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AFWAL-TR-82-2017

TRANSONIC FAN/COMPRESSOR ROTOR DESIGN STUDY

Volume VI

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General Electric Company
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Advanced Technology Programs Dept.
Cincinnati, Ohio 45215

February 1982

Final Report for Period September 1980 - February 1982

Aero Propulsion Laboratory
Air Force Wright Aeronautical Laboratories
Air Force System Command
Wright-Patterson Air Force Base, Ohio 45433

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This technical report has been reviewed and is approved for publication.

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Chief, Compressor Research Group

WALKER H. MITCHELL
Chief, Technology Branch

FOR THE COMMANDER

H. IVAN BUSH
Director, Turbine Engine Division

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REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER: AFWAL-TR-82-2017	2. GOVT ACCESSION NO.: AD-B069628L
3. RECIPIENT'S CATALOG NUMBER:	
4. TITLE *(and Subtitle)*: Transonic Fan/Compressor Rotor Design Study Volume VI	5. TYPE OF REPORT & PERIOD COVERED: Final Technical Report September 1980 - July 1982
	6. PERFORMING ORG. REPORT NUMBER: R82AEB328, Volume VI
7. AUTHOR(s): D.E. Parker, M.R. Simonson	8. CONTRACT OR GRANT NUMBER(s): F33615-80-C-2059
9. PERFORMING ORGANIZATION NAME AND ADDRESS: General Electric Company, Aircraft Engine Business Group, Cincinnati, Ohio 45215	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: Project 2307, Task S1, Work Unit 38
11. CONTROLLING OFFICE NAME AND ADDRESS: Aero Propulsion Laboratory (AFWAL/POT), Air Force Wright Aeronautical Laboratories, Air Force System Command, Wright-Patterson Air Force Base, Ohio 45433	12. REPORT DATE: September 1982
	13. NUMBER OF PAGES: 117
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*	15. SECURITY CLASS. *(of this report)*: Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

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17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Fan
Compressor
Rotor
Aerodesign
Aerodynamics
Aircraft Engines
Blade Thickness
Camber Distribution
Throat Margin

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

This report describes the aerodynamic design of a series of five transonic rotors all parametrically related to a baseline design documented in Technical Report AFAPL-TR-79-2078. Each of the five designs deviate from the base line, in so far as practical, by a variation of parameter only. The parametric variations are specified at the rotor tip. The original hub characteristics were preserved to the maximum extent practical. The varied parameter was adjusted along the span.

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This volume describes the aerodynamic design details of the Phase V rotor. The Phase V rotor was designed to have less effective camber in the aft region of the airfoil than the baseline rotor. The hub regior was kept essentially the same as the baseline rotor. The location of maximum airfoil thickness is 70% of length at the tip and 56% at the hub which is the same as the baseline rotor.

VOLUME VI

PHASE V ROTOR DESIGN

Foreword

This Final Technical Report was prepared by the Advanced Technology Programs Department, Aircraft Engine Business Group, General Electric Company, Evendale , Ohio for the United States Air Force Systems Command, Air Force Wright Aeronautical Laboratories Wright-Patterson Air Force Base, Ohio under Contract F33615-80-C-2059. The work was performed over a period of one year starting in September 1980. Effren Strain (Captain USAF) was the Air Force Project Engineer for this program.

This report describes the results of an effort to aerodynamically define five rotor designs, all parametrically related to a base line design which could be evaluated by future testing in order to define the sensitivity of transonic blade rows to several design variables.

For the General Electric Company Mr. D.E. Parker was the Technical Program Manager for this program. Mr. M.R. Simonson was the principal investigator. Mr. A.J. Bilhardt was the overall Program Manager.

VOLUME VI

TABLE OF CONTENTS

VOLUME VI

LIST OF ILLUSTRATIONS

LIST OF SYMBOLS AND ABBREVIATIONS

1. Used in Circumferential Average Flow Output Tables

STA	calculation station number	
WTF	total airflow	
PSIC	stream function (0 = tip (OD), 1 = hub (ID))	
Z	axial location	inches
R	radius	inches
PHI	streamline slope	degrees
CURV	streamline curvature ⌣ = neg., ⌢ = pos.	1/inches
VM	meridional velocity	ft/sec
CU	absolute tangential velocity	ft/sec
ALPHAM	absolute flow angle on stream surface	degrees
MM	meridional Mach number	
SL	calculation streamline number	
BLDBLK	flow blockage factor	(free area - blocked area)/free area
PS	static pressure	psia
PT	total pressure	psia
TT	total temperature	degrees
BETAM	relative flow angle on stream surface	degrees
UREL	relative velocity	ft/sec
MREL	relative Mach number	
VABS	absolute velocity	ft/sec
MABS	absolute Mach number	
GAMMA	specific heat ratio	
PT-RAT	total pressure/inlet total pressure	
TT-RAT	total temperature/inlet total temperature	
RCU	radius x tangential velocity	in-ft/sec
CZ	axial velocity	ft/sec
PCT IMM	percent annulus immersion from tip (OD)	
RAD	average of leading and trailing edge streamline radii	inches
ACC PT RATIO	cumulative total pressure ratio	
ACC TT RATIO	cumulative total temperature ratio	

1. Used in Circumferential Average Flow Output Tables (Cont'd)

AD.	adiabatic efficiency	
POLY	polytropic efficiency	
Axial VEL R	axial velocity ratio across blade row	

2. Used in Stream Surface Blade Coordinate Tables

PT	point number	
PCT X	fraction of meridional distance from leading edge	
X	meridional coordinate on meanline	inches
Y	tangential coordinate on meanline	inches
B*M	meanline angle on stream surface	degrees
T(M)	thickness of blade perpendicular to meanline	inches
XS	meridional coordinate on suction surface	inches
YS	tangential coordinate on suction surface	inches
XP	meridional coordinate on pressure surface	inches
YP	tangential coordinate on pressure surface	inches

3. Used in Plane Section Coordinate Tables

Z	axial coordinate of stacking axis	inches
R	radius of coordinate system origin	inches
MU	tilt angle in axial direction	degrees
ETA	tilt angle in tangential direction	degrees
RHO	section height	inches
PT	point number	
ALPHA	axial coordinate	inches
ZETA*	meanline angle from axial	degrees
UPSILON	coordinate perpendicular to ALPHA and radius	inches
PCT AL	fraction of axial distance from leading edge	
T/C	local thickness/chord ratio	

SECTION XIX

DESIGN OF PHASE V ROTOR

1. INTRODUCTION

The best efficiency at the design speed for transonic rotors normally occurs near the "knee" of the pressure ratio - flow characteristics where the flow begins to decrease. [For the baseline rotor, the best design speed efficiency occurred at a pressure ratio that is about 8% higher than the test data point selected as the base for the designs carried out under this contract. The peak efficiency at the design speed was about 2 points higher than that measured at the base point.] The baseline point was selected for this work because it provides reasonable, stall margin. If it is thought of as an "operating line" point, then there is reason to think that an improvement in efficiency might be achieved at this "operating line" point by adjusting the effective camber so that the "knee" of the characteristics more nearly coincides with the operating line point. The term "effective camber" is loosely used to indicate the circulation capacity of the cascade, since the normal camber definition is not sufficient for cascades with nonstandard mean lines which may depart significantly from a circle arc.

The reduction in effective camber will not necessarily reduce the stall line at the design speed but may have a detrimental effect on the efficiency at reduced RPM operation. Currently there is inadequate definitive data to allow an assessment of the trade in a potentially higher design speed operating line efficiency against a potential loss in part speed efficiency.

2. DESIGN PROCEDURE

The "data match" circumferential average flow solution and the stream Surface Blade Sections (SBS) analysis of the baseline rotor previously described in Volume I were used as a starting point for the design of the Phase V rotor. For the Phase V rotor a higher efficiency was assumed for the outer 60% of the flow since it is believed that the Phase V blade will have increased efficiency in this region at the design pressure ratio. The rotor exit total pressure was maintained the same as the baseline rotor while the total temperature was reduced to reflect the assumed higher efficiency.

Since it was desired to keep the front portion of the airfoil essentially identical to the baseline rotor, the cordwise distribution of total pressure was kept identical to that of the data match of the baseline rotor. The work input (total temperature rise) was maintained the same as the data match of the baseline rotor in the front half of the rotor then departed smoothly from the baseline case so that the rotor exit total temperature was consistent with the assumed increased efficiency in the outer portion of the annulus.

The resulting streamline work input (as a fraction of the total streamline work) is plotted versus percent axial projection in Figure 68. The tip streamline is the one on the left. Each subsequent streamline is indexed to the right by the value of its stream function (fraction of the total flow from the tip). The dashed lines are lines of constant percent axial projection.

The resulting streamline static pressure distribution for the Phase I blade is compared with the data match of the baseline rotor on Figure 69.

To reduce the effective camber of the rotor, the departure angle distribution in the rear half of the airfoil was modified to concentrate the camber more heavily toward the trailing edge. This results in a larger stagger angle than the baseline rotor. A comparison of the Phase V tip airfoil with the baseline rotor is shown on Figure 70. The trailing edge angle was specified in the same manner as was used for all rotors designed under this contract. A modified version of Carter's Rule was used to calculate a reference deviation angle for the baseline rotor. This procedure converts the vector diagrams (from the data match calculations) to an equivalent two-dimensional set of vectors which would produce the same circulation as the actual blade taking into account the change in streamline radius and meriodional velocity. The difference between the deviation angle implied by the data match calculations and the reference deviation angle was then added to the reference deviation angle calculated from the modified Carter's Rule for the Phase V blade.

A method of characteristics computer program was used to analyze the flow in the cascade flow induction region for streamlines 3 and 6 to assure that the rotor would achieve the design flow. For other streamlines the difference between the suction surface angle and the "free-flow" streamline angle was compared with similar data from the data match calculations of the baseline rotor. This,

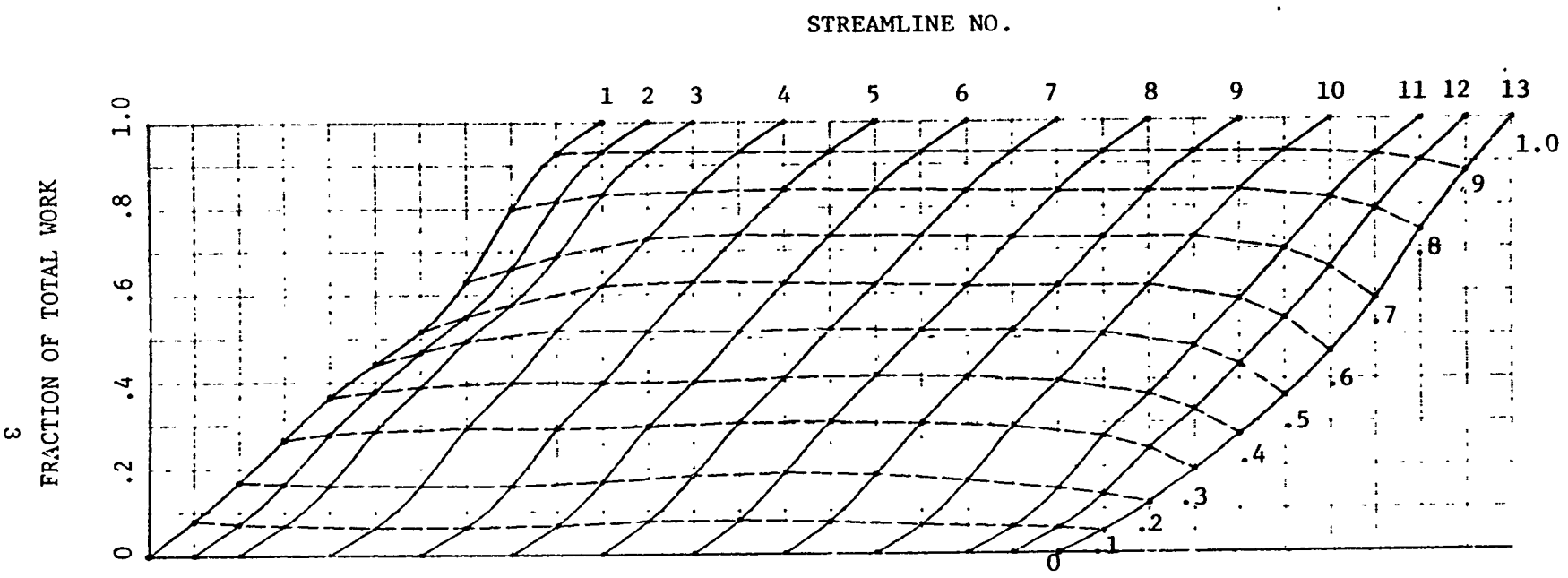

Figure 68. Rotor V Intrablade Work Distribution

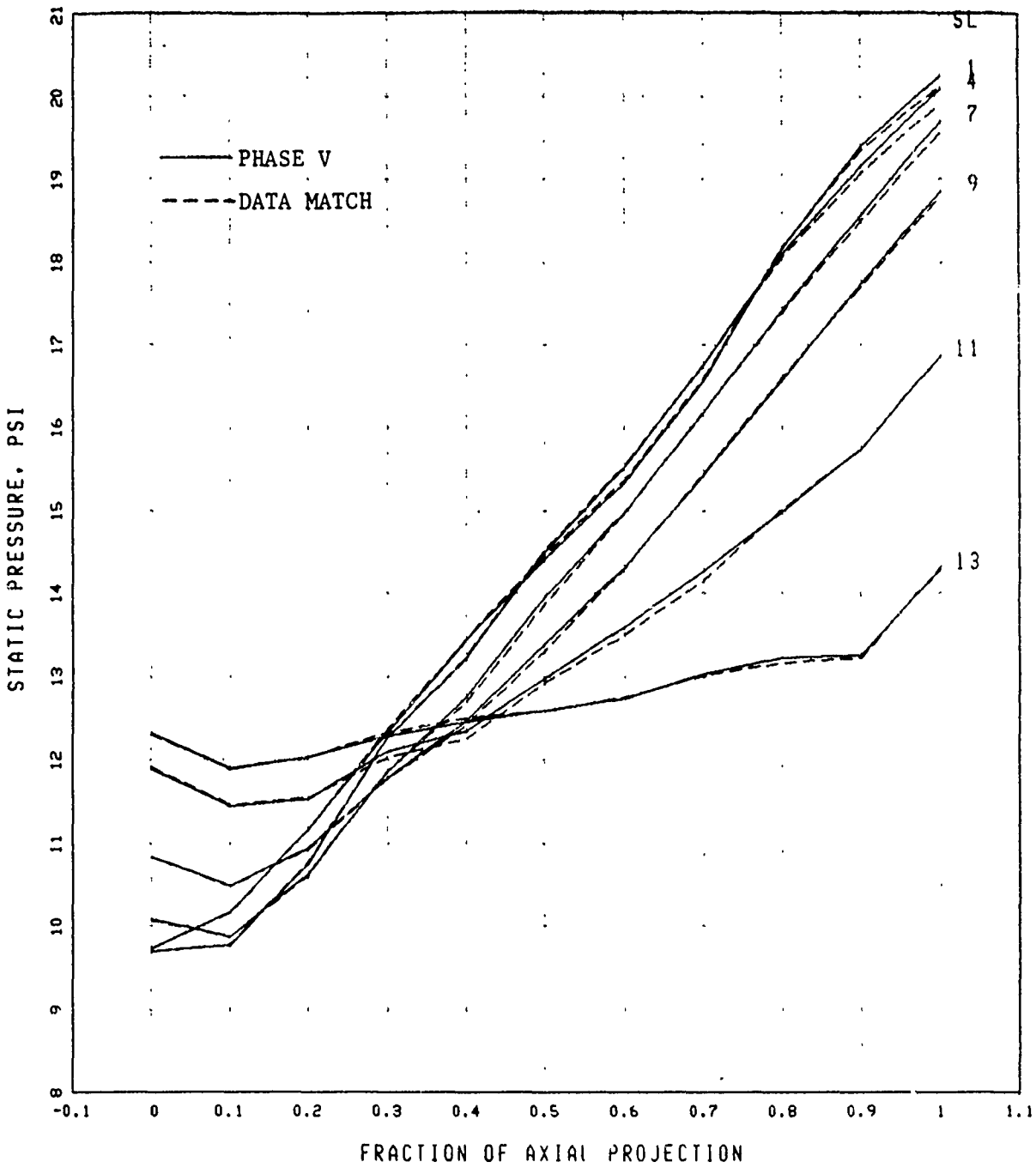

Figure 69 . Phase V Rotor Static Pressure Distribution

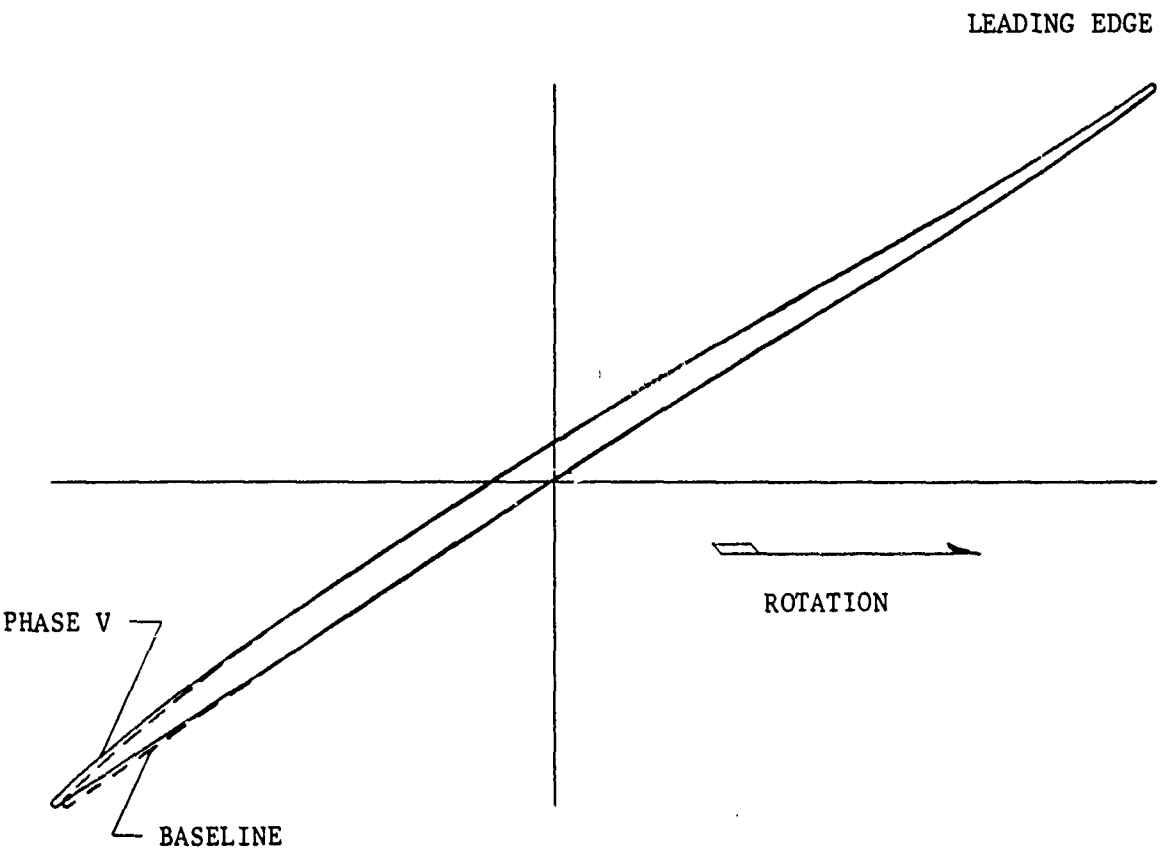

Figure 70. Phase V Rotor Streamsurface Tip Section Compared with Baseline Design

then, was used as a guide in setting the suction surface angle in the flow induction region. This procedure was largely a formality for the Phase V rotor since the front portion of the airfoil was kept essentially the same as the baseline rotor. However, somewhat different radial blade forces resulting from somewhat different lean angles of the stacked blade made small difference in the radial distribution of streamtube convergence. This required small adjustments in blade shape to achieve the same flow induction capacity.

The radial variation of blade incidence angle was kept essentially the same as the data match of the baseline rotor and is shown in Figure 71.

The radial variation of the Phase V rotor deviation angle is shown in Figure 72 and the rotor deviation angle minus the reference deviation angle is compared with the data match of the baseline rotor in Figure 73.

The radial distribution of the calculated stator incidence angle is compared with the data match of the baseline rotor in Figure 74. The smaller calculated incidence angle in the outer portion for the Phase V rotor results primarily from the assumed higher efficiency in this region.

A plot of the departure angles (the difference between the local flow angle and blade meanline angle) for each streamsurface section is shown in Figure 75.

The throat margin was kept essentially identical to the data match of the baseline rotor and is shown in Figure 76. The throat margin for a streamsurface blade section is defined here as the percent of excess throat area over and above the minimum theoretical area required to pass the streamtube flow at a throat Mach number of 1.0 and assuming a total pressure loss equivalent to a normal shock at the upstream Mach number. In a rotor the effect of radius change (between the leading edge and throat) on the relative total enthalpy and pressure is included. As can be seen in Figure 76 the Phase I rotor throat margin is nearly identical to that of the data match of the baseline design.

Details of the Phase I rotor design are given in Section XXI.

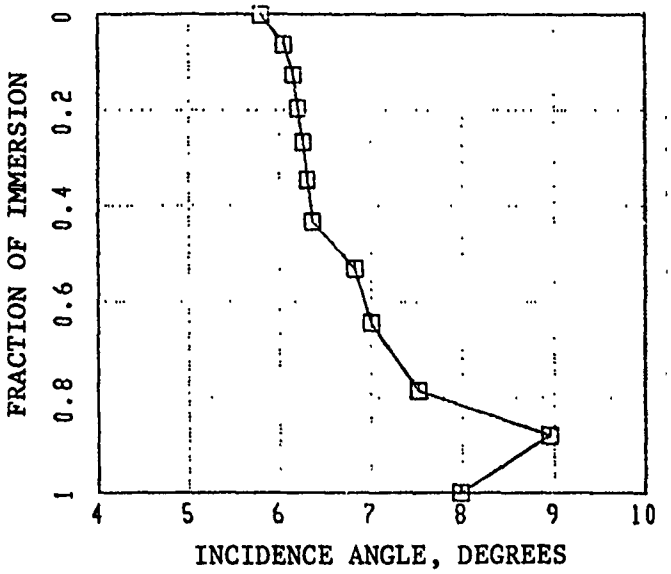

Figure 71. Phase V Rotor Incidence Angle Versus Fractional Immersion

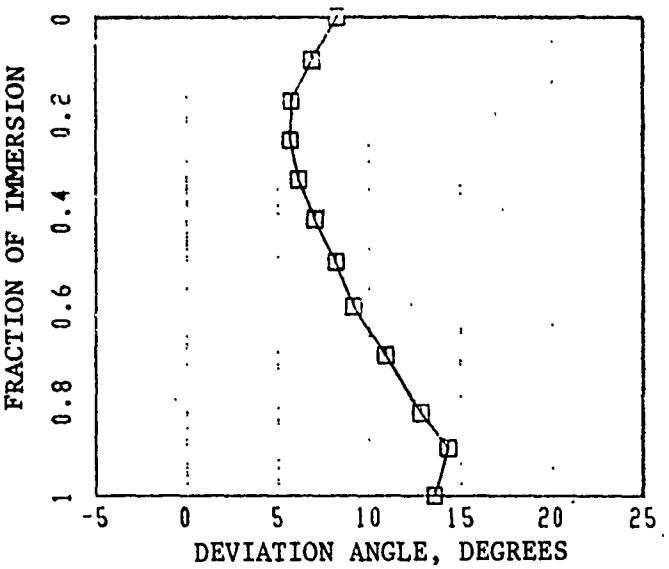

Figure 72. Phase V Rotor Deviation Angle Versus Fractional Immersion

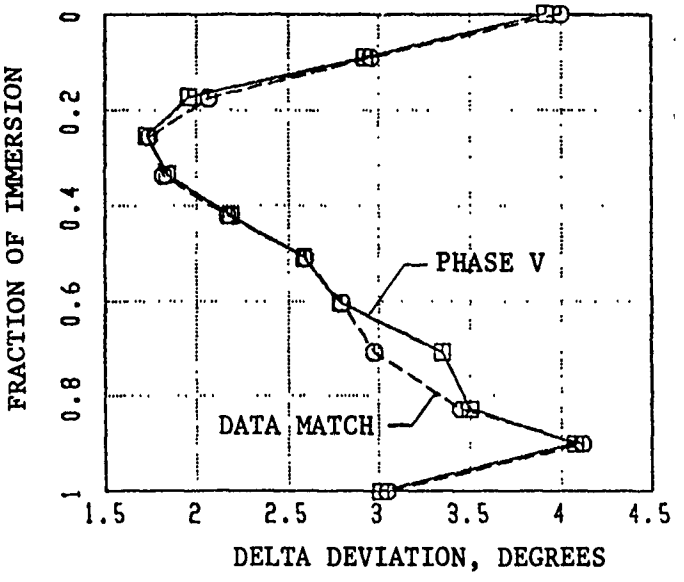

Figure 73. Phase V Rotor Deviation Angle Minus Reference Deviation Angle Compared With Data Match

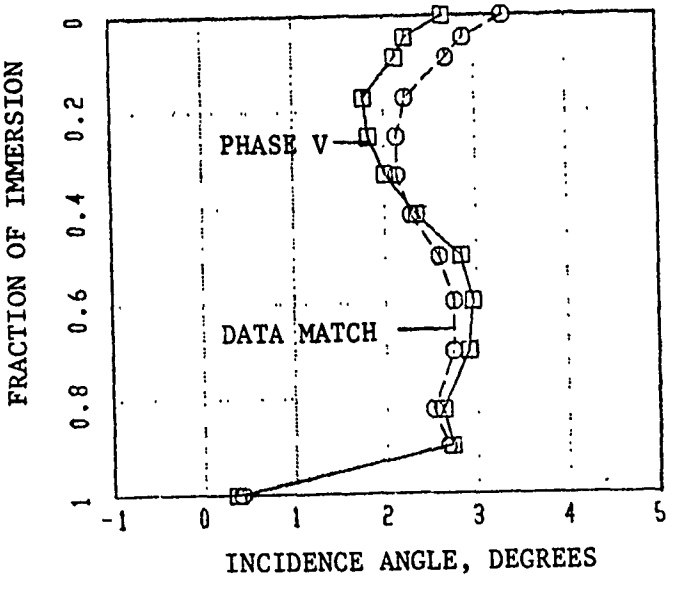

Figure 74. Phase V Stator Incidence Angle Compared With Data Match

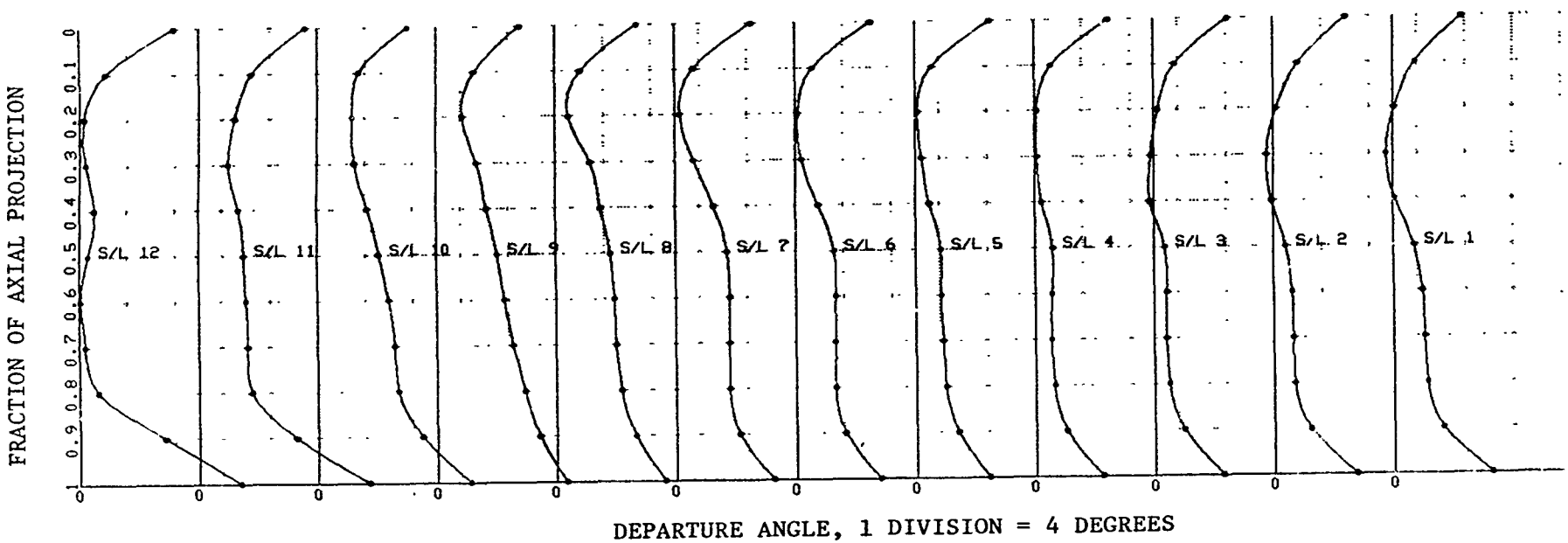

Figure 75 . Phase V Rotor Deviation Angle Versus Fractional Immersion

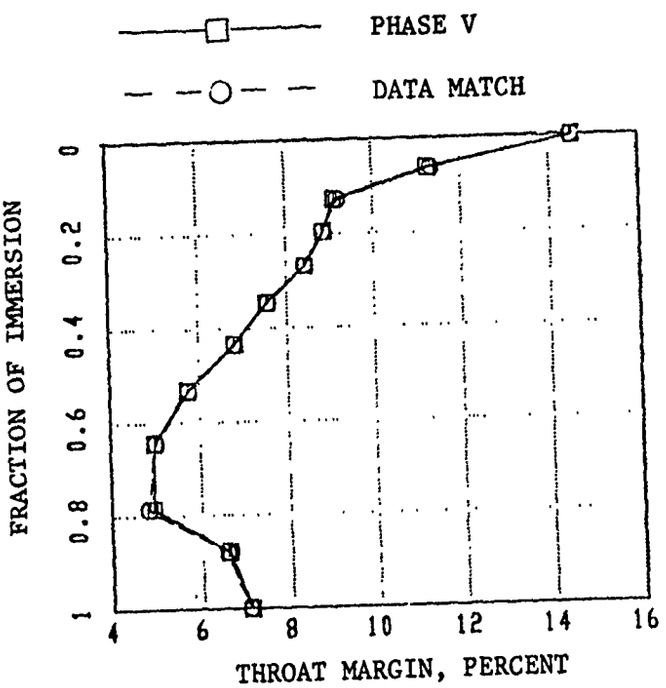

Figure 76 . Phase V Rotor Throat Margin Compared With Data Match

SECTION XX

DETAILS OF PHASE V ROTOR DESIGN

1. CIRCUMFERENTIAL AVERAGE FLOW SOLUTION

The following tabulation presents the detail results of the Phase I Rotor circumferential average flow computation. Each page of the tabulation gives results for one calculation station. Figure 77 shows the calculation station locations within the gas flowpath. At each calculation station various aerodynamic parameters are given on each of thirteen calculation streamlines. Also given are several mass averaged station flow properties. The Phase V rotor blade forces are included at the end of this section.

