), STRE 3543 RINT(11), ROSTAG(11), RH0(32,11), X RH(32), STRE3544 SOCO(29,5), RSLOPE(10,11), RTRAIL(11), X RS(32), STRE3545 TERMA(11), SSCO(29,5), TERM1(10,11), X SOLID(29,11), TIP(32), TITLE(12), STRE3546 TERMC(11), Х TERMB(11), W(11), STRE3547 u(32,11), **TSTAT(11)**, X TO(32,11), STRE 3548 X X(32) STRE3549 A202AG, A303AO, A40440, COMMON /SCALER/ A1CAO. AA. Α, CMEANP, COINTG, STRE 3550 CMEAN, X A505A0, 8, 88. CC. CM, CP02. C PO3. CP04, STRE 3551 CPI6, CP13, CP15, CPI4, X CPI2. DD, ERAS1, STRE3552 DIFCM, DT. DUMMY . DCP. X CP05. DAMP . STRE3553 G72, JOULE, MAPR, MOLEWT, GR. XG, GASK, GJ, **STRE3554** TESTDS, TESTMS, ICP. TERMD, TESTBH, X POCO, Q, RPM, TOLMS, TOLTIP, TOLCP, **STRE3555** TOLMIN, TOLAT. TOL82, X TOCO. TOL, ۷, VMI STRE 3556 TOTPR. TOLCX, TOLR, TOTINT, X 181, IDUMP. IERROR, IFIRST, STRE3557 COMMON / INTEGR/ 18, Ι, JJ. LT, JIN. **STRE3558** J, IPASS. IS. IOUTTR, X IG, L, LIMIT. LSTAGE, STRE 3559 JML. K, K1, Kite X JM, X MSTAGE, NLINES, NTUBES, NX. NX1, **STRE3560** YES (ATAR(1,1),ATAS(1,1)), (FLOW(1), DFLOW(1)) STRE3561 EQUIVALENCE STRE3562 COMMON / ENERGY/ H, T, GAMMER 1 STRE3563 STRE3564 CMEAN=CX(I, JM) STRE 3565 *** COMPUTE VALUES OF CXM, ROSTAG, AND TERMA, (CU**2+CR**2) STRE3566 STRE3567 STRE3568 DO 150 J=1, NL INES STRE3569 CXM(L,J)=CX(I,J)/CMEAN **STRE3570** 150 TERMA(J)=CU(I,J)++2+CR([,J)++2 STRE3571 NCOUNT=1 STRE 3572 ******* START OF LOOP ON CM CONVERGENCE STRE3573 STRE3574 **STRE3575** INDIC=0 STRE3576 J= JM STRE3577 155 H= - (CMEAN**2 +TERMA(J)) /GJ T = TQ(I,J)STRE3579

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STREM. - EFN SOURCE STATEMENT - IFN(S) STRE3579 CALL ENTALP STRE3582 С STRE3583 ***** ERROR TRANSFER TO A NEW DATA SET** STRE3584 STRE3585 IF (VMI.LE.0.)) CALL ERROR(27) STRE3586 -': VMI= SQRT(VMI) IF (CMEAN-VMI) 205, 205, 160 STRE3587 STRE3588 160 IF(INDIC)165,170,165 STRE3589 STRE 1590 С *** PROGRAM NOT SUITABLE FOR SUPERSONIC FLOW, GO TO A 10 C STRE3591 NEW DATA SET STRE3592 STRE3593 165 CALL ERROR( 2) STRE3594 170 INDIC=1 **STRE3595** CMEAN= VMI#0.75 205 DO 260 J=1, NLINES STRE3596 CX(I,J)=CMEAN+CXM(L,J)STRED597 H = -(CX(I,J) * *2 + TERMA(J))/GJSTRE3598 T = TO(I,J)STRE3599 CALL ENTALP **STRE3600** STRE3601 ***** CALCULATE STATIC DENSITY** C STRE 3602 STRE3603 B= PO(1, J)*EXP((THERM3(TSTAT(J)) -THER 3(TO(1, J)))/DCP) STRE3604 RHO(I, J) = B/ TSTAT(J)/ GASK STRE3605 DEPV(L,J)=RHO(I,J)*CXM(L,J)**STRE3605** 260 CONTINUE STRE36C7 STRE3608 *** CALCULATE INTEGRAL OF RHO*CXM*R VS. R FROM HUB TO TIP, С STRE3609 С (TOTINT), AND NEW VALUE OF CMEAN STRE3610 STRE3611 275 CALL INTEG (DEPV,1) STRE3612 TOTINT=RINT(NLINES)-RINY(1) STRE3613 STRE361 CMEANP=FLOW(I)/6.2831853/TUTINT STRE3615 **STRE3616** С *** CHECK CONVERGENCE OF CM Ţ. **STRE3617** . **STRE3618** DIFCM=ABS((CMEAN-CMEANP)/CMEAN) South Street Barbara IF (DIFCM-TOLR)300,300,280 STRE3619 280 IF (NCOUNT-30)290,290,285 STRE3620 STRE 3621 ******* ERROR WIL¹. CAUSE TRANSFER TO NEXT DATA SET C STRE3622 , F STRE 3623 285 CALL ERROR( 3) STRE3624 290 NCOUNT=NCCUNT+1 3 STRE3625 STRE3626 CMEAN= CMEANP in the second STRE 3627 J= JM GO TO 155 STRE3628 · 13 STRE 3629 *** SUCCESSFUL CONVERGENCE ON CM í. STF 23630 C STRE3631 ₹. *** USE CONVERGED VALUES OF INTEGRAL OF RHO+CXM+R VS. R FROM STRE 3632 C X R(J) TO R(J+1), (DA VALUES), TO CALCULATE VALUES OF - -**STRE3633** C DEPV(L, J)=(INTEGRAL RHO*CXM*R VS. R FROM RH TO R(J))/TOTINTETRE3634 C **B-77** 

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300 CONTINUE D0 400 J=1, NLINES 400 CX(I,J)=CXM(L,J)*CMEANP 700 RETURN END

STRE3635 STRE3636 STRE3637 STRE3639 STRE3639 STRE3640

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	Т			-	FEN	Š		ĒŚ	TATE	AEN.	r	IFN	N(S)	-			
ΕL	INCT 1		FRM1 (	(1)	<u>, , , , , , , , , , , , , , , , , , , </u>	~	00110				•					-	[HEK364]
																•	THER 3642
		<b>.</b>							<b>N</b> N	Ω.	τη τ	05 0	CP D1	. WH	HERE CF	> IS	THER 3643
•	***	CAL	JULAIL	:3 P	1 = 1		COLE	00		• • • • •	10 1	0, ,	<b>,</b> .				THER 3644
		GIV	EN AS	AF	-1-1-	1 08	UK EE	۳٥	LINU	Γ <u>ε</u> μι	<b>L</b> ,			•			THER3645
																	THER3646
DC	DUBLE	PRE	CISIO	N I	ITLE				-								THFR 3647
RE	EAL	MACH	, MAI	PR,	MOL	EW	le J	UUL	E								THER3648
DI	IMENS	ION /	ATASC	29,1	[1],	FI	-OM(3	5Z)					•				THER 3649
L	DGICA	LI	ERROR	<b>,</b> YE	ES								0.217				THER3650
CC	DMMCN	/ M A	TRIX/	AL	<u>ГЬНУ (</u>	10	, 11 },		ATAR	(29	+11)	+	0214	2711			THE03651
Xŧ	BETAC	10,1	1).	Bł	1(32)	•			BLAD	ECZ	91+		61(2	2211	• •		TUED 3457
X (	CO(10	,11)	,	CI	P(32)	11	•		CPCO	(6)	•		CRI:	32 1 1	114		THER 3072
X (	SLOP	E(10	,11),	CL	J2(1)	L) •			CU(3	2,1	1),	_	CUCI	U(29	1711		1 HER 3033
X (	CX(32	,11)	,	C S	XMC 13	9+1	1),		CXNE	W{1	0,11		CXR	AIUU	291,		1 NEK 3034
X (	CXS(1)	0,11	1.	Ð	4(10)	),			DELM	{11	1.		DEP	VC 10	+11),		1 MER 30332
X	DF(20	1.		D	FACT	(29	,11),	1	DFL(	29)	•		DFL	DW ( 3 )	Z) •		THEK 3030
X	EMACH	129.	11),	FI	DUND	120	, 3, 10	)),	FRDE	L ( 1	0,11	L),	GAM	MA (3	2,11),		1HEK303/
XI	HMN 12	91	•	H	UB(3)	21.		.,	IKK(	10)	•		MACI	H(29	,111,		THEK 5075
X	BAR(	29.1	1).	P	0(32	.11	),		R(32	,11	1.		RCU	RVE (	10+11)	•	THER3059
x	RH( 32	1.		R	HO(3	2.1	1),		RINT	(11	),		ROS	TAG(	11),		THER3663
x	RS(32	1.		R	SLOP	EC1	0,11	•	RTRA	IL(	11)	•	SOC	0(29	•5)•		THER3661
x		(29.	111.	S	SCOL	29.	51,		TERM	1(1	0,11	L) .	TER	MA(1	1),		THER3662
<b>x</b> -	TFRMR	(11)	•	Ť	ERMC	(11	).		TIP(	32)	•		TIT	LE (1	2),		THER3663
Ŷ.	10132	.111	-	Ť	STAT	(11	).		U(32	,11	.).		WC1	1),	•		THER 3664
Ŷ.	X(32)		•		-		•										THER 3665
ົດ		150	AL FR/	Δ	•		ΑΑ,		A10A	0,	A 21	D2A0,	A 30	340,	A404A	0,	THER3666
¥	A 50 5 A	0.8		8	B.		cc.		CM,		CMI	EAN 🖡	CME	ANP+	COINT	G,	<b>THER3667</b>
Ŷ,	CP12.		P13.	Ē	PI4.		CPI5	•	CPI6		CP	02,	C 90	3,	СР04,		THER3668
Ŷ	CPILT	ň	ANP.	ñ	CP .		DD.	•	DIFC	Μ.	DT	•	DUM	MY 🚛	ERAS1	•	THER3669
<u>.</u>	G.	្ល	ASK.	Ğ	J.		GR.		GR2.		10	ULE,	ΜΑΡ	R,	MOLEW	T,	THER3670
Ŷ	oncn.			Ř	PM.		T CP .		TERM	ID.	TE	STBH,	TES	TDS,	TESTM	S,	THER3671
÷.	TOCO,	1	<u>.</u>	Ť		•	TOLB	2.	TOLM	IIN	T0	LMS.	TOL	TIP,	TOLCP	•	THER3672
÷		. 1		Ť	NTIN	Ť.	TOTP	R.	۷.	-	VM	I					THER 3673
^	OMMON		TEGO	, i		••	18.	•	İB1.		10	UMP .	IER	ROR .	IFIRS	T,	THER 3674
ູບ	TC	· / L ··	WITTD.	Ť	7		IS.		11.		1.	-	JIN		JJ,		THER3675
A.	109 .	10	AFTIN <b>y</b> 41.	ĸ		•	K1.		KK.		L.		LIM	IT,	LSTAG	E.	<b>THER3676</b>
÷.	JMP	ים א	L F H TNEC	. N	TURE	s	NX		NX1.		YE	S					<b>THER3677</b>
		7 <b>69</b> (* 11 <b>6</b> 1/	16 · 18		(1.1	3.	TASI	1.1	} .	(FI	LOWE	1).DF	LOW	1))			THER3678
E			)[] ( <i>f</i>	4 1 MIN		144				•,• •							THER 3679
-					(013		012+	(CP	14+10	. PT	5+CP	[6*T]	)*T)4	t			TKER3680
	112 M M J	L= [] FT1+1			VF 1 6	. • • • •											THER3681
11	J 71 )4	<b>- ( 3 -</b> 4*) 	<b>ا</b> ,														THER3682
- P	IL TURN	N															THER3683
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**THER3684** SUBROUTINE THERM2(POVER, TOP, T) **THER 3685 THER3686** *** SOLVES FOR TOP IN GASK * ALOG(POVER) = INTEGRAL FROM T TO TOP OF (CP/T) DT, WHERE CP IS GIVEN AS A FIFTH DEGREE **THER 3687 THER 3688** POLYNOMIAL. (SEE THERM1). **THER 3689** THER3690 DOUBLE PRECISION TITLE **THER3691** MAPR: MOLEWT, JOULE REAL MACH, THER 3692 DIMENSION ATAS(29,11). FLOW(32) THER 3693 LOGICAL IERROR, YES **THER 3694** B2(29). ATAR (29,11), COMMON /MATRIX/ ALPHA(10,11). BT(32). THER3695 BLADE(29), BH(32), X BETA(10,11), CPC0(6). CR(32,11), **THER3696** X CO(10,11), CP(32,11), CUCO(29.5). **THER3697** CU(32,11), cu2(11), X CSLOPE(10,11), **THER3698** CXNEW(10,11), C XRATO(29), CXM(10,11), X CX(32,11), **THER3699** DEPV(10,11), DELM(11), DA(10). X CXS(10,11), DFLOW(32), THER 3700 DFACT(29,11), DFL(29), х DF(20), GAMMA (32,11), THER3701 FOUND(20,3,10), FRDEL(10,111, EMACH(29,11), X MACH(29,11); THER3702 IKK(10), HUB(32), X HMN(29). R(32,11), RCURVE(10,11), THER3703 OBAR(29,11). PO(32,11), X ROSTAG(11), THER 3704 RINT(11), RHO(32,11), x RH(32). SOCO(29,5). TKER3705 RTRAIL(11). RSLOPE(10,11), X RS(32). **THER3706** TERMA(11), SSCO(29.5). TERM1(10,11), X SULID(29,11), THER3707 TITLE(12), TERMC(11), TIP(32), X TERM8(11). **THER3708** w(11), TSTAT(11), U(32,11), X TO(32,11), THER 3709 X X(32) A10A0, A202A0, A303A2, A404A0, **THER 3710** COMMON /SCALER/ AA, Α, CM. CMEANP, COINTG, THER3711 CMEAN. CC. X A505A0, B, 88, CPI6. CP02. C PO3, CP04, **THER3712** CPI4. CPI5. CP 13. X CPI2, DT, ERAS1, **THER3713** DD. DIFCM. DUMMY, CAMP. DCP, X CP05. MOLEWT, **THER 3714** JOULE . MAPR, GR, GRZ, X G. GA SK . GJ. TESTBH, TESTDS, TESTMS, **THER3715** TERMD, RPM. TCP, POCO. Ç, X TOLTIP, TOLCP, **THER3716** TOLAT, TCLMIN, TOLMS. TOL 82, TOL. X TOCO. TOTPR, ۷, VMI **THER3717** X TOLCX. TOTINT, TOLR, 18, IDUMP, IERROR, IFIRST, THER 3718 181. COMMON / INTEGR/ Ι, IS. JIN. JJ, **THER3719** IT. J. IUUTTR. IPASS. X IG, THER 3720 JML . K. K1, LIMIT, LSTAGE, KK. 1. . X JM, THER 3721 NX1. YES X MSTAGE, NLINES, NTUBES, NX, **THER3722** (FLOW(1),DFLOW(1)) (AT AR (1, 1), ATAS (1, 1)), EQUIVALENCE **THER 3723** THER 3724 XA= ALOG(POVER) + DCP THER3725 BOT= THERM3(T) THER 3726 DO 10 NN=1,50 **THER3727** DT= TOP*(XA -THERM3(TOP) +BOT)/CP(1,1) **THER3728** TOP=TOP +CT THER3729 IF (ABS(DT).LE.TOLCP) GO TO 15 "HER 3730 **10 CONTINUE** THER 730 THER 3731 ******* ERROR TRANSFER TO A NEW DATA SET THER 3732 **THER3733** CALL ERROR(26) **THER3734 15 RETURN** YHER 3735 END.

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FUNCTIO	IN THERM3(	T)						THER 3736
								THER3737
***	CALCULATE	THE INT	EGRAL OF	CP/T DT	FROM 0.	D TO T		THER3738
								THER 3739
DOUBLE	PRECISION	TITLE						<b>THER3740</b>
REAL M	ACH, MAP	R. MOLE	WT, JOU	LE				THER 3741
DIMENSI	ON ATASIZ	9,111,	FLOW(32)					THER374?
LOGICAL	IERROR.	YES	• • • • •					THER374,
COMMEN	/MATRIX/	ALPHA(1	0,11),	ATAR (29	.11).	82(29),		<b>THER3744</b>
X BETA(1	0,11),	BH(32).	· · ·	BLADE(2	9),	BT(32).		<b>THER3745</b>
X CO(10,	11),	CP(32.1	1),	CPCO(6)	•	CR(32,1	1).	THER3746
X CSLOPE	(10,11),	CU2(11)	•	CU(32.1	1).	CUC0(29	,5),	THER3747
X CX(32.	11),	CXM(10.	11).	CXNEW(1)	0,11).	CXRATO	29).	THER3748
X CXS(10	.11).	DA(10).		DELM(11		DEPV(10	•11)•	THER3749
X DF(20)	•	DFACT(2	9.11).	DFL(29)	•	DFLOW(3	2).	THER 3750
X EMACH (	29.11).	FOUND(2	0.3.10).	FRDEL (1	0.11).	GAMMA (3	2.11).	THER3751
X HMN(29	),	HUB(32)	•	IKK(10)	•	MACHI 29	.11).	THER3752
X OBAR(2	9,11).	PO(32.1	i). (	R(-32-11	).	RCURVEL	10.11).	THER3753
X RH(32)	•	RH0(32.	,	RINT(11	).	ROSTAGE	11).	THER3754
X RS(32)	•	RSLOPE	10.11).	RTRAIL	ii).	SOC0(29	•5)•	THER 3755
X SOLIDE	29.11).	SSC0(29	.51.	TERM1(1	0.11).	TERMA(1	1).	THER3756
X TERMB(	11).	TERMC (1	1).	T[P(32)	•	TITLE (1	2).	THER3757
X TO(32.	11).	TSTAT(1	1).	U(32.11		W(11) .		THER 3758
X X(32)			- • •		••			THER 3759
COMMON	/SCALER/	Α.	<b>A</b> A.	A10A0.	A202A0.	A303A0.	A404A0.	THER 3760
X 450540	· B.	BB.	<b>CC</b> .	CM.	CHEAN.	C MEANP.	COINTG	THER 3761
X CPI2.	CP 13.	CPI4.	CP15.	CPI6.	CPO2.	C P03.	C P04.	THER 3762
X CP05.	DAMP.	000	00.	DIECM.	DT.	DUMMY .	ERASI .	THERSTOR
X G.	GA SK .	GJ.	GR.	GR2.	JOULE	MAPR.	MOLEWT.	THER 3764
X POCO.	0.	RPM.	TCP.	TERMD.	TESTRH.	TESTOS.	TESTMS.	THER 3765
X TOCO.	TOL.	TOLAT.	TOL 82.	TOI MIN.	TOLMS	TOITIP.	TOLCP	THER 3766
X TOLCX.	TOLR.	TOTINT.	TOTER	V_	VMT	102111	,	THER 3767
COMMEN	/INTEGR/	1.	18.	IB1.	I DUMP -	I FRRDR.	IFIRST.	THER 3769
X IG.	IOUTTR.	IPASS.	IS,		150mry	ITN.		THED2740
X JM.	.IN1 .	K.	K1.	KK -		LINIT.	ISTACE.	THE0 3770
X MSTAGE	NL INFS.	NTURES.	NX.	NX1.	YES			THER 3771
FOUTVAL	ENCE LAT	AR(1,1),	ATAS(1.1)	11. (EL)	<b>123</b>	เกษยากา	-	TUE01772
		**********	~~~~1+1+		~~~~~			THER 2772
THERM3=	CPC(1)*	ALOGITIA		+ ( CP() 2+ 4	CP03+1CP	04+CP05±	T) #T) #T)	THE03774
X *T)*T								THERATTE
RETURN								THER 3774
END								THE02777
				~				111613111

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SUBROUTINE THERMP THER3778 THER 3779 ******* CALCULATE SPECIFIC HEAT AT CONSTANT PRESSURE (CP) AS A THER3780 FUNCTION BEING A FIFTH DEGREE POLYNOMIAL. THEN THE THER 3781 **THER3782** RATID OF SPECIFIC HEATS IS CALCULATED AS CP/(CP-.0686) THER3783 **THER3784** COUBLE PRECISION TITLE MAPR, **THER3785** MOLEWT, JOULE MACH. REAL THER3786 DIMENSION ATAS(29,11), FLOW(32) LOGICAL **IERROR**, YES THER3787 B2(29), COMMEN /MATRIX/ ALPHA(10,11), ATAR (29,11), THER3789 **THER3789** BLADE(29). BT(32). X BETA(10.11). BH(32). **THER3790** CP(32,11), CPC0(6). CR(32,11); x CO(10,11), **THER3791** CUCO(29,5), X CSLOP 5(10, 11), CU2(11). CU(32,11), **THER3792** CXNEW(10,11), C XRATO(29), X CX(3-11), CXM(10,11), DEPV(10,11), **THER3793** DELM(11), X CXS(10,11), DA(10), DFACT(29,11), DFL(29), DFLOW(32). THER3794 X DF(20), GAMMA (32,11), **THER3795** X EMACH(29,11), FOUND(20,3,10), FRDEL(10,11), HMN(29), HUB(32), IKK(10), MACH(29,11), THER3796 X X PO(32,11), R(32,11), RCURVE(10,11), **THER3797** OBAR(29,11), RH(32), RINT(11), ROSTAG(11), THER3798 X RH0(32,11), **THER3799** RSLOPE(10,11), RTRAIL(11), SOCO(29,5), X RS(32). SSC0(29,5), TERM1(10,11), TERMA(11), THER3800 х SOLID(29,11), TITLE(12), THER3801 TERMC(11), TIP(32). X TERMB(11). **THER3802** W(11), X TO(32,11), TSTAT(11), U(32,11), **THER 3803** X X(32) A10A0, A202A0, A303A0, A404A0, **THER3804** COMMON /SCALER/ AA, Α, CC, CM. CMEAN. CMEANP, COINTG, **THER3805** X A505A0, B. 88, CP04, X CPI2, CP 13. CPI4, CPI5. CPI6. CPO2. C PO3. **THER3805** X CP05. DAMP. DCP, DD. DIFCM. DT, DUMMY . ERAS1, **THER3807** GJ, GR2. JOULE. MAPR, MOLEWT, **THER3808** XG. GASK. GR. RPM, TCP. TERMD, TESTBH, TESTDS. TESTMS, **THER3809** X POCO. ۵. IULB2, TOLTIP, TOLCP, **THER3810** TOLAT, TOLMIN. TOLMS, X TOCO. TOL. VMI **THER3811** TOLCX, TULR, TOTINT, TOTPR, ۷. X THER3812 IDUMP. IERROR, IFIRST, COMMEN /INTEGR/ I, 18. 181, JJ, J. JIN, **THER3813** IG, IPASS, IS, IT, X IOUTTR, K1, KK, L, LIMIT, LSTAGE, **THER3814** JM1. κ, X JM. NX1, X MSTAGE, NLINES, NTUBES, NX, YES THER 3815 (ATAR(1,1),ATAS[1,1)), (FLOW(1), DFLOW(1)) **THER3816** EQUIVALENCE THER 3817 CP(1,J)= CPCO(1)+(CPCO(2)+(CPCO(3)+(CPCO(4)+(CPCO(5)+CPCO(6)* THER3818 THER 3819 X TO(I,J))*TO(I,J))*TO(I,J))*TO(I,J))*TO(I,J) CV = CP(I,J) - DCPTHER3820 GAMMA(I,J)=CP(I,J)/CV THER 3821 THER 3822 RETURN END THER3823

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SUBROUTINE	XDER IV (Y. DYD)						XDER3824
							XDER 3825
*** CALCU	LATE THE EIRS	T AND SE	COND DER	I VATI VE	OF Y		XDER3826
WITH	DESDECT TO Y	FAX TAL	ENGTH)				XDER 3827
M. 2. 111	NEURSEI IC A						XDER 3828
	122 111 DVD	(10.11)					XDFR3829
UIMENSIUN (		(10,11)					XDER 3830
DUUBLE PRECI	SIUN TITLE		r				YDE0 3831
REAL MACH,	MAPN, MULEI	II JUUL	E				VUED2022
DIMENSION AT	AS(29,11), 1	LUW(32)					XUENJOJ2
LOGICAL IER	ROR, YES						XUEK3033
CCMMON /MATR	IX/ ALPHA(10	),11),	ATAR (29,	113.	82(29),		XUEK 30 34
X BETA(10+11)	, BH(32),		BLADE(29	15 +	BT(32),		XDER 3835
X CO(10,11),	GP(32,1)	L),	CPC0(6),	1	CR(32,1)	.),	XDER3836
X CSLOPE(10,1	1), CU2(11)	,	CU132,11		CUC0(29	,51,	XDER 3837
X CX(32,11),	CXM(10,)	11),	CXNEW(10	),11),	C XRATO(2	291.	XDER3939
X CXS(10,11).	ĐA(10),		DEL4(11)	•	DEPV(10	,11),	XDER3839
X DF(20).	DFACT (2	9.11).	DFL(29),	,	DFLOW(32	2),	XDER 3840
X FMACH(29.1)	). FOUND(2)	).3.10).	FRDEL(10	.11).	GAMMA (32	2,11),	XDER 3841
X HMN(29).	HUB ( 32)		IKK(10).		MACH(29	11).	XDER 3842
Y 0840120.111	PO132.1		R (32.11)		RCURVE	0.11).	XDER3043
V DU/221.	0H0132		RINTINI		ROSTAGE	1 ) .	XDER3844
N NR(321)			DTDATIII		SOCOL29	51.	XDER 3845
X K313211		5)	TEDM1/1/		TEOMAIL		YDEP3846
X SUL10(29+1)	11 2200(24)		TERMETEL	/ • • • • •	TITICI	., .	YNED3847
X TERMB(11),	TERMULL.	L J 9	1171 3214		1116114	L] •	VDED 2049
X TU[32,11],	ISTATCL	[] •	0132,111	•	W(11/9		XUEN 30 70
X Y (32)							AUER JOHY
COMMON /SCAL	ER/ A,	AA,	A10A0,	A202A0,	A 303A0+	A404A0,	XUEK385U
X A505A0, B,	<b>BB</b> •	CC.	C M+	CMEAN,	C MEANP .	CUINIG,	XUER 3851
X CP12. CP1	13, CP14,	CP15,	CP16.	CP02,	С РОЗ.	CP04,	XDER 38 52
X CPU5, DAM	AP, DCP,	DDr	DIFCM	DT.	DUMMY ,	ERAS1,	XDER3853
X G, GAS	ik, GJ,	GR,	GR2.	JOULE,	MAPR,	MOLEWT,	XDER3854
X POCO, Q,	RPM,	TCP .	TERMD.	TESTBH,	TESTDS,	TESTMS,	XDER 3855
X TOCO, TOL	, TOLAT,	TOLB2,	TOLMIN,	TOLMS	TOLTIP,	TOLCP,	XDER 38 56
X TOLCX. TOL	R. TOTINT.	TOTPR,	۷.	VMI			XDER 3857
COMMON / INTE	EGR/ I.	18.	I81.	IDUMP,	IERROR,	IFIRST,	XDER 3858
X IG. IOUI	TR. IPASS.	IS.	IT.	J.	JIN.	JJ.	XDER 159
X INIM1	K.	к1.	KK.	L.	LIMIT.	LSTAGE.	KDER 3863
X MSTAGE, NI	INES. NTURES.	NX.	NX1.	YES			XDER 3861
	(AT AD ( ] . 1 ).	ATAS(1.1)	). IFII	าผ่ไปเรื่อเกตเ	09(1))		XDER3862
EQUITALLAL	141 40 111111						XDER 3RA3
DVDV (10 11-0	۰ <b>۰</b>						XDER 3844
DIDY(IO) 31+0	J•U						V050 2048
• - •							VDED 2043
							AUER 3000
3 DO 5 I=181.	NX 1						AUERSBOI
L=L+1							AUEN 3805
AA=(Y(I-1,J	)X)\{(L,J)}/(X(	1-1)-X(()	2	•			XUEK3869
88=(Y(I+1+J	)-Y(I+J))/(X(	[+1)-X([)			•		XDER3870
$DYDX(L_{j}) = 0$	(Y(I+1,J) -Y(	I-1,J}}/(	X(I+1) -	-X(I-1))	× ,•		XDER3871
5 CONTINUE			-				XDER 3872
6 RETURN					•	. ·	XDER 3873
END				•	٠		XDER 3874

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### APPENDIX C

## PROGRAM FLOW CHARTS

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SHEE 1			APPRO	VED	
IV. 8 8 4 7 0 9	= 0.5 * B = AMIN 1(VC = (U(I,NLII NLINES)) * = TO(I-1, ALL ENTA TIP = PO(I	)(I), B) VES) * B-U(I ATAR (I, NLI NLINES) 'LP -I, NLINES)	-1, N NES) * <u>E</u> X F	LINES)* * 2.0/G	CU(I-1, J M 3
V. Sa v H T C	(TSTAT) $= CT(I, I)$ $= SQCO + CO$ $= -V/GJ$ $= TO(I, 1)$ $ALL ENTA$ $ALL GAM$	)))- <i>THERM3(</i> 1)**2+CR( U(I,1)**2 9LP	T))/ I, 1) *	(DCP) ** 2 * - (1)	
A VI. A B C A	MI = GRZ = A = (-SQRT() + CR(I + 1)) + CR(I + 1) SOLID(1 B = SI(DFL) C = AA * BB A = ((CA(1)))	MN(I) * * 2 $MN(I) * * 2$ $(1) * * 2) - Ci$ $(1, 1) / (DFi)$ $(I + 1) - 1.) / 3$ $/ (BE * BB - 2)$ $(3) * * 2 + Ci$	- SQ * 2 + V(I + V(I + V(I + V(I + V(I + V(I + V(I + V(I + V(I +))) R(I , .)	CO CU(I + 1, 1, 1) / 2. (I - 1.) (I + 1, 1 i) * * 2)	1)**2 / /) -AA*
A VII. C 1-1 7	AA)/( A = CC * C U(I,1)=AM = (CU(I,1) * ATAR(I, = TO(I-1,	I BB * BB, C AH INI (CU(I, 1), U(I, 1) - CU(1 1) * 2.0/GJ 1)	) CUHM [-1, 1	1N, CUBE 1) *U(I, 1	(TA )) *
C A K	ALL EN TA = (R(I,1) = NORM(K) + CUCO( # A) # A	LP RH(I))/RS(: *(CUCO(I, 1, I, 3) + (CUCO )	t)-R )/(CC (I,4	H(I)) ICO(I, 1)+CUCO	2) +A) (I, 5)

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	HEE / /	UF 1		APPR	OVED		
	$\begin{bmatrix} A = (R(), I) \\ O PO(I, J) \end{bmatrix}$	I, J) - P,H ) = PO(I,	(I))/(RS(I)- NLINES)*NO	RHORM	(I)) (K) *((		I,1)
	(1	CUCO (1 , 4) + C	(,2)+A)+Cl vCO(I,5)*	(A)	(1,3) * A)		
XT	CALL 7	HERM2	(PO(I,J)/PO	(I): M1(	τ, J), ΤΟ	(I,J) 7 .1))	,
	H = H	ATAR (	I,J)	// 1 \		., 0 / /	
X		)=(0.5 V(I,J)	* H *GJ + CU(	T-1	′,J <i>`≯U</i>	( <i>I</i> -1,	<i>)))</i>
	TO=7 CALL TO(I,	С(Т-1) ЕNТАЦ J)=TST	, J) ; P ; AT ( J)				
	H = AT CALL PO(T)	AS(I+ ENTA	1, J) * H 2 P 2 A ( T - 1 , 1) * F	- X P	(( THER	7M3	
-	CALL	TSTAT	(J))-THERM MP	13(	Τ)/D	P)	
	TO(I) CP(I) CAMM	+I,J) = 7 +I,J) = ( A(T+7	TO(I,J) CP(I,J) D=CAMMA	(Τ	.1)		
	Garan	// ( 1 * 1 ;	J 4////////	`-)	07		
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¥.	AA = SQI - CU(1) DFACT(1) + (U(1) - (U(1)) - (U(1	RT((C I-I, J J)= I. I, J)- + (U(I I, J))/ I-1)-	X(I-I, J. )) * * 2 + 0 - SQRT( CU(I, J) -1, J) - CU 2. / SOLIL RH(I-I)	) * *2 +( CR(I-1 (CR(I, 1 ) * *2 + (I-1, J) O(I, J)	U(I-1, , J) * * 2 J) * * 2 CK(I,J) - U(I,J) I A A	J) )) ★ *2))   +
¥I.	0BAR(I, (R *Soz 1.2 A = (R(I B = (R( (R)3	J) = 0B (I , <b>J)</b> (10 (1 217)) (+1,J) (1) +1 (1) +1	9R(I,J) - RH(I) ,J)/COS +R(I,J)) R(I+I,J) RS(I+I)	+ LOSE (1 )/A, L (A.MINI ) * . 5 ) - RH(I - RH(I)	0FACT ( 1 3LADE ( 1 (BETA ( 1 ) - RH( I ) - RH( I +	-, J), -, ) * 2.0 + 1, J), + 1))/ 1) )
VII	R 4 = SQF CR (I UFACT ( CU ( ) A 4 1 SOL	T ( ( C) , J) * * T + I, J T + I, J) + ( C U ( D ( T	(I, J) * * 2)) ) = 1.0 - Sq * * 2 + Cl I, J) - CU + I, J) / A,	*2 + CU( RT((CX) R(I+I,) /(I+I,) P	I, J) ** (I+I, J) * J) * * 2)) I))/2./	2 + * * 2 + /
<u>7</u> 177	PREL = P $-B$ $H = (U(T)$ $T = TS$ $CALL$ $B = TH$	D(I-1 /DCR (,J)-U TRT( ENTR ERM	,J)*EXP ) (I-I,J)) J) LP 3(T)	(( THE R M * ( U ( I	13(737A -1, J) +U	τ(J) (I,J)) <b>/G</b>
IX.	P = P IC H = -U ( T = TO	)EAL - I, J) * (I, J)	0BAR(I (2.0*C	, J) *(P, U (I, J)	REL-P. -U(I,J))	<i>ら テルテ</i> ) ノ ら し

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I.	$\mathcal{A} = SQF$ $\mathcal{A} = \mathcal{A} = \mathcal{A}$	RT(CX( T.J) = A	I, J) * *2 ( PTAN (CU)	S CR(I IJ)/A	)**? )* 57:	) 1 <i>951773</i>
	REURVE	(T, J) = R OPE(T, J) = R	CURYE(I, J) * * 2) *	J)/(39. *3) DEC(T	RT(1.G	96777.
	RSLOPE	= (1,0)=,	A TAN (NOL	UFE(I)	<i>۲۰۰۶٬۵</i>	
I.	TMAB( TMAB(.	IS) = TN IS G1) =	1A(IS)/TI TMA(ISG	1A(IS- 1)/TM,	1) A(IS-1)	,
	PMAB( RA = T	IS)=PI MA(IS	MH(IS), P. 3) * TO(1	MH(I.º ,1)	-1)	
	BB = A	ADIT	(P. 1) * Th	) / 7 7)		
	CC = 7 DD = C	м/4 (1. .С	5(1) * 10	( 2 ; 2 7		×
<u>II</u> .	FRDEL	(I, J) = 7	THERMIC	TO(IS-	<i>I</i> , J))	
	F P.DEL TE RMO	(3, J) - 7 ) - 70 (	(IS, J)	ro(ISE	((, ))	
IV.	H = - C.7 T = TD	(M(1, 5)	) **2/GJ			
	CALL CXNEW	ENTA (i,J)	LP = TSTRT ()	J)		
	CALL	7,7.1	NA LADATO	× - 11 -	$(\tau(1))$	
	EKASI CO(8.)	= GR ? '  ) = PO(	* (; ; MIMER '; S. J) * EX	Р ( (ТНЁ	FRM3(T	STAT
		(1))	- THERM.	3(7)).	IOCF)	
<b>T</b> .	A = GAM	IMA(is-	1, 1)			
	BET.4 (+ EMACH	2, 1) = <i>1</i> 3 (1, 5, 1) =	ETA(2,5)/ COS(BETA	57.27 (2.1))	518	*
	(AG	1.0))+	*(-0,5*(	AG1.0)	1(A-1.5	w/
	MAC	H(iS,J)	* (1.0 G0.	5*(A-	1.0) 4	,
	N1.40 1 A - 1	(13, 5)	(A&1.0)*	0.9 * () E,1AC.H	(is.j)*	* 2 /
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JOB NO PAGE EPORT NO DIV. ALLISON GMC. DATE TITLE CHECKED OUTPUT SHEET 12 OF 13 APPROVED ((A-1.0) * EM.ACH(IS, J) ** 24 2.0)) * * (A/(A-1.0))*((?G1.0)/(2.0*A* EMACH(13, J) * * 2 41.0-21) * * (1.01  $(A \cdot I, \hat{O}))$ BETA(2, J) = BETA(2, J) * 57. 27578 A=SGRT(CX(13, J) * * 2GCR(13, J)**2) R = GAMMA(IS, J) VZ. A: PHA(I, J) = A'LPHA(1, J) / 57. 29578 EMACH(ISGI,J) = COS(ALPHA(I,J))/((0.5*(RE,1.0))**(-0.5*(RE1.0)/(A-1.0))/MACH(ISG1, J)*(1.0G0.5(A-1.0) · * MACH(ISCII, J) * * 2) * * (0.5 * (AGI.0)/ (A-I.O)) ( , AGI.O) * EMACH(ISGI, J) * * 2 ~ (( 4-1.0) * EMAC.4(ISG1, J) * * 2 G2.0)) **(,7/(A-1,0))*((AG1.0)/(1.0 * A * EMACH(ISGI, ) **2 GI.O-A)) **(1.01 (A - I. 0)))ALPHA(1,J) = ALPHA(1,J) * 57.29578  $\mathbf{\nabla} \mathbf{I}$ .  $H^{\pm}$  ·  $\gamma M(2, J) * *$  $, = TO(IS\hat{G}I, J)$ WALL ENTALP CALL GAM CANEW(2, J) = TSTRT(J)ERASI = GR2 * GAMMER * TSTAT(J) CO(9, J) - PC(ISGI, J)* EXP((THERM 3 (TSTAT(J)) - THERM3(T))/OCP) VIII. SQCO = CX(iS, JM)/CX(iS-1, M) R = CA(,SGI, JM)/CA(iS, JM) Q = (RS(iS) - RH(iS))/DEPV(5,2)AA= (RS(iS-1)-RH(iS-1))/OEPV(5,1) C-64 FORM 1677 :EV. 7-87

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## APPENDIX D

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## INPUT FORMAT AND SAMPLE DATA SETS

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## Part A. Input Format-Data Preparation

## Q45 DATA PREPARATION

The Q45 program is a compressor design program which iterates on efficiency through blade element loss correlation based on diffusion factor. Energy addition is based on either rotor tip diffusion factor, tip tangential absolute velocity, stator hub Mach number, rotor hub exit relative flow angle or stator hub diffusion factor. The energy addition can be limited by any one of these variables.

Two primary options have been incorporated in this design program. These are:

- Modification I— Annulus wall geometry defined to compute aerodynamics and axial velocities.
- Modification II—Mean streamline axial velocity ratio defined to compute aerodynamic and annulus wall geometry.

The procedure necessary to use these options will become evident in the following description of input data preparation. Reference can be made to the descriptive data sheets.

All data input in each field is specified either as an integer or as a floating point number. The integer must be right adjusted in its field. The noninteger input can be read in as an exponential which will take four columns in each field. This reduces the amount of significant numbers and computing accuracy.

All data cards are displayed by type in the sample data sheet appearing at the end of Part A of this appendix.

CARD 1--TITLE CARD

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Alphanumeric information from Columns 1-72 which is printed out at the beginning of the output data.

CARDS 2 & 3-CONSTANT PRESSURE SPECIFIC HEAT AS FUNCTION OF ABSOLUTE TEMPERATURE

The constant pressure specific heat variable as a function of temperature is determined by:

 $c_p = a_0 + a_1^T + a_2^T + a_3^T + a_4^T + a_5^T$ 

where T is in °R. The following sets of constants can be used as derived from Keenan and Kaye gas tables:

Temperature	0° to 1700°R	500° to 3400°R	1500° to 5000°R
a ₀	0,23746571	0,257348261	0.18198209
a ₁	0.219619999 ×10 ⁻⁴	-0.82118436 ×10 ⁻⁴	0.87076455 $\times 10^{-4}$
a ₂	-0.87791471 ×10 ⁻⁷	$0.11967112  imes 10^{-6}$	-0.28093746 ×10 ⁻⁷
ag	0.13991136 ×10 ⁻⁹	-0.57795091 ×10 ⁻¹⁰	0.50606304 ×10 ⁻¹¹
a ₄	-0.78056154 ×10 ⁻¹³	0.12572563 ×10 ⁻¹³	-0.40556182 ×10 ⁻¹
a ₅	0.15042604 $\times 10^{-16}$	-0.10414624 ×10 ⁻¹⁷	0.18191946 ×10 ⁻¹⁹

## CARD 4-LOSS PARAMETER DATA SET BUFFER ZONE

A total of up to ten loss data sets may be called from the library of permanent data described earlier. A loss data set consists of the loss parameter  $(\bar{\boldsymbol{\omega}}_p \cos \beta'_2/2\sigma)$  versus diffusion factor at each of 10, 50 and 90% annulus height stations of the geometric annulus. (For the purposes of loss computation, blade height is measured from the hub.) The library may consist of a data deck as this program deck is presently set up or a logical storage unit. The loss-data set is prescribed as an integer and a total of 999 loss data sets can be defined in the library. Card 4 is a buffer zone calling up to ten sets of losses. The data sets should be called in the buffer layer in increasing numerical order for read-in time saving. Needed fields in the buffer zone should be filled from left to right with no blank fields to the left of the last used field. As will be shown later, any one of these loss data sets in the buffer zone can be specified for any rotor or stator blade row as desired. However, loss-data sets specified in program data for individual blade rows are identified by an integer describing their location in the buffer zone—(e.g., if loss-data set 015 is retrieved from the master file and stored in the fifth sector of the buffer zone, it is identified as data set 005 when called up in the data for any given blade row).

## CARD 5-GENERAL DATA AND OPTIONS

## Columns 1-5

The maximum number of compressor stages desired is specified up to a maximum of 12 stages.

## Columns 6-10

Number of streamlines desired for the aerodynamic analysis. Number that can be specified, which includes the annulus aerodynamic wall boundaries (2), is 5, 7, 9 or 11.

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## Columns 11-15

Option on printed output of computed data as function of streamline position. Options are:

Integer 1: Print all streamline data computed

Integer 2: Print odd number streamline data computed

Integer 3: Print hub, mean and tip streamline data computed

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Integer 4: Print hub and tip streamline data computed

## Columns 16-20

Option to compute annulus walls through input of mean streamline blade row axial velocity ratio or to read in annulus wall geometry. Read in "TRUE" for annulus walls calculation or "FALSE" for annulus walls geometry read-in.

## Columns 21-25

Any one or several of the foll ing options may be selected by inputting a trigger value equal to the sum of the integers corresponding to the desired individual options. The options are:

Integer 1: Specify suction surface expansion from leading edge to normal shock intersection through fraction of total camber.

Integer 2: Card punch flow path coordinates.

Integer 4: Specify suction surface expansion from leading edge to normal shock intersection through flow angle at shock.

If options 1 and 2 are desired, input integer 3. Possible trigger values are 1, 2, 3, 4 and 6.