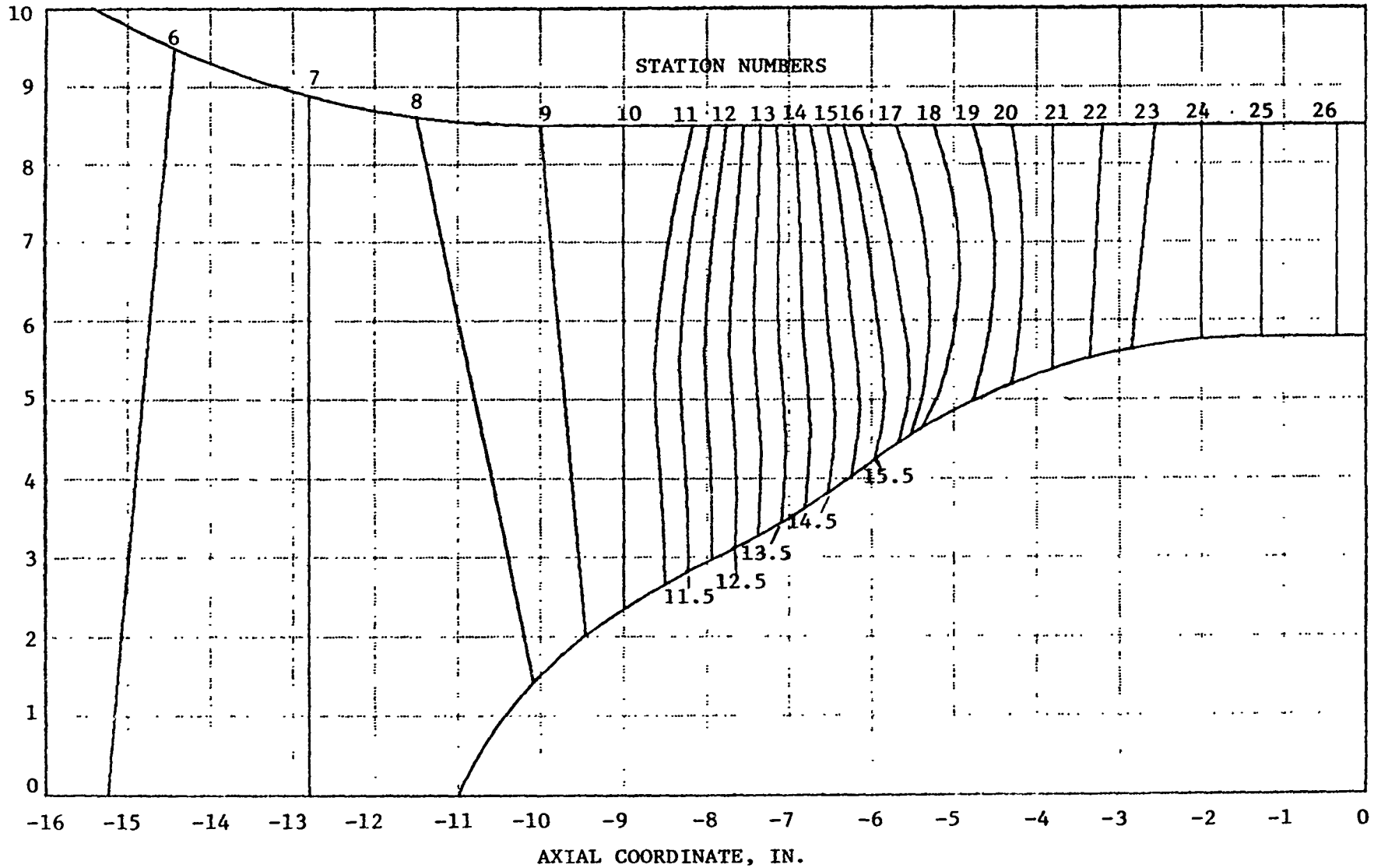

Figure 77. Compressor Flowpath With Calculation Stations

INLET STA= 5.000 FREE

I= 1 MTIP= 1 AFLOW= 478.13 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-18.800	13.207	-50.10	0.0831	150.4	0.	0.	0.135
0.050	-18.800	12.564	-43.54	0.	181 0	0.	0.	0.163
0.100	-18.800	12.020	-40.31	0.	195.9	0.	0	0.176
0.200	-18.800	11.027	-34.70	0.	218.6	0.	0	0.196
0.300	-18.800	10.099	-29.90	0.	237.1	0.	0.	0.213
0.400	-18.800	9.193	-25.65	0.	252.4	0.	0.	0.227
0.500	-18.800	8.277	-21.78	0.	265.1	0.	0.	0.239
0.600	-18.800	7.319	-18.16	0.	275.9	0.	0.	0.248
0.700	-18.800	6.277	-14.68	0.	284.9	0.	0.	0.257
0.800	-18.800	5.083	-11.19	0.	292.5	0.	0.	0.264
0.900	-18.800	3.569	-7.34	0.	298.9	0.	0.	0.270
0.950	-18.800	2.516	-4.92	0.	301.6	0.	0.	0.272
1.000	-18.800	0.000	0.	0.	303.9	0.	0.	0.274

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.997	14.510	14.696	518.7	86.31	2335.4	2.095	150.4	0.135
2	0.997	14.427	14.696	518.7	85.33	2224.5	1.997	181.0	0.163
3	0.997	14.382	14.696	518.7	84.72	2130.2	1.913	195.9	0.176
4	0.997	14.305	14.696	518.7	83.59	1958.1	1.760	218.6	0.196
5	0.997	14.237	14.696	518.7	82.42	1797.9	1.617	237.1	0.213
6	0.997	14.177	14.696	518.7	81.16	1641.9	1.477	252.4	0.227
7	0.997	14.124	14.696	518.7	79.71	1484.6	1.337	265.1	0.239
8	0.997	14.077	14.696	518.7	77.94	1320.6	1.190	275.9	0.248
9	0.997	14.037	14.696	518.7	75.58	1143.7	1.031	284.9	0.257
10	0.997	14.002	14.696	518.7	71.94	943.5	0.850	292.5	0.264
11	0.997	13.972	14.696	518.7	64.61	697.2	0.629	298.9	0.270
12	0.997	13.959	14.696	518.7	55.81	536.8	0.484	301.6	0.272
13	0.997	13.947	14.696	518.7	0.00	303.9	0.274	303.9	0 274

STA 5.000 MASS AVERAGED PROPERTIES

PT= 14.696 TT= 518.69 GAMMA=1.4015 PT-RAT= 1.000 TT-RAT= 1.000

RCU= 0. VM= 255.3 CZ= 233.4 MM=0.230 MABS=0.230 MREL=1.300

INLET STA= 6.000 FREE

I= 2 MTIP= 14 AFLOW= 277.56 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-14.431	9.481	-24.96	-0.0952	514.7	0.	0.	0.471
0.050	-14.450	9.254	-24.10	-0.1028	507.6	0.	0.	0.464
0.100	-14.470	9.020	-22.95	-0.0955	501.1	0.	0.	0.458
0.200	-14.513	8.532	-20.65	-0.0825	489.4	0.	0.	0.447
0.300	-14.558	8.010	-18.38	-0.0712	478.4	0.	0.	0.436
0.400	-14.606	7.446	-16.13	-0.0614	467.8	0.	0.	0.426
0.500	-14.660	6.829	-13.87	-0.0529	457.2	0.	0.	0.416
0.600	-14.719	6.141	-11.59	-0.0455	446.4	0.	0.	0.406
0.700	-14.787	5.352	-9.23	-0.0390	434.9	0.	0.	0.395
0.800	-14.869	4.402	-6.73	-0.0330	422.1	0.	0.	0.383
0.900	-14.978	3.142	-4.03	-0.0257	407.0	0.	0.	0.369
0.950	-15.057	2.234	-2.57	-0.0190	398.2	0.	0.	0.361
1.000	-15.250	-0.000	0.	0.	387.1	0.	C.	0.351

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.997	12.623	14.696	518.7	72 90	1750.4	1.601	514.7	0.471
2	0.997	12.676	14.696	518.7	72.73	1710.1	1.564	507.6	0.464
3	0.997	12.726	14.696	518.7	72.53	1668.8	1.525	501.1	0.458
4	0.997	12.812	14.696	518.7	71.99	1583.2	1.445	489.4	0.447
5	0.997	12.892	14.696	518.7	71.30	1492.2	1.361	478.4	0.436
6	0.997	12.968	14.696	518.7	70.40	1394.8	1.271	467.8	0.426
7	0.997	13.041	14.696	518.7	69.22	1288.9	1.174	457.2	0.416
8	0.997	13.116	14.696	518.7	67.61	1172.0	1.066	446.4	0.406
9	0.997	13.193	14.696	518.7	65.27	1039.7	0.945	434.9	0.395
10	0.997	13.277	14.696	518.7	61.48	884.2	0.803	422.1	0.383
11	0.997	13.374	14.696	518.7	53.72	687.8	0.624	407.0	0.369
12	0.997	13.429	14.696	518.7	44.72	560.4	0.508	398.2	0.361
13	0.997	13.496	14.696	518.7	-0.00	387.1	0.351	387.1	0.351

STA 6.000 MASS AVERAGED PROPERTIES

PT= 14.696 TT= 518.69 GAMMA=1.4016 PT-RAT= 1.000 TT-RAT= 1.000

RCU= 0. VM= 455.6 CZ= 438.5 MM=0.415 MABS=0.415 MREL=1.120

INLET STA= 7.000 FREE

I= 3 MTIP= 27 AFLOW= 244.35 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-12.800	8.880	-15.47	-0.0952	625.2	0.	0.	0.578
0.050	-12.800	8.675	-14.65	-0.0872	617.8	0.	0.	0.571
0.100	-12.800	8.464	-13.90	-0.0849	610.4	0.	0.	0.564
0.200	-12.800	8.021	-12.40	-0.0795	595.1	0.	0.	0.549
0.300	-12.800	7.546	-10.87	-0.0736	579.6	0.	0.	0.533
0.400	-12.800	7.032	-9.28	-0.0680	563.9	0.	0.	0.518
0.500	-12.800	6.468	-7.60	-0.0629	547.6	0.	0.	0.502
0.600	-12.800	5.837	-5.79	-0.0587	530.4	0.	0.	0.486
0.700	-12.800	5.112	-3.79	-0.0560	511.3	0.	0.	0.468
0.800	-12.800	4.237	-1.46	-0.0558	488.4	0.	0.	0.446
0.900	-12.800	3.064	1.52	-0.0634	455.8	0.	0.	0.415
0.950	-12.800	2.206	3.55	-0.0759	428.6	0.	0.	0.390
1.000	-12.800	0.000	0.	0.	383.5	0.	0.	0.347

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.998	11.714	14.696	518.7	68.25	1687.2	1.560	625.2	0.578
2	0.998	11.779	14.696	518.7	68.02	1650.8	1.525	617.8	0.571
3	0.998	11.843	14.696	518.7	67.77	1613.5	1.490	610.4	0.564
4	0.998	11.974	14.696	518.7	67.20	1535.5	1.415	595.1	0.549
5	0.998	12.105	14.696	518.7	66.48	1452.4	1.337	579.6	0.533
6	0.998	12.235	14.696	518.7	65.56	1363.1	1.253	563.9	0.518
7	0.998	12.366	14.696	518.7	64.37	1266.0	1.162	547.6	0.502
8	0.998	12.502	14.696	518.7	62.76	1158.6	1.061	530.4	0.486
9	0.998	12.649	14.696	518.7	60.46	1036.9	0.948	511.3	0.468
10	0.998	12.819	14.696	518.7	56.85	893.0	0.815	488.4	0.446
11	0.998	13.051	14.696	518.7	49.87	707.2	0.644	455.8	0.415
12	0.998	13.234	14.696	518.7	42.25	579.1	0.526	428.6	0.390
13	0.998	13.517	14.696	518.7	0.00	383.5	0.347	383.5	0.347

STA 7.000 MASS AVERAGED PROPERTIES

PT= 14.696 TT= 518.69 GAMMA=1.4017 PT-RAT= 1.000 TT-RAT= 1.000

RCU= 0. VM= 539.1 CZ= 532.1 MM=0.495 MABS=0.495 MREL=1.109

INLET STA= 8.000 FREE

I= 4 MTIP= 40 AFLOW= 224.07 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CL	ALPHAM	MM
0.	-11.499	8.608	-8.21	-0.0953	712.0	0.	0.	0.665
0.050	-11.461	8.412	-7.49	-0.0964	703.2	0.	0.	0.656
0.100	-11.421	8.211	-6.86	-0.0909	693.8	0.	0.	0.647
0.200	-11.339	7.790	-5.59	-0.0815	675.7	0.	0.	0.628
0.300	-11.250	7.341	-4.25	-0.0744	658.7	0.	0.	0.611
0.400	-11.155	6.858	-2.77	-0.0695	642.1	0.	0.	0.595
0.500	-11.052	6.333	-1.09	-0.0668	625.1	0.	0.	0.578
0.600	-10.938	5.753	0.90	-0.0667	606.2	0.	0.	0.559
0.700	-10.809	5.096	3.37	-0.0696	583.8	0.	0.	0.538
0.800	-10.656	4.320	6.70	-0.0769	554.5	0.	0.	0.509
0.900	-10.459	3.318	12.11	-0.0935	510.5	0.	0.	0.467
0.950	-10.323	2.629	17.76	-0.1212	468.0	0.	0.	0.427
1.000	-10.086	1.421	47.99	0.1910	433.9	0.	0.	0.394

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.997	10.919	14.696	518.7	64.89	1677.6	1.567	712.0	0.665
2	0.997	11.003	14.696	518.7	64.65	1642.6	1.533	703.2	0.656
3	0.997	11.092	14.696	518.7	64.41	1606.5	1.497	693.8	0.647
4	0.997	11.259	14.696	518.7	63.82	1531.8	1.424	675.7	0.628
5	0.997	11.415	14.696	518.7	63.05	1453.3	1.349	658.7	0.611
6	0.997	11.564	14.696	518.7	62.05	1370.1	1.269	642.1	0.595
7	0.997	11.716	14.696	518.7	60.78	1280.6	1.184	625.1	0.578
8	0.997	11.879	14.696	518.7	59.16	1182.5	1.091	606.2	0.559
9	0.997	12.069	14.696	518.7	57.01	1072.2	0.987	583.8	0.538
10	0.997	12.311	14.696	518.7	53.97	942.7	0.866	554.5	0.509
11	0.997	12.655	14.696	518.7	48.92	776.8	0.710	510.5	0.467
12	0.997	12.966	14.696	518.7	44.75	659.0	0.601	468.0	0.427
13	0.997	13.200	14.696	518.7	30.03	501.1	0.456	433.9	0.394

STA 8.000 MASS AVERAGED PROPERTIES

PT= 14.696 TT= 518.69 GAMMA=1.4017 PT-RAT= 1.000 TT-RAT= 1.000

RCU= 0. VM= 612.1 CZ= 604.7 MM=0.566 MABS=0.566 MREL=1.140

INLET STA= 9.000 FREE

I= 5 MTIP= 53 AFLOW= 211.87 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-9.999	8.500	0.	0.	758.7	0.	0.	0.713
0.050	-9.984	8.315	-1.11	-0.0542	751.7	0.	0.	0.706
0 100	-9.968	8.125	-0.88	-0.0525	743.8	0.	0.	0.698
0.200	-9.935	7.728	-0.27	-0.0508	730.0	0.	0.	0.683
0.300	-9.900	7.305	0.61	-0.0511	715.9	0.	0.	0.669
0.400	-9.862	6.851	1.77	-0.0531	700.6	0.	0.	0.653
0 500	-9.821	6.359	3.28	-0.0573	682.8	0.	0.	0.635
0.600	-9.776	5.816	5.23	-0.0634	661.0	0.	0.	0.614
0.700	-9.725	5.201	7.76	-0.0713	633.1	0.	0.	0.586
0.800	-9 665	4.475	11.18	-0.0792	596.4	0.	0.	0.550
0.900	-9.587	3.542	16.60	-0.0812	546.1	0.	0.	0.501
0.950	-9.536	2.919	21.64	-0.0409	515.3	0.	0.	0.471
1.000	-9.460	2.011	38.65	0.1881	511.4	0.	0.	0.468

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.996	10.468	14.696	518.7	63.17	1681.0	1.580	758.7	0.713
2	0.996	10.536	14.696	518.7	62.87	1648.7	1.548	751.7	0.706
3	0.996	10.614	14.696	518.7	62.58	1615.2	1.515	743.8	0.698
4	0.996	10.747	14.696	518.7	61.84	1546.8	1.448	730.0	0.683
5	0.996	10.882	14.696	518.7	60.95	1474.5	1.378	715.9	0.669
6	0.996	11.028	14.696	518.7	59.91	1397.4	1.303	700.6	0.653
7	0.996	11.194	14.696	518.7	58.68	1313.6	1.223	682.8	0.635
8	0.996	11.394	14.696	518.7	57.22	1220.8	1.133	661.0	0.614
9	0.996	11.644	14.696	518.7	55.40	1115.1	1.032	633.1	0.586
10	0.996	11.963	14.696	518.7	52.94	989.6	0.912	596.4	0.550
11	0.996	12.378	14.696	518.7	48.86	830.0	0.762	546.1	0.501
12	0.996	12.618	14.696	518.7	45.00	728.7	0.667	515.3	0.471
13	0.996	12.648	14.696	518.7	34.76	622.4	0.569	511.4	0.468

STA 9.000 MASS AVERAGED PROPERTIES

PT= 14.696 TT= 518.69 GAMMA=1.4018 PT-RAT= 1.000 TT-RAT= 1.000

RCU= 0. VM= 663.8 CZ= 655.4 MM=0.617 MABS=0.617 MREL=1.178

INLET STA= 10.000 FREE

I= 6 MTIP= 66 AFLOW= 204.13 D*C=0. D*H=0

WTF= 61 365 OPTX=DPP OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0	-9.000	8.500	0.	0.	773.9	0.	0.	0.729
0.000	-9.000	8.317	0.34	0.0031	774.2	0.	0.	0.729
0 100	-9.000	8.130	0.64	-0.0023	774.2	0.	0.	0.729
0.200	-9.000	7.742	1.42	-0.0123	771.6	0.	0.	0.726
0.300	-9 000	7.333	2.46	-0.0210	765.4	0.	0.	0.720
0 400	-9.000	6.896	3.84	-0.0306	755.1	0.	0.	0.709
0.500	-9.000	6.425	5.60	-0.0410	739.3	0.	0.	0.693
0 600	-9.000	5.906	7.92	-0.0568	715.7	0.	0.	0.669
0.700	-9.000	5.320	10.81	-0.0735	681.4	0.	0.	0.634
0.800	-9.000	4.626	14.42	-0.0870	634.5	0.	0.	0.587
0.900	-9.000	3.734	19.55	-0.0853	575.2	0.	0.	0.529
0.950	-9.000	3.141	23 72	-0.0842	535.7	0.	0.	0.491
1.000	-9.000	2.340	32.46	0.1922	543.6	0.	0.	0.499

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.994	10.317	14.696	518.7	62.71	1687.9	1.589	773.9	0.729
2	0 994	10.315	14.696	518.7	62.19	1659.4	1.563	774.2	0.729
3	0.994	10.315	14.696	518.7	61.65	1630.3	1.535	774.2	0.729
4	0.994	10.341	14.696	518.7	60.55	1569.1	1.477	771.6	0.726
5	0.994	10.402	14.696	518.7	59.40	1503.4	1.414	765.4	0.720
6	0.994	10.503	14.696	518.7	58.18	1432.2	1.345	755.1	0.709
7	0.994	10.657	14 696	518.7	56.89	1353.5	1.269	739.3	0.693
8	0 994	10.884	14.696	518.7	55.52	1264.4	1.182	715.7	0.669
9	0.994	11.207	14.696	518.7	54.03	1160.0	1.079	681.4	0.634
10	0 994	11.633	14.696	518.7	52.14	1033.9	0.957	634.5	0.587
11	0.994	12.142	14.696	518.7	48.88	874.6	0.805	575 2	0.529
12	0.994	12.460	14.696	518.7	45.98	770.9	0.707	535.7	0.491
13	0.994	12.398	14.696	518.7	37.22	682.6	0.626	543.6	0.499

STA 10.000 MASS AVERAGED PROPERTIES

PT= 14.696 TT= 518.69 GAMMA=1.4018 PT-RAT= 1.000 TT-RAT= 1.000

RCU= 0. VM= 705.9 CZ= 694.5 MM=0.660 MABS=0.660 MREL=1.217

ROTOR1 STA= 11.000 LE ROTOR

I= 7 MTIP= 79 AFLOW= 197.41 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=FREE ITYPE=4 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0	-8.166	8.500	0.	0.	832.8	0.	0.	0.791
0.050	-8.204	8.322	0.38	-0.0049	834.4	0.	0.	0.793
0.100	-8.242	8.140	0.75	-0.0030	835.3	0.	0.	0.794
0.200	-8 322	7.762	1.73	-0.0033	835.2	0.	0.	0.793
0.300	-8.397	7.362	3.02	-0.0110	829.7	0.	0.	0.788
0.400	-8.466	6.936	4.61	-0.0196	817.7	0.	0.	0.775
0.500	-8.531	6.475	6.63	-0.0351	797.1	0.	0.	0.753
0 600	-8.592	5.968	9.19	-0.0510	764.7	0.	0.	0 719
0 700	-8.624	5.397	12.32	-0.0638	720.6	0.	0.	0.674
0.800	-8.604	4.735	16.21	-0.0649	669.3	0.	0.	0.622
0.900	-8.548	3 904	21.67	-0.0681	603.7	0.	0.	0.557
0.950	-8.526	3.361	25.85	-0.0582	560.0	0.	0.	0.514
1.000	-8.507	2 653	31.20	0.1471	553.1	0.	0.	0.508

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.990	9.723	14.696	518.7	60.96	1715.7	1.629	832.8	0.791
2	0.990	9.707	14.696	518.7	60.40	1689.1	1.604	834.4	0.793
3	0.990	9.697	14.696	518.7	59.82	1661.6	1.579	835.3	0.794
4	0.990	9.699	14.696	518.7	58.63	1604.3	1.524	835.2	0.793
5	0.990	9.755	14.696	518.7	57.44	1541.6	1.463	829.7	0.788
6	0.990	9.878	14.696	518.7	56.26	1472.0	1.395	817.7	0.775
7	0.990	10.085	14.696	518.7	55.10	1393.2	1.316	797.1	0.753
8	0.990	10.409	14.696	518.7	54.02	1301.5	1.224	764.7	0.719
9	0.990	10.837	14.696	518.7	52.89	1194.3	1.117	720.6	0.674
10	0.990	11.319	14.696	518.7	51.31	1070.6	0.995	669.3	0.622
11	0.990	11.901	14.696	518.7	48.77	916.1	0.845	603.7	0.557
12	0.990	12.266	14.696	518.7	46.65	815.8	0.749	560.0	0.514
13	0.990	12.322	14.696	518.7	40.25	724.6	0.665	553.1	0.508

STA 11.000 MASS AVERAGED PROPERTIES

PT= 14.696 TT= 518.69 GAMMA=1.4018 PT-RAT= 1.000 TT-RAT= 1.000

RCU= 0. VM= 755.7 CZ= 741.5 MM=0.712 MABS=0.712 MREL=1.260

ROTOR1 STA= 11.500 IN ROTOR

I= 8 MTIP= 92 AFLOW= 181.06 D*C=0. D*H=0.

WTF= 61.365 OPTX=TT OPTY=PT ITYPE=5 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7 963	8.500	0.	0.	848.1	44.8	3.03	0.798
0.050	-7.991	8.323	0.24	0.0275	851.7	40.5	2.72	0.803
0.100	-8.020	8.143	0.59	0.0291	860.0	38.3	2.55	0.812
0.200	-8.083	7.769	1.64	0.0166	876.9	36.5	2.38	0.831
0 300	-8.143	7.376	3.10	-0.0005	886.7	37.1	2.39	0.842
0.400	-8.198	6.958	4.88	-0.0166	886.5	40.3	2.61	0.841
0.500	-8.251	6.509	7.08	-0.0209	878.6	47.8	3.12	0.832
0.600	-8.301	6.017	9.72	-0.0109	854.7	51.7	3.46	0.807
0.700	-8.324	5.465	12.91	-0.0026	819.2	53.6	3.75	0.769
0.800	-8.299	4.826	16.76	0.0046	771.8	52.8	3.91	0.721
0.900	-8.247	4.027	22.18	0.0139	711.5	57.0	4.58	0.660
0.950	-8.231	3.507	25.89	0.0546	678.1	62.3	5.25	0.627
1.000	-8.224	2.817	29.07	0.0800	653.8	69.0	6.02	0.603

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.956	10.153	15.467	529.9	59.77	1684.3	1.584	849.2	0.799
2	0.956	10.071	15.414	528.6	59.19	1663.0	1.567	852.7	0.804
3	0.955	9.962	15.391	527.9	58.41	1641.8	1.550	860.8	0.813
4	0.952	9.766	15.379	527.0	56.69	1596.9	1.513	877.6	0.832
5	0.948	9.668	15.397	526.7	54.96	1544.5	1.466	887.5	0.843
6	0.943	9.705	15.451	527.0	53.26	1482.0	1.407	887.4	0.842
7	0.935	9.868	15.565	527.9	51.41	1408.4	1 334	879.9	0.833
8	0.925	10.136	15.584	527.9	49.76	1323.2	1.249	856.3	0.808
9	0.913	10.486	15.545	527.3	48.03	1225.0	1.151	820.9	0.771
10	0.897	10.901	15.440	526.2	45.99	1110.8	1.038	773.6	0.723
11	0.879	11.445	15.365	525.4	42.57	966.1	0.896	713.8	0.662
12	0.850	11.734	15.328	525.1	39.38	877.2	0.811	680.9	0.629
13	0.812	11.892	15.250	524.4	33.22	781.4	0.721	657.4	0.606

STA 11.500 MASS AVERAGED PROPERTIES

PT= 15.448 TT= 527.04 GAMMA=1.4018 PT-RAT= 1.051 TT-RAT= 1.016

RCU= 283.5 VM= 829.3 CZ= 812.2 MM=0.781 MABS=0.783 MREL=1.276

ROTOR1 STA= 12.000 IN ROTOR

I= 9 MTIP=105 AFLOW= 170.54 D*C=0. D*H=0.

WTF= 61.365 OPTX=TT OPTY=PT ITYPE=5 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.759	8.500	0.	0.	815.6	94.9	6.64	0.754
0.050	-7.778	8.323	-0.15	0.0369	822.9	93.4	6.47	0.762
0.100	-7.798	8.144	0.13	0.0426	832.9	91.7	6.29	0.773
0.200	-7.844	7.775	1.36	0.0241	856.0	92.0	6.13	0.798
0.300	-7.889	7.390	3.09	0.0018	870.5	93.4	6.13	0.814
0.400	-7.931	6.982	5.10	-0.0119	882.1	101.8	6.58	0.826
0.500	-7.972	6.545	7.34	-0.0112	887.5	114.1	7.32	0.831
0 600	-8.010	6.067	9.83	-0.0026	879.0	124.6	8.07	0.822
0.700	-8.024	5.534	12.80	0.0142	858.4	130.7	8.66	0.801
0.800	-7.995	4.918	16.58	0.0151	823.6	132.6	9.15	0.766
0.900	-7.946	4.149	21.93	0.0129	772.4	136.8	10.04	0.716
0.950	-7.936	3.647	25.27	0.0115	737.3	141.8	10.89	0.681
1.000	-7.941	2.971	28.21	0.0136	690.1	149.3	12.21	0.635

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.933	11.159	16.356	542.4	59.87	1624 7	1.502	821.1	0.759
2	0.933	11.092	16.382	541.6	59.11	1602.9	1.485	828.2	0.767
3	0.932	10.983	16.392	540.7	58.24	1582.4	1.469	837.9	0.778
4	0.928	10.762	16.459	539.8	56.23	1540.0	1.436	860.9	0.805
5	0.922	10.620	16.507	539.0	54.28	1491.1	1.395	875.5	0.819
6	0.912	10.580	16.658	539.6	52.03	1433.8	1.343	887.9	0.832
7	0.898	10.623	16.837	540.7	49.55	1367.9	1.281	894.8	0.838
8	0.881	10.759	16.916	540.9	47.11	1291.4	1.208	887.8	0.830
9	0.863	10.937	16.854	540.0	44.58	1205.1	1.125	868.3	0.810
10	0.840	11.177	16.654	537.9	41.75	1104.0	1.027	834.2	0.776
11	0.818	11.525	16.388	535.4	37.62	975.3	0.904	784.5	0.727
12	0.776	11.756	16.222	533.9	34.24	891.9	0.824	750.9	0.694
13	0.733	12.025	15.981	531.8	28.51	785.3	0.723	706.0	0.650

STA 12.000 MASS AVERAGED PROPERTIES

PT= 16.585 TT= 539.12 GAMMA=1.4018 PT-RAT= 1.129 TT-RAT= 1.039

RCU= 694.0 VM= 841.8 CZ= 823.9 MM=0.785 MABS=0.792 MREL=1.231

ROTOR1 STA= 12.500 IN ROTOR

I=10 MTIP=118 AFLOW= 162.19 D*C=0. D*H=0.

WTF= 61.365 OPTX=TT OPTY=PT ITYPE=5 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.556	8.500	0.	0.	775.6	150.5	10.98	0.704
0.050	-7.565	8.322	-0.31	-0.0117	788.6	158.1	11.34	0.717
0.100	-7.576	8.144	-0.15	0.0009	797.9	162.5	11.52	0.726
0.200	-7.606	7.780	1.02	0.0251	817.9	168.2	11.62	0.746
0.300	-7.636	7.403	2.87	0.0291	833.2	170.6	11.57	0.763
0.400	-7.664	7.006	4.98	0.0278	850.0	178.1	11.84	0.781
0.500	-7.692	6.586	7.18	0.0309	866.8	190.3	12.38	0.798
0.600	-7.719	6.117	9.64	0.0247	873.6	201.6	12.99	0.806
0.700	-7.724	5.601	12.59	0.0100	864.3	212.4	13.81	0.798
0.800	-7.690	5.008	16.36	0.0097	837.7	226.1	15.10	0.772
0.900	-7.645	4.269	21.60	0.0226	798.0	241.5	16.84	0.734
0.950	-7.641	3.786	25.06	0.0104	768.0	242.8	17.54	0.706
1.000	-7.658	3.123	28.51	-0.0461	711.7	236.3	18.37	0.653

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.912	12.329	17.377	556.4	60.11	1556.5	1.413	790.1	0.717
2	0.911	12.345	17.616	557.4	58.96	1529.5	1.390	804.3	0.731
3	0.910	12.346	17.780	557.7	57.95	1503.7	1.368	814.3	0.741
4	0.906	12.261	18.020	557.2	55.83	1456.2	1.329	835.1	0.762
5	0.898	12.129	18.118	555.9	53.74	1408.7	1.290	850.5	0.779
6	0.886	11.997	18.256	555.4	51.23	1357.3	1.247	868.5	0.798
7	0.868	11.858	18.404	555.6	48.24	1301.6	1.199	887.5	0.817
8	0.849	11.756	18.432	555.0	45.14	1238.6	1.143	896.6	0.828
9	0.829	11.780	18.357	553.7	41.93	1161.5	1.072	889.8	0.821
10	0.802	11.941	18.207	552.0	38.13	1065.0	0.982	867.7	0.800
11	0.776	12.101	17.869	549.0	32.68	948.1	0.872	833.7	0.767
12	0.728	12.139	17.482	545.7	28.97	877.9	0.807	805.5	0.741
13	0.683	12.289	16.876	540.4	23.86	778.2	0.714	749.9	0.688

STA 12.500 MASS AVERAGED PROPERTIES

PT= 18.062 TT= 554.06 GAMMA=1.4017 PT-RAT= 1.229 TT-RAT= 1.068

RCU= 1201.5 VM= 829.1 CZ= 811.3 MM=0.761 MABS=0.782 MREL=1.157

ROTOR1 STA= 13.000 IN ROTOR

I=11 MTIP=131 AFLOW= 155.54 D*C=0. D*H=0.

WTF= 61.365 OPTX=TT OPTY=PT ITYPE=5 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.352	8.500	0.	0.	740.6	206.0	15.55	0.662
0.050	-7.352	8.321	-0.46	0.0364	759.6	214.9	15.80	0.680
0.100	-7.354	8.143	-0.43	0.0444	777.7	221.2	15.87	0.697
0.200	-7.367	7.784	0.62	0.0337	808.9	229.6	15.84	0.729
0.300	-7.382	7.415	2.45	0.0279	826.4	232.6	15.72	0.748
0.400	-7.397	7.028	4.51	0.0335	844.1	239.8	15.86	0.767
0.500	-7.413	6.615	6.79	0.0182	862.2	253.9	16.41	0.786
0.600	-7.429	6.166	9.28	0.0178	871.3	269.5	17.19	0.796
0.700	-7.425	5.668	12.25	0.0285	872.7	285.4	18.11	0.799
0.800	-7.386	5.096	16.11	0.0177	861.6	302.3	19.33	0.790
0.900	-7.344	4.387	21.34	0.0047	829.3	320.0	21.10	0.761
0.950	-7.346	3.923	25.14	-0.0185	801.1	321.6	21.87	0.735
1.000	-7.375	3.281	29.92	-0.1052	736.3	318.7	23.41	0.674

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.893	13.441	18.431	570.2	60.21	1490.9	1.332	768.8	0.687
2	0.893	13.433	18.742	571.3	58.79	1465.7	1.311	789.4	0.706
3	0.892	13.375	18.981	571.7	57.39	1443.3	1.294	808.6	0.725
4	0.887	13.223	19.345	571.3	54.74	1401.1	1.262	840.8	0.757
5	0.880	13.077	19.489	569.4	52.47	1356.7	1.227	858.5	0.777
6	0.866	12.913	19.630	568.3	49.85	1309.0	1.189	877.5	0.797
7	0.848	12.743	19.804	568.1	46.65	1256.0	1.144	898.8	0.819
8	0.828	12.605	19.873	567.6	43.21	1195.5	1.092	912.0	0.833
9	0.805	12.472	19.817	566.3	39.32	1128.1	1.033	918.2	0.841
10	0.777	12.384	19.608	564.0	34.72	1048.2	0.961	913.1	0.837
11	0.748	12.351	19.126	560.0	28.71	945.6	0.867	888.9	0.815
12	0.702	12.298	18.609	555.8	24.84	882.8	0.810	863.3	0.792
13	0.655	12.463	17.848	549.5	19.47	780.9	0.715	802.3	0.735

STA 13.000 MASS AVERAGED PROPERTIES

PT= 19.385 TT= 566.74 GAMMA=1.4016 PT-RAT= 1.319 TT-RAT= 1.093

RCU= 1632.4 VM= 830.2 CZ= 812.2 MM=0.755 MABS=0.792 MREL=1.110

ROTOR1 STA= 13.500 IN ROTOR

I=12 MTIP=144 AFLOW= 151.15 D*C=0. D*H=0.

WTF= 61.365 OPTX=TT OPTY=PT ITYPE=5 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0	-7.148	8.500	0.	0.	702.8	249.9	19 58	0.620
0.050	-7.139	8.319	-0.57	-0.0184	726.8	266.0	20.10	0.641
0.100	-7.132	8.140	-0.63	-0.0142	748.0	281.0	20.59	0.661
0.200	-7.128	7.786	0.28	0.0155	781.5	298.6	20.91	0.693
0.300	-7.129	7.425	2.01	0.0327	800.7	302.1	20.67	0.713
0.400	-7.130	7.048	4.10	0.0203	816.6	308.2	20.68	0.731
0.500	-7.133	6.647	6.37	0.0338	835.9	321.6	21.05	0.751
0.600	-7.138	6.213	8.87	0.0314	851.8	335.4	21.49	0.769
0.700	-7.125	5.732	11.84	0.0179	860.1	355.2	22.44	0.779
0.800	-7.081	5.183	15.91	0.0043	854.6	379.6	23.95	0.776
0.900	-7.043	4.505	21.43	-0.0142	829.3	405.9	26.08	0.755
0.950	-7.051	4.063	25.60	-0.0308	809.8	409.9	26.85	0.739
1.000	-7.092	3.450	31.86	-0.0937	762.7	402.5	27.82	0.697

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.885	14.429	19.294	581.2	60.65	1434.1	1.264	745.9	0.658
2	0.885	14.481	19.792	583.8	58.84	1404.7	1.240	774.0	0.683
3	0.884	14.526	20.260	586.0	57.08	1376.5	1.216	799.1	0.706
4	0.880	14.508	20.913	587 1	53.99	1329.3	1.179	836.6	0.742
5	0.872	14.363	21.116	584.7	51.54	1287.4	1.147	855.8	0.763
6	0.857	14.189	21.236	582.6	48.89	1241.8	1.111	872.8	0.781
7	0.839	13.954	21.382	581.6	45.53	1193.2	1.072	895.6	0.805
8	0.818	13.642	21.361	580.0	41.78	1142.2	1.031	915.4	0.826
9	0.795	13.388	21.326	578.6	37.34	1081.8	0.980	930.5	0.843
10	0.768	13.192	21.157	576.6	32.05	1008.3	0.916	935.2	0.850
11	0.738	12.986	20.634	572.5	25.14	916.0	0.834	923.3	0.841
12	0.699	12.746	20.000	567.7	20.77	866.0	0.790	907.6	0.828
13	0.649	12.590	18.978	559.6	15.14	790.1	0.722	862.4	0.788

STA 13.500 MASS AVERAGED PROPERTIES

PT= 20 856 TT= 580.10 GAMMA=1.4015 PT-RAT= 1.419 TT-RAT= 1.118

RCU= 2087.0 VM= 811.9 CZ= 793.8 MM=0 729 MABS=0.789 MREL=1.049

ROTOR1 STA= 14.000 IN ROTOR

I=13 MTIP=157 AFLOW= 147.59 D*C=0. D*H=0.

WTF= 61.365 OPTX=TT OPTY=PT ITYPE=5 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.945	8.500	0.	0.	671.9	291.6	23.46	0.586
0.050	-6.926	8.317	-0.33	-0.0197	700.3	313.1	24.09	0.611
0.100	-6.910	8.138	-0.37	-0.0255	724.5	329.6	24.46	0.633
0.200	-6.890	7.787	0.30	-0.0181	764.4	358.1	25.10	0.670
0.300	-6.875	7.433	1.75	0.0039	783.5	368.2	25.17	0.690
0.400	-6.863	7.066	3.70	0.0316	800.3	374 8	25.10	0.708
0 500	-6.853	6.677	5.88	0.0271	819.2	384.4	25.14	0.728
0 600	-6.847	6.257	8.43	0.0210	834.9	399.4	25.56	0.746
0.700	-6.825	5.794	11.59	0.0110	843.2	421.9	26.58	0.756
0.800	-6.777	5.270	15.91	-0.0047	845.7	455.4	28.30	0.762
0.900	-6.742	4.624	21.83	-0.0286	826 0	484.4	30.39	0.747
0.950	-6.756	4.206	26 35	-0.0486	811.6	492.1	31.23	0.737
1.000	-6.809	3.632	33.48	-0.0749	785.6	490.0	31.95	0.717

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.878	15.334	20.180	591.6	60.92	1382.7	1.206	732.5	0.639
2	0.879	15.403	20.801	595.3	58.76	1350.4	1.178	767.1	0.669
3	0.879	15.463	21.364	597.6	56.79	1322.7	1.155	796.0	0.695
4	0.874	15.519	22.326	600 7	53.05	1271.5	1.114	844.1	0.740
5	0.866	15.475	22.736	599.2	50.29	1226.4	1.079	865.7	0.762
6	0.852	15.292	22.896	596.6	47.46	1183.7	1.047	883.7	0.782
7	0.834	14.974	22.935	594.2	44.10	1140.8	1.014	904.9	0.804
8	0.814	14.624	22.911	592.2	40.17	1092.6	0.976	925.5	0.827
9	0.793	14.315	22.869	590.6	35.46	1035.2	0.929	942.9	0.846
10	0.770	13.989	22.803	589.3	29.30	969.8	0.873	960.5	0.865
11	0.739	13.590	22.174	584.6	21.87	890.0	0.805	957.6	0.866
12	0.713	13.221	21.469	579.6	17.13	849.2	0.771	949.1	0.862
13	0.662	12.738	20.324	571.1	10.87	800.0	0.730	925.9	0.845

STA 14.000 MASS AVERAGED PROPERTIES

PT= 22.329 TT= 592.76 GAMMA=1.4014 PT-RAT= 1.519 TT-RAT= 1.143

RCU= 2517.6 VM= 37.4 CZ= 779.0 MM=0.709 MABS=0.793 MREL=0.996

ROTOR1 STA= 14.500 IN ROTOR

I=14 MTIP=170 AFLOW= 145.34 D*C=0. D*H=0.

WTF= 61.365 OPTX=TT OPTY=PT ITYPE=5 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.741	8.500	0.	0	637.7	356.8	29.23	0.548
0.050	-6.713	8.316	-0.15	-0.0099	666.5	375.4	29.39	0.574
0.100	-6.688	8.138	-0.08	-0.0212	691.3	392.8	29.61	0.596
0.200	-6.651	7.788	0.54	-0.0167	735.1	420.5	29.77	0.636
0.300	-6.621	7.441	1.70	0.0026	757.8	431.5	29.66	0.659
0.400	-6.596	7.083	3.39	0.0097	775.5	438.4	29.48	0.678
0.500	-6.573	6.705	5.61	0.0066	791.5	450.9	29.67	0.695
0.600	-6.556	6.299	8.21	0.0046	805.9	467.5	30.12	0.712
0.700	-6.525	5.855	11.53	-0.0041	814.4	491.9	31.13	0.723
0.800	-6.473	5.357	16.10	-0.0156	822.0	528.1	32.72	0.733
0.900	-6.441	4.746	22.53	-0.0463	815.1	564.4	34.70	0.732
0.950	-6.461	4.356	27.49	-0.0717	805.7	577.6	35.63	0.727
1.000	-6.526	3.824	34.87	-0.0668	795.8	588.7	36.49	0.723

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.877	16.567	21.609	607.9	60.84	1309.0	1.125	730.8	0.628
2	0.878	16.653	22.277	610.5	58.61	1279.5	1.101	765.0	0.658
3	0.878	16.713	22.884	612.7	56.47	1251.5	1.078	795.1	0.685
4	0.874	16.753	23.948	615.0	52.38	1204.3	1.042	846.9	0.733
5	0.867	16.678	24.420	613.1	49.32	1162.5	1.011	872 0	0.758
6	0.855	16.489	24.625	610.0	46.30	1122.5	0.981	890.8	0.779
7	0.837	16.179	24.678	607.6	42.78	1078.3	0.948	910.9	0.800
8	0.821	15.801	24.652	605.3	38.63	1031.7	0.911	931.7	0.823
9	0.803	15.425	24.601	603.4	33.61	977.9	0.868	951.4	0.844
10	0.786	14.942	24.521	601.9	26.92	921.8	0.822	977.0	0.872
11	0.753	14.273	23.897	597.5	18.53	859.7	0.772	991.5	0.890
12	0.745	13.778	23.170	592.7	13.34	828.1	0.747	991.4	0.894
13	0.696	13.028	22.035	584.9	6.18	800.5	0.728	989 9	0.900

STA 14.500 MASS AVERAGED PROPERTIES

PT= 24.006 TT= 606.38 GAMMA=1.4012 PT-RAT= 1.633 TT-RAT= 1.169

RCU= 2981.3 VM= 772.6 CZ= 753.6 MM=0.680 MABS=0.795 MREL=0.936

ROTOR1 STA= 15.000 IN ROTOR

I=15 MTIP=183 AFLOW= 144.25 D*C=0. D*H=0.

WTF= 61.365 OPTX=TT OPTY=PT ITYPE=5 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.538	8.500	0	0.	598.3	453.1	37.14	0.505
0.050	-6.500	8.316	-0.08	-0.0023	627.8	465.1	36.53	0.531
0.100	-6.466	8.138	-0.01	0.0110	653.3	475.3	36.04	0.554
0.200	-6.412	7.791	0.55	0.0152	700.3	483.4	34.61	0.599
0.300	-6.367	7.448	1.67	0.0008	726.7	492.8	34.14	0.625
0.400	-6.328	7.098	3.40	-0.0115	745.4	501.7	33.94	0.645
0.500	-6.295	6.732	5.65	-0.0117	760.3	514.3	34.08	0.661
0.600	-6.265	6.341	8.32	-0.0177	772.0	533.7	34.66	0.674
0 700	-6.225	5.916	11.78	-0.0248	779.7	559.3	35.65	0.685
0.800	-6.168	5.446	16.48	-0.0265	791.2	597.0	37.04	0.699
0.900	-6.139	4.874	23.48	-0 0559	801.2	644.0	38.79	0.714
0.950	-6.166	4.513	28.67	-0 0516	806.6	671.3	39.77	0.724
1.000	-6.243	4.026	36.12	-0.0570	810.9	710.2	41.21	0.735

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.881	18.155	23.777	631.9	60.25	1205.8	1.017	750.5	0.633
2	0.882	18.211	24.416	632.4	57.94	1182.8	1.000	781.4	0.661
3	0.883	18.214	24.943	632.4	55.78	1161.8	0.986	808.0	0.685
4	0.880	18.096	25.738	629.4	51.85	1133.7	0.969	850.9	0.727
5	0.874	17.919	26.154	626.6	48.51	1096.8	0.943	878.0	0.755
6	0.865	17.715	26.407	623.4	45.21	1058.1	0.915	898.6	0.777
7	0.851	17.401	26.477	620.5	41.55	1015.9	0.883	917.9	0.798
8	0.839	17.004	26.448	618.2	37.17	968.8	0.846	938.5	0.820
9	0.826	16.577	26.390	616.0	31.87	918.1	0.806	959.6	0.843
10	0.815	15.950	26.295	614.3	24.71	870.9	0.770	991.2	0.876
11	0.785	14.982	25.810	611.0	15.10	829.9	0.740	1027.9	0 916
12	0.790	14.247	25.244	607.8	8.82	816.2	0.733	1049.4	0.942
13	0.743	13.223	24.388	602.8	0.01	810.9	0.735	1078.0	0.977

STA 15.000 MASS AVERAGED PROPERTIES

PT= 25.878 TT= 620.97 GAMMA=1.4010 PT-RAT= 1.761 TT-RAT= 1.197

RCU= 3478.6 VM= 743.6 CZ= 723.5 MM=0.648 MABS=0.800 MREL=0.873

ROTOR1 STA= 15.500 IN ROTOR

I=16 MTIP=196 AFLOW= 145.07 D*C=0. D*H=0.

WTF= 61.365 OPTX=TT OPTY=PT ITYPE=5 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.334	8.500	0.	0.	562.1	526.5	43.13	0.468
0.050	-6.286	8.315	-0.35	0.0467	592.8	530.8	41.84	0.495
0.100	-6.244	8.137	-0.28	0.0308	620.2	532.8	40.67	0.521
0.200	-6.173	7.793	0.47	-0.0036	667.9	537 5	38.83	0.565
0.300	-6.114	7.456	1.85	-0.0244	696.0	544.4	38.04	0.593
0.400	-6.061	7.115	3.74	-0.0331	713.0	554.2	37.86	0.611
0.500	-6.014	6.761	6.08	-0.0415	723.7	567.6	38.11	0.623
0 600	-5.974	6.385	8.89	-0.0494	729.4	588.2	38.89	0.631
0.700	-5 925	5.980	12.40	-0.0454	735.4	614.3	39.87	0.639
0.800	-5.864	5.538	17.09	-0.0400	748.3	651.7	41.06	0.655
0.900	-5.838	5.008	24.35	-0.0358	778.7	704.3	42.13	0.689
0.950	-5.871	4.678	29.59	-0.0437	797.0	740.1	42.88	0.711
1.000	-5.960	4.235	36.53	0.0158	835.9	799.8	43.74	0.757

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.898	19.394	25.568	650 2	60.00	1124.1	0.935	770.2	0.641
2	0.899	19.378	26.071	648.4	57.67	1108.4	0.926	795.7	0.665
3	0.899	19.310	26.464	646.1	55.52	1095.6	0.920	817.6	0.686
4	0.898	19.159	27.205	641.8	51.43	1071.4	0.907	857.4	0.726
5	0.894	19.015	27.694	638.0	47.94	1038.8	0.885	883.6	0.753
6	0.889	18.842	27.994	634.6	44.53	1000.1	0.857	903.1	0.774
7	0.881	18.567	28.080	631.5	40.84	956.5	0.823	919.7	0.792
8	0.874	18.207	28.050	629.1	36.44	906.6	0.784	937.0	0.810
9	0.868	17.752	27.985	626.7	30.95	857.5	0.745	958.2	0.833
10	0.862	17.041	27.876	624.8	23.51	816.0	0.714	992.3	0.868
11	0.842	15.739	27.505	622.4	12.98	799.2	0.707	1050.0	0.929
12	0.847	14.803	27.101	620.5	6.12	801.5	0.715	1087.6	0.971
13	0.800	13.254	26.566	618.3	-3.59	837.5	0.759	1156.9	1.048

STA 15.500 MASS AVERAGED PROPERTIES

PT= 27.493 TT= 632.94 GAMMA=1.4008 PT-RAT= 1.871 TT-RAT= 1.220

RCU= 3886.8 VM= 710.7 CZ= 689.7 MM=0.613 MABS=0.801 MREL=0.818

ROTOR1 STA= 16.000 TE ROTOR

I=17 MTIP=209 AFLOW= 148.35 D*C=0. D*H=0.

WTF= 61.365 OPTX=TT OPTY=PT ITYPE=6 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.131	8.500	0.	0.	520.2	567.1	47.47	0.429
0.050	-6.073	8.314	-0.37	-0.0438	560.3	570.0	45.49	0.465
0.100	-6.022	8.136	-0.69	-0.0600	588.4	571.9	44.19	0.490
0.200	-5.935	7.795	1.04	-0.0802	634.5	577.2	42.29	0.533
0.300	-5.860	7.465	2.64	-0.0849	659.5	584.4	41.55	0.557
0.400	-5.794	7.134	4.58	-0.0763	673.3	594.4	41.44	0.572
0.500	-5.734	6.792	6.89	-0.0599	678.7	608.2	41.86	0.579
0.600	-5.683	6.432	9.63	-0.0378	680.6	629.5	42.77	0.583
0.700	-5.626	6.048	12.94	-0.0156	687.5	654.8	43.60	0.592
0.800	-5.560	5.633	17.25	0.0221	700.7	690.4	44.58	0.608
0.900	-5.537	5.145	23.80	0.0935	725.2	746.5	45.83	0.636
0.950	-5.576	4.846	28.32	0.1745	757.6	792.0	46.27	0.670
1.000	-5.677	4.442	35.49	0.0883	781.8	870.1	48.06	0.700

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.926	20.245	26.560	660.3	60.86	1068.1	0.882	769.6	0.635
2	0.927	20.194	27.120	657.9	58.02	1057.7	0.877	799.2	0.663
3	0.927	20.157	27.560	655.4	55.74	1045.2	0.871	820.6	0.684
4	0.927	20.091	28.390	650.9	51.53	1019.8	0.857	857.8	0.720
5	0.928	20.023	28.940	646.9	48.02	985.9	0.833	881.2	0.745
6	0.928	19.910	29.280	643.3	44.63	946.0	0.804	898.1	0.763
7	0.928	19.696	29.380	640.1	41.03	899.6	0.768	911.3	0.778
8	0.928	19.355	29.350	637.7	36.61	847.8	0.727	927.0	0.795
9	0.928	18.858	29.280	635.1	30.96	801.8	0.691	949.4	0.818
10	0.928	18.112	29.160	633.0	23.43	763.6	0.663	983.7	0.853
11	0.930	16.870	28.920	631.6	12.56	743.0	0.651	1040.7	0.912
12	0.914	15.740	28.770	631.5	4.77	760.2	0.672	1095.9	0.969
13	0.875	14.297	28.650	632.3	-6.30	786.6	0.704	1169.8	1.048

STA 16.000 MASS AVERAGED PROPERTIES

PT= 28.783 TT= 642.01 GAMMA=1.4006 PT-RAT= 1.959 TT-RAT= 1.238

RCU= 4196.1 VM= 668.4 CZ= 649.0 MM=0.572 MABS=0.791 MREL=0.765

AVERAGE PCT IMM	AVERAGE RAD	BLADE SPEED IN	BLADE SPEED OUT	ACC PT RATIO	ACC TT RATIO	EFFICIENCY AD.	EFFICIENCY POLY	AXIAL VEL R
0.	8.500	1500.0	1500.0	1.8073	1.2730	0.675	0.701	0.625
3.7	8.318	1468.6	1467.1	1.8454	1.2684	0.713	0.737	0.671
7.3	8.138	1436.4	1435.7	1.8753	1.2656	0.747	0.768	0.704
14.6	7.779	1369.7	1375.6	1.9318	1.2549	0.812	0.829	0.760
21.9	7.414	1299.2	1317.3	1.9692	1.2472	0.865	0.877	0.795
29.6	7.035	1224.0	1258.9	1.9924	1.2402	0.907	0.915	0.823
37.7	6.634	1142.7	1198.6	1.9992	1.2341	0.936	0.942	0.851
46.4	6.200	1053.2	1135.1	1.9971	1.2294	0.953	0.957	0.889
56.1	5.723	952.4	1067.3	1.9924	1.2244	0.971	0.973	0.952
67.0	5.184	835.6	994.0	1.9842	1.2204	0.982	0.984	1.041
80.3	4.525	689.0	908.0	1.9679	1.2177	0.981	0.983	1.183
88.8	4.104	593.2	855.1	1.9577	1.2175	0.974	0.976	1.323
100.0	3.547	468.2	783.8	1.9495	1.2190	0.960	0.964	1.346

FREE STA= 17.000 FREE

I=18 MTIP=222 AFLOW= 146.24 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-5.700	8.500	0.	0.	509.7	567.1	48.05	0.420
0.050	-5.639	8.315	0.73	-0.0445	558.8	569.9	45.56	0.463
0.100	-5.587	8.141	1.44	-0.0632	592.2	571.6	43.98	0.494
0.200	-5.499	7.811	2.90	-0.0684	646.1	576.1	41.72	0.543
0.300	-5.430	7.492	4.39	-0.0563	676.7	582.3	40.71	0.573
0.400	-5.375	7.173	5.97	-0.0394	695.7	591.1	40.35	0.592
0.500	-5.333	6.845	7.79	-0.0178	704.3	603.5	40.59	0.602
0.600	-5.305	6.498	9.98	0.0054	707.3	623.1	41.38	0.608
0.700	-5.294	6.125	12.76	0.0336	712.8	646.6	42.21	0.615
0.800	-5.304	5.711	16.55	0.0685	717.0	680.9	43.52	0.623
0.900	-5.351	5.225	22.40	0.1474	726.3	735.1	45.34	0.636
0.950	-5.405	4.934	26.18	0.2132	742.3	777.8	46.34	0.654
1.000	-5.521	4.550	33.90	0.2101	731.0	849.4	49.29	0.649

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.940	20.329	26.533	660.3	61.35	1063.1	0.877	762.5	0.629
2	0.940	20.191	27.093	657.9	58.09	1057.2	0.877	798.1	0.662
3	0.940	20.097	27.532	655.4	55.60	1048.3	0.874	823.1	0.686
4	0.940	19.956	28.390	650.9	51.15	1030.1	0.866	865.7	0.728
5	0.940	19.818	28.940	646.9	47.55	1002.6	0.849	892.7	0.756
6	0.940	19.641	29.280	643.3	44.12	969.2	0.825	912.9	0.777
7	0.940	19.398	29.380	640.1	40.64	928.1	0.794	927.5	0.793
8	0.940	19.066	29.350	637.7	36.52	880.1	0.756	942.6	0.810
9	0.940	18.617	29.280	635.1	31.35	834.6	0.721	962.4	0.831
10	0.940	18.015	29.160	633.0	24.51	788.0	0.684	988.8	0.859
11	0.940	17.009	28.920	631.6	14.44	750.0	0.657	1033.4	0.905
12	0.940	16.132	28.770	631.5	7.13	748.1	0.659	1075.2	0.948
13	0.940	15.176	28.564	632.3	-3.64	732.5	0.650	1120.7	0.995

STA 17.000 MASS AVERAGED PROPERTIES

PT= 28.777 TT= 642.01 GAMMA=1.4006 PT-RAT= 1.958 TT-RAT= 1.238

RCU= 4196.1 VM= 681.0 CZ= 662.8 MM=0.583 MABS=0.796 MREL=0.779

STATOR STA= 18 000 LE STATOR

I=19 MTIP=235 AFLOW= 141.59 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=FREE ITYPE=1 INBR=4 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-5.250	8.500	0.	0.	548.9	567.1	45.94	0.454
0.050	-5.193	8.324	1.38	-0.0062	588.6	569.2	44.04	0.489
0.100	-5.143	8.157	2.40	-0.0120	618.1	570.4	42.70	0.516
0.200	-5.064	7.838	3.98	-0.0180	670.0	574.0	40.59	0.564
0 300	-5.004	7.529	5 30	-0.0181	702.0	579.4	39.54	0.596
0.400	-4.962	7.220	6.64	-0.0166	723.8	587.3	39.06	0.618
0.500	-4.938	6.901	8.16	-0.0143	735.7	598.6	39.14	0.631
0.600	-4.933	6.564	10.06	-0.0129	742.5	616 9	39.72	0.640
0 700	-4.952	6.200	12.53	-0.0104	751.2	638.7	40.37	0.651
0.800	-5.003	5.797	15.89	0.0055	759.4	670.8	41.45	0.662
0.900	-5.108	5.321	21.09	0.0278	765.2	721.9	43.33	0.672
0.950	-5.201	5.029	24.65	0.0252	754.3	763.0	45.33	0.665
1.000	-5.375	4.643	31.23	0.3271	800.3	832.3	46.12	0.715

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0 940	19.931	26.533	660.3	59.53	1082.4	0.895	789.2	0.653
2	0 940	19.867	27.093	657.9	56.81	1075.2	0.894	818.8	0.681
3	0.940	19.805	27.532	655.4	54.58	1066.5	0.891	841.1	0.702
4	0.940	19.671	28.390	650.9	50.38	1050.6	0.885	882.2	0.743
5	0.940	19.506	28.940	646.9	46.86	1026.8	0.871	910.3	0.772
6	0.940	19.291	29.280	643.3	43.50	997.7	0.852	932.1	0.796
7	0.940	19.011	29.380	640.1	40.08	961.5	0.825	948.4	0.814
8	0.940	18.644	29.350	637.7	36.10	918.9	0.792	965.3	0 832
9	0.940	18.172	29.280	635.1	31.23	878.6	0.761	986.1	0.854
10	0.940	17.554	29.160	633.0	24.89	837.2	0.730	1013.2	0.883
11	0.940	16.658	28.920	631.6	15.84	795.4	0.698	1052.0	0.924
12	0.940	16.175	28.770	631.5	9.37	764.5	0.674	1072.9	0.945
13	0.940	14.539	28.564	632.3	-0.92	800.4	0.715	1154.6	1.031

STA 18.000 MASS AVERAGED PROPERTIES

PT= 28.777 TT= 642.01 GAMMA=1.4007 PT-RAT= 1.958 TT-RAT= 1.238

RCU= 4196.1 VM= 713.1 CZ= 695.3 MM=0.612 MABS=0.815 MREL=0.809

STATOR STA= 19.000 IN STATOR

I=20 MTIP=248 AFLOW= 126.03 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=BETM ITYPE=2 INBR=4 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-4.770	8.500	0.	0.	614.0	375 1	31.42	0.504
0.050	-4.724	8.335	1.06	0.0296	643.2	384.2	30.86	0.531
0.100	-4.683	8.177	1.94	0.0468	666.7	390.9	30.38	0.553
0.200	-4.617	7.870	3.43	0.0607	711.4	405.6	29.69	0.595
0.300	-4.567	7.570	4.78	0.0593	742.5	416.4	29.29	0.625
0 400	-4.532	7.270	6.19	0.0531	765.0	426.4	29.13	0.648
0.500	-4.512	6.962	7.79	0.0444	779.2	435.8	29.22	0.663
0.600	-4.508	6.639	9.73	0.0396	791.1	447.6	29.50	0.676
0.700	-4.524	6.295	12.13	0.0420	806.1	466.3	30.05	0.693
0 800	-4.565	5.921	15.19	0.0480	826.6	495.3	30.93	0.715
0.900	-4.641	5.495	19.46	0.0863	856.8	536.5	32.05	0.747
0 950	-4.696	5.253	22 42	0.1156	881.8	564.2	32.61	0.774
1.000	-4.770	4.975	26.23	0.1265	913.5	602.2	33.40	0.807

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.875	20.954	26.533	660.3	61.37	1281.6	1.052	719.5	0.591
2	0.877	20.937	27.093	657.9	59.38	1262.8	1.042	749.2	0.618
3	0.878	20.891	27.532	655.4	57.64	1245.5	1.032	772.8	0.641
4	0.879	20.744	28.390	650.9	54.11	1213.5	1.015	819.0	0.685
5	0 880	20 546	28.940	646.9	51.08	1181.8	0.995	851.3	0.717
6	0.881	20.310	29.280	643.3	48.23	1148.4	0.973	875.8	0.742
7	0.880	20.034	29.380	640.1	45.50	1111.6	0.946	892.7	0.760
8	0.880	19.688	29.350	637.7	42.47	1072.4	0.917	908.9	0.777
9	0.878	19.196	29.280	635.1	38.65	1032.2	0.887	931.3	0.800
10	0.875	18.487	29.160	633.0	33.61	992.6	0.859	963.6	0.834
11	0.867	17.432	28.920	631.6	26.83	960.2	0.838	1010.9	0.882
12	0.857	16.666	28.770	631.5	22.37	953.5	0.837	1046.9	0.918
13	0.837	15.674	28.564	632.3	16.80	954.2	0.843	1094.1	0.967

STA 19 000 MASS AVERAGED PROPERTIES

PT= 28.777 TT= 642 01 GAMMA=1.4005 PT-RAT= 1.958 TT-RAT= 1.238

RCU= 3055.6 VM= 770.9 CZ= 754.1 MM=0.657 MABS=0.761 MREL=0.941

STATOR STA= 20.000 IN STATOR

I=21 MTIP=261 AFLOW= 118.87 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=BETM ITYPE=2 INBR=4 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-4.300	8.500	0	0	652.8	261.4	21.82	0.535
0.050	-4.277	8.341	0.63	0.0044	682.7	270.9	21.64	0.563
0.100	-4.258	8.188	1.26	0.0088	705.1	277.6	21.49	0.584
0.200	-4.225	7.889	2.57	0.0163	746.2	290.0	21.24	0.623
0.300	-4.201	7.597	3.93	0.0217	772.7	297.1	21.03	0.649
0.400	-4.184	7.305	5.39	0.0263	791.1	302.1	20.90	0.668
0.500	-4.174	7.006	7.03	0.0332	801.7	305.5	20.86	0.680
0.600	-4.173	6.695	8.93	0.0431	810.7	310.0	20.93	0.689
0.700	-4.180	6.367	11.15	0.0554	822.6	318.2	21.15	0.702
0.800	-4.199	6.016	13.86	0.0750	840.5	332.6	21.59	0.721
0.900	-4.233	5.631	17.33	0.0867	865.1	353.1	22.20	0.746
0.950	-4.261	5.420	19.55	0.0993	882.1	365.7	22.52	0.763
1.000	-4.300	5.188	22.50	0.1259	903.6	381.9	22.91	0.784

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.849	21.184	26.533	660.3	62.21	1400.1	1.148	703.2	0.577
2	0.851	21.156	27.093	657.9	60.39	1381.6	1.138	734.5	0.605
3	0.852	21.124	27.532	655.4	58.87	1363.7	1.129	757.7	0.627
4	0.855	21.048	28.390	650.9	55.90	1331.1	1.111	800.5	0.668
5	0.857	20.950	28.940	646.9	53.48	1298.5	1.091	827.9	0.695
6	0.859	20.824	29.280	643.3	51.28	1264.9	1.068	846.9	0.715
7	0.860	20.660	29.380	640.1	49.26	1228.5	1.041	858.0	0.727
8	0.860	20.432	29.350	637.7	47.07	1190.2	1.012	867.9	0.738
9	0.858	20.098	29.280	635.1	44.39	1151.2	0.983	882.0	0.753
10	0.855	19.590	29.160	633.0	40.94	1112.6	0.955	903.9	0.776
11	0.847	18.855	28.920	631.6	36.52	1076.5	0.929	934.4	0.806
12	0.840	18.379	28.770	631.5	33.81	1061.6	0.918	954.9	0.826
13	0.828	17.781	28.564	632.3	30.56	1049.4	0.911	981.0	0.851

STA 20.000 MASS AVERAGED PROPERTIES

PT= 28.777 TT= 642.01 GAMMA=1.4004 PT-RAT= 1.958 TT-RAT= 1.238

RCU= 2135.2 VM= 793.5 CZ= 780.0 MM=0.672 MABS=0.722 MREL=1.035

STATOR STA= 21.000 IN STATOR

I=22 MTIP=274 AFLOW= 115.15 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=BETM ITYPE=2 INBR=4 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CL	ALPHAM	MM
0.	-3.800	8.500	0.	0.	669.0	169.3	14.20	0.548
0.050	-3.800	8.346	0.53	0.0027	700.2	174.8	14.02	0.576
0.100	-3.800	8.197	1.09	0.0046	723.2	178.4	13.86	0.598
0.200	-3.800	7.907	2.25	0.0093	765.1	185.0	13.59	0.638
0.300	-3.800	7.623	3.50	0.0157	791.3	188.7	13.41	0.664
0.400	-3.800	7.339	4.84	0.0235	809.2	191.1	13.29	0.682
0.500	-3.800	7.049	6.32	0.0328	819.0	192.2	13.21	0.693
0.600	-3.800	6.750	7.99	0.0438	826.7	193 2	13.16	0.701
0.700	-3.800	6.437	9.91	0.0564	836.0	196.2	13.20	0.712
0.800	-3.800	6.108	12.15	0.0711	848.2	202.7	13.44	0.725
0.900	-3.800	5.757	14.95	0.0978	864.3	212.2	13.79	0.741
0.950	-3.800	5.571	16.62	0.1115	876.7	216.9	13.90	0.753
1.000	-3.800	5.376	18.63	0.1266	891.1	221.8	13.98	0.766

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.849	21.367	26.533	660.3	63.31	1489.4	1.220	690.1	0.565
2	0.850	21.344	27.093	657.9	61.66	1474.8	1.214	721.7	0.594
3	0.851	21.320	27.532	655.4	60.30	1459.8	1.207	744.9	0.616
4	0 853	21.267	28.390	650.9	57.70	1431.9	1.193	787.2	0.656
5	0.855	21.195	28.940	646.9	55.62	1401.3	1.175	813.5	0.682
6	0 856	21.094	29.280	643.3	53.76	1368.8	1.154	831.4	0.701
7	0.858	20.957	29.380	640.1	52.09	1333.1	1.128	841.2	0.712
8	0.858	20.771	29.350	637.7	50.36	1295.9	1.100	849.0	0.720
9	0.859	20.516	29.280	635.1	48.35	1257.9	1.071	858.8	0.731
10	0.858	20.168	29.160	633.0	45.90	1218.7	1.041	872.1	0.745
11	0.855	19.664	28.920	631.6	42.92	1180.2	1.012	889.9	0.763
12	0.854	19.323	28.770	631.5	41.15	1164.3	1.000	903.1	0.776
13	0.852	18.924	28.564	632.3	39.20	1149.9	0.989	918.2	0.790

STA 21.000 MASS AVERAGED PROPERTIES

PT= 28.777 TT= 642.01 GAMMA=1.4003 PT-RAT= 1.958 TT-RAT= 1.238

RCU= 1346.9 VM= 806.5 CZ= 796.3 MM=0.681 MABS=0.700 MREL=1.118

STATOR STA= 22.000 IN STATOR

I=23 MTIP=287 AFLOW= 114.72 D*C=0. D*H=0.

WTF= 1.365 OPTX=DPP OPTY=BETM ITYPE=2 INBR=4 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-3.204	8.500	0.	0.	660.0	83.3	7.19	0.539
0.050	-3.211	8.351	0.54	-0.0033	692.0	85.9	7.08	0.568
0.100	-3.218	8.207	1.04	-0.0019	715.1	87.5	6.97	0.590
0.200	-3.232	7.928	2.00	0.0063	757.4	90.2	6.79	0.629
0.300	-3.245	7.655	3.01	0.0151	784.0	91.6	6.66	0.656
0.400	-3.259	7.381	4.10	0.0239	802.1	92.2	6.56	0.674
0.500	-3.272	7.103	5.33	0.0324	812.0	92.3	6.48	0.685
0.600	-3.286	6.816	6.71	0.0423	819.2	92.3	6.43	0.693
0.700	-3.301	6.517	8.31	0.0543	827.8	93.2	6.43	0.703
0.800	-3.316	6.204	10.33	0.0574	837.6	95.5	6.51	0.713
0.900	-3.333	5.871	12.72	0.0640	845.3	98.6	6.65	0.721
0.350	-3.341	5.695	13.98	0.0823	850.9	100.2	6.72	0.727
1.000	-3.350	5.512	15.23	0.1249	860.5	102.2	6.77	0.735

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.880	21.706	26.533	660.3	65.02	1563.0	1.277	665.3	0.544
2	0.880	21.696	27.093	657.9	63.50	1550.8	1.273	697.3	0.573
3	0.881	21.689	27.532	655.4	62.28	1537.3	1.268	720.4	0.594
4	0.882	21.660	28.390	650.9	59.94	1512.1	1.257	762.8	0.634
5	0.883	21.602	28.940	646.9	58.09	1483.4	1.240	789.3	0.660
6	0.883	21.510	29.280	643.3	56.47	1452.0	1.220	807.4	0.679
7	0.884	21.379	29.380	640.1	55.04	1417.0	1.195	817.2	0.689
8	0.885	21.204	29.350	637.7	53.58	1380.0	1.168	824.4	0.698
9	0.886	20.972	29.280	635.1	51.93	1342.5	1.140	833.1	0.707
10	0.886	20.685	29.160	633.0	50.03	1303.9	1.110	843.1	0.718
11	0.886	20.357	28.920	631.6	47.96	1262.3	1.077	851.1	0.726
12	0.887	20.151	28.770	631.5	46.76	1242.1	1.061	856.7	0.732
13	0.887	19.843	28.564	632.3	45.33	1224.1	1.046	866.6	0.740

STA 22.000 MASS AVERAGED PROPERTIES

PT= 28.777 TT= 642.01 GAMMA=1.4002 PT-RAT= 1.958 TT-RAT= 1.238

RCU= 651.6 VM= 796.2 CZ= 789.1 MM=0.670 MABS=0.675 MREL=1.184

STATOR STA= 23.000 TE STATOR

I=24 MTIP=300 AFLOW= 118.17 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=BETM ITYPE=3 INBR=4 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-2.567	8.500	0.	0.	654.7	0.	0.	0.535
0.050	-2 581	8.358	0.49	0.0062	682.0	0.	0.	0.559
0.100	-2.595	8.218	0.91	0.0090	699.8	0.	0.	0.576
0.200	-2.622	7.948	1.68	0.0122	742.0	0.	0.	0.615
0.300	-2.648	7.683	2.44	0.0180	767.8	0.	0.	0.641
0.400	-2.674	7.419	3.26	0.0263	786.0	0.	0.	0.659
0.500	-2.700	7.151	4.18	0.0374	795.7	0.	0.	0.670
0.600	-2.727	6.875	5.22	0.0500	801.6	0.	0.	0.676
0.700	-2.756	6.588	6.43	0.0650	810.1	0.	0.	0.686
0.800	-2.785	6.291	8.01	0.0934	829.7	0.	0.	0.705
0.900	-2 816	5.977	9.87	0.1247	829.5	0.	0.	0.706
0.950	-2.833	5.809	10.79	0.1318	829.5	0.	0.	0.706
1.000	-2.850	5.631	11.52	0.1267	817.6	0.	0.	0.694

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.940	21.498	26.109	660.3	66.42	1636.7	1.336	654.7	0.535
2	0.940	21.499	26.581	657.9	65.18	1624.9	1.332	682.0	0.559
3	0.940	21.495	26.910	655.4	64.24	1610.3	1.325	699.8	0.576
4	0.940	21.479	27.731	650.9	62.12	1586.7	1.316	742.0	0.615
5	0.940	21.449	28.269	646.9	60.48	1558.2	1.300	767.8	0.641
6	0.940	21.396	28.639	643.3	59.02	1527.1	1.280	786.0	0.659
7	0.940	21.307	28.780	640.1	57.77	1491.9	1.256	795.7	0.670
8	0.940	21.173	28.769	637.7	56.55	1454.2	1.227	801.6	0.676
9	0.940	20.986	28.749	635.1	55.13	1417.0	1.200	810.1	0.686
10	0.940	20.699	28.851	633.0	53.23	1386.0	1.178	829.7	0.705
11	0.940	20.256	28.251	631.6	51.81	1341.8	1.142	829.5	0.706
12	0.940	19.975	27.860	631.5	51.02	1318.7	1.122	829.5	0.706
13	0.940	19.674	27.159	632.3	50.55	1286.9	1.093	817.6	0.694

STA 23.000 MASS AVERAGED PROPERTIES

PT= 28.163 TT= 642.01 GAMMA=1.4001 PT-RAT= 1.916 TT-RAT= 1.238

RCU= 0. VM= 780.4 CZ= 776.2 MM=0.655 MABS=0.655 MREL=1.244

AVERAGE PCT IMM	AVERAGE RAD	BLADE SPEED IN	BLADE SPEED OUT	ACC PT RATIO	ACC TT RATIO	EFFICIENCY AD.	EFFICIENCY POLY	AXIAL VEL R
0.	8 500			1.7766	1.2730	0.654	0.681	1.193
4.7	8.341			1.8088	1.2684	0.688	0.713	1.159
9.3	8.188			1.8311	1.2636	0.716	0.739	1.133
18.1	7.893			1.8870	1.2549	0.781	0.799	1.110
26.6	7.606			1.9236	1.2472	0.832	0.847	1.097
35.1	7.319			1.9487	1.2402	0.875	0.886	1.092
43.8	7.026			1.9584	1.2341	0.905	0.914	1.090
53.0	6.719			1.9576	1.2294	0.923	0.930	1.092
62.6	6.394			1.9563	1.2244	0.942	0.948	1.098
73.0	6.044			1.9632	1.2204	0.965	0.968	1.125
84.8	5.649			1.9223	1.2177	0.944	0.949	1.145
91.6	5.419			1.8958	1.2175	0.923	0.929	1.189
100.0	5.137			1.8480	1.2190	0.876	0.887	1.171

EXIT STA= 24.000 FREE

I=25 MTIP=313 AFLOW= 116 57 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-2 000	8.500	0.	0.	672.1	0.	0.	0.550
0.050	-2.000	8.362	0.32	0.0039	698.9	0.	0.	0.574
0.100	-2.000	8.226	0.63	0.0079	716.4	0.	0.	0.590
0.200	-2.000	7.963	1.18	0.0158	758.5	0.	0.	0.630
0.300	-2.000	7.707	1.68	0.0232	785.3	0.	0.	0.656
0 400	-2.000	7.451	2 15	0.0311	804 9	0.	0.	0.676
0 500	-2.000	7.193	2.63	0.0400	816.0	0.	0.	0.688
0.600	-2.000	6.928	3.12	0.0507	823.3	0.	0.	0.696
0.700	-2.000	6.655	3.62	0.0642	833.2	0.	0.	0.707
0.800	-2.000	6.373	4.11	0.0791	852.4	0.	0.	0.727
0.900	-2.000	6.078	4.59	0.0996	849.0	0.	0.	0.724
0 950	-2.000	5.921	4.85	0.1150	846.8	0.	0.	0.722
1.000	-2.000	5.757	5.28	0.1260	833.6	0.	0.	0.709

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.950	21.267	26.109	660.3	65.86	1643.7	1.344	672.1	0.550
2	0.950	21.264	26.581	657.9	64.66	1632.7	1.341	698.9	0.574
3	0.950	21.256	26.910	655.4	63.73	1618.9	1.334	716.4	0.590
4	0.950	21.224	27.731	650.9	61.64	1596.9	1.327	758.5	0.630
5	0.950	21.166	28.269	646.9	60.00	1570.5	1.313	785.3	0.656
6	0.950	21.081	28.639	643.3	58.53	1541.7	1.295	804.9	0.676
7	0.950	20.963	28.780	640.1	57.26	1509.0	1.273	816.0	0.688
8	0.950	20.803	28.769	637.7	56.04	1474.0	1.247	823.3	0.696
9	0.950	20.589	28.749	635.1	54.64	1439.9	1.222	833.2	0.707
10	0.950	20.302	28.851	633.0	52.84	1411.2	1.203	852.4	0.727
11	0.950	19.921	28.251	631.6	51.63	1367.9	1.167	849.0	0.724
12	0.950	19.683	27.860	631.5	50.98	1345.0	1.147	846.8	0.722
13	0.950	19.413	27.159	632.3	50.63	1314.2	1.118	833.6	0.709

STA 24.000 MASS AVERAGED PROPERTIES

PT= 28.163 TT= 642.01 GAMMA=1.4002 PT-RAT= 1.916 TT-RAT= 1.238

RCU= 0. VM= 799.7 CZ= 798.6 MM=0.673 MABS=0.673 MREL=1.261

EXIT STA= 25.000 FREE

I=26 MTIP=326 AFLOW= 116.27 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-1.270	8.500	0.	0.	689.3	0.	0.	0.564
0.050	-1.270	8.365	0.19	0.0025	715.2	0.	0.	0.588
0.100	-1.270	8.232	0.36	0.0048	732.0	0.	0.	0.604
0.200	-1.270	7.974	0.66	0.0092	772.3	0.	0.	0.643
0.300	-1.270	7.722	0.91	0.0135	797.1	0.	0.	0.667
0.400	-1.270	7.471	1.13	0.0180	814.4	0.	0.	0.685
0.500	-1.270	7.217	1.32	0.0228	822.6	0.	0.	0.694
0.600	-1.270	6.955	1.47	0.0279	825.9	0.	0.	0.699
0.700	-1.270	6.685	1.58	0.0335	830.2	0.	0.	0.704
0.800	-1.270	6.406	1.62	0.0398	841.6	0.	0.	0.716
0.900	-1.270	6.112	1.54	0.0463	826.5	0.	0.	0.703
0.950	-1.270	5.956	1.41	0.0493	816.1	0.	0.	0.693
1.000	-1.270	5.790	0.00	0.1263	796.4	0.	0.	0.675

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.956	21.036	26.109	660.3	65.32	1650.8	1.352	689.3	0.564
2	0.956	21.034	26.581	657.9	64.15	1640.3	1.349	715.2	0.588
3	0.956	21.028	26.910	655.4	63.26	1626.8	1.343	732.0	0.604
4	0.956	21.008	27.731	650.9	61.24	1605.3	1.335	772.3	0.643
5	0.956	20.973	28.269	646.9	59.68	1578.8	1.321	797.1	0.667
6	0.956	20.922	28.639	643.3	58.30	1549.7	1.303	814.4	0.685
7	0.956	20.851	28.780	640.1	57.14	1516.1	1.280	822.6	0.694
8	0.956	20.758	28.769	637.7	56.06	1479.4	1.252	825.9	0.699
9	0.956	20.640	28.749	635.1	54.86	1442.6	1.224	830.2	0.704
10	0.956	20.491	28.851	633.0	53.33	1409.4	1.200	841.6	0.716
11	0.956	20.307	28.251	631.6	52.54	1358.9	1.156	826.5	0.703
12	0.956	20.200	27.860	631.5	52.17	1330.6	1.131	816.1	0.693
13	0.956	20.016	27.159	632.3	52.07	1295.5	1.098	796.4	0.675

STA 25.000 MASS AVERAGED PROPERTIES

PT= 28.163 TT= 642.01 GAMMA=1.4002 PT-RAT= 1.916 TT-RAT= 1.238

RCU= 0. VM= 801.0 CZ= 800.8 MM=0.674 MABS=0.674 MREL=1.264

EXIT STA= 26.000 FREE

I=27 MTIP=339 AFLOW= 116.28 D*C=0. D*H=0.