## Columns 26-30

Instructions can be given to ensure that each stage has reached a limit on either rotor tip diffusion factor, maximum rotor tip tangential velocity, relative hub exit flow angle, stator hub Mach number or stator hub diffusion factor. The limit for each value is the value read in. The number "0" is used for this instruction.

Because of the iteration process, the rotor tip diffusion factor may be reduced to a lower value because of stator hub Mach number limit, for example. If this limit ceases to be a limiting value, the rotor tip diffusion factor can be raised or left to remain at its last reduced value. If this latter alternative is desired, then an integer "1" is read in for this instruction.

Summarizing, we have

Integer 1: In converged design, all parameters will be less than or equal to their input limiting values.

## Columns 31-40

Desired inlet flow rate in lb_m/sec

Columns 41-50

Molecular weight of gas in lb_m/mole

Columns 51-60

Inlet total temperature in °R

Columns 61-70

Inlet total pressure in psia

## CARD 6-GENERAL DATA AND CONVERGENCE TOLERANCES

Columns 1-10

Desired overall pressure ratio. Calculation will cease when either overall pressure ratio or maximum number of stages from Card 5 is reached.

## Columns 11-20

Relative error tolerance on iteration for axial velocity. This is used at each streamline and at each axial station. Tolerance indicates accuracy on successive calculations. A recommended value is 0.01. This convergence tolerance is independent of all other tolerances.

## Columns 21-30

Relative error tolerance on continuity. This is used at each axial station and independent of all other convergence tolerances. A recommended value for this relative error limit is 0.0005.

Number 0: Drive calculation to one of its aerodynamic limits in each stage.

## Columns 31-40

Relative error tolerance in iteration for total temperature on each streamline at each axial station. Tolerance indicates accuracy on successive calculations. A recommended value is 0.05 (°R). This convergence tolerance is independent of all other tolerances.

### Columns 41-50

Rotor tip speed (ft/sec) at first rotor inlet defined by geometric axial station and case wall radius. Blade twist and rotor tip clearance are ignored.

CARD 7-CONVERGENCE TOLERANCES AND EXIT AREAS

Columns 1-10

Loading relative error tolerance defines the degree of convergence to be obtained during drive option on the controlling limit value for each stage. A recommended loading tolerance is 0.01.

## Columns 11-20

Relative error tolerance on rotor and stage adiabatic efficiency for each streamline. A recommended efficiency tolerance is 0.01.

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Columns 21-30. Blank.

#### Columns 31-40

Degree of convergence on mean streamline axial velocity ratio across each blade row. A recommended tolerance is 0.01. Should be read in only if "TRUE" is specified on Card 5.

### Columns 41-50, 51-60, and 61-70

Ratio of annulus areas at three axial stations downstream of the last stator exit station to annulus area at the last stator exit station.

CARD TYPE 8-FLOW PATH DATA, ANNULUS WALLS SPECIFIED.

As many Card Type 8 cards as axial stations are required through the last stage stator exit. There are five inlet stations, the fifth being the first rotor inlet station. For each stage specified on the input data, two additional cards are required. Thus, the maximum number of Card Type 8 cards is 29. The wall slopes at axial station number one should be zero since the method of analysis assumes them to be zero. Columns 1-10. Axial coordinate station (in.)

Columns 11-20. Geometric hub radius (in.)

Columns 21-30

Blockage factor at hub expressed as fraction of geometric annulus area. Blockage factor of unity means zero blockage. ħ

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<u>Columns 31-40.</u> Geometric tip radius (in.) Columns 41-50. Blockage factor at tip.

CARD TYPE 9-EXIT STATION DATA, ANNULUS WALLS SPECIFIED.

Three exit station cards are required for the exit annulus. The axial station data on these cards will be used if the maximum number of stages entered on Card 5 has been computed. Otherwise, the last three exit station axial locations will be those corresponding to the first three stations of the non-computed stage data. The exit stations' tip radius is always equal to the last stator exit tip radius.

Columns 1-10. Axial station location (in.)

Columns 11-20. Blank.

Columns 21-30. Blockage factor at hub.

Columns 31-40. Blank.

Columns 41-50. Blockage factor at tip.

CARD TYPE 10-FLOW PATH DATA. ANNULUS WALLS COMPUTED.

For the five inlet stations, the Card Type 8 is used. Two Card Type 10 cards are used for each stage specified on Card 5 plus 3 exit stations (Card Type 11). Thus, the maximum number of Card Type 10 cards is 24.

## Columns 1-10

Axial velocity ratio across the blade or vane row along the mean streamline.

## Columns 11-20

Maximum hub ramp angle for the blade or vane row (degrees). This angle is based on a straight line relationship between stations. It is recommended that a linear variation between desired rotor one hub and last stator hub versus blade row number be used as an estimate for the first flow path calculation.

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## Columns 21-30. Blockage factor at hub.

## Columns 31-40

Maximum case ramp angle (i.e., negative value) for the blade or vane row (degrees). Hub ramp angle statements apply here also except tip ramp angle is  $\leq 0^{\circ}$  and both hub and tip ramp angle limits cannot be zero for the same axial station.

Columns 41-50. Blockage factor at tip.

Columns 51-60

Blade or vane aspect ratio based on axial inlet station annulus height divided by axial station distance (i.e., projected chord).

CARD TYPE 11-EXIT STATION DATA. ANNULUS WALLS COMPUTED.

Three exit station cards are required for the exit annulus which specifies the blockage factor at hub and tip. The axial station locations are successively incremented from the last station a distance equal to the last station row axial spacing. The exit station tip radius is always equal to the last stator out tip radius.

Columns 1-10. Blank.

Columns 11-20. Blank.

Columns 21-30. Blockage factor at hub.

Columns 31-40. Blank.

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Columns 41-50. Blockage factor at tip.

CARD TYPE 12-STREAMTUBE MASS FLOW

The fractional mass flow to total annulus flow between the hub and each streamline specified on Card 5. Each value is entered in fields of 10 columns. Seven streamline values can be entered on the first Card Type 12. If 9 or 11 streamlines are specified, the additional streamline values are entered on a second Card Type 12. These additional values are entered in Columns 1-10 and 11-20 for 9 streamlines and Columns 1-10, 11-20, 21-30, and 31-40 for 11 streamlines. The first streamline value is obviously equal to zero.

## CARD TYPE 13-INLET GUIDE VANE LOSS COEFFICIENTS

The loss coefficient,  $\overline{\omega} = (P_{t1} - P_{t2})/(P_{t1} - P_{1})$ , for each streamline from hub to tip specified at axial station 5. Two cards are used in fields of ten if more than seven streamlines are specified as defined for Card Type 12. A value of zero is read in for each streamline if no vanes or zero loss is desired.

## CARD TYPE 14-INLET GUIDE VANE EXIT WHIRL DISTRIBUTION

The whirl distribution is given by

$$\mathbf{V}_{\boldsymbol{\theta}} = \frac{\mathbf{A}}{\mathbf{R}^2} + \frac{\mathbf{B}}{\mathbf{R}} + \mathbf{C} + \mathbf{D}\mathbf{R} + \mathbf{E}\mathbf{R}^2$$

where  $V_{\theta}$  is in ft/sec and R is in inches. The tangential velocity is defined as positive in the direction of rotor rotation. A value of zero is read in for each specified constant if no whirl is desired.

## CARD TYPE 15-FIRST ROTOR ADIABATIC EFFICIENCY ESTIMATE

Estimate of rotor adiabatic efficiency for start of iteration. One value per streamline from hub to tip in fields of 10 columns. Two cards are used if more than seven streamlines are specified as defined for Card Type 12. Succeeding rotors assume previous rotor efficiency calculated as first estimate for this rotor.

CARD TYPE 16-FIRST STAGE ADIABATIC EFFICIENCY ESTIMATE

Estimate of stage adiabatic efficiencies for start of iteration on stator losses. One value per streamline specified from hub to tip as described for Card Type 15.

## CARD TYPE 17-LOADING LIMIT DATA FOR EACH STAGE

Card Types 17 through 24 are placed in sequence as a group of cards for each stage specified on Card 5.

Columns 1-10. Rotor tip diffusion factor limit.

Columns 11-20. Stator hub inlet Mach number limit.

Columns 21-30

Relative flow angle limit at hub of rotor exit (degrees). Negative value signifies turning past axial direction.

Columns 31-40. Stator hub diffusion factor limits.

## Columns 41-50

Maximum rotor exit tip tangential velocity permissible (ft/sec).

CARD TYPE 18-BLADE LOSS AND TOTAL MASS FLOW CHANGE

## Columns 1-5

Rotor loss parameter data set from buffer zone of Card 4 described by an integer identifying the position of the desired loss-data set in the buffer zone.

## Columns 6-10

Stator loss parameter data set from buffer zone of Card 4 described by an integer identifying the position of the desired loss-data set in the buffer zone.

## Columns 11-20

Mass flow added to or subtracted from rotor blade row and/or annulus walls within row ( $lb_m/sec$ ). This mass flow change is divided equally among streamtubes.

#### Columns 21-30

Mass flow added to or subtracted from stator blade row and/or annulus walls within row ( $lb_m$ /sec). This mass flow change is divided equally among stream tubes.

## CARD TYPE 19-ROTOR EXIT TOTAL PRESSURE PROFILE

The total pressure profile is defined by the following expression.

$$\frac{P_t}{P_{tT}} = \frac{A}{B+p} + C + Dp + Ep^2$$

where

$$p = \frac{R - R_H}{R_T - R_H}$$

Note that during design computations, this polynomial is normalized before each use. That is, the ratio  $P_t/P_{t_T}$  is set to 1.0 for  $p = (R_{T_e} - R_{H_g})/(R_{T_g} - R_{H_g})$ .

The program user should avoid using B = 0. In the case of zero blockage,  $p_{H_e} = 0$  and for B = 0, the term A/(B + p) results in a division by zero at the hub.

Columns 1-10. Constant A

Columns 11-20. Constant B

Columns 21-30. Constant C

Column 31-40. Constant D

Columns 41-50. Constant E

## CARD TYPE 20-ROTOR SHOCK LOSS PARAMETER

Shock loss calculations require the suction surface Mach number at the incident shock location. Thus, the supersonic turning along the suction surface to shock intersection based on the normal shock model must be specified. One of two methods may be selected (Card 5, Columns 21-25). These are (1) ratio of supersonic turning to total turning,  $\phi_{SS}/\phi$ ; and (2) suction surface flow angle,  $\beta_{SS}$ , (degrees) at shock intersection. These data are to be established along the streamline airfoil section. The method of input is identical to Card Type 19 where  $P_t/P_{tT}$  is replaced by  $\phi_{SS}/\phi$  or  $\beta_{SS}$ . The program user should beware of using  $\beta_{SS}$  on the first attempt at designing a given compressor. Very large shock losses can result, since it is difficult to guess appropriate values for  $\beta_{SS}$  in advance.

#### CARD TYPE 21-ROTOR SOLIDITY

Solidity,  $\sigma$ , for the streamline airfoil section as a function of p, the fraction of blade height. The method of input is identical to Card Type 19 where  $P_t$  is replaced by  $\sigma$ .

## CARD TYPE 22-STATOR EXIT TANGENTIAL VELOCITY PROFILE

Tangential velocity (ft/sec) distribution as a function of radius is given by

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$$V_{\theta} = \frac{A}{R^2} + \frac{B}{R} + C + DR + ER^2$$

where R is in inches. The fields for constants A through E are identical to Card Type 19.
### CARD TYPE 23-STATOR SHOCK LOSS PARAMETER

Identical procedure to that for the rotor on Card Type 20. CARD TYPE 24-STATOR SOLIDITY

Identical procedure to that for the rotor on Card Type 21.

### APPENDIX D

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Part B. Sample Design Problem Data Set



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OUTPUT FORMAT-SAMPLE DESIGN PROBLEMS

10/31/67 EXAMPLE - ANNULUS WALL GEOMETRY SPECIFIED (PROGRAM 111)

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	STREAM	0.048	0,0851	0.0861	0.0760	0.0637	0.0506	0.03750	1110°0	0.000						-						STREA CURVAT	0.0302	0.0020	-0.0146	-0-022	-0.0236	-0-0210	-0-0131	600.0-	-0-005							L	)
	STREAMLINE Slope (degs)	26.07	17.87	9.89	7.66	5.87	4.36	3.07	1.73 0.92	. 00.0							×				2	STRÉAMLINE Slope (degs)	33.78	24.73	19.24	11,96	9.24	6.87	4° 78	1.15	-0.45					:		a free at a free at a free at a free at a free at a second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s	
	RADIAL VEL. (FT/SEC)	164.7023	102.3773	81.9409	64.8573	50.2675	37.6214	20.5281	7.9142	0.000								•				RADIAL VEL. (FT/SEC)	219.6809	194.2094	166.9367	114.3859	91.1478	69-0471	48.5168 29.4629	11.7815	-4.6354				-			Latural Chief	
	AXIAL VEL- (ft/sec)	336.70	4 10 - 71 4 56 - GB	479.55	494.61	504.52	510.98	517 <b>.</b> U3	518.14	517.86							-,					AXIAL VEL. (FT/SEC)	328.42	422.10	479.35	544°89	563.87	576.98	540, 67	592.89	592.77							familie for the second	
518.65 518.69	ABS• VEL• (FT/SEC)	374.82	450°U7 467,42	466.50	÷58°85	507.01	512.37	713°11	518.20	517.86	TUTAL TEMP.	518.69	518.65	516.69	518.69	518,69	518.65	518.65	518.65	518•c9 518•65	-	ABS. VFL. (FT/SEC)	395.12	464.64	507.60	556.38 556.87	571.19	581.10	541-60 541-40	593.00	552•79	TJÍAL TEMP.	516.69	518.05	7] H. O.Y. 7 1 0. 7 0	518.69	518.69	2 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C • 5 C •	
14.70 14.70 14.70 Number 3	ABS. PACH Number	0•340 0-340	0 • 55 • 5 5 • 6 7 5	C. 4 4 4	G.456	0.464	C.469	2/ <b>1 ° C</b>	7~7 °C	0.414	TOTAL PRES.	100/26 10.1 14.70	14.70	14.70	14.7C	14.70	14.70	14.7C	14.70	14.7C	ксмвек 4	ABS. FACH NUMBER	3¢ē.0	0.423	0.464	0.452 6.512	C+525	U.535	0.545	0.547	<b>U•</b> 546	TUTAL PRES.	14.70	14.70	14.70	14.70	14.70		
23.9469 25.UCCO STATICN 1	STREAPLINE Rajius (In.)	8.58CU	14.16CS	16.0257	17.6432	1360°61	20.4269	0100012	23.9416	25 - UC CO	STREAMLINE	RAU 105 1 111.1 8.5800	11,8665	14.16(3	16.0257	1200-12	20.4269	21.6670	22.8341	23.9418 25.00C0	STATICN	STRÊAMLÎNÊ Kadius (In.)	10.3500	13.2379	15.28¢8	16.954U 18.39f3	19.6548	20.6654	21.5562	24.0428	25.0600	STREAPLINE PAD (115 / 1N - 1	10.3500	13.2379	15.2868	18.3583	19-6948	20.0854	
11	S.L. NG.	-4 (		<b>•</b>	<b>u</b> 1	ų, I	<b>-</b> a	ю, <b>с</b>	, 0 , 1	11	S.L.		1 <b>(N)</b>	( <b>n</b> ) -		nj se	, ,	· 00.	5 ( E-	6 01 11		S.L. NC.	1	<b>0</b>	n ·	<b>4</b> 161	( <b>4</b> )		an u	10	11	S.L.	1.	, ,	m 4	r un	u r		

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v Z	RNAWN- DI.	SIREAMLINE RADIUS (IN.) 12.5924 14.6314	ACS. PACH	ABS. VEL.	ALTAN VEL		STOFAMI INC	STRF AMI INF	
		12。5934 14。6314 14 5524	NUMBER	(FT/SEC)	(FT/SECI	RADIAL VEL. (FI/SEC)	SLUPF (DEG)	CURVATURE	FLUW ANGLE
		12。5934 14。6314 14 3544						1/IN.	
· ·	こうちうじ	14.6314 14 3564	Ú. 530	575.76	458.54	348.1945	37.21	0.00374	-0-0
( ,	<i>ህ ፋ ሲ ብ</i> !	14 35.44	u. 559	605.28	537.07	279.1387	27.51	0.02510	-0-0
(	4 M O		C.576	623.20	581.44	224.2975	21.18	0.03361	-0-0
ί.	ς Υ	17.0562	<b>0.568</b>	635.U¢	609.20	179. 3805	16.52	0.03524	-0-0
	¢	18.9146	r.550	643.3C	627.53	141.5863	12.83	0.03306	0-0-
		20.0711	Ú•6CZ	045.2C	639.98	108.9715	9.78	0.02873	-0-0
	2	21-1503	0.600	653.42	648.47	80.3361	7.16	0.02335	-0-0
	30	22.1663	U. 6C9	656.40	¢54.09	54.9238	4.88	0.01770	-0-0
	0	23.1363	0.611	658.39	¢57.60	32.2010	2.86	0.01231	-0-0
 E	10	24.0625	U.612	c55.61	659.50	11.4028	1.05	0.00753	-0-0-
	. <b>11</b>	24.9531	U.¢13	6¢0.19	¢60.16	-6.5231	-0-57	0.00368	0.0-
Ś	S.L.	STREAMLINE	IUTAL PRES.	TOTAL TEMP.	REL. VEL.	WHIRL VEL.	RELATIVE	REL . FLOM	WHEEL COEF
Z	NC.	KADIUS (IN.)	(Le/SC IN.)	(DEGREES)	(FT/SEC)	(FT/SEC)	MACH NO.	ANG. (DEG)	(FT/SEC)
•	Ļ,	12.5934	14.70	513.65	H34.PO	10.00	0.768	46.394	604.483
	N	14.6314	14.70	514.69	927.14	00.00-	0.85ó	49 • 2 4 4	702.306
1	ų '	16,2548	14.70	518.65	958 <b>.</b> 57	-0.00	0.923	51.384	780.233
ţ	4	17.6562	14.7U	518.09	1059.04	-0.00	186*0	53.154	847.499
•	ŝ	18.914ó	14.7C	518.69	1112.71	-0.00	1.031	54.680	907.901
:	Ŷ	20.0711	14.70	518.69	1.51.73	-0.00	1.077	56.026	963.414
1	~	21.1503	14.70	518.59	1207.32	-0.00	1.120	57.233	1015.215
	30	22.1683	14.70	518.65	1250.25	00.00	1.160	58.331	1064.078
( , , ,	م	23.1363	14.70	518 <b>.</b> 65	1291.04	-0.00	1.198	59.338	1110.541
	<u></u> 0	24.0625	14.70	j18.69	1330.08	-0.00	1.235	60.270	1154.998
~	11	24.9521	14.7C	<b>518.69</b>	1367.64	-0.00	1.270	61.137	1197.748

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***--*** FINAL FLUW PARAMETERS FUR STAGE NUMBER 1 ***--***

## *** STAGE INPUT PARAMETEPS ***

		50L f 01 TY	250500E 01 100000E 01 639000E 00 536000E 00 149000E 00		MASS AVE. Adlabatic eff.	0.8980	0.8856	CUMULATIVE Mass ave. Adiabatic eff.	0•8980	ŋ. 8856
	A T OR	IN ANGLE He shock	11340E 02 0. 00000E 01 0. 55500E 02 -0. 9300E 01 0. 97700E 01 -0.		MASS FLUN (LB/SEC)	401-0000	0 000 • 1 04	CUMULATIVE MASS AVF. TEMP. RATIO	1.1206	1.1206
0.3500 20.0 0.7300 0.4700 1000.0	12	IRL FLO DCITY AT T	000E-38 0.15 000E-38 0.10 000E-38 0.10 000E-38 0.53 000E-38 0.25	*	AXIAL LENGTH (IN.)	3.1250	2+5250	CUMULATIVE Mass ave. Pr. ratio	1.4331	1.4263
נטדחג באוד		VELC	A B C C B C C C C C C C C C C C C C C C	QUANTITIES ***	TIP RAMP Angle (deg)	0000	0°00	MASS AVE. Temp. ratio	1.1206	1.1206
LÍMIT AT THE F Imít (IN) t Elocity			100100	STAGE SCALER	HUB RAMP Angle (deg)	37.524	3C• 715	MASS AVE. Pk. ratic	1.4331	1.4263
-FACTCR LIMIT E FLUW ANGLE I Mach Number Li D-Factor Limi Tangential Vi	۰ <b>.</b>	K SOLIDIT	2 0.534000E 1 0.130000E 2 -0.303500E 2 -0.234100E 1 -0.681000E	***	GEJMETRIC TIP RAD.(IN.)	25.600	25.CCOU	TIP BLUCKAGE Factor	0°4 575	0065*0
RLTOR TIP D Hub Relativ Stator Hub Stator Hub Maximum Tip		FLCM ANGLE AT THE SHGC	U.249650E U J.10000E 0 J.114100E 0 U.3189940E 0 -U.334600E 0		ECMETRIC HUB RACILS (IN.)	14.9000	16.4660	HUB ELOCKAGÉ Factor	0.9925	0066.0
, , ,		PRESSLÄE PROFILE	C.LOUUGE-38 0.00000CE-38 0.10000CE -38 0.LUUUCE-38 0.CC000CE-38 0.CC000CE-38		ASPECT GE RATIC R	4.UUG	4 •Uf C	VEL。RATIO 1 At the Pean	0.916	360°T .
	. :	. 1 . i . j.		E-8	; ; ;	FCT 0R	-STATCR-	· ·	-FUT0R	-STATCK-

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Carl Street

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REL. MACH NUMBER 0.5790 0.5790 0.6150 0.6529 0.6877 0.7593 0.7593 0.7593 0.7593 0.8470 0.8415 0.8715 0.8933 REL. FLDW ANGLE (DEG) 21.118 29.570 35.485 39.485 39.485 39.485 48.362 48.560 48.560 50.570 52.971 53.971 53.971 LOSS COEFF ABS. FLOW ANGLE (DEG) 38,616 38,616 34,425 34,425 34,715 32,713 31,387 31,387 31,355 30,850 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 31,087 3 PEL. /FL. (FT/SEC) 651.3943 651.3943 694.3831 739.0227 781.227 781.227 864.3149 864.3149 969.3848 969.3848 969.3848 969.3848 0.6551 0.6571 0.6407 0.6223 0.62834 0.65834 0.5834 0.5839 0.56539 0.5266 0.5266 0.5266 0.5266 0.5266 ABS. MACH NUMBER 0.6512 0.6512 0.6545 0.6545 0.6128 0.6128 0.6128 0.6075 0.6075 0.5982 0.5982 0.5982 SOLIDITY **CURVATURE** -0.0111 -0.03412 -0.02663 -0.01656 -0.01237 -0.00463 -0.00463 -0.000463 0.00030 0.00030 2-280 1-922 1-922 1-928 1-928 1-928 1-928 1-529 1-525 1-465 1-465 1-383 1-383 1-371 1-371 1-371 1-297 HFEL SPEED (FT/SEC) 720.05 788.51 8847.68 900.98 950.10 950.10 950.10 950.10 1039.44 1039.44 1159.45 1157.09 ABS. VEL. (FT/SEC) 770.693 750.679 733.086 720.866 704.520 698.820 698.820 698.820 682.260 SLOPE (DEGREES) 34.72 27.75 27.75 22.57 19.57 19.57 14.79 14.79 8.84 8.84 6.28 3.944 1.77 -0.25 (L8/50 IN.) 15.30 15.30 15.89 15.89 16.26 16.41 16.41 16.43 16.54 16.54 16.50 STATIC PRES KADIAL VEL-(FT/SEC) 346.07 261.15 261.15 280.82 1330.82 1330.42 91.35 91.35 91.35 91.35 91.35 91.35 91.35 91.35 91.35 91.35 91.35 21.35 21.35 21.35 21.35 21.35 21.35 21.35 21.35 21.35 21.35 21.35 25 2.52 DIFFLSION FACTOR 0.95169 0.95169 0.95119 0.95119 0.3516 0.3556 0.3475 0.3475 0.3485 STATIC TEMP. (DEGREES) 526-04 5326-04 5326-32 533-05 533-05 533-05 533-10 5340-91 5442-089 5442-089 5442-05 5442-05 5442-05 5442-05 5442-05 5442-05 5442-05 5442-05 5442-05 5542-05 MHIRL VEL. (FT/SEC) (FT/SEC) (F5.84 (F5.84 (F1.8.69 (F1.8.69 (F1.8.69 (F1.8.69 (F1.8.69) (F1.8.69) (F1.8.69) (F1.8.69) (F1.8.69) (F1.8.69) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.60) (F1.8.6 AU LABATIC EFFICIENCY 0.9655 0.9569 0.9560 0.9560 0.9568 0.9536 0.9536 0.8513 0.8513 0.8513 0.8513 0.8513 TUTAL PRES. (LU/S4 IN.) 21.06 21.06 21.06 21.06 21.06 21.06 21.06 21.06 21.06 21.06 UJAL PRES. KAFIC 1.4321 1.4321 1.4531 1.4531 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.4331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.4431 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.44331 1.443451 1.44351 1.44351 1.44351 1.445555555555555555555555555555 AX IAL VEL (FT/SEC) 555-567 555-513 555-513 555-513 555-513 555-555 565-555 561-542 561-542 564-274 564-274 STREAMLINE RAUIUS (IN.) 15.0011 16.4272 17.6600 18.7705 19.7934 26.7564 27.7564 27.7564 27.35168 23.35168 23.3516 23.1551 24.9395 TCTAL TL # 10EGREES) 576.85 577.23 577.29 574.72 574.72 580.41 581.55 582.98 588.90 588.90 TCTAL TEMP. RATIO 1.1122 1.1129 1.11399 1.11399 1.1139 1.1212 1.1239 1.1239 1.1239 1.1239 1.1239 1.1239 1.1239 100400 - 005 Sel - N M 4 N 9 N 8 5 0 1 E-9 N 11 1

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**-----## STATCR EX IT ##----##

DW REL. FL(N FEG) ANGLE (DFG) 10 49.699 0 51.828 0 53.828 0 55.004	0 56.250 0 57.336 0 58.293 0 59.144 0 59.907 0 60.598 0 51.224	LOSS COEFF. 2 0.0298 4 0.0259 4 0.0235 4 0.0235 6 0.0176 0 0.0176 0 0.0176 8 0.0176 9 0.0176 8 0.0176 8 0.0165 8 0.0165	EL. REL. MACH FC) NUMBER 78 0.9126 19 0.9126 62 0.9729 15 1.0020 100304 50 1.0581 27 1.0843 1.110 05 1.110
ABS. FL ABS. FL -0.00 -0.00 -0.00 -0.00	00000000000000000000000000000000000000	A#/S 0.709 0.725 0.723 0.723 0.725 0.725 0.725 0.725 0.725 0.725 0.725 0.725 0.725 0.725 0.725 0.725 0.725 0.725 0.725 0.725 0.725 0.725 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.755 0.7550 0.7550 0.7550 0.7550 0.7550 0.7550 0.7550 0.7550 0.7550 0.7550000000000	REL. V (FT/S) 1038.999 1074.85 1110.03 1144.49 1178.05 1242.87 12242.87
ABS. MACH NUMBER 0.5903 0.5592 0.5779 0.5778	0.5725 0.5711 0.5702 0.5698 0.5697 0.5698 0.5701	SOLIDITY 1.844 1.622 1.622 1.472 1.213 1.213 1.138 1.138 1.035 1.003	CURVATURE 1/IN. 1/IN. -0.01235 -0.00033 0.00190 0.00190 0.00193 -0.00068 -0.00193
ABS. VEL. (FT/SEC) 672.034 662.334 659.374 656.381	654.501 653.487 653.222 653.566 654.382 654.382 657.159	WHEEL SPEED (FT/SEC) 792.39 845.00 892.98 937.56 979.51 10193.93 1057.37 1093.92 1153.37 1153.37 1196.58	SLOPE (DEGREES) 29.84 20.52 20.52 10.93 10.93 10.95 8.37 5.99 5.99
RADIAL VEL. (F1/SEC) 334.38 277.16 230.34 190.24	154.85 94.17 94.17 67.55 42.81 19.43 -2.25	01 FF LS 10 N FAC TOR 0. 3 55 1 0. 2980 0. 2942 0. 2927 0. 2927 0. 2995 0. 2995 0. 2995 0. 2941 0. 2941	STATIC PRES. (LB/50 IN.) 16.50 16.62 16.75 16.75 16.75 16.81 16.81 16.83 16.83
WHIAL VEL. (FI/SEC) -0.00 -0.00 -0.00 -0.00		GD1A6ATIC 6FFICIENCY 0.9412 0.9412 0.9412 0.9219 0.9219 0.9219 0.9219 0.9219 0.9219 0.8167 0.8424 0.8167 0.8124 0.8167 0.7522	STATLC TEMP. (JEGREES) 539.29 540.50 541.60 542.46 542.46 542.48 542.43 542.43 542.43
AX1AL VEL. (F7/SEC) 532.940 653.710 617.834 628.208	625,921 641,754 641,754 646,399 650,756 650,756 652,980 652,2980 657,155	101AL PKES. KAT10 KAT10 C.9933 C.9933 C.9933 C.9933 C.9955 C.9955 C.9955 C.9955 C.9966 C.9966 C.9966 C.9966	TUTAL PRES. (Lb/30 Th.) 20.95 20.95 20.95 20.95 20.95 20.96 20.98 20.98
STREAMLINE RADIUS (IN. 14.5082 17.6041 18.6037 19.5226	20.4465 21.2360 22.0286 22.790 24.2369 24.2369 24.2369 24.9287	TOTAL TEMP. RATIO 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000	TCTAL TEMP. (DEGREES) 576.45 577.23 577.23 578.72 580.41 581.55 582.98 582.98
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★★★ STAGE INPUT PARAMETERS &★★

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S.L.	STREAMLINE RADIUS (14.)	AX IAL VEL- (FT/SEC)	WHIRL VEL. (FI/SEC)	ADIAL VEL. (F1/SEC)	ABS. VEL. (FT/SEC)	Aus, MACH NUMBER	ABS. FLOW ANULE (DEG)	REL. FLOW Angle (Deg)
- <b>!</b> ~	14.71505 18.7150	550.644	475.48	240.77	800.943 777.908	0.6491	38.491	34.493
ŝ	19.5245	571.640	458.19	203.07	760.228	0.6327	37.064	38.293
4	20.2874	574.818	444.83	169.49	746.366	0.6194	36.589	41.431
ŝ	21.0155	577.961	431.92	139.40	734.854	0.6086	35,998	44.134
<b>.</b> 9	21.713d	5 79.268	421.23	111.71	725.422	0.5995	35.496	46.437
►.	. 22.3877	5 80.449	413.54	65.94	717.857	0.5918	35.175	48.407
80	23.0420	574.¢38	4.38.26	61.88	711.678	0.5852	35,006	50.123
0	23.0804	577.597	405.10	35.36	700.593	0.5792	34.982	51.643
10	24.3062	574.344	403.51	18.26	702.387	0 45739	35.103	53.008
11	24.9224	569.677	404,67	-1-44	698.944	0.5689	35.379	54.250
Sete	TLTAL YEMP.	TCIAL PKES.	AG I ABA TI C	ULFFLSICN	WHEEL SPEED	SOLIDITY	A#/S	LOSS COEFF.
• 0N	KAT IO	2ATIG	EFFICIEVCY	FAC TCR	(FT/SEC)			
~*	1.1231	]. 40 du	C.•94Co	0.4103	857.22	1.982	0.6435	0+0567
2	1.1229	1.4003	0.9379	0.4124	898.51	1.823	0.6185	0.0566
τ <b>η</b>	1.1234	1.4000	0.9317	0.4124	937.17	1.713	0.5974	0.0594
+ E	1.1243	1.4ć4l	U.9235	0.4114	973.79	1.624	0.5791	0.0640
-1 ت	1.1249	L. 4635	0.9184	0.4069	1008.74	1.552	0.5615	0.0657
。 12	1.1250	1.4030	0.4119	0.4023	1042.26	1.492	0 • 5454	0.0686
-	1.1209	1.4c2c	0.9020	0.3993	1074.01	1.442	0.5307	0.0742
70	1.1286	1.4c23	0.2854	0.3475	1106.02	1.400	0.5170	0.0818
¢	1.1308	1.4620	0.8742	0.3970	11 30•66	1.363	0.5043	0.0914
10	461.1	i.461.	0.6556	0.3576	1156.70	1.330	0.4924	0.1027
11	1.1364	1.4615	J. 3363	0° 3095	1145.27	1.302	0.4812	0.1158
s les	ILTAL TEMP.	TOTAL Pres.	STATIC TENP.	STATIC PRES.	SLOPE	CURVATURE	REL. VEL.	REL. MACH
N0.	: DEGREES)	(LB/ SJ 11)	(JEGREES)	(LE/S4 IN.)	(UEGREES)	1/IN.	(FT/SEC)	NUMBER .
1	647.8B	30.46	544.62	22. 70.	26.95	-0.02827	722.2049	0.6043
	648-20	3 <b>).</b> 08	247.96	23.11	23.03	-0.0216J	747.0012	0.4234
1.10	c 49 . 12	30.66	601.14	23.43	19.57	-0. 1552	772.0344	Ù•6433
	£50.6d	30.68	24.200	23.66	16.45	-0.01024	799.3056	C.6635
Ś	ć51 <b>.</b> 30	30.66	01.08	23.89	13.59	-0.00559	828.3679	0.6861
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***--*** FINAL FLOW PANAMETERS FJR STAGE NUMBER 3 ***--***

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*** STAGE INPUT PARAMETERS ***

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E-14	·		**	STAGE SCALER	JUANTIFIES **	÷			
ł	A SPECT K AT IC	GECMETRIC HLD Hadils (1n.)	⊎EUMETRIC [IP RAD.[IA.]	HLB KAMP Angle (deg)	TIP RAMP Angle (UEG)	AX IAL LI	ENGTH MA	ISS FLOW	MASS AVE. Autabatic eff.
KGT GR	2.540	19 • u8 ĉŭ	23.6600	21.722	0.000	2 • 48(	00 40	1.0000	0. 9063
-STATCR-	2 • 5 ບ ເ	ں2220 مى	000.00	21.429	0.100	2.12	50 40	0000.11	0.8936
	IÉL. RAILÚ VI THE PEAN	HUE ELCCRACE	11P BLCCKAGE FACTUR	MASS AVE. Pr. Katlo	MASS AVE. Temp. Katio	CUMULAT MASS AV	IVE CUN	IULATIVE ISS AVE. IP. RATIG	CUMULATIVE Mass ave. Adlabatic eff.
RLTCF	376"0	3-56-6	0.5825	I.4831	1.1306	3.07	96	1.4230	0. 8825
-STATCŘ-	1.122	נ.586ר	0.44.0	1.4754	1.1306	3.06	36	1.4280	0.4777
	LUSS FATA								