WTF= 61.365 OPTX=DPP OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-0.350	8.500	0.	0.	707 0	0.	0.	0.580
0.050	-0.350	8.367	0.11	-0.0000	732.1	0.	0.	0.603
0.100	-0.350	8.237	0.21	-0.0000	748.1	0.	0.	0.619
0.200	-0.350	7.982	0.37	-0.0000	786.1	0.	0.	0.655
0.300	-0.350	7.732	0.49	-0.0000	808.2	0.	0.	0.677
0.400	-0.350	7.483	0.57	-0.0000	822.1	0.	0.	0.692
0.500	-0.350	7.230	0.61	-0.0000	826.0	0.	0.	0.698
0.600	-0.350	6.969	0.61	-0.0000	824.0	0.	0.	0.697
0.700	-0.350	6.699	0.55	-0.0000	821.5	0.	0.	0.696
0.800	-0.350	6.418	0.40	-0.0000	824.4	0.	0.	0.700
0.900	-0.350	6.120	0.11	-0.0000	797.9	0.	0.	0.677
0.950	-0.350	5.961	-0.10	-0.0000	780.3	0.	0.	0.660
1.000	-0.350	5.791	0.	0.	747.3	0.	0.	0.630

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.956	20.792	26.109	660.3	64.76	1658.3	1.360	707.0	0.580
2	0.956	20.791	26.581	657.9	63.63	1648.0	1.358	732.1	0.603
3	0.956	20.791	26.910	655.4	62.77	1634.7	1.352	748.1	0.619
4	0.956	20.791	27.731	650.9	60.84	1613.0	1.344	786.1	0.655
5	0.956	20.791	28.269	646.9	59.36	1585.9	1.329	808.2	0.677
6	0.956	20.791	28.639	643.3	58.10	1555.5	1.309	822.1	0.692
7	0.956	20.791	28.780	640.1	57.08	1519.9	1.284	826.0	0.698
8	0.956	20.791	28.769	637.7	56.18	1480.4	1.252	824.0	0.697
9	0.956	20.791	28.749	635.1	55.20	1439.6	1.220	821.5	0.696
10	0.956	20.790	28.851	633.0	53.95	1400.9	1.190	824.4	0.700
11	0.956	20.789	28.251	631.6	53.55	1342.8	1.139	797.9	0.677
12	0.956	20.789	27.860	631.5	53.43	1309.7	1.108	780 3	0.660
13	0.956	20.789	27.159	632.3	53.82	1266.0	1.067	747.3	0.630

STA 26.000 MASS AVERAGED PROPERTIES

PT= 28.163 TT= 642.01 GAMMA=1.4002 PT-RAT= 1.916 TT-RAT= 1.238

RCU= 0. VM= 799.2 CZ= 799.1 MM=0.672 MABS=0.672 MREL=1.264

PHASE V ROTOR

BLADE FORCES

THE FORCE CALCULATIONS ARE 'PER BLADE ROW'.
TO FIND THE FORCE ON A SINGLE BLADE, DIVIDE BY 'NB'

THE FORCES ARE THAT OF THE AIR ON THE BLADES.
POSITIVE AXIAL IS AFT; POSITIVE TANGENTIAL IS IN ROTATION DIRECTION.
THE COLUMNS HEADED BY F-TAN*, F-AXL*, AND F-RAD* ARE THE TANGENTIAL, AXIAL, AND RADIAL FORCES PER INCH OF CHANGE IN R-AVG.

SL	R-AVG (IN.)	H-AVG (IN.)	F-TAN* (LB/IN)	F-AXL* (LB/IN)	F-RAD* (LB/IN)
1	8.500	Ø.	-296.2	-397.9	-1Ø.8
2	8.318	Ø.182	-299.7	-399.4	-11.3
3	8.138	Ø.362	-3Ø4.2	-4ØØ.2	-11.3
4	7.779	Ø.721	-3Ø5.8	-394.8	-9.8
5	7.414	1.Ø86	-3Ø3.Ø	-382.8	-8.5
6	7.Ø35	1.465	-295.9	-362.2	-12.7
7	6.634	1.866	-286.Ø	-332.5	-13.8
8	6.2ØØ	2.3ØØ	-274.4	-297.3	-8.3
9	5.723	2.777	-262.5	-257.6	-16.Ø
1Ø	5.184	3.316	-245.1	-2Ø7.8	-23.4
11	4.525	3.975	-214.2	-136.7	-25.5
12	4.1Ø4	4.396	-186.8	-82.9	-29.9
13	3.547	4.953	-165.3	-44.6	-31.5

NET TORQUE= -8ØØØ.6 IN-LB
NET TAN. FORCE= -1279.2 LB
NET AXIAL FORCE= -1298.Ø LB
NET RADIAL FORCE= -86.4 LB

2. STREAMSURFACE BLADE COORDINATES

Figure 78 shows the stacked Phase V rotor streamsurface sections. Each page of the following tabulation gives the coordinates for one of these sections. The streamline designation for these sections corresponds to the calculation streamlines of the circumferential average flow calculation. Streamline 1 is at the casing and streamline 13 is at the hub. Also given in the tabulations are coordinates for the section meanline, the meanline angle, and the section thickness at each point. Streamsurface section chord, camber angle, and stagger angle are also given. All dimensions in this tabulation are in inches or degrees.

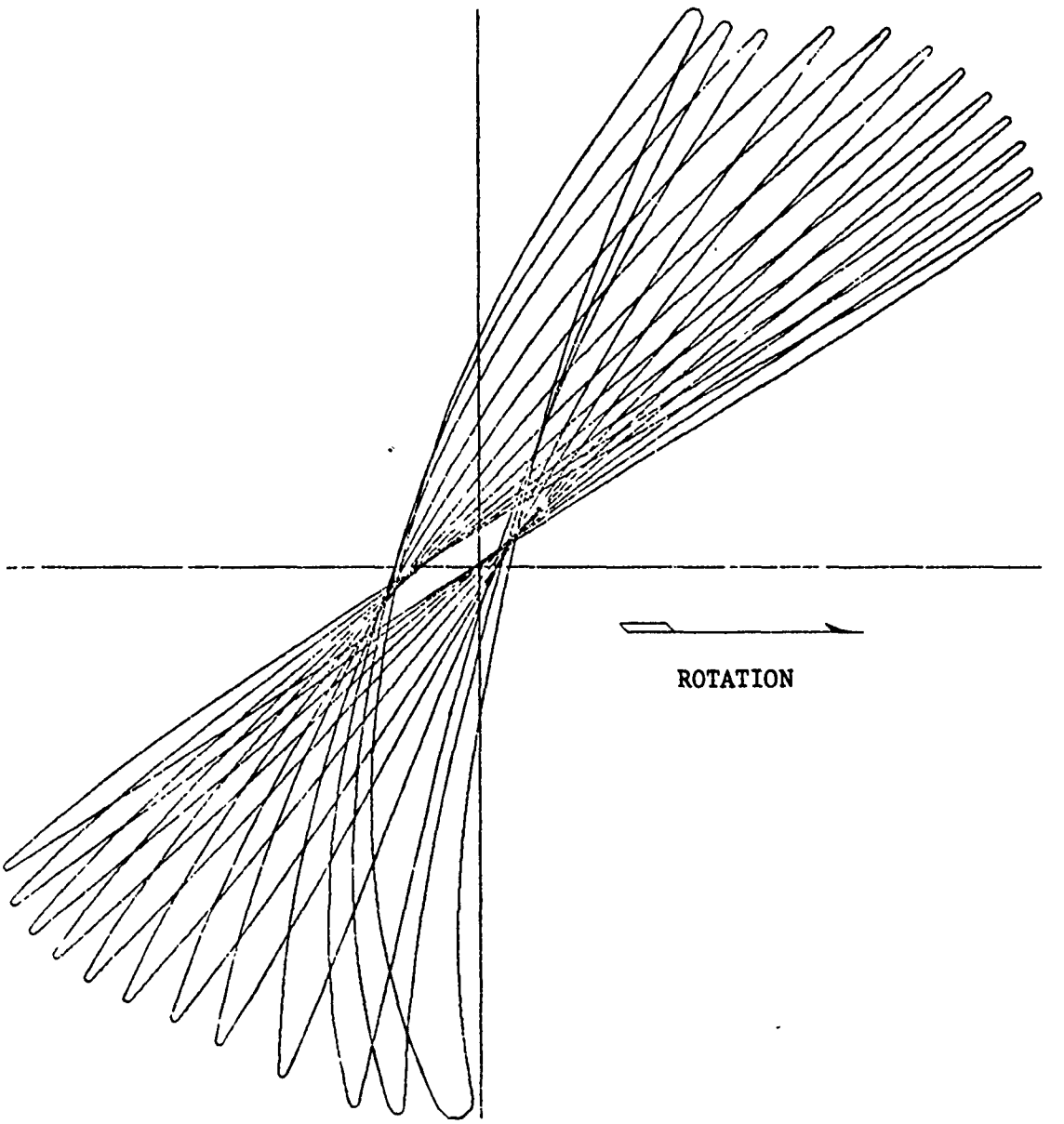

Figure 78. **Stacked Phase V Rotor Streamsurface Sections**

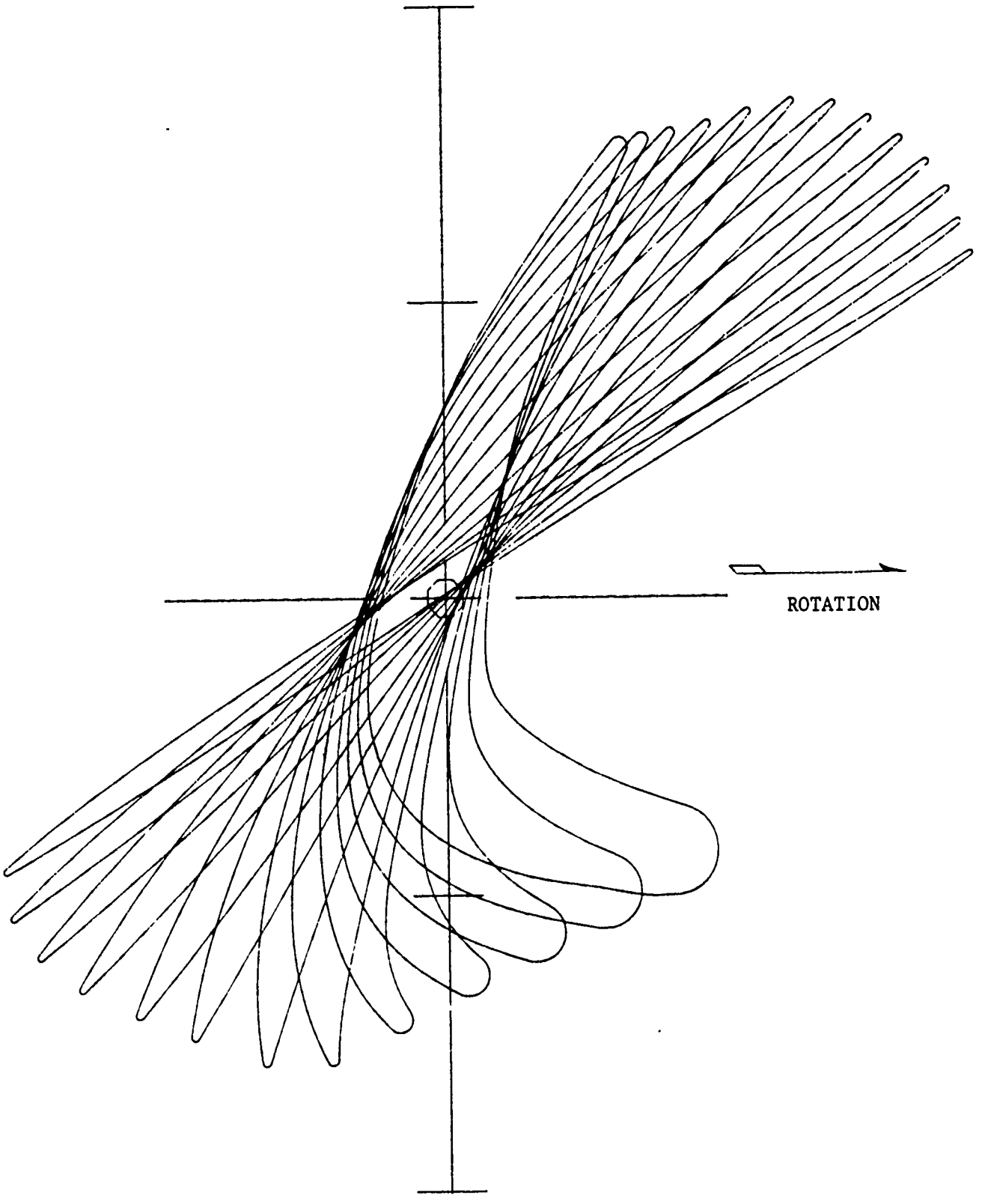

Figure 79 . Stacked Phase V Rotor Plane Sections

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 1

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.12850	8.50000	0.21035	-55.160	0.01882	0.	-1.12850	-55.160	0 01882
2	-1.07760	8.50000	0.20163	-55.923	0.02265	0.	1.07760	-55.923	0.02265
3	-0.97580	8.50000	0.18344	-57.311	0 03051	0.	-0.97580	-57.311	0.03051
4	-0.87410	8 50000	0.16435	-58 457	0.03854	0.	-0 87410	-58.457	0 03854
5	-0.77230	8.50000	0.14447	-59.373	0.04658	0.	-0.77230	-59.373	0.04658
6	-0.66030	8.50000	0.12184	-60.185	0.05530	0.	-0.66030	-60.185	0.05530
7	-0.53820	8.50000	0.09646	-60.691	0.06443	0.	-0.53820	-60 691	0.06443
8	-0 41610	8.50000	0.07090	-60.518	0.07279	0.	-0.41610	-60.518	0.07279
9	-0.29390	8.50000	0.04578	-59.899	0.08006	0.	-0.29390	-59.899	0 08006
10	-0.17180	8.50000	0.02134	-59.226	0.08608	0.	-0.17180	-59.226	0.08608
11	-0 04970	8.50000	-0.00255	-58.760	0.09078	0	-0 04970	-58.760	0 09078
12	0.07240	8.50000	-0.02612	-58.547	0.09408	0.	0.07240	-58.547	0 09408
13	0.19460	8.50000	-0.04955	-58.416	0.09587	0.	0.19460	-58.416	0 09587
14	0.31670	8.50000	-0.07283	-58.194	0.09601	0.	0 31670	-58.194	0.09601
15	0.43880	8.50000	-0.09582	-57.757	0.09333	0.	0.43880	-57.757	0 09333
16	0.56100	8.50000	-0.11833	-57.092	0.08547	0.	0.56100	-57.092	0.08547
17	0.68310	8.50000	-0.14015	-56.106	0.07035	0.	0.68310	-56.106	0.07035
18	0.80520	8.50000	-0.16099	-54.635	0.04644	0	0.80520	-54.635	0.04644
19	0.90700	8.50000	-0.17740	-53.100	0.01923	0.	0.90700	-53.100	0.01923

MEANLINE INPUT DATA - STREAMLINE 3

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.20460	8.13970	0 21627	-53.773	0.01945	0 752	-1 20464	-53 770	0.01945
2	-1.14910	8.14050	0.20684	-54.485	0.02362	0.731	-1.14914	-54.483	0.02362
3	-1.03810	8.14190	0.18726	-55.791	0.03213	0.657	-1.03813	-55 789	0.03213
4	-0.92710	8.14310	0.16677	-56.879	0.04078	0.484	-0 92712	-56 878	0.04078
5	-0 81610	8.14380	0.14553	-57.717	0.04942	0.241	-0 81612	-57.717	0.04942
6	-0.69410	8 14410	0.12148	-58.342	0.05870	0.027	-0.69412	-58.342	0.05870
7	-0.56090	8.14380	0.09479	-58.573	0.06827	-0.122	-0.56092	-58.573	0.06827
8	-0.42770	8.14340	0.06817	-58.196	0.07690	-0.283	-0.42772	-58.196	0.07690
9	-0 29450	8.14270	0.04217	-57.394	0.08431	-0.465	-0.29452	-57 393	0.08431
10	-0 16130	8.14120	0.01704	-56.485	0.09032	-0.610	-0.16131	-56 484	0 09032
11	-0.02810	8.13970	-0.00731	-55.764	0.09488	-0.588	-0.02810	-55.763	0.09488
12	0.10510	8.13850	-0 03114	-55.337	0.09791	-0.409	0 10510	-55.336	0.09791
13	0.23830	8.13780	-0 05470	-55.083	0.09935	-0.211	0 23831	-55 083	0.09935
14	0.37150	8.13750	-0.07804	-54.814	0.09897	-0.055	0.37151	-54.814	0.09897
15	0.50470	8.13760	-0.10108	-54.373	0 09539	0 015	0.50471	-54.373	0 09539
16	0.63790	8.13760	-0 12366	-53.734	0.08657	0 091	0 63791	-53.734	0.08657
17	0.77110	8.13720	-0.14561	-52 744	0.07076	-0 265	0.77111	-52 743	0.07076
18	0.90430	8.13650	-0.16656	-51.124	0.04671	-0.238	0.90431	-51.124	0.04671
19	1.01530	8 13580	-0.18298	-49.372	0.01997	-0.092	1.01531	-49.372	0.01997

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 4

PT	Z	R	THETA	B•	T(Z)	PHI	X	B•M	T(M)
1	-1.28430	7.76190	0.22309	-52.490	0.02005	1.729	-1.28457	-52 477	0.02006
2	-1.22460	7.76370	0 21294	-53.212	0.02489	1.717	-1.22485	-53 200	0 02490
3	-1.10520	7.76730	0.19189	-54.469	0.03474	1 676	-1.10539	-54.457	0.03475
4	-0.98590	7.77080	0 17003	-55.318	0.04470	1.583	-0.98605	-55.308	0.04471
5	-0.86650	7.77390	0.14759	-55.785	0 05453	1.439	-0 86660	-55 777	0.05454
6	-0.73520	7.77710	0.12261	-56.082	0.06495	1.262	-0.73527	-56.075	0 06496
7	-0.59200	7.78000	0.09516	-56.159	0.07558	1.059	-0.59204	-56 154	0.07559
8	-0 44880	7.78240	0 06785	-55.784	0.08513	0.827	-0 44882	-55.781	0.08514
9	-0.30550	7.78410	0 04119	-54.913	0.09328	0.579	-0.30551	-54.912	0 09328
10	-0.16230	7.78520	0.01556	-53.704	0.09982	0.357	-0.16230	-53 704	0.09982
11	-0.01910	7.78590	-0.00900	-52.704	0 10467	0.248	-0.01910	-52 703	0 10467
12	0.12410	7.78640	-0.03287	-52.121	0.10780	0.284	0.12410	-52.121	0 10780
13	0.26740	7.78730	-0.05633	-51.695	0.10913	0.423	0.26740	-51.694	0.10913
14	0.41060	7.78850	-0.07946	-51 323	0.10839	0.556	0.41061	-51.321	0 10839
15	0 55380	7.79010	-0.10228	-50.926	0.10399	0.581	0.55382	-50.925	0.10399
16	0.69710	7 79140	-0.12468	-50 282	0.09389	0.497	0.69712	-50.281	0.09389
17	0.84030	7.79260	-0.14644	-49.247	0.07633	0.454	0.84033	-49.246	0.07633
18	0.98350	7.79390	-0.16725	-47 802	0.04997	0.691	0.98353	-47.800	0.04997
19	1.10290	7.79530	-0.18373	-46.370	0.02062	1.044	1.10295	-46.365	0.02062

MEANLINE INPUT DATA - STREAMLINE 5

PT	Z	R	THETA	B•	T(Z)	PHI	X	B•M	T(M)
1	-1.35910	7.36230	0.22858	-51.272	0.02034	3 018	-1 36071	-51 233	0 02036
2	-1.29570	7.36580	0.21771	-51.976	0.02624	3.042	-1.29722	-51 937	0 02626
3	-1.16890	7.37260	0.19519	-53.173	0.03824	3.085	-1 17024	-53.133	0.03828
4	-1.04210	7.37950	0.17189	-53.886	0.05030	3.113	-1.04325	-53.846	0.05035
5	-0 91520	7.38630	0.14821	-54.119	0.06211	3 111	-0.91616	-54.079	0 06217
6	-0.77570	7.39390	0.12213	-54.061	0.07450	3.049	-0.77646	-54.022	0.07457
7	-0.62350	7.40200	0.09391	-53.678	0.08696	2.900	-0 62405	-53.643	0.08703
8	-0.47130	7.40940	0.06634	-52.840	0.09798	2.675	-0.47167	-52.810	0.09805
9	-0.31920	7.41610	0.03979	-51.702	0.10726	2.406	-0.31942	-51.678	0.10732
10	-0.16700	7.42220	0 01435	-50 555	0.11454	2.134	-0.16710	-50.535	0.11469
11	-0.01480	7.42750	-0.01014	-49.647	0.12005	1.907	-0 01481	-49.631	0.12009
12	0.13740	7.43220	-0 03396	-49.003	0.12340	1.761	0 13747	-48.990	0 12343
13	0.28960	7.43680	-0.05727	-48.414	0.12458	1.708	0 28974	-48 402	0 12461
14	0.44180	7.44140	-0.08009	-47.836	0.12316	1.697	0 44201	-47 823	0.12319
15	0.59400	7.44590	-0.10244	-47.253	0.11734	1.680	0 59427	-47.241	0.11737
16	0.74620	7.45020	-0.12429	-46.532	0.10507	1.680	0.74654	-46.520	0.10509
17	0.89840	7.45470	-0.14548	-45.548	0.08454	1.801	0.89881	-45 534	0.08456
18	1.05050	7.46010	-0.16583	-44.224	0.05427	2.186	1.05100	-44 203	0.05429
19	1.17740	7.46490	-0.18201	-42.926	0.02086	2.641	1.17801	-42 896	0 02087

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 6

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.42790	6.93610	0 23274	-50.082	0.02047	4.607	-1.43281	-49.991	0.02051
2	-1.36110	6.94160	0.22111	-50.676	0.02812	4.676	-1.36579	-50.583	0.02818
3	-1.22750	6.95270	0.19719	-51.658	0.04359	4.815	-1 23173	-51.559	0.04368
4	-1.09390	6.96410	0.17267	-52.130	0.05902	4.955	-1 09764	-52.026	0.05916
5	-0.96030	6.97580	0.14801	-52.084	0.07400	5.071	-0.96352	-51.975	0.07418
6	-0.81340	6 98900	0.12115	-51.709	0.08956	5.113	-0.81604	-51.598	0.08978
7	-0 65310	7.00340	0.09246	-50.992	0.10501	5.015	-0.65511	-50 884	0.10525
8	-0.49280	7.01720	0.06477	-49.843	0.11850	4.764	-0.49422	-49 745	0.11874
9	-0.33240	7.03010	0 03834	-48.518	0.12970	4.465	-0.33330	-48.431	0 12992
10	-0 17210	7.04220	0.01311	-47.360	0.13847	4.215	-0.17254	-47 282	0.13867
11	-0.01180	7.05370	-0 01117	-46.399	0.14469	3 981	-0.01183	-46.330	0.14487
12	0 14850	7.06460	-0.03467	-45.558	0.14823	3.741	0.14884	-45 497	0.14839
13	0 30880	7.07470	-0.05746	-44.723	0.14894	3.514	0 30946	-44.669	0.14908
14	0.46910	7.08420	-0.07957	-43.919	0.14604	3.370	0.47005	-43.869	0.14616
15	0.62940	7.09350	-0.10106	-43.166	0.13755	3.363	0.63062	-43.117	0.13766
16	0.78980	7.10280	-0 12194	-42.305	0 12155	3.458	0.79130	-42.253	0.12165
17	0.95010	7.11290	-0.14211	-41.271	0.09629	3.683	0.95191	-41.212	0.09638
18	1.11040	7.12390	-0.16148	-40.131	0.06025	4.117	1.11258	-40.058	0.06031
19	1.24400	7.13360	-0.17701	-39.130	0.02102	4.580	1.24657	-39.040	0.02105

MEANLINE INPUT DATA - STREAMLINE 7

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1 49330	6.47520	0.23554	-48.981	0 02011	6.632	-1.50438	-48.790	0 02019
2	-1 42340	6.48360	0.22305	-49.385	0.03020	6.751	-1.43400	-49.188	0.03032
3	-1 28350	6.50050	0.19762	-50.018	0.05048	6 980	-1.29309	-49.808	0 05070
4	-1.14370	6 51780	0.17189	-50.175	0.07053	7.178	-1.15221	-49 953	0.07086
5	-1 00390	6.53560	0.14632	-49.845	0.08984	7.313	-1.01128	-49 614	0.09027
6	-0.85010	6 55550	0.11876	-49.212	0.10972	7.337	-0 85621	-48.979	0.11024
7	-0.68220	6.57720	0.08962	-48.195	0.12930	7.215	-0.68695	-47.969	0 12987
8	-0.51440	6.59810	0.06190	-46.543	0.14620	6.995	-0.51785	-46 329	0.14677
9	-0 34660	6.61820	0.03597	-44.652	0.16000	6 746	-0.34883	-44.453	0.16055
10	-0.17880	6.63780	0.01165	-43.117	0.17060	6.502	-0 17991	-42 933	0.17111
11	-0.01100	6.65660	-0 01150	-41 975	0.17691	6 218	-0.01106	-41 807	0.17838
12	0 15680	6.67430	-0.03379	-41.090	0.18179	5.921	0.15768	-40.938	0.18221
13	0 32460	6.69130	-0.05537	-40.272	0.18200	5.704	0.32634	-40.132	0.18238
14	0 49240	6.70780	-0.07629	-39.490	0.17739	5.595	0.49496	-39 356	0.17773
15	0.66020	6.72420	-0.09662	-38.753	0.16579	5 599	0.66356	-38.619	0.16610
16	0 82800	6.74060	-0 11635	-37.986	0.14512	5.731	0 83218	-37.847	0.14539
17	0.99580	6.75770	-0.13547	-37.073	0.11342	6.013	1 00086	-36.921	0.11365
18	1.16360	6.77620	-0.15382	-35.890	0 06894	6.454	1.16966	-35 717	0.06909
19	1.30340	6.79230	-0.16843	-34.746	0.02110	6.893	1.31041	-34 551	0 02115

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 8

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.55280	5 96820	0 23716	-48.019	0.01913	9.197	-1.57429	-47 650	0.01927
2	-1.48010	5.98040	0.22357	-48.280	0.03203	9.349	-1.50063	-47.899	0 03227
3	-1.33470	6.00480	0.19616	-48.622	0.05783	9.618	-1 35321	-48 220	0.05829
4	-1.18930	6.02960	0.16876	-48.451	0.08314	9.787	-1.20570	-48 034	0.08382
5	-1.04390	6.05480	0.14193	-47.679	0.10728	9.839	-1.05814	-47 257	0.10815
6	-0.88390	6.08260	0 11363	-46.319	0.13181	9.799	-0.89575	-45 898	0.13282
7	-0 70950	6.11270	0.08461	-44.390	0 15551	9.672	-0.71880	-43.980	0 15660
8	-0 53500	6.14210	0 05778	-42.162	0.17558	9.475	-0.54184	-41 771	0 17666
9	-0 36050	6.17090	0 03307	-40.058	0.19176	9.244	-0 36498	-39.690	0 19279
10	-0.18600	6.19900	0.01005	-38.463	0 20394	8 999	-0.18824	-38.118	0.20491
11	-0.01150	6.22620	-0.01176	-37.212	0.21198	8.728	-0.01163	-36.891	0 21288
12	0.16300	6.25250	-0.03257	-36.135	0 21566	8.464	0 16485	-35.836	0.21648
13	0.33750	6 27810	-0.05255	-35.172	0 21460	8.284	0.34122	-34.890	0.21534
14	0.51200	6.30330	-0.07177	-34.267	0 20730	8 206	0.51754	-33.993	0.20797
15	0.68640	6.32840	-0.09028	-33.384	0.19171	8.243	0.69375	-33.111	0 19231
16	0.86090	6.35380	-0.10812	-32.540	0.16586	8.454	0.87011	-32 256	0.16638
17	1.03540	6.38010	-0.12531	-31 636	0.12787	8 821	1 04661	-31.332	0.12829
18	1 20990	6.40810	-0.14176	-30 477	0 07599	9 252	1 22330	-30 150	0.07624
19	1.35530	6.43220	-0.15480	-29.352	0 02109	9.627	1.37070	-29.006	0.02116

MEANLINE INPUT DATA - STREAMLINE 9

P.	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.59080	5.39620	0.23550	-46.729	0 01859	12.310	-1.62947	-46.064	0 01882
2	-1.51580	5 41310	0 22073	-46.826	0 03419	12 498	-1.55268	46.140	0.03462
3	-1.36580	5.44710	0.19125	-46.843	0 06523	12.811	-1.39894	-46.122	0.06610
4	-1 21580	5.48140	0.16217	-46.330	0 09548	12.932	-1.24506	-45 594	0.09676
5	-1.06570	5.51590	0.13413	-45.113	0.12417	12.865	-1.09107	-44.385	0.12574
6	-0.90070	5.55340	0.10521	-43.008	0.15304	12 741	-0.92186	-42.296	0 15480
7	-0.72070	5.59390	0.07650	-40.224	0.18056	12.616	-0.73736	-39.535	0 18238
8	-0.54070	5.63400	0.05056	-37.825	0.20363	12.443	-0 55297	-37.167	0.20543
9	-0.36070	5.67340	0.02670	-35.900	0.22211	12.214	-0 36872	-35.279	0.22384
10	-0 18070	5.71190	0.00454	-34.161	0.23577	11.962	-0.18464	-33.578	0.23738
11	-0 00070	5.74960	-0.01616	-32.649	0.24431	11.750	-0.00071	-32 100	0.24580
12	0.17940	5.78680	-0.03566	-31 350	0.24743	11.609	0.18319	-30 826	0.24880
13	0 35940	5.82360	-0.05409	-30.114	0.24457	11 532	0 36692	-29.610	0.24581
14	0 53940	5.86020	-0.07152	-28.866	0.23412	11.536	0.55062	-28 374	0.23522
15	0.71940	5 89700	-0 08796	-27 585	0 21429	11.658	0.73437	-27.098	0.21523
16	0.89940	5.93440	-0.10343	-26.310	0.18336	11 941	0.91824	-25.815	0 18414
17	1.07940	5.97300	-0 11798	-25.073	0 13966	12.330	1.10236	-24.564	0.14024
18	1.25950	6 01320	-0.13165	-23.884	0 08157	12 679	1.28684	-23 364	0 08189
19	1.40950	6.04750	-0.14241	-22 903	0.02103	12.932	1.44066	-22.380	0.02111

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 10

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.56570	4.73500	0.22872	-45.466	0.02076	16.214	-1.63192	-44.303	0 02118
2	-1.48960	4.75780	0.21250	-45.198	0.03882	16.396	-1.55263	-44.009	0 03962
3	-1.33730	4.80340	0.18078	-44 519	0.07448	16.688	-1.39374	-43.287	0.07604
4	-1.18510	4.84920	0.15030	-43.423	0.10893	16.770	-1.23480	-42.182	0.11114
5	-1.03290	4.89490	0.12152	-41.780	0.14142	16.659	-1.07588	-40.562	0.14407
6	-0.86540	4.94480	0.09231	-39.384	0.17400	16.505	-0.90111	-38.206	0 17690
7	-0.68270	4 99870	0.06370	-36.378	0.20502	16.379	-0.71063	-35.252	0 20795
8	-0.50010	5.05220	0.03830	-33.565	0 23085	16.238	-0 52037	-32 500	0.23366
9	-0 31740	5.10520	0.01554	-31.112	0.25146	16.084	-0 33015	-30.109	0.25377
10	-0.13470	5.15750	-0.00501	-28.911	0.26567	15.954	-0.14007	-27.969	0.26805
11	0.04790	5.20950	-0.02365	-26.824	0.27400	15 889	0 04980	-25 935	0.27612
12	0.23060	5.26150	-0.04052	-24.793	0.27580	15.905	0.23976	-23 953	0 27764
13	0.41330	5.31360	-0.05577	-22.856	0.27032	15.987	0 42977	-22.058	0 27188
14	0.59600	5 36610	-0.06952	-20.919	0.25620	16.125	0.61988	-20.164	0.25747
15	0 77860	5.41920	-0.08181	-18.945	0.23204	16.331	0.81005	-18.232	0.23301
16	0.96130	5.47320	-0.09273	-17.198	0.19645	16.670	1.00059	-16.516	0.19716
17	1.14400	5.52840	-0.10255	-15.777	0.14801	17.041	1.19150	-15.116	0.14848
18	1.32670	5.58500	-0.11145	-14.541	0.08524	17.217	1.38270	-13.915	0.08548
19	1.47890	5.63280	-0.11825	-13.563	0.02101	17.249	1.54205	-12.974	0.02106

MEANLINE INPUT DATA - STREAMLINE 11

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.50890	3.90510	0.22115	-43.343	0.02534	21.674	-1.62430	-41 252	0.02620
2	-1.43360	3.93570	0.20314	-42.960	0.04366	21.846	-1.54322	-40.838	0 04514
3	-1.28290	3 99710	0.16833	-41.965	0.07990	22 116	-1.38069	-39 799	0.08256
4	-1.13230	4.05830	0.13557	-40.324	0.11504	22.169	-1.21808	-38.169	0.11863
5	-0 98160	4 11940	0.10552	-37.985	0.14837	22.021	-1 05542	-35.900	0.15249
6	-0.81590	4.18620	0.07593	-35.093	0.18217	21.815	-0.87681	-33 117	0.18648
7	-0.63520	4.25830	0.04758	-31.890	0.21496	21.625	-0.68231	-30 045	0.21915
8	-0.45440	4.32950	0.02300	-28.638	0.24304	21.442	-0.48794	-26.943	0.24686
9	-0.27370	4.40010	0.00185	-25.500	0.26595	21.335	-0.29389	-23.955	0.26927
10	-0.09290	4.47070	-0.01635	-22.646	0.28329	21.371	-0.09978	-21.232	0.28612
11	0.08790	4.54160	-0.03200	-19.995	0.29474	21.524	0.09446	-18.701	0.29709
12	0.26860	4.61320	-0.04539	-17.457	0.29993	21.782	0.28887	-16.278	0 30181
13	0.44940	4.68600	-0.05670	-14.987	0.29824	22 152	0.48381	-13.926	0 29967
14	0 63020	4.76030	-0.06610	-12.613	0.28759	22.620	0 67933	-11.670	0.28861
15	0.81090	4.83660	-0.07374	-10 299	0.26525	23.177	0 87548	-9 484	0.26591
16	0.99170	4.91530	-0.07967	-7.810	0.22843	23.835	1.07264	-7.151	0.22878
17	1.17250	4.99620	-0.08380	-5.096	0.17436	24.326	1.27073	-4.646	0.17448
18	1.35320	5.07810	-0.08614	-2 328	0.10036	24 209	1.46902	-2 123	0.10037
19	1.50390	5 14680	-0.08674	0.010	0.02158	23.794	1.634[illegible]	0 009	0.02158

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY

MEANLINE INPUT DATA - STREAMLINE 12

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.48900	3.36120	0 22123	-40.649	0.03331	25 852	-1.64855	-37.692	0 03474
2	-1.41530	3.39770	0.20271	-40 009	0.05419	25.907	-1.56664	-37 053	0.05646
3	-1.26790	3 47030	0 16754	-38.587	0.09544	25.944	-1 40272	-35.660	0.09920
4	-1 12040	3 54170	0.13495	-36 893	0.13530	25 764	-1.23879	-34.059	0.14016
5	-0.97300	3.61190	0.10509	-34.885	0.17293	25.422	-1.07535	-32 199	0 17839
6	-0.81080	3.68840	0.07550	-32 367	0.21075	25.151	-0.89598	-29 844	0.21643
7	-0 63390	3.77140	0 04712	-29.331	0 24670	25.068	-0 70064	-26 975	0 25219
8	-0.45690	3 85390	0 02271	-26.118	0.27617	25.065	-0.50525	-23.947	0 28110
9	-0 28000	3 93660	0.00198	-22.942	0.29830	25 167	-0.30990	-20 961	0 30248
10	-0.10310	4.02020	-0.01550	-20.019	0.31227	25 428	-0.11425	-18 214	0.31570
11	0 07390	4.10490	-0.03025	-17.416	0.31731	25.786	0.08202	-15.773	0.32003
12	0 25080	4 19110	-0 04265	-15 019	0.31285	26.249	0 27884	-13.531	0.31493
13	0 42770	4.27930	-0.05292	-12.558	0.29910	26.887	0.47661	-11.237	0.30056
14	0 60470	4 37030	-0 06106	-9.867	0.27631	27.596	0 67569	-8.763	0.27718
15	0 78160	4.46430	-0.06696	-6 776	0.24463	28.286	0.87593	-5.974	0.24501
16	0.95850	4.56140	-0.07035	-2.969	0.20418	29.062	1.07755	-2.596	0 20424
17	1.13550	4.66060	-0.07086	1.555	0.15503	29.585	1.28068	1 352	0.15504
18	1 31240	4 76080	-0.06826	6.418	0.09742	29.176	1 48384	5.609	0.09756
19	1.45980	4.84460	-0.06368	10.578	0.04307	28.329	1 65201	9 335	0.04323

MEANLINE INPUT DATA - STREAMLINE 13

PT	Z	R	THETA	B*	T(Z)	PHI	X	B*M	T(M)
1	-1.46930	2.65330	0.23827	-36.435	0.05041	31 199	-1.68831	-32.270	0 05298
2	-1 39860	2.69470	0 21888	-36 023	0.06912	30.603	-1.60592	-32.041	0 07244
3	-1.25710	2.77680	0.18190	-35.063	0.10651	29.513	-1.44246	-31.416	0.11105
4	-1.11560	2 85610	0.14740	-33.840	0.14304	28.724	-1.28053	-30.453	0 14846
5	-0 97410	2.93290	0.11555	-32.243	0.17791	28.302	-1.11954	-29.047	0.18389
6	-0 81840	3.01620	0.08393	-29.905	0.21365	28.181	-0.94285	-26.883	0.21983
7	-0 64860	3 10760	0.05398	-26.732	0.24875	28 431	-0.75005	-23.889	0 25466
8	-0 47880	3.20060	0.02881	-23 343	0.27877	29.100	-0.55641	-20.660	0.28409
9	-0 30900	3.29700	0.00793	-20.285	0.30288	30.104	-0.36116	-17.732	0 30757
10	-0.13920	3 39790	-0.00959	-17.896	0.32018	31.281	-0.16370	-15.428	0.32433
11	0 03060	3.50340	-0.02448	-15.744	0.32992	32.389	0.03620	-13 391	0.33346
12	0 20040	3 61310	-0.03689	-13.313	0.33124	33.335	0.23838	-11 183	0.33392
13	0 37020	3.72660	-0.04659	-10.180	0 32362	34.186	0 44264	-8 449	0.32523
14	0.54000	3 84380	-0.05309	-6.107	0.30700	35.003	0.64891	-5.009	0 30757
15	0 70980	3.96430	-0.05586	-0.977	0.28121	35.786	0.85723	-0 793	0.28122
16	0 87960	4.08830	-0.05437	5.209	0.24587	36.379	1.06740	4 197	0.24623
17	1.04940	4.21400	-0.04817	12 133	0.20102	36.561	1.27868	9.797	0.20261
18	1 21920	4.33860	-0.03702	19.205	0 14745	36 136	1.48962	15 713	0.15031
19	1.36070	4.44150	-0.02393	24.944	0.09632	35.488	1.66414	20.743	0.09934

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 1

MEANLINE DATA						SURFACE COORDINATES				
PT	PCT X	X	Y	B•M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.12850	1.78792	-55.160	0 01882	1	-1.12850	1.78792	-1.12850	1.78792
2	0.02500	-1.07761	1.71376	-55.923	0.02265	2	-1.13253	1.78140	-1 12078	1.78938
3	0.05000	-1.02673	1.63749	-56.644	0.02655	3	-1.13103	1.77472	-1.11524	1.78568
4	0.07500	-0.97584	1.55918	-57.311	0.03051	4	-1.08699	1.70741	-1.06823	1.72010
5	0.10000	-0.92495	1.47893	-57.916	0.03451	5	-1.03781	1.63019	-1.01564	1.64478
6	0.12500	-0.87406	1.39688	-58.458	0.03854	6	-0.98868	1.55094	-0 96300	1.56742
7	0.15000	-0.82318	1.31317	-58.939	0.04257	7	-0.93957	1.46976	-0 91033	1.48810
8	0 17500	-0.77229	1.22795	-59.373	0 04658	8	0.89049	1 38680	-0 85764	1.40696
9	0.20000	-0.72140	1.14130	-59.769	0.05057	9	-0.84141	1.30219	-0.80494	1.32415
10	0.23000	-0.66034	1.03560	-60.185	0 05530	10	-0.79233	1.21608	-0.75225	1.23981
11	0 26000	-0.59927	0.92829	-60.510	0.05993	11	-0.74325	1.12857	-0.69955	1 15403
12	0.29000	-0.53821	0.81985	-60.691	0 06443	12	-0.68432	1.02185	-0.63635	1.04935
13	0.32000	-0.47714	0.71102	-60.684	0.06873	13	-0.62535	0.91354	-0 57319	0.94304
14	0.35000	-0.41608	0.60260	-60.518	0.07279	14	-0.56630	0.80408	-0.51011	0.83562
15	0.38000	-0.35501	0.49516	-60.239	0.07657	15	-0.50710	0.69420	-0.44718	0.72785
16	0.41000	-0.29395	0.38908	-59 899	0.08006	16	-0.44776	0 58468	-0.38439	0 62051
17	0.44000	-0.23288	0.28449	-59.549	0.08323	17	-0.38825	0 47616	-0.32177	0.51417
18	0.47000	-0.17182	0.18129	-59.226	0.08608	18	-0 32858	0.36901	-0.25931	0.40916
19	0 50000	-0.11075	0.07931	-58.959	0.08860	19	-0.26875	0.26340	-0.19701	0.30558
20	0.53000	-0.04969	-0.02173	-58.760	0.09078	20	-0.20879	0.15927	-0.13484	0.20332
21	0.56000	0.01138	-0.12213	-58.630	0.09261	21	-0.14871	0.05647	-0.07279	0.10216
22	0.59000	0 07244	-0.22211	-58.547	0 09408	22	-0.08849	-0.04527	-0 01088	0.00181
23	0 62000	0.13351	-0.32182	-58.482	0.09516	23	-0 02816	-0.14623	0 05092	-0.09802
24	0 65000	0 19457	-0 42127	-58.416	0 09587	24	0.03232	-0.24666	0.11257	-0.19757
25	0.68000	0 25564	-0.52043	-58.326	0.09619	25	0 09295	-0.34669	0 17407	-0.29694
26	0 71000	0 31670	-0.61916	-58.194	0.09601	26	0.15374	-0 44638	0.23541	-0.39617
27	0.74000	0.37777	-0.71728	-58.004	0.09516	27	0.21471	-0.54568	0.29657	-0.49517
28	0.77000	0.43884	-0 81457	-57.757	0.09333	28	0.27591	-0.64446	0 35750	-0.59386
29	0 80000	0.49990	-0 91084	-57.456	0.09020	29	0 33742	-0 74249	0 41812	-0.69207
30	0.83000	0.56096	-1 00588	-57.092	0.08547	30	0.39937	-0.83947	0.47830	-0.78968
31	0.86000	0.62203	-1.09948	-56.651	0.07890	31	0.46188	-0.93510	0.53792	-0 88658
32	0 89000	0.68310	-1.19136	-56.106	0.07035	32	0.52509	-1.02910	0 59684	-0.98267
33	0.92000	0.74416	-1.28115	-55.431	0.05966	33	0.58908	-1 12117	0.65498	-1.07780
34	0 95000	0.80523	-1.36850	-54.635	0.04643	34	0.65390	-1.21097	0.71229	-1.17174
35	0.97500	0.85611	-1.43924	-53.893	0.03335	35	0.71960	-1.29807	0.76872	-1.26422
36	1.00000	0.90700	-1.50801	-53.100	0.01923	36	0.78629	-1 38194	0 82416	-1.35506
						37	0 84264	-1.44907	0.86959	-1.42941
						38	0 89290	-1.50659	0.90960	-1.49410
						39	0.89894	-1.50995	0.91109	-1.50106
						40	0 90700	-1.50801	0.90700	-1.50801

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PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 3

MEANLINE DATA						SURFACE COORDINATES				
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.20464	1.76096	-53.770	0 01945	1	-1.20464	1.76096	-1 20464	1 76096
2	0 02500	-1.14914	1.68421	-54.483	0 02362	2	-1.20864	1 75411	-1 19671	1.76266
3	0.05000	-1.09364	1.60546	-55 159	0.02785	3	-1 20693	1 74726	-1.19088	1 75898
4	0.07500	-1.03814	1.52477	-55.789	0.03213	4	-1 15875	1 67735	-1.13953	1 69107
5	0.10000	-0 98265	1.44224	-56.363	0.03645	5	-1.10507	1 59751	-1.08221	1.61342
6	0.12500	-0 92715	1.35799	-56 877	0 04078	6	-1.05143	1.51574	-1.02486	1.53381
7	0.15000	-0.87165	1.27217	-57 328	0 04511	7	-0 99782	1 43215	-0 96747	1.45233
8	0 17500	-0.81615	1.18496	-57.716	0.04942	8	-0 94422	1.34685	-0 91007	1 36913
9	0 20000	-0.76065	1.09654	-58.042	0.05368	9	-0.89063	1.26000	-0 85266	1.28435
10	0 23000	-0 69405	0.98913	-58.342	0.05870	10	-0 83704	1.17177	-0 79526	1.19816
11	0 26000	-0 62745	0 88068	-58.528	0.06359	11	-0 78342	1 08234	-0 73788	1.11075
12	0 29000	-0.56086	0 77173	-58 573	0.06827	12	-0 71904	0.97372	-0.66907	1.00453
13	0.32000	-0.49426	0.66293	-58 455	0.07273	13	-0.65457	0.86408	-0 60034	0.89728
14	0.35000	-0.42766	0.55495	-58 195	0 07690	14	-0.58998	0.75393	-0.53173	0.78952
15	0.38000	-0.36106	0.44829	-57.828	0 08078	15	-0.52525	0.64391	-0.46327	0 68195
16	0 41000	-0.29446	0 34328	-57.393	0.08431	16	-0.46034	0.53468	-0.39498	0.57521
17	0.44000	-0.22786	0.24009	-56.931	0.08750	17	-0.39525	0.42678	-0.32687	0.46979
18	0.47000	-0.16126	0.13869	-56 484	0.09033	18	-0.32997	0.32057	-0.25895	0.36600
19	0.50000	-0.09467	0.03890	-56 088	0.09279	19	-0 26453	0.21622	-0 19120	0.26396
20	0 53000	-0.02807	-0.05954	-55.762	0.09488	20	-0 19892	0 11375	-0.12361	0.16362
21	0.56000	0.03853	-0.15692	-55.517	0.09659	21	-0.13317	0.01301	-0.05616	0.06478
22	0.59000	0.10513	-0 25354	-55.336	0.09791	22	-0.06729	-0.08623	0.01115	-0.03285
23	0.62000	0.17173	-0.34960	-55.199	0.09883	23	-0.00128	-0.18427	0.07834	-0.12958
24	0.65000	0.23833	-0 44521	-55 083	0.09935	24	0 06486	-0.28139	0 14540	-0.22570
25	0.68000	0.30493	-0.54040	-54 963	0.09945	25	0.13115	-0.37780	0.21230	-0.32139
26	0 71000	0.37152	-0.63513	-54.814	0.09897	26	0.19759	-0.47364	0 27906	-0.41677
27	0 74000	0 43812	-0.72927	-54.618	0 09770	27	0 26421	-0.56895	0.34564	-0.51186
28	0.77000	0.50472	-0.82263	-54.373	0.09539	28	0.33108	-0.66365	0 41197	-0.60662
29	0.80000	0.57132	-0 91508	-54.083	0.09176	29	0.39829	-0.75755	0 47795	-0.70098
30	0.83000	0.63792	-1.00646	-53 734	0.08657	30	0.46595	-0.85041	0.54349	-0 79485
31	0.86000	0.70452	-1.09655	-53 303	0.07960	31	0.53416	-0.94200	0 60848	-0.88817
32	0.89000	0.77111	-1.18505	-52 743	0.07076	32	0.60302	-1.03207	0.67282	-0.98086
33	0.92000	0.83771	-1.27151	-52.013	0.05991	33	0.67260	-1.12034	0.73643	-1.07277
34	0.95000	0 90431	-1 35548	-51 124	0.04671	34	0.74295	-1.20647	0 79927	-1 16363
35	0.97500	0.95981	-1.42331	-50.281	0.03382	35	0 81410	-1.28995	0 86132	-1.25307
36	1.00000	1 01531	-1.48906	-49.372	0.01997	36	0 88613	-1.37014	0 92249	-1.34083
						37	0 94680	-1 43412	0 97282	-1.41251
						38	1.00062	-1.48852	1 01705	-1 47448
						39	1.00708	-1.49161	1.01907	-1 48161
						40	1.01531	-1.48906	1.01531	-1.48906

CHORD 3.93584 CAMBER 4.398 STAGGER -55.665

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 4

MEANLINE DATA						SURFACE COORDINATES				
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0	-1.28457	1.73494	-52 477	0.02006	1	-1.28457	1.73494	-1.28457	1.73494
2	0.02500	-1.22489	1.65619	-53.200	0.02489	2	-1.28855	1.72778	-1.27643	1.73689
3	0.05000	-1.16520	1.57540	-53.869	0.02979	3	-1.28663	1 72075	-1.27032	1.73324
4	0 07500	-1.10551	1.49273	-54.456	0 03474	4	-1.23485	1.64873	-1.21492	1 66364
5	0.10000	-1.04582	1.40841	-54.936	0 03972	5	-1.17723	1.56662	-1.15317	1.58418
6	0.12500	-0.98613	1.32275	-55.308	0 04470	6	-1.11964	1.48263	-1 09138	1.50283
7	0.15000	-0.92645	1.23606	-55.577	0.04965	7	-1.06208	1.39700	-1.02955	1.41982
8	0.17500	-0.86676	1.14863	-55.776	0.05453	8	-1.00451	1.31003	-0.96775	1.33547
9	0.20000	-0.80707	1 06061	-55 934	0.05933	9	-0.94692	1.22203	-0.90597	1.25010
10	0.2300C	-0.73544	0.95438	-56.075	0.06495	10	-0 88930	1.13329	-0.84421	1 16396
11	0.26000	-0.66382	0 84770	-56.159	0.07038	11	-0.83164	1.04399	-0.78250	1.07722
12	0.29000	-0.59219	0.74085	-56.154	0.07558	12	-0.76239	0.93626	-0 70850	0.97251
13	0.32000	-0.52057	0.63425	-56.031	0.08051	13	-0.69304	0.82810	-0.63459	0.86730
14	0.35000	-0.44894	0.52839	-55 781	0.08513	14	-0.62358	0.71980	-0 56081	0.76189
15	0.38000	-0.37732	0.42376	-55 407	0.08939	15	-0.55395	0.61175	-0.48718	0.65674
16	0 41000	-0.30569	0.32082	-54.913	0.09327	16	-0.48414	0 50445	-0 41374	0.55233
17	0 44000	-0.23406	0.21995	-54 320	0.09675	17	-0.41411	0.39839	-0.34052	0.44914
18	0.47000	-0 16244	0.12133	-53.705	0.09982	18	-0.34385	0.29402	-0.26753	0.34763
19	0.50000	-0.09081	0.02480	-53.153	0.10245	19	-0.27336	0.19173	-0.19477	0 24817
20	0.53000	-0 01919	-0 06997	-52.704	0.10467	20	-0.20266	0.09178	-0 12221	0.15087
21	0 56000	0.05244	-0.16341	-52.374	0.10646	21	-0.13181	-0.00592	-0.04982	0.05553
22	0.59000	0.12406	-0.25590	-52.121	0.10780	22	-0.06082	-0.10168	0.02245	-0 03825
23	0.62000	0.19569	-0.34760	-51 899	0.10869	23	0.01028	-0.19591	0.09460	-0.13092
24	0.65000	0.26732	-0.43861	-51.694	0.10913	24	0.08152	-0.29899	0.16661	-0.22280
25	0.68000	0.33894	-0.52897	-51.503	0.10910	25	0.15292	-0.38113	0.23846	-0 31407
26	0.71000	0.41057	-0 61873	-51.321	0.10839	26	0.22450	-0.47243	0.31013	-0.40478
27	0 74000	0.48219	-0.70792	-51 139	0.10678	27	0 29625	-0.56292	0.38163	-0.49501
28	0.77000	0.55382	-0.79648	-50.925	0.10399	28	0.36826	-0.65260	0 45288	-0.58486
29	0.80000	0.62544	-0 88427	-50.645	0.09978	29	0.44062	-0.74141	0.52376	-0 67442
30	0 83000	0.69707	-0 97107	-50 281	0.09390	30	0.51345	-0.82925	0.59418	-0.76370
31	0.86000	0 76870	-1.05661	-49.816	0.08611	31	0 58687	-0.91591	0.66402	-0.85264
32	0.89000	0.84032	-1 14059	-49.246	0.07633	32	0.66096	-1 00108	0.73318	-0.94107
33	0.92000	0.91195	-1.22275	-48.569	0.06443	33	0.73580	-1.08439	0.80159	-1.02883
34	0.95000	0 98357	-1 30283	-47.800	0.04996	34	0.81141	-1.16551	0.86923	-1 11568
35	0.97500	1.04326	-1 36787	-47.101	0.03582	35	0 88779	-1 24406	0 93610	-1.20143
36	1.00000	1.10295	-1.43129	-46.365	0.02062	36	0.96507	-1.31961	1.00208	-1.28605
						37	1 03014	-1.38006	1 05638	-1.35568
						38	1.08773	-1.43158	1.10400	-1.41611
						39	1 09460	-1 43438	1.10645	-1 42335
						40	1.10295	-1.43129	1.10295	-1.43129

CHORD 3.96551 CAMBER 6.112 STAGGER -52.982

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 5

MEANLINE DATA						SURFACE COORDINATES				
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.36071	1.69040	-51.233	0.02036	1	-1.36071	1.69040	-1.36071	1.69040
2	0.02500	-1.29724	1.61036	-51.937	0 02626	2	-1.36460	1 68303	-1.35247	1.69257
3	0.05000	-1.23377	1.52834	-52.583	0.03224	3	-1.36252	1.67592	-1 34617	1.68901
4	0.07500	-1.17030	1.44452	-53 133	0.03827	4	-1.30758	1.60226	-1.28690	1 61845
5	0.10000	-1.10683	1.35919	-53.555	0.04432	5	-1.24657	1.51854	-1.22097	1.53813
6	0.12500	-1 04337	1 27276	-53.845	0.05034	6	-1.18561	1 43304	-1.15499	1.45600
7	0.15000	-0.97990	1 18560	-54.009	0.05629	7	-1.12466	1.34603	-1 08901	1.37236
8	0.17500	-0 91643	1.09809	-54.079	0.06215	8	-1 06369	1 25791	-1 02304	1.28761
9	0 20000	-0.85296	1.01045	-54.085	0.06787	9	-1 00267	1.16906	-0.95713	1.20214
10	0.23000	-0 77680	0.90539	-54.022	0.07454	10	-0.94159	1.07986	-0.89127	1 11632
11	0.26000	-0.70064	0.80072	-53 884	0.08093	11	-0.88045	0 99054	-0.82548	1 03036
12	0 29000	-0 62448	0.69676	-53 645	0.08700	12	-0.80696	0.88350	-0.74664	0 92729
13	0.32000	-0.54832	0.59393	-53.282	0.09271	13	-0.73333	0.77687	-0.66795	0.82457
14	0.35000	-0.47216	0.49265	-52.813	0.09802	14	-0.65951	0.67097	-0 58945	0.72254
15	0.38000	-0.39599	0.39324	-52 267	0.10289	15	-0.58547	0 56621	-0 51116	0 62164
16	0.41000	-0.31983	0.29584	-51.681	0.10730	16	-0.51120	0.46303	-0 43311	0.52228
17	0.44000	-0.24367	0.20048	-51.092	0.11123	17	-0.43668	0.36175	-0.35531	0.42472
18	0.47000	-0.16751	0.10706	-50.538	0.11467	18	-0 36192	0.26257	-0.27774	0.32910
19	0.50000	-0 09135	0.01536	-50.048	0.11762	19	-0.28695	0.16555	-0.20040	0.23541
20	0 53000	-0 01519	-0.07487	-49.633	0.12008	20	-0.21178	0.07062	-0.12324	0.14350
21	0 56000	0 06097	-0.16391	-49.292	0.12202	21	-0.13643	-0 02240	-0 04626	0.05313
22	0 59000	0.13714	-0.25196	-48 991	0.12343	22	-0.06093	-0 11376	0 03056	-0 03599
23	0.62000	0 21330	-0.33909	-48 696	0 12430	23	0.01473	-0.20370	0 10722	-0.12412
24	0.65000	0 28946	-0 42533	-48 403	0.12461	24	0.09057	-0.29245	0.18371	-0.21146
25	0.68000	0 36562	-0 51068	-48.111	0.12432	25	0.16661	-0.38011	0.25998	-0.29807
26	0.71000	0 44178	-0 59517	-47.824	0.12319	26	0.24286	-0.46669	0.33605	-0.38396
27	0 74000	0.51794	-0.67882	-47.540	0.12097	27	0 31935	-0.55218	0.41189	-0.46918
28	0.77000	0.59410	-0.76162	-47.241	0.11738	28	0.39613	-0.63652	0.48743	-0.55381
29	0 80000	0.67027	-0.84352	-46.907	0.11218	29	0 47332	-0.71965	0 56256	-0.63799
30	0.83000	0.74643	-0.92439	-46.521	0.10511	30	0 55101	-0.80146	0 63719	-0.72178
31	0.86000	0.82259	-1 00409	-46.068	0.09594	31	0.62931	-0 88184	0.71122	-0.80520
32	0.89000	0.89875	-1.08244	-45.535	0.08457	32	0.70829	-0.96055	0.78456	-0.88823
33	0.92000	0.97491	-1.15921	-44.909	0.07084	33	0 78804	-1.03737	0.85714	-0.97081
34	0.95000	1.05107	-1.23422	-44.203	0.05427	34	0.86857	-1.11206	0.92893	-1.05282
35	0 97500	1.11454	-1 29527	-43.564	0 03816	35	0.94991	-1.18430	0.99992	-1.13413
36	1.00000	1.17801	-1 35494	-42 896	0.02087	36	1.03215	-1.25367	1.06999	-1.21477
						37	1.10139	-1.30909	1.12769	-1.28144
						38	1.16257	-1 35627	1 17824	-1 33946
						39	1.16975	-1.35862	1.18109	-1.34665
						40	1 17801	-1.35494	1.17801	-1.35494

CHORD 3.96474 CAMBER 8.338 STAGGER -50 184

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 6

MEANLINE DATA						SURFACE COORDINATES				
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.43281	1.62720	-49.991	0.02051	1	-1.43281	1.62720	-1.43281	1.62720
2	0.02500	-1.36582	1.54654	-50.582	0.02817	2	-1.43659	1.61965	-1 42454	1.62959
3	0.05000	-1.29884	1.46424	-51.120	0.03590	3	-1.43437	1.61252	-1 41808	1.62617
4	0.07500	-1.23185	1.38049	-51.559	0 04367	4	-1.37670	1.53760	-1.35494	1.55549
5	0.10000	-1.16487	1.29560	-51.863	0.05143	5	-1.31281	1.45298	-1.28486	1.47551
6	0.12500	-1.09788	1.21000	-52.026	0.05913	6	-1.24895	1.36691	-1 21475	1 39406
7	0.15000	-1.03090	1.12411	-52.051	0.06671	7	-1.18509	1.27972	-1.14464	1.31148
8	0 17500	-0 96391	1 03831	-51.976	0.07414	8	-1.12119	1.19181	-1.07458	1.22819
9	0.20000	-0.89693	0 95285	-51.836	0.08137	9	-1.05720	1.10360	-1.00460	1.14462
10	0 23000	-0.81655	0.85099	-51.599	0 08973	10	-0.99312	1.01548	-0.93471	1.06115
11	0.26000	-0 73617	0.75011	-51.292	0.09769	11	-0.92892	0.92771	-0.86494	0.97799
12	0 29000	-0 65579	0.65049	-50.888	0.10519	12	-0.85171	0 82312	-0 78139	0.87885
13	0.32000	-0.57541	0.55250	-50.365	0.11221	13	-0.77428	0.71956	-0.69805	0.78065
14	0 35000	-0 49502	0.45649	-49.751	0.11868	14	-0.69660	0.61731	-0.61498	0.68367
15	0.38000	-0.41464	0.36263	-49.092	0.12457	15	-0.61861	0.51672	-0.53220	0.58829
16	0.41000	-0.33426	0.27093	-48.439	0.12986	16	-0.54031	0.41815	-0.44973	0.49483
17	0.44000	-0.25388	0.18124	-47.836	0.13455	17	-0.46171	0.32184	-0.36757	0.40341
18	0.47000	-0.17350	0.09334	-47.288	0.13863	18	-0.38285	0.22785	-0.28568	0.31400
19	0 50000	-0.09312	0.00703	-46.790	0.14206	19	-0.30375	0.13608	-0.20401	0.22640
20	0.53000	-0.01274	-0.07785	-46.335	0.14435	20	-0.22443	0.04632	-0.12257	0.14035
21	0 56000	0.06764	-0 16144	-45 911	0.14695	21	-0.14489	-0.04160	-0.04135	0.05566
22	0.59000	0 14803	-0.24383	-45 501	0.14838	22	-0.06513	-0.12786	0.03965	-0.02785
23	0.62000	0.22841	-0.32504	-45.087	0.14911	23	0.01487	-0.21257	0.12042	-0.11032
24	0 65000	0.30879	-0 40509	-44.672	0.14908	24	0.09511	-0.29583	0.20094	-0.19183
25	0 68000	0 38917	-0.48399	-44 264	0.14819	25	0.17561	-0.37768	0.28120	-0.27240
26	0.71000	0 46955	-0.56179	-43.872	0.14618	26	0.25638	-0.45809	0 36119	-0 35208
27	0.74000	0 54993	-0.63856	-43.497	0.14275	27	0.33745	-0.53705	0 44089	-0 43092
28	0.77000	0.63031	-0.71433	-43.118	0.13768	28	0.41890	-0.61448	0.52020	-0.50910
29	0.80000	0.71069	-0.78907	-42.708	0.13075	29	0.50080	-0.69034	0.59906	-0.58678
30	0.83000	0.79108	-0.86269	-42.254	0.12168	30	0.58326	-0.76458	0.67737	-0.66408
31	0 86000	0.87146	-0.93508	-41.753	0.11026	31	0.66635	-0.83711	0.75503	-0.74103
32	0.89000	0.95184	-1.00616	-41.212	0.09639	32	0.75017	-0.90772	0.83198	-0.81766
33	0 92000	1.03222	-1.07587	-40.646	0.07993	33	0.83475	-0.97621	0 90817	-0.89396
34	0.95000	1 11260	-1.14417	-40 058	0.06031	34	0.92008	-1.04242	0.98359	-0.96991
35	0.97500	1.17958	-1.19999	-39.554	0.04134	35	1.00619	-1.10619	1.05825	-1.04555
36	1.00000	1.24657	-1.25482	-39.040	0.02105	36	1.09319	-1.16725	1.13201	-1.12109
						37	1.16642	-1.21593	1.19275	-1.18405
						38	1.23103	-1.25736	1.24588	-1 23909
						39	1.23848	-1.25915	1.24916	-1.24619
						40	1.24657	-1.25482	1.24657	-1.25482

CHORD 3.93511 CAMBER 10.951 STAGGER -47 087

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 7

MEANLINE DATA						SURFACE COORDINATES				
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.50438	1.54463	-48.790	0 02019	1	-1 50438	1 54463	-1 50438	1.54463
2	0.02500	-1.43401	1.46370	-49.188	0.03032	2	-1 50798	1.53706	-1 49629	1.54718
3	0.05000	-1.36364	1.38168	-49.542	0 04049	3	-1.50569	1.53008	-1.48978	1.54400
4	0 07500	-1 29327	1.29875	-49 808	0.05067	4	-1.44548	1.45379	-1.42253	1 47361
5	0 10000	-1.22290	1 21522	-49 948	0 06080	5	-1.37904	1.36854	-1.34823	1.39482
6	0 12500	-1.15253	1.13147	-49 954	0 07081	6	-1 31262	1 28240	-1.27391	1 31510
7	0.15000	-1.08216	1.04790	-49.830	0.08063	7	-1.24617	1 19565	-1.19963	1.23478
8	0 17500	-1 01179	0 96484	-49 616	0 09020	8	-1.17963	1.10869	-1.12542	1 15425
9	0 20000	-0.94142	0 88248	-49 352	0.09947	9	-1.11297	1 02189	-1 05135	1 07390
10	0 23000	-0 85698	0 78474	-48 983	0 11014	10	-1 04614	0 93561	-0 97744	0.99406
11	0 26000	-0.77253	0 68838	-48.544	0.12025	11	-0.97916	0.85008	-0 90368	0 91488
12	0 29000	-0 68809	0.59369	-47 978	0.12975	12	-0.89853	0.74860	-0.81542	0.82089
13	0.32000	-0 60365	0 50115	-47.231	0.13857	13	-0.81760	0.64858	-0.72747	0.72819
14	0.35000	-0.51920	0 41123	-46.344	0.14665	14	-0 73628	0.55026	-0.63990	0.63711
15	0 38000	-0.43476	0.32418	-45.394	0.15395	15	-0.65451	0.45410	-0 55278	0.54819
16	0 41000	-0.35031	0.23995	-44.468	0.16044	16	-0.57225	0 36061	-0.46615	0.46185
17	0.44000	-0.26587	0.15826	-43.650	0.16614	17	-0.48956	0.27012	-0 37996	0.37823
18	0.47000	-0 18143	0 07872	-42.945	0.17103	18	-0 40651	0.18270	-0.29412	0.29720
19	0 50000	-0.09698	0.00097	-42 338	0.17510	19	-0.32321	0.09815	-0 20853	0.21837
20	0 53000	-0.01254	-0.07525	-41.816	0.17833	20	-0.23969	0.01612	-0.12317	0 14132
21	0.56000	0.07190	-0.15018	-41.361	0.18070	21	-0.15595	-0 06374	-0 03802	0.06569
22	0 59000	0.15635	-0.22398	-40 945	0.18219	22	-0 07199	-0.14170	0.04691	-0.00879
23	0.62000	0.24079	-0.29672	-40.538	0.18280	23	0 01220	-0 21799	0.13161	-0.08237
24	0 65000	0.32524	-0 36843	-40.137	0 18239	24	0.09665	-0.29279	0.21605	-0.15517
25	0 68000	0.40968	-0 43913	-39 743	0 18081	25	0.18139	-0 36618	0.30020	-0.22726
26	0.71000	0.49412	-0.50887	-39.360	0 17777	26	0 26645	-0.43814	0.38402	-0 29871
27	0.74000	0.57857	-0.57767	-38.989	0.17297	27	0 35188	-0.50864	0 46748	-0.36962
28	0 77000	0.66301	-0.64558	-38.621	0 16615	28	0.43775	-0.57759	0 55049	-0.44014
29	0.80000	0.74745	-0.71259	-38.245	0.15707	29	0.52415	-0.64489	0 63298	-0.51045
30	0.83000	0.83190	-0.77868	-37.848	0.14544	30	0.61116	-0.71048	0 71486	-0.58067
31	0 86000	0.91634	-0.84379	-37.414	0 13100	31	0.69884	-0.77427	0.79607	-0.65091
32	0.89000	1.00078	-0.90783	-36.921	0.11366	32	0 78728	-0.83610	0.87652	-0.72126
33	0 92000	1.08523	-0.97064	-36.353	0 09324	33	0.87654	-0 89582	0.95614	-0.79177
34	0.95000	1.16967	-1 03209	-35.717	0.06909	34	0.96664	-0 95327	1.03492	-0.86239
35	0 97500	1.24004	-1.08216	-35.146	0.04590	35	1.05759	-1.00819	1.11286	-0.93310
36	1.00000	1.31041	-1.13116	-34.551	0.02115	36	1.14951	-1.06013	1.18984	-1.00404
						37	1.22683	-1.10092	1.25325	-1.06340
						38	1.29491	-1.13519	1 30868	-1.11525
						39	1.30258	-1.13625	1.31242	-1.12224
						40	1.31041	-1 13116	1.31041	-1.13116

CHORD 3.88367 CAMBER 14.239 STAGGER -43.550

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 8

		MEANLINE DATA					SURFACE COORDINATES			
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.57429	1.44220	-47.650	0.01927	1	-1.57429	1.44220	-1.57429	1.44220
2	0.02500	-1.50067	1.36107	-47.899	0.03226	2	-1.57763	1.43486	-1.56661	1.44484
3	0.05000	-1.42704	1.27928	-48.104	0.04528	3	-1.57536	1.42822	-1.56027	1.44196
4	0.07500	-1.35342	1 19702	-48.219	0.05825	4	-1 51264	1.35026	-1.48870	1.37189
5	0.10000	-1.27979	1.11461	-48.202	0.07111	5	-1.44390	1.26416	-1.41019	1.29440
6	0 12500	-1.20617	1.03246	-48.035	0.08374	6	-1.37514	1.17761	-1.33170	1.21643
7	0 15000	-1.13255	0.95102	-47.715	0.09607	7	-1.30630	1.09091	-1.25329	1.13830
8	0.17500	-1 05892	0.87067	-47.262	0.10802	8	-1.23730	1.00446	-1 17504	1 06046
9	0.20000	-0.98530	0 79175	-46.702	0.11952	9	-1 16808	0.91870	-1.09701	0.98334
10	0.23000	-0.89695	0.69924	-45.910	0.13265	10	-1.09859	0.83402	-1.01925	0 90733
11	0.26000	-0.80860	0 60944	-45.004	0.14497	11	-1.02879	0.75076	-0.94180	0.83273
12	0 29000	-0 72025	0.52258	-43.998	0.15642	12	-0.94458	0 65309	-0.84931	0.74538
13	0 32000	-0.63190	0 43886	-42.911	0.16693	13	-0.85985	0.55818	-0.75734	0.66069
14	0 35000	-0.54355	0.35832	-41.792	0 17649	14	-0.77457	0.46632	-0.66592	0.57884
15	0.38000	-0.45520	0 28085	-40.704	0.18506	15	-0.68873	0.37773	-0.57507	0.49999
16	0.41000	-0.36685	0.20619	-39.709	0.19264	16	-0.60236	0.29252	-0.48474	0.42411
17	0.44000	-0.27850	0.13395	-38.859	0.19923	17	-0.51554	0.21070	-0.39485	0.35100
18	0 47000	-0.19015	0.06370	-38.132	0.20480	18	-0.42839	0.13210	-0 30531	0.28029
19	0.50000	-0 10180	-0.00484	-37.488	0.20934	19	-0.34100	0.05638	-0.21600	0.21152
20	0.53000	-0.01345	-0.07188	-36.902	0.21282	20	-0.25338	-0.01684	-0.12692	0.14425
21	0.56000	0 07490	-0.13756	-36.357	0.21520	21	-0.16550	-0.08789	-0.03810	0.07822
22	0.59000	0.16325	-0.20198	-35.845	0 21646	22	-0.07734	-0.15697	0.05044	0.01321
23	0.62000	0 25160	-0.26524	-35.361	0.21658	23	0.01111	-0.22421	0.13869	-0 05091
24	0 65000	0 33995	-0 32739	-34.896	0.21537	24	0.09987	-0.28972	0.22663	-0.11425
25	0.68000	0.42830	-0 38850	-34 444	0 21261	25	0.18893	-0.35355	0.31427	-0.17692
26	0.71000	0 51665	-0.44859	-33 998	0.20803	26	0.27834	-0 41572	0 40156	-0 23907
27	0.74000	0.60500	-0.50768	-33.552	0.20136	27	0.36817	-0.47617	0.48843	-0.30083
28	0.77000	0.69335	-0.56579	-33.113	0.19236	28	0.45849	-0.53483	0 57481	-0.36236
29	0.80000	0.78170	-0.62294	-32.684	0.18079	29	0.54935	-0 59158	0.66064	-0.42378
30	0.83000	0 87005	-0.67916	-32.257	0.16639	30	0.64081	-0.64634	0.74589	-0.48523
31	0.86000	0.95840	-0.73445	-31.816	0.14891	31	0.73288	-0.69902	0.83051	-0.54685
32	0.89000	1.04675	-0 78876	-31.331	0 12825	32	0.82565	-0.74952	0.91445	-0.60880
33	0 92000	1.13510	-0 84197	-30.774	0.10424	33	0.91915	-0.79772	0.99765	-0.67118
34	0.95000	1.22345	-0.89394	-30.149	0.07619	34	1.01340	-0.84353	1.08009	-0.73398
35	0 97500	1.29707	-0.93623	-29 589	0.04952	35	1.10843	-0.88675	1.16176	-0.79719
36	1 00000	1.37070	-0.97754	-29 006	0.02116	36	1.20431	-0.92688	1.24258	-0 86100
						37	1.28485	-0.95776	1 30930	-0 91470
						38	1.35556	-0 98328	1.36759	-0.96168
						39	1.36335	-0.98346	1.37189	-0.96838
						40	1.37070	-0.97754	1.37070	-0.97754