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Mol.         Rulus (INA)         FF/SEC         FF/S	s.L.	SI REANLINE	AXIAL VEL.	ANIRL VEL.	RACIAL VEL.	ABS. VEL.	Ads. MACH	ABS. FLOW	REL. FLOW
1         2.0.0011         c.5.0.01         2.5.0.00         2.5.0.00         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000         5.5.000	NG.	RAUIUS (IN.)	1F1/séC)	(FI/Sec)	(FT/SEC)	(FT/SEC)	NUMBER	ANGLE (DEC)	ANGLE LUEUT
Zilinii         Cilinii         Cilinii <t< td=""><td>-</td><td>20.6211</td><td>c 24 . 38C</td><td>-0-00</td><td>229.64</td><td>005.271</td><td>0.5158</td><td>-0*000</td><td>56.094</td></t<>	-	20.6211	c 24 . 38C	-0-00	229.64	005.271	0.5158	-0*000	56.094
District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District         District	• •	2101-15	é 31, 452	-0.00	201.82	662.921	0.5138	-0" 000	56.796
ZILING         COLUNA         COLUNA <thcoluna< th=""> <thcoluna< th=""> <thcoluna< td="" th<=""><td>1 4</td><td></td><td>427.417</td><td>-00-00-</td><td>175.66</td><td>661.276</td><td>0.5120</td><td>-0• 000</td><td>57.430</td></thcoluna<></thcoluna<></thcoluna<>	1 4		427.417	-00-00-	175.66	661.276	0.5120	-0• 000	57.430
2::::::::::::::::::::::::::::::::::::	• •	2 2 1 1 2 2	· · · · · · · · · · · · · · · · · · ·	00 3-	06-041	660-401	0.5106	-0, 000	58.000
1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1	<b>r</b> 4	55 - 4 5 S 5	647.43R	(0 m-	127-21	659.316	0.5094	- 0• 000	58.530
7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7         7	<b>N</b> 4	3074972	651,29U	- 4- 04	104-53	059.025	U • 5086	-0.000	59.019
1         1         1         0.5017         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000	•		450 . 046	-02.00	x / . 85	660-166	J = 5080	-0-000	59.456
9         241127         622.060         -0.000         60149           11         243127         622.061         -0.000         60149           12         24323         623.06         -0.000         60149           11         24312         623.06         -0.000         20145           11         24312         613.01         0.9164         0.9164         0.9164           11         10000         6.9332         0.9164         0.3177         993.01         1.451         0.0693         0.0173           1         1.0000         0.9344         0.3161         0.3728         0.3164         0.3728         0.0293           1         1.0000         0.9447         0.3161         0.3728         0.3261         1.379         0.0673           1         1.0000         0.9476         0.3561         1.178.00         0.6473         0.0233           1         1.0000         0.9593         0.3561         1.178.00         0.6473         0.0233           1         1.0000         0.9593         0.3564         1.178.00         0.6473         0.0233           1         1.0000         0.9594         0.3564         1.178.00         0.6493         <	- 0	1002.5.		-11-	61-96	661.417	0.5077	-0*000	59.847
V         X-X-X-Y         C-X-000         Z-1.70         G-0.001         Z-0.000         G-0.000         G-0.000 <thg-0.000< th=""> <thg-0.000< th=""> <thg-0.000<< td=""><td>0</td><td></td><td></td><td></td><td>51 F3</td><td>443.204</td><td>0.5076</td><td>- 0.000</td><td>60.193</td></thg-0.000<<></thg-0.000<></thg-0.000<>	0				51 F3	443.204	0.5076	- 0.000	60.193
IN         243241         CC3000         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         2100         <	Dr ;	24+1225	020*700			446°200	5010 5010		607 °09
I.         Zarata         Generation         Contract (Frick Net)         Contract (Frick Net) <thcontract (frick="" net)<="" th="">         Contract (Fric</thcontract>	3	2425*42	642.001 0 /05		01-12	1000°004			60° 765
L.       Turia, Terp.       Unit.       Diatantic       Diatantic <thdiatantic< th=""> <th< td=""><td>11</td><td>ž4.91d3</td><td>0c9.415</td><td>-0.00</td><td>90<b>•</b>2</td><td>A 1 + • A 0 0</td><td>2800.0</td><td></td><td></td></th<></thdiatantic<>	11	ž4.91d3	0c9.415	-0.00	90 <b>•</b> 2	A 1 + • A 0 0	2800.0		
Mo.         RATIU         KALID         E+HCLENCY         FALTOR         (FT/SEC)         1.550         0.6490         0.0293           1<0000		TLIAL TENP.	TÜTAL PRÉS.	AD 1 À.3 À TIC	DIFFLSICN	WHEEL SPEED	SOLIDITY	A+/S	LOSS COEFF.
1         1.0000         C.9932         0.9164         0.3777         989-81         1.556         0.6490         0.6503           2         1.0000         C.9947         0.9101         0.3565         1095.88         1.457         0.6994         0.071           5         1.0000         C.9944         0.9101         0.3555         1095.88         1.457         0.6974         0.071           6         1.0000         C.9944         0.9101         0.3554         1035.08         1.457         0.6973         0.023           7         1.0000         C.9944         0.9443         0.3554         118.79         0.4475         0.023           8         1.0000         C.9945         0.8433         0.3554         118.713         1.2305         0.0234           9         1.0000         C.9945         0.8613         0.3554         117.113         1.273         0.6478         0.0234           10         1.0000         C.9945         0.8613         0.3564         1.77113         1.273         0.6633         0.0234           11         1.0000         C.9945         0.3564         1177.113         1.273         0.6634         0.0234           10         1.0000		RATIO	KA110	EFF ICIENCY	FAC TOR	(FT/SEC)			
1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1	-	1-0000	C. 9932	0.9164	J. 3777	989.81	1.568	0*6490	0.0293
7         1.000         0.9641         0.9651         0.9653         0.071           7         1.000         0.9944         0.9141         0.3695         1075.08         1.447         0.6593         0.071           7         1.0000         0.9944         0.3943         0.3695         1075.08         1.379         0.6472         0.0234           7         1.0000         0.9942         0.3543         1.3854         1.379         0.6472         0.0234           9         1.0000         0.9942         0.3544         0.3554         1136.03         0.0234         0.0234           9         1.0000         0.9943         0.3554         1138.79         1.270         0.0386         0.0234           9         1.0000         0.9943         0.3564         1177.13         1.275         0.0234         0.0234           1         1.0000         0.9545         0.3564         1177.13         1.275         0.0234         0.0234           1         1.0000         0.9545         0.3569         1.964251         0.0234         0.0234           1         1.0000         0.5549         0.1664455         0.177.013         1.1774         0.0234           1	• ~	1-0004	C. 5437	0.9161	U.3721	1012.88	1.516	0.6502	0.0281
i.u.000       0.9941       0.956       1056.88       1.421       0.6449       0.021         i.u.000       0.9942       0.3514       118.79       0.6449       0.021         i.u.000       0.9952       0.3514       118.79       0.6449       0.023         i.u.000       0.9952       0.3564       118.79       0.6449       0.023         i.u.000       0.9952       0.3569       117.18       1.305       0.6449       0.023         i.u.000       0.9754       0.3569       117.18       1.256       0.033       0.0230         i.u.000       0.9754       0.3569       117.18       1.250       0.0336       0.0220         i.u.000       0.9569       0.3569       117.118       1.226       0.0336       0.0220         i.u.000       0.9511       138.58       1.71.13       1.226       0.0224       0.0224         i.u.1010       0.4442       0.3569       1177.13       1.226       0.0224       0.0224         i.u.1010       0.5496       0.3569       1177.13       1.266       0.0124       0.0224         i.u.111       1.0000       0.4464       0.3569       1.1712       0.0224       0.0224         1	, 1 u	0000-1	1426-3	0-9141	0.3682	1035.20	1.467	0.6503	0"0")
F         1.0000         C.9949         0.9556         1078.00         1.379         0.6478         0.0243           1         1.0000         C.9949         0.9493         0.3561         118.79         0.6472         0.0243           1         1.0000         C.9949         0.3561         118.60         1.305         0.6472         0.0243           1         1.0000         C.9952         0.4843         0.3561         118.60         1.273         0.6472         0.0230           1         1.0000         C.9952         0.48613         1.245         0.6536         0.0225           1         1.0000         C.9953         0.3569         1177.18         1.220         0.6336         0.0226           1         1.0000         C.9953         0.3566         0.3566         0.0236         0.0226           1         1.0000         C.9953         0.3567         0.3566         0.0236         0.0236           1         1.0000         C.9954         0.1710         1.7719         0.6584         0.0236           1         1.0101         1.7714         0.1710         1.7714         0.01936         0.0236           1         1.0101         1.0101	4	1.00000		0.4100	0.3656	1056.88	1.421	0.6494	0*02
1.0000         0.6472         0.0543         0.0243         0.0243         0.0243         0.0243         0.0243         0.0243         0.0243         0.0243         0.0243         0.0243         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234         0.0234 <th0.0234< th=""> <th0.0234< th=""> <th0.0234< td="" th<=""><td>t u</td><td>(m)(m) = 1</td><td>14-5</td><td>1409-0</td><td>0.3636</td><td>1078.00</td><td>1.379</td><td>0.6478</td><td>0.0251</td></th0.0234<></th0.0234<></th0.0234<>	t u	(m)(m) = 1	14-5	1409-0	0.3636	1078.00	1.379	0.6478	0.0251
7       1.0000 $C_{9955}$ $U_{-8955}$ $U_{-3956}$ $U_{-3956}$ $U_{-8955}$ $U_{-8956}$ $U_{-9956}$ $U_{-$	•	1-0000	6449	u 4003	J. 3612	1098.61	1 • 340	0.6472	0.0243
B       1.0000       C.9954       J.8862       U.3561       1138.58       1.273       0.6428       0.0230 $10$ 1.0000       C.9955       U.8613       0.3574       1158.03       1.245       0.6338       0.0220 $10$ 1.0000       C.9955       U.8613       0.3569       117.18       1.245       0.6333       0.0220 $11$ 1.0000       C.9955       U.8613       0.3569       117.18       1.245       0.6234       0.0220 $11$ 1.0000       C.9955       U.8613       0.3569       117.18       0.6264       0.0216 $11$ 1.0000       C.9956       U.861251       U.16446       37.51       U.174       0.0211       1193       0.0256       0.0236       0.0216       0.0216       0.0216       0.0216       0.0226       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216       0.0216 <td< td=""><td>) ~</td><td>1-0040</td><td>2565 7</td><td>U- 3943</td><td>U. 3594</td><td>1118.79</td><td>1.305</td><td>0.6455</td><td>0.0236</td></td<>	) ~	1-0040	2565 7	U- 3943	U. 3594	1118.79	1.305	0.6455	0.0236
9       10000       C.9955       0.8748       0.3554       1158.03       0.05386       0.0228         10       10000       C.9955       0.8613       0.3569       1177.13       1245       0.05333       0.0220         11       10000       C.9955       0.8613       0.3569       1177.13       1245       0.05333       0.0220         11       10000       C.9959       0.8613       0.3569       1177.13       1245       0.0224         11       1.0000       C.9959       0.4504       0.0216       0.0224       0.0224         11       1.000       C.9959       0.4504       177.13       1193       0.0224       0.0224         11       1.000       C.9959       0.1504       10.6546       177.13       1.193       0.0224       0.0224         11       1.0019       U.054665       U.01049       177.14       0.02011       1192.6079       0.9932       0.9932         11       1.1001       U.05469       17.74       -0.01193       1120.5355       0.9932       0.9938       0.9938       0.9938       0.9938       0.9938       0.9938       0.9938       0.9938       0.9946       0.9946       0.9946       0.9946 <td>. 3</td> <td>1-0.00</td> <td>C.9454</td> <td>J. EEEZ</td> <td>u.3581</td> <td>1138.58</td> <td>1.273</td> <td>0.6428</td> <td>0.0230</td>	. 3	1-0.00	C.9454	J. EEEZ	u.3581	1138.58	1.273	0.6428	0.0230
10         1.0000         L.5957         0.5569         117.13         1.220         0.6333         0.0220           11         1.0000         L.5957         0.8613         0.3569         117.16         1.220         0.6333         0.0220           1         1.0000         L.5957         0.8613         0.3569         117.16         1.220         0.6333         0.0220           1         1.0000         L.5957         0.3568         1196.08         1.193         0.6264         0.0216           1         7.010         ULEKES3         ULEKES3         U.8452         0.3568         0.0216         0.0216           1         730.70         44.97         0.1644E53         ULEKS         510.19         0.02011         1193         0.0535         0.9382           2         730.95         44.97         0.44.65         37.54         15.42         0.01937         1120.55561         0.9382           2         730.95         0.45.97         37.54         15.42         0.01937         1120.55551         0.9382           3         735.01         0.45.97         37.54         15.42         0.011823         1244.675         0.9515           3         744.57	• •		C. 9455	0.8748	0.3574	1158.03	1.245	0.6386	0.0225
II         I.3000         G.5458         U.8452         U.3568         II96.UB         I.193         D.6264         D.0216           ML.         TUTAL TEMP.         TUTAL PKES.         STATIC TEMP.         STATIC TEMP.         D.193         D.6264         D.0216           ML.         TUTAL TEMP.         TUTAL PKES.         STATIC TEMP.         STATIC TEMP.         D.1945         D.0226         D.0226           NL.         TUTAL PKES.         STATIC TEMP.         D.110         D.05261         D.0226         D.0226           NL.         TUTAL PKES.         STATIC TEMP.         D.110         D.02011         D.192.0079         D.9246         D.9246           2         730.95         44.97         D.044.05         J.753         D.02011         D.192.0079         D.9246         D.9246           3         730.95         44.97         D.044.05         J.74         D.0102011         D.192.6079         D.9246         D.9246           3         732.10         44.97         D.944.05         J.74         D.0102011         D.1220.5355         D.9955         D.9955         D.9758           3         J.34.00         J.32.10         45.47         D.0102013         D.224.528         D.9955         D.9758	• •	000001	1.4457	0.8413	0.3569	1177.18	1.220	0.6333	0.0220
NU.       ILTAL TEMP.       TUTAL PRES.       STATIC TEMP.       STATIC TEM	31	1-000	G. 5458	U • K 4 5 2	U. 3568	1196.48	1.193	0.6264	0.0216
Number       TUTAL TEMP.       UTAL PRES.       STATIC TEMP.       STATIC PRES.       STATIC P									
Nu.       (UEGREES)       I/1N.       (FT/SEC)       NUMBER         1       730.75       694.14       37.51       20.19       -0.02011       1192.6079       0.9246         2       730.75       694.14       37.51       20.19       -0.02011       1192.6079       0.9246         2       730.75       694.65       37.51       20.19       -0.02011       1192.6079       0.9246         2       730.75       675.67       37.54       17.4       -0.01898       1292.6079       0.9382         3       732.10       44.97       697.17       37.69       13.23       -0.01898       1246.2428       0.9635         5       730.012       37.73       11.14       -0.01829       1246.2428       0.9758         7       700.012       37.76       9.14       -0.01723       1246.2428       0.9758         7       70.403       37.78       7.25       -0.01723       1281.4272       0.9758         7       70.403       37.80       5.37       11.14       -0.01723       1294.674       0.9758         7       70.403       37.80       5.37       0.11723       1294.674       0.9904         744.55       45.05 </td <td></td> <td>TITAL TEMP.</td> <td>TUTAL PRES.</td> <td>STATIC TEMP.</td> <td>STATIC PRES.</td> <td>SLUPE</td> <td>CURVATURE</td> <td>REL. VEL.</td> <td>RFL. MACH</td>		TITAL TEMP.	TUTAL PRES.	STATIC TEMP.	STATIC PRES.	SLUPE	CURVATURE	REL. VEL.	RFL. MACH
1       730.70 $44.67$ $694.14$ $37.51$ $20.19$ $-0.02011$ $1192.6079$ $0.9246$ 2 $730.75$ $44.97$ $694.14$ $37.51$ $20.19$ $-0.02011$ $1192.6079$ $0.9246$ 3 $732.10$ $44.67$ $944.65$ $37.54$ $17.74$ $-0.01931$ $1229.3838$ $0.9511$ 4 $732.10$ $44.67$ $37.56$ $13.23$ $-0.01898$ $1246.2428$ $0.9758$ 5 $736.00$ $45.00$ $700.122$ $37.76$ $13.23$ $-0.01828$ $1246.2428$ $0.96556$ 5 $736.00122$ $37.76$ $9.14$ $-0.01829$ $12846.2428$ $0.96556$ 7 $700.42$ $700.122$ $37.76$ $9.14$ $-0.011723$ $1284.272$ $0.98756$ 7 $744.55$ $45.06$ $7723$ $1296.751$ $10007$ $120212$ 7 $744.55$ $45.06$ $7723$ $1296.751$ $0.9908$ $1.00177$ 7 $744.55$ $706.077$ $120.245$ $0.01312$ $1.0107$		( JFLAFES)	ILASS IN.	(JEJKJES)	(LB/50 IN.)	(DEGREES)	- 21 / 1	IFT/SEC1	NUMBER
2       730.95       44.97       694.65       37.58       17.74       -0.01936       1210.5355       0.9382         3       732.10       44.97       594.65       37.54       15.42       -0.01937       1228.3838       0.9511         4       13.21       45.00       597.17       37.54       15.42       -0.01898       1246.2428       0.9511         5       730.07       45.00       597.17       37.73       11.14       -0.01898       1264.2428       0.9758         6       730.07       45.03       77       37.73       11.14       -0.01879       1281.4272       0.9758         7       740.63       702.08       37.78       7.25       -0.01723       1281.4272       0.99679         7       740.63       706.43       37.80       5.39       -0.011667       1299.0414       0.99696         7       744.53       45.05       706.43       37.81       5.39       -0.01331       1316.7517       1.01077         9       744.53       45.05       778       37.81       5.39       -0.01331       1316.7517       1.01077         9       744.53       70.131       1.4572       0.99124       1.010743       1326.539		730-70		0.46.14	37.51	20.19	-0.02011	1192.6079	0.9246
37.54       15.42       -0.01937       1228.3838       0.9511         37.54       15.42       -0.01897       1228.3838       0.9511         473.11       45.00       697.17       37.54       15.42       -0.01898       1246.2428       0.9535         573.00       697.17       37.73       11.14       -0.01898       1265.8956       0.9758         7       700.12       37.75       9.14       -0.01829       1265.8956       0.9978         7       700.12       37.76       9.14       -0.01723       1281.4272       0.9879         7       700.43       37.78       7.23       -0.01723       12891.4272       0.99879         7       700.43       37.80       5.39       -0.01351       12814.4272       0.99879         6       744.53       705.01331       1316.7517       1.0107       1.0107         7       749.05       778.13       37.81       37.81       0.01831       1.0107         7       749.05       776.13       1.477       0.0109791       1316.7517       1.0107         8       749.25       77.81       1.477       0.01831       1.20107       1.0107         9       749.25	• •	730.05	79-24	044.05	37.53	17.74	-0.01966	1210.5355	0.9382
134.10       45.00       69f.17       37.69       13.23       -0.01898       1246.2428       0.9635         5       730.07       45.02       700.12       37.73       11.14       -0.01829       1263.8956       0.9758         5       730.07       45.02       700.12       37.73       11.14       -0.01829       1265.8956       0.9758         7       700.12       37.76       9.14       -0.01723       1281.4272       0.9879         7       700.43       37.78       7.25       -0.01723       1281.4272       0.99696         7       740.43       37.80       5.39       -0.01723       1281.4272       0.99796         6       744.53       45.05       705.43       37.80       5.39       -0.01331       1316.7517       1.0107         6       749.55       77.81       3.7.81       5.39       -0.01331       1316.7517       1.0107         9       749.56       77.84       37.81       1.877       -0.000979       1316.7517       1.0107         9       749.56       1.417       3.7.81       1.417       0.000979       1334.5815       1.0212         10       772.5395       1.21.817       1.21.817       <	4 4	720-10	55.77	99.354	37.54	15.42	-0.01937	1229.3838	0.9511
5       730.07       45.02       700.12       37.73       11.14       -0.01829       1263.8956       0.9758         5       736.07       45.02       700.12       37.75       9.14       -0.01723       1281.4272       0.9879         7       740.63       45.64       704.80       37.78       7.25       -0.01723       1281.4272       0.9879         7       740.63       45.64       704.80       37.78       7.25       -0.01723       1281.4272       0.9996         7       740.63       37.80       5.39       -0.01331       1281.4272       0.9996         6       744.53       45.05       705.43       37.80       5.39       -0.01331       1316.7517       1.0107         9       749.20       45.05       37.81       3.61       -0.01331       1316.7517       1.0107         9       749.20       72.63       37.81       3.7.81       3.61       -0.00979       1334.5875       1.0212         10       45.05       77.63       37.81       1.877       0.00979       1376.56595       1.0107         10       45.477       45.477       37.81       0.18       0.00779       1370.6669       1.00107	n 4	736.14	45.00	09F.17	37.69	13.23	-0.01898	1246.2428	0.9635
736.00     45.03     702.08     37.7b     9.14     -0.01723     1281.4272     0.9879       7     740.43     37.78     7.25     -0.01567     1299.0414     0.9996       7     740.43     37.8U     5.39     -0.01567     1299.0414     0.9996       6     744.53     45.05     706.43     37.8U     5.39     -0.01331     1316.7517     1.0107       6     749.20     45.05     712.89     37.8U     5.39     -0.01331     1316.7517     1.0107       9     749.20     45.05     712.89     37.8U     5.39     -0.00979     1334.5875     1.0212       9     749.20     718.17     37.8U     3.61     -0.000979     1334.5875     1.0212       10     754.75     45.06     714.17     37.8U     3.7.8U     0.000979     1336.559955     1.0012       10     754.75     45.06     77.44     0.18     0.000679     1370.6669     1.0010	t u	71	45.02	700-12	37.73	11.14	-0.01829	1263.8956	0.9758
7     740.43     45.64     704.80     37.78     7.23     -0.01567     1299.0414     0.9096       6     744.53     45.05     706.43     37.80     5.39     -0.01331     1316.7517     1.0107       6     744.53     45.05     712.89     37.81     5.39     -0.01331     1316.7517     1.0107       9     749.20     45.06     712.89     37.81     3.61     -0.00979     1334.5875     1.0212       10     754.75     45.06     714.17     37.81     1.817     -0.00979     1334.5875     1.0212       10     754.75     45.06     714.17     37.81     1.817     -0.000679     1334.5875     1.0312       10     754.75     45.06     714.17     3.781     0.18     0.000643     13370.56669     1.0406	•	736.00	50-67	102-08	37.76	9.14	-0.01723	1281.4272	0.9879
6       744.53       45.05       706.43       37.80       5.39       -0.01331       1316.7517       1.0107         6       749.20       45.05       705.43       37.81       5.39       -0.00979       1334.5875       1.0212         9       749.20       45.06       712.89       37.81       3.61       -0.00979       1334.5875       1.0212         10       749.71       45.06       718.17       37.81       1.87       -0.00463       1352.5395       1.0312         10       75.71       45.06       77.41       37.81       0.18       0.00767       1370.6669       1.0406	<b>)</b> r	740-42	45.04	704 80	37.78	7.25	-0.01567	1299.0414	9606*0
0     749-20     45-06     712-39     37.81     3.61     -0.00979     1334.5875     1.0212       10     749-20     718-17     37.81     1.87     -0.00463     1352.5395     1.0312       10     754.75     45-06     718-17     37.81     1.87     -0.00463     1352.5395     1.0312       10     754.75     45.61     1.81     0.00767     1370.6669     1.0406	• 0	144.5.440	4 4 4 C 4	706.43	37.80	5.39	-0.01331	1316.7517	1.0107
1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1 <th1< th=""> <th1< th=""> <th1< th=""> <th1< th=""></th1<></th1<></th1<></th1<>		749 20		712-89	37.81	3.61	-0.00979	1334.5875	1.0212
20 171 17 17 17 17 17 17 17 17 17 17 17 17		745 71	4-1-64	714-17	37.61	1.87	-0.00463	1352.5395	1.0312
					37.41	(1 - 1 B	0.00262	1370-6669	1.0406

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### STAGE INFUT PARAMETERS ###

---STATOR---20•0 0.7300 0.4700 1000•0 0.4500 HUG RLLATIVE FLUM ANGLE LIMIT AT THE ROTOR EXIT Statuk HUG Aaûm Number Limit (IN) Statuk HUG D-FAŭtok Limit MAXIMUM FIP TANGENTIAL VELUCITY KUIUR TIP D-FACTUR LIMIT 

0.162900E 0.162900E -0.463000E 0.124000E -0.14900E 0.298940E 01 0.100000E 01 0.194970E 02 -0.285400E 01 0.105500E 01 FLUM ANGLE AT THE SHUCK 0.00000E-38 -0.00000JE-38 -0.00000E-38 -0.00000 E-38 -0.00000E-38 VELOCITY uου 000000 -0.1060000 0.100000 0.1787000 -0.594000 SUL 101 TY J. 1906CUE U.445764E Ö2 0.117220€ D2 -U.530840€ U1 10 FLUN PNULE AI THE SHUCK 10 J.~67000E **0. .**ເປັບຕໍ່ຍົ -0.000006-36 -0.000006-36 -6. CC000Cc - 38 -C.QUUUCCE-38 U. JUULCCE JI PRESSLKE PROFILE c) w

*** STAGE SCALER UUANTIFIES ***

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SOLIUITY

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CUMULATIVE Mass ave. Adiabatic eff. MASS AVE. Adiabatic eff. 0.9778 0.8743 0.9111 0.9981 CUMULATIVE Mass Ave. Temp. Ratio MASS FLCH (LB/SEC) 1.5944 1.5944 401-0000 401.0000 AXIAL LENGTH (IN.) CJMULATIVE MASS AVE. P.S. RAT 10 4.3812 4.3600 1.5940 1.7920 MASS AVE. Temp. Katij TIP RA4P ANGLE (JEG) 1.1165 1.1155 0.000 0.0.0 GEUMETRIC HUR RAMP ' TIP VAD.(IN.) ANGLE (DEG) 4ASS AVE. PK. KATIO 1.4301 1.4232 19.513 10.254 TIP ALUCKAGE 25.1630 20.000 FAC TOR 0.5800 0.5800 GELMETHIC FUC Ratius (In.) AUG CLUCKALE Faitur 21.425C J.58CU 0005-0 1-15CL VËL. KAILJ AT THE PEAN ASPECT 526°C) 1.081 RATIC 5:5**7 505-2 -FCTCK---STATCR--STATCR--RCTCR--

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				DADIAL VE	AAC VEL	AAC MACH	ANC. FI CH	RFL FLON
	SIKEARLINE SIN I	44146 VCL•	ATTAL VEL .	IET / SEC 1	151/561	NIMBER	ANGLE (DEG)	ANGLE LDEGD
- 2	KAULUS LIN .							10.579
<b>-1</b>	21-2330	167-150	11.100	00+00				
~	21-6315	558.507	491.66	le6.57.	C10.261	0.5866	36.336	41.963
r#	22-0195	6CJ.134	483.87	144.85	784.394	0。5796	36.088	42.870
• •	22.4005	001-087	417.39	124.33	777.064	0.5734	37.874	44.244
r ur	22.7743	061.3cl	471.93	104.76	771.578	0.5678	37.709	45.503
• •	23.1420	AC1-170	467.38	86°07	766.325	0.5029	37.582	46.655
- (		étu-219	454 - 86	68.14	762.233	0.5584	37.580	47.679
•, 3	22 24 18	742.024	463-14	50.98	759.091	0.5543	37.599	48.605
<b>.</b>	3010 TL	567.235	04.544	34.43	757-004	0.5506	37.792	49°429
r c	0413 <b>013</b>	504 1 10	466.87 466.87	14.52	755.824	0.5472	38.144	50.172
2	24-9288	564.868	412.23	3.25	755-617	0.5441	38.679	50.842
<b>,</b>	, , ,				-			
S-L-2	TOTAL TEMP.	TUTAL PRES.	AU LABA LIC	UIFFLSIUN	WHEEL SPEED	SOLIDITY	A+/S	LOSS COEFF.
	RALIO	RATIC	EFFICIENCY	FACTOR	(FT/SEC)			
-	1.1156	1-4324	0.9267	0.4410	1019.22	1.612	0.5575	0.0622
1	1411.1	1.4317	0.5283	0.4390	1038.31	1.567	0.5488	0.0611
1 1	1.1149	1.4.12	0.3270	0.4375	1056.36	1.526	0.5407	0.0609
n 4		1-4307	0.9253	0.4563	1075.22	1.487	0.5333	0.0611
<b>u</b>	1.116.7	511-2-1	0.9222	U - 4354	1093.10	1.451	0.5263	0.0626
С-	1.1156	1.4295	0.9181	0.4347	1110.32	1.419	0.5199	0.0648
) r 18	1,1164	1.4796	J-9116	0.4354	1128.23	1.390	0.5140	0*0690
•'n J	01111	1.4253	0-9052	0.4363	1145.46	1.364	0.5081	0.0732
<b>,</b> 0	1.118.2	1.4290	0-3556	0.4392	1162.55	1.341	0.5029	0.0801
р ( 1 ⁹	1 1 1 0 7	1.4748		0.4438	11 79 .57	1.321	0.4982	0.0892
2	L. 1. 1. 21.7	1. 4786	0-40-79	0.4505	1196.58	1.303	0*440	0.1009
11 .	177-1	0074 •T					P 	
ł	-							
	TITAL OF END .	TOTAL PRES-	STATIC TEMP.	STATIC PRES.	SLOPE	CURVATURE	REL. VEL.	RFL. MACH
			(UFGREES)	("NI CS/87)	(DEGAEES)	1/ [N.	(FT/SEC)	NUMBER
<b>i</b> ,	814-70	64.35	761.32	50. 75	17.02	-0.02641	813.0878	0.6023
• 8	-14 Q.)	54.44	755.31	51.05	15.55	-0.01952	827。8497	0.6127
<b>.</b>	01-110 01-12		165.68	51.23	13.58	-0.01308	942,3583	0.6224
• • ;			108.93	51.57	11.70	-0.00728	856.8357	0.4318
r u	20.010 AD.AA	66.24	112.01	51.78	0.6.6	-0.00224	870.9401	0.6410
) -4	23.37	56-23	775-14	51.98	8.16	0.00148	884 <b>.</b> 7786	0.6499
•••	22220	64-35	179-35	52.15	6•49	0.00486	897.2034	0.6573
• a	221-50 221-66	64.39	784 42	52.31 .	4.37	0.00649	909.5515	0.6642
<b>0</b>	837.73	64.39	790.78	52.45	3.31	0.00649	919.7801	0.6691
	245 . AC		764-167	52.58	1.79	0.00435	1060.929	0.6720
33	854 . (19	64 • 35	307.38	52.70	0.32	-0.00045	934.1539	0.6727
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Size         Constraint         Constraint <th>S.L.</th> <th>STREAMLINE PAUTUS I THE</th> <th>AXIAL VEL.</th> <th>AHISL VEL. 18176861</th> <th>KAULPL VEL.</th> <th>ABV. VCL.</th> <th>ABS . MACH</th> <th>ADV- FLOW</th> <th>RFL. FLOW</th>	S.L.	STREAMLINE PAUTUS I THE	AXIAL VEL.	AHISL VEL. 18176861	KAULPL VEL.	ABV. VCL.	ABS . MACH	ADV- FLOW	RFL. FLOW
2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2         2	-	51.4974	6 20 157		177 66	1112C112		ANGLE LUEUT	ANULE (UEGI
5.2.1385         5.2.1385         5.2.1385         5.2.1000         13.2.1         0.01111         0.01111         0.01111         0.01111         0.01111         0.01111         0.01100         95.12           1         2.2.1385         5.2.1385         5.2.1000         11.1.1         0.01111         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01101         0.01001         0.01001	4 7							000-0-	105.76
SL:         Trth         Fig.         O.100         135.45         O.000         59.5           F         22.3373         64.44         0.4604         0.4000         59.4           F         22.43743         65.453         0.0400         59.3         99.3           F         22.43743         65.451         0.0400         59.3         99.3           F         23.43743         65.451         0.000         59.3         90.4000         59.3           F         24.4313         65.451         0.000         58.49         0.4765         -0.000         59.3           L         24.4313         65.451         0.001         35.74         055.759         0.4765         -0.000         59.2           L         24.447         0.011         3.23         051.410         0.4765         -0.000         60.5           L         1.10000         65.471         0.414.47         0.4765         0.4000         60.20           L         1.10000         6.974         0.113         0.741.49         0.4693         0.02           L         1.10000         6.974         0.113         0.7456         0.4000         0.0000         0.0000	<b>v</b> '	A++0=77	C 40.0 07		126.25	000.141	0.4831	-0*000	58.041
*       22.72.03       ************************************	m	<b>č</b> 2 <b>.</b> 3355	643.ul9	-0.00	139.40	657.956	0,4816	-0• 000	58.519
5       23.43497       54.445       -0.00       103.37       95.57590       0.4787       -0.000       95.94         1       2.53.4534       55.451       -0.00       8.94       955.759       0.4771       -0.000       96.00         1       2.53.4534       55.451       -0.00       8.94       955.759       0.4771       -0.000       90.000         1       2.44.3074       55.451       -0.00       13.74       955.480       0.4775       -0.000       90.000         1       2.44.307       65.475       -0.00       13.74       655.480       0.4775       -0.000       90.000         1       2.44.304       65.475       -0.00       13.74       655.480       0.4775       -0.000       90.000         2.44.10       65.475       -0.00       13.74       055.480       0.4775       -0.000       90.000         2.44.10       64.10       0.775       0.775       0.775       0.775       0.000       90.000         2.4       1.0000       6.994       0.3751       10174       1.471       0.0659       0.000         2.4       1.0000       6.994       0.3751       10174       1.771       0.000       90.02     <	\$	ź2.7203	645.457	-00-	121.16	656.77U	0.4800	-0-000	58.943
1         22:13:43         65:17:5         0.4776         -0.000         55.2           1         22:13:43         65:41:         -0.000         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2         55.2	ŝ	23°0497	641.E55	- Ū• UO	103.37	656.030	0.4787	000-0-	59.334
I         2:40336         652.442         -1.00         68.94         656.312         0.4771         -0.000         60.0           I         2:40334         655.472         -0.400         55.480         0.4775         -0.000         60.0           I         2:40334         655.472         -0.400         55.480         0.4775         -0.000         60.0           I         2:4034         655.472         -0.00         55.480         0.4775         -0.000         60.0           S.L.         I'TAL FFM         Iulat PREs         Molabilic         0.17501         0.4776         -0.000         60.0           S.L.         I'TAL FFM         Iulat PREs         Molabilic         0.17501         0.4776         0.000         60.0           S.L.         I'TAL FFM         Iulat PREs         Molabilic         0.17501         0.4776         0.000         60.0           J         1.0000         0.9913         0.1375         100443         1.473         0.06794         0.020           J         1.10000         0.9736         0.1375         10174.011         1.473         0.06794         0.020           J         1.10000         0.9736         0.37601         0.3760	¢	23.3740	650.035	-0.00	85.97	655.759	0.4776	-0-000	59.635
9         24.00%         52.20         57.55         0.4767         -0.000         667.55           10         24.4305         655.474         -0.000         57.55         0.4765         -0.000         66.7           11         24.4317         655.072         0.000         57.55         0.000         66.7           11         24.5372         655.072         0.010         57.55         0.000         66.7           11         24.5372         0.55.680         0.4765         0.4765         0.000         66.7           11         1.0000         659.410         0.4113         0.3823         104.111         1.473         0.659         0.02           11         1.0000         6.9944         0.4113         0.3761         1076.55         1.441         0.659         0.02           11         1.0000         6.9944         0.3776         1076.55         1.441         0.659         0.02           11         1.0000         6.9944         0.3776         1076.55         1.471         0.659         0.02           11         1.0000         6.9944         0.3776         1124.95         0.475         0.02           11         1.10000         6.9	7	23.6938	£52.662	-0.00	68.34	656.312	0.4771	-0,000	60.012
9         24:4325         654:611         -0.00         35.74         659:590         0.4765         -0.000         60.7           11         24:437         -0.10         3.29         655.423         -0.100         50.7           11         24:437         -0.10         3.29         655.423         -0.000         60.7           11         10000         655.472         -0.00         3.29         655.472         -0.000         60.7           11         10000         65946         0.1123         0.3852         1041.49         0.475         -0.000         60.7           11         10000         69946         0.3123         1041.49         1.473         0.65934         0.02           2         1.0000         69946         0.3123         1074.51         1.473         0.65734         0.02           1         1.0000         6.993         0.3761         1074.51         1.473         0.65734         0.02           1         1.0000         6.993         0.3773         1121.99         1.473         0.65734         0.02           1         1.0000         6.993         0.3773         1121.99         1.473         0.65734         0.274 <t< td=""><td>30</td><td>24 .0094</td><td>655.474</td><td></td><td>52.20</td><td>657.549</td><td>0.4767</td><td>-0.000</td><td>60.292</td></t<>	30	24 .0094	655.474		52.20	657.549	0.4767	-0.000	60.292
10         24.6305         622.037         -0.03         15.46         0.675         -0.000         0.675           11         24.9375         655.072         -0.00         3.23         655.880         0.4765         -0.000         60.9           11         24.9374         655.072         -0.00         3.23         655.880         0.4775         -0.000         60.9           11         1.10000         6.9944         0.9125         0.91213         0.3373         1041.49         1.473         0.6534         0.02           2         1.10000         6.9944         0.9113         0.3376         1096.58         1.4441         0.6539         0.02393         0.023           3         1.10000         6.9944         0.9113         0.3761         1190.59         1.4499         0.6639         0.023           4         1.10000         6.9944         0.9113         0.3776         1121.95         1.4699         0.6939         0.023           11         1.0000         6.9943         0.3776         1121.95         1.473         0.6579         0.023           11         1.0000         6.9943         0.9175         1137.30         0.1271         0.022 <t< td=""><td>6</td><td>24.3215</td><td>658.611</td><td>-0,00</td><td>35.74</td><td>659.580</td><td>0 4765</td><td>-0,000</td><td>60-534</td></t<>	6	24.3215	658.611	-0,00	35.74	659.580	0 4765	-0,000	60-534
11       24-9710       655-072       -0.00       3.23       655-880       5.4765       -0.000       60.9         21.       ITAL       FFI LAID       FFI LAID       FFI LAID       FFI LAID       FFI LAID       FFI LAID       6.93       0.010       0.02       0.010       0.010         23.       I Johuo       C.9440       0.9120       0.3873       10141.49       1.471       0.6503       0.02       0.02         3       1.0000       C.9946       0.9120       0.3873       1054.149       1.471       0.6503       0.02         3       1.0000       C.9946       0.9123       0.3761       1106.39       1.471       0.6503       0.02         4       4       1.0000       C.9946       0.9123       0.3761       1106.39       1.471       0.6533       0.02         4       1.10000       C.9946       0.9113       0.3761       1106.39       1.471       0.6533       0.02         4       1.10000       C.9946       0.3773       1121.35       1.471       0.6539       0.02         7       1.10000       C.9943       0.377       1121.35       1.471       0.6539       0.02         1       1.10000	10	24-6305	662.J37	-0+00	15.45	662.323	0 - 4764	-0-000	60° 742
S.I.       TCTAL TEPP.       IUIL PRES.       ADIAJAIC       DIFLSION       MEEL SPEED       SULIDITY       Ar/S       LOSS CO         1       1.00000       C.9944       0.9120       0.3852       1074.51       1.471       0.06594       0.02         2       1.00000       C.9944       0.9123       0.3852       1074.51       1.471       0.06594       0.02         3       1.00000       C.9944       0.9123       0.3913       0.074.51       1.471       0.06594       0.02         3       1.00000       C.9994       0.3913       0.074.51       1100.53       0.002       0.023       0.02         4       1.00000       C.9994       0.3813       0.3745       1130.545       1.471       0.06593       0.02         4       1.00000       C.9994       0.3873       0.3776       1135.45       1.471       0.06375       0.02         9       1.00000       C.9994       0.3776       1135.45       1.471       0.06599       0.02         9       1.00000       C.9994       0.3776       1135.45       1.1277       0.0274       0.02         10       1.00000       C.9994       0.3776       1135.45       1.1277 <t< td=""><td>ŢŢ</td><td>24.9370</td><td>665.072</td><td>-0-00</td><td>3.28</td><td>655.880</td><td>0.4765</td><td>-0- 000</td><td>60.913</td></t<>	ŢŢ	24.9370	665.072	-0-00	3.28	655.880	0.4765	-0- 000	60.913
N0.         RATU         KATU         KATU <th< td=""><td>S.L.</td><td>TUTAL TEPP.</td><td>TUTAL PRES.</td><td>AUIALALIC</td><td>DIFFLSTON</td><td>WHEEL SPEED</td><td></td><td>8*/S</td><td>LOSS COFFE</td></th<>	S.L.	TUTAL TEPP.	TUTAL PRES.	AUIALALIC	DIFFLSTON	WHEEL SPEED		8*/S	LOSS COFFE
1         1.0000         C.9941         0.9120         0.3823         1041.49         1.473         0.0534         0.003           2         1.0000         C.9946         0.9120         0.3823         1090.58         1.471         0.0534         0.003           7         1.0000         C.9946         0.9123         0.3776         1090.58         1.471         0.0534         0.002           7         1.0000         C.9946         0.9123         0.3776         1137.49         1.471         0.0534         0.023           9         1.0000         C.9956         0.4722         0.3736         1137.45         1.277         0.0534         0.0234           9         1.0000         C.9556         0.4722         0.3733         1137.45         1.277         0.0539         0.023           9         1.0000         C.9559         0.4572         0.3733         1137.45         1.277         0.0539         0.023           10         1.0000         C.9559         0.4572         0.3733         1135.45         0.023         0.023           11         1.0000         C.9559         0.3732         1136.27         1.277         0.0539         0.023           11	DN.	RAT LU	KAI 10 -	EFFICIENCY	FALTOR	(FT/SECT			
Z         1.0000         C.9944         0.9130         0.3823         1058.15         1.444         0.0659         0.002           T         1.0000         C.9946         0.9130         0.3776         1090.58         1.444         0.0659         0.0658         0.002           T         1.0000         C.9946         0.9112         0.3776         1100.58         1.441         0.0659         0.025           T         1.0000         C.9954         0.9712         0.3776         1121.95         1.471         0.0658         0.025           T         1.0000         C.9954         0.3776         1121.95         1.471         0.0639         0.025           H         1.0000         C.9954         0.3778         1121.95         1.471         0.0537         0.023           H         1.0000         C.9954         0.3778         1121.95         1.471         0.0537         0.023           H         1.0000         C.9954         0.3778         1137.30         1.271         0.0537         0.023           H         1.0000         C.9954         0.3778         1137.30         1.271         0.0539         0.023           H         1.0000         C.9954	-	1.0000	C. 5941	U.9126	0.3852	1041.49	1.473	0.6534	0.0279
3         1.0000         C.9946         0.9123         0.3778         1000.58         1.410         0.0683         0.002           7         1.0000         C.9946         0.9113         0.3778         1090.58         1.411         0.0643         0.022           7         1.0000         C.9946         0.9113         0.3778         1100.59         0.6463         0.025           7         1.0000         C.9953         0.3727         1121.95         0.0633         0.023           7         1.0000         C.9756         0.8934         0.3723         1121.95         0.023         0.023           9         1.0000         C.9756         0.8934         0.3723         1121.95         1.277         0.6333         0.023           9         1.0000         C.9559         0.4874         0.3752         1187.71         1.276         0.6333         0.023           10         10000         C.9574         0.3752         1187.73         1.2756         0.6433         0.023           11         1.0000         C.9574         0.3752         1187.73         0.2136         0.2366         0.023           11         1.0000         C.55746 <th0.1336< th=""> <th0.1237< td="" th<=""><td>2</td><td>1-0000</td><td>C. 9944</td><td>0.9130</td><td>0.3823</td><td>1058.15</td><td>1.441</td><td>0.6509</td><td>0.0271</td></th0.1237<></th0.1336<>	2	1-0000	C. 9944	0.9130	0.3823	1058.15	1.441	0.6509	0.0271
F.         1.0000         C.5944         0.9113         0.3778         1090.58         1.379         0.6458         0.02           7         1.0000         C.9953         0.3761         1106.39         1.371         0.6473         0.6473         0.05375         0.023           7         1.0000         C.9954         0.3152         0.3723         1135.45         1.271         0.6433         0.023           9         1.0000         C.9954         0.38534         0.3723         1137.43         1.275         0.65393         0.023           9         1.0000         C.9558         0.3172         1182.47         1.275         0.6543         0.023           10         1.0000         C.9558         0.3172         0.3752         0.3752         0.3753         1.276         0.6543         0.023           11         1.0000         C.9558         0.3752         0.3752         1182.47         1.276         0.6243         0.023           11         1.0000         C.9558         0.3752         103674         1.2356         0.023           11         1.0000         C.9558         0.3752         0.3752         1.2356         0.023           11         1.0000 </td <td><b>`</b></td> <td>1-000</td> <td><b>C.</b> 9946</td> <td>J.9123</td> <td>0.3800</td> <td>1074.51</td> <td>1.409</td> <td>0.6483</td> <td>0.0264</td>	<b>`</b>	1-000	<b>C.</b> 9946	J.9123	0.3800	1074.51	1.409	0.6483	0.0264
5         1.0000         C.9931         0.9988         0.3745         1120.95         1.451         0.6433         0.023           6         1         1.0000         C.9955         0.3745         1121.95         1.451         0.6433         0.023           9         1.0000         C.9955         0.3735         1121.95         1.451         0.6533         0.022           9         1.0000         C.9955         0.3736         1152.45         1.277         0.6533         0.022           9         1.0000         C.9956         0.8574         0.3722         1152.45         1.277         0.6533         0.0233           11         1.0000         C.9759         0.3736         1187.43         1.277         0.6239         0.0273           11         1.0000         C.9759         0.3752         1187.43         1.276         0.6239         0.0273           11         1.0000         C.9759         0.3752         1187.43         1.276         0.0273         0.0273           12         1.0000         C.9759         0.3752         1.185.45         0.0173         0.0273         0.0275           11         1.0000         C.976.49         1.185.0         0.015	, • •	1-0000	C. 5949	0.9113	U.3778	1090.58	1.379	0.6458	0.0258
61         6         1.0000         0.9953         0.9952         0.3775         0.05375         0.05375         0.002           7         1.0000         0.9954         0.8737         1137.30         1.27         0.6375         0.002           9         1.0000         0.9954         0.8734         1137.30         1.27         0.6379         0.023           9         1.0000         0.5956         0.8734         0.3723         1152.45         0.6579         0.0539         0.023           10         1.0000         0.5956         0.8732         0.3723         1152.27         0.05243         0.023           11         1.0000         0.5559         0.6574         0.3752         0.3752         1182.27         0.023         0.023           11         1.0000         0.5559         0.6574         0.3752         1182.27         0.0173         0.023         0.023           11         1.0000         0.5559         0.6574         0.3750         1.276         0.023         0.023           12         0.0114         152.27         0.01502         1236.4485         0.01502         1237.9668         0.023           12         0.0550         116.659         110	ری 19	1.0000	C. 9951	0.908B	U.3761	1106.39	124.41	0.5433	0.0252
7         1000         0.9954         0.3736         1137.30         11         0.6375         0.002           9         1.0000         C.9956         0.8642         0.3727         1157.45         1.277         0.6343         0.002           9         1.0000         C.9556         0.6542         0.3724         1157.45         1.277         0.65343         0.002           10         1.0000         C.9556         0.6542         0.3724         1157.45         1.276         0.65343         0.023           11         1.0000         C.9556         0.6574         0.3752         1182.77         1.236         0.6299         0.02173           11         1.0000         C.9559         0.6722         0.3736         1182.77         1.236         0.023           11         1.0000         C.9559         0.6724         0.3752         1182.77         1.236         0.023           11         1.0000         C.9594         0.3752         1182.77         1.2356         0.023           11         1.0001         C.9759         0.8766         0.4723         0.9173         0.9173           11         11.0100         C.9759         1182.77         0.01162	.0 19	1.000	G <b>•</b> 5553	U. 3052	0.3745	1121.95		0.6408	0.0246
8         1.0000         C.9556         0.8534         0.3721         1152.45         1.277         0.6343         0.002           9         1.0000         C.5959         0.3723         1167.43         1.277         0.6299         0.002           10         1.0000         C.5959         0.3723         1167.43         1.276         0.6299         0.022           11         1.0000         C.5959         0.3752         1196.97         1.236         0.6299         0.022           11         1.0000         C.5959         0.3752         1196.97         1.236         0.6299         0.022           11         1.0000         C.5959         0.3752         1196.97         1.236         0.023           11         1.0000         C.5959         0.3752         1196.97         1.236         0.023           11         1.0000         C.5959         0.3752         1196.97         1.219         0.023           11         1.0000         C.5959         0.6574         0.3752         1.247.1996         0.910           2         814.70         0.402         779.14         94.496         12.111         1.111.         1.111.         1.247.1996         0.912	~ )	1.000	C. 9954	0.8-93	<b>0.3736</b>	1137.30	۲. ۲	0.6375	0.0241
9         1.0000         (.5595         0.0575         0.3738         1167.43         1.256         0.6299         0.002           11         1.0000         (.59556         0.4722         0.3736         1182.17         1.236         0.6243         0.02           11         1.0000         (.59556         0.4722         0.3752         1196.37         1.236         0.6243         0.02           11         1.0000         (.59556         0.4722         0.3752         1196.37         1.236         0.02173         0.02           11         1.0000         (.59596         0.6574         0.3752         1196.37         1.219         0.021           12         614.70         0.401         775.58         54.49         15.56         -0.01502         1234.9628         0.991           2         814.30         0.402         779.14         54.49         15.56         -0.01502         1234.9628         0.991           2         816.50         0.402         775.58         54.49         15.55         -0.01502         1234.9628         0.991           2         816.50         0.402         775.56         54.49         15.55         -0.011762         1234.95.2610         0.91	<b>10</b>	1.0000	C.9526	9-8434	0.3727	1152.45	1.27/	0.6343	0.0237
Ju         L-UUUU         C.5558         0.a722         0.a735         1182.27         1.236         0.6243         0.02           JI         i.00UU         C.5559         0.a772         0.a752         1196.97         .219         0.06243         0.02           Sale         TLTAL TEPP.         TGIAL PAES.         STATIC TEMP.         STATIC PRES.         SLOPE         CURVATURE         AEL.         VEL         REL.         VEL           NO.         C.5759         0.8574         0.3752         1196.97         .219         0.06243         0.021           Sale         TTAL         Free         STATIC PRES.         SLOPE         CURVATURE         AEL.         VEL           NO.         C.575         0.11502         12.34.9528         0.01502         1247.18628         0.992           a b15-19         54.06         13.3.49         -0.01530         1247.18628         0.993           a b15-19         54.07         13.3.49         56.8068         54.89         0.91562         1273.0688         0.993           a b15-19         54.08         12.27         -0.01570         1294.71846         0.9164         0.9164           a b15-19         54.08         12.27         0.011642 <td>, C</td> <td>1-0060</td> <td>C. 5457</td> <td>U.6642</td> <td>0.3728</td> <td>1167.43</td> <td>1.250</td> <td>0.6299</td> <td>0.0233</td>	, C	1-0060	C. 5457	U.6642	0.3728	1167.43	1.250	0.6299	0.0233
11       i.0000       C.5359       0.8574       0.3752       1196.97       .219       0.0173       0.02         23.4.       TLTAL TEMP.       TGIAL PREs.       STATIC TEMP.       STATIC PREs.       SLOPE       URVATURE       AEL. VEL.       NUM         34.1       UEGREES)       (LB/50 IN.)       105674       0.3155       1234,9627       0.90         1       B14.70       04.02       779.14       54.49       15.55       -0.011502       1234,9627       0.90         2       B14.70       04.02       779.14       54.49       15.55       -0.011502       1234,9627       0.90         3       B13.50       04.02       779.14       54.48       12.27       -0.01570       1259.9485       0.90         3       B13.50       04.02       790.14       54.48       12.65       0.90       0.91         4       B13.50       04.02       790.67       12.94       0.91       0.01747       12159.9485       0.97         4       B27.00       04.012       794.09       54.49       12.67       0.01747       1219.0872       0.94         6       B31.06       040       0.0101747       1219.0872       0.94       0.95	ָ הַנ	1.0000	C. 5558	0.6722	0.3736	1182.27	1.236	0.6243	0.0229
Sol.       TLTAL TEMP.       TGIAL PRES.       STATIC TEMP.       STATIC PRES.       STATIC PRES.       SLOPE       CURVATURE       AEL. VEL.       REL.         1       10.6       0.664EES)       11.0       10.644EES)       11.0       171.0       0.90         1       814.70       0.4.02       779.14       54.49       15.55       -0.01552       1234.9628       0.90         2       814.10       04.02       779.14       54.49       15.55       -0.015520       1247.1895       0.90         2       814.19       04.02       779.14       54.49       15.55       -0.015520       1247.1895       0.90         3       815.19       54.02       13.49       -0.015520       1247.1895       0.91         4       813.05       54.68       12.67       9.11       -0.01762       1273.0688       0.95         5       820.66       64.07       785.18       54.48       0.16       12.67       1297.1895       0.91         6       823.52       64.07       785.18       54.48       9.11       -0.01762       1297.1895       0.95         7       823.66       54.49       7.57       -0.01642       1297.1895       0.95	11	i.0000	C• 5959	0.8574	0.3752	1196.97	.219	0.0173	0.0227
Sol.       TLTAL TEMP.       TGIAL PKES.       STATIC TEMP.       STATIC TE	,						-		
NO.         (UEGREES)         (LB/SJ IN.)         (DEGREES)         (LB/SJ IN.)         (DEGREES)         (LB/SG IN.)         (DEGREES)         (LB/SG IN.)         (DEGREES)         (I'I)         (T/SFC)         NUM           1         B14.70         04.01         772.58         54.49         15.55         -0.01530         1234.9628         0.907           2         B14.30         04.02         779.14         54.60         13.49         -0.01530         1247.1895         0.912           3         815.119         54.61         13.49         -0.01570         1259.485         0.923           4         B15.19         54.68         12.27         -0.01670         1296.2610         0.933           5         B20.66         64.07         783.18         54.85         9.11         -0.01742         1273.0688         0.945           6         823.52         64.05         7.57         -0.01623         1236.6458         0.954           7         827.00         64.05         7.57         -0.01742         1299.5388         0.956           823.52         64.05         7.57         -0.01762         1299.5388         0.956           823.5166         64.05         54.85         5	S.L.	TLTAL TEPP.	TGIAL PRES.	STATIC TEMP.	STATIC PRES.	SLOPE	CURVATURE	fel. Vel.	REL. MAC
1       814.70       04.01       778.58       54.49       15.56       -0.01550       1247.1895       0.90         2       814.40       04.02       779.14       54.60       13.49       -0.01570       1247.1895       0.91         3       815.19       04.02       779.14       54.60       13.49       -0.01570       1247.1895       0.92         4       816.19       04.02       779.14       54.68       12.27       -0.01570       1259.4485       0.93         5       820.66       64.05       783.18       54.68       12.27       -0.01742       1273.0688       0.93         6       823.42       64.06       12.27       -0.01742       1286.2610       0.94         6       823.42       765.18       9.11       -0.01742       1286.2610       0.94         7       827.00       64.05       54.89       6.06       -0.01747       1313.0882       0.96         8       831.75       64.01       7.57       -0.01623       1340.8752       0.96         8       837.73       64.01       74.93       3.12       -0.01747       1313.0882       0.96         9       64.05       54.94       1.63	÷9ï	( DEGREES)	(LE/Sa IN.)	( DEGREES)	(LB/50 1%.)	(DEGREES)	1/IN.	1 PINSEC)	NUMBER
2       814.40       04.02       779.14       54.60       13.49       -0.01530       1247.1895       0.91         3       815.19       54.04       54.68       12.27       -0.01570       1259.445       0.92         4       816.19       54.05       54.68       12.27       -0.01570       1259.445       0.93         5       820.66       780.67       54.68       12.27       -0.01642       1273.0688       0.93         6       823.42       74.66       74.68       12.27       -0.01742       1273.0688       0.93         6       8233.42       64.05       74.81       9.11       -0.01742       1286.2610       0.94         7       823.40       64.66       7.57       -0.01742       1288.2610       0.95         7       827.00       64.05       54.49       7.57       -0.01747       1313.0882       0.96         8       831.66       64.06       6.06       -0.01623       1340.8752       0.96         9       64.11       802.10       54.94       1.65       -0.01623       1340.8752       0.96         9       64.12       809.19       54.94       0.28       -0.001251       1369.7244	nat	814.70	04-01	776.58	54.49	15.50	-0.01562	1234.9628	0.9051
3       d15.13       54.64       730.67       54.68       12.27       -0.01570       1259.9485       0.93         4       813.50       64.65       763.18       54.75       10.67       -0.01642       1273.0688       0.93         5       820.66       64.07       763.18       54.75       10.67       -0.01642       1273.0688       0.93         6       823.42       64.05       763.18       54.81       9.11       -0.01714       1286.2610       0.93         7       823.42       64.05       74.85       7.57       -0.01747       1313.0882       0.95         7       827.00       64.05       54.99       6.06       -0.01747       1313.0882       0.96         8       831.66       64.01       785.23       54.99       4.28       -0.01623       1340.8752       0.96         9       837.63       64.11       802.12       54.94       1.65       -0.01241       1340.8752       0.96         10       645.09       64.12       809.193       54.94       0.28       -0.00025       1369.7244       0.96         11       654.09       54.94       0.28       -0.00025       1369.7244       0.96      <	~	814.30	04°ÜŽ	.779.14	54 • 60	13.09	-0.01530	1247.1896	0.9138
+       813.50       £4.65       763.18       54.75       10.07       -0.01642       1273.0688       0.93         5       820.66       £4.07       785.57       54.81       9.11       -0.01714       1286.2610       0.93         6       823.32       £4.07       785.57       54.81       9.11       -0.01714       1286.2610       0.94         7       823.32       £4.08       7.57       -0.01762       1299.5388       0.954         7       827.00       64.05       791.69       54.89       6.06       -0.01747       1313.0882       0.96         8       8371.66       £4.04       795.4491       6.05       4.458       0.96       0.96         9       837.53       64.91       796.23       54.99       6.06       -0.01340       1340.8752       0.96         9       837.53       64.12       802.19       54.99       54.99       1.69       -0.0001240       1340.8752       0.96         10       £45.09       64.12       817.33       24.94       0.28       -0.000125       1369.7244       0.97         11       £54.09       54.94       0.28       -0.00025       1369.7244       0.97 <td>m,</td> <td>815<b>.</b>19</td> <td>94<b>°C</b>4</td> <td>790.67</td> <td>54 • 68</td> <td>12.27</td> <td>-0.01570</td> <td>1259.9485</td> <td>0.9223</td>	m,	815 <b>.</b> 19	94 <b>°C</b> 4	790.67	54 • 68	12.27	-0.01570	1259.9485	0.9223
5       820.60       64.07       785.57       54.81       9.11       -0.01714       1286.2610       0.93         6       823.52       64.08       7.57       -0.01762       1299.5388       0.94         7       827.00       64.05       7.57       -0.01762       1299.5388       0.95         7       827.00       64.05       7.57       -0.01762       1293.5388       0.95         8       831.66       64.05       791.69       54.91       4.54       -0.01623       1313.0882       0.96         9       831.66       64.01       796.23       54.93       54.93       3.12       -0.01340       1340.8752       0.96         9       637.73       64.12       807.19       54.93       3.12       -0.001340       1340.8752       0.96         10       645.09       64.12       807.19       54.94       0.28       -0.00025       1369.7244       0.97         11       654.09       6.28       0.28       -0.00025       1369.7244       0.97	*	813.ju	£4.C5	763.18	54.75	10.07	-0.01642	1273.0688	0.9304
6         823.32         £4.08         706.06         54.85         7.57         -0.01762         1299.5388         0.94           7         827.00         c4.05         791.69         54.89         6.06         -0.01747         1313.0882         0.95           9         831.66         c4.10         796.23         54.91         4.58         -0.01340         1326.8458         0.96           9         637.73         c4.11         802.12         54.93         3.12         -0.01340         1340.8752         0.96           10         c45.12         809.19         54.94         0.28         -0.001340         1340.8752         0.96           11         654.09         54.94         0.28         -0.001340         1340.474         0.97           11         654.09         c4.12         817.33         24.94         0.28         -0.00025         1369.7244         0.97	ŝ	620.Eo	E4.07	785.57	54.81	9.11	-0-01714	1286.2610	1959.0
7         827.00         64.05         791.69         54.89         6.06         -0.01747         1313.0882         0.95           8         831.66         c4.10         796.23         54.91         4.58         -0.01623         1326.8458         0.96           9         637.73         c4.11         602.10         54.93         3.12         -0.01340         1340.8752         0.96           9         637.73         c4.11         602.10         54.93         3.12         -0.01340         1340.8752         0.96           10         c45.09         64.12         809.49         54.94         1.63         -0.000832         1355.1474         0.97           11         654.09         54.94         0.28         -0.00025         1369.7244         0.98	<b>.</b> ,	. 823.32	64 <b>.</b> U8	706.36	54.85	7.57	-0.01762	1299.5388	0*9469
B       B31.66       c4.1U       796.23       54.91       4.58       -0.01623       1326.8458       0.96         9       d37.73       c4.11       d02.10       54.93       3.12       -0.01340       1340.8752       0.96         10       c45.09       b4.12       BU9.19       54.94       1.63       -0.001340       1340.8752       0.96         10       c45.09       b4.12       BU9.19       54.94       0.28       -0.00032       1355.1474       0.97         11       654.09       b4.64       0.28       -0.00025       1369.7244       0.98	1	827.00	04°05	791.69	54.89	6.06	-0-01747	1313.0882	0.9546
9       d37.73       c4.11       d02.10       54.93       3.12       -0.01340       1340.8752       0.96         10       E45.09       b4.12       BU9.19       54.94       1.63       -0.00832       1355.1474       0.97         11       E54.09       c44.12       d17.33       54.94       0.28       -0.00025       1369.7244       0.96	<b>80</b> -	831-66	c4.lu	796.23	54.91	4.58	-0.01623	1326.8458	0.9619
10     E45.09     b4.12     BU9.19     54.94     1.63     -0.00832     1355.1474     0.97       11     E54.09     64.12     d17.33     54.94     0.28     -0.00025     1369.7244     0.98	9	d37.73	c4.11	d02.10	54.93	3.12	-0-01340	1340.8752	0.9686
<b>11 654.09</b> 64.12 d17.33 24.94 0.28 -0.00025 1369.7244 0.98	10	E45.09	04.12	809-19	54.94	1.63	-0.00832	1355.1474	0.9749
	11	654. J9	64.12	d17.33	24.94	0.28	-0.00025	1369.7244	0.9802