CHORD 3.81158 CAMBER 18.644 STAGGER -39.408

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 9

MEANLINE DATA						SURFACE COORDINATES				
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.62947	1.30540	-46.064	0.01882	1	-1.62947	1 30540	-1.62947	1.30540
2	0.02500	-1.55272	1 22563	-46.140	0.03462	2	-1.63257	1.29808	-1.62203	1.30822
3	0.05000	-1.47597	1.14570	-46.175	0.05039	3	-1.63022	1.29165	-1.61570	1.30563
4	0 07500	-1.39921	1.06578	-46.122	0.06604	4	-1.56520	1.21364	-1.54024	1.23762
5	0.10000	-1.32246	0.98618	-45 938	0.08150	5	-1.49414	1.12825	-1.45779	1.16314
6	0.12500	-1.24571	0 90730	45.598	0.09663	6	-1.42302	1.04289	-1.37541	1.08867
7	0.15000	-1.16895	0.82959	-45.084	0.11134	7	-1.35174	0 95784	-1.29318	1.01452
8	0 17500	-1.09220	0 75349	-44.396	0.12554	8	-1 28023	0 87350	-1.21119	0.94111
9	0 20000	-1.01545	0 67942	-43 538	0 13914	9	-1.20838	0.79028	-1 12953	0.86890
10	0.23000	-0.92334	0.59369	-42 317	0 15456	10	-1.13611	0.70864	-1.04829	0.79834
11	0.26000	-0.83124	0.51180	-40.946	0.16891	11	-1.06337	0 62899	-0.96752	0.72985
12	0 29000	-0.73913	0.43383	-39.561	0.18214	12	-0.97537	0 53655	-0.87131	0.65084
13	0.32000	-0.64703	0.35945	-38.301	0.19424	13	-0.88659	0 44801	-0 77589	0 57559
14	0.35000	-0.55493	0.28818	-37.189	0.20521	14	-0.79714	0.36361	-0.68113	0.50404
15	0.38000	-0.46282	0.21955	-36.204	0.21503	15	-0.70723	0.28324	-0.58683	0.43567
16	0.41000	-0.37072	0.15325	-35.299	0.22366	16	-0.61695	0.20644	-0.49291	0.36992
17	0 44000	-0.27861	0.08909	-34 426	0.23109	17	-0.52633	0 13280	-0 39932	0.30631
18	0.47000	-0.18651	0.02695	-33.595	0 23727	18	-0.43534	0 06198	-0.30610	0.24452
19	0 50000	-0.09440	-0.03333	-32.823	0.24217	19	-0.34394	-0.00621	-0.21329	0.18440
20	0.53000	-0.00230	-0.09192	-32.112	0.24575	20	-0.25215	-0.07187	-0.12087	0.12577
21	0 56000	0.08980	-0.14898	-31.456	0.24797	21	-0 16004	-0.13508	-0.02877	0.06843
22	0 59000	0.18191	-0.20464	-30 835	0.24880	22	-0.06762	-0.19600	0.06302	0.01215
23	0.62000	0.27401	-0.25896	-30.224	0.24815	23	0.02510	-0.25475	0.15450	-0.04322
24	0.65000	0.36612	-0.31196	-29.615	0.24584	24	0.11815	-0.31146	0.24567	-0.09783
25	0.68000	0 45822	-0.36367	-29.000	0.24161	25	0 21155	-0 36617	0 33647	-0.15175
26	0 71000	0.55032	-0.41407	-28.376	0.23524	26	0.30537	-0 41883	0 42686	-0.20510
27	0.74000	0 64243	-0.46317	-27.740	0.22651	27	0.39965	-0 46933	0 51679	-0 25801
28	0 77000	0.73453	-0 51095	-27.097	0.21521	28	0.49442	-0 51756	0 60622	-0.31058
29	0 80000	0 82664	-0.55742	-26 453	0 20114	29	0.58971	-0 56341	0 69514	-0 36293
30	0.83000	0 91874	-0.60261	-25.812	0 18404	30	0.68552	-0.60674	0.78355	-0 41516
31	0.86000	1.01084	-0.64653	-25.180	0 16370	31	0 78184	-0.64746	0.87143	-0.46739
32	0.89000	1.10295	-0.68922	-24.560	0.14007	32	0.87867	-0.68545	0.95881	-0.51977
33	0.92000	1.19505	-0.73073	-23.956	0 11301	33	0 97602	-0.72060	1.04567	-0 57246
34	0.95000	1.28716	-0.77108	-23.362	0.08178	34	1.07384	-0.75292	1.13206	-0.62552
35	0.97500	1.36391	-0.80384	-22.871	0.05232	35	1.17211	-0 78236	1.21800	-0.67909
36	1.00000	1.44066	-0.83583	-22.380	0.02111	36	1.27094	-0.80861	1.30337	-0.73354
						37	1.35374	-0.82794	1 37408	0 77974
						38	1.42629	-0.84346	1.43586	-0.82030
						39	1.43405	-0 84262	1.44083	-0.82653
						40	1.44066	-0.83583	1 44066	-0.83583

CHORD 3 74308 CAMBER 23.684 STAGGER -34 893

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 10

PT	PCT Y	X	Y	B*M	T(M)
1	0	1 63192	1 12422	-44.303	0.02118
2	0.02500	-1.55257	1 04717	-44.009	0.03964
3	0.05000	-1.47322	0.97095	-43.682	0.05794
4	0.07500	-1.39387	0.89567	-43 288	0.07601
5	0.10000	-1.31452	0 82154	-42.795	0.09375
6	0 12500	-1.23517	0.74883	-42.185	0.11106
7	0 15000	-1.15582	0.67782	-41 444	0.12783
8	0 17500	-1.07648	0 60879	-40 569	0.14395
9	0 20000	-0.99713	0 54202	-39.567	0.15935
10	0.23000	-0.90191	0.46517	-38.218	0.17676
11	0 26000	-0.80669	0.39212	-36 755	0.19293
12	0.29000	-0.71147	0.32292	-35 265	0.20782
13	0 32000	-0.61625	0.25736	-33.841	0.22138
14	0 35000	-0.52103	0.19512	-32 509	0.23358
15	0 38000	-0.42581	0 13589	-31 271	0.24437
16	0.41000	-0.33059	0.07938	-30.114	0.25373
17	0.44000	-0.23537	0.02537	-29.021	0.26164
18	0 47000	-0.14015	-0.02632	-27.970	0.26804
19	0.50000	-0.04493	-0 07579	-26.943	0.27288
20	0 53000	0.05029	-0 12313	-25.930	0.27613
21	0.56000	0.14550	-0 16840	-24.927	0.27773
22	0.59000	0.24072	-0.21166	-23.943	0.27763
23	0 62000	0.33594	-0.25299	-22.986	0.27571
24	0.65000	0.43116	-0.29246	-22.044	0.27181
25	0.68000	0.52638	-0.33011	-21.103	0 26573
26	0 71000	0 62160	-0 36596	-20.146	0.25729
27	0.74000	0.71682	-0.39997	-19.170	0 24633
28	0.77000	0 81204	-0.43218	-18.213	0 23270
29	0 80000	0.90726	-0 46268	-17.317	0.21624
30	0.83000	1 00248	-0.49161	-16 500	0.19674
31	0 86000	1.09770	-0.51915	-15.769	0.17404
32	0 89000	1.19292	-0.54543	-15.107	0.14807
33	0.92000	1.28813	-0.57059	-14.493	0.11870
34	0.95000	1.38335	-0.59468	-13.912	0 08523
35	0.97500	1.46270	-0.61399	-13.440	0.05399
36	1.00000	1.54205	-0.63261	-12.974	0.02106

PT	XS	YS	XP	YP
1	-1.63192	1.12422	-1.63192	1.12422
2	-1 63519	1.11579	-1.62367	1.12769
3	-1.63237	1.10864	-1.61636	1.12507
4	-1 56634	1.03292	-1.53880	1.06143
5	-1.49323	0.95000	-1.45321	0.99190
6	-1.41993	0.86801	-1.36781	0.92333
7	-1.34637	0.78715	-1.28268	0.85594
8	-1.27246	0.70768	-1 19788	0 78997
9	-1 19813	0.62991	-1 11352	0.72573
10	-1.12329	0.55412	-1.02966	0 66347
11	-1.04788	0.48061	-0 94638	0.60344
12	-0.95658	0.39574	-0.84723	0 53461
13	-0.86441	0.31483	-0.74896	0.46941
14	-0.77146	0.23807	-0 65147	0.40776
15	-0 67789	0.16542	-0 55461	0.34930
16	-0 58380	0.09663	-0.45826	0 29361
17	-0.48924	0.03146	-0.36239	0.24033
18	-0.39424	-0.03036	-0.26694	0.18913
19	-0.29884	-0.08903	-0.17191	0 13977
20	-0.20301	-0.14468	-0.07730	0 09205
21	-0.10676	-0 19742	0 01689	0 04584
22	-0 01009	-0.24730	0.11066	0.00103
23	0 08698	-0.29433	0.20403	-0.04247
24	0.18439	-0.33853	0 29706	-0.08479
25	0.28211	-0.37990	0.38978	-0.12608
26	0.38015	-0.41843	0.48217	-0.16649
27	0 47854	-0 45407	0 57422	-0.20616
28	0.57729	-0.48673	0 66591	-0.24518
29	0.67637	-0.51631	0.75727	-0 28364
30	0.77567	-0.54270	0.84840	-0.32166
31	0.87508	-0.56590	0 93944	-0 35946
32	0.97454	-0.58593	1 03042	-0.39729
33	1.07405	-0.60289	1.12134	-0.43540
34	1 17362	-0.61691	1.21221	-0.47396
35	1.27328	-0.62805	1.30299	-0.51313
36	1.37311	-0.63605	1.39360	-0.55332
37	1.45643	-0.64025	1.46898	-0.58773
38	1.52914	-0 64260	1.53485	-0.61797
39	1.53665	-0.64043	1.54072	-0 62337
40	1.54205	-0.63261	1.54205	-0.63261

CHORD 3.62775 CAMBER 31 329 STAGGER -28.965

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 11

MEANLINE DATA						SURFACE COORDINATES				
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.62430	0 91073	-41.252	0.02620	1	-1.62430	0.91073	-1.62430	0.91073
2	0.02500	-1.54284	0.83981	-40.836	0.04522	2	-1.62779	0.90005	-1.61435	0.91558
3	0.05000	-1.46138	0.76997	-40.367	0.06410	3	-1.62387	0.89142	-1.60511	0.91285
4	0.07500	-1.37993	0.70139	-39.793	0.08273	4	-1.55763	0.82270	-1.52806	0.85691
5	0.10000	-1.29847	0.63438	-39.061	0.10103	5	-1.48214	0.74555	-1.44062	0.79439
6	0 12500	-1 21701	0 56930	-38.156	0.11886	6	-1.40640	0.66961	-1.35345	0.73318
7	0 15000	-1.13555	0 50650	-37.078	0.13613	7	-1.33030	0.59516	-1.26664	0.67361
8	0 17500	-1.05410	0.44625	-35.880	0.15275	8	-1.25373	0 52257	-1 18029	0 61603
9	0.20000	-0.97264	0 38867	-34 625	0.16868	9	-1.17659	0 45220	-1 09452	0.56080
10	0.23000	-0.87489	0.32308	-33.086	0.18682	10	-1.09886	0.38437	-1.00933	0 50813
11	0 26000	-0.77714	0.26125	-31.546	0.20382	11	-1 02056	0.31926	-0 92472	0.45807
12	0 29000	-0.67939	0.20303	-29.999	0 21961	12	-0.92588	0 24482	-0.82390	0.40135
13	0 32000	-0.58164	0.14835	-28.438	0.23414	13	-0 83046	0.17440	-0.72382	0.34809
14	0 35000	-0.48389	0.09713	-26.879	0.24738	14	-0 73429	0.10794	-0 62449	0.29813
15	0 38000	-0.38614	0 04921	-25.349	0.25929	15	-0.63739	0.04541	-0.52589	0 25130
16	0.41000	-0.28840	0.00445	-23.874	0.26983	16	-0.53981	-0.01320	-0.42797	0.20745
17	0.44000	-0.19065	-0.03739	-22.475	0.27895	17	-0.44165	-0.06795	-0.33064	0 16638
18	0.47000	-0.09290	-0.07649	-21.139	0.28661	18	-0.34300	-0 11893	-0.23379	0.12782
19	0 50000	0.00485	-0 11303	-19.851	0.29278	19	-0 24396	-0.16627	-0.13733	0 09149
20	0 53000	0.10260	-0.14711	-18 598	0.29741	20	-0.14458	-0.21016	-0.04122	0.05717
21	0.56000	0.20035	-0.17884	-17.371	0.30045	21	-0 04486	-0.25072	0.05456	0.02467
22	0.59000	0 29810	-0.20829	-16.165	0.30187	22	0.05518	-0.28805	0.15003	-0.00617
23	0.62000	0.39585	-0.23553	-14 977	0 30159	23	0.15550	-0.32221	0 24520	-0 03546
24	0 65000	0.49360	-0 26061	-13.810	0.29935	24	0.25608	-0.35326	0.34012	-0.06332
25	0 68000	0.59135	-0.28361	-12.670	0.29486	25	0 35688	-0.38120	0.43482	-0.08986
26	0 71000	0 68910	-0 30458	-11.561	0.28778	26	0.45787	-0 40596	0 52933	-0 11526
27	0.74000	0.78684	-0.32362	-10.476	0.27777	27	0.55901	-0 42744	0 62368	-0.13977
28	0.77000	0.88459	-0.34073	-9 380	0.26453	28	0.66026	-0.44555	0 71793	-0.16362
29	0 80000	0.98234	-0.35589	-8.244	0.24774	29	0.76159	-0.46019	0.81210	-0.18705
30	0 83000	1.08009	-0.36903	-7.059	0.22705	30	0.86304	-0.47123	0.90615	-0.21023
31	0.86000	1.17784	-0.38008	-5.830	0.20215	31	0.96458	-0.47848	1.00010	-0.23330
32	0.89000	1.27559	-0.38899	-4.584	0.17292	32	1.06614	-0.48170	1.09404	-0.25637
33	0.92000	1.37334	-0.39576	-3.342	0.13907	33	1.16757	-0 48063	1.18811	-0.27953
34	0.95000	1.47109	-0.40040	-2.097	0.09947	34	1.26868	-0.47517	1.28250	-0.30280
35	0 97500	1.55254	-0 40264	-1.047	0.06172	35	1.36928	-0.46517	1.37739	-0.32634
36	1.00000	1.63400	-0.40338	0.009	0.02158	36	1.46927	-0 45010	1.47291	-0 35070
						37	1.55198	-0.43350	1.55311	-0 37178
						38	1 62349	-0.41678	1 62357	0.38996
						39	1 63036	-0.41271	1.63066	-0.39435
						40	1.63400	-0.40338	1.63400	-0 40338

CHORD 3.51332 CAMBER 41.161 STAGGER -21.965

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 12

MEANLINE DATA						SURFACE COORDINATES				
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1 64855	0.79816	-37.692	0.03474	1	-1.64855	0.79816	-1.64855	0.79816
2	0.02500	-1.56604	0.73513	-37.048	0.05662	2	-1.65236	0.78358	-1.63577	0.80551
3	0.05000	-1.48352	0 67360	-36.369	0 07830	3	-1.64657	0.77240	-1.62317	0.80282
4	0 07500	-1.40101	0.61363	-35.644	0.09964	4	-1.58309	0.71254	-1 54898	0.75773
5	0. 10000	-1.31850	0.55529	-34.867	0.12052	5	-1.50674	0.642[illegible]8	-1.46031	0.70513
6	0 12500	-1 23598	0 49868	-34.029	0 14084	6	-1 43004	0.57314	-1.37198	0.65412
7	0. 15000	-[illegible].15347	0.44389	-33.123	0.16049	7	-1.35294	0.50585	-1.28405	0 60473
8	0 17500	-1.07095	0.39104	-32 145	0.17938	8	-1.27539	0.44032	-1.19657	0.55704
9	0 20000	-0.98844	0.34022	-31.097	0.19739	9	-1.19732	0.37668	-1.10962	0 51110
10	0 23000	-0.88942	0.28205	-29.752	0.21773	10	-1.11867	0.31510	-1.02323	0 46698
11	0 26000	-0.79041	0.22706	-28.324	0.23655	11	-1.03941	0.25571	-0.93747	0 42473
12	0.29000	-0.69139	0.17533	-26.833	0.25372	12	-0.94345	0.18753	-0.83540	0.37656
13	0 32000	-0.59237	0.12688	-25.305	0.26911	13	-0.84652	0.12294	-0.73429	0.33118
14	0 35000	-0 49336	0.08168	-23.762	0.28262	14	-0.74865	0 06213	-0 63412	0.28853
15	0 38000	-0 39434	0 03966	-22.233	0.29421	15	-0.64988	0.00524	-0 53486	0.24852
16	0.41000	-0.29532	0.00068	-20.747	0.30376	16	-0.55030	-0.04765	-0 43642	0 21101
17	0.44000	-0.19630	-0.03542	-19.329	0 31120	17	-0.45000	-0.09651	-0.33868	0.17582
18	0 47000	-0.09729	-0.06885	-17.991	0.31644	18	-0.34912	-0.14135	-0.24152	0.14271
19	0.50000	0.00173	-0.09980	-16.736	0.31938	19	-0 24781	-0.18225	-0.14480	0.11141
20	0.53000	0.10075	-0.12845	-15 554	0.31996	20	-0 14616	-0 21933	-0.04842	0.08164
21	0 56000	0 19976	-0 15496	-14 423	0 31811	21	-0.04426	-0.25272	0.04771	0.05313
22	0 59000	0.29878	-0.17940	-13.304	0.31389	22	0.05785	-0 28257	0 14364	0 02567
23	0 62000	0.39780	-0.20178	-12.166	0.30736	23	0.16015	-0.30900	0.23938	-0.00092
24	0 65000	0 49681	-0.22208	-10.994	0 29859	24	0.26266	-0.33213	0.33490	-0.02666
25	0 68000	0.59583	-0 24023	-9.781	0.28761	25	0.36541	-0.35201	0.43018	-0.05155
26	0 71000	0.69485	-0 25619	-8 513	0 27448	26	0.46834	-0 36863	0.52529	-0.07552
27	0 74000	0.79386	-0.26984	-7.172	0 25922	27	0.57140	-0 38195	0.62026	-0.09852
28	0.77000	0.89288	-0.28104	-5.714	0.24190	28	0.67453	-0.39191	0.71516	-0.12046
29	0 80000	0 99190	-0.28957	-4.106	0.22257	29	0.77768	-0.39844	0 81004	-0.14124
30	0 83000	1 09091	-0.29518	-2.350	0.20125	30	0.88084	-0.40139	0 90492	-0.16069
31	0.86000	1.18993	-0.29762	-0.462	0 17800	31	0.98393	-0.40057	0 99987	-0.17857
32	0 89000	1.28895	-0.29672	1.520	0.15288	32	1.08679	-0.39572	1.09504	-0.19464
33	0 92000	1.38796	-0.29233	3 563	0.12587	33	1.18921	-0.38662	1.19065	-0.20863
34	0.95000	1.48698	-0.28434	5.677	0 09660	34	1.29098	-0.37313	1 28692	-0 22031
35	0.97500	1.56949	-0.27482	7.496	0.07038	35	1.39188	-0.35515	1.38405	-0.22952
36	1.00000	1.65201	-0.26261	9.335	0.04323	36	1.49176	-0.33240	1.48220	-0.23628
						37	1.57400	-0 30970	1.56490	-0.23993
						38	1 63477	-0.29080	1 62711	-0 24118
						39	1.64736	-0 28172	1 64272	-0.24671
						40	1.65201	-0.26261	1 65201	-0.26261

CHORD 3.46683 CAMBER 47.027 STAGGER -17 817

09

PHASE V ROTOR NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 13

MEANLINE DATA						SURFACE COORDINATES				
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.68831	0 69983	-32.270	0.05298	1	-1 68831	0 69983	-1 68831	0.69983
2	0.02500	-1.60450	0 64714	-32 037	0.07278	2	-1.69201	0 67736	-1.66984	0.71281
3	0.05000	-1.52069	0.59498	-31.751	0.09261	3	-1.68154	0.66113	-1.65050	0.71041
4	0 07500	-1.43688	0.54346	-31.389	0.11236	4	-1.62381	0.61630	-1 58520	0 67799
5	0.10000	-1.35307	0.49276	-30.934	0.13187	5	-1.54506	0.55560	-1.49632	0.63435
6	0 12500	-1.26926	0 44307	-30 371	0.15100	6	-1.46614	0.49550	-1.40762	0 59142
7	0.15000	-1.18545	0.39461	-29.684	0.16965	7	-1.38696	0 43621	-1.31918	0.54932
8	0.17500	-1 10163	0 34761	-28.858	0.18769	8	-1.30743	0.37793	-1 23108	0.50822
9	0 20000	-1.01782	0.30232	-27.881	0.20501	9	-1.22745	0.32092	-1 14344	0 46830
10	0 23000	-0 91725	0.25060	-26.517	0.22474	10	-1.14693	0 26542	-1 05634	0 42980
11	0 26000	-0.81668	0.20207	-24.975	0.24320	11	-1.06576	0.21172	-0.96989	0.39293
12	0.29000	-0.71610	0.15696	-23.323	0.26024	12	-0.96742	0.15005	-0.86708	0.35115
13	0.32000	-0.61553	0.11534	-21.637	0.27573	13	-0 86802	0.09184	-0.76533	0.31230
14	0.35000	-0.51496	0.07711	-19.994	0.28962	14	-0.76762	0.03747	-0 66459	0.27644
15	0.38000	-0.41438	0.04205	-18.469	0.30182	15	-0.66636	-0 01282	-0.56469	0 24349
16	0.41000	-0.31381	0.00980	-17.124	0.31225	16	-0.56447	-0.05897	-0.46544	0.21319
17	0.44000	-0.21323	-0.02005	-15.958	0.32082	17	-0.46219	-0.10109	-0.36657	0.18519
18	0 47000	-0.11266	-0.04780	-14.899	0.32745	18	-0.35978	-0 13941	-0.26784	0.15900
19	0 50000	-0.01209	-0.07360	-13 881	0.33202	19	-0.25734	-0.17428	-0.16913	0 13418
20	0 53000	0.08849	-0 09750	-12.850	0.33445	20	-0 15476	-0.20602	-0.07057	0.11042
21	0 56000	0.18906	-0.11945	-11.756	0.33465	21	-0 05191	-0.23476	0.02774	0.08756
22	0.59000	0.28963	-0.13930	-10.554	0.33260	22	0.05130	-0 26054	0 12568	0.06553
23	0.62000	0.39021	-0.15685	-9.210	0.32832	23	0 15497	-0.28327	0 22315	0.04436
24	0 65000	0.49078	-0.17183	-7.710	0.32188	24	0.25918	-0.30279	0.32009	0.02418
25	0.68000	0 59135	-0.18399	-6.041	0.31336	25	0 36393	-0.31889	0 41648	0.00519
26	0.71000	0.69193	-0 19302	-4 200	0.30282	26	0 46919	-0.33132	0 51237	-0.01235
27	0.74000	0.79250	-0.19866	-2 183	0.29031	27	0.57486	-0 33980	0.60784	-0.02817
28	0.77000	0.89308	-0.20059	0.008	0.27585	28	0.68084	-0.34403	0.70302	-0.04202
29	0 80000	0 99365	-0.19853	2.368	0.25947	29	0.78697	-0.34371	0.79803	-0.05361
30	0.83000	1 09422	-0.19218	4 882	0.24115	30	0.89310	-0.33852	0.89306	-0.06267
31	0 86000	1.19480	-0.18126	7 523	0.22091	31	0.99901	-0.32816	0.98829	-0 06890
32	0.89000	1.29537	-0.16554	10 255	0.19883	32	1.10448	-0 31232	1 08396	-0 07204
33	0.92000	1.39594	-0.14481	13.070	0 17483	33	1.20926	-0.29076	1 18034	-0.07176
34	0.95000	1.49652	-0.11884	15.911	0 14840	34	1.31307	-0.26337	1.27767	-0.06772
35	0.97500	1.58033	-0.09301	18.336	0.12437	35	1.41568	-0.22997	1.37620	-0.05965
36	1 00000	1.66414	-0.06326	20.743	0.09934	36	1.51686	-0 19020	1.47618	-0.04748
						37	1.59989	-0.15204	1.56077	-0.03398
						38	1.63657	-0.13364	1.59933	-0.02673
						39	1.66154	-0.10839	1.63676	-0.03207
						40	1.66414	-0.06326	1 66414	-0.06326

CHORD 3.43821 CAMBER 53.013 STAGGER -12.823

3. PLANE SECTION BLADE COORDINATES

Figure 79 shows the stacked Phase V rotor plane sections. The following tabulation gives the coordinates for these sections. These sections are spaced one half inch apart, beginning at the tip height of 8.5 inches and progressing inward to 2.5 inches. These are the same section locations as given for the baseline rotor in Reference 1. Also included in the tabulation are coordinates for the section meanline, the meanline angle, and the section percent thickness at each point. Plane section chord, camber angle, and stagger angle are also given. These coordinates are intended to represent the blade under hot running conditions and do not include any corrections for blade untwist, meanline deformation, centrifugal growth or thermal growth.

ZPC

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7 03590 R 0. MU 0. ETA 0

SECTION NO 1 SECTION AA RHO 8 5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	1 09100	57.228	0.01888	1.78987
2	-1.04534	57.658	0.02240	1.71816
3	-0 95280	58.503	0.02965	1.56930
4	-0 85882	59.373	0.03710	1.41288
5	0 76312	60.278	0.04471	1.24818
6	-0 65610	61 280	0.05313	1.05690
7	-0 53753	62.297	0 06226	0 83563
8	-0 41726	63 080	0.07097	0.60229
9	0 29565	63 350	0 07888	0.36099
10	0 17353	63 030	0.08554	0 11884
11	0 05146	62 383	0.09069	-0 11792
12	0 06999	61.678	0 09424	-0.34669
13	0 19042	61.198	0.09619	-0.56773
14	0 30919	60 954	0.09655	-0.78282
15	0 42600	60 856	0.09416	-0.99301
16	0 54061	60 930	0 08672	-1 19923
17	0 65248	61 039	0.07196	-1.40182
18	0 76150	60 773	0 04792	-1 59907
19	0 85033	60.143	0 01977	-1.75626

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0	0 00467	-1.09100	1.78987	57.439
2	0 0250	0 00560	-1 04246	1.71361	57 703
3	0 0500	0 00653	-0 99393	1.63610	58 185
4	0 0750	0.00748	-0.94540	1.55716	58.641
5	0 1000	0 00843	-0.89686	1.47683	59.080
6	0 1250	0 00938	-0 84833	1.39510	59 508
7	0 1500	0 01034	-0 79980	1.31197	59.939
8	0 1750	0.01129	-0.75126	1.22737	60.379
9	0 2000	0.01224	-0 70273	1.14122	60.832
10	0 2300	0.01337	-0.64449	1.03568	61 388
11	0 2600	0 01448	-0.58625	0.92771	61.915
12	0 2900	0 01558	-0.52801	0 81744	62.394
13	0 3200	0.01664	-0.46977	0.70508	62.792
14	0 3500	0.01765	-0.41153	0.59101	63.097
15	0.3800	0 01862	-0.35329	0.47571	63.284
16	0 4100	0.01952	-0 29505	0 35979	63.340
17	0.4400	0.02035	-0 23681	0.24392	63.267

ZPC

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0 ETA 0.

SECTION NO 1 SECTION AA RHO 8.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0 4700	0.02110	-0.17857	0.12875	63.063
19	0 5000	0.02176	-0.12033	0.01485	62.769
20	0 5300	0 02234	-0.06209	-0.09757	62.448
21	0 5600	0.02282	-0 00385	-0.20840	62.110
22	0 5900	0.02322	0 05439	-0.31767	61.778
23	0 6200	0.02352	0 11263	-0.42547	61.474
24	0 6500	0.02374	0.17087	-0.53212	61.261
25	0 6800	0 02387	0.22911	-0 63802	61.129
26	0 7100	0.02390	0.28735	-0.74341	61.026
27	0 7400	0 02379	0.34559	-0.84841	60.950
28	0 7700	0.02348	0.40383	-0.95317	60.912
29	0 8000	0 02288	0.46207	-1.05784	60.913
30	0 8300	0.02190	0 52031	-1.16264	60.969
31	0 8600	0 02044	0.57855	-1.26778	61.066
32	0 8900	0.01844	0.63679	-1.37333	61.153
33	0 9200	0 01582	0.69503	-1 47914	61.150
34	0 9500	0 01241	0 75327	-1.58433	60.852
35	0 9750	0 00885	0.80180	-1.67070	60.514
36	1 0000	0.00489	0 85033	-1.75626	60.397

CHORD	STAGGER	CAMBER
4 0427	61.301	-2.958

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0 00467	-1.09100	1.78987	-1 09100	1.78987
2	0 00467	-1.09528	1.78344	-1 08298	1.79098
3	0 00467	-1.09401	1.77673	-1 07746	1.78663
4	0 00560	-1 05202	1.70756	-1 03290	1 71965
5	0 00653	-1.00515	1 62914	-0 98271	1 64306
6	0 00748	-0.95831	1.54930	-0.93249	1.56503
7	0 00843	-0.91148	1.46807	-0.88224	1 48558
8	0 00938	-0 86467	1 38548	-0.83198	1.40473
9	0 01034	-0.81788	1 30151	-0.78171	1.32244
10	0 01129	-0.77110	1.21609	-0.73142	1.23865
11	0 01224	-0.72433	1 12916	-0.68113	1.15328
12	0 01337	-0.66821	1 02274	-0.62077	1.04861
13	0.01448	-0.61208	0.91393	-0.56042	0.94150
14	0 01558	-0.55591	0.80285	-0.50011	0.83203

PHASE IV ROTOR

•ZPC•

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 1 SECTION AA RHO 8.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
15	0 01664	-0.49968	0.68970	-0.43986	0 72045
16	0 01765	-0.44335	0.57486	-0.37971	0.60716
17	0 01862	-0.38691	0.45879	-0.31967	0.49263
18	0 01952	-0.33031	0.34209	-0.25979	0.37750
19	0 02035	-0.27355	0.22542	-0.20007	0.26243
20	0 02110	-0.21659	0.10943	-0.14055	0.14807
21	0 02176	-0.15944	-0.00528	-0.08122	0.03497
22	0 02234	-0.10212	-0.11845	-0 02206	-0.07668
23	0 02282	-0.04463	-0.22998	0.03693	-0.18682
24	0 02322	0 01303	-0.33987	0.09575	-0.29548
25	0 02352	0.07085	-0.44818	0 15441	0.40277
26	0 02374	0.12879	-0.55519	0.21295	-0.50904
27	0 02387	0.18685	-0 66132	0.27137	-0.61471
28	0 02390	0.24508	-0.76681	0.32962	-0.72000
29	0 02379	0.30354	-0.87177	0.38764	-0 82506
30	0 02348	0.36235	-0.97624	0 44531	-0.93009
31	0 02288	0.42165	-1.08032	0.50249	-1.03536
32	0 02190	0.48160	-1.18412	0.55901	-1.14115
33	0 02044	0.54238	-1.28777	0.61472	-1.24778
34	0 01844	0.60414	-1.39131	0.66944	-1.35534
35	0 01582	0.66702	-1.49457	0.72304	-1 46371
36	0 01241	0.73136	-1.59655	0.77518	-1.57211
37	0 00885	0.78623	-1.67950	0.81737	-1.66189
38	0 00489	0.83615	-1.75299	0 85477	-1.74240
39	0 00489	0.84195	-1 75722	0 85542	-1.74962
40	0 00489	0.85033	-1 75626	0.85033	-1.75626

LE RAD 0 00965 CENTER AT ALPHA -1.08578 UPSILON 1.78176

TE RAD 0 01075 CENTER AT ALPHA 0 84502 UPSILON -1.74691

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7 03590 R 0. MU 0. ETA 0

SECTION NO 1 SECTION AA RHO 8.5000

CHORD	STAGGER	CAMBER
4 0427	61.302	-2.958

AREA 0 283342 SURFACE ARC LENGTH 8 11230

	ALPHA	UPSILON
SECTION C.G.	-0.01490	-0.16795
STREAMSURFACE SECTION C G.	-0.01976	-0.15372
BLADE AXIS	-0.01976	-0.15372
STACKING AXIS (RADIAL)	-0 00220	0.

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0 MU 0. ETA 0.