1 11

5 ###--### ###==### FINAL FLUM PAKAMETERS FUR STAGE NUMBER

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## *** STAGE IN PUT PARAMETERS ***

		50LT 11 TY	-0.176000E 00 0.100000E 01 0.161900E 01 -0.402000E 00 0.114000E 00
	STATOR	FLOW ANGLE At the shock	-0.460900E 01 0.100000E 01 0.265020E 02 -0.835300E 01 0.381200E 01
xIT 0.4500 xIT 20.0 0.7300 0.4700 1000.0	٠	WHIRL VELOCITY	-U.0000036-38 -U.0000006-38 0.0000006-38 -U.0000006-38 -U.0000006-38
ROTUK E			n U C B N
CTOR LIMIT Lum Anglé Límit at Thé H rumber Límit (In) Altor Límit Núéntial Velúcity		SGL I LI TY	0.4500000-01 0.1300000 U1 0.1463000 01 -0.2400000 U0 0.5400005-01
KLTUR IIP Ü-FA MLS RELATIVE F Statok Hue Mac Statok Hub Ü-f Makimla IIP Ta Makimla IIP Ta		FLUM ANGLE AT THE SPUCK	Ůo24JJCE ŮC Ů.IVŮVVČE Ŭ1 Û.442480E Ü2 Ú.6čŨ€UČE Ŭ1 -Ú.I304VČE Ŭ1
	-	PRESSLKE PROFILE	-0.600066-38 -0.000006-38 0.100006 01 -0.000066 01 -0.000066-38

# *** STAGE SCALEK QUANITTES ***

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			***	STAGE SCALER	UUANI ITI ES ***			
, , ,	ASPECT KAT IC	GECPEIAIC FUB RACILS (19+)	GEUMETAIC IIP ADD.(IN.)	HUB RAMP Angle (děg)	IIP RAMP Angle {ueg)	AXIAL LENGTH (IN.)	MASS FLOW (LB/SEC)	MASS AVF. Antabatic eff.
4CTOR	2.496	1122.1ž	25.0000	15.147	0.300	1.3520	401-0060	6° 16 °0
-SFATCR-	1.910	22.4JúC	25. じしうり	14.557	000*0	1.5750	0000-105	0.9077
VEL	L. KATLU The Pean	HUG ELČČKAGÉ Factor	TIP BLCCKAGE Factur	MASS AVE. Pr. Patio	MASS AVE. Témp. ratiu	СUMULATIVE Máss ave. Pr. Ratio	CUMULATIVE MASS AVE. TEMP. RATIO	CUMULATIVE MASS AVE. ADIABATIC EFF.
-6610Å	J.415	<b>U-</b> 58vÜ	0.5800	<b>1</b> • 3330	1.1032	6+0299	1.7590	0.8749
-STATCR-	1.110	0032.**	J.¢ 80:J	1.3773	1.1032	6.0053	1.7590	0.8724

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-FLTCR---

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Sete	STREAML INC	AXIAL VEL.	WHIRL VEL.	RAJIAL VEL.	ABS. VEL.	ABS . MACH	ABS. FLC	3
NG.	LAUIUS LIN.	) (F1/SEC)	(FT/SEC)	(FT/SEC)	(FT/SEC)	NUMBER	ANGLE (DEC	-
	22-0552	563.768	485.14	151.04	773.424	0.5437	38-819	
~	22.3612	560.896	477-04	135.10	768.283	0.5395	38.383	
<b>(1</b> )	ž2.66ž3	569.524	470.53	119.35	763.666	U.5357	36.036	
\$	2 a 9 564	5+1.139	465.41	103.93	759.959	0.5322	37.764	
ŝ	23-2473	516.22ē	460 <b>-</b> 56	88.54	756.587	<b>0.52</b> 39	37.536	
0	23.5343	554.626	457°C9	73.52	753.603	0.5259	37,340	
~ -	<3.8192	554 .985	4 55.34	58.73	751.529	0.5231	37.293	
70	24.1300	55+•4Jb	435.51	44.22	750.174	0.5204	37.387	
0	24.38J7	552.714	456.14	30°02	749.768	0.5180	37.670	
10	24.0014	504.926	402.53	16.17	750.096	0.5156	38-115	
11	24.0434	565.139	410.47	2.74	751.290	0.5133	38.771	
t		-						
S.L.	JUTAL TEMP.	TEITAL PRES.	AD LABA TIC	DIFFLSIGN	WHEEL SPEED	SOL LDITY	A*/S	
NU.	KAI II	X 41 1U	EFFICIENCY	FACTUR	(FT/SEC)			
-	1.1029	l. 3345	0.5274	0.4523	1054.65	1.502	0.5344	
Ň	4.1025	1. 38+L	J.4295	<b>U.</b> 4461	1073.34	1.474	0.5274	
m,	L.1023	1.3837	0.93C5	0.4412	10 37 • 74	1.449	0.5212	
<b>.</b>	1.1422	1.38:4	U.93CA	0.4376	101.91	1.425	0.5157	
Ś	1.1322	1.3831	0.9300	0.4345	1115.87	1.403	0.5106	
¢	1.1023	1. 3628	0.5286	0.4319	1129.04	1.383	0.5057	
~	1.1026	1. 3026	0.9247	- 4313 -	1143.27	1.365	0.5015	
rð	1.1032	l. 3624	0.9183	0.4325	1156.80	1.347	0.4976	
6	1.1042	1. 3422	U. JU85	0.4362	1170.27	1.331	0.4943	
20	1.1055	1.3821	U.8964	0.4420	1183.75	1.316	0.4914	
11	1.1072	i. 3840	<b>U.</b> 8811	0.4503	1197.28	1.302	0.4989	
.ا.د	TLTAL TEMP.	TOTAL PRES.	STATIC TENP.	STALIC PRES.	SLUPE	CURVATURE	REL. VEL	
S.	( DEGREES)	(LU/Su IN.)	( JEUREES)	(LB/SQ IN.)	(DÉGREÉS)	I/IN.	(FT/SEC	. ~
4	a53.53	88-61	649.73	72.56	14.51	-0.00661	832.1732	
•1	850.47	88.61	850.38	72.79	12.90	-0-0444	847.5068	
m.	<b>699</b> •72	30.01	<b>55-22</b>	12.99	11.45	-0.00179	861.8178	
*	902.24	E8.61	855.21	73.17	9.45	0.00105	875.2565	
Ś	21.402	E3.61	858.17	·73.34	8.49	0.00383	888.1664	
¢,	907.52	86.61	361.30	73.49	7.05	0.00640	900.7295	
1	911 • ő o	80.61	d65.91	73.64	5.64	0.00842	911.4287	
80	917.51	56.61	371.76	73.77	4.25	0.00939	920.3743	
9	925.03	86.01	879.36	73.90	2.40	0.30PTL	926.9682	
10	934.25	. 86.01	938.59	74.03	1.57	0.00579	931.5396	
11	945.03	88. Él	19.926	74.15	0.27	-0.0003	933.4655	

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5.L.	STREAML INE	AXIAL VEL.	WHIKL VEL.	RACIAL VEL.	ABS. VÉL.	ABS. MACH	ABS. FLJW	REL. FLOW
NŬ.	. RADIUS (IN.)	(FT/SEC)	(FT/SEC)	(F1/SEC)	(FT/SEC)	NUMBER	ANGLE (DEG)	ANGLE (DEG)
-	22-4550	643.459	-0-03	157 <b>.</b> 54	662.540	0.4620	-0* 000	58.421
2	22°57167	647.110	-0.00	141.16	662.328	0.4618	-0*000	59.727
m	22.9782	£\$0.6E7	00	124.84	662.555	0.4617	-0*000	59.006
- <b>-P</b>	23.2340	654.240	-0.00	108.91	663.243	0.4615	-0*000	59.260
	23.4865	o57.3č8	-0.00	93.25	663.950	0.4614	-0• 000	59.504
٥	23.7360	66U.213	-0.00	77.86	664.789	0.4613	-0*000	59.737
-	23.9823	663.284	-0-03	62.75	666.245	0.4612	-0*000	59.940
8	24.2273	66c.526	-0.00	47.80	668.237	0.4612	-0" 000	60.117
0	24-4658	o70.133	-0.00	32.94	670.947	0.4613	-0*000	60.263
10	24.7106	674.07B	-0,00	18.00	674.320	0.4614	-0* 000	60.381
H	24.9507	678.441	-0.00	3.05	678.498	0.4615	-0*000	60.467
Set.	TLTAL TEMP.	TOTAL PRES.	ADI ABATIC	ULFFLSICK	WHEEL SPERD	<b>SOL IDI TY</b>	3*/5	LOSS COEFF.
N.	KAT LU	RATIC	EFFICIENCY	FACTUR	(F1/SEC)			
-	1-00u0	6453)	0.9132	0.3619	1077.84	1.438	0.6157	0.0261
N	1-0363	C. 5954	0.9159	0.3574	1090.50	1.415	0.6163	0.0255
'n	1-0000	C. 5556	0.9174	0.3538	1102.95	1.391	0.6163	0.0249
	1.0300	(, 555 B	0.9180	0.3510	1115.23	1.369	0.6158	0.0244
Ē	1.0000	C. 5559	0.4176	0.3486	1127.35	1.347	0.6151	0.0239
-2	1.0000	Ú• 556U	<b>0.</b> 9166	0.3465	1159.33	1.326	0.6143	0.0234
2	1.0000	C• 5951	0.9130	0.3452	1151.17	1.307	0.6124	0.0230
60	1.0000	C. 9962	0.9670	0.3446	1162.91	1.290	0.6095	0.0227
0	1.000	C. 5563	0.4576	0.3451	1174.55	1.273	0.6052	0.0224
10	1.0000	C•9963	0.6857	0.3462	1136.12	1.259	0.5996	0.0222
1	0000.1	405F •3	<b>0.870</b> 9	0.3483	1197.63	1.245	0.5923	0.0221
•								
	TCTAL TEWN	10   M   00 62	STATIC TOWN.	STATIC BUES	30015	CURVATURE	REL VEL	REL MACH
	I DECAPESI	IL RY SEL IN. )	(DEGREES)	("NI CS/PI)	(DEGREES)	1/ IN-	(FT/SEC)	NUMBER
-	898.53	äe 19	db2 • 79	76.27	13.74	-0.01108	1265.1852	0.8822
ļ	858.47	88.21	862.75	76.29	12.31	-0.01188	1275.8769	0.8897
) m	499 <b>.</b> 72	84.22	963.98	76.31	10.80	-0.01274	1286.6567	0.8966
•	902.24	86.24	866.43	76.33	. 9.45	-0.01350	1297.5501	0.9029
	904.77	68.25	363.90	76.35	8.06	-0.01406	1308.3407	0.9092
. <b>.</b> 0	907.52	60.2c	371.57	76.36	6.73	-0.01433	1315.0957	0.9153
-	911.00	86.27	375.77	76.38	5.41	-0-01411	1330.0691	0.9208
୍ଷ	12.119	58°28	881.22	76.39	4.10	-0.01304	1341.2297	0.9257
9	9,25 .03	E8.28	338.48	76.39	2.81	-0.01068	1352.6784	0.9299
01	934.65	88.29	597.37	76.40	1.54	-6.00658	1364.3993	0.9335
11	945 •63	88.29	30E.33	76.40	0.26	-0.00017	1376.4741	0.9303

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***--*** FINAL FLUW PARAMETERS FUR STAGE NUMBER 6 ***--***

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### *** STAGE INPUT PARAMETERS ***

U. 4500 20.0 0. 7300 0. 4700 1000.0	
KLTCK TIP J-FACTUR LIMIT Hus Kelaijee Flow Angle Limit at the Rutor exit Statuk Fub Rach Wumber Limit (IN) Statuk Fub C-Factur Limit Paximum Tip Tsyuéntial Velúcity	

---STATOP.---

---kC Tuk---

SOLIDITY	-0.125006 00 0.1000006 01 0.1521006 01 0.1521006 01 -0.2980006 00
FLOW ANGLE AT THE SHOCK	0.312000E 00 0.100000E 01 0.205990F 02 -0.315200E 01 0.1554002 01
WHIRL Velocity	- U. UJU005E-38 - U. UJU005E-38 0. 000030E-38 - U. 033000E-38 - U. 033000E-38
	00 01 01 10 10 10
K SGLIGITY	11 v.1.576.06 11 c.100.00F 22 v.128800E 11 -0.5300.0F 11 -0.1306.0E
FLUM ANGLE Al TPE SHUC	U-+463ecce c 0-1000cc 0 0-1407466 c U-+407466 c U-+451006 c
PRESSLKE PRUFILE	<ul> <li>-C. COUJUCE - 38</li> <li>-G. OOOUCCE - 38</li> <li>C. C. 10U00E - 11</li> <li>C. C. 10U00E - 18</li> <li>DU. CUUUCE - 38</li> <li>EC. COUUCE - 38</li> </ul>

## *** STAGE SCALER WUANTITIES ***

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	ASPECI KATIC	GELVETAL FUB Kailus (In.)	GEUMETRIC TIP FAD.(IN.)	HLB KAMP Angle (deg)	TIP RAMP ANGLE (DEG)	AXIAL LENGTH [[N.])	MASS FLOW (L3/SEC)	MASS AVE. Adiabatic eff.
-FCT 0R	- 1.684	ž. • 7230	25.6600	13.566	0•000	1.3800	401-0000	0. 9267
-STATOR-	- 2.464	é ? • 44aU	23.600	13.154	0•000	0+9200	401 • 0000	0.9134
	VEL. KATIU At thë pean	FUB ELUCKAGE i Faltur	TIP BLOCKAGE Factur	MASS AVE. Pr. ratic	MASS AVE. Teyp. Aaflû	CJMULATIVE MASS AVE. PR. RATIO	CUMULATIVE MASS AVE. TEMP. RATID	CUMULATIVE MASS AVE. ADIABATIC EFF.
-RCTOR	196°0	ມູລອດຕ	0.8280	1.3073	1.0354	8.1510	1.925g	0.8732
-STATCK-	. <b>1.</b> 056	L.*5CC	0.9800	1.3517	I.0354	8.1173	1.92 <u>6</u> 8	0. 87 UP

LUSS CATA Ser Used

- ƙuT CK--

-STATCK-

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**-----** Y I I C & E X I I **----**

•	SINE	AML INE	AXIAL VEL.	WHIKL VEL.	RACIAL VEL.	ABS. VEL.	ABS. MACH	ABS. FLOW	RÉL. FLOW
Ż	W. KAUL	US (IN)	(FI/sec)	(FI/SEC)	(F1/SLC)	(FT/SEC)	NUMBER	ANGLE (DEC)	ANGLE (DEG)
	t £2.	7000	6 lo. 464	4 83. 65	144.05	744.231	0.5364	37, 294	43.840
•	2 23.	9670	6210176	417.60	128.01	143.942	0.5333	36.981	44.657
	3 23.	2264	623.497	472.69	112.49	704.067	0.5305	36.726	45,391
-	4 23 ···	4485	625.465	400.04	97.47	747.429	0.5278	36.542	44 044
	5 23.	<b>060</b> ¢	tio.373	405.64	62°89	765.399	0.5253	, 36,379	46.663
	6 <u>2</u> 3.	4329	627.454	400.34	oğ.71	763.329	0.5230	36.264	47.241
	7 24.	0978	620.271	462.70	54.88	782.195	0.5209	36.267	47.737
	8 24.	120	021.83L	464.lu	41.37	751.877	0.5149	36.416	48.164
2	9 24-	26U	625.364	468.03	26.17	752.502	0.5170	36.750	48.513
Ţ	0 24.	1400	67.4.20	414.20	15.27	764.135	0.5152	37.215	48.799
	1 24.	1950	£2J.759	445.33	2.69	786.741	U•5135	37.905	610°67
S1	L. TUTA	L LEND.	FUTAL PRES.	401434TIC	DIFFLSION	WHEEL SPEED	Sul tol TV	A+/S	LOSS COEFE.
ž	U. RA	110	K AT IL	EFF ICIENCY	F AC TUR	(F1/SEC)			
	1	0452	1.2562	0.9320	0.4312	1093.47	1.45.)	0.5183	0.0540
	2 1.1	0350	l.soëu	0.9339	0.1279	L104.28	1.430	0.5147	0.0516
		0943	1.3570	U. 5353	Ũ•4253	1114.90	L.412	0.5114	0.0458
•	4 l.	0340	1. 2070	0.4358	0.4237	1125.53	1.396	0.5083	0.0489
E	5 1.0	0340	1.5574	÷2691)	0.4222	1136.00	1.381	0.5053	0.0483
-2	0	0440	śrec.i	0.9343	0.4213	1146.38	1.367	0.5024	0.0486
4	7 3.4	0 245	1766.1	U.9313	0.4220	1150.70	1.353	0.4499	0.0504
-	6 Lei	6.36 i	1. 2570	U.9261	0.4247	)166.93	1.340	0.4976	0.0545
-	9 1.	<b>J961</b>	1.1500	0.9177	0.4297	1177.25	1.323	0.4957	0.0607
Ţ	0	1250	1. 5568	0.4064	0.4371	1137.55	1.315	0.4942	0.0693
	1	0430	1.3067	U.8922	0.4472	.47.92	1.303	0.4930	0.0804
3	I . TCIA	I F WP -	TETAL PRESS	STALLC LEWPS	STATIC PRES.	SLOPE	CURVATURE	REL. VEL.	REL. MACH
ž	0. (DE	GREESI	(Le/ 5- 1A.)	(DEJREES)	(Lb/50 [N.)	(NEGREES)	1/14.	I FT/SECI	NUMBER
	1 58.	4 D )	114.75	<b>32.64</b>	j8. 69	13.12	-0.00592	880.4190	0.5913
	2 96	3.40	114.79	952.40	64.90	11.55	-0-00414	891.6199	0.5987
1		4.38	i 17.75	でちょうちゃ	69 66	10.23	-0.00173	902.1753	0.6053
	4 98		119.79	137.53	5.5.27	8.86	10100*0	911 <b>.</b> auga	0.6109
• '	- 66' C		111.79	940.50	44 .00	7.54	3.30.82	921.3841	0.6163
	6.5	3.37	115.74	40.04	4 <b>9</b> •60	b.25	Lei065J	930.3047	0.6212
	155 1	8.31 J	119.75	(10*047	97.75	5.33	6020(*0	937.74:0	0.6246
~	8 100	4.95	1 45.79	17.364	66° 88	3.77	0.00983	943.3145	C.6262
•	101 9	3.45	1175	404.02	100.02	5 • 5 ð	0.00925	946.7850	0.6257
Ĭ	0 102	<b>4.</b> 98	115.79	75.57	100.14	1.40	0.00623	944.0185	0.6231
1	1 1u3	ð.To	51.411	01.246	100.27	5.25	-0.0008	946.5638	0.6161

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SINGARLINE       AXIAL VEL.       MILS. VEL.       AVIAL VEL.       AVIAL VEL.       AVIAL VEL.       AVIAL VEL.       AVIAL VEL.       AVIAL VEL.       AVIAL VEL.       AVIAL VEL.       AVIAL VEL.       AVIAL VEL.       AVIAL VEL.       AVIAL VEL.       AVIAL VEL.       AVIAL       AVIAL VEL.       AVIAL       AVIAL <t< th=""><th>SIRAWLINE AXIAL VEL.       MHK. YEL.       AUIL VEL.       AUIL</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>	SIRAWLINE AXIAL VEL.       MHK. YEL.       AUIL VEL.       AUIL								
R00105 ( No.1 (FT/SEC)       (FT/SEC)       (FT/SEC)       (FT/SEC)       (FT/SEC)         22.9504       601.449       -0.00       96.1111.         23.34       601.445       -0.00       95.1111.         23.34       601.467       -0.00       95.1111.         23.34       601.467       -0.00       95.1111.         24.373       601.467       -0.00       95.1111.         24.373       601.111.       72.773       -0.00       95.111.         24.373       601.111.       72.773       -0.00       29.111.         24.373       601.111.       72.773       -0.00       29.111.         24.373       601.111.       72.773       -0.00       29.111.         24.373       601.111.       72.773       -0.00       29.111.         24.4700       72.773       -0.00       29.111.       29.111.         24.4710       72.723       0.9176.       0.9176.       0.9176.         24.4710       1.0000       0.9215.       0.9176.       0.9176.       0.9176.         24.4710       0.9215.       0.9176.       0.9176.       0.9176.       0.9176.       0.9176.         1.0000       0.9256.       0.9176.	141.       141.         22.9593       141.         23.239       641.149       -0.00       45.         23.239       641.149       -0.00       45.         23.239       642.030       -0.00       45.         23.239       662.030       -0.00       45.         24.1339       662.030       -0.00       55.         24.1339       662.030       -0.00       55.         24.1339       662.030       -0.00       55.         24.1339       662.030       -0.00       29.         24.1339       662.030       -0.00       29.         24.1339       662.172       -0.00       29.         24.1339       662.172       -0.00       29.         24.1339       662.172       -0.00       29.         24.1339       664.270       -0.00       29.         24.133       664.270       -0.00       29.         24.141       -11.11       -11.00       29.       29.         24.141       -11.00       -14.00       24.14       0.37         1.0000       -5550       0.9215       0.9176       0.317         1.0000       -5550       0.9176 <th>5 SINEARL</th> <th>INE AX</th> <th>IAI. VEL.</th> <th>NHIA. YEL.</th> <th>24 Ü I AL</th> <th>vel.</th> <th>VEL. ABS. VEL.</th> <th>VEL. ABS. VEL. ABS. MACH</th>	5 SINEARL	INE AX	IAI. VEL.	NHIA. YEL.	24 Ü I AL	vel.	VEL. ABS. VEL.	VEL. ABS. VEL. ABS. MACH
23.550d       661.784       -0.00       141.44         23.333       661.144       -0.00       111.0         23.333       662.036       661.144       -0.00       111.0         23.333       662.036       -0.00       652.036       -0.00       111.0         23.333       662.036       -0.00       662.036       -0.00       654.20         24.133       662.036       -0.00       67.92       -0.00       67.92         24.133       662.036       -0.00       67.92       -0.00       67.92         24.133       662.036       -0.00       67.92       -0.00       67.92         24.133       662.046       -0.00       67.92       -0.00       67.92         24.133       662.046       -0.00       20.03       42.73       27.92         24.100       0.755       0.2114       0.0374       0.3751       0.3751         21.000       0.755       0.712.60       0.91176       0.3761       0.3761         21.000       0.5557       0.91136       0.9215       0.3761       0.3761         1.0000       0.5957       0.91156       0.9215       0.3761       0.3761         1.0000       0.	23.5504       661.784       -0.00       141.44         23.333       661.144       -0.00       111.03         23.333       662.036       -0.00       111.03         23.333       662.036       -0.00       111.03         23.333       662.036       -0.00       67.91         23.333       662.036       -0.00       67.92         24.133       662.036       -0.00       67.92         24.1333       662.036       -0.00       67.92         24.1333       662.036       -0.00       67.92         24.1333       662.036       -0.00       27.92         24.1333       662.046       -0.00       27.92         24.101       0.755       0.2114       0.374         24.101       0.4955       0.2115       0.374         24.101       0.4913       0.372       0.374         25.900       0.214       0.372       0.374         1.000       0.4156       0.4915       0.374         1.000       0.4913       0.4913       0.374         1.000       0.4925       0.4154       0.374         1.000       0.4955       0.4154       0.374	SUICAN .	[ [~~]	F1/SEC)	(FI/SEC)	(F1/SEC		CI CET/SECI	CI (FT/SFC) NUMBER
23.33       C61.149       -0.00       125.90         23.33       C61.445       -0.00       55.92         23.34       C61.445       -0.00       55.92         23.34       C61.445       -0.00       55.92         24.133       C62.4467       -0.00       55.92         24.133       C62.4467       -0.00       55.92         24.133       C65.270       -0.00       55.92         24.133       C65.170       -0.00       55.92         24.577       C65.170       -0.00       55.92         24.577       C65.170       -0.00       55.92         24.577       C65.170       -0.00       55.92         24.577       C65.170       -0.00       29.63         24.777       27.23       0.5110       29.63         24.777       27.43       -0.00       29.63         24.777       27.455       0.1012       29.63         27.2       25.577       0.2160       0.3756         24.777       0.4156       0.3756       0.3756         24.000       2.5557       0.9160       0.3756         20000       2.5561       0.9156       0.3752         2000	Z3.34       C61.144       -0.00       L25.40         Z3.34       C61.444       -0.00       E4.20         Z4.334       C62.4467       -0.00       E5.42         Z4.334       C62.420       -0.00       E5.42         Z4.334       C62.420       -0.00       E5.42         Z4.334       C62.420       -0.00       E5.42         Z4.334       C65.270       -0.00       E5.42         Z4.334       C65.270       -0.00       E5.42         Z4.334       C65.270       -0.00       E5.42         Z4.77       C65.270       -0.00       E5.73         Z4.77       C55.770       -0.00       E5.73         Z4.77       C55.770       -0.00       29.63         Z4.77       C55.770       -0.00       29.63         Z4.77       C55.770       -0.00       29.63         Z4.700       C7.72       C7.72       0.375         Z4.710       C.5557       0.9217       0.376         Z0.000       C.5557       0.9217       0.376         Z0.000       C.5557       0.9217       0.376         Z0.000       C.5557       0.92176       0.376         Z0.000<	155°22	d ċ	-1-7P4	- 0 • 0 -	141.46		676.735	676.735 U.4511
24.34       C(1.046       -0.00       111.03         24.341       642.467       -0.00       65.21         24.133       642.467       -0.00       65.21         24.133       642.20       -0.00       65.21         24.3789       645.20       -0.00       65.21         24.3789       645.20       -0.00       65.21         24.3789       645.20       -0.00       65.34         24.573       645.20       -0.00       65.42         24.573       645.20       -0.00       65.42         24.573       645.20       -0.00       29.63         24.573       645.20       -0.00       27.45         24.573       645.173       -0.00       2.73         24.573       97.61       0.9143       0.316         24.772       0.9145       0.376       0.376         24.710       0.9176       0.9176       0.376         24.711       0.49176       0.9176       0.376         10000       0.5557       0.9217       0.376         1.0000       0.5557       0.9217       0.376         1.0000       0.5557       0.9217       0.375         1.0000 <td>23.34       C(1.048       -0.00       95.92         23.34       C(1.048       -0.00       95.92         23.34       C(2.036       -0.00       95.92         24.133       C(2.136       -0.00       65.92         24.133       C(1.14       1.00       55.92         24.133       C(1.110)       1.11.00       55.92         24.133       C(1.14)       -0.00       55.00         24.143       C(1.14)       -0.00       55.00         24.144       C(1.14)       1.11.00       29.63         24.144       C(114       P4E       0.379       0.3719         24.144       C(114       P4E       0.374       0.374         1.0000       C(5557       0.9217       0.372       0.374         1.0000       C(5557       0.9217       0.374       0.374         1.0000       C(5557       0.9217       0.375       0.374         1.0000<th>253.02</th><td>3 51</td><td>t1.149</td><td>-0.00</td><td>125.90</td><td>-</td><td>673.030</td><td>673.030 0.4487</td></td>	23.34       C(1.048       -0.00       95.92         23.34       C(1.048       -0.00       95.92         23.34       C(2.036       -0.00       95.92         24.133       C(2.136       -0.00       65.92         24.133       C(1.14       1.00       55.92         24.133       C(1.110)       1.11.00       55.92         24.133       C(1.14)       -0.00       55.00         24.143       C(1.14)       -0.00       55.00         24.144       C(1.14)       1.11.00       29.63         24.144       C(114       P4E       0.379       0.3719         24.144       C(114       P4E       0.374       0.374         1.0000       C(5557       0.9217       0.372       0.374         1.0000       C(5557       0.9217       0.374       0.374         1.0000       C(5557       0.9217       0.375       0.374         1.0000 <th>253.02</th> <td>3 51</td> <td>t1.149</td> <td>-0.00</td> <td>125.90</td> <td>-</td> <td>673.030</td> <td>673.030 0.4487</td>	253.02	3 51	t1.149	-0.00	125.90	-	673.030	673.030 0.4487
Z3:3927       641.447       -0.00       95.42         Z3:3937       642.436       -0.00       65.43         Z4:373       642.436       -0.00       65.43         Z4:373       645.27       -0.00       65.43         Z4:373       645.27       -0.00       65.43         Z4:373       645.27       -0.00       65.43         Z4:373       645.27       -0.00       55.92         Z4:373       645.27       -0.00       55.92         Z4:373       645.173       -0.00       29.63         Z4:372       65.173       -0.00       29.63         Z4:372       65.173       -0.00       27.5         Z4:372       0.11AL       73       -0.00       27.5         Z4:471       77.465       0.1334110       16.4516       0.3719         RATU       Natiu       EFFLEUEVCY       0.3719       0.3733         LUDUU       C.5557       0.9215       0.3719       0.3733         LUDUU       C.5557       0.9215       0.3733       0.3744         LUDUU       C.5550       0.9215       0.3752       0.3745         LUDUU       C.5551       0.9216       0.9135 <td< td=""><td>Z3.7947       641.447       -0.00       95.72         Z3.793       642.433       -0.00       65.43         Z4.373       642.433       -0.00       65.43         Z4.373       645.27       -0.00       65.43         Z4.373       645.27       -0.00       65.43         Z4.373       645.27       -0.00       65.43         Z4.373       645.27       -0.00       55.92         Z4.373       645.173       -0.00       55.63         Z4.373       645.173       -0.00       27.63         Z4.371       27.72       65.173       -0.00       27.5         Z4.470       21.44       -0.00       27.5       2.73         Z4.470       21.44       -0.00       27.5       2.73         Z4.77       27.73       0.745       0.3719       2.73         Z4.77       0.745       0.91430110       0.16407       0.3719         Z1000       0.557       0.9143010       0.373       0.373         L0000       0.557       0.9215       0.3763       0.373         L0000       0.557       0.9212       0.373       0.3763         L0000       0.576       0.9145</td><th>23.54</th><td>ر د</td><td><b>61.045</b></td><td>-0.00</td><td>111.03</td><td></td><td>670.307</td><td>670.JU7 0.4465</td></td<>	Z3.7947       641.447       -0.00       95.72         Z3.793       642.433       -0.00       65.43         Z4.373       642.433       -0.00       65.43         Z4.373       645.27       -0.00       65.43         Z4.373       645.27       -0.00       65.43         Z4.373       645.27       -0.00       65.43         Z4.373       645.27       -0.00       55.92         Z4.373       645.173       -0.00       55.63         Z4.373       645.173       -0.00       27.63         Z4.371       27.72       65.173       -0.00       27.5         Z4.470       21.44       -0.00       27.5       2.73         Z4.470       21.44       -0.00       27.5       2.73         Z4.77       27.73       0.745       0.3719       2.73         Z4.77       0.745       0.91430110       0.16407       0.3719         Z1000       0.557       0.9143010       0.373       0.373         L0000       0.557       0.9215       0.3763       0.373         L0000       0.557       0.9212       0.373       0.3763         L0000       0.576       0.9145	23.54	ر د	<b>61.045</b>	-0.00	111.03		670.307	670.JU7 0.4465
2:.7343       662.036       -0.00       62.036         24.133       664.20       -0.00       65.32         24.133       664.20       -0.00       65.32         24.573       664.20       -0.00       55.92         24.573       664.20       -0.00       55.92         24.573       664.20       -0.00       55.92         24.573       664.20       -0.00       29.63         24.573       664.20       -0.00       29.63         24.573       57.73       -0.00       29.63         27.573       57.73       -0.00       29.63         27.500       0.110       0.9143       0.16.94         27.500       0.9145       0.9176       0.3719         1.0000       0.9215       0.9176       0.3719         1.0000       0.9257       0.9156       0.3719         1.0000       0.9557       0.9156       0.3719         1.0000       0.9557       0.9156       0.3733         1.0000       0.9215       0.9156       0.3719         1.0000       0.9257       0.9116       0.3723         1.0000       0.9556       0.9217       0.3723         1	Z*.7343       662.436       -0.00       67.43         Z*.573       664.244       -0.00       67.42         Z*.573       664.244       -0.00       67.42         Z*.573       664.244       -0.00       67.42         Z*.573       664.244       -0.00       29.63         Z*.573       664.244       -0.00       29.63         Z*.573       664.244       -0.00       29.63         Z*.573       664.240       -0.00       29.63         Z*.773       0.91430110       UFF1CLENCY       FG.70H         RATIU       AMTU       LFF1CLENCY       FG.70H         RATIU       AMT10       C.9557       0.9176       0.3733         LOUDU       C.9555       0.9176       0.3753       0.3764         LOUDU       C.9594       0.9176       0.3753       0.3764         LOUDU       C.9941       0.9176       0.3733       0.3744         LOUUU <th>23. 242</th> <td>7 61</td> <td>54 - 45 Z</td> <td>- 0. 00</td> <td>46.72</td> <td></td> <td>668.520</td> <td>668.520 0.4447</td>	23. 242	7 61	54 - 45 Z	- 0. 00	46.72		668.520	668.520 0.4447
Z3+Y917       C42.763       -0.00       65.21         Z4-173       C55.270       -0.00       25.92         Z4-572       C55.270       -0.00       25.92         Z4-572       C55.270       -0.00       25.92         Z4-572       C55.270       -0.00       29.63         Z4-572       C55.270       -0.00       29.63         Z4-572       C55.270       -0.00       29.63         Z4-77       -7.00       2.73       -0.00       29.63         Z4-77       -7.205       -0.00       29.63       -0.00         Z4-77       -7.205       -0.00       29.63       -0.73         Z4-77       -7.200       -0.141       2.73       -0.379         Z4-70       -0.141       2.755       0.3719       0.3719         L0000       C.5557       0.9215       0.3719       0.3723         L0000       C.5557       0.9215       0.3719       0.3723         L0000       C.5557       0.9217       0.3723       0.3723         L0000       C.5551       0.9217       0.3723       0.3723         L0000       C.5551       0.9217       0.3723       0.3723         L0000<	Z3+9374       C42.764       -0.00       65.42         Z4.1334       665.270       -0.00       29.63         Z4.173       65.170       -0.00       29.63         Z4.7671       65.173       -0.00       29.63         Z4.777       65.173       -0.00       29.63         Z4.7671       65.173       -0.00       29.63         Z4.777       65.173       -0.00       29.63         Z4.777       97.73       -0.00       29.63         Z4.777       0.011       16.94       2.73         Z4.777       0.011       0.141       2.73         Z4.774       0.141       24.74       0.373         Z4.700       0.9145       0.9176       0.3764         Lubuu       0.9557       0.9215       0.3769         Lubuu       0.9557       0.9215       0.3769         Lubuu       0.9557       0.9215       0.3769         Lubuu       0.9557       0.9215       0.3769         Lubuu       0.95410       0.9135       0.3769         Lubuu       0.95410       0.9149       0.3752         Lubuu       0.9542       0.9149       0.3333         Lubuu <th>&lt;</th> <td>9 9</td> <td>62.U3C</td> <td>-0.00</td> <td>82.80</td> <td></td> <td>667.L47</td> <td>0 0 2 4 2 1 4 2 1 1 2 4 4 2 1</td>	<	9 9	62.U3C	-0.00	82.80		667.L47	0 0 2 4 2 1 4 2 1 1 2 4 4 2 1
Z4-1334       664.200       -0.00       55.92         Z4-173       664.200       -0.00       29.63         Z4-772       57.51       56.515       -0.00       29.63         Z4-701       57.51       56.51       0.01       29.63         Z-100       C.9955       0.913301C       015600       2.73         Z-1000       C.9955       0.9176       0.3719       0.3719         Z-1000       C.9955       0.9176       0.3719       0.3719         Z-1000       C.9955       0.9215       0.3719       0.3753         Z-1000       C.9955       0.9217       0.3723       0.3753         Z-2000       C.9955       0.9217       0.3753       0.3753         Z-2000       C.9955       0.9217       0.3752       0.3752         Z-29       Z-925       0.9217       0.3752       0.3752         Z-29       Z-925       0.9212       0.3752       0.3752         Z-29 <td< td=""><td>Z4.1334       664.200       -0.00       55.92         Z4.1733       664.200       -0.00       29.63         Z4.773       76.6712       76.673       -0.00       29.63         Z4.701       72.773       76.673       -0.00       29.63         Z4.701       72.773       76.673       -0.00       29.63         Z4.701       72.773       76.713       -0.00       29.63         Z4.701       72.713       -0.00       2.73       -0.591         Z4.701       7.753       -0.1131       PAES       -0.1141       PAES         Z4.701       7.753       -0.1191       2.73       -0.3719         Z4.701       2.744       0.3719       0.3719       0.3719         Z4.701       2.755       0.9215       0.3719       0.3719         Lubuu       C.5557       0.9217       0.3723       0.3723         Lubuu       C.5557       0.9217       0.3723       0.3723         Lubuu       C.5551       0.9212       0.3723       0.3752         Lubuu       C.5551       0.4923       0.3762       0.3753         Lubuu       C.5551       0.4924       0.3653       0.3653</td><th>23. 431</th><td>بر ۲</td><td>ti.7ti</td><td>- 0.00</td><td>65.¢1</td><td></td><td>066.308</td><td>0.44°</td></td<>	Z4.1334       664.200       -0.00       55.92         Z4.1733       664.200       -0.00       29.63         Z4.773       76.6712       76.673       -0.00       29.63         Z4.701       72.773       76.673       -0.00       29.63         Z4.701       72.773       76.673       -0.00       29.63         Z4.701       72.773       76.713       -0.00       29.63         Z4.701       72.713       -0.00       2.73       -0.591         Z4.701       7.753       -0.1131       PAES       -0.1141       PAES         Z4.701       7.753       -0.1191       2.73       -0.3719         Z4.701       2.744       0.3719       0.3719       0.3719         Z4.701       2.755       0.9215       0.3719       0.3719         Lubuu       C.5557       0.9217       0.3723       0.3723         Lubuu       C.5557       0.9217       0.3723       0.3723         Lubuu       C.5551       0.9212       0.3723       0.3752         Lubuu       C.5551       0.4923       0.3762       0.3753         Lubuu       C.5551       0.4924       0.3653       0.3653	23. 431	بر ۲	ti.7ti	- 0.00	65.¢1		066.308	0.44°
24.5739       666.270       -0.000       42.77         24.5772       065.150       -0.000       29.63         24.5772       065.150       -0.000       2.73         24.5772       065.173       -0.000       2.73         24.577       0.77.205       -0.000       2.73         24.577       0.77.205       -0.000       2.73         24.577       0.71.205       -0.000       2.73         27.900       0.77.205       0.0976       0.376         20.001       0.4555       0.9176       0.3769         1.0000       0.4555       0.9176       0.3769         1.0000       0.4555       0.9176       0.3779         1.0000       0.4555       0.9176       0.3779         1.0000       0.4250       0.9176       0.3779         1.0000       0.4250       0.9217       0.3779         1.0000       0.4250       0.92176       0.3779         1.0000       0.4250       0.9176       0.3779         1.0000       0.4250       0.9176       0.3769         1.0000       0.4250       0.92176       0.3769         1.0000       0.4910       0.4250       0.3769 </td <td>24.573       666.270       -0.00       42.77         24.573       57.671       -0.00       29.63         24.577       57.671       -0.00       29.63         24.577       57.671       -0.00       29.63         24.577       57.671       -0.00       29.63         24.577       57.671       -0.00       29.63         24.577       57.73       -0.00       29.63         24.577       5.73       -0.111       EFFICIENC       10.00         RATIU       narriu       LFFICIENC       0.9176       0.3791         RATU       narruu       0.9176       0.3791       0.3791         10000       0.5557       0.9215       0.3716       0.3719         1.0000       0.5557       0.9217       0.3733       0.3719         1.0000       0.5557       0.9217       0.3753       0.3753         1.0000       0.5557       0.9217       0.3753       0.3765         1.0000       0.5557       0.9217       0.3753       0.3753         1.0000       0.5557       0.9217       0.3753       0.3753         1.0000       0.5954       0.9126       0.782       0.3753</td> <th>24-133</th> <td>Č.</td> <td>54.2UU</td> <td> • (:)</td> <td>55.92</td> <td></td> <td>600.550</td> <td>600.550 0.4409</td>	24.573       666.270       -0.00       42.77         24.573       57.671       -0.00       29.63         24.577       57.671       -0.00       29.63         24.577       57.671       -0.00       29.63         24.577       57.671       -0.00       29.63         24.577       57.671       -0.00       29.63         24.577       57.73       -0.00       29.63         24.577       5.73       -0.111       EFFICIENC       10.00         RATIU       narriu       LFFICIENC       0.9176       0.3791         RATU       narruu       0.9176       0.3791       0.3791         10000       0.5557       0.9215       0.3716       0.3719         1.0000       0.5557       0.9217       0.3733       0.3719         1.0000       0.5557       0.9217       0.3753       0.3753         1.0000       0.5557       0.9217       0.3753       0.3765         1.0000       0.5557       0.9217       0.3753       0.3753         1.0000       0.5557       0.9217       0.3753       0.3753         1.0000       0.5954       0.9126       0.782       0.3753	24-133	Č.	54.2UU	• (:)	55.92		600.550	600.550 0.4409
Z4.5732       C65.150       -0.00       Z9.63         Z4.7071       77.1265       -0.00       Z9.63         Z4.7071       77.1265       -0.00       Z9.63         Z4.7071       77.1265       -0.00       Z9.63         Z4.7071       72.773       -0.00       Z9.63         Z4.7071       72.773       -0.00       Z9.63         Z4.700       2.733       -0.00       Z.73         Z114       Z.7555       0.9176       0.3719         L0000       C.5557       0.9215       0.3719         L0000       C.5557       0.9217       0.3733         L0000       C.5551       0.9217       0.3733         L0000       C.5551       0.9217       0.3753         L0000       C.5551       0.9217       0.3753         L0000       C.5551       0.9217       0.3753         L10000       C.5551       0.9267       0.3353	Z4.5752       c6%.150       -0.00       29.63         Z4.7071       77.265       -0.00       2.73         Z4.7010       2.755       -0.00       2.73         Z4.7010       2.755       0.9176       0.3591         Lubuu       C.5557       0.9215       0.3719         Lubuu       C.5557       0.92176       0.3733         Lubuu       C.5551       0.92176       0.3733         Lubuu       C.5551       0.92176       0.3769         Lubuu       C.5551       0.92176       0.3769         Lubuu       C.5551       0.9054       0.3769         Lubuu       C.5551       0.4954       0.3853 <t< td=""><th>. 24-378</th><td>ĩ</td><td>t6.27U</td><td>-0.00</td><td>42.77</td><td></td><td>55 154<b>2</b></td><td><b>56 152 0.4402</b></td></t<>	. 24-378	ĩ	t6.27U	-0.00	42.77		55 154 <b>2</b>	<b>56 152 0.4402</b>
Z***7071       772.673       -0.00       16.34         Z***9005       V17.265       -0.00       20.34         TLIAL TEW       NATIU       KFICLENCY       10.1FLUSICN         RATIU       NATIU       C.9555       0.9176       0.3691         1.0000       C.9557       0.9215       0.35719       1.03691         1.0000       C.9557       0.9215       0.3719       1.03733         1.0000       C.9557       0.9215       0.3719       1.03733         1.0000       C.9557       0.9215       0.3719       1.03733         1.0000       C.9557       0.9217       0.3753       1.03733         1.0000       C.9957       0.9217       0.3753       0.3719         1.0000       C.9956       0.9217       0.3723       0.3753         1.0000       C.9956       0.9135       0.3753       1.03329         1.0000       C.9956       0.9054       0.3329       1.03329         1.0000       C.9956       0.9054       0.3329       1.03329         1.0000       C.9956       0.9054       0.3329       1.05.05         1.0000       C.9956       0.9054       0.3329       1.05.05	2***7071       572*773       -0.00       16.34         2***9005       777*265       -0.00       25.73         7LIAL TEWP      1AL PRES       AU1A3A11C       U1FFLSICN       47         RAFIU      1AL PRES       AU1A3A11C       U1FFLSICN       47         RAFU      1AL PRES       AU1A3A11C       U1FFLSICN       47         RAFU      1AL PRES       AU1A3A11C       U1FFLSICN       47         RAFU      1AL PRES       0.9176       0.3591       0.3719       1         1.0000       C.5557       0.9215       0.3719       1       0.3753       1         1.0000       C.5557       0.9217       0.3753       0.3753       1       1       0.3753       1         1.0000       C.5550       0.91135       0.9145       0.3753       1       0.3753       1         1.0000       C.5550       0.9145       0.3753       0.3753       1       0.3753       1       1         1.0000       C.5550       0.9145       0.3353       1       0.3353       1       1       1       1       1       1       1       1       0.3353       1       1       1       1       1	24-575	0	64.150 	-0.00	29.63		6U6	6 <u>06</u> 0.4398
Z***900       \$77.265       -0.00       Z.73       6         TLIAL TEW*      1AL PRES.       AUIASAILC       UIFLISION       2.73       6         RATIU      411       PRES.       AUIASAILC       UIFLISION       2.73       6         RATIU      411       PRES.       AUIASAILC       UIFLISION       2.73       6         RATIU      411       EFFICIENCY       FACTON       0.3491       11         1.0000       C.9955       0.9215       0.3706       11         1.0000       C.9955       0.9215       0.3744       11         1.0000       C.9956       0.9135       0.3752       11         1.0000       C.9956       0.9135       0.3752       11         1.0000       C.9961       0.9135       0.3752       11         1.0000       C.9961       0.9135       0.3782       11         1.0000       C.9961       0.9135       0.3782       11         1.0000       C.9961       0.9135       0.3631       11         1.0000       C.9961       0.9135       0.3631       11         1.0000       C.9961       0.9054       0.3661       0.3651	Z***000       \$77.265       -0.00       Z.73       0         TLIAL TEW*      1AL PRES.       AUIASAILC       UIFELSIGN       HE         RATIU      4710       EFFICIENCY       DIFELSIGN       HE         RATIU      4755       0.9176       UIFELSIGN       HE         1.0000       C.9557       0.9176       U1       U1         1.0000       C.9557       0.9176       U1       U1         1.0000       C.9557       0.9215       0.3705       U1         1.0000       C.9958       0.9217       0.3733       U1         1.0000       C.9959       0.9217       0.3744       U1         1.0000       C.9950       0.9135       0.3744       U1         1.0000       C.9950       0.9135       0.3752       U1         1.0000       C.9950       0.9135       0.3769       U1         1.0000       C.9950       0.9135       0.3782       U1         1.0000       C.9950       0.9135       0.3782       U1         1.0000       C.9950       0.9135       0.3782       U1         1.0000       C.9950       0.9054       0.3829       U1         1.	1 24.107		16.173	00°	1c.34	,	.72. 12	12.12 0.4395
TLIAL TEM*      1AL PRES.       AU1A3A11C       U1FFLSIGN       H         RATIU      4555       0.9176       0.3091       U         1.0000       C.9555       0.9176       0.3091       U         1.0000       C.9557       0.9176       0.37195       U         1.0000       C.9557       0.9176       0.37195       U         1.0000       C.9557       0.9215       0.37195       U         1.0000       C.9557       0.9215       0.3733       U         1.0000       C.9955       0.9126       0.3733       U         1.0000       C.9955       0.9136       U       3744       U         1.0000       C.99561       0.9135       U.3753       U       3753         1.0000       C.99561       0.9054       0.3752       U       3753         1.0000       C.99561       U.9055       U       0.3803       U <t< td=""><td>TLIAL TERP.      1AL PRES.       AU1A3A11C       U1FFLSIGN       H         RATIU      ariu       LFFICLENCY       FACTOR       H         RATIU      ariu       LFFICLENCY       FACTOR       H         1.0000       C.95557       0.9176       0.3719       U.3551         1.0000       C.95557       0.9176       0.3719       U         1.0000       C.95557       0.9215       0.3733       U         1.0000       C.99567       0.92170       0.3733       U         1.0000       C.99567       0.92170       0.3753       U         1.0000       C.99561       0.9054       0.3752       U         1.0000       C.99561       0.9054       0.3752       U         1.0000       C.99561       0.9054       0.3752       U         1.0000       C.99561       0.49145       0.3829       U         1.0000       C.99561       0.49145       0.3829       U         1.0000       C.99561       0.49244       0.3829       U         1.0000       C.99561       0.49145       0.3829       U         1.0000       C.99561       0.49145       0.3829       U</td><th>24.400</th><td><u>.</u></td><td>17.205</td><td>00-0-</td><td>2.73</td><td>-</td><td>67 .274</td><td>6⁷ .274 0.4395</td></t<>	TLIAL TERP.      1AL PRES.       AU1A3A11C       U1FFLSIGN       H         RATIU      ariu       LFFICLENCY       FACTOR       H         RATIU      ariu       LFFICLENCY       FACTOR       H         1.0000       C.95557       0.9176       0.3719       U.3551         1.0000       C.95557       0.9176       0.3719       U         1.0000       C.95557       0.9215       0.3733       U         1.0000       C.99567       0.92170       0.3733       U         1.0000       C.99567       0.92170       0.3753       U         1.0000       C.99561       0.9054       0.3752       U         1.0000       C.99561       0.9054       0.3752       U         1.0000       C.99561       0.9054       0.3752       U         1.0000       C.99561       0.49145       0.3829       U         1.0000       C.99561       0.49145       0.3829       U         1.0000       C.99561       0.49244       0.3829       U         1.0000       C.99561       0.49145       0.3829       U         1.0000       C.99561       0.49145       0.3829       U	24.400	<u>.</u>	17.205	00-0-	2.73	-	67 .274	6 ⁷ .274 0.4395
RATIU       RATIU       RATIU       RATIU       RATU       Record       Record <threcord< th="">       Record       Record</threcord<>	RATIU       NATIU       NATIU       NATIU       NATIU       NATIU       NATIU       NATIU       NATU       NATU <th>TLIAL T</th> <td>ÊM</td> <td>IAL PRES.</td> <td>01103010P</td> <td>UIFFLSIGN</td> <td>T T</td> <td>EEL SPEED</td> <td>EEL SPEER SULIDITY</td>	TLIAL T	ÊM	IAL PRES.	01103010P	UIFFLSIGN	T T	EEL SPEED	EEL SPEER SULIDITY
1.0000       0.5555       0.9176       0.3691       11         1.0000       0.5557       0.9215       0.3706       11         1.0000       0.5557       0.9215       0.3733       11         1.0000       0.5757       0.5757       0.3733       11         1.0000       0.5757       0.5757       0.3733       11         1.0000       0.5757       0.5757       0.3744       11         1.0000       0.5550       0.517       0.3753       11         1.0000       0.5956       0.517       0.3753       11         1.0000       0.5956       0.517       0.3752       11         1.0000       0.59561       0.5135       0.3633       11         1.0000       0.59561       0.5954       0.3653       11         1.0000       0.59561       0.6954       0.3653       11         1.0000       0.59561       0.69544       0.3653       11         1.0000       0.59561       0.69544       0.3653       11         1.0000       0.59561       0.6954       0.3653       11         1.0100       0.59561       0.6054       0.3653       11         1.0100 <td>1.0000       C.5555       0.9176       0.3691       11         1.0000       C.5557       0.9215       0.3706       11         1.0000       C.5557       0.9217       0.3733       11         1.0000       C.5557       0.9217       0.3733       11         1.0000       C.5557       0.9217       0.3733       11         1.0000       C.5551       0.9217       0.3753       11         1.0000       C.5550       0.9215       0.3769       11         1.0000       C.5550       0.9135       0.3769       11         1.0000       C.5550       0.4954       0.3633       11         1.0000       C.5550       0.49054       0.3829       11         1.0000       C.5550       0.49054       0.3829       11         1.0000       C.5550       0.49055       0.3832       11         1.0000       C.5550       0.49055       0.3832       11         1.0000       C.5550       0.49055       0.3832       11         1.0000       C.5550       0.49055       0.3853       11         1.0100       C.5550       0.49055       0.3853       10         1.01000&lt;</td> <th>RATIU</th> <td></td> <td>n 4f 10</td> <td>LEFTCIENCY</td> <td>F AC TOR</td> <td>5</td> <td>T/SEC)</td> <td>T/SEC)</td>	1.0000       C.5555       0.9176       0.3691       11         1.0000       C.5557       0.9215       0.3706       11         1.0000       C.5557       0.9217       0.3733       11         1.0000       C.5557       0.9217       0.3733       11         1.0000       C.5557       0.9217       0.3733       11         1.0000       C.5551       0.9217       0.3753       11         1.0000       C.5550       0.9215       0.3769       11         1.0000       C.5550       0.9135       0.3769       11         1.0000       C.5550       0.4954       0.3633       11         1.0000       C.5550       0.49054       0.3829       11         1.0000       C.5550       0.49054       0.3829       11         1.0000       C.5550       0.49055       0.3832       11         1.0000       C.5550       0.49055       0.3832       11         1.0000       C.5550       0.49055       0.3832       11         1.0000       C.5550       0.49055       0.3853       11         1.0100       C.5550       0.49055       0.3853       10         1.01000<	RATIU		n 4f 10	LEFTCIENCY	F AC TOR	5	T/SEC)	T/SEC)
1	1000       C.3555       0.3119       0.3706       111         1.000       C.5557       0.9215       0.3719       112         1.0000       C.5557       0.9215       0.3719       112         1.0000       C.5557       0.9215       0.3733       113         1.0000       C.5555       0.9217       0.3733       113         1.0000       C.5555       0.9135       0.3763       114         1.0000       C.5560       0.9135       0.3782       114         1.0000       C.5960       0.9135       0.3782       114         1.0000       C.5961       0.9135       0.363       114         1.0001       C.5961       0.9054       0.3863       114         1.0001       C.5961       0.4944       0.3863       114         1.0013       C.5961       0.4974       0.3863       118         1.0013       C.5961       0.4974       0.3863       118         1.0013       C.5961       0.4977       0.3863       118         1.0114       T.114       1.1472       0.3863       118         1.114       T.114       1.1447.14       101366       11944.16	1.0.00	ר כ	C. 5 5 5 5	0.9176	U. 3641	110	13.50	13.50 1.392
1.0000       C.5557       0.9215       0.3719       112         1.0000       C.5557       0.9215       0.3733       113         1.0000       C.5557       0.9217       0.3733       113         1.0000       C.5555       0.9217       0.3733       114         1.0000       C.5555       0.9135       0.3753       115         1.0000       C.5555       0.9135       0.3752       116         1.0000       C.5550       0.9135       0.3752       116         1.0000       C.5561       0.9054       0.3633       116         1.0000       C.5561       0.4944       0.3633       118         1.0000       C.5561       0.4944       0.3633       118         1.0000       C.5561       0.4944       0.3633       118         1.0000       C.5561       0.4044       0.3633       118         1.0000       C.5561       0.4044       0.3633       118         1.0000       C.5561       0.4055       0.3653       118         1.0100       C.5561       0.4045       0.3653       118         1.0100       C.5561       0.4576       0.3653       118 <td< td=""><td>1.0000       C.5557       0.9215       0.3719       112         1.0000       C.5757       0.9215       0.3733       113         1.0000       C.5757       0.9215       0.3733       113         1.0000       C.5757       0.9215       0.3733       113         1.0000       C.5554       0.9210       0.3733       114         1.0000       C.5554       0.9135       0.3723       116         1.0000       C.9561       0.9135       0.3722       0.3752       116         1.0000       C.9961       0.9954       0.3803       117       116         1.0000       C.9961       0.9954       0.3803       117       116         1.0000       C.9961       0.9954       0.3853       119       116         1.0000       C.9961       0.4944       0.3853       119       116         1.0000       C.9961       0.4974       0.3853       119       116       116         1.0100       C.9962       0.49765       0.49765       0.3853       119       118         1.0100       C.9964       0.49765       0.49665       0.3853       119       10353       119         1.0100<!--</td--><th>1.000</th><td>、 つ</td><td><b>:.</b>.:55c</td><td>9516 90</td><td>J. 3706</td><td>111</td><td>3.25</td><td>3.25 1.375</td></td></td<>	1.0000       C.5557       0.9215       0.3719       112         1.0000       C.5757       0.9215       0.3733       113         1.0000       C.5757       0.9215       0.3733       113         1.0000       C.5757       0.9215       0.3733       113         1.0000       C.5554       0.9210       0.3733       114         1.0000       C.5554       0.9135       0.3723       116         1.0000       C.9561       0.9135       0.3722       0.3752       116         1.0000       C.9961       0.9954       0.3803       117       116         1.0000       C.9961       0.9954       0.3803       117       116         1.0000       C.9961       0.9954       0.3853       119       116         1.0000       C.9961       0.4944       0.3853       119       116         1.0000       C.9961       0.4974       0.3853       119       116       116         1.0100       C.9962       0.49765       0.49765       0.3853       119       118         1.0100       C.9964       0.49765       0.49665       0.3853       119       10353       119         1.0100 </td <th>1.000</th> <td>、 つ</td> <td><b>:.</b>.:55c</td> <td>9516 90</td> <td>J. 3706</td> <td>111</td> <td>3.25</td> <td>3.25 1.375</td>	1.000	、 つ	<b>:.</b> .:55c	9516 90	J. 3706	111	3.25	3.25 1.375
100.0       0.5737       0.3733       113         10000       0.5759       0.5759       0.3744       114         10000       0.5550       0.5170       0.3753       115         1.0000       0.5550       0.5170       0.3753       115         1.0000       0.5550       0.9135       0.3762       116         1.0000       0.5561       0.9135       0.3782       116         1.0000       0.5561       0.9054       0.3782       119         1.0000       0.5561       0.9054       0.3633       119         1.0000       0.5561       0.4944       0.3363       119         1.0000       0.5561       0.4965       0.3653       119         1.0000       0.5962       0.4965       0.3653       119         1.0000       0.5962       0.4965       0.3653       119         1.0100       0.5965       0.4705       0.3653       119         1.014       119.25       947.16       1035.86       1         983.60       119.25       947.15       104.16       1         983.60       119.25       947.25       1       1         984.90       144.7	100.0       0.5737       0.3733       113         10000       0.5750       0.3744       114         10000       0.5550       0.5753       115         1.0000       0.5550       0.5173       115         1.0000       0.5550       0.5173       115         1.0000       0.5561       0.9135       0.3752       116         1.0000       0.5950       0.9135       0.3633       117         1.0000       0.5950       0.9054       0.3782       117         1.0000       0.5951       0.4944       0.3929       118         1.0000       0.5952       0.4944       0.3953       119         1.0000       0.5952       0.4944       0.3953       119         1.0000       0.5952       0.4945       0.3853       119         1.0000       0.5952       0.4965       0.3853       119         1.0000       0.5952       0.4965       0.3853       119         1.0100       0.5952       0.46655       0.3853       119         1.0100       0.5952       0.46655       0.3853       119         1.01925       947.16       1035.86       1       104.16     <	1-000	с С	1.5557	0.9215	0.3719	112	2.88	2.88 1.357
1.0000       0.5745       0.3744       114         1.0000       0.5555       0.9723       0.3753       115         1.0000       0.5550       0.9135       0.3752       116         1.0000       0.5961       0.9054       0.3603       111         1.0000       0.99561       0.9054       0.3603       113         1.0000       0.99561       0.9054       0.3803       113         1.0000       0.99561       0.4944       0.3853       113         1.0000       0.5961       0.4974       0.3853       119         1.0000       0.5961       0.4964       0.3853       119         1.0000       0.5962       0.4965       0.3853       119         1.0100       0.5962       0.4965       0.3853       119         1.0100       0.5962       0.46655       0.3853       119         1.0100       0.5966       0.4705       0.3853       119         1.01925       947.15       104.16       1033.86       1         983.60       119.25       947.25       104.16       1	1.0000       0.9748       0.9725       0.3744       114         1.0000       0.9959       0.9217       0.3753       115         1.0000       0.9946       0.9135       0.3752       116         1.0000       0.9964       0.3752       111         1.0000       0.9964       0.3633       111         1.0000       0.9964       0.3833       111         1.0000       0.9964       0.3833       111         1.0000       0.9964       0.3833       111         1.0000       0.9964       0.3853       111         1.0000       0.6964       0.3853       111         1.0000       0.6964       0.3853       119         1.0000       0.6964       0.3853       119         1.0000       0.6964       0.3853       119         1.0100       0.6964       0.3853       119         1.01910       0.6964       0.3853       119         1.01910       0.6964       0.3853       119         1.01910       0.6964       0.3865       119         1.01910       0.6964       0.3865       103         1.01910       1.0195       11035       104 <th>1.00.0</th> <td>о о</td> <td>1 - 5 3 - 7</td> <td>いいかった</td> <td>0.3733</td> <td>113</td> <td>2.45</td> <td>2.45 1.340</td>	1.00.0	о о	1 - 5 3 - 7	いいかった	0.3733	113	2.45	2.45 1.340
1.0000       C.5555       U.9237       U.3753       115         1.0000       C.5550       U.5135       115       117         1.0000       C.5560       U.5135       113         1.0000       C.5561       U.49135       0.3760       111         1.0000       C.5561       U.4954       0.3832       113         1.0000       C.5561       U.4954       0.3853       113         1.0000       C.5961       U.4954       0.3853       113         1.0000       C.5962       U.4965       0.3853       113         1.0000       C.5962       U.4965       0.3853       119         1.0000       C.5962       U.4865       0.3853       119         1.0100       C.5962       U.4865       0.3853       119         1.0100       C.5962       U.46655       0.3853       119         1.114       I.193.86       1.19       1.05       1.04       1.05         983.80       1.19.25       947.25       104.16       1.04       1.05       1.04         984.98       1.19.27       J44.725       1.04       1.04       1.05       1.04       1.05       1.04       1.05       1.00 </td <td>1.0000       C.9595       0.9217       0.3753       115         1.0000       C.9560       0.9145       0.3760       116         1.0000       C.9561       0.9145       0.3760       111         1.0000       C.9561       0.9145       0.3760       111         1.0000       C.9961       0.9145       0.3752       111         1.0000       C.9961       0.4694       0.3853       113         1.000       C.9961       0.4694       0.3853       113         1.000       C.9962       0.4694       0.3853       113         1.000       C.9962       0.4694       0.3853       113         1.000       C.9962       0.46653       0.3853       119         1.000       C.9962       0.46653       0.3853       119         1.11925       947.14       1033.86       1       104.02         983.80       119.26       947.25       104.02       1         983.80       119.28       951.58       104.29       1       1</td> <th>1.000</th> <td>5</td> <td>9475</td> <td>0.9229</td> <td>0.3744</td> <td>114</td> <td>1.90</td> <td>1.40 1.324</td>	1.0000       C.9595       0.9217       0.3753       115         1.0000       C.9560       0.9145       0.3760       116         1.0000       C.9561       0.9145       0.3760       111         1.0000       C.9561       0.9145       0.3760       111         1.0000       C.9961       0.9145       0.3752       111         1.0000       C.9961       0.4694       0.3853       113         1.000       C.9961       0.4694       0.3853       113         1.000       C.9962       0.4694       0.3853       113         1.000       C.9962       0.4694       0.3853       113         1.000       C.9962       0.46653       0.3853       119         1.000       C.9962       0.46653       0.3853       119         1.11925       947.14       1033.86       1       104.02         983.80       119.26       947.25       104.02       1         983.80       119.28       951.58       104.29       1       1	1.000	5	9475	0.9229	0.3744	114	1.90	1.40 1.324
1.0000       0.5560       0.5100       0.3760       116         1.0000       0.9961       0.9145       0.752       117         1.0000       0.9961       0.9954       0.3829       119         1.000       0.9961       0.9954       0.3829       119         1.000       0.5961       0.4915       0.3829       119         1.000       0.5961       0.4965       0.3853       119         1.000       0.5961       0.4965       0.3853       119         1.000       0.5962       0.4965       0.3853       119         1.000       0.5962       0.4965       0.3853       119         1.000       0.5962       0.46665       0.3853       119         1.0190       0.5962       0.46665       1.050       105         1.01925       947.14       1.035.86       1       105       1         983.80       119.25       947.25       104.16       1       1       1       1         983.80       1.94.73       1.44.73       1       1       1       1       1       1       1	1.0000       C.5500       0.95120       0.3760       116         1.0000       C.9961       0.9145       0.3782       111         1.0000       C.9961       0.99145       0.3829       113         1.0000       C.9961       0.49145       0.3829       113         1.0000       C.9961       0.4994       0.3829       113         1.0000       C.9962       0.4994       0.3853       119         1.0000       C.9962       0.4964       0.3853       119         1.0000       C.9962       0.4965       0.3853       119         1.0000       C.9962       0.4965       0.3853       119         1.0100       C.9962       0.4965       0.3853       119         1.114       1.1925       947.14       1033.86       1         983.80       119.25       947.25       104.02       1         983.80       119.28       951.58       104.29       1       1	1.400	5	· · · · · ·	0.9217	U. 3753	1151	1.42	1.42 1.308
1UUUU       C.9960       U.9135       0.752       117         1.00U0       C.9961       0.9054       0.5803       117         1.00U0       C.9961       0.4944       0.3829       118         1.00U       C.5961       0.40944       0.3829       118         1.00U       C.5961       0.40944       0.3829       118         1.00U       C.5962       U.4065       0.3853       119         1.010U       C.5952       U.4055       0.3853       119         1.010U       C.5952       U.4055       103536       119         1.010U       C.9142       10.46651       (L3750 PA)       10566         1.0402       113.25       947.14       103586       1         983.80       113.25       947.25       104.02       1         794.98       1.19.27       44.75       104.16       1	1UUU       C.9960       U.9135       0.752       11         1.0UU       C.9961       0.9054       0.5803       111         1.0UU       C.9961       0.9054       0.3829       118         1.0UU       C.5961       0.4944       0.3829       118         1.0UU       C.5961       0.4054       0.3853       119         1.0UU       C.5961       0.4055       0.3853       119         1.0UU       C.5962       0.4055       0.3853       119         1.0UU       C.5942       0.4055       0.3853       119         1.0UU       C.5942       0.4055       0.3853       119         1.0UU       C.5942       0.447.14       1035.86       1         953.64       119.26       947.25       104.02       1         953.64       119.28       951.58       104.29       1       1	1.0001	5	C• 556U	0.12.0	0.3760	1160	.83	• B3 1.293
10000 C.9961 0.9054 0.503 117 1.00.3 C.9961 0.4044 0.3829 118 1.00.3 C.9962 0.4044 0.3829 118 1.000 C.9962 0.4055 0.363 119 1.000 C.9962 0.4065 0.40363 119 1.000 C.9962 0.4070 0.3653 109 1.000 C.996 0.1 983.80 119.25 947.15 104.02 1 944.73 104.15 104.02 1	1.0000       C.9961       0.9054       0.5803       117         1.000       C.9961       0.4944       0.3829       118         1.000       C.9962       0.4944       0.3853       119         1.000       C.9962       0.4044       0.3853       119         1.000       C.9962       0.4054       0.3353       119         1.010       C.9962       0.4055       0.3353       119         1.011       U.4055       STATIC FRUSS       0.3353       119         1.011       U.4055       STATIC FRUSS       0.3353       119         1.011       U.6504       U.4053       104.02       119         9537.62       113.28       951.53       104.16       104.16	1.000	در	C. 9950	0.4135	0.752	1.70	.19	1.19 1.279
1.000 0 0.5501 0.6944 0.3829 118 1.0000 0.5962 0.3653 119 1.0000 0.5962 0.3653 119 1.0100 0.3653 119 1.114L TEMP. 1.014L P.K.S. STATIC TEMP. STATIC FR., S 0.3653 119 54.09 119.25 947.14 103.86 1 963.60 119.26 947.25 104.02 1 964.98 119.21 044.73 104.15	1.000 0       0.5561 0.6944 0.3629 116         1.000 0       0.5962 0.665 0.3653 119         1.000 0       0.5962 0.3653 119         1.114 TEMP. TUTAL FALS. STATIC TEMP. STATIC FAL.       0.3653 119         1.000 0       0.5952 0.3655 10       0.3353 119         1.010 0       0.5952 0       0.3653 119         1.114 10       114.25       947.14       103.86         963.80       119.26       947.14       103.86       1         963.80       119.26       947.55       104.02       1         963.80       119.26       947.55       104.65       1         963.80       119.26       947.55       104.65       1         963.80       119.26       947.55       104.65       1         963.80       119.26       951.55       104.29       1	2.000	0	. 9361	0.9054	0. 5803	1179	.52	1.52 1.207
1.0000 C.5962 0.0055 0.3853 119 TLTAL TEMP. TUTAL PALS. STATIC TEMP. STATIC FRL. (DEURES) (LUSS IN.) (UEGRETS) (LNSU IN.) (DE 564.09 119.25 947.14 103.86 1 983.80 119.26 947.25 104.02 1 784.98 219.27 044.73 104.16	1.0000 C.5962 0.0665 0.3653 119 TLTAL TEMP. TUTAL PALS. STATIC TEMP. STATIC PALJ. S (DEURES) (LUSU IN.) (UEGNETS) (LTV9 IN.) (DE 564.09 119.25 947.14 103.86 1 983.80 119.26 947.25 104.02 1 983.80 119.28 951.53 104.16 587.64 119.28 951.53 104.29	, ju u u		1945 -2	4+69-0	U. 3929	118	3.82	3.82 1.255
Tital Temp.       Tutal Phus.       Static Frus.       S	Tital Temp.       Tutal Phus.       Static Frus.       S	1.000	ر د		u.dbCj	U. 3853	119,	4 <b>.</b> 11	d.ll lu244
TLTAL TEMP. TUTAL PALS. STATIC TEMP. STATIC FAL. UDEGREESI (LUYS. IN.) (UEGRETS) (LUYSU IN.) (DE SE4.09 119.25 947.14 103.86 1 983.80 119.27 044.73 104.15	TLIAL TEMP.       TUIAL PLS.       STATIC FRL.         TUDEUREESI       LUAL PLS.       STATIC TEMP.       STATIC FRL.         CDEUREESI       (LEVS. IN.)       (UEGKE[S])       (LEVS. IN.)         SE4.09       119.25       947.14       103.86       1         983.80       119.25       947.15       104.02       1         983.80       119.26       947.55       104.16       1         983.80       119.28       951.55       104.29       1	-							
(DEGREES) (LUASA IN.) (UEGREES) (LANSU IN.) (D 564.09 114.25 347.14 103.86 983.80 113.26 947.25 104.02 984.98 113.26 344.73 104.15	(DeGREES)     (Lersa in.)     (DEGRES)     (Larsa in.)     (D       54.09     114.25     347.14     103.86       983.80     113.26     947.25     104.02       734.38     113.26     344.73     104.16       537.62     113.28     951.53     104.29	TLTAL TE	EMP. 101	AL "ALS.	STATIC TEMP.	STALLC PAL		SLOPE	ST OPE CHAVATURE
564.09 114.25 347.14 103.86 1 983.80 113.26 347.25 104.02 7 784.38 213.27 34.73 104.15	564.09     114.25     347.14     103.86       983.80     113.26     947.25     104.02       983.81     113.26     947.25     104.16       983.82     113.28     951.53     104.29	(JEURE	ESI (Lê	1.54 IN.1	( JEGKELS )	(LB/SU IN.)	.0	EGRE (S)	
983.84 113.26 947.25 104.02 7 784.98 214.27 24.73 104.15	983.84 113.26 947.25 104.02 7 784.38 213.27 244.73 104.16 587.62 113.28 951.53 104.29	584.01	3	114.25	347.14	103, 36		12.07	12.07 -0.01977
404.48 L14.27 / 444.73 104.16	784.38 213.27 7 244.73 104.15 527.62 113.28 951.53 164.29	983 <b>.</b> 8.	3	119.26	947.25	104.02	1	0.73	U.78 -0.01728
	587.62 113.28 951.53 164.29	34.404	8	114.27	52 ***7	104.15		9.52	9.52 -0.01572
450"33 "104" 34" 424" TO4" 36		553°3	~	119.30	957.59	104.43		5.94	5.94 -0.01398
4504,23 10444 104439 453437 119430 957459 104448	453.37 119.30 457.59 104.48	553 553	-	14.30	962.55	104.55		1 E • 4	4.3J -0.Jl35b
450.23 104.44 104.39 453.37 119.30 957.59 104.48 458.31 119.30 962.55 104.55	453.37 119.30 457.54 104.48 553.31 149.30 962.55 104.55	1004.3	<b>.</b>	119.31	44 9.08	104.60		3.60	3.60 -0.01255
450.23     450.23     454.44     104.39       453.37     119.30     957.59     104.46       558.31     149.30     962.55     104.55       104.45     119.31     952.55     104.60	453.37 119.34 457.59 104.48 553.31 149.30 962.55 104.55 119.31 94.408 104.60	1013.6	œ .	26.641	52°126	104.64		<b>2 • 5 2</b>	2.52 -0.J1042
450.23     450.23     454.44     104.39       453.37     119.30     957.59     104.48       453.37     119.30     952.55     104.55       453.37     119.30     962.55     104.60       104.35     119.31     455.03     104.60       10413.59     119.52     977.82     104.64	453.37 119.34 957.59 104.48 553.31 119.30 962.55 104.55 104.95 119.31 965.08 104.60 104.64 119.52 977.82 104.64	1054-91	'n	114.32	) 4 3 <b>6</b> h l	104.67		1.Jd	I.38 -0.00659
450.23     450.23     494.44     104.39       453.37     119.30     957.59     104.48       553.37     119.30     952.55     104.55       553.31     119.30     962.55     104.60       104.35     119.31     952.55     104.60       104.35     119.31     952.55     104.60       104.35     119.22     977.82     104.61       104.95     119.32     939.61     104.67	453.37     119.30     957.59     104.48       553.31     119.30     962.55     104.55       104.95     119.31     957.08     104.60       1013.59     119.31     957.82     104.61       104.95     119.32     943.61     104.61	1033555	D	119.33	1001.44	104.68		U.23	U.23 -0.0036

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****** FINAL FLOW PARAMETERS FUR STAUE NUMPER 7 ***--***

### *** STAGE INPUT PAHAMETERS ***

0.4563 20.0 0.7300 0.4700	1000-0
AT THE KOTOR EXIT Line	ΓY _
RLTCK TIP U-FACTOR LIMIT Hug Relative Flum angle Limit Statck Hub Mach Nuaber Limit Statcr Fun D-Faltor Limit	ANAIRUM TIP TANGENTLAL VELOCI

C

---STATOR---

		PRESSURE PREFILE	FLCH ANGLE At the shock	A 1 I DI TOS		WHIRL VELOCITY	FLOW ANGLE At the shock	SOL I DI TY
	đ	COUOL CE-36	J.410CCLE UD	0.570000E-01	4	-0.0000E-38	-0.549 300 € 01	-0-340000E-0]
	60	-0.0000005-38	U.ILOCUCE 01	0.100000E 31	Ð	-J. UUDOODE-38	U.100000E 01	0.10000E 0
	ų,	U. IGUICE UI	U.428680E U2	Ú.1355COE Ul	رب	U. 000000 E- 38	0.263740E 02	0.146200E 0]
	0	-C.UJJJJCE-34	J.75CCLUE UL	-0. 101004 JO	2	-0.000000E-38	-0.642000E Ul	-0.141000E 00
E-	ų.	-Ú. CUDUQCE - 38	-J. 28551 UE UI	<b>J.1366006-01</b>	ĥ	-3.00000138	0.319800E Ul	0-240000E-0
26		-		Ĵ.				