SECTION NO 2 SECTION BB RHO 8.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA•	THICKNESS	UPSILON
1	1 19582	55.315	0.01973	1.75031
2	1 14421	55.762	0.02381	1.67508
3	1 03969	56.611	0.03223	1.51907
4	0 93344	57.423	0.04092	1.35528
5	0 82548	58.205	0.04975	1 18377
6	0 70486	59.030	0 05947	0 98602
7	0 57131	59.646	0.06978	0.76043
8	0 43599	59.551	0.07927	0.52927
9	-0 29945	58 797	0.08742	0 29990
10	-0 16217	57.653	0.09386	0.07809
11	-0 02487	56.483	0 09847	-0.13396
12	0 11201	55.515	0.10133	-0.33691
13	0 24812	54.793	0.10245	-0.53245
14	0 38314	54.273	0.10163	-0.72205
15	0.51667	53.886	0.09743	-0.90644
16	0.64833	53.599	0.08807	-1.08613
17	0 77783	53.427	0.07207	-1.26121
18	0 90490	53 377	0.04804	-1 43235
19	1 00875	53.356	0.02084	-1.57224

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA•
1	0	0 00495	-1.19582	1.75031	55 315
2	0 0250	0.00604	-1.14070	1.66993	55.790
3	0 0500	0 00715	-1.08559	1.58819	56.228
4	0 0750	0 00827	-1.03047	1.50507	56.682
5	0 1000	0 00940	-0.97536	1.42051	57.117
6	0.1250	0.01053	-0 92025	1.33459	57.519
7	0 1500	0.01167	-0.86513	1.24736	57.912
8	0 1750	0 01279	-0.81002	1.15878	58.307
9	0.2000	0 01391	-0.75490	1.06884	58.691
10	0 2300	0.01523	-0.68877	0.95915	59.129
11	0 2600	0.01653	-0.62263	0.84773	59.460
12	0 2900	0 01777	-0 55649	0.73514	59.653
13	0 3200	0.01896	-0 49035	0.62205	59.678
14	0 3500	0 02007	-0.42422	0 50926	59.519
15	0 3800	0.02110	-0.35808	0.39754	59.205
16	0 4100	0 02202	-0 29194	0.28752	58 746
17	0 4400	0.02285	-0 22581	0.17968	58.208

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PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0 ETA 0

SECTION NO 2 SECTION BB RHO 8.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0 4700	0.02356	-0 15967	0.07414	57.640
19	0 5000	0 02417	-0 09353	-0.02909	57.070
20	0 5300	0.02468	-0.02739	-0.13015	56 526
21	0 5600	0.02508	0 03874	-0.22920	56.024
22	0 5900	0 02538	0 10488	-0.32651	55.581
23	0 6200	0 02558	0.17102	-0.42233	55.197
24	0 6500	0 02569	0.23715	-0.51688	54.868
25	0 6800	0 02568	0.30329	-0.61038	54.588
26	0 7100	0.02554	0.36943	-0.70297	54 339
27	0 7400	0.02520	0 43557	-0.79477	54 123
28	0.7700	0.02461	0.50170	-0.88590	53.947
29	0 8000	0.02370	0.56784	-0.97651	53.799
30	0 8300	0.02242	0 63398	-1.06663	53.655
31	0 8600	0.02070	0 70011	-1.15629	53.525
32	0 8900	0.01851	0.76625	-1.24560	53.438
33	0 9200	0.01580	0 83239	-1 33470	53.399
34	0 9500	0.01242	0 89853	-1.42376	53 414
35	0 9750	0 00899	0 95364	-1.49804	53.424
36	1 0000	0.C0523	1.00875	-1.57224	53.356

CHORD	STAGGER	CAMBER
3 9874	56 435	1.959

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
1	0 00495	-1.19582	1.75031	-1.19582	1.75031
2	0 00495	-1.20007	1.74343	-1.18745	1 75176
3	0 00495	-1.19850	1.73645	-1.18152	1.74738
4	0 00604	-1.15067	1.66315	-1 13074	1.67670
5	0 00715	-1.09744	1.58027	-1.07374	1.59612
6	0 00827	-1 04426	1 49601	-1 01669	1 51412
7	0 00940	-0 99110	1 41033	-0.95962	1.43069
8	0 01053	-0.93796	1 32331	-0.90253	1.34587
9	0 01167	-0.88484	1.23500	-0.84543	1.25971
10	0 01279	-0.83172	1.14538	-0 78832	1.17218
11	0 01391	-0.77860	1.05443	-0.73121	1 08325
12	0 01523	-0.71484	0.94356	-0.66270	0.97473
13	0 01653	-0 65101	0 83099	-0.59425	0.86447
14	0 01777	-0.58707	0.71724	-0.52591	0.75305

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PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7 03590 R 0 MU 0. ETA 0

SECTION NO 2 SECTION BB RHO 8 0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
15	0 01896	-0.52299	0.60296	-0 45772	0 64113
16	0 02007	-0.45871	0.48896	-0.38973	0.52956
17	0 02110	-0.39421	0 37601	-0.32195	0.41908
18	0 02202	-0 32948	0.26474	-0 25441	0 31031
19	0 02285	-0 26452	0 15568	-0.18709	0 20368
20	0 02356	-0.19935	0.04899	-0 11998	0.09928
21	0 02417	-0 13398	-0 05529	-0.05308	-0.00289
22	0 02468	-0 06844	-0 15728	0.01365	-0 10301
23	0.02508	-0.00273	-0.25715	0.08021	-0.20126
24	0 02538	0.06313	-0.35512	0.14663	-0.29791
25	0 02558	0.12913	-0 45144	0 21290	-0.39321
26	0.02569	0.19527	-0.54635	0.27903	-0.48741
27	0 02568	0.26156	-0.64005	0 34503	-0.58071
28	0 02554	0.32806	-0.73265	0.41080	-0.67328
29	0 02520	0.39485	-0.82421	0.47628	-0 76532
30	0 02461	0.46204	-0 91478	0.54137	-0 85703
31	0 02370	0.52971	-1.00442	0.60597	-0 94860
32	0 02242	0.59797	-1.09312	0.66998	-1.04014
33	0.02070	0.66693	-1 18083	0.73330	-1.13176
34	0 01851	0.73661	-1 26758	0.79589	-1.22362
35	0 01580	0.80710	-1.35348	0.85768	-1.31592
36	0 01242	0.87865	-1 43852	0.91841	-1.40900
37	0 00899	0.93925	-1.50872	0.96803	-1.48736
38	0 00523	0 99351	-1.57064	1.01161	-1.55718
39	0 00523	1.00015	-1 57433	1.01323	-1.56461
40	0 00523	1.00875	-1 57224	1.00875	-1.57224

LE RAD 0 01010 CENTER AT ALPHA -1.19007 UPSILON 1.74200
TE RAD 0 01132 CENTER AT ALPHA 1.00200 UPSILON -1.56316

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0 ETA 0.

SECTION NO 2 SECTION BB RHO 8.0000

CHORD	STAGGER	CAMBER
3 9874	56 435	1.959

AREA 0.295909 SURFACE ARC LENGTH 8.00639

	ALPHA	UPSILON
SECTION C.G.	-0.01777	-0 09947
STREAMSURFACE SECTION C G.	-0 02237	-0.08965
BLADE AXIS	-0.02237	-0 08965
STACKING AXIS (RADIAL)	-0.00220	0

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7 03590 R 0. MU 0 ETA 0.

SECTION NO 3 SECTION CC RHO 7.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.29977	53.704	0.02050	1.71005
2	-1 24306	54.072	0.02552	1.63218
3	-1.12816	54 745	0.03589	1.47150
4	1 01149	55.375	0.04659	1 30444
5	-0 89319	55 999	0 05752	1.13101
6	0 76116	56.629	0.06955	0 93277
7	0 61525	56.803	0 08225	0.70963
8	-0.46739	55 878	0.09381	0.48686
9	0 31820	54 216	0.10356	0.27310
10	-0.16821	52.502	0.11119	0.07147
11	-0 01775	51.044	0 11666	-0.11939
12	0.13277	49.950	0.11997	-0.30176
13	0 28288	49.203	0 12106	-0.47792
14	0 43250	48.656	0.11959	-0.64944
15	0 58129	48.173	0.11389	-0.81693
16	0.72879	47.796	0.10212	-0.98062
17	0 87499	47 535	0 08260	-1.14084
18	1 01950	47 340	0.05380	-1.29808
19	1 13848	47 197	0.02162	-1.42698

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0	0 00516	-1.29977	1.71005	53.704
2	0 0250	0.00652	-1.23882	1.62631	54.144
3	0 0500	0 00790	-1 17786	1.54146	54.473
4	0 0750	0.00929	-1 11690	1.45555	54.811
5	0 1000	0 01070	-1.05595	1.36856	55.147
6	0.1250	0.01211	-0.99499	1.28049	55.476
7	0 1500	0 01353	-0.93404	1.19134	55.796
8	0.1750	0.01494	-0.87308	1.10113	56.109
9	0 2000	0.01634	0.81212	1.00986	56 412
10	0.2300	0.01800	-0.73897	0.89898	56.749
11	0.2600	0.01962	-0.66583	0.78706	56.873
12	0 2900	0.02117	-0.59268	0.67518	56.725
13	0 3200	0.02263	-0.51953	0.56448	56 322
14	0 3500	0.02399	-0 44638	0.45598	55.663
15	0 3800	0 02522	-0.37324	0.35043	54.877
16	0 4100	0.02633	-0.30009	0 24807	54 011
17	0 4400	0.02730	-0.22694	0 14893	53.154

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0 ETA 0.

SECTION NO 3 SECTION CC RHO 7.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0 4700	0.02814	-0.15379	0.05274	52.351
19	0 5000	0.02885	-0 08065	-0.04081	51 614
20	0 5300	0.02944	-0.00750	-0.13204	50.955
21	0 5600	0.02989	0.06565	-0.22130	50.388
22	0 5900	0 03022	0 13880	-0.30893	49.925
23	0 6200	0.03041	0.21194	-0 39526	49.536
24	0 6500	0 03047	0.28509	-0.48049	49.193
25	0 6800	0 03039	0 35824	-0 56475	48.891
26	0 7100	0.03011	0 43139	-0.64817	48.623
27	0 7400	0 02957	0.50453	-0.73086	48.387
28	0 7700	0.02872	0.57768	-0.81290	48.180
29	0 8000	0.02749	0.65083	-0.89438	47.989
30	0 8300	0.02583	0.72398	-0.97531	47.794
31	0 8600	0 02367	0.79712	-1.05571	47.620
32	0 8900	0.02098	0.87027	-1.13569	47.498
33	0 9200	0.01772	0 94342	-1.21539	47.416
34	0 9500	0 01372	1.01657	-1.29490	47.358
35	0.9750	0.00975	1.07752	-1.36103	47.300
36	1 0000	0.00544	1.13848	-1.42698	47.197

CHORD	STAGGER	CAMBER
3 9732	52 144	6.507

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0 00516	-1 29977	1.71005	-1.29977	1.71005
2	0 00516	-1.30401	1.70276	-1 29144	1.71186
3	0 00516	-1.30220	1 69557	-1.28523	1.70799
4	0 00652	-1.24931	1.61873	-1.22832	1.63390
5	0 00790	1.19063	1.53234	-1.16509	1.55057
6	0 00929	-1.13199	1.44491	-1.10182	1.46619
7	0 01070	-1.07339	1 35642	-1.03851	1.38070
8	0 01211	-1.01481	1 26685	-0.97517	1 29412
9	0 01353	-0.95626	1.17623	-0.91181	1.20645
10	0 01494	-0.89772	1.08457	-0.84844	1.11768
11	0 01634	-0 83917	0.99190	-0 78507	1.02782
12	0 01800	-0.76888	0.87937	-0.70906	0 91859
13	0 01962	-0.69847	0.76575	-0.63318	0.80836
14	0 02117	-0.62784	0.65211	-0.55752	0.69826

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PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0 MU 0. ETA 0.

SECTION NO 3 SECTION CC RHO 7.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.02263	-0.55695	0.53955	-0.48212	0.58942
16	0.02399	-0.48573	0.42911	-0.40704	0.48286
17	0.02522	-0.41422	0.32161	-0.33226	0.37926
18	0.02633	-0.34241	0.21733	-0.25777	0.27880
19	0.02730	-0.27034	0.11640	-0.18354	0.18145
20	0.02814	-0.19806	0.01859	-0.10953	0.08689
21	0.02885	-0.12558	-0.07640	-0.03572	-0.00522
22	0.02944	-0.05292	-0.16888	0.03792	-0.09521
23	0.02989	0.01990	-0.25916	0.11139	-0.18344
24	0.03022	0.09286	-0.34757	0.18473	-0.27029
25	0.03041	0.16598	-0.43447	0.25790	-0.35606
26	0.03047	0.23927	-0.52004	0.33091	-0.44093
27	0.03039	0.31276	-0.60444	0.40372	-0.52506
28	0.03011	0.38651	-0.68771	0.47627	-0.60864
29	0.02957	0.46062	-0.76987	0.54845	-0.69185
30	0.02872	0.53517	-0.85094	0.62020	-0.77486
31	0.02749	0.61025	0.93093	0.69141	-0.85783
32	0.02583	0.68597	-1.00978	0.76198	-0.94085
33	0.02367	0.76239	-1.08740	0.83186	-1.02402
34	0.02098	0.83954	-1.16385	0.90100	-1.10753
35	0.01772	0.91750	-1.23921	0.96934	-1.19157
36	0.01372	0.99652	-1.31336	1.03662	-1.27643
37	0.00975	1.06329	-1.37416	1.09175	-1.34790
38	0.00544	1.12247	-1.42714	1.13987	-1.41103
39	0.00544	1.12978	-1.43013	1.14229	-1.41857
40	0.00544	1.13848	-1.42698	1.13848	-1.42698

LE RAD 0.01052 CENTER AT ALPHA -1.29356 UPSILON 1.70156

TE RAD 0.01191 CENTER AT ALPHA 1.13039 UPSILON -1.41824

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0 MU 0 ETA 0

SECTION NO 3 SECTION CC RHO 7.5000

CHORD	STAGGER	CAMBER
3.9732	52.144	6.507

AREA 0.341989 SURFACE ARC LENGTH 7.98916

	ALPHA	UPSILON
SECTION C.G.	-0.01298	-0.06823
STREAMSURFACE SECTION C.G.	-0.02284	-0.05934
BLADE AXIS	-0.02284	-0.05934
STACKING AXIS (RADIAL)	-0.00220	0

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7 03590 R 0. MU 0 ETA 0

SECTION NO 4 SECTION DD RHO 7 0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.38977	52 277	0 02080	1.64184
2	-1 32847	52 588	0 02735	1 56212
3	1 20452	53 201	0 04104	1 39838
4	1 07890	53.820	0.05536	1.22869
5	0 95175	54 323	0.07008	1.05322
6	0 81016	54 471	0 08631	0 85511
7	0 65366	53.798	0.10330	0.63796
8	-0 49548	52 014	0.11855	0.42803
9	-0 33582	49 813	0 13135	0 23157
10	0 17518	48 054	0 14142	0.04739
11	0 01389	46.675	0.14862	-0 12769
12	0 14763	45 500	0.15280	-0.29553
13	0 30939	44 461	0.15387	-0 45710
14	0 47104	43.552	0.15096	-0.61317
15	0 63226	42.784	0 14213	-0 76439
16	0 79307	42.135	0.12555	-0.91140
17	0 95320	41 587	0.09952	-1.05481
18	1 11256	41.122	0.06241	-1 19491
19	1 24453	40.782	0.02179	-1 30952

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0	0 00526	-1 38977	1.64184	52 277
2	0 0250	0 00704	-1.32391	1.55616	52 609
3	0 0500	0 00886	-1 25805	1.46953	52 912
4	0 0750	0 01073	-1.19220	1.38190	53 235
5	0 1000	0 01262	-1.12634	1.29322	53 562
6	0 1250	0 01453	-1 06048	1.20349	53.883
7	0 1500	0 01646	-0 99462	1.11276	54.162
8	0 1750	0 01839	-0 92877	1.02118	54.383
9	0 2000	0 02030	-0.86291	0.92903	54 487
10	0 2300	0 02256	-0 78388	0.81833	54 433
11	0 2600	0.02475	-0 70485	0.70833	54 130
12	0 2900	0 02683	-0 62582	0 60009	53 554
13	0 3200	0 02878	-0 54679	0 49462	52 714
14	0 3500	0 03058	-0.46776	0.39280	51 613
15	0 3800	0 03221	-0.38874	0.29500	50.513
16	0 4100	0 03366	-0 30971	0.20081	49.506
17	0 4400	0.03495	-0.23068	0.10974	48.610

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PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0

SECTION NO 4 SECTION DD RHO 7.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA•
18	0 4700	0.03606	-0 15165	0.02131	47.836
19	0 5000	0.03699	-0 07262	-0.06490	47.149
20	0 5300	0.03774	0 00641	-0.14917	46.538
21	0 5600	0 03831	0 08544	-0.23172	45.958
22	0 5900	0 03869	0 16447	-0.31263	45 392
23	0 6200	0.03889	0 24350	-0 39200	44 860
24	0 6500	0 03888	0 32252	-0.46997	44 374
25	0 6800	0 03863	0 40155	-0 54668	43.926
26	0 7100	0 03808	0 48058	-0 62224	43.513
27	0 7400	0 03715	0 55961	-0 69676	43 122
28	0 7700	0 03580	0 63864	-0.77028	42 745
29	0 8000	0 03398	0 71767	-0 84288	42.404
30	0 8300	0 03161	0 79670	-0 91467	42.113
31	0 8600	0.02866	0 87573	-0.98578	41.841
32	0 8900	0.02508	0 95476	-1.05619	41 558
33	0 9200	0.02084	1 03378	1.12593	41.306
34	0 9500	0 01576	1 11281	-1.19514	41.125
35	0 9750	0 01081	1 17867	1.25250	40.979
36	1 0000	0 00551	1.24453	-1 30952	40.782

CHORD	STAGGER	CAMBER
3 9560	48.249	11.495

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0 00526	-1 38977	1.64184	-1.38977	1.64184
2	0 00526	-1.39390	1.63431	-1.38135	1.64392
3	0 00526	-1 39191	1 62705	-1.37492	1.64017
4	0 00704	-1.33497	1 54771	-1.31285	1.56461
5	0 00886	-1.27204	1 45895	-1.24407	1.48010
6	0 01073	-1.20919	1.36920	-1.17520	1.39460
7	0 01262	-1.14642	1.27840	-1.10626	1 30805
8	0 01453	-1.03370	1 18655	-1.03726	1.22043
9	0 01646	-1.02101	1 09370	-0.96823	1.13182
10	0 01839	-0.95833	1 00000	-0.89920	1 04236
11	0 02030	-0.89560	0.90571	-0.83022	0 95236
12	0 02256	-0 82018	0 79237	-0.74758	0 84429
13	0 02475	-0.74452	0 67965	0.66518	0 73702
14	0 02683	-0 66851	0 56857	-0.58313	0 63162

•ZPC•

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7 03590 R 0 MU 0. ETA 0

SECTION NO 4 SECTION DD RHO 7.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0 02878	-0 59209	0.46013	-0 50150	0.52910
16	0 03058	-0 51517	0 35524	-0 42035	0.43036
17	0 03221	-0 43790	0 25449	-0 33957	0.33551
18	0 03366	-0 36035	0.15757	-0 25907	0 24405
19	0 03495	-0.28254	0 06403	-0 17881	0 15545
20	0 03606	-0 20452	-0.02657	-0 09878	0.06919
21	0 03699	-0 12626	-0.11466	0 01897	-0.01514
22	0 03774	0 04778	-0 20052	0.06060	-0.09782
23	0 03831	0 03097	-0 28439	0 13991	-0.17904
24	0 03869	0.10998	-0 36637	0 21895	-0.25888
25	0 03889	0 18924	-0 44652	0 29775	-0 33747
26	0 03888	0 26874	-0.52494	0.37631	-0.41499
27	0 03863	0 34855	-0 60171	0.45456	-0.49164
28	0 03808	0 42873	-0.67686	0 53244	-0 56762
29	0 03715	0.50938	-0.75039	0.60984	-0.64312
30	0 03580	0 59057	-0.82229	0 68671	-0.71828
31	0 03398	0.67235	-0.89250	0.76299	-0 79325
32	0 03161	0 75476	-0.96106	0 83863	-0 86828
33	0 02866	0 83792	-1 02800	0.91354	-0.94355
34	0 02508	0 92185	-1.09331	0 98767	-1.01907
35	0 02084	1 00658	-1 15689	1 06099	-1 09496
36	0 01576	1.09231	1 21862	1.13331	-1.17166
37	0 01081	1 16464	-1 26865	1.19270	-1.23635
38	0 00551	1 22835	-1 31170	1 24433	-1 29321
39	0 00551	1.23608	-1 31375	1.24749	1 30061
40	0 00551	1.24453	-1 30952	1.24453	-1 30952

LE RAD 0 01074 CENTER AT ALPHA -1 38320 UPSILON 1 63334

TE RAD 0 01231 CENTER AT ALPHA 1.23521 UPSILON -1.30147

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0 MU 0. ETA 0

SECTION NO 4 SECTION DD RHO 7 0000

CHORD	STAGGER	CAMBER
3 9560	48 249	11 495

AREA 0 421805 SURFACE ARC LENGTH 7.97273

	ALPHA	UPSILON
SECTION C G	-0.01015	-0 06977
STREAMSURFACE SECTION C.G.	-0.03057	-0.05563
BLADE AXIS	-0.03057	-0.05563
STACKING AXIS (RADIAL)	-0.00220	0.

PHASE IV ROTOR *ZPC*

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 5 SECTION EE RHO 6.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1 46674	51.224	0.02071	1.55182
2	1 40169	51.558	0.02964	1.47024
3	1 27038	52 150	0.04834	1 30280
4	1 13742	52 516	0.06786	1.13037
5	1 00295	52.504	0.08773	0.95476
6	0.85328	51.922	0.10931	0 76130
7	-0 68807	50.494	0 13150	0 55527
8	-0 52115	48 191	0 15126	0.36050
9	-0 35290	45.688	0 16787	0 18062
10	-0 18362	43 720	0 18104	0.01342
11	0 01355	42 070	0.19065	-0.14443
12	0 15706	40.560	0.19641	-0.29431
13	0 32817	39.242	0 19796	-0 43726
14	0 49962	38.091	0.19386	-0.57440
15	0 67124	37.045	0 18192	-0.70651
16	0 84292	36 042	0 15992	-0 83402
17	1 01468	35 033	0.12568	-0 95695
18	1 18656	33 976	0.07674	-1 07538
19	1 32985	33.042	0.02275	-1.17073

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0	0.00531	1.46674	1.55182	51.224
2	0 0250	0 00777	-1.39683	1.46410	51.633
3	0 0500	0.01030	-1.32691	1.37529	51.938
4	0 0750	0 01288	-1.25700	1 28555	52.208
5	0 1000	0.01551	-1 18708	1 19503	52.417
6	0 1250	0 01815	-1 11717	1.10395	52.552
7	0 1500	0 02081	1 04726	1.01259	52.571
8	0 1750	0 02344	-0 97734	0.92139	52.458
9	0 2000	0 02604	-0.90743	0.83078	52.210
10	0 2300	0.02907	-0.82353	0.72346	51.725
11	0 2600	0 03198	-0 73963	0.61839	51.022
12	0 2900	0.03473	-0 65573	0 51634	50.088
13	0 3200	0 03730	-0 57183	0.41796	48.962
14	0 3500	0 03966	-0.48794	0.32372	47 662
15	0 3800	0 04181	0.40404	0.23366	46.403
16	0 4100	0.04373	-0.32014	0 14732	45.259
17	0 4400	0.04543	-0.23624	0.06417	44.248

•ZPC•

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7 03590 R 0. MU 0. ETA 0

SECTION NO 5 SECTION EE RHO 6.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA•
18	0 4700	0.04691	-0.15235	-0.01630	43.380
19	0 5000	0 04816	-0 06845	-0.09446	42.569
20	0 5300	0.04917	0.01545	-0.17048	41.792
21	0 5600	0 04994	0.09935	-0.24449	41.048
22	0 5900	0 05046	0 18324	-0.31663	40.340
23	0 6200	0 05072	0.26714	-0.38704	39.680
24	0 6500	0 05067	0 35104	0.45589	39.072
25	0 6800	0.05027	0.43494	-0.52331	38.508
26	0 7100	0 04944	0 51884	-0.58943	37.982
27	0 7400	0.04811	0 60273	-0 65435	37 482
28	0 7700	0.04622	0.68663	-0.71813	37.003
29	0 8000	0.04371	0 77053	-0.78081	36.525
30	0 8300	0 04049	0 85443	-0 84240	36.036
31	0 8600	0.03651	0 93832	-0.90288	35.535
32	0 8900	0.03174	1 02222	-0.96223	35.019
33	0 9200	0 02610	1.10612	-1.02048	34.528
34	0 9500	0 01936	1.19002	-1.07772	34.094
35	0 9750	0 01282	1.25993	-1.12469	33.658
36	1 0000	0.00583	1.32985	-1.17073	33.042

CHORD	STAGGER	CAMBER
3 9030	44 231	18.182

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0 00531	-1 46674	1.55182	-1.46674	1.55182
2	0 00531	-1.47076	1.54423	-1.45836	1 55407
3	0 00531	-1.46870	1.53700	-1.45185	1.55049
4	0 00777	-1.40871	1.45469	-1.38495	1.47350
5	0 01030	-1 34273	1 36290	-1 31110	1.38767
6	0 01288	-1.27687	1.27015	-1.23713	1.30096
7	0 01551	-1.21107	1.17658	-1.16310	1.21349
8	0 01815	-1.14530	1 08240	-1 08904	1 12549
9	0 02081	-1.07950	0.98791	-1.01501	1 03727
10	0 02344	-1.01361	0.89352	-0.94107	0.94926
11	0 02604	-0.94758	0 79965	-0.86727	0.86192
12	0 02907	-0.86806	0.68832	-0.77899	0.75860
13	0 03198	-0.78814	0.57913	-0.69112	0.65764
14	0 03473	-0.70772	0.47285	-0.60374	0.55983

•ZPC•

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7 03590 R 0. MU 0 ETA 0

SECTION NO 5 SECTION EE RHO 6.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0 03730	-0 62674	0.37017	-0.51693	0.46575
16	0 03966	-0 54515	0.27158	-0.43072	0 37585
17	0 04181	-0 46313	0.17740	-0.34495	0.28993
18	0 04373	-0.38076	0.08724	-0 25952	0.20740
19	0 04543	-0.29811	0 00066	-0.17438	0 12768
20	0.04691	-0.21522	-0.08283	-0.08947	0.05024
21	0 04816	-0 13202	-0.16367	-0.00487	-0.02525
22	0 04917	-0.04850	-0.24202	0.07939	-0.09894
23	0 04994	0.03535	-0.31798	0.16334	-0.17099
24	0 05046	0.11950	-0.39168	0.24699	-0.24157
25	0 05072	0.20395	-0.46322	0.33034	-0.31087
26	0 05067	0.28871	-0.53266	0.41337	-0.37912
27	0 05027	0 37386	-0.60008	0.49602	-0.44655
28	0 04944	0.45946	-0.66548	0.57821	-0.51339
29	0 04811	0.54560	-0.72885	0.65986	-0.57985
30	0 04622	0 63234	-0.79016	0.74092	-0.64609
31	0 04371	0.71977	-0.84935	0.82129	-0 71227
32	0 04049	0.80794	-0.90629	0 90091	-0.77850
33	0 03651	0.89691	-0.96086	0.97973	-0.84490
34	0 03174	0 98668	-1 01296	1.05776	-0.91151
35	0 02610	1.07725	-1.06244	1 13499	-0.97851
36	0 01936	1.16884	-1 10901	1.21119	-1.04643
37	0 01282	1.24606	-1.14552	1.27380	-1.10386
38	0 00583	1.31320	-1.17568	1.32769	-1 15352
39	0 00583	1.32153	-1.17649	1.33181	-1.16100
40	0 00583	1.32985	-1.17073	1.32985	-1.17073

LE RAD 0 01080 CENTER AT ALPHA -1.45999 UPSILON 1.54339

TE RAD 0 01342 CENTER AT ALPHA 1 31861 UPSILON -1.16340

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0 ETA 0

SECTION NO 5 SECTION EE RHO 6.5000

CHORD	STAGGER	CAMBER
3 9030	44 231	18.182

AREA 0 526004 SURFACE ARC LENGTH 7.89775

	ALPHA	UPSILON
SECTION C G.	-0.00786	-0.08023
STREAMSURFACE SECTION C G	-0 04051	-0.06741
BLADE AXIS	-0.04051	-0.06741
STACKING AXIS (RADIAL)	-0.00220	0

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0 ETA 0.

SECTION NO 6 SECTION FF RHO 6.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA•	THICKNESS	UPSILON
1	1 53244	50.428	0.01988	1 44710
2	1 46403	50.665	0 03161	1.36406
3	1 32610	50.942	0 05597	1.19482
4	1 18650	50 835	0.08096	1.02304
5	1 04552	50 228	0 10596	0.85148
6	0 88870	48.786	0 13247	0 66725
7	-0 71590	46.201	0.15907	0.47809
8	0 54154	43 076	0 18233	0 30579
9	-0 36592	40 239	0 20175	0 14987
10	0 18930	38.050	0 21713	0.00634
11	0 01175	36.205	0 22823	-0.12789
12	0 16653	34 470	0.23468	-0.25411
13	0 34554	32 718	0.23581	-0.37277
14	0 52524	30 963	0.22976	-0.48391
15	0 70542	29.262	0 21424	-0 58788
16	0 88636	27 509	0.18695	-0.68507
17	1 06803	25.575	0.14545	-0.77522
18	1 25087	23.426	0.08691	0.85780
19	1 40417	21.413	0.02288	-0.92057

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA•
1	0	0.00527	-1.53244	1.44710	50.428
2	0 0250	0 00861	-1.45903	1.35796	50.649
3	0 0500	0.01203	-1.38561	1.26805	50.862
4	0 0750	0.01550	-1.31219	1 17769	50.929
5	0 1000	0.01898	-1.23878	1.08729	50.895
6	0 1250	0 02246	-1.16536	0.99713	50.778
7	0 1500	0 02593	-1.09195	0.90757	50.509
8	0 1750	0.02933	-1 01853	0 81914	50.058
9	0 2000	0.03265	-0 94512	0.73240	49.417
10	0 2300	0 03647	-0.85702	0.63133	48.382
11	0 2600	0 04010	-0.76892	0.53429	47.102
12	0 2900	0 04349	-0.68082	0.44190	45.585
13	0 3200	0 04663	-0.59273	0 35442	44.000
14	0 3500	0.04951	-0 50463	0.27168	42.412
15	0 3800	0.05211	-0 41653	0.19324	40 971
16	0 4100	0.05444	0 32843	0 11844	39.727
17	0 4400	0.05650	-0.24033	0.04668	38 618

PHASE IV ROTOR *ZPC*

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 6 SECTION FF RHO 6.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0 4700	0.05827	0.15223	-0.02244	37.629
19	0 5000	0.05976	-0.06414	0.08922	36.702
20	0 5300	0.06095	0 02396	-0 15384	35.820
21	0 5600	0.06183	0 11206	-0.21642	34.954
22	0 5900	0.06239	0 20016	0 27702	34.093
23	0 6200	0 06260	0 28826	0.33568	33.216
24	0 6500	0 06239	0 37636	-0.39239	32 321
25	0 6800	0 06170	0.46445	-0.44718	31.441
26	0 7100	0.06046	0 55255	-0.50014	30.586
27	0 7400	0.05860	0 64065	-0.55134	29 739
28	0 7700	0.05605	0 72875	-0.60081	28 894
29	0 8000	0.05275	0 81685	-0.64858	28.036
30	0 8300	0 04861	0.90495	-0.69464	27.159
31	0 8600	0 04358	0.99304	-0 73895	26.232
32	0 8900	0.03761	1.08114	-0.78143	25.240
33	0 9200	0.03063	1.16924	-0 82199	24.193
34	0 9500	0.02238	1.25734	-0.86057	23 097
35	0 9750	0 01448	1 33075	-0.89120	22.213
36	1 0000	0.00607	1 40417	-0.92057	21 413

CHORD	STAGGER	CAMBER
3 7722	38.878	29.015

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0 00527	-1 53244	1.44710	-1.53244	1.44710
2	0 00527	-1.53622	1.43971	-1.52441	1.44942
3	0 00527	-1.53418	1 43277	-1.51804	1.44613
4	0 00861	-1.47158	1.34766	-1.44647	1 36826
5	0 01203	-1.40321	1.25373	-1 36801	1.28236
6	0 01550	-1 33489	1.15927	-1.28950	1 19611
7	0 01898	-1 26656	1.06471	-1 21100	1.10987
8	0 02246	-1 19819	0 97034	1 13254	1 02392
9	0 02593	-1.12969	0.87647	-1.05421	0 93867
10	0 02933	-1.06095	0 78362	-0 97612	0.85466
11	0 03265	-0.99188	0.69235	-0.89836	0 77246
12	0 03647	-0.90845	0 58564	-0.80559	0.67701
13	0 04010	-0.82432	0.48281	-0.71352	0.58577
14	0 04349	-0.73942	0.38449	-0.62223	0.49931

ZPC

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 6 SECTION FF RHO 6.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
15	0.04663	-0.65382	0.29115	-0.53163	0.41769
16	0.04951	-0.56760	0.20274	-0.44.65	0.34062
17	0.05211	-0.48097	0.11903	-0.35208	0.26746
18	0.05444	-0.39406	0.03946	-0.26280	0.19741
19	0.05650	-0.30684	-0.03658	-0.17383	0.12994
20	0.05827	-0.21934	-0.10948	-0.08513	0.06460
21	0.05976	-0.13150	-0.17959	0.00323	0.00115
22	0.06095	-0.04331	-0.24705	0.09124	-0.06063
23	0.06183	0.04525	-0.31199	0.17887	-0.12084
24	0.06239	0.13420	-0.37446	0.26612	-0.17957
25	0.06260	0.22358	-0.43445	0.35293	-0.23691
26	0.06239	0.31344	-0.49183	0.43927	-0.29295
27	0.06170	0.40375	-0.54647	0.52516	-0.34789
28	0.06046	0.49453	-0.59831	0.61058	-0.40197
29	0.05860	0.58583	-0.64731	0.69547	-0.45537
30	0.05605	0.67767	-0.69337	0.77983	-0.50826
31	0.05275	0.77008	-0.73640	0.86361	-0.56076
32	0.04861	0.86309	-0.77622	0.94680	-0.61306
33	0.04358	0.95672	-0.81267	1.02937	-0.66523
34	0.03761	1.05089	-0.84559	1.11139	-0.71726
35	0.03063	1.14556	-0.87469	1.19292	-0.76929
36	0.02238	1.24078	-0.89940	1.27390	-0.82174
37	0.01448	1.32043	-0.91648	1.34108	-0.86592
38	0.00607	1.38869	-0.92924	1.39877	-0.90370
39	0.00607	1.39704	-0.92815	1.40424	-0.91050
40	0.00607	1.40417	-0.92057	1.40417	-0.92057

LE RAD 0.01049 CENTER AT ALPHA -1.52575 UPSILON 1.43901
TE RAD 0.01401 CENTER AT ALPHA 1.39113 UPSILON -0.91545

•ZPC•

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 6 SECTION FF RHO 6.0000

CHORD	STAGGER	CAMBER
3.7722	38.878	29.015

AREA 0 603658 SURFACE ARC LENGTH 7.69444

	ALPHA	UPSILON
SECTION C G.	-0.01735	-0.04598
STREAMSURFACE SECTION C G.	-0.05233	-0.04683
BLADE AXIS	-0 05233	-0 04683
STACKING AXIS (RADIAL)	-0.00220	0.

•ZPC•

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0 MU 0. ETA 0.