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# *** STAGE SCALER QUANTITLES ***

	45PELT KALIC	GEUMETRIC FUB XACIUS (IN.)	GEUMETRIC TLA RAD.(IN.)	HUB RAMP Angle (úfu)	TIP RAMP Angle (Jeg)	AXIAL LENGTH ([N.)	MASS FLOW (LB/SEC)	MASS AVE. Adiabatic eff.
-FCTCR	1 • 46 ¢	<3.240℃	0600-22	11.781	0.00	1.4000	401.0000	0.9346
-STATCK-	1.956	うりうちょう	25.400	3.814	0.000	0004-0	401.0000	C. 9163
	VËL- KATLÛ Al Thê Yea.	ruð sluckags Factúk	TIP OLOCKAGE Factję	MASS AVE . PR. Railg	MASS AVL. ILMP. HATIU	LJMULATIVE Mass ave. Pr. Raiic	CUMULATIVE Mass ave. Temp. ratio	CUMULATIVE MASS AVE . ADIABATIC EFF .
-RUTOR		<u>ט</u> בזפרט	0.5800	ù•? 362	1. U3 86	10.9462	2.0975	0.8720
-SIATCH-	0 •5 8 4	C. 5 aCC	0.08 0.0	1.3340	1.0937	10.7963	2.0976	0.8695
				*				

LCSS CATA Set LSED

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-STATCA-

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5.6.	SI REARLINE	AKIZL VEL		JANTAL NC	101 101			
NO.	RADIUS LIN.	1.61/2641		157 / 55/ 1		ABS . MACH	ABS. FLOW	REL. FLUW
~	<3.2405	c t i 159				ANTEON CONTROL	ANGLE (DFG)	ANGLE (DEG)
•				20.02	F30.970	0.5356	35. 964	41.044
4		r c U • > 84	433.00	58.48	823.457	0-5305		
•	23.0110	627.420	474.11	11.81	317.185			
4	23.7472	654.372	470.35	07.49	371 (CT 3			44.675
~	23.7561	654.057	474.01	57.47	9.07 4.65	1226.0	55. 409	45.324
•	24-245	522.423	57.72	52 . L 7			35.926	45.935
-	24-2525	347.1.75	477.20			2515-0	35.956	46.48
đ	24.44.13			12.00	110.208	0.5125	36.077	46-944
				2 C • F B	PJ1.121	0.5101	36-326	5 J. 2 J. 2
• •		C • < • 365	65.4	19.72	9.01.771	0.5033	36.731	
3	101 101	65,,53	440.83	- 1 U.G.G	803.896	0.05		
1	24.4060	6 Eb. 332	4 ) 7 . 4 8	1.90	307.721	0.5060		4 / • 71 S
							910.00	41.164
S.t.	FCTAL TEMP.	ILIAL PRES.	A. IABATIC	AUTS 144 (C	Hitel Lbeen			
<b>1</b> 2	RATIU	+ 41 10	LEF IL LENCY	FAC TOR	IFTICC STCCU	20170705	A#/S	LOSS CCEFF.
~	1.0386	7dec.i	0.9354	0.4185				
2	1-Cdd>	1 2 3 4 4				1.413	0.5148	0.0497
					1125-48	1.398	0.5100	0.0476
•		1. 2262	5 × 1 × 5	0.4175	1133.05	1.385	0-5058	0 0460
* 1 E	4-0852	1.2304	2042-0	0.4174	1141.78	1.372		
^	1.0091	1.3562	0-5410	0.4182	1149-44	1,36,		
0 27	1.0331	4.352	94CJ	0.4187	11 57 - 34			244040
34p	1 . CUSS	1022.4	0.9360	0.4209	1144-04			0 • 0 4 4 3
90	1.000	1.336.0	10.01				1.4430	0.0457
0	2640-1					1.329	0104-0	0.0494
1.1					91.92.10	1.319	0.4894	0.0553
			0.12.0	2454-0	1190.24	1.310	0.4384	0-0616
1		5100-1	0.941L	0.4504	11 18.37	1.301	0.4:80	0-0747
Set.	TCIAL TEPS.	1210. the C						
Sa	I DELUCION				SLUPE	CURVATURE	SEL. VEL.	REL. MACH
-				ILU/SU IN.)	(JEGRFES)	1/14.	IFT/SEC)	NUMBER
• •			5.170°23	131.45	8.52	-0.11676	921.0417	0.5937
<b>1</b> n		1 1 4 4 C	1010.00	131.91	7.52	-0.10415	925.4805	0. 5067
•		1 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1016-00	132.32	6.74	-0-09140	930.4577	0.5004
<b>r</b> 1		15540	1322-00	132.69	5.83	-0.07864	935-7147	0.6015
•	10-11-11	125.45	1025.45	133.03	5.03	-0-0540	196. 670	
<b>0</b>	16 80.07	144.40	1024.23	105.32	4.19	07250-0-	072 270 072 270	
•	iubo8	104-40	1035.00	133.59	1 2 7			
<b>\$</b>	1093.97	155-40	1.442.32					3.6067
¢	( II04.33	19-461					120.160	0.6060
10	1417.51		1.155.05			-u-u1420	2511.256	U.6035
II	1133.56	154-46			c	*6600 · C-	950.3059	0.5951
   -				C2 + 6-1	c 0	-0.00223	946.5573	0.5923

* *

	STREAM INC	AX 234 - 44-						
						AUX . VOA	ABS. FLUM	REL. FLOW
•		1112201	1 1 1 2 E C 1		{ F T / > E C	A URINUM	ANGLE (DEG)	ANGLE (DEG)
7	2655-12	たちじゅはし	00-3-	47.91	o52.582	J.4165	- 0, 000	59.774
V	č005-cs	540.400	20-0-	43.05	64 <b>4.291</b>	0.4138	-0.000	
n)	<.3.6632	£43.dc2		54.5	200-240	1 - 5 1 2 4	000-0-	
+	23.4295	t41.799	-6-00	33.72	642.084	1004 0		
Ŷ	23-9455	240-21ú	- 0 - 00	1.0	540 - 74			
4	6-15c5						- 0 <b>-</b> 00	5 <b>0</b> • 50 5
) •					00.000	2004 - 0	-0-00	61.117
• 1	C4+7742		- 4. 00	×0.14	564°56°	U • 405 L	-0.000	61 <b>.</b> 286
7	24040TO	540.J7L	00-0-	15.55	64U.251	0 • 40 4 2	-0-000	61-416
\$	2-+6430	t41.12b	-0-	10°03	0+2•221	0-4036	(100 m -	
10	24-8054	645.24b	50	£C7	645-277	K 2 07 - 0		
34	24+3671	ちょう。ことじ		0. 91	195-549			C 4 C 4 T 0
			8 - -	1° }				1+2+74
3.L.	TLTAL TENO.	ICIAL PLIS.	ADIABATIC	ùl'FFL Sluñ.	HFEA SPFF:	SALIDITY		
<b>1</b> 0.	<b>42710</b>	-AI LU	EFFICIENCY'	FACTOR	(+1/SEC)			LUSS LUCTT.
4	1.0300	6+63-7	4. 3169	1-4-01	1120-05	1-476	0 6230	09200
N	1-0-00	1644 27	1.9216	0.4193				
	0.0000-1		24 / 6 / 11	0.4145			2620*0	
1							9670.0	0.0284
<b>ب</b> م					1145.82	1 • 395	0.6223	2.20*0
		キャラフィー	5575°D	0.4191	11 > 1.63	1.384	0.6192	0.0280
a : ,21	1-000	(• >955	U. 4252	0.4176	11-9.11	1.374	0.6162	0.0277
► 8	4-3340	6645.3	5232	U.4isl	1167.33	1.365	0.0130	0-0275
10	いいい	1, 470 a	u.9185	0.4152	1175.12	1.356	0.4091	0.0774
<b>?</b>	LUL[]	64 5 4 3 5	0.4110	0.4211	21 32 . 34	1 - 347	0-6044	0-0274
0 E	i.u3c0	C • 44 5 7	らつつか。つ	0.4241	1190.56	1-338	0.5086	0-0276
11	1.0300	C • 5 + 5 7	J. 65 70	0.4283	1193.42	1.350	0.5921	0-0275
-					2			
S.L.	TETAL TEPP.	TGIAL PARS.	STATIC TEMP.	STATIC PRES.	SLUPE	CURVATURE	REL. VFL.	APL MACH
2	1 20020 251	110/20 11.1	したらうたたろし	(LU/SC IN.)	(DLURFES)	1/14.	(FT/SEC)	NUMBER
<b>,</b>	2075.43	156.55	1 037.43	140.53	4.21	0.01275	1296.3277	U.8274
N	1670.0 ,	150.61	1057.34	141.21	3.41	6.01173	1301.0458	0-8304
m,	2071.47	150.63	1 J3 8. 70	141.42	3.41	0.01030	1336.2612	<b>7.832</b>
*	4074.71	1 26 • c4	2141.75	141.59	3.12	0.J0862	1312.0064	U. F : 57
'n	10.11.57	126•66	1044.31	141.74	2.02	· 0.00673	1317.9942	0.83%5
Đ	2003.07	liu.ol	1049.25	141. R6	2.22	0.00484	1324.2397	0.8411
<b>P</b>	1050.33	15t.6f	103.79	141.97	1.32	0.00295	1330. 3957	0.8432
ŋ	iu53.97	156.09	1061.34	142.05	1.41	16100-0	1338.2214	0.8440
7	1104.33	153.70	1171.55	142.10	56.0	0_20013	1345.0492	0.2440
10	1217.31	103.76	104.26	142.14	J.54	-0-032	1354.2729	0- 8466
11	1133.50	150.70	1100.15	142.10	0-03	0-00025	343,1477	0.4461

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23     35.000     35.000     31.000       21     41.000     35.000     23.405       22     41.000     23.405       23     54.500     23.405       24     23.438     55.405       25     41.000     23.405       25     51.000     23.405       25     51.000     23.405       25     51.000     23.405       25     51.000     23.405       25     51.000     23.405       25     51.000     23.405       25     51.000     20.000       25     24.0567     651.015       25     24.0567     651.015       25     24.0567     652.325       26     27.056     -0.00       27.5560     10.00       27.55194     10.565       27.55194     10.565       27.55194     101.566       27.55194     101.566       27.55194     101.566       27.55194     101.566       27.55194     101.566       27.55194     10.00       27.55194     10.00       27.55194     10.00       27.55194     10.00       27.55194     10.00       27.55194     10.00 <th>25.000 25.000 25.000 25.000 25.000 25.000 25.000 25.000 25.72 36.35 36.35</th> <th>0.980 0.980 0.980 0.980 0.980 0.980 0.980 1.980 1.980 1.980 1.980 0.980 0.980 0.980 0.980 0.980</th> <th>086°0 086°0 086°0</th> <th></th> <th></th>	25.000 25.000 25.000 25.000 25.000 25.000 25.000 25.000 25.72 36.35 36.35	0.980 0.980 0.980 0.980 0.980 0.980 0.980 1.980 1.980 1.980 1.980 0.980 0.980 0.980 0.980 0.980	086°0 086°0 086°0		
22     41.000     23.441       22     41.000     23.441       23     430     54.540       23     53.640     54.541       23     53.640     54.650       23     53.640     54.650       23     53.640     54.650       23     54.110     64.44       23     54.057     55.324       23     59.093     55.324       24.0567     55.112     -0.00       24.5567     55.265     -0.00       24.55143     552.325     -0.00       24.55143     552.325     -0.00       24.55143     552.325     -0.00       24.55143     552.325     -0.00       24.55143     552.325     -0.00       24.55143     552.325     -0.00       24.55143     552.325     -0.00       24.55143     552.325     -0.00       24.55143     552.355     -0.00       24.55143     552.355     -0.00       24.55143     552.355     -0.00       24.55143     552.355     -0.00       24.5535     703.901     -0.00       24.5535     703.901     -0.00       24.5557     703.905     -0.00       23.5557	25.000 25.000 STALICN NUME RAULAL VEL- (FT/SEC) 36.35	0.980 0.980 0.980 0.980 0.980 0.980 485 485 485 455 33 693.10			
22     41.000     23.441       1     5146AM, INE     A.M.AL     VLL.     MHRL     VEL.       1     53.5940     651.615     -0.00     -0.00       23.5940     651.615     651.615     -0.00       23.5940     651.615     -0.00       23.5940     651.615     -0.00       23.5940     651.615     -0.00       23.5940     652.354     -0.00       23.5940     652.444     -0.00       23.5940     652.444     -0.00       23.5940     652.444     -0.00       24.356     765.365     -0.00       24.356     765.365     -0.00       24.456     765.263     -0.00       24.456     765.263     -0.00       24.456     765.263     -0.00       24.456     765.263     -0.00       24.519     655.365     -0.00       24.519     655.317     -0.00       24.519     655.356     -0.00       24.519     655.356     -0.00       24.519     655.346     -0.00       24.519     655.317     -0.00       24.519     655.317     -0.00       24.519     655.317     -0.00       24.519     655.316 <td< td=""><td>Z5.000 STATICN NUME RAULAL VEL. (FT/SEC) 36.35</td><td>0.980 J.980 JER 20 Abs. Vel. (FT/Sec) 693.10</td><td>0000</td><td></td><td></td></td<>	Z5.000 STATICN NUME RAULAL VEL. (FT/SEC) 36.35	0.980 J.980 JER 20 Abs. Vel. (FT/Sec) 693.10	0000		
Sikkank INE       AMAL VLL.       HHRL VEL.         RADIUS IN.       (FT/SEL)       (FT/SEL)         Z3.4388.       654.381       -0.00         Z3.4388.       651.01b       -0.00         Z3.4388.       651.01b       -0.00         Z3.4388.       651.01b       -0.00         Z3.4388.       652.031       -0.00         Z4.3567       650.444       -0.00         Z4.3127       652.045       -0.00         Z4.3143       652.046       -0.00         Z4.3143       652.046       -0.00         Z4.3143       652.046       -0.00         Z4.3143       652.046       -0.00         Z4.314       701.254       -0.00         Z4.312       702.056       -0.00       -0.00	STATICN NUME Ravial vel- (ft/sec) 32-35	3ER 20 A85. VEL. (FT/SEC) 693.10	·	-	
Le     STREAMLINE     ANJAL VLL.     HITLL VLL.       1     23:4389     651.01b     -0.00       23:4389     651.01b     -0.00       23:4389     651.01b     -0.00       23:4381     651.01b     -0.00       23:4381     651.01b     -0.00       24.54205     651.01b     -0.00       24.5143     652.444     -0.00       24.5143     652.465     -0.00       24.5143     652.465     -0.00       24.5143     652.465     -0.00       24.5143     655.365     -0.00       24.5143     655.365     -0.00       24.4591     705.253     -0.00       24.4591     705.253     -0.00       24.4692     705.255     -0.00       24.4694     705.915     -0.00       24.4694     705.915     -0.00       24.4694     705.915     -0.00       24.4694     705.915     -0.00       24.4694     705.915     -0.00       24.4694     705.915     -0.00       24.4694     705.915     -0.00       23.6055     705.915     -0.00       24.4694     705.915     -0.00       23.6055     705.915     -0.00       24.4694 <td>STATICN NUME Raulal Vel. 1ft/Sec1 3c-35</td> <td>3ER 20 A85. VEL. (FT/Sec) 693.10 693.10</td> <td>-</td> <td></td> <td></td>	STATICN NUME Raulal Vel. 1ft/Sec1 3c-35	3ER 20 A85. VEL. (FT/Sec) 693.10 693.10	-		
23.4384       A.M.AL VLL.       A.M.AL VLL.       (FT/SEU)         23.4383       654.581       -0.00         23.4383       651.618       651.618         23.4383       652.524       -0.00         23.4383       651.618       651.618         24.6166       651.618       651.618         24.6116       652.006       -0.00         24.6116       655.006       -0.00         24.6116       655.006       -0.00         24.6116       655.006       -0.00         24.6116       655.006       -0.00         24.61176       655.006       -0.00         24.6116       655.006       -0.00         24.6117       655.006       -0.00         24.6116       655.006       -0.00         24.6117       655.006       -0.00         24.6181       655.006       -0.00         24.6194       655.006       -0.00         24.6194       655.006       -0.00         24.6194       10.5.263       -0.00         24.6194       10.5.263       -0.00         24.6194       655.010       -0.00         24.6194       655.010       -0.00	STATICN NUME Raulat vel- (ft/sec) 36-35	3ER 20 Abs. Vel. (FT/Sec) 693.10 693.10			
Image: Site of the state of	RAUIAL VEL. (FT/SEC) 36-35	ABS. VEL. {FT/SEC] 695.33 693.10			
RADIAS IN.       IFT/SEU         Z3.4384       654.361         Z3.4384       654.361         Z3.5940       651.015         Z3.5940       651.015         Z3.59031       650.444         Z3.59031       650.444         Z4.205       650.444         Z4.205       650.444         Z4.205       650.444         Z4.205       650.444         Z4.205       650.444         Z4.362       652.462         Z4.362       652.462         Z4.362       703.400         Z4.9591       703.711         Z23.6593       703.901         Z4.9591       703.901         Z3.6593       703.901         Z4.360       659.110         Z4.361       659.126         Z4.451       703.901         Z4.5191       659.710         Z4.5194       60.00         Z4.5194       60.00         Z4.5194	(FT/SEC) 36+35 32,74	(FT/SEC) 695.33 693.10	ABS MACH	TOTAL TEMP.	TUTAL DRES
23.438*       554.541       -0.30         23.5940       652.324       -0.00         23.5940       652.324       -0.00         23.5940       652.324       -0.00         23.9031       650.444       -0.00         24.0367       650.110       -0.00         24.0367       650.110       -0.00         24.0367       650.110       -0.00         24.0367       650.345       -0.00         24.0176       655.345       -0.00         24.0176       655.345       -0.00         24.0176       655.345       -0.00         24.0176       655.345       -0.00         24.0176       655.345       -0.00         24.0176       655.345       -0.00         24.057       70.243       655.345         24.056       70.263       -0.00         24.057       655.345       -0.00         24.056       70.263       -0.00         24.051       70.263       -0.00         24.056       655.346       -0.00         24.057       70.00       -0.00         24.056       655.346       -0.00         24.0515       70.00       -0.00	36.35	695.33 693.10	NUMBER	(DEG.S R)	(LB/SO IN.
23.5940       652.324       -0.00         21.7466       651.41b       -0.00         23.9031       650.444       -0.00         24.0367       650.120       0.00         24.3129       650.345       0.00         24.5143       650.345       0.00         24.5143       650.345       0.00         24.5143       655.345       -0.00         24.5143       655.345       -0.00         24.5143       655.345       -0.00         24.5143       655.345       -0.00         24.5174       703.766       -0.00         24.5181       655.345       -0.00         24.5181       655.345       -0.00         24.5181       655.345       -0.00         24.5181       655.345       -0.00         24.5181       655.345       -0.00         24.5181       655.345       -0.00         24.5194       703.901       -0.00         24.5194       703.901       -0.00         24.5194       703.901       -0.00         24.5194       703.901       -0.00         24.5194       703.901       -0.00         24.5194       703.905	37.74	693.10	0.4447	1071.43	158.6
Z3.7486       651.01b         Z4.0567       650.444         Z4.2057       650.112         Z4.2057       650.112         Z4.2057       650.112         Z4.3143       652.466         Z4.416       652.466         Z4.416       652.466         Z4.417       652.117         Z4.4181       652.466         Z4.5181       652.417         Z4.516       701.2536         Z4.515       702.636         Z4.515       70.00         Z4.555       70.00         Z4.5905 <td></td> <td></td> <td>0.4434</td> <td>1070.89</td> <td>158.6</td>			0.4434	1070.89	158.6
Z4.0567     650.122       Z4.2057     650.122       Z4.2057     650.122       Z4.365143     652.0662       Z4.365143     652.0662       Z4.9591     763.066       Z4.9591     763.766       Z4.9591     763.266       Z4.0693     763.266       Z4.0693     763.266       Z4.0695     763.2636       Z4.0695     763.2636       Z4.0695     763.2636       Z4.0695     763.2636       Z4.0695     763.2636       Z4.0695     763.2636       Z4.0695     7	29.16	631.63	0 • 4 4 2 2	1071.97	158.6
Z4.205     650.112       Z4.3143     652.062       Z4.3143     652.062       Z4.3143     652.062       Z4.9591     7.3.768       Z4.9591     7.3.768       Z4.9591     7.5.263       Z4.556     7.5.263       Z3.4556     7.5.263       Z3.4556     7.5.263       Z3.4556     7.5.263       Z3.4564     -0.00       Z4.5181     655.346       Z4.515     7.12.536       Z4.5355     7.15.346       Z4.5355     7.15.346       Z4.5355     7.15.346       Z4.5555     7.15.3405       Z4.5366     -0.00	25.50	690.92	0.4412	1074.71	158.6
Z4.326.22       650.996       -0.00         Z4.326.22       650.996       -0.00         Z4.9591       7.3.766       655.662         Z4.9591       7.3.766       -0.00         Z4.9591       7.5.263       -0.00         Z4.9591       7.5.263       -0.00         Z4.9591       7.5.263       -0.00         Z4.9591       7.5.263       -0.00         Z4.556       7.5.263       -0.00         Z3.4556       7.5.263       -0.00         Z3.4556       7.5.263       -0.00         Z4.5181       655.340       -0.00         Z4.5194       7.12.356       -0.00         Z4.555       7.15.915       -0.00         Z4.555       7.15.915       -0.00         Z3.615       7.15.915       -0.00         Z4.555       7.15.915       -0.00         Z4.5905       -0.00 <td>52+03</td> <td>690.47</td> <td>0.4403</td> <td>1077.57</td> <td>158.7</td>	52+03	690.47	0.4403	1077.57	158.7
24.554       652.662       -0.00         24.6564       655.365       55.365         24.6564       655.365       -0.00         24.656       763.066       -0.00         24.556       765.263       -0.00         24.556       765.263       -0.00         24.556       765.263       -0.00         24.556       765.263       -0.00         23.6693       765.263       -0.00         23.769       763.901       -0.00         23.9145       760.662       -0.00         24.5181       655.340       -0.00         24.5194       761.264       -0.00         24.5194       761.264       -0.00         24.5194       763.901       -0.00         24.5194       765.905       -0.00         24.5194       765.905       -0.00         24.5194       765.905       -0.00         24.5194       765.905       -0.00         24.5194       765.905       -0.00         24.5105       -0.00       -0.00         24.5105       -0.00       -0.00         24.5905       -0.00       -0.00         25.57777       -0.00       -0.0	10.40	690.57	0.4395	1080.37	158.7
24.9591       7(3.766       55.365       -0.00         24.9591       7(3.766       55.365       -0.00         23.4556       7(5.263       7(5.263       -0.00         23.4556       7(5.263       7(5.263       -0.00         23.4556       7(5.263       7(5.263       -0.00         23.4556       7(2.717       -0.00       -0.00         23.759       7(2.717       -0.00       -0.00         24.5191       655.340       -0.00       -0.00         24.5194       7(1.536       -0.00       -0.00         24.5194       7(1.536       -0.00       -0.00         24.5194       7(1.536       -0.00       -0.00         24.515       7(5.536       -0.00       -0.00         24.555       7(5.536       -0.00       -0.00         23.6155       7(5.536       -0.00       -0.00         23.6155       7(5.536       -0.00       -0.00         23.6155       7(5.536       -0.00       -0.00         23.6255       7(5.915       -0.00       -0.00         23.6155       7(5.915       -0.00       -0.00         23.6155       7(5.915       -0.00       -0.00 </td <td>14•41</td> <td>01.140</td> <td>0.4390</td> <td>1086.38</td> <td>158.7</td>	14•41	01.140	0.4390	1086.38	158.7
24.9176       655.006       -0.00         24.9591       7.5.263       7.5.263         23.9556       7.5.263       7.6.00         23.9556       7.5.263       7.6.00         23.9145       7.6.264       -0.00         23.9145       7.6.263       7.6.263         23.9145       7.6.263       -0.00         23.9145       7.6.263       -0.00         23.9145       7.60.662       -0.00         23.9167       655.340       -0.00         24.2181       655.340       -0.00         24.5181       655.340       -0.00         24.5166       7.12.366       -0.00         24.9694       7.12.366       -0.00         24.9694       7.5.915       -0.00         23.6255       7.5.915       -0.00         24.9694       7.5.915       -0.00         23.6156       -0.00       -0.00         23.6155       7.5.915       -0.00         23.6156       -0.00       -0.00         24.9694       -0.00       -0.00         23.6156       -0.00       -0.00         23.6156       -0.00       -0.00         24.969       -0.00	11•30 7 b2	- 72. 4 B	C. 4 385	1043.97	158.7
24.9591       7(3.766       -0.00         23.4556       7(5.2c3       -0.00         23.4556       7(5.2c3       -0.00         23.9145       7(2.467       -0.00         23.9145       7(2.467       -0.00         23.9145       7(2.467       -0.00         23.9145       7(0.502       -0.00         23.9145       7(0.502       -0.00         24.0657       655.340       -0.00         24.5184       655.340       -0.00         24.5194       7(1.284       -0.00         24.9694       7(1.284       -0.00         24.9694       7(5.915       -0.00         24.9694       7(5.915       -0.00         24.9694       7(5.915       -0.00         23.4714       7(5.915       -0.00         23.4714       7(5.915       -0.00         23.4714       7(5.915       -0.00         23.4755       7(5.915       -0.00         23.4755       7(5.915       -0.00         24.9694       -0.00       -0.00         23.6755       7(5.915       -0.00         23.6755       7(5.915       -0.00         24.9695       -0.00	4.27	400,004	2064-0	1117 21	1-26-1
23.4556       7C5.263       -0.00         23.6693       7C5.263       -0.00         23.7624       7C0.567       -0.00         23.7625       7C0.567       -0.00         23.7624       7C0.563       -0.00         24.0067       655.340       -0.00         24.519       655.340       -0.00         24.519       655.340       -0.00         24.519       657.356       -0.00         24.519       659.736       -0.00         24.519       659.736       -0.00         24.515       7C5.536       -0.00         24.405       7C5.915       -0.00         24.515       7C5.915       -0.00         25.5177       7C5.915       -0.00         23.475       7C5.915       -0.00	0- 10	703.79	0-4379	1133.58	159.7
Z3.4556       7(5.263       -0.00         Z3.6093       7(5.117       -0.00         Z3.6093       7(5.117       -0.00         Z3.6145       7(1.551       -0.00         Z3.9145       7(1.551       -0.00         Z3.9145       7(1.551       -0.00         Z3.9145       7(1.553       -0.00         Z4.5194       7(1.536       -0.00         Z4.5194       7(1.536       -0.00         Z4.5195       7(1.536       -0.00         Z4.5195       7(1.536       -0.00         Z4.5195       7(2.5905       -0.00         Z4.5174       7(5.915       -0.00         Z4.5174       7(5.915       -0.00	STATION NUM	IB.ER 21			
23.6093       762.117       -0.00         23.7624       762.457       762.5717         23.9145       760.557       -0.00         24.0657       655.340       -0.00         24.0657       655.340       -0.00         24.01657       655.340       -0.00         24.5194       761.284       -0.00         24.5194       761.284       -0.00         24.5194       761.284       -0.00         24.5194       761.284       -0.00         24.5194       761.284       -0.00         24.5194       761.284       -0.00         24.5194       761.536       -0.00         24.905       765.905       -0.00         23.6255       765.905       -0.00         23.6255       765.905       -0.00	01.21	76.205	0.4514	1071 43	160 4
23-7624       763-467       -0.00         23-9145       760.662       -0.00         24.0657       655.340       -0.00         24.057       655.340       -0.00         24.5194       761.284       -0.00         24.5194       761.284       -0.00         24.5194       761.284       -0.00         24.5194       761.284       -0.00         24.5194       761.284       -0.00         24.5195       763.901       -0.00         24.905       765.905       -0.00         23.4774       765.915       -0.00	11-07	702.80	0.4498	1070.89	158.6
23.9145       700.002       -0.00         24.0657       655.340       -0.00         24.2181       655.340       -0.00         24.350       659.736       -0.00         24.4694       701.284       -0.00         24.4694       712.366       -0.00         24.4694       712.366       -0.00         23.4774       705.915       -0.00         23.4774       705.915       -0.00	65.5	701-04	0.4484	1071.97	158.4
24.0657       655.340       -0.00         24.2181       655.340       -0.00         24.340       659.736       -0.00         24.45196       701.284       -0.00         24.4696       701.284       -0.00         24.4696       712.366       -0.00         23.472       755.915       -0.00         23.472       755.915       -0.00         23.474       755.915       -0.00	8.86	700-06	0-4472	1074-71	158.6
24.2181       659.170       -0.00         24.5194       761.284       -0.00         24.5194       761.284       -0.00         24.9694       712.366       -0.00         24.9694       712.366       -0.00         24.9694       712.366       -0.00         23.4727       705.915       -0.00         23.4727       705.915       -0.00         23.4776       705.915       -0.00	7.70	699.38	0.4462	1077.57	158-7
24.3590       659.736       -0.00         24.5194       701.284       -0.00         24.5194       701.284       -0.00         24.9694       712.356       -0.00         24.9694       712.356       -0.00         23.4727       705.915       -0.00         23.4727       705.915       -0.00         23.4774       705.915       -0.00	6.50	699.10	0.4453	1080.87	158.7
24.5194       761.284       -0.00         24.9694       767.536       -0.00         24.9694       712.366       -0.00         24.9694       712.366       -0.00         23.4727       705.915       -0.00         23.4774       705.915       -0.00	5.28	699 <u>.7</u> 6	0-446	1086.38	158.7
Z4.9095     703.901     -0.00       Z4.9694     712.356     -0.00       Z4.9694     712.356     -0.00       Z3.4727     705.915     -0.00       Z3.4774     705.915     -0.00	4.04	701.30	0.4441	1093.97	158.7
24.4694       712.364       -0.00         24.4694       712.364       -0.00         23.4727       705.915       -0.00         23.4774       705.905       -0.00	2 - 79	103.91	0.4437	1104.33	158.7
23.4727 705.915 -0.00 23.4727 705.915 -0.00 23.6255 705.905 -0.00	1•52 1	707.54	0-4435	1117.31	158.7
23.4727 705.915 -0.00 23.6255 705.905 -0.00 23.7774 706.415 -0.00	U.23	712.37	0.4435	1133.58	158.7
23.4727 705.915 -0.00 23.4255 705.905 -0.00 23.7774 705.905 -0.00	STATION NUM	IBER 22			
23.6255 705.915 -0.00 23.6255 705.905 -0.00 23.7774 705.905 -0.00					
23+8235 100-00-00-00-00-00-00-00-00-00-00-00-00-	n <b>n•n</b>	26.001	0.4518	1071.43	158.6
		16.07	0.4519	1070.89	158.6
			0.4060	1011.97	158.5
	25 <b>*2</b> c	101-44 105	0.4361	1014-11	156.6
74-2284 762-702 -0.00		10-001	0.4776 0.4673	1011.571 1000 07	
24.3774 711.581 -0.00	00-00	711.58	0.452	1086.38 1086.38	158.7
24.5259 714.654 -0.00	00-0	714-09	0.4405	1002.07	1.001
-0.00	0-00	717-43	0-4526	1104.33	158.7
24.8219 7.11.552 -0.00	00.0	721.55	0.4526	1117.31	158.7
24-969R 24-025	00.00	726.43	0 4637		

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EXAMPLE - AXIAL VELOCITY RATIO SPECIFIED (PROGRAM 111)

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****---*** 4DVANCEn MULTISTAGE 4X[AL-FL04 COMPRESS3? ***---****

**--** ANALYSIS AT DESIGN CONDITIONS **--**

----I N P U T U A T A----

THE MACHINE IS TO MAVE NO MARE THAM TO STAGES CALCULATIONS ARE TO BE PERFORMED AT 11 STREAMLINES THE TWLET MASS FLOW RATE IS 401.00 LB/SEC MOLECULAR WEIGHT DF THE FLUID IS 26.97 AXIAL VELOCITY TOLERANCE IS 0.0100 THE EFFICIENCY TOLERANCE IS 0.01C0 THE AXIAL VELOCITY RATIO TOLERANCE IS 0.0100 THE AXIAL VELOCITY RATIO TOLERANCE IS 0.0100

A TOTAL PRESSURE RATIN OF 9.000 IS DESIREN THE INLET TOTAL PRESSURE IS 14.77 LAS/S2 IN. THE INLET TOTAL TEMPERATURE IS F18.69 DEG. 7 THE TIP SPEED IS 1200.7 FT./SEC. THE LOADING LIMIT TOLERANCE IS 0.0100 THE CONTINUITY TOLERANCE IS 0.0007

THE FRACTION OF THE TOTAL MASS FLOW BETWEEN THE HUR AND THE 1-TH STREAMLINE IS.

1.000 006*0 0.800 0•70U 0.600 0.500 0.400 0.300 **0• 2**00 0.100 0-000 THE INLET GUIDE VANE LOUD COEFFICIENTS FOR THE 11 STREAMLINES ARE (FROM HUB TO TIP)

0*000C-0*0000-0*0000-0*0000-0*000C-0*0300-0*3000-0*30000-0*30000-0*03000

-J.000007--39 " u -0.0000000E-38 ×0 EXIT 11 60 THE INLEF GUIDE VANE **A** = -0.000000E-38

THE SPECIFIC HEAT PULYNCMIAL IS IN THE FOLLOWING FORM

Cr 25 .0 ).[399]E-09¢T¢≄3 + -3.7R]56E-13¢T¢≭4 + ∩.!5Q43F-1A¢T¢‡5 THE RAILS OF THE AREAS OF THE LAST & STATICNS TOUTHE AREA OF THE LAST STATOR EXIT ARE 0.04000. 0.9300. C.21962E-C4#T + -0.87791E-07#T##2 + = 0.23747E 00 + Ĵ

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		INLET	DE SCRI PTI DI	<i>1</i>		
STATION ND.	AXIAL CORRDINATE (IN.)	HUB RADIUS	HUB BLOCKI FACTOR	AGE TTP RADIUS (IN.)	TIP RLUCKA Factor	ߣ
	0, 100 2, 900 6, 100 9, 000 12, 000	7.000 7.415 8.580 8.580 10.350	1.000 1.000 1.000 1.000 0.903	25.00 25.200 25.200 75.000	1.000 1.000 1.000 1.000 1.000 1.000 1.000	
		** GEUME	TRIC PARAMETERS	** 3		
AXIAL VE Ratio (0	STEL ASPECT	I RAFIO	HUB RANP	HUB BLOCKAGE FACTOR	TEP RAMP Angle Limit	110 ALT FACT

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BLADE 904 Exit sta.	AKIAL VEL- Ratio (0/1)	ASPECT RAFIC	HUB RAND . ANGLE LIWIT	HUB BLOCKAGE Factor	TIP RAMP Angle Limit	TIP RLUCKAGF Factop
Ŷ	0* 950	4.000	40,000	Û. 992	02.000	0-997
-	1.050	4.000	37.290	0-99.0		
æ	0. 550	. 3. 500	34.500	0.987	00000	0.087
0 [,]	1.050	3.500	31.700	0.985	0.000	
10	0.950	2.500	28.990	0.983	0-000	
11	1.050	2.500	25.200	0.780	0.000	
12	0.950	2.500	23.400	0. 480	000.00	089.00
13	1.050	2.500	20. 610	0.980	00000	Cap C
14	C. 950	2.500	17.900	0.980	0.000	
15	1. C5C	2.500	15.100	0.980	0.000	0 a B O
16	C. 950	2.500	12.300	0.980	0000	
17	1.050	2.500	9. 500	0.980	00000	
19	0.550	2.500	<b>4.</b> 800	0.987	0, 00	
19	1.050	2.500	4.000	0.980	0.000	1.987
20	C* 250	2.500	. 4.000	0.980	0.000	0.080
21	1.650	2.500	4.030	0.980	00000	100
52	C. 950	2.500	4.000	0- 780	0-100	0.95
23	1.050	2.500	4.000	0-9-0	0-0-0	
24	C- 950	2.500	4.000	0.983	000 0	0.23
25	1,050	2.500	4.000	0* 980	0-0-0	Cie C
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 .... LOSS DATA SET NUMBER 1 ....

LO PERCENT	4T 50 PERCENT	AT 90 PERCENT	(OF 9LADE HEIGHT FRJM The Geometric 408. )
	0-0060	0.0080	
	0-0060	0.0053	
	0.0068	0.0093	-
	0. 3072	0.0095	
	0.0077	0.0103	
	0.0080	0.0114	
	0.0089	0.0127	
	0.0097	1+10*0	
	0.010P	0.0159	
	0°0139	0.0143	
	0,0134	0.0205	
	0.0152	0.0233	
	0.0176	0.0285	
	0.0204	0.0351	
	0.0236	0.0424	
	0.0277	0.0515	
	0.0330	0.0629	
	0.0397	0.0764	
	0.0464	\$260°0	
	0.0531	0.1084	

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	AT LO PERCENT	AI 50 PERCENS	AT 90 PERCENT	(DE BLADE HEIGHT FROM The Genweiric Hur. )
0.000	0.0060	0.0064	0.0063	
001-0	0-0060	0-0060	0.0063	
0-150	0.0068	0.006B	0.063	•
0.200	0.0072	0.0072	G. 0072	
0.250	0-C017	0.0077	0.0077	
0.300	0.0080	0.00F0	0.0083	
0*350	0.0089	0.0089	0.0089	
0.400	0.0097	0.0097	0.0097	
0.450	0-0108	0.0108	0.0108	
0.500	6.10.0.	0.0119	0.0113	
0-550	0-01 J	0.0134	0.0134	
0.600	0.0152	0.0152	0.0152	
0.650	0.6176	0.0176	0.0175	
0.700	0. 02 04	0.0204	0.0204	
0.750	0.0236	0.0236	0.0235	
0.800	4.0277	0.0277	0.0277	
0-850	0.0350	0-0330.	0.0330	
0.900	0.6397	1 960 ° 0	0.9397	
0.950	0.0464	0.0464	0.0464	
1-000	C. C531	0.0531	0.0531	

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TATACN NUMBER 1

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Set.2	STREAMLINE	ABS. MACH	ABS. VEL.	AXIAL VFL.	RADIAL VEL.	ST PEANLINE	STRFAML INF	FLOW NGLF
	RADIUS (IN.)	NUPBER	(FT/SEC)	(FT/SEC)	(FT/ScC)	SLJPF (DEGS)	CURVATJRF 1/1%-	()FGREES)
•	0 5050	0.36.0	376.17	117.01	154.8544	76.07	0.04873	6. 3
× (		205.0	415.14	415.58	129.0193	1 46	0.0¤958	0.0
<b>N</b> (		0.435	446.63	454, 45	104.1973	15.19	0.09565	¢•0
<b>n</b> v	740104T	2442	486.15	478,84	84.0020	10.26	£0000°0	0° U
r v	17 4545	0-456	498.97	494.47	66.8783	8.00	1*61 0*0	U ° C
	10-1056	0.466	507.54	504 . A6	52.0842	<b>6.16</b>	0.04654	0.0
9 9	37 6 356	0.470	513.22	£11.72	1261.96	4.60	0.05278	<b>د</b> •0
- 4	2672.02	0.473	516-80	516.05	27.6891	3. 24	0.C38R9	0.0
6 G	2828 66	0.475	518.80	518. 50	17.4772	2.05	0.02531	0.0
	1440.55	0.476	519-53	519.46	8.2994	0.97	0.01230	0,0
)	25-0003	0.475	519.21	519.21	<b>J.</b> 9000	0.00	0.0000	0.0
5.1.2	STRFAMIENE	TOTAL PRES.	TUTAL TEMP.					
	RADIUS (IN.)	(La/Su IN.)	(DEGRFES)					
-	A. 58(M	14.70	518.59					
• •	11 8726	14.70	518-69					
4	6710-11							
n,	14:1042	14 • 7 0	40°01C					
4	16.0368	14.70	518-69					
<b>.</b>	17.6545	14.70	518.69					
9	19.1054	14.70	518.69					
-	20.4356	14.70	518.59					
• @	71.6736	14.70	518.69					
9 0			Ala AC					
<b>?</b>	626 8+ 77							
9	23.9440	14.70	60.810					
11	25.0000	14.70	518.69					
	NUL AL LUN	MIMAFR 4						
5.4.2	<b>STREAM FNE</b>	ABS. PACH	ABS. VEL.	AXIAL VEL.	RADIAL VEL.	STRFAMLINF	STPFAML INE	FLOW ANGLE
2	RADIUS (IN.	NUMBER	IFT/SEC)	(FT/SEC)	(FT/SEC)	SLJPF 1 DEGS	C'JR VAT JRE	(JEGSGES)
						06 65	- MINI	
	10.3500	0.349	<b>584.8</b> 7	5F * 7 7 9				
2	13.2804	0.419	459 <b>.</b> 86	417.20	193.4427			
	15.3385	0.463	506.23	477.45	163.2307	19.41	10000-0-	0.0
1	17.0049	0.493	537.44	518.27	142.2514	15.35	-0.02878	0*0
. 10	18-4447	0-514	559.25	546.87	117.0311	12.09	-0.33061	0.0
	10.7338	0.529	574.61	567.0]	93.LIRT	96 96	-0 <b>-</b> 0385	0.0
	2410.05	0.534	585.24	580.55	70.6847	6.95	-0.07515	0.0
• •	3010 20	0.546	597.74	590.15	C647.94	4.93	7 5040-0-	0°0
5 6	22 AGC	0.550	596.38	595. 61	30.2646	2.91	-0-01519	0.0
•		0 440	568.19	598.07	12.1540	1.17	-0.01004	0.0
2:		1 553	508.10	SCP. OB	-4-5769	-0-45	-0-n0521	0.0
					1	,		

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TGTAL TEMF. (DEGRCES) 513.65 518.69 519.69 519.69 518.69 518.69 518.69 518.69

14-70 14-70 14-70 14-70 14-70 14-70 14-70 14-70

STPEAMLINE 1 RADIUS (IN.) ( '10.35C0 13.28C4 15.3385 17.0049 18.4442 19.7323 20.9167 22.0195

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TCTAL PRES.

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518.69 518.69 518.69 14.70 14.70 14.70 23.0558 24.0502 25.0000

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MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO.         MO. <th>Sut.</th> <th>STREAML AF</th> <th>ASC MACU</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	Sut.	STREAML AF	ASC MACU						
2         11.5934         0.530         575.54         450.17         531.563         35.54         0.01175         0.0357         0.01175           3         10.5836         0.560         575.54         450.17         531.51         351.56         533.55         575.54         450.17         531.57         541.51         531.57         541.51         531.57         541.51         531.57         541.51         541.57         541.51         541.57         541.51         541.57         541.51         541.57         541.51         541.57         541.51         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57         541.57	ů.	RADIUS ( IN-1	NIMAFR	ALTA VELA	AXIAL VEL.	RADIA' VEL.	STREAYLINE	STREAMLINE	FI ON ANGLE
1         12.593         0.530         575.54         450.1         394.56         1/14           2         10.687         0.530         575.54         450.1         581.51         394.56         0.01377         -0.0           4         11.6882         0.597         533.70         591.3169         27.13         0.0357         -0.0           5         11.6882         0.597         533.70         591.359         28.069         57.13         90.357         -0.0           7         20.0911         0.5787         17.79         0.04377         -0.0         -0.0           7         21.1065         0.6117         557.43         189.2083         10.226         0.003471         -0.0           7         21.1065         0.6117         557.43         18.2083         55.527         10.226         0.003471         -0.0           7         21.1065         0.6117         557.33         15.2134         1.17         0.00333         -0.0           7         21.1065         11.17         557.57         10.0124         0.00333         -0.0         -0.0           8         21.1065         11.112         557.57         10.0125         -0.0         -0.0				1.1.2.2.2.1	(F1/SFC)	(FT/SEC)	SLJPE (DEG)	CURVATJRE	(DESTEES)
2         11.5547         0.590         57.17         791.3169         39.54         0.01375         -0.0           5         11.5735         0.590         57.17         791.3169         22.13         0.01375         -0.0           5         11.5735         0.590         53.717         791.3169         22.13         0.01375         -0.0           7         21.01917         0.561         53.717         791.3157         117.79         0.04307         -0.0           7         21.0193         0.611         657.81         59.1571         13.45         0.04307         -0.0           7         21.0193         0.611         657.81         15.2983         10.25         0.04307         -0.0           7         21.0163         0.0111         557.81         53.45         0.02313         0.04307         -0.0           7         21.0163         0.0111         249.52         113.2138         10.25         0.04307         -0.0           7         21.0403         0.0114         0.01144         0.01144         -0.0         0.01313           11         24.952         0.0115         0.01144         0.01144         -0.0         0.01144           21.112 </td <td>-</td> <td>17.6936</td> <td>0.630</td> <td></td> <td></td> <td></td> <td></td> <td>1/14-</td> <td></td>	-	17.6936	0.630					1/14-	
16.734         0.590         533.70         791.3169         28.66         0.0357         0.0377           17         21.1065         0.591         641.75         581.77         581.57         0.04307         0.04307         0.04307         0.04307         0.00357         0.04307         0.00357         0.04307         0.00357         0.04307         0.00357         0.04307         0.00357         0.04307         0.00307         0.04307         0.000         0.01307         0.04307         0.00357         0.00307         0.00357         0.00307         0.00357         0.00307         0.00357         0.00307         0.00357         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327         0.00327 <t< td=""><td></td><td></td><td></td><td>212+34</td><td>450.1</td><td>359.5633</td><td>38.54</td><td>0.01276</td><td></td></t<>				212+34	450.1	359.5633	38.54	0.01276	
No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No         No<	•	14-0241	0.561	6C8.05	533.70	0712 100			0.1-
•         IT.0842         0.597         0.74.4         71.11         23.13         0.04397         0.04397         0.04397         0.04357         -0.0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0          0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0<	m	16.2836	0.580	627.17			00.07	0.03528	0.01
7       10.61       647.67       10.67       10.67       117.79       0.04358       117.79       0.04358       -0.0         7       20.0917       0.607       657.87       730.35       149.5522       117.79       0.04358       -0.0         7       21.1439       0.607       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.89       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.89       657.87       657.87       657.89       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87       657.87	4	17.6847	0.502		12+300	235.0869	22.13	0.04302	
7         20.001         0.01.85         (30.35)         149.5652         13.45         0.0402         0.0402           7         21.1065         0.61         657.87         (30.35)         115.2883         10.26         0.02139         0.0002           9         23.1165         0.61         657.87         653.43         115.2883         10.26         0.01484         0.00139           9         23.1461         0.617         657.87         655.33         85.7007         7.53         0.02139         0.0           11         24.062         0.617         54.443         13.2138         13.2138         10.26         0.01484         -0.0           11         24.062         0.617         55.138         55.337         55.138         10.26         0.01484         -0.0           24.050         0.617         56.347         56.337         56.337         56.336         51.25         -0.0           24.051         0.6147         56.347         56.347         56.347         50.01484         -0.0           24.052         0.01484         -0.025         0.01484         -0.025         0.01989         -0.0           31.5594         11.17         0.0251         11.17			0.076	0 4 4 4 5	£10,87	189.1357	17.29	0.04350	
7         2.0.071         0.607         553.72         0.43.48         115.298         1.2.2         0.0218         0.0213         0.0213         0.0213         0.0213         0.0213         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02018         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133         0.02133 <th0.02133< th="">         0.021333         0.021333</th0.02133<>	•		0. 601	647.95	1 30. 35	149-5652			0.0-
T         Z1.1065 $9.611$ $657.67$ $657.67$ $657.07$ $17.26$ $0.07471$ $-0.02818$ 9         Z2.1100 $0.0168$ $662.69$ $657.67$ $657.67$ $557.67$ $58.5339$ $5.16$ $0.02818$ $-0.0$ 10 $24.062$ $0.617$ $657.67$ $658.17$ $58.5339$ $5.16$ $0.02139$ $-0.0$ 11 $24.0531$ $0.0517$ $655.33$ $58.5339$ $58.5339$ $5.167$ $0.02139$ $-0.0$ 11 $24.0531$ $0.517$ $58.5337$ $13.2138$ $1.177$ $0.00392$ $-0.0$ 54.47 $10.769$ $663.73$ $13.2138$ $1.177$ $0.00392$ $-0.0$ 51.12594 $10.767$ $667.69$ $663.757$ $-0.000$ $0.0784$ $-0.00323$ 51.12694 $10.767$ $10.767$ $10.769$ $0.0037$ $0.0037$ $0.0037$ 51.12677 $10.767$ $0.0000$ $0.927$ 0.769         0.0027         0.0027 <td>0</td> <td>2160.02</td> <td>0.607</td> <td>553.72</td> <td>67 E24</td> <td></td> <td></td> <td>220+0°0</td> <td>0-0-</td>	0	2160.02	0.607	553.72	67 E24			220+0°0	0-0-
7         21.13         1.17         0.02818         -0.0           9         21.1439         0.617         653.07         13.2136         1.17         0.02818         -0.0           9         21.1439         0.617         653.07         13.2136         1.17         0.02818         -0.0           11         24.9531         0.617         663.66         663.73         13.2136         1.17         0.01393         -0.0           11         24.9531         0.617         663.66         663.73         13.2136         1.17         0.00393         -0.0           11         24.9531         0.6174         564.40         -6.084         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.01393         -0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0         0.0	<b>}~~</b>	21.1665	0.611			5967°C71	10.26	0°03471	-0-0-
9       21.11439       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.01143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143       0.010143		27.140			56.200	85.2007	7.53	0.02818	
V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V         V	• •			660.76	658.17	58.5339	5.15		
10         24.9662         0.617         663.86         563.73         13.2138         1.17         0.00880         -9.0           11         24.9531         0.517         663.65         563.73         13.2138         1.17         0.00880         -9.0           5.L<5784         10.517         663.65         563.73         13.2138         1.17         0.00880         -9.0           5.L<5784         1074L         FFS         TGTAL FEWP         REL         VEL         MHRL VEL         RELATIVE         REL         -0.0383         -9.0           3.L<57934         10.570         518.69         934.65         -0.000         0.7689         466.405         674.483         -9.0           12.5934         14.70         518.69         979.81         -0.000         0.7689         466.405         674.483         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0         -0.0<	Þ	66 9 1 4 1 7	0.615	662.69	661-79	14 4673			0-0-
11         24.9531         0.00880         -0.52         0.00880         -0.0           5.L. STREAMLING         T0TAL         FES.         TGTAL         TEWPES.         TGTAL         TEWPES.         -0.52         0.00383         -0.52         0.00383         -0.0         -0.0           8.L. STREAMLING         T0TAL         PES.         TGTAL         TEWP.         REL.         VEL.         WHEL VEL.         MACH         VE.         -0.0383         -0.03         -0.03         -0.03         -0.03         -0.03         -0.00         -0.0383         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -0.03         -	2	24 - 7662	0.617	461 44			60.5	0.01484	-0-0-
Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu       Solu	11	76.9531			61.600	13.2138	1.17	0.00880	
SoluSTREAMLINGTUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.TUTALPPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.PPES.	} <i>.</i>		176.00	64440	564.40	-6.0844	-0.52	0.00383	0.0
M3.       RADIUS (1%.) (18/50 IN.)       CECRFES)       FT/SEC1       RFLATIVE       RFLATIVE       RFLATIVE       RFLATIVE       RFLATIVE       RFL.       FUN         2       14.570       518.69       939.65       -0.000       0.769       46.405       500.483         2       14.570       518.69       939.65       -0.000       0.769       46.405       500.483         3       16.6       14.70       518.69       979.81       -0.000       0.769       46.405       500.483         4       11.694.2       14.70       518.69       1002.13       -0.000       0.958       40.513       70326         5       18.693.4       10.62.77       -0.000       0.977       51.256       781.513         5       18.693.4       10.62.77       -0.000       0.985       54.525       905.089         5       20.0917       14.70       518.69       10.62.77       -0.000       0.985       54.525       905.077         6       20.0917       14.70       518.69       1116.31       -0.000       1.015.997       54.525       905.076         7       21.1665       14.70       518.69       12210.39       -0.000       1.015.495 <t< td=""><td>S.L.</td><td>STREAMLINC</td><td>TUTAL PPES.</td><td>TRTAL TEMO</td><td>961 111</td><td></td><td></td><td></td><td></td></t<>	S.L.	STREAMLINC	TUTAL PPES.	TRTAL TEMO	961 111				
2       12.5934       14.70       518.69       834.65       -0.00       0.768       46.405       604.487         3       16.7       6       14.70       518.69       834.65       -0.00       0.768       46.405       604.487         4       16.7       6       14.70       518.69       834.65       -0.00       0.927       512.56       70326         5       16.7       6       14.70       518.69       1062.77       -0.00       0.927       51.256       70326         5       18.9334       14.70       518.69       1062.77       -0.00       0.985       54.657       964.407         5       14.70       518.69       1116.31       -0.00       0.985       54.525       903.089         6       20.0917       14.70       518.69       1116.31       -0.00       1.015       55.867       964.407         7       21.1665       14.70       518.69       1210.39       -0.00       1.015       55.867       964.407         7       22.1805       14.70       518.69       1250.39       1.020       1.124       57.076       1064.607         1       24.525       0.00       1.126.03       -0.00	"CN	RADIUS (IN.)			KEL. VLL.	WHIRL VEL,	REL AT I VE	REL. FLOW	Mussi speed
2       14.747       1.4.70       518.69       834.65       -0.00       0.769       46.405       504.483         3       16.7       518.69       979.81       -0.00       0.927       51.256       703.483         4       17.694       14.70       518.69       979.81       -0.00       0.927       51.256       703.483         5       18.9354       14.70       518.69       1002.13       -0.00       0.927       51.256       703.483         5       18.9354       14.70       518.69       1002.13       -0.00       0.927       51.256       703.483         6       20.0917       14.70       518.69       1116.31       -0.00       0.985       54.575       903.089         7       21.1665       14.70       518.69       1116.31       -0.00       1.015       55.867       964.407         7       21.1665       14.70       518.69       1210.39       -0.00       1.016.407       55.867       964.407         7       21.1665       14.70       518.69       1210.39       -0.00       1.12124       57.676       964.407         8       23.1439       14.70       518.69       12323.55       -0.00       1	. 17	13 6036		I DOUNT FST	IF I/SEC)	(FT/SEC)	MACH ND.	ANG COLCO	
14.774       14.70       518.69       979.81       -0.00       0.958       49.157       70326         4       17.684.2       14.70       518.69       1002.13       -0.00       0.958       49.157       70326         5       18.70       518.69       1002.13       -0.00       0.957       51.256       781.513         5       18.9334       14.70       518.69       1062.77       -0.00       0.985       54.575       900.0842         5       18.9334       14.70       518.69       1062.77       -0.00       0.985       54.575       900.0842         6       20.0917       14.70       518.69       1116.31       -0.00       0.985       54.575       904.407         7       21.1667       14.70       518.69       1116.33       -0.00       1.015.992       964.407         7       21.1667       14.70       518.69       11165.09       1.016.992       964.407         8       22.1801       14.70       518.69       1210.39       -0.00       1.124       57.076       1015.992         9       23.1439       14.70       518.69       1253.355       -0.00       1.124       59.176       1064.407	• •		0/**1	918.69	834.65	-0*00	0.764	47 20E	
<b>b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b b </b>	Y.	しざしからする	14.70	518.69	929.81	-0-			004.483
4       17.6942       19.70       518.69       10.6277       71.256       781.613         5       18.9334       14.70       518.69       10.62.77       -0.00       0.985       54.6525       964.407         6       20.0917       14.70       518.69       1116.31       -0.00       0.985       54.6525       964.407         7       21.01665       14.70       518.69       1116.31       -0.00       1.081       55.867       964.407         7       21.01665       14.70       518.69       1116.31       -0.00       1.081       55.867       964.407         8       22.0181       14.70       518.69       1210.39       -0.00       1.0181       55.867       964.407         8       23.01801       14.70       518.69       1210.39       -0.00       1.1124       57.676       905.645         9       24.662       14.70       518.69       12233.55       -0.00       1.154       59.174       1066.645         10       24.953       14.70       518.69       12323.55       -0.00       1.233       59.174       1066.645         11       24.953       14.70       518.69       136.77       -0.00       1.233	*	16.7 .6	14.70	514.69	1003 13				703.426
5       18.9394       14.70       518.69       1016.31       -0.00       0.985       53.007       846.942         7       21.1665       14.70       518.69       1116.31       -9.00       1.035       54.575       909.089         7       21.1665       14.70       518.69       1116.31       -9.00       1.035       54.575       909.089         7       21.1665       14.70       518.69       11165.09       -0.00       1.081       55.867       964.407         8       22.1601       14.70       518.69       1210.39       -0.00       1.124       57.676       1015.992         9       23.1439       14.70       518.69       1253.03       -0.00       1.124       58.174       1064.645         10       24.0662       14.70       518.69       1253.05       -0.00       1.233       59°.174       1064.645         11       24.0662       14.70       518.69       1369.770       -0.00       1.233       59°.175       1110.907         11       24.0662       14.70       518.69       1369.770       -0.000       1.233       59°.175       1110.907	4	17-6942	14.70			00.0-	126-0	51 25E	781.513
6       20.0917       1.4.70       518.69       1116.31       -9.00       1.015       54.525       904.035         7       21.1665       1.4.70       518.69       11165.09       -0.00       1.081       55.867       964.407         8       22.1801       14.70       518.69       1210.39       -0.00       1.124       57.676       1015.992         9       23.1439       14.70       518.69       1210.33       -0.00       1.124       58.174       1064.645         10       24.657       1233.03       -0.00       1.124       58.174       1064.645         10       24.6562       14.70       518.69       12253.03       -0.00       1.154       59.174       1064.645         10       24.6562       14.70       518.69       1232.355       -0.00       1.233       59°.183       1110.907         11       24.9531       14.70       518.69       1369.70       -0.000       1.233       59°.175       1155.176	-	18.03C4		20012	11.2401	-0.00	0.985	53.007	848.847
7       210,001       1,061       55,86       964,407         7       21,1665       14,70       518,69       1210,39       -0.00       1.081       55,86       964,407         8       22,1801       14,70       518,69       1210,39       -0.00       1.124       57,576       1015,992         9       23,1439       14,70       518,69       12233,55       -0.00       1.124       58.174       1064,645         10       24,0662       14,70       518,69       12233,55       -0.00       1.231       59.183       1110,907         10       24,0662       14,70       518,69       1332,35       -0.00       1.233       59.183       1110,907         11       24,05631       14,70       518,69       1362,70       -0.00       1.233       59.183       1110,907         11       24,9531       14,70       518,69       1369,70       -0.00       1.233       50.115       1155,176       1155,176	• •			69.816	1116.31	-0.00	1.035	54.435	
7         21.1665         14.70         518.67         1210.39         -0.00         1.124         57.67         964.407           8         22.1801         14.70         518.69         1210.39         -0.00         1.124         57.676         1015.992           9         23.1439         14.70         518.69         1253.03         -0.00         1.124         57.676         1015.992           9         23.1439         14.70         518.69         1253.03         -0.00         1.124         59.174         1065.645           10         24.0562         14.70         518.69         1332.35         -0.00         1.233         59.183         1110.907           11         24.9531         14.70         518.69         1369.70         -0.00         1.233         60.115         1155.176	0	1160.02	14.70	518.69	11(5.09	-0.00			5 80 ° 707
8       22.018.01       14.70       518.69       1253.03       -0.00       1.124       57.676       1015.992         9       23.01439       14.70       518.69       1253.03       -0.00       1.154       58.174       1064.645         9       23.01439       14.70       518.69       1233.55       -0.00       1.154       58.174       1064.645         10       24.06662       14.70       518.69       1332.355       -0.00       1.233       59°.183       1110.907         11       24.05652       14.70       518.69       1332.355       -0.000       1.233       601.115       1155.176         11       24.95531       14.70       518.69       1369.70       -0.000       1.233       601.115       1155.176	~	21.1665	14.70	518.60	1010 20		10001	308.00	964.407
9     23.1439     14.70     518.63     12.233.55     -0.00     1.154     58.174     1.064.645       10     24.6662     14.70     518.69     12.233.55     -0.00     1.21     59.183     1110.907       11     24.6662     14.70     518.69     1332.35     -0.00     1.233.65     170.907       11     24.9531     14.70     518.69     1369.70     -0.00     1.273     601.1.5     1155.176	8	22.1805	14-70			00*0-	1-124	57.076	1015.992
10     24.6662     14.70     518.69     1332.35     -0.00     1.238     60.15     110.907       11     24.9531     14.70     518.69     1352.35     -0.00     1.238     60.155     1155.176	•	PF 21 FC			1473.03	-0.00	1.154	58.174	1064-645
L 24.9531 14.70 518.69 1332.35 -0.00 1.238 60.115 1155.176	ŝ			50 mg 1 c	1233.55	-0*00	1.201	59.183	1110 007
<b>11 27</b> , 372 14,10 518,69 1369,70 -0.00 1.272 0.00 1.272	2:		14 - 10	518.69	1332.35	-0.00	1.238	20 T	
	11	16 64 . 42	14.70	518.69	1369.70	-0.00	6701		01100011

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###--### FINAL FLOW PARAMETERS FOR STAGE NUMBER 1 ###--###

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RUTOR TIP D-FACTOR LIMIT HUB RELATIVE ELOW ANGLE LIMIT STATOR HUB MACH NUMBER LIMIT Stator HUB D-FACTOR LIMIT Stator HUB D-FACTOR LIMIT MAXIMUM TIP TANGFNTIAL VELOCIS	

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	PROFILE PROFILE	FLGW ANGLE At the shuck	SOL 101 TY	WHIRL VFLOCITY	FLOW ANGLE At the shock	SOLIDITY
< 6 U, O U	-0.000006-38 -0.000006-38 0.170006 01 -0.000006 38	-U.V00C0CE~38 -U.000000E~38 0.374000E 02 0.16600E 02 -0.00000E 02	0.433006 01 0.1000006 01 -0.2528006 01 0.1917006 01 -0.564006 00	A -0.0000075-38 a -0.0000055-38 C 0.0000055-38 D -0.0000055-39 E (-0.0000055-39 E (-0.0000055-39	-0.000005-38 -0.000005-38 0.3550005 02 -0.650005 01	-0.0000006-18 -0.0000006-18 0.1857006 11 -0.1715006 01 0.8540006 00

# +++ STAGE SCALER WUANFITTES +++

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		, n						
	A SP ECT .RAI LO	GEOMETRIC HUB RADIUS (IN.)	GEOMETRIC TIP RAD.(IN.)	HUB RAMP Angle (deg)	TTP RAMP Angle (")EG)	AX [AL I ENGTH [[N.]	MASS FLJW (LR/SFC)	MASS & VE. Ajiabatic fef.
-ROT OR	3.689	15.3432	25.0000	40.000	000.0	3.3883	401-0000	SCOF.0
-STATOR-	000* *	10.4708	25.0000	25.037	0.000	2.4142	0000-104	0.8802
-	EL. RATIO I THE MEAN	HUB BLUCKAGE M FACTUR	TIP BLOCKAGE Factor	MASS AVE. Pr. Ratin	MASS AVE. Temp. Ratio	CJMULATIVE Mass ave. Pr. Ratio	CUMULATIVE MASS AVE. TEMP., PATIN	CUMULATIVE MASS AVE. Adiabatic FFF.
ROT OR	0.944	0.9925	0• ¢925	1.4484	1.1238		1.1239	0.9025
-STATOR-	1 -057	0066*0.	0066*0	1.4450	1.1237	1.4409	1.1237	· 2897 ·
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	STREAMLINE	AXIAL VEL.	WHIRL VEL.	RADIAL VEL.	ARS. YEL.	ABS. MACH	ABS. FLOW	AFL FLOW
NO.	RADIUS LEN.	) (FT/SEC)	IFT/SEC)	(FT/SEC)	(FI/SEC)			
	15.4381	525.795	484 . 67	361-05	AU1 - 074			
2	16-7720	560-145	448.32					268 * 17
	17.0269					1020-0	30° 3172	29.412
				C2 (•12)	621°04/	3 • 6698	33.043	34.955
• •		266.276	ロケ・ナフナ	144.05	743.322	3.6550	÷10°26 .	39.108
<b>n</b> -	116.61	601.228	39.,23	156.70	733.696	0.6463	32,132	47.454
•	2068-02	607.181	378.85	123.64	726.280	1869 ° C.	31.442	10x
~	21.7616	6 10.531	370.69	. 63. 79	720.384	0.6923		47 401
•	22.5958	611.501	365.52	66.55	715.521	0.604		
¢.	23-4002	610.625	362.35	41-59	711.958			
0	24-1804	607-907	361 - 20				120.00	7 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5
ant.	24.9415	603.411	361.92	64.2-	703.633	0.6122	30. 955	54.155
	TOTAL TEMP.	TUTAL DOFC.	401424715	01661010				
	RATIO	RATIO			WICEL SPERU		<b>V</b> •/2	LOSS COFFF.
	1 - 1463					-		
4 F	1 1 1 2 2 2			0.2019	141.03	2 • 274	0.6550	0.0383
	663147.		0445.00	0.3169	905.06	1.926	0.6472	0.0369
	1-1108	1= 4484	0.9559	. 0.3356	850.97	1.733	0.6239	0.0402
•	1.195	2. 4484	0.9424	0.3442	911.68	1.609	0. 6050	0.0405
•	1.121	1.4484	0.9301	0.3457	459.c4	1.525	0.5852	0-0551
	1.1219	1.4484	0.9159	0.3451	1002.73	1.464	0.5156	0-0630
-	1.1263	1-4484	0.8986	0.3445	1044.56	1.417	7-54-57	0.0730
	I.1273	1.4484	0.8776	·· 0.3447	1084.60	1.383	0.5288	0.0454
•	1.1306	1. 4484	·U. 8549	0.3453	1123.21	1.350	0.5115	0,0989
~	1.1346	1. 4484	0.8299	0.1469	11 50.65	1.324	0.4950	0-11-0
	1.1391	1.4484	0.8030	0.3494	1197.19	10: • 1	£624 0	5Ct 1 .U
•		·	-					
•	TOTAL TEMP.	TOTAL PRES.	STATIC TEMP.	STATIC PRES.	34075	CUAVAT'JRE	REL. VEL.	RFL. MACH
	( DEGREES)	(LB/ SQ IN.)	(DEGREES)	(LB/SQ [N.)	(DEGREES)	1/1/.	(FT/SEC)	NUMAFR
	578-50	21.29	525.07	15.17	34.48	-0, J 7095	A87.4134	0.6119
••	578.79	21.29	528.89	15.53	27.45	-0.06101	725.0845	0.6431
-	579.30	21.29	531.70	15.77	22.30	-0-35099	764. 907	0.6766
	580.17	21.29	534.18	15.94	18.15	-0.04155	803.7801	0-7089
	580. 98	21.29	536.17	16.07	14.62	-0.33283	842.0965	0.7418
•	581.94	21.25	538.04	16.18	11.53	17450-0-	R79.3074	2 ELL 0
	583.16	21.29	539.97	16.26	8.75	-0.01737	914,1383	0. 8024
-	584.70	21.29	542.09	16.33	6.23	POILC.0-	946.2747	0.8290
•	586.45	21.29	544.35	14.40	3.71	-0,0605	976.4754	0.6537
_	589.49	21.29	546.85	16.45	1.76	-0.J024A	1004.5040	G. 876 2
	590.83	21.29	549.63	14.53	-0.24	-0.00058	1030.4309	2960°U

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VFL. (FT/SEC) 1034.7475 11034.7475 1109.7474 1145.7474 1145.741 1217.6541 1217.777 1244.444 1217.6737 1365.7497 1365.7497 1365.7497 0.7393 0.7393 0.7393 0.7420 0.74210 0.7424 0.7424 0.7424 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0.7423 0 24/5 CJ4VATJR 1/114 0.055044 0.055044 0.055044 0.055044 0.055044 0.055044 0.055044 0.05442 0.025044 0.021055 0.00344 0.003440 0.016458 ARS. 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(LH/50 IN.) (LH/50 IN.) (16.99 16.99 16.99 16.99 16.99 17.00 17.00 17.00 RADIAL VEL. (FT/SEC) 325-53 325-53 273-45 273-45 273-45 191-34 125-14 125-14 125-14 125-14 125-14 125-14 43-910 43-910 43-27 20-22 DIFFUSION FACTOR 0.33984 0.3247 0.3247 0.3245 0.3245 0.3245 0.3255 0.3255 0.3255 0.3255 0.3255 0.3255 0.3255 STATIC KHFRL VEL (FT/SEC) -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 STATIC TEMP. CEGREES) 542.08 542.08 542.08 542.08 542.08 542.08 542.08 542.08 542.08 552.08 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 552.05 ADIAJATIC EFFICIENCY 0.9433 0.9434 0.9385 0.9385 0.9385 0.9365 0.8873 0.8873 0.8873 0.84573 0.84573 0.7944 TOTAL PRES. 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(LB/SQ IN.) 21.09 21.13 21.13 21.15 21.19 21.19 21.19 21.19 21.20 21.20 21.20 21.20 21.20 AX IAL VEL. (FT/SEC) 575.784 575.784 613.147 625.159 641.969 641.535 651.874 651.874 651.874 652.899 659,629 STREAMLINE RADIUS (IV.) 10.5778 11.6692 118.6692 118.6692 19.5867 20.4535 21.2752 21.2752 22.6535 22.6535 22.6535 22.6535 22.6535 22.6535 22.6537 22.6537 22.6535 22.6537 22.6537 22.65292 24.9292 TOTAL TEMP. RATIO 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 TOTAL FEMP. (DEGREES) 578.50 578.50 580.99 580.99 581.94 581.94 581.94 583.16 583.16 583.16 583.16 583.16 583.16 583.16 583.16 583.10 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 583.20 5 S.L. 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### *** STAGE INPUT PARAMETERS' ***

	RGTGR TIP D-F HUB RELATIVE Stator HUB Ma Stator HUB D- Ratinum Tip T	ACTOR LIMIT FLOW ANGLE CH NUMBER L FACTOR LIMI ANGENTIAL V	LIMIT AT THE ROTO Imit (IN) T Elocity	Ω α	xIT 0.4003 20.0 0.7303 0.4773 1000.0			
2	RGTOR				:	STATOR		
PR ES SUR E PROFILE	FLUM ANGLE AT THE SHOCK	50F 101 T	>		WHIRL VELNCITY	FLOW ANGLE At the shock	501 I DI 14	
-0.00000E-38	-0.000300E-38	0.247300E	10	< ₫	-0.000006-34 -0.000006-34	-0.000000E-3A -0.000000E-3A	-0.000300E-38 -0.000000E-38	
0.1000000 01	0.387CODE 02	-0.4730006	. 8	<del>ں</del> د	0-00000E-38	0.380000F 02	0.171400E 01	
-0.000000E-38	0.127000E 02	0,916000F	000	<b>0</b> u	-0,000000E-38 -0,000000E-38	-0.200000F 01 -0.000000F-38	-0.107690E 01 0.480300E 00	
				,				

## *** STAGE SCALER QUANTITLES ***

E-40

	ASPEC RAT EQ	T GEOMETRIC HUB RADIUS (IN.)	CEOMETRIC TIP RAD.(IN.)	HUB RAMP Angle (Deg)	TIP RAMP Angle (deg)	AXIAL LENGTH (IN.)	MASS FLOW (LB/SEC)	MASS AVE. Adlabatic eff.
-NOTOR	- 3.500	18.0779	25-0000	33.404	0*000	2.4369	0000-10+	0.8951
-STATOR-	- 3.500	18 - 8 - 72	25+0000	21.755	0°00	1.9777	0000-104	0. #824
~	VEL. RAT At the M	IO HUE BLCCKAGE Ean Factor	TIP BLOCKAGE Factor	MASS AVE. Pr. Patin	MASS AVE. Temo. Ratio	CJMULATIVE Mass ave. Pr. ratio	CUMULATIVE Mass ave. Temp. Ratin	CUMULATIVE MASS AYE Adiabatic FFF.
-ROT OR	- 0.943	0+9875	0.9875	1.4697	1.1295	2.1177	1 • 269 2	0.9870
-STATOR-	- 1,-053	0.9850	0•5850	1.4615	1.1294	2.1058	1 • 269 2	0. 4797
	-							

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-STATOR-

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. 1.2	STORAM INC	AV IAL VEL				-		
			HUINC VEC.	KAULAL VEL.	ANS. VEL.	ABS. MACH	ABS. FLOW	RFI. FLOW
• •	NAULUS LINel		I LI VEC J	(FI/SEC )	(FT/SEC).	LUNGER	ANGLE (DFG)	AVGIE INECT
<b></b>	1001-01	576.673	. 491.68	312,48	A19.914	0.6865	34, 947	
~	18-9982	588.557	472.75	265.45	8.0.222	0.644.7		
•	19.7630	595.321	459-69	273.10	784 510		212.00	
•	20-4865	599-684	449.75				55. K C	37.542
۲.	21 . 7 B1 H	AC1.178	72 724				35.561	40°425
	0198-10				100-004	1019-0	35.104	47.957
9 P				12-121	751.395	0.6210	34.769	44.137
- (	7766977	665 ° 242	422.16	93.00	7+3.890	<b>0.6132</b>	34.576	47.02B
8	23.1183	664.413	417.74	66.85	737.759	.0.6064	34.487	104 07
ð	23.7313	<b>601.96</b> 6	415.67	42.51	732.772	1.6076		
01	24.3327	119.822	415.06	19-84	728.701			001-00
22	24-9253	554.183	414.12				34.122	864 • 14
			410014	CC • 1 -	6444677	0.5300	35• 304	52.709
Sale	FOTAL TEMP.	TUTAL DRFS.	ANIARATIC '	015510				
- CH	RATIO	ATIO	FEETCIENCY		MITEL SPERC	SUCIDITY	8#/S	LJSS CREFF.
-	7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1 4754						
• •			776400	0800.00	812.67	1.979	0.6356	n.0469
4 1	162101	16 9 6 3 L	0.9439	0.3768	911.91	1.827	0.6133	0.0522
<b>n</b> .	1-120	1.4715	0.9311	0.3844	948.63	1.713	0.5947	0.0613
<b>e</b> 1	1.4253	I.4704	0.9195	0.3888	983.45	1.629	0.5786	
s E	1.1271	<b>I.</b> 4696	0.9125	0.3884	1016.72	1-563	0.5625	0.0710
ہ 4	1.1282	1-4690	0.94	0.3381	1048-70			
-	1.1298	<b>1.</b> 4685	0.8918	0.384	1079.62	1 447		
60	1.1316	1.4682	0.8786	D 3894				
0	1-1340	1. 4679	0 8 4 7 3				0124-0	11000
01	1-1367	1 4677			11.34.10	C 86 • 1	0.5789	0.1027
				0-3445	1161.97	L . 342	0.4574	0.1125
11		(104 •1	0.8255	1666.0	1190.42	I. 304	0.4864	0.1244
	,							
5-1-5	TGTAL TEND	TOTAL DUCC	CTATEC TEMD					
ģ				STALLS PAGS	SEUPE	CJAVATJRE	REL. VEL.	AFL. MACH
			UDEGREE 31	("NI DS/AT)	IDEGREES )	1/1/.	(FT/SFC)	NUNGER
- (		51.12	26°264	22.71	28.49	1281C-0-	759.7246	0.6353
V	050.60	31.12	597.24	23.07	24.28	-0.7221	780. A545	0.6520
•	651.73	31.12	600.63	23.37	20.55	-0-36323	802-0202	0-6678
4	653 •46	31.12	604.05	23. 52	17.20	-0-35337	824.5817	0.4847
n	654.83	31.12	506 <b>.</b> 83	23.82	14.15	-1540-0-	850.1847	
Q	656.57	31.12	505.72	24.00	11-34	-0-13779	976 0034	
~	<del>6</del> -58 <b>.</b> 84	31.12	612.93	24.15	9.75			
80	661.67	31.12	516-51	24.78				
•	665 -06	31.12	420°53	24 40 24 40			921.1959	0.7572
ġ		24.44	20.020		CD**	-0-34776C	942.CR32	0.7719
		24.42	26.420	Z4• 50	1.90	-0.0303	367.0705	0.7955
77	04-500	11.12	629+83	24.60	-0.13	17000.0-	90i1°086	1.7976

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**----** STATOP EX LT **----**

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L. STREAM INE AX D. RADIUS (IN.) ( 1 18.9738 6	2 19-6605 6	<b>3 20.3189 6</b>	4 20.9532 6	5 21.5663 6	<b>6</b> 22.1609 6	7 22.7389 6	8 23.3022 6	9 23.8525 6	0 24 <b>.</b> 3911 6	9 2616-92 1	L. TOTAL TEMP. TO	0. RATIO	1 1.0000	2 1.0000	3 <b>1.0</b> 000	1.0300	5 1.0000	1.000	7 1.0000	8 1.0003	9 1.0000	0 1.0000	1 1.0000	, TATAL TEMP, TO	O. IDECRESS (1	1 649.77	2 650.40	3 651.73	4 653.46	5 654.83	6 656.57	7 658.84	8 661.57	9 665.06	
K IAL VEL. 1FT/SEC) 525.992	528 • 534	621:263	533 <b>.</b> 564	535.443	5374308	539.3LO	541.459	543.760	121.042	648 <b>.</b> 729	JTAL PRES.	R AT LO	C. 9419	0. 9927	C.9933	0 <b>°</b> 9939	C <b>°</b> 9943	0~9947	0. 9950	0.9952	0.5954	<b>0.</b> 9956	0* 9957	TAL DEFS.	ALCO IN. 1	30.87	30.89	10.06	30.93	30.94	30.96	30.97	30.97	30.98	10 00
WHIRL VEL. (FT/SEC) -0.00	00.0	-0*00	-0.00	-0.00	-0*00	-0.00	-0-00	8.0	-0*00	-0*00	AD LABATEC	EFF ICIENCY	0.9311	0.9250	0.9141	0*06*0	0.8982	0.8902	0.8795	0.8670	0.8514	0.8346	0.6158	STATIC TEMP.	I DEGREF SI	611.52	613.4.)	515.63	618.01	619.86	621.91	624.36	627.23	630.56	12 727
RADIAL VEL. (FT/SEC) 262.56	224.51	191.01	160.83	133.20	107.71	83.84	61.27	39.76	19.12	-0-74	UTFFUSION	F AC TOR	0.3486	0.3521	0.3566	0.3602	U. 3621	0.3635	0.3646	0.3649	0.3649	0.3637	0.3616	CTATIC DRFC.	(IR/SO IN.)	24. 95	25.15	25. 31	25.43	25.52	25.59	25.64	25.67	25.49	75 70
ABS. VEL. (FT/SEC) 678.826	667.710	659.530	653.358	F49.254	646a345	644.784	644.379	644.987	646.454	648.730	WHEEL SPEED	(FT/SEC)	910°74	943.71	975.31	1005.75	1035.18	1063.72	1091.47	1118.51	1144.32	11 70.77	1196.12		IDEGREES)	22.75	19.67	16.38	14.31	11.91	9.67	7.54	5.51	3.57	
AAS . MACH Vumber 0.5607	3,5502	0.5425	3.5354	7.5322	1.5290	3.5257	3.5252	3.5243	0.5239	J-52+0	AA IOI 105		1.699	1.583	I • 485	1.402	l.333	1.274	1.226	1.185	1.159	1.136	1.121	C'IPVATILEE	1/1/	0.01179	0.01540	0.01606	404IC*0	0.01262	0.30945	0°00004	0.00303	4P00C.0	20000
ABS. FLOW Angle (deg) -0-000		-0-060	-0*000	-0+000	-0+000	-0•000	-0-000	-0,000	-0*000	-0-000	A*/S		0.7245	0.7207	0.7154	0.7109	0.7082	0.7753	0.7018	0.6980	5503°0	0.5482	0.6923	DEI . VEI	(FT/SEC)	1135.0950	1156.0355	1177.2716	1199.5070	1221-9399	1244.5947	1257.4923	1290.8453	1314° n942	1337 5000 FCF1
AFL. FLOW Angle foed 53,301	54.719	55.932	56.979	57.905	58.716	59.429	50.053	60.605	61°04	61 <b>.</b> 526	LOSS COEFF		0.0302	0.0293	9.0267	0.0254	0.0242	0.0232	0.0224	0.0217	0.0212	0-0207	0-0204	061 - 400		1.9374	0.9526	0.9684	0.9849	1.0017	1.0197	1.0355	1.0520	1.0682	0500 1

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***--*** FINAL FLOW PARAMETERS FUR STAGE NIMBER 3 ***--***

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### *** STAGE IN PUT PARAMETERS ***

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SGLIDITY	-0.0000005-38 -0.0000005-38 0.1563005.01 -0.5913005 00 -0.2180005 00
FLOW ANGLE At the shock	-0.0070705-38 -0.000005-38 0.4007005 72 -0.1737005 72 -0.0020005-38
VELOCITY	A -0.000005-33 B -0.0000006-33 C 0.0000005-38 D -0.0000005-38 E -0.0000005-38
	0.379600E 00 0.100600E U1 0.138900E 01 -0.369000E 01 0.900000E-01
AT THE SHUCK	-0.000006-38 -0.000006-38 0.420000 02-38 0.4200000 01 0.8800000 01
PROFILE	0.000006-38 0.000006-38 0.100006 01 0.000006-38 0.000006-38 0.000006-38

# *** STAGE SCALER QUANTITLES ***

E-49

3	ASPECT RAT LO	GEDMETRIC HUB RADIUS (IN.)	GEOMETRIC TIP RAD.(IN.)	HUB RAMP ANGLE (DEG)	TIP RAMP ANGLE (DEG)	AXIAL LENGTH (IN.)	MĂSS FLMW (LR/SEC)	KASS AVE. Ajlabatic eff.
-R0T0K	2.500	19.9396	25+0000	23.614	0•000	2.4531	<b>401-000</b> 2	0*9142
-STATOR-	2.500	20.4767	25+0.000	14.859	0.000	2+0241	<b>401</b> ,0000	0°8923
~~	FEL. RATTO LT THE MEAN	HUB BLOCKAGE FACTOR	TIP BLOCKAGE FACTOR	MASS AVE. Pr. ratio	MASS AVE. TEMP. RATIO	CJMULATIVE MASS AVE. PR. RATIU	CUMULATIVE Mass ave. Teyp. Ratic	CUMULATIVE Mass ave Ajiabatic Fef
-ROT OR	0.944	0.9825	0.9825	l.4896	1-1321	3.1369	1.4340	0.4810
-STATCR-	1.045	0-9800	0°¢800	1.4809	1261.1	3.1184	1.4350	0.9757

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- 1-5	STRFAM INF	AX 3A1 VFL	WIRI VEL	RADIAL VEL	ARC. VEL.	HUVN JOV		
3	RADIUS ( N. I	(FT/SEC)	(FT/SEC)	(FT/SEC)	(FI/SEC)	NUMBER	ANGLE LOFGI	ANGLE ADEGU
-	20.0392	557.762	526.69	214.03	824.939	3.6473	39.476	34.428
~	20.5824	599.348	513.29	le 7.15	810.996	0.6352	39.266	37,098
m,	21.1080	600.331	502.91	161.90	799.702	3.6249	38. 967	39.375
4	21.6187	6 00 <b>.</b> 888	64*464	138°C5	790.345	0,6160	39.731	41.382
ŝ	22.1165	600.904	497.12	115.40	782.108	3.6082	38.523	43.194
¢	22-6027	601.414	479.80	63°66	775.077	0.6014	38.246	44.830
~	23.0786	600.908	474.80	73.44	769.355	J.5953	38.107	46.276
-	23.5464	599.520	471.76	. 53.76	764.771	3.5899	39.088	47.568
æ	24.0080	556.993	470.94	34.90	761.187	3.5849	38. 221	48.731
10	24.4554	593.215	472.27	16.90	758.441	0.5803	38. 513	192
11	24.9203	588.230	475.45	-0.21	756.431	0.5759	38.943	50°775
5.L.	TOTAL TEMP.	TOTAL PRES.	AD I ABATIC	DIFFUSION	WHEEL SPEED	SOL IDITY	A#15	LOSS COEFF.
Ś	<b>RAT 10</b>	RAT 10	EFFICIENCY	FAC TOR	(FT/SEC)			
-	1.1290	l. 4934	0.9352	0.4416	3r1,3a	1.754	0.507G	0.0621
N	1.1290	<b>1.</b> 4922	0.9331	0 <b>*</b> 4399	641.43	1.679	0.5799	0.0624
m	1.1293	<b>I.4</b> 912	0.9289	0.4391	1113.18	1.615	0.5544	0. 0647
4	1.1299	l. 4904	0.9236	0.4387	10.7.74	1.559	0.5508	0.0680
5	1.1306	<b>1.4897</b>	0.9172	0.4380	6666	1.503	0.5385	0.0719
٩	1.1311	<b>1.48</b> 92	0.9127	0.4361	11-4.93	1.465	0.5269	0.0741
2	1.1320	L. 4887	0.9057	0.4355	1107.77	1.425	0.5165	0.0785
60	1.1332	1. 4884	0.3967	0.4370	1133.23	1.391	0.5070	0•0846
ø	1.1348	l. 4881	0.8350	0.4398	1152.39	1.359	0.4084	0°0°29
2	1.1369	<b>1.4878</b>	0.8777	0.4444	1174.34	1.330	0.4906	0.1035
11	1.1394	1.4876	0.8545	0.4503	1196.17	1.304	0.4833	0.1157
	TOTAL TEMP.	TOTAL PRES.	STATIC TEMP.	STATIC PRES.	SLOPE	CURVAT JRE	261. VEL	RFL. MACH
3	(JEGREES)	(LBV SQ IN.)	(DEGREES)	(LE/SQ IN.)	(DEGREES)	1/1/	(FT/SFC)	NUMBER
-	733.56	46.10	617.33	34.90	19.70	-0.36285	769. 7567	0.6040
N	134.27	46.10	679.93	35.15	17.34	-0.35455	787.1136	0.6155
m	736.00	46.10	683.16	35.45	15.10	-0.04613	P04. 2570	3.6285
4	738.32	46.10	686.73	35.71	12.95	-0.3789	R21.7044	0.6404
ŝ	740.33	46.10	68° 82	35. 93	10.98	000£ C* 0+	839. 2964	0.6527
•	742.63	46.10	693 <b>•</b> 03	36.12	8.89	-0.32251	a58.°162	0.6660
•	745.78	46.10	696.92	36.29	6.93	-0.31554	975.8614	7.420
10	749.78	46.10	701.52	36. 45	5.13	64600-0-	892° 1264	0.6981
•	754.72	44°10	706.92	36. 59	3.35	-0.00475	906.4329	0.6965
10	760.55	46.10	713.12	36.72	1.64	£710C.0-	919.2956	0.7033
1	167.35	46.10	720.20	36.84	-0-02	-0*000*0-	930-3500	0.7094

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###--### FINAL FLOW PARAMETERS FOR STAGE NUMBER 4 ###--###

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### *** STAGE INPUT PARAMETERS ***

PRESSURE PROFILE -0.0000006-38 0.1000006-38 0.1000006-38 -0.000006-38	STATOR HUB K STATOR HUB D MAXIMUM TIP ROTOR FLOM_ANGLE AT THE SHOCK -0.0000006-3 0.410000E -3 0.208000E -3 0.2000000E -3 0.200000E -3 0.200000E -3 0.20000E -3 0.20000E -3 0.2000E -3 0.200000E -3 0.20000E -3 0.2000000E -3 0.20000E -3 0.2000000E -3 0.200000E  -3 0.2000000E -3 0.2000000E -3 0.200000E 3 0.200000E -3 0.200000E -3 0.200000E -3 0.200000E -3 0.20000E -3 0.20000E -3 0.20000E -3 0.2000E 3 0.2000E -3 0.2000E -3 0.2000E -3 0.2000E -3	ACH NUMBER LI FACTOR LIMI TANGENTIAL V SOLIDITAL V 0.100000F 0.112400F 0.400C00E 3 0.400C00E	LIGCITY C 00 01 01 01 01 01 01 01 01 01	A -0.000 A -0.000 B -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.000 C -0.0	0.47300 0.47300 1000.0 00117 0017 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 0006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 00006-33 000006-33 000006-33 0000000000	STATOR FLOW ANGLE AT THE SHOCK 0.0000006-38 0.0000006-38 0.0000006-38 0.0000006-38 0.0000006-38 0.1000006-38 0.1000006-38	¢ ¢ ¢ ¢ ¢ ¢
	EQMETRIC HUB Radius (In.)	GEOMETRIC IP RAD.(IN.)	ANGLE (DFG)	TIP RAMP ANGLE (DEG)	AXIAL LEN	6TH MASS	5FC1
	21.1636	25+0000	20.788	00000	1.8093	401 .(	2000
	<b>čl</b> •5554	25.0000	14.325	000*0	1.5345	101.	0000
CIJ	HUB BLOCKAGE	rip BLOCKAGE	MASS AVE.	MASS AVE. TEMP BATTO	CJMULATIV MASS AVE.	E CUMUL	ATT

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S.L.	STREAMLINE	AXIAL VEL.	WHIRL VEL.	RADIAL VEL.	ABS_ V.T.	ARS, MACH		
ND.	RADIUS (IN.	I (FT/SEC)	(F1/SEC)	(FT/SEC)	(FT/SE.)		ANGLE CORDA	100 × 1007 ×
-	21.2471	580.566	511.72	182.79	795,180			
2	21.6475	5 65 . 146	501.68	162.16	787.661			
Ś	22.0371	5 68 . 894	493.42	142.14	78, 210			
4	22.4178	591.792	486.59	122.72	775.918	0.5100		
ŝ	22.7908	593.807	480.52	103.48	770-906			
•	23.1569	595.140	475.44	85.65	766.530	3.55.0	20. 224	
~	23.5175	595.482	472.31	67.99	763-085			
80	23.8739	594.924	470.55	50.91	760-475		10.244	
6	24.2272	5 54. 002	470-64	34.46	759.437			
10	24-5785	541.943	477.64				さまて。日介	
	24.0201							50.05
•	7.7.4.7	670.000	62.014	30 60	915.7C1	:.5432	33.966	50.737
S.L.	TOTAL TEMP -	TOTAL PRES.	1144410°	DIFFUELCIN	0000 - 139HA		4	
V	RAT LO	RATIO	EFFICTENCY	EACTOR				
-	1.1170	1.4377	0.9224	0.4510		1 434	0643 0	
2	1-1167	1.4368	0.0226	044740				6010°0
1 11	1.2166	12221	0 0333					0.0685
<b>ا</b> ا	11146	1011-1			B. • / GOT	÷26 • 1	0.5279	0.0572
• u 1			2726-0	0.4420	L076.06	1.492	0.5209	1.066R
n . F.	101101	1-4350	1616.0	0.4405	1093.95	1.445	0.5141	0.0572
0   4'	1.1169	1. 4345	0.9162	0.4383	1111.	1.414	0.5078	0.0684
~	1.1174	1.4342	0.9113	0.4387	1128.44	1.385	0.5020	0.0713
80	1.1182	1.4338	0+5345	0*4390	1145.75	1.362	0.4065	0.0758
9	. 1.1190	1.4330	0.8973	0.4016	1162.91	1 - 340	0.4411	0.0807
2	1.1202	1.4333	0.8874	0.4451	11 79.77	166-1	0.4447	0.0870
11	1.1217	1.4332	0.8753	0.4503	1104 60			
•					4.000.77		G [ 54 • 0	0*0.0
	-		•					
S.L.	TOTAL TEMP.	OTAL PRES.	STATIC TEMP.	STATIC PRES.	SLUPE	<b>CURVAT.JRF</b>	RFL. VFL.	REL. 4AC
No.	(DEGREES)	(Ta/ 20 IN.)	(DEGREES)	(LB/SQ IN.)	(I)EGREES)	1/14.	(FT/SFC)	ないですつす
8 1	819.36	65.76	157.46	52.13	17.48	-0.36284	792. P410	0.5452
~	819.97	e5.76	769.05	52.37	15.49	-0.34618	A10.P%A	0.5979
Ţ,	821.78	65.76	771.69	52.60	13.57	-0-04963	827.0554	0.6005
4	824.36	65.76	774.97	52.80	11.72	-0.34058	944.2471	0.6202
ŝ	826.70	<u> </u>	717.96	52°99	6.93	-0.03239	960.000	0.6104
•	829.44	65.76	741.25	53.15	8.20	-0.32434	975. 2977	0.4405
~	833.34	65.76	785.61	53.32	6.52	-0.01683	988.9429	0.6487
m	838.37	6 65.76	190.99	53.47	4.90	-0.01033	901.1934	0.6555
σ	844.52	65.76	95.39	52,41	3.32	FEC0C.0-	912.8311	0.6613
10	851.95	65.76	66**08	53.74	1.40	-0.00204	922.5236	7.6453
11	860.74	65.76	813.95	53.84	0.31	-0.00114	930.3417	7.6674

RFL. #ACH NUMBER 0.8965 0.9139 0.9139 0.9139 0.9311 0.9395 0.9595 0.9595 0.9595 0.9595 0.9556 LOSS COEFF ARS. FLOW AVGLF (DFG) -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 REL. VFL. (FT/SFC) 1215.5369 1229.35369 1229.3724 1221.0013 12284.9580 12284.9580 1323.5495 1313.1945 1323.5495 1342.1427 1356.0337 0.6358 0.6358 0.63358 0.63358 0.63358 0.63358 0.65328 0.65277 0.66277 0.66198 0.65147 2/48 CURVATJRE 1/11. 0.03993 0.03493 0.03493 0.03422 0.03422 0.03422 0.03697 0.01825 0.01825 0.001829 0.00029 SOLIDITY L • 493 L • 451 L • 451 L • 451 J • 333 J • 335 J • 233 L • 233 L • 233 L • 233 L • 233 L • 233 L • 233 L • 233 L • 233 L • 233 L • 233 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L • 4 L HHEL SPEED (FT/SEC) 1035.23 1035.23 1035.23 1035.23 1035.23 1135.12 1135.12 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.65 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 1135.55 11 ABS. "EL 632.152 632.152 629.546 629.546 629.215 628.923 628.923 633.12178 633.12178 633.2018 635.2018 St Ope (DEGREFS) 15.71 13.92 122.21 122.21 122.21 122.21 122.23 7.43 7.443 7.443 7.443 7.443 7.443 7.443 7.443 7.443 7.443 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.2447 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.244 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7.2447 7 STATIC PRES. (LB/S0 IV.) 56.55 56.55 56.55 56.65 56.75 56.75 56.75 56.80 56.85 56.85 56.85 RADIAL VEL. (FT/SFC) 171.12 151.66 153.06 115.16 97.87 81.10 81.10 64.83 64.83 64.83 13.13 18.17 33.39 D1FFUSIUN FACTOR 0.4210 0.4136 0.4136 0.4171 0.4135 0.4137 0.4130 0.4130 0.4130 0.4137 0.4137 STATIC TEMP. {DEGREES} 795.58 787.35 787.35 791.05 791.02 791.01 797.01 797.01 797.01 805.75 811.871 811.871 811.871 AD1434TLC EFFIC1ENCY 0.9056 0.9066 0.9070 0.9070 0.9070 0.9026 0.9026 0.8919 0.8851 0.8551 0.8551 0.8541 HIRL VEL (FT/SEC) -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 T01AL PRES. RAT10 0.9937 0.9940 0.99445 0.99445 0.99445 0.9951 0.9954 0.9954 0.9956 0.9956 101AL PRES. (LR/SQ 17.) 65.34 65.34 65.36 65.40 65.41 65.44 65.44 65.44 65.44 65.44 65.44 AX [AL VEL, (FT/SEC) 608-551 612-067 615-627 613-583 621-262 623-728 623-228 623-278 623-278 632-641 632-256 STREAMLINE RADIUS (IN.) 21.6297 21.9857 22.63942 22.63942 23.3432 23.3432 23.3432 23.3432 23.3432 23.3999 24.6337 24.6337 24.9358 TOTAL TENP. RATIO 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 TOTAL TEMP. (DEGREES) 819.36 819.36 819.97 821.78 822.70 829.44 829.44 829.44 838.37 838.37 844.95 851.952 850.74 No stans 8691 2969811 S°L. Bol ġ 8 0 2 1

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*** STAGE INPUT PARAMETERS ***

0.4503

:	STATOR	FLOM ANGLE
0.4503 20.0 0.7303 0.4703 1000.0		WHIRL
EXIT	·	
ROTOR		
<b>1</b> HE		
AT (1N) TY		
CTOR LÍMIT LOW ANGLE LÍMIT H NUMBER LÍMIT ACTOR LIMIT ACTOR LIMIT NGENTIAL VELOCI		710110r
RCTOR TIP D-FA HUB RELATIVE FI Stator HUB MACI Stator HUB O-F Maximum Tip Tai		FI DH ANGLES
-	,	u J

	-0.7007076-38 -0.0007006-38 0.1439076 01 -0.2697076 01 -0.2697076 00 0.7007006 00
AT THE SHOCK	-0.00006-39 -0.000006-39 0.383000 C2 -0.0000005-38 -0.000005-38
WHIRL VELOCITY	-0.0000005-39 -0.0000055-38 0.0000055-38 -0.0000055-39 -0.0000055-39
	4 Υ Ο Ο Π
10110r	C.630000E-01 0.100000E 01 0.144500E 01 -0.222000E 00 0.450000E-01
FLOW ANGLEC	-0.0000006-38 -0.0000006-38 0.4340006 02 0.9100006 01 -0.0000006 38
PR ES SURE PROFILE	-0.00000000-38 -0.0000000-38 0.10000000-38 -0.00000000000000000000000000000000000

SOLIDITY

MASS AVE. Adiaratic eff.

MASS FLOW (L0/SEC)

TIP RAMP AXIAL LENGTH Angle (deg) (IN.)

GEOMETRIC HUB RAMP TIP RAD.(IN.) ANGLE (DEG)

GECMETRIC HUB RADIUS (IN.)

ASPECT. RATIO

*** STAGE SCALER QUANTITIES ***

Q. 30A?

9.9217

401.0000 401-0000

1.4231 1.1940

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17.960 13.121

25.CO00 25.0000

22.0151 22.2934

2.5C0 2.420

-STATOR--ROT OR---

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-	VEL. RATIO At the Mean	HUB BLOCKAGE Factor	TIP BLOCKAGE FACTOR	MASS AVE. Pr. Ratig	MASS AVF. , EMP. RATIO	CJMULATIVE Mass ave. Pr. ratio	CUMULATIVE Mass Ave. Tend. Ratin	CUMULATIVE MASS AVE. ADIABATIC EFF.
-ROTOR-	- 0.944	0.9800	0•9800	1.3845	l.1033	6.1528	1.7720	0°9722
-STATCR	- 1.046	0.9800	0086-0	1.3783	1.1033	6.1353 ,	1-1721	0.8705

LOSS CATA Set used

-ROTOR--

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-STATOR-

**----** ROTOR EXIT **----

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FLOW (JEG	0 f 1 4		414	536	378	127	792	382	806	378			0605	1970	565	1553	147	0550	568	9604	1667	0220	859		MACI	<b>JMBER</b>	5829	916	9996	5071	5146	514	5270	5310	0669	22.7	111
REL. Avglf	লা ব বাব			47.	4	.64	0	50.5		15	1 000		0.0	••	0	0.0	•••	••	.0	••	.0	.0	••		RFL.	ž	0	Ċ	c	0.0	••	о. С	0.6	.0	C	0.0	0.8
ANGLF (JEG) Anglf (Jeg)	34 429 36 420	195.395	33.184	37.099	37.966	37. 833	37. 978	38.195	38.613	39. 223	3 <b>4 4</b> 4		0.5160	0.5101	0.5046	0.4995	0.4945	0.4400	0.4857	0.4819	0.4785	0.4754	0.4728		REL. VEL.	(FT/SEC)	£31.9971	845.2174	857.°317	870.2120	882.4157	894.0299	904.4817	913.3668	920.1365	925.0656	927.5984
ABS - MACH Vumber	0.5449	0.5340	0.5375	0.5265	<b>J.5</b> 228	3.5195	<b>0.5164</b>	0.5136	3.5110	0.5096			1.502	1.474	1.449	1.426	1 • 404	1.384	1.365	1.348	1.332	1.317	1.302		<b>CURVATURE</b>	1 / [N.	-0.36007	-0.05330	-0.04565	-0.33748	-0.02907	-0.02073	-0.J1292	-0.0626	-0.00152	0.00048	-0.00115
ABS. VEL. (FT/SEC) 777 862	771-000	745.299	760.445	755.991	752.197	749.392	747.528	746.575	746.523	747.365	WHEEL SPEEN	(FT/SEC)	1059.78	1074.27	1088.51	1102.54	1116.37	1130.04	1143.58	I157.03	1170.43	1183.94	1197.30		SLOPE	(DEGREES)	15.40	13.65	11.97	10.35	8.73	7.26	5.79	4.36	2.97	1.61	0.23
RADIAL VEL. (FT/SEC) 140,73	142.15	124.39	107.35	90.92	75.07	59.72	44.84	30.39	16.40	2.87	U FF USION	FAC TOR	0.4435	0.4400	0.4374	0.4351	0.4329	0.4314	0.4312	0.4327	0.4364	0.4420	0.4500	-	STATIC PRES.	(LB/SQ IN.)	74.11	74.39	74 . 64	74.87	75.08	75.2k	75.45	75.61	75.76	75.90	76.03
WHIRL VEL. (FT/SEC) 488.77	1200-11	475.26	470.09	465.41	461.71	459.64	459.49	461.64	465.87	472.59	AD I ABATIC	EFF IC I ENC Y	0.9281	0.9296	0.9304	0.9308	0.9305	0.9291	0.9261	0.9207	0.9121	0.9011	0.8870		STATIC TEMP.	(DEGREES)	854.59	855.91	858.49	861.81	854,91	868 <b>4</b> 5	873.31	979.53	987.18	896.41	907.38
AX IAL VEL. (FI/SEC) 583,370	585.299	586.791	588.016	588.765	589.057	538.854	587 <b>.</b> 929	585 <b>.</b> 952	583.090	5 72 ,968	TOTAL PRES.	R AT IO	1.3860	1.3856	<b>1.</b> 3853	1. 3849	<b>1.3846</b>	c 1. 3844	1.3841	I. 3839	1.3837	<b>1.</b> 3836	1.3834		TOTAL PRES.	(FRVSQ IN.)	90.57	90.57	90.57	90.57	50.57	90.57	90.57	90.57	90.57	90.57	90.57
STREAMLINE RADIUS (IN.) 22_0788	22-3807	22-6773	22.9695	23.2578	23•5426	23.8246	24.1048	24.3840	24-6633	24°9438	TOTAL TEMP.	RAT IO	1.1031	1.1029	1.1027	1.102>	1.1025	1.1025	1.1028	1.1032	1.1041	1.1052	1-1068		TOTAL TENP.	( DEGREES)	903.86	904°34	906.16	908.87	<b>011.40</b>	914.47	918.97	924.93	932.43	94' .61	952.63
S.L.	4 N	m	4	<b>S</b>	Ð	~	80	6	9	11	Set.	2	٦	, N	ų	4	ŝ	•	-	•	<b>с</b> ,	9	11		S.L.	9	-	2	m	4	ŝ	•	~	80	•	2	- <b>11</b>

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AFL. FLOW ANGLE (JES) 59.504 59.397 59.395 50.735 60.735 61.71 61.71 61.678 61.678 61.678 61.678 61.678 61.003 62.234 62.341 LOSS CREFF 0.0259 0.0259 0.0259 0.0259 0.0259 0.02559 0.02559 0.02559 0.02559 0.02559 0.02559 ABS. FL7W ANGLE (756) -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 REL. VFL. (FT/SFC) 1245.0753 1254.1668 1263.7625 1283.4757 1283.4757 1294.2855 1305.0851 1305.0851 1316.2590 1316.2590 0.6143 0.6127 0.6110 0.6075 0.6075 0.6051 0.5013 0.5913 0.5913 0.5913 10.7271 .6157 A*/S CURVATURE 1/11 -0.01051 -0.00935 -0.00935 -0.01157 -0.01157 -0.01127 -0.00127 -0.0017 ABS. MACH VUMBER VUMBER 0.43353 0.43353 0.43353 0.43353 0.4235 0.4259 0.4259 0.4254 0.4254 0.4254 0.4254 0.4254 0.4254 0.4254 0.4254 SOL IDITY 1.407 1.407 1.989 1.989 1.989 1.989 1.285 1.2555 1.2555 #HEEL SPEED (FT/SEC) 1072.84 1085.67 11085.67 1111.95.99 1123.99 1123.99 1123.99 1136.48 1185.47 1185.47 1185.47 ABS. VEL (F7/SEC) 621.851 624.851 624.537 624.537 620.462 519.167 519.167 519.167 521.551 624.121 624.121 SLOPE SLOPE 11.02 11.02 11.02 7.16 7.16 5.94 5.94 5.94 1.03 3.59 0.23 0.23 STATIC PRES. (LR/SQ IN.) 79.04 79.04 79.33 79.65 79.65 79.65 79.77 79.70 79.80 RADIAL VEL (FT/SEC) 137.001 105.16 905.16 905.15 77.32 54.12 54.12 54.12 54.12 54.12 54.12 54.12 54.12 54.12 55.61 14.52 2.52 DIFFUSION FACTUR 0.4069 0.4077 0.4077 0.4077 0.4085 0.4085 0.4091 0.4094 0.4094 0.4110 0.4147 C STATIC TEMP. (DEGREES) 871.38 872.26 874.43 874.43 877.26 887.23 887.83 883.29 901.09 910.09 910.09 AD I ABA TIC EFFICIENCY 0.9128 0.9148 0.9168 0.9169 0.9169 0.9159 0.9159 0.9159 0.9132 0.9082 0.9893 0.8756 FT/SEC) (FT/SEC) (FT/SEC) -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 J ITAL PRES. RATIO C. 9949 C. 9950 0. 9953 0. 9955 0. 9956 0. 9958 0. 9959 0. 9959 0. 9959 0. 9959 T01AL PRES. (L8/SQ IN.) 90.12 90.13 90.15 90.15 90.16 90.19 90.20 90.20 90.20 LX LAL VEL. 1 F. / SEC ) 617.106 615.5597 615.659 615.659 615.626 615.626 615.626 615.637 618.689 623.952 623.952 627.635 STREAMLINE RADIUS ( IN.) 22.3508 22.65213 22.65213 22.6590 23.4156 23.4156 23.9346 23.9346 24.6973 24.9487 24.9487 T01AL TEMP. RATIG 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 TOTAL TEMP. (DEGREES) 904.31 904.31 904.31 904.31 908.87 918.97 918.97 924.93 932.493 932.61 932.63 NO. しこうゆうらで 19 8091 * * <u>0</u> <u>-</u> **しっちょう** 10 P . { E-51

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***--*** 9 ***--*** FINAL FLOW PARAMETERS FOR STAGE NUMBER

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*** STAGE INPUT PARAMETERS ***

		RCTOR TIP D- HUB RELATIVE Stator HUB M Stator HUB D Stator HUB D Maximum TIP	FACTOR LIMIT FLOW ANGLE L ACH NUMBER LI FACTOR LIMIT TANGENTIAL VE	INIT AT THE	ROTOR EXIT	0.4503 20.0 20.7303 0.4700 1000.0		-
•		RO FOR			•	<b>1</b> 1 1	57 A T OR	
~ ,	PR ES SUR E PROFILE	FLOW ANGLE AT THE SHOCK	SOL IDITA		NH VEL	IRL FI DCITY AT	LOW ANGLE The shock	SOL 101 TY
ссссс і і і і і і « Ф С С Ш Е-5	• 000000E-38 • 000000E-38 • 100000E -38 • 000000E -38	-0.000000E-3 -0.00000E-3 0.465000E 0 0.810000E 0 -0.810000E 0	3 0.1050005 3 0.100005 2 0.135006 1 -0.125006 1 -0.000006	00 00 00 33	A 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,000 10,0	000 E-38 -0.0 002 E-38 -0.0 000 E-38 0.0 000 E-38 0.0 000 E-38 -0.0	0000006-38 - 0000006-38 - 3710006 02 0000006-38 - 0000006-38 -	0.000006-38 0.000006-38 0.1392006 01 0.2000006 00 0.4800006 00
- 2 .			*	STAGE SCALER	QUANTITIES ##	•		
_ ·	ASPECT G RATIO	EDMETRIC HUB	GEDMETRIC TIP RAD.(IN.)	HUB RAMP Anglé (deg)	TTP RAMP Angle (Deg)	AXIAL LENGT	H MASS FLOW (LB/SEC)	MASS AVE. Adlabatic eff.
-R010R	169.1	22.5990	25.0000	12.300	0000	1.4016	0000*10+	0.9297
-STATOR-	1•943	22.+8058	25.000	9•500	0•000	1.2356	401 - 0000	0.9166
>	EL. RATIO	C HUB BLOCKAGE	TIP BLOCKAGE	MASS AVE.	MASS AVE. Temp. Ratio	CJMULATIVE Mass ave. Pr. ratio	CUMULATIVE Mass Ave. Teyp. Rati	CUMULATIVE MASS AVE. MASIABATIC EFF.

-ROTOR	160.1	22.5990	25.0000	12.300	00000	1.4016	401*0000	0.9297
-STA TOR-	E+6•1	22.+8058	25.0000	9•500	0•000	1.2356	401 - 0000	0.9166
	<pre></pre>	C HUB BLOCKAGE Factor	TIP BLOCKAGE Factor	MASS AVE. PR. RATIO	MASS AVE. Temp. Ratio	CJMULATIVE Mass ave. Pr. ratio	CUMULATIVE Mass Ave. Teyp. Ratin	CUMULATIVE 4855 AVF. 401ABATIC EFF.
-ROT OR	0.941	0.9800	0086*0	1.3440	1.0918	8.2458	1.9348	0.9718
-STATOR-	1.045	0.9800	0.9800	1.3397	1.0918	8.2135	8760"1	0•3695

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-STATOR--ROT OR---

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---** R O T O R E X I T **---

S.L.	STREAML INE	AXIAL VEL.	WHIRL VFL	BADIAL VEL	40 C 1161			
NO.	RADIUS (IN.)	(FT/SEC)	(FT/SEC)	LET/SEC1			ABS. FLIP	REL. FLOW
-	22.6495	583.754	×77 07				ANGLE (DEG)	ANGLE (DEG)
, ù				AL 0 1 1	624.401	0+25040	38.517	45.951
N 1	0000477	202 . 508	466.60	98.53	753.054	0.5035	38.280	44.014
ń	23.1207	581 <b>.</b> 985	461.60	86.59	747.848	400 × 0 ×		
4	23.3551	581.280	457.50	75.04	743-520			
ŝ	23.5837	580.499	453.83	63-65	730.404			
¢	23.8127	579.739	450.92	52.80	724 240		168.16	44° 268
2	24-0405	578.695	440 77				37. 761	160.04
- a	24.2470			77 • 7 4	1 34.142	0.4854	37.781	50.512
			40C•3C	61 • 1 6	7 32 • 943	J • 4R39	37.963	51.015
	2664+42	214.480	454.33	21.59	732.742	7184°C	38.310	51.450
2	24.7237	571.038	460.29	11.65	733.542	3-4796	39.865	
11	24°9542	566.273	469.15	1.99	735.371	D.4777	39.441	190916
			×					1 + 7 = 7 6
S.L.	TOTAL TEMP.	TOTAL PRES.	AD I ABA TI C	DIFFUSION	MACEL CREEN	A1101 103		
NO.	RAT IO	<b>RAT 10</b>	EFFICIENCY	FACTUR	(FT/SEC)		C/+P	LUSS CUFFF.
-	1.0920	1.3449	0.9319	0.4405	1047.18	1 461	0,000	
2	1.0917	1.3447	0.9347	0.4365	1098.54	1 4 2 1	0 × 0 4 4 4 7 7 4 4 4 4 4 4 4 4 4 4 4 4 4 4	9560.0
m	1.0914	1. 3445	0-9366	0.4333	11.70.70			0100.0
4	1.0912	1.3443	0.9379			+ 7 + • 7	0.43.73	0.04849
n F	1160-1	1445			65-0211	5 565 · 1	0.4828	0.0473
R		1 26.20			20.2611	1.382	0.4782	0.0465
) r 9			1964 0	0.440	10.6411	1.369	0.4741	0.0462
• 0	2140e1	1. 3438	BCE6 O	0.4267	1153.95	1.354	0.4705	0-0476
0 0	14010	1. 3430	0.9305	0.4289	1154.85	1.341	0.4674	0.0513
<b>,</b>	1.0423	L. 3435	0.9219	0.4334	1175.77	1.328	0.4649	0.0577
3	1.0934	l. 3434	0.9102	0.4405	1186.74	1.315	0.4629	0.0666
11	1 • 0948	l. 3424	0.8549	0.4505	1197.30	1 - 303	0.4614	0.0786
					8 1 1			
Sale	TUTAL TEMP.	TUTAL PRES.	STATIC TEMD	CTATIC 0026				
NO.	(DEGRFESI	LIRISO IN.I				LURVALURE	REL. VEL.	REL. WACH
	987.01				(UEGREES)	· NI / I	(FT/SEC)	NUMBER
• •	067.00	010101			10.75	-0.03561	R54. 4187	0.5717
1 11		07 171			9.60	-0-03099	865 <b>.</b> 2859	0.5785
• •	700 071	010171	945.80	102.38	8•46	-0.02583	975.4210	0.5¤46
tu	01 • 144	91.121	94 7 . 18	102.63	7.36	-0.32039	<b>985.2586</b>	0.5902
<b>n</b> .	14****	91-121	26.026	102.86	6.27	-0.01481	1776.49A	0.5957
0 1	21-166	81.121	954.02	103.07	5.21	16000-0-	904.3659	0.6008
•	1002 • 75	121.18	959.35	103.25	4.17	-0-30421	912-4306	0.6046
00	1009-65	121.18	966 • 42	103.43	3.15	-0-1000	918.5705	
0	1018.52	121.18	975.36	103.58	2.15	0,10,40	077 4704	
10	1029.54	121.18	986.34	103.72	1 - 1 7	0.10252	0.0 0.0 00 KE	
11	1042.96	121.18	13°066	103.36	0.20	-0.10067	033 0365	
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REL. FL NW ANGLF (DEG) 60.497 61.8323 61.3323 61.3323 61.323 62.125 62.329 62.494 62.404 62.404 62.404 62.404 LOSS COEFF. 0.0276 0.0272 0.0269 0.0265 0.0265 0.0255 0.0255 0.0255 0.0255 0.0255 0.0255 ABS. FL/M ANGLE (DEG) -7.900 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 -0.000 REL. VEL. (FT/SEC) 1259.6727 1265.9798 1265.9798 1273.7524 1281.6771 1290.1669 1297.6555 1326.7238 1336.7238 1336.7238 1336.7238 0.5990 0.5991 0.5861 0.5840 0.5840 0.5821 0.5776 0.5776 0.5531 0.5533 A+/S ABS. MACH J. 4097 J. 4097 J. 4097 J. 4093 J. 4093 J. 4018 J. 3996 J. 3988 J. 3988 J. 3988 J. 3988 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 3983 J. 4094 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4007 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4097 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4007 J. 4 CUR VAT JRE 20110177 1/11 -0.03051 -0.02513 -0.02513 -0.022156 -0.0201562 -0.01291 -0.01291 -0.0057 1.388 1.369 1.351 1.359 1.359 1.239 1.276 1.276 1.253 WHEEL SPEED (FT/SEC) 1096-98 1107-22 1117-51 1127-74 1137-91 1137-91 1158-10 1158-10 1138-05 1198-05 1197-93 SLOPF (UEGRES) 7.75 6.93 6.93 4.58 4.58 3.82 2.33 2.63 0.60 0.15 ABS. VEL. (FT/SEC) 617.338 611.247 611.247 603.197 607.197 600.269 607.197 610.143 612.984 612.984 STATIC PRES. (LB/SQ IN.) (LD/5Q IN.) 107.62 107.91 108.21 108.28 108.28 108.33 108.40 RADIAL VEL (F1/SEC) 84.20 85.87 55.87 56.87 56.87 56.87 56.87 58.58 40.48 22.55 17.01 17.01 1.57 DIFFUSION FACTOR 0.4116 0.4117 0.4117 0.4117 0.4104 0.4104 0.4104 0.4111 0.4179 0.4179 STATIC TEMP. (DEGREES) 955.28 956.83 958.85 958.85 964.63 964.63 964.63 964.63 964.63 964.63 964.63 973.08 973.08 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 973.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.00 975.000 AD1ABATIC EFFICIENCY 0.9206 0.9229 0.9245 0.9253 0.9253 0.9253 0.9182 0.9182 0.9182 0.9835 0.9835 WHIRL VEL (FT/SEC) -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 -0.00 TOTAL PRES. (LB/ SQ IN.) 120.64 170.66 170.66 120.69 120.70 120.72 120.73 120.73 120.73 120.73 120.73 120.73 120.73 120.73 AX IAL VEL. (FT/SEC) 611.706 605.318 605.743 605.846 605.846 605.395 605.395 605.395 605.395 605.395 612.914 612.914 612.813 TOTAL PRES. R AT 10 0.9956 0.9956 0.9958 0.9960 0.9960 0.9963 0.9964 0.9964 0.9964 T07AL 76% RAT 10 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 STREAML INE 22.95517 23.0672 23.0672 23.0672 23.4545 23.4545 23.9173 23.9173 23.9173 24.1270 24.1370 24.7511 24.9580 TOTAL TEMP. (DEGREES) 987.01 987.01 988.98 991.16 991.75 994.41 997.72 1002.75 1002.75 1029.54 1029.54 1042.96 5.L 8.L S.L. S. S. 8023

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###==#### FINAL FLOW PARAMETERS FOR STAGE NUMBER 7 ###==###

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### *** STAGE INPUT PARAMETERS ***

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		RUTUR TIP U Hur Relativ Stator Hub Stator Hub Maximum Tip	)-FACTOR LIMIT FE FLOW ANGLE L Mach Number Li D-Factor Limit D-factor Limit Tangential Ve	IMIT AT THE ' MIT (IN) LOCITY	R0109 EXIT	0.4500 20.0 0.7300 0.4700 1000.0		
		R0T0R			-	:	-STATOR	·
	PRESSURE PROFILE	FLOW ANGLE AT THE SHOC	SOL IULTY		HX VEL	IRL DCITY A	FLOW ANGLE T THE SHOCK	50L I DI TY
< هرْ ۲ ۵ ۵ م ک ک ک ک	• 000000000000000000000000000000000000	8 -0.JOUJOOE -3 8 -0.JOUJOOE -3 8 -0.JOUJOOE -3 8 -0.499000E -0 8 -0.578000E -0 8 -0.00000.5-3	18 0.126000E 18 0.100000E 10.129000E 12 0.129000E 12 -0.430000E	00 10 10	M 1000000000000000000000000000000000000	0006-39 -0 0006-39 -0 0006-38 -0 0006-38 -0	.0000006-38 - .0000006-38 - .330000E 02 .170006 01 -	0.0000005-38 0.0000005-38 0.1368005 01 0.9900005-01 0.600005-01
R_8		,	*	STAGE SCALER	QUANTITIES **	*		
, 5.,	ASPECT RATIO	GEDMETRIC HUB Radius (In.)	GEOMETRIC TIP RAD.(IN.)	HUB RAMP Anglé (deg)	TIP RAMP Angle (deg)	AXIAL LENC	ITH MASS FLOW (LR/SEC)	MASS AVE. ADIARATIC EFF.
-R010R	1.245	23.0160	25.0000	6.800	000.0	1.7631	401 • 0000	0.9301
-STATOR-	0.896	23.1709	25.0000	4.000	0*000	2.2153	401-0000	£410°C
> <	THE MEAN	HUB BLOCKAGE Factor	TIP 9LOCKAGE Factor	MASS AVE. Pr. Ratio	MASS AVE. Temp. ratio	CJMULATIV MASS AVE. PR. RATIO	E CUMULATIVE MASS AVE TEMP. PATI	CUMULATIVE Mass ave. 0 adiabatic efe.

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		ALAL VEL.	WHIRL VEL.	RAULAL VEL.	ABS. VEL.	ABS MACH	ABS. FLOW	REL. FL
	KAULUS IN.	( LI/SEC )	(FI/SEC)	(FT/SEC)	(FT/SEC)	NUMBER	ANGLF (DEG)	ANGLE ID
	23.0574	572.172	458.61	51.37	735.082	3.4718	38-601	48.44
~	23.2510	571.845	452 <b>.</b> 95	46.20	730.963	3.4691	38.292	40.13
m	23.4432	571.552	448.61	41.04	727.741	3 4666	38.057	40.76
+	23.5342	571.262	445.25	35.89	725.171	1-4643	37.970	
ir.	23.8241	573.856	442.32	30.76	722.822	0.4621	37. 730	50° 81
•	24.0132	570.432	440.15	25.67	720.959	0 - 460 2	37.676	51.20
~	24a2016	569.647	439.84	20.61	10.084			
œ	24. 1499	568.120	441.03					
•		6714600	76 * 7 * *	10.00	455.51.	3.4567	37.667	52.05
<b>7</b> (	184	461.000	446.53	10.61	720.805	C.4551	39, 270	52.343
0	24.7692	562.215	453.93	5.72	722.615	0.4537	38.016	57.58
1	24.9619	557.151	464.53	0.94	725.403	0.4525	39.820	52.786
4	TOTAL TEM	10141 0050						
	PAT FO	UTIO	AUJADATIC ECETTICATV	EALTOP	WHEEL SPEED	20110114	A#15	LOSS COFF
	6790°T	79.05	99908 °	0.4381	1106.75	1.413	0.4783	0.052
N 1	1.0520	1905-1	2466.0	0.4329	1116.03	1.397	0.4735	0*046
•	1.00.1	1.3079	0.9368	0.4289	1125.27	1.384	0.4693	0-046
•	1.0al 5	<b>1.</b> 30 : 8	0.9385	0.4258	1134.44	1.372	0.4655	0-045
ي مر	1.0814	1.3076	U.9393	0.4232	1143.56	1.360	0-4620	0-044
ф ж	1.0813	1.3075	29392	0.4212	1152.63	1.349	0.4589	0.042
~	1.0815	l. 3074	0.9370	0.4212	1161.68	955.1	0-6563	
•	1.0819	1. 3073	0.9314	0.4237	11 70. 72	CFF [	0.4541	
9	1.0875	2012	0.025	04780				
						1-360	L264.0	0.0
		1. 3016	1016.0	0.64.0	26°8411	116.1	0.4514	0.065
	1.0849	I• 3071	0.8933	0.4487	1198.17	1.302	0.4508	0.078
						·		
S.L.	TOTAL TEMP.	TOTAL PRES.	STATIC TEMP.	STATIC PRES.	31005	CURVATURE	RFL. VEL.	REL. W
Ş.	(DEGREES)	(L3/ SQ [N.)	(DEGREES)	(LB/SQ IN.)	(D'ÉGREES)	1/14.	(FT/SEC)	NU4B
-	1068.32	157.83	1025.14	135.79	5.13	-0.32395	866. 0P57	0.555
~	1068.18	157.83	1025.48	136.02	4.62	-0.32109	876.8341	0.562
m	1069.93	157.83	1027.51	136.24	4.11	-0.31790	886.6950	0.568
4	1072.63	157.83	1030.63	136.43	3.59	+2+10-0-	895. 8378	0.573
ŝ	1075.37	. 157.83	1033.66	136.62	3.08	-0.01157	04.7407	0.578
9	1078.8R	157.83	1037.40	136.78	2.57	-0.00845	913.0526	0.587
~	1084.44	157.83	1043.11	136.94	2.07	-0.30552	919.7680	0.585
60	1092.29	157.83	1051.00	137.09	1.57	<b>7920C-0-</b>	924_2066	0.586
•	1102.58	157.83	1061.24	137.22	1.07	-0-00105	0981	0.584
01	1115.52	157.83	1074-04	137.35	0.58		1085.3401	0 501
	1131.47	157.83	1080.75	127.42				
•					01.0		0C12 •1 25	

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S.L. NU.	STREAMLINE RADIUS (IN.)	AXIAL VEL. (FT/SEC)	HHIRL V	СШ-	EL. RADIAL VEL. C) (FT/SEC)	EL. RADIAL VEL. ABS. VEL. C) (FT/SEC) (FT/SEC)	EL. RADIAL VEL. ABS. VEL. ABS. MACH C) (FT/SEC) NUMBER	EL. RADIAL VEL. ABS. VEL. ABS. MACH A9S. FLCM C) (FT/SEC) NUMBER AVGLE (DFC)
2-	23.2089	554.173	-0.00		35.26	35.26 595.219	35.26 595.219 J. 3795	35.26 595.219 J. 3795 -0.000
• ~	23.3885	593.363	00.0-		31.67	31.67 594.207	31.67 594.207 3.3789	31.67 594.207 3.3788 -0.000
1	23-5670	553.118	-0,00	28	22	22 593.789	22 593.789 0.3783	22 593•789 3.3783 -0.000
• •	23.7444	593.272	00*0-	24.8	5	5 593.793	5 593.793 0.3778	5 593•793 0.3778 -0.000
Ś	23.9208	593.500	-0.00	21.55		593.891	593.891 D.3774	593.891 J.3774 -0.000
•••	24.0962	594.028	-0*00	18.28		594.310	594.310 0.3770	594.310 0.3770 -0.000
-	24.2708	595.203	00.00-	15.04		595.393	595°393 0.3758	595*393 <b>3.</b> 3758 -0.000
<b>nb</b> (	24.4448	597.082	-0.00	11.75		597.197	597.197 3.3766	597.197 3.3766 -0.000
¢,	24.6183	599.694	-0-00	e.33		599.752	599.752 3.3765	599.752 J.3765 -0.000
2	24.7916	603.089	-0.00	4.68		603.107	603.107 0.3765	603.107 0.3765 -0.000
11	24.9647	607.336	-0•00	0.68		607.337	607.337 3.3766	607.337 3.3766 -0.000
Sete	TOTAL TEMP.	COTAL PRES.	ADI A 3ATI C	DIFFUSION		WHEEL SPEED	WHEEL SPEED SOLIDITY	WHEEL SPEED SOLIDITY A*/S
2	RAT 10	RATIO	EFFICIENCY	FACTOR		(FT/SEC)	IFT/SEC)	IFT/SEC)
-	1.0000	0.9361	0.9169	0.4195		1114.03	1114.03 1.366	1114•03 1.366 0.5 ^{cg} 3
2	1.0000	0.9962	0.9206	0.4153		1122.65	1122.65 1.357	1122.65 1.357 0.5593
m	1.0000	<b>C.</b> 9963	0.9234	0.4124		1131.21	1131.21 1.349	1131.21 1.349 0.5578
*	1.0000	C. 9964	0.9253	0.4097		1139.73	1139.73 I.343	1139.73 I.343 0.557!
5	1.0000	C. 5965	0.9264	0.4071		1148.20	1148.20 1.338	1148-20 1.338 0.5563
•	1.0000	<b>C.</b> 9965	0.9265	0 • 4046		1156.62	1156.62 1.333	1156.62 1.333 0.5552
~	1.0000	0. 9966	0.9245	0.4026		1165.00	1165.00 1.330	1165.00 1.330 0.5533
60	1.0000	0.9966	0.9192	0.4015		1173.35	1173.35 1.328	1173.35 1.328 0.5502
đ	1.0000	0.9966	0.9105	0.4013		1141.68	1141-68 1.327	1131-68 1.327 0.5457
10	1.0000	0.9966	0.8382	0.4020		1190.00	1190.00 1.327	1190.00 1.327 0.5395
H	1.0000	C• 9966	0.4421	0.4038		1198.31	1198.31 1.329	1198.31 I.329 0.5312
	· · · · · · · · · · · · · · · · · · ·	-	<b>1</b> 			<b>!</b>	9 9	
	TOTAL TEMP.	TOTAL PRES.	STATIC TEMP.	STATIC PRES.		SLOPE	SLOPE CURVATURE	SLOPE CURVATURE REL. VEL.
S.	( DEGREES!	(LB/ 50 IN.)	(DEGREES)	(LB/SQ IN.)		IDFGREES )	(DFGREES) 1/IN.	INTRACESI INTRA (FT/SFC)
1	1068.32	157.22	1040.03	142.56		3.40	3.40 -0.00815	3.40 -0.30815 1263.05K6
~	1068.13	157.24	1039.99	142.42		3.05	3.05 -0.30782	3.05 -0.30782 1270.2067
m	1069.83	157.25	1641.68	142.67		2.72	2.72 -0.00746	2.72 -0.00745 I277.58P3
<	1072.63	157.26	1044.49	142.72		2.40	2.40 -0.30704	2.40 -0.30704 1285.1352
ŝ	1075.37	157.27	1047.23	142.76		2.08	2.08 -0.30656	2.08 -0.30656 1292.6952
¢	1078.89	157.28	1050.72	142.79		1.76	1.76 -0.30602	1.76 -0.30602 1300.372P
~	1084.44	157.29	1056.20	142.42		1.45	1.45 -0.30539	1.45 -0.30539 1-08.3270
60	1092.29	157.29	1063.90	142.84		1.13	1.13 -0.30459	1.13 -0.00459 1316.5860
¢	1102.58	157.30	1073.98	142.85		0.80	0+80 -0+30352	0+80 -0+30352 1325+1682
10	1115.52	157.30	1086.65	142.87		0.45	0.45 -0.30209	0.45 -0.30209 1334.3016
11	1131.47	157.30	1102.25	142.87		0•36	0.36 -0.30015	0.06 -0.00015 1343.4276

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###--### OUTLET FLOW PARAMETERS ###--###

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22.22	STREAMLI	RADIUS	23.3203	23.4875	23.6540	23.8195	23.9851	24 . 1 491	24.3137	24-4772	24.6405	24.8037	24.9668
AXIAL COGRUINATE 41.486 43.702 45.917	E AXIAL VEL.	(, (FT/SEC)	630.156	638•285	638.045	6 38 <b>.</b> 239	639.507	639.088	640.349	642.347	645.121	648.731	653 <b>.</b> 276
6E04ETRIC HUB RADIUS (1N.) 23.285 23.304 23.323	WHIRL VEL.	(FT/SEC)	-0.00	-0*00	-0*00	-0.00	-0.00	-0•00	00*0-	-0• 00	-0-00	-0.00	-0*00
GEQMETRIC TIP RADIUS (1N.) 25.000 25.000 25.000 25.000 Station Num	RADIAL VEL.	(FT/SFC)	L8.73	16.63	14.63	12.70	10.83	9 <b>•</b> 02	7.24	5, 50	3.78	2.07	0.36
HUB BLOCKAGE FACTOR 0.980 0.980 0.980 0.980 0.980 BER 20	ABS. VEL.	(FT/SEC)	639.43	638.50	638.21	638.37	638.60	639.15	640.39	642.37	645.13	648.73	653-7R
TIP BLNCKAGE FACTJR 0.990 0.990 0.990 0.990	ARC. WACH	NJMBER	0.4085	0.4079	0-4074	0.4069	0.4066	0.4063	0.4061	0.4059	0.4058	0.4058	0.4059
	TOTAL TEMD.	IDIAL ICHT.	1058.32	1068.18	1169.83	1072.63	1075.37	1078.58	1084.44	1092.29	1102.58	1115.52	1131.47
	TTTAL DOCC	LIBISO TWO	157.0	157.0	157.9	157.3	157.2	157.3	157.3	157.3	157.3	157.3	157.3

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