SECTION NO 7 SECTION GG RHO 5.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA•	THICKNESS	UPSILON
1	-1.58134	49.188	0 01886	1.32697
2	-1.50929	49.159	0 03330	1.24339
3	-1.36379	48.916	0.05285	1 07546
4	-1 21657	48.343	0 09273	0.90806
5	1 06765	47.180	0.12220	0.74372
6	0 90221	44 774	0.15311	0.57195
7	0 72034	41.200	0.18362	0 40223
8	0.53719	38.111	0 20994	0.25078
9	0.35315	35.695	0.23168	0.11261
10	0 16844	33 371	0.24842	-0 01484
11	0 01700	31.069	0.25963	-0.13207
12	0 20288	28.776	0 26479	-0.23961
13	0 38944	26.371	0.26304	-0.33779
14	0 57647	23.841	0.25285	-0.42640
15	0 76411	21 098	0.23279	-0.50519
16	0 95229	17.862	0.20120	-0.57319
17	1.14123	13.950	0.15579	-0.62810
18	1 33066	9.261	0.09266	-0.66708
19	1 48886	4.486	0.02178	-0.68490

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA•
1	0	0.00514	-1 58134	1.32697	49.188
2	0 0250	0 00933	-1.50458	1.23793	49.228
3	0 0500	0.01357	-1.42783	1.14914	49.080
4	0 0750	0.01783	-1.35107	1.06087	48.893
5	0 1000	0 02208	-1.27432	0.97330	48.622
6	0 1250	0.02630	-1.19756	0.88673	48.235
7	0 1500	0.03047	-1.12081	0.80157	47.672
8	0 1750	0.03454	-1 04405	0.71838	46.895
9	0 2000	0.03848	-0.96730	0.63777	45.859
10	0.2300	0.04302	0.87519	0.54540	44.238
11	0 2600	0.04728	-0.78308	0.45843	42.463
12	0 2900	0.05126	-0.69098	0.37676	40.654
13	0 3200	0.05492	-0.59887	0.29996	39.033
14	0 3500	0.05826	-0 50677	0.22710	37.696
15	0 3800	0.06128	-0 41466	0.15747	36.489
16	0 4100	0.06397	-0.32255	0.09074	35.360
17	0.4400	0.06631	-0.23045	0.02673	34.228

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PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 7 SECTION GG RHO 5.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA•
18	0.4700	0.06828	-0.13834	-0.03458	33.068
19	0 5000	0.06987	-0.04624	-0.09325	31.927
20	0 5300	0.07106	0.04587	-0.14941	30.821
21	0 5600	0.07185	0.13797	-0.20316	29.711
22	0 5900	0.07219	0.23008	-0.25453	28.582
23	0 6200	0.07208	0.32219	-0.30353	27.430
24	0 6500	0.07143	0.41429	-0.35014	26.252
25	0 6800	0.07022	0.50640	-0.39437	25.039
26	0 7100	0.06839	0.59850	-0.43619	23.789
27	0 7400	0.06590	0.69061	-0.47556	22.489
28	0 7700	0.06272	0.78272	-0.51243	21.132
29	0 8000	0.05877	0.87482	-0.54667	19.611
30	0 8300	0.05399	0.96693	-0.57795	17.871
31	0 8600	0.04831	1.05903	-0.60599	15.960
32	0.8900	0.04168	1.15114	-0.63058	13.906
33	0.9200	0.03397	1.24325	-0.65141	11.498
34	0.9500	0.02473	1.33535	-0.66780	8.587
35	0 9750	0.01567	1.41211	-0.67774	6.264
36	1.0000	0.00593	1.48886	-0.68490	4.486

CHORD	STAGGER	CAMBER
3 6707	33.236	44.703

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0 00514	-1.58134	1.32697	-1.58134	1.32697
2	0 00514	-1.58482	1.31982	-1.57377	1.32936
3	0.00514	-1.58280	1.31329	-1.56759	1.32640
4	0 00933	-1.51755	1.22675	-1.49161	1.24911
5	0 01357	-1.44664	1.13283	-1.40901	1.16545
6	0 01783	-1.37573	1.03936	-1.32642	1.08239
7	0 02208	-1.30473	0.94651	-1.24391	1.00009
8	0 02630	-1.23357	0.85458	-1.16155	0.91888
9	0 03047	-1.16215	0.76392	-1.07947	0.83922
10	0 03454	-1.09033	0.67507	-0.99777	0.76170
11	0 03848	-1.01798	0.58858	-0.91661	0.68696
12	0 04302	-0.93027	0.48884	-0.82011	0.60196
13	0 04728	-0.84167	0.39441	-0.72450	0.52245
14	0 05126	-0.75227	0.30539	-0.62969	0.44813

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PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 7 SECTION GG RHO 5.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
15	0.05492	-0.66235	0.22166	-0.53540	0.37825
16	0.05826	-0.57215	0.14249	-0.44138	0.31171
17	0.06128	-0.48155	0.06704	-0.34777	0.24790
18	0.06397	-0.39050	-0.00500	-0.25461	0.18649
19	0.06631	-0.29890	-0.07389	-0.16200	0.12735
20	0.06828	-0.20672	-0.13960	-0.06997	0.07044
21	0.06987	-0.11405	-0.20208	0.02158	0.01559
22	0.07106	-0.02095	-0.26141	0.11269	-0.03741
23	0.07185	0.07262	-0.31769	0.20333	-0.08864
24	0.07219	0.16669	-0.37089	0.29347	-0.13818
25	0.07208	0.26125	-0.42094	0.38312	-0.18611
26	0.07143	0.35630	-0.46772	0.47228	-0.23256
27	0.07022	0.45185	-0.51113	0.56094	-0.27761
28	0.06839	0.54788	-0.55104	0.64913	-0.32133
29	0.06590	0.64434	-0.58731	0.73688	-0.36380
30	0.06272	0.74122	-0.61979	0.82421	-0.40507
31	0.05877	0.83862	-0.64828	0.91103	-0.44506
32	0.05399	0.93652	-0.67227	0.99734	-0.48364
33	0.04831	1.03465	-0.69123	1.08341	-0.52074
34	0.04168	1.13275	-0.70484	1.16953	-0.55632
35	0.03397	1.23082	-0.71251	1.25568	-0.59031
36	0.02473	1.32858	-0.71267	1.34213	-0.62292
37	0.01567	1.40897	-0.70633	1.41525	0.64915
38	0.00593	1.47719	-0.69742	1.47938	-0.67071
39	0.00593	1.48429	-0.69409	1.48631	-0.67575
40	0.00593	1.48886	-0.68490	1.48886	-0.68490

LE RAD 0.01006 CENTER AT ALPHA -1.57477 UPSILON 1.31935

TE RAD 0.01376 CENTER AT ALPHA 1.47514 UPSILON -0.68380

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PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7 03590 R 0. MU 0. ETA 0.

SECTION NO 7 SECTION GG RHO 5.5000

CHORD	STAGGER	CAMBER
3 6707	33.236	44.703

AREA 0.664510 SURFACE ARC LENGTH 7.57340

	ALPHA	UPSILON
SECTION C.G	-0.01101	-0.03029
STREAMSURFACE SECTION C.G.	-0.04546	-0.04074
BLADE AXIS	-0.04546	-0.04074
STACKING AXIS (RADIAL)	-0.00220	0.

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PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0 ETA 0.

SECTION NO 8 SECTION HH RHO 5.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1 58986	47.438	0.01945	1.18771
2	-1.51279	47 239	0.03662	1.10419
3	-1.35779	46.652	0.07140	0.93813
4	-1.20201	45.486	0.10583	0.77571
5	-1.04570	43.465	0.13874	0.62152
6	-0.87345	40.504	0.17193	0.46603
7	0 68560	37.192	0.20362	0.31468
8	0.49773	34.334	0.23023	0.17950
9	-0.31013	31.609	0.25181	0.05778
10	-0.12260	28.714	0.26848	-0.05097
11	0.06465	25.763	0.28037	-0.14689
12	0.25155	22.704	0.28765	-0.23036
13	0.43807	19 276	0.28989	-0.30114
14	0 62375	15.347	0.28490	-0.35799
15	0.80855	10.918	0.26870	-0 39963
16	0.99159	5.938	0.23585	-0.42507
17	1.17168	-0.196	0.18079	-0.43295
18	1.34718	-8.539	0.10219	-0.42002
19	1.48821	-17.733	0.02843	-0.38809

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00562	-1.58986	1.18771	47.438
2	0 0250	0.01058	-1.51291	1.10432	47.189
3	0 0500	0 01557	-1.43596	1.02152	46.990
4	0.0750	0.02057	-1.35901	0.93942	46.696
5	0 1000	0.02553	-1.28206	0.85836	46.248
6	0 1250	0.03041	-1.20510	0.77886	45.580
7	0 1500	0.03518	1.12815	0.70149	44.694
8	0.1750	0.03980	-1.05120	0.62675	43.595
9	0 2000	0.04423	-0.97425	0.55506	42.330
10	0.2300	0.04927	-0.88191	0.47329	40.694
11	0.2600	0.05399	-0.78956	0.39621	39.010
12	0.2900	0.05836	-0.69722	0.32354	37.409
13	0.3200	0.06237	-0.60488	0.25482	35.911
14	0 3500	0.06603	-0.51254	0.18965	34.533
15	0.3800	0.06933	-0.42020	0.12764	33.219
16	0.4100	0.07229	-0 32785	0.06873	31.840
17	0 4400	0.07491	-0.23551	0.01296	30.407

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PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 8 SECTION HH RHO 5.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.07718	-0.14317	-0.03967	28.948
19	0 5000	0.07912	-0.05083	-0.08921	27.471
20	0 5300	0.08073	0.04151	-0.13571	25.983
21	0 5600	0.08201	0.13386	-0.17923	24.474
22	0.5900	0.08298	0.22620	-0.21976	22.914
23	0.6200	0.08361	0.31854	-0.25727	21.282
24	0 6500	0.08385	0.41088	-0.29165	19.526
25	0 6800	0.08361	0.50322	-0.32271	17.636
26	0 7100	0.08278	0.59557	-0.35029	15.592
27	0 7400	0.08121	0.68791	-0.37419	13.402
28	0 7700	0.07870	0.78025	-0.39426	11.101
29	0 8000	0.07502	0.87259	-0.41038	8.681
30	0 8300	0.06996	0.96494	-0.42239	6.110
31	0 8600	0 06326	1.05728	-0.43007	3.342
32	0.8900	0.05465	1.14962	-0.43301	0.246
33	0 9200	0.04393	1.24196	-0.43063	-3.322
34	0.9500	0.03141	1.33430	-0.42183	-7.683
35	0 9750	0.02003	1.41126	-0.40351	-12.143
36	1 0000	0.00822	1.48821	-0.38809	-17.733

CHORD	STAGGER	CAMBER
3 4580	27.110	65.171

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0 00562	-1.58986	1.18771	-1.58986	1.18771
2	0.00562	-1.59325	1.18017	-1.58214	1.19045
3	0 00562	-1.59099	1.17349	-1.57561	1.18765
4	0.01058	-1.52633	1.09188	-1.49949	1.11676
5	0 01557	-1 45565	1.00315	-1.41627	1.03988
6	0.02057	-1.38489	0.91503	-1.33313	0.96382
7	0 02553	-1.31394	0.82784	-1.25017	0.88888
8	0.03041	-1.24266	0.74206	-1.16755	0.81566
9	0.03518	-1.17093	0.65825	-1.08537	0.74473
10	0 03980	-1.09865	0.57691	-1.00375	0.67658
11	0.04423	-1.02574	0.49852	-0.92275	0 61159
12	0.04927	-0.93745	0.40869	-0.82636	0.53788
13	0.05399	-0.84832	0.32368	-0.73081	0.46875
14	0 05836	-0.75852	0.24339	-0.63592	0.40369

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PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 8 SECTION HH RHO 5.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
15	0.06237	-0.66813	0.16748	-0.54163	0.34217
16	0.06603	-0.57725	0.09561	-0.44782	0.28369
17	0.06933	-0.48587	0.02736	-0.35452	0.22793
18	0.07229	-0.39379	-0.03745	-0.26191	0.17491
19	0.07491	-0.30106	-0.09873	-0.16996	0.12466
20	0.07718	-0.20776	-0.15644	-0.07858	0.07710
21	0.07912	-0.11393	-0.21057	0.01227	0.03216
22	0.08073	-0.01963	-0.26117	0.10266	-0.01024
23	0.08201	0.07511	-0.30828	0.19260	-0.05017
24	0.08298	0.17034	-0.35191	0.28206	-0.08762
25	0.08361	0.26607	-0.39197	0.37101	-0.12258
26	0.08385	0.36243	-0.42828	0.45934	-0.15501
27	0.08361	0.45943	-0.46049	0.54702	-0.18494
28	0.08278	0.55710	-0.48816	0.63404	-0.21243
29	0.08121	0.65537	-0.51078	0.72045	-0.23760
30	0.07870	0.75405	-0.52778	0.80645	-0.26074
31	0.07502	0.85301	-0.53861	0.89217	-0.28215
32	0.06996	0.95206	-0.54267	0.97781	-0.30212
33	0.06326	1.05090	-0.53926	1.06365	-0.32088
34	0.05465	1.14921	-0.52750	1.15003	-0.33852
35	0.04393	1.24636	-0.50645	1.23756	0.35480
36	0.03141	1.34156	-0.47565	1.32704	-0.36802
37	0.02003	1.41854	-0.44237	1.40397	-0.37466
38	0.00822	1.48006	-0.40917	1.47007	-0.37519
39	0.00822	1.48673	-0.40230	1.48125	-0.37850
40	0.00822	1.48821	-0.38809	1.48821	-0.38809

LE RAD 0.01048 CENTER AT ALPHA -1.58277 UPSILON 1.17999

TE RAD 0.01828 CENTER AT ALPHA 1.47074 UPSILON -0.39345

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 8 SECTION HH RHO 5.0000

CHORD	STAGGER	CAMBER
3 4580	27 110	65 171

AREA 0.705706 SURFACE ARC LENGTH 7.29278

	ALPHA	UPSILON
SECTION C.G.	0.01493	-0.02029
STREAMSURFACE SECTION C.G.	0.00673	-0.05751
BLADE AXIS	0.00673	-0.05751
STACKING AXIS (RADIAL)	-0 00220	0.

PHASE IV ROTOR *ZPC*

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 9 SECTION JJ RHO 4.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.55904	45.684	0.02149	1.04128
2	-1.47986	45.418	0.03986	0.96061
3	-1 32167	44.598	0.07583	0.80252
4	-1.16390	42.998	0.11012	0.65153
5	-1 00677	40.578	0.14217	0.51173
6	-0.83464	37.515	0.17451	0.37287
7	-0.64789	34.087	0.20638	0.23879
8	-0.46225	30.638	0.23478	0.12161
9	-0 27798	27.167	0.25967	0.02019
10	-0.09503	23.729	0.28055	-0.06653
11	0 08612	20.361	0.29€20	-0.13987
12	0.26532	16.944	0.30404	-0.20065
13	0.44204	13.201	0.30066	-0.24884
14	0.61569	9.236	0.28247	-0.28395
15	0.78529	4.870	0.24912	-0.30584
16	0.94965	-2.031	0.20598	-0.31122
17	1.10733	-13.663	0.15905	-0.29020
18	1.25708	-28.864	0.11106	-0.23075
19	1.37519	-41.889	0.07156	-0.14314

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00679	-1.55904	1.04128	45.684
2	0.0250	0.01217	-1.48568	0.96650	45.408
3	0.0500	0.01750	-1.41232	0.89252	45.066
4	0 0750	0.02274	-1.33897	0.81955	44.609
5	0 1000	0.02788	-1.26561	0.74790	44.009
6	0 1250	0.03290	-1.19226	0.67799	43.198
7	0 1500	0.03778	-1.11890	0.61029	42.183
8	0 1750	0.04250	-1.04555	0.54510	41.043
9	0 2000	0.04706	-0 97219	0.48262	39.789
10	0.2300	0.05230	-0.88416	0.41128	38.240
11	0 2600	0 05731	-0.79614	0.34385	36.663
12	0 2900	0.06209	-0.70811	0.28020	35.065
13	0 3200	0.06663	-0 62008	0.22024	33.450
14	0.3500	0.07094	-0.53206	0.16386	31.827
15	0.3800	0.07502	-0.44403	0.11093	30.203
16	0.4100	0.07887	-0.35600	0.06136	28.557
17	0.4400	0.08246	-0.26798	0.01510	26.881

ZPC

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0

SECTION NO 9 SECTION JJ RHO 4.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.08577	-0.17995	-0.02793	25.222
19	0.5000	0.08876	-0.09192	-0.06789	23.614
20	0.5300	0.09139	-0.00389	-0.10493	22.026
21	0.5600	0.09356	0.08413	-0.13913	20.430
22	0.5900	0.09516	0.17216	-0.17052	18.807
23	0.6200	0.09606	0.26019	-0.19908	17.134
24	0.6500	0.09610	0.34821	-0.22476	15.379
25	0.6800	0.09512	0.43624	-0.24745	13.501
26	0.7100	0.09294	0.52427	-0.26700	11.537
27	0.7400	0.08943	0.61229	-0.28339	9.538
28	0.7700	0.08456	0.70032	-0.29653	7.395
29	0.8000	0.07850	0.78835	-0.30610	4.975
30	0.8300	0.07148	0.87637	-0.31140	1.679
31	0.8600	0.06377	0.96440	-0.31056	-3.013
32	0.8900	0.05558	1.05243	-0.30132	-9.205
33	0.9200	0.04699	1.14045	-0.28114	-16.864
34	0.9500	0.03806	1.22848	-0.24620	-26.637
35	0.9750	0.03040	1.30184	-0.20198	-35.173
36	1.0000	0.02262	1.37519	-0.14314	-41.889

CHORD	STAGGER	CAMBER
3.1643	21.982	87.574

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0.00679	-1.55904	1.04128	-1.55904	1.04128
2	0.00679	-1.56255	1.03281	-1.55059	1.04459
3	0.00679	-1.55980	1.02550	-1.54325	1.04174
4	0.01217	-1.49939	0.95298	-1.47197	0.98002
5	0.01750	-1.43192	0.87296	-1.39273	0.91207
6	0.02274	-1.36424	0.79393	-1.31370	0.84516
7	0.02788	-1.29626	0.71617	-1.23497	0.77963
8	0.03290	-1.22789	0.64005	-1.15663	0.71593
9	0.03778	-1.15903	0.56600	-1.07877	0.65457
10	0.04250	-1.08970	0.49439	-1.00140	0.59582
11	0.04706	-1.01984	0.42541	-0.92455	0.53983
12	0.05230	-0.93538	0.34629	-0.83295	0.47628
13	0.05731	-0.85028	0.27111	-0.74199	0.41658
14	0.06209	-0.76454	0.19980	-0.65168	0.36060

ZPC

PHASE IV ROTOR

STAGE 4 ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 9 SECTION JJ RHO 4.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
15	0 06663	-0.67819	0.13228	-0.56198	0.30820
16	0 07094	-0.59125	0 06849	-0 47287	0.25922
17	0.07502	-0.50374	0.00835	-0.38432	0.21351
18	0 07887	-0.41565	-0.04824	-0.29635	0.17096
19	0.08246	-0.32696	-0.10127	-0.20899	0.13146
20	0 08577	-0.23777	-0.15069	-0.12213	0.09483
21	0 08876	-0.14817	-0.19656	-0.03567	0.06079
22	0.09139	-0.05812	-0.23897	0.05033	0.02911
23	0 09356	0.03246	-0.27785	0.13581	-0.00041
24	0.09516	0.12362	-0.31304	0.22070	-0.02799
25	0.09606	0.21541	-0.34431	0.30496	-0.05385
26	0 09610	0.30789	-0.37137	0.38654	-0.07816
27	0 09512	0.40110	-0.39379	0.47138	-0.10112
28	0 09294	0.49486	-0.41107	0.55367	-0.12294
29	0 08943	0.58885	-0.42292	0.63574	-0.14385
30	0 08456	0.68310	-0.42920	0.71754	-0.16385
31	0 07850	0.77758	-0.42983	0.79912	-0 18238
32	0.07148	0.87306	-0.42445	0.87969	-0.19836
33	0 06377	0.96970	-0.41131	0.95910	-0.20981
34	0 05558	1.06649	-0.38812	1.03836	-0.21453
35	0.04699	1.16202	-0.35229	1.11889	-0.21000
36	0 03806	1.25548	-0.30003	1.20148	-0.19236
37	0 03040	1.32954	-0.24130	1.27413	-0.16267
38	0.02262	1.37396	-0.19759	1.32475	-0.13400
39	0.02262	1.38429	-0.17746	1.35231	-0.12977
40	0.02262	1.37519	-0.14314	1.37519	-0.14314

LE RAD 0 01165 CENTER AT ALPHA -1.55089 UPSILON 1.03294
TE RAD 0 04070 CENTER AT ALPHA 1.34433 UPSILON -0.16968

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 9 SECTION JJ RHO 4.5000

CHORD	STAGGER	CAMBER
3.1643	21.982	87.574

AREA 0.664729 SURFACE ARC LENGTH 6.87514

	ALPHA	UPSILON
SECTION C.G.	-0.00726	-0.00142
STREAMSURFACE SECTION C.G.	0.04647	-0.05830
BLADE AXIS	0.04647	-0.05830
STACKING AXIS (RADIAL)	-0.00220	0.

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 10 SECTION KK RHO 4.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.52196	43.955	0.02405	0 90476
2	-1.44355	43.542	0.04238	0.83013
3	-1.28758	42.372	0.07901	0.68560
4	1.13314	40.460	0.11568	0.54944
5	-0.98019	37.803	0.15225	0 42453
6	0.81355	34.439	0.19136	0.30221
7	0.63364	30.682	0 23115	0.18664
8	-0.45568	27 040	0.26607	0.08797
9	0.27972	23.523	0.29403	0.00436
10	0.10573	20.127	0.31290	-0.06551
11	0.06578	16.981	0.32125	-0.12297
12	0 23439	13.962	0.31919	-0.16941
13	0.39937	10.459	0.30906	-0.20488
14	0 55989	5.764	0.29445	-0.22782
15	0.71473	-1.872	0.27766	-0.23359
16	0 86293	-14.539	0.25491	-0.21233
17	1.00348	-31.007	0.21833	-0.15116
18	1.13591	-46.939	0.16791	-0.03770
19	1.23993	-57.531	0 11973	0.10666

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0	0.00836	-1.52196	0.90476	43.955
2	0 0250	0.01398	-1.45291	0.83897	43.351
3	0.0500	0.01960	-1.38387	0.77420	42.966
4	0.0750	0.02525	-1.31482	0.71043	42.461
5	0.1000	0.03092	-1.24577	0.64792	41.821
6	0.1250	0.03662	-1.17672	0.58697	41.025
7	0 1500	0.04236	-1.10768	0.52788	40.063
8	0 1750	0.04810	-1.03863	0.47091	38.956
9	0 2000	0.05384	-0.96958	0.41630	37.701
10	0 2300	0.06065	-0.88673	0.35409	36.079
11	0 2600	0.06734	-0.80387	0.29556	34.378
12	0 2900	0 07383	-0.72101	0.24069	32.646
13	0.3200	0.08007	-0.63816	0.18934	30.920
14	0 3500	0.08598	-0.55530	0.14138	29.210
15	0 3800	0.09149	-0.47244	0.09664	27.522
16	0.4100	0.09652	-0.38959	0.05499	25.850
17	0.4400	0.10096	-0.30673	0.01633	24.171

PHASE IV ROTOR

•ZPC•

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 10 SECTION KK RHO 4.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA•
18	0 4700	0.10475	-0.22387	-0.01941	22.493
19	0 5000	0.10779	-0.14102	-0.05232	20.841
20	0 5300	0.11002	-0.05816	-0.08253	19.226
21	0 5600	0.11139	0.02470	-0.11017	17.676
22	0 5900	0.11188	0.10755	-0.13539	16.182
23	0 6200	0 11153	0.19041	-0.15824	14.654
24	0 6500	0 11041	0.27327	-0.17870	13.061
25	0.6800	0.10864	0.35612	-0.19661	11.308
26	0 7100	0.10636	0.43898	-0.21175	9 338
27	0 7400	0.10372	0.52184	-0.22364	6.904
28	0.7700	0.10085	0.60469	-0.23155	3.842
29	0 8000	0.09770	0.68755	-0.23418	-0.415
30	0 8300	0.09406	0.77040	-0.22964	-6.215
31	0 8600	0.08933	0.85326	-0.21489	-14.302
32	0 8900	0.08279	0.93612	-0.18632	-23.700
33	0.9200	0.07416	1.01897	-0.14141	-33.097
34	0.9500	0.06341	1.10183	-0.07459	-44.714
35	0 9750	0.05296	1.17088	0.00681	-53.560
36	1 0000	0.04165	1.23993	0.10666	-56.167

CHORD	STAGGER	CAMBER
2 8749	16.118	100.122

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0 00836	-1.52196	0.90476	-1.52196	0.90476
2	0 00836	-1.52559	0.89512	-1.51266	0.90878
3	0 00836	-1.52234	0.88706	-1.50431	0.90588
4	0 01398	-1.46671	0.82435	-1.43912	0.85358
5	0 01960	-1.40307	0.75358	-1.36466	0.79482
6	0 02525	-1.33932	0.68366	-1.29032	0.73720
7	0 03092	-1.27541	0.61480	-1.21614	0.68105
8	0 03662	-1.21128	0.54725	-1.14217	0.62669
9	0 04236	-1.14686	0.48128	-1.06849	0.57447
10	0.04810	-1.08210	0.41714	-0.99516	0.52468
11	0 05384	-1.01691	0.35507	-0.92226	0.47753
12	0.06065	-0.93807	0.28363	-0.83539	0.42455
13	0 06734	-0.85852	0.21567	-0.74922	0.37544
14	0.07383	-0.77826	0.15132	-0.66376	0.33005

ZPC

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0 MU 0. ETA 0.

SECTION NO 10 SECTION KK RHO 4.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
15	0 08007	-0.69730	0.09060	-0.57901	0.28808
16	0 08598	-0.61562	0.03350	-0.49498	0.24926
17	0 09149	-0.53321	-0.01999	-0.41167	0.21328
18	0 09652	-0.45008	-0.06986	-0.32910	0.17985
19	0.10096	-0.36616	-0.11608	-0.24731	0.14874
20	0 10475	-0.28148	-0.15852	-0.16627	0.11971
21	0 10779	-0.19614	-0.19712	-0.08589	0.09248
22	0 11002	-0.11024	-0.23185	-0.00608	0.06679
23	0 11139	-0.02392	-0.26272	0.07331	0.04239
24	0 11188	0.06273	-0.28984	0.15237	0.01907
25	0.11153	0.14985	-0.31335	0.23097	-0.00314
26	0.11041	0.23740	-0.33331	0.30913	-0.02409
27	0.10864	0.32550	-0.34975	0.38674	-0.04348
28	0.10636	0.41417	-0.36261	0.46379	-0.06089
29	0 10372	0.50391	-0.37164	0.53976	-0.07563
30	0 10085	0.59498	-0.37618	0.61441	-0.08691
31	0 09770	0.68857	-0.37462	0.68653	0.09374
32	0 09406	0.78504	-0.36405	0.75577	-0.09524
33	0 08933	0.88498	-0.33931	0.82154	-0.09046
34	0 08279	0.98395	-0.29529	0.88828	-0.07735
35	0 07416	1.07719	-0.23072	0 96076	-0.05210
36	0 06341	1.16596	-0.13936	1.03770	-0.00982
37	0 05296	1.23212	-0.03840	1.10964	0.05203
38	0 04165	1 26268	0.01868	1.15062	0.09570
39	0 04165	1.26971	0.05756	1.19344	0.11790
40	0 04165	1.23993	0.10666	1.23993	0 10666

LE RAD 0 01308 CENTER AT ALPHA -1.51253 UPSILON 0.89570

TE RAD 0 06858 CENTER AT ALPHA 1.20158 UPSILON 0.04981

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 10 SECTION KK RHO 4.0000

CHORD	STAGGER	CAMBER
2.8749	16.118	100 122

AREA 0 699880 SURFACE ARC LENGTH 6.56806

	ALPHA	UPSILON
SECTION C.G.	0.01136	0.00566
STREAMSURFACE SECTION C.G.	-0.02420	-0.02728
BLADE AXIS	-0 02420	-0.02728
STACKING AXIS (RADIAL)	-0.00220	0.

•ZPC•

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 11 SECTION LL RHO 3.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA•	THICKNESS	UPSILON
1	-1.49758	41.792	0.02987	0.78332
2	-1.42164	41.071	0.05117	0.71576
3	-1.27107	39.284	0.09458	0.58721
4	1.12208	36.896	0.13753	0.46933
5	0.97445	34.059	0.17798	0.36388
6	0.81378	30.908	0.21785	0.26199
7	0.64055	27.587	0.25468	0.16562
8	0.46943	24.227	0.28418	0.08316
9	0.30060	20.890	0.30635	0.01382
10	0.13437	17.869	0.32163	-0.04375
11	0.02873	15.214	0.33107	-0.09149
12	0.18818	12.407	0.33619	-0.13044
13	0.34327	8.511	0.33873	-0.15912
14	0.49288	1.914	0.33996	-0.17283
15	0.63619	-9.901	0.33781	-0.16200
16	0.77151	-26.756	0.32290	-0.11284
17	0.89757	-44.077	0.28446	-0.01151
18	1.01427	-57.851	0.22569	0.15552
19	1.10463	-66.003	0.16790	0.35647

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA•
1	0	0.01133	-1.49758	0.78332	41.792
2	0.0250	0.01824	-1.43252	0.72537	41.492
3	0.0500	0.02527	-1.36747	0.66855	40.760
4	0.0750	0.03241	-1.30241	0.61326	39.942
5	0.1000	0.03958	-1.23736	0.55964	39.029
6	0.1250	0.04672	-1.17230	0.50787	37.962
7	0.1500	0.05374	-1.10725	0.45821	36.724
8	0.1750	0.06060	-1.04219	0.41082	35.412
9	0.2000	0.06723	-0.97714	0.36569	34.071
10	0.2300	0.07482	-0.89907	0.31448	32.464
11	0.2600	0.08197	-0.82101	0.26630	30.906
12	0.2900	0.08863	-0.74294	0.22096	29.383
13	0.3200	0.09478	-0.66487	0.17835	27.868
14	0.3500	0.10038	-0.58681	0.13838	26.353
15	0.3800	0.10543	-0.50874	0.10100	24.806
16	0.4100	0.10993	-0.43067	0.06621	23.232
17	0.4400	0.11386	-0.35261	0.03395	21.672

PHASE IV ROTOR *ZPC*

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 11 SECTION LL RHO 3.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0 4700	0.11724	-0.27454	0.00413	20.143
19	0.5000	0.12008	0.19647	-0.02338	18.700
20	0 5300	0.12240	-0.11841	-0.04878	17.363
21	0.5600	0.12426	-0 04034	-0.07225	16.102
22	0 5900	0.12569	0.03772	-0.09389	14.903
23	0 6200	0.12677	0.11579	-0.11376	13.626
24	0 6500	0 12754	0.19386	-0.13167	12.178
25	0.6800	0.12809	0.27192	-0.14730	10.392
26	0 7100	0.12848	0.34999	-0.16009	8 131
27	0 7400	0.12878	0.42806	-0.16918	4.945
28	0.7700	0.12893	0 50612	-0.17304	0.486
29	0 8000	0.12873	0.58419	-0.16965	-5 798
30	0.8300	0.12757	0.66225	-0.15619	-14.081
31	0 8600	0.12451	0.74032	-0.12883	-24.783
32	0 8900	0.11820	0.81839	-0.08240	-36.370
33	0.9200	0.10805	0.89645	-0.01269	-46.573
34	0.9500	0.09409	0.97452	0.08696	-57.130
35	0.9750	0.07972	1.03958	0.20696	-64.936
36	1.0000	0.06367	1.10463	0.35647	-67.195

CHORD	STAGGER	CAMBER
2 6370	9.315	108.987

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0.01133	-1.49758	0.78332	-1.49758	0.78332
2	0 01133	-1.50177	0.77109	-1.48614	0.78880
3	0.01133	-1.49751	0.76113	-1.47553	0.78568
4	0.01824	-1.44846	0.70736	-1.41659	0.74338
5	0.02527	-1.38922	0.64331	-1.34571	0.69378
6	0 03241	-1.32985	0.58050	-1.27498	0.64602
7	0.03958	-1.27022	0.51910	-1.20449	0.60018
8	0 04672	-1.21019	0.45931	-1.13441	0.55644
9	0 05374	-1.14962	0.40141	-1.06488	0.51500
10	0 06060	-1.08849	0.34570	-0.99590	0.47593
11	0 06723	-1.02679	0.29227	-0.92748	0.43912
12	0 07482	-0.95203	0.23124	-0.84612	0.39772
13	0 08197	-0.87652	0.17356	-0.76549	0.35903
14	0 08863	-0.80028	0.11913	-0.68560	0.32279

ZPC

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 11 SECTION LL RHO 3.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
15	0.09478	-0.72328	0.06788	-0.60646	0.28882
16	0.10038	-0.64556	0.01978	-0.52805	0.25697
17	0.10543	-0.56706	-0.02519	-0.45042	0.22719
18	0.10993	-0.48785	-0.06698	-0.37350	0.19940
19	0.11386	-0.40805	-0.10557	-0.29717	0.17346
20	0.11724	-0.32777	-0.14100	-0.22131	0.14926
21	0.12008	-0.24723	-0.17335	-0.14572	0.12658
22	0.12240	-0.16657	-0.20282	-0.07025	0.10525
23	0.12426	-0.08578	-0.22965	0.00510	0.08516
24	0.12569	-0.00490	-0.25405	0.08035	0.06626
25	0.12677	0.07641	-0.27620	0.15517	0.04867
26	0.12754	0.15838	-0.29604	0.22933	0.03271
27	0.12809	0.24146	-0.31341	0.30239	0.01881
28	0.12848	0.32603	-0.32779	0.37395	0.00761
29	0.12878	0.41342	-0.33835	0.44269	-0.00002
30	0.12893	0.50468	-0.34303	0.50757	-0.00305
31	0.12873	0.60133	-0.33851	0.56704	-0.00079
32	0.12757	0.70318	-0.31934	0.62133	0.00695
33	0.12451	0.80914	-0.27788	0.67150	0.02023
34	0.11820	0.91081	-0.20789	0.72597	0.04310
35	0.10805	0.99991	-0.11062	0.79299	0.08524
36	0.09409	1.07871	0.01963	0.87033	0.15428
37	0.07972	1.13478	0.16243	0.94437	0.25148
38	0.06367	1.15910	0.24184	0.98474	0.31712
39	0.06367	1.15804	0.29838	1.03667	0.35914
40	0.06367	1.10463	0.35647	1.10463	0.35647

LE RAD 0.01656 CENTER AT ALPHA -1.48524 UPSILON 0.77227

TE RAD 0.09572 CENTER AT ALPHA 1.06714 UPSILON 0.26840

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 11 SECTION LL RHO 3.5000

CHORD	STAGGER	CAMBER
2.6370	9.315	108.987

AREA 0.766645 SURFACE ARC LENGTH 6.39471

	ALPHA	UPSILON
SECTION C.G.	0.03076	0.04001
STREAMSURFACE SECTION C.G.	-0.00152	-0.01220
BLADE AXIS	-0.00152	-0.01220
STACKING AXIS (RADIAL)	-0.00220	0.

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 12 SECTION MM RHO 3.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA•	THICKNESS	UPSILON
1	-1.48278	38.375	0.04053	0.68854
2	-1.40890	37.427	0.06289	0.63160
3	-1.26267	35.432	0 10589	0.52511
4	-1.11822	33.324	0.14561	0.42796
5	0.97544	31.209	0.18137	0.33938
6	-0 82018	28.755	0.21602	0.25095
7	-0.65298	25.551	0.24870	0.16574
8	-0.48802	21.974	0.27650	0.09347
9	0.32562	18.575	0.30002	0.03376
10	0 16635	15.937	0.31988	-0.01562
11	-0.01070	13.717	0.33722	-0.05703
12	0.14056	10.984	0.35342	-0.09052
13	0 28653	6.582	0.36959	-0.11323
14	0 42571	-1.960	0.38600	-0.11785
15	0.55764	-17.558	0.39798	-0.09040
16	0.68010	-36.834	0.39089	-0.01336
17	0.79166	-53.175	0.35059	0.12813
18	0.89263	-64.664	0.28346	0.34874
19	0.96934	-71.103	0.21607	0.60629

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA•
1	0	0.01652	-1.48278	0.68854	38.375
2	0.0250	0.02409	-1.42148	0.64112	37.177
3	0 0500	0.03157	-1.36018	0.59527	36.408
4	0 0750	0.03891	-1.29888	0.55074	35.563
5	0 1000	0.04606	-1.23757	0.50765	34.630
6	0.1250	0.05300	-1.17627	0.46605	33.699
7	0.1500	0.05970	-1.11497	0.42586	32.792
8	0.1750	0.06613	-1.05366	0.38704	31.906
9	0.2000	0.07228	-0.99236	0.34951	31.036
10	0.2300	0.07928	-0.91880	0.30615	29.985
11	0 2600	0.08588	-0.84523	0.26465	28.865
12	0 2900	0.09211	-0.77167	0.22508	27.655
13	0 3200	0.09796	-0.69811	0.18761	26.303
14	0.3500	0.10344	-0.62454	0.15242	24.805
15	0.3800	0.10857	-0.55098	0.11962	23.244
16	0.4100	0.11337	-0.47742	0.08923	21.643
17	0.4400	0.11785	-0.40385	0.06120	20.096

ZPC

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0

SECTION NO 12 SECTION MM RHO 3.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.12203	-0.33029	0.03533	18.665
19	0.5000	0.12592	-0.25672	0.01142	17.370
20	0.5300	0.12957	-0.18316	-0.01077	16.231
21	0.5600	0.13302	-0.10960	-0.03147	15.200
22	0.5900	0.13633	-0.03603	-0.05074	14.148
23	0.6200	0.13955	0.03753	-0.06853	13.016
24	0.6500	0.14276	0.11109	-0.08463	11.621
25	0.6800	0.14599	0.18466	-0.09865	9.855
26	0.7100	0.14932	0.25822	-0.10987	7.354
27	0.7400	0.15280	0.33178	-0.11724	3.815
28	0.7700	0.15635	0.40535	-0.11880	-1.736
29	0.8000	0.15974	0.47891	-0.11178	-9.640
30	0.8300	0.16211	0.55248	-0.09235	-20.233
31	0.8600	0.16212	0.62604	-0.05560	-32.968
32	0.8900	0.15751	0.69960	0.00575	-46.031
33	0.9200	0.14663	0.77317	0.09898	-56.501
34	0.9500	0.12942	0.84673	0.23245	-65.546
35	0.9750	0.11034	0.90803	0.39542	-72.387
36	1.0000	0.08807	0.96934	0.60629	-74.413

CHORD	STAGGER	CAMBER
2.4535	1.921	112.788

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0.01652	-1.48278	0.68854	-1.48278	0.68854
2	0.01652	-1.48744	0.67139	-1.46783	0.69709
3	0.01652	-1.48088	0.65824	-1.45303	0.69401
4	0.02409	-1.43934	0.61758	-1.40363	0.66466
5	0.03157	-1.38316	0.56410	-1.33719	0.62643
6	0.03891	-1.32663	0.51191	-1.27112	0.58956
7	0.04606	-1.26969	0.46115	-1.20546	0.55415
8	0.05300	-1.21235	0.41195	-1.14019	0.52014
9	0.05970	-1.15463	0.36430	-1.07530	0.48743
10	0.06613	-1.09654	0.31817	-1.01079	0.45590
11	0.07228	-1.03807	0.27354	-0.94665	0.42548
12	0.07928	-0.96740	0.22191	-0.87019	0.39039
13	0.08588	-0.89609	0.17238	-0.79437	0.35691
14	0.09211	-0.82411	0.12500	-0.71923	0.32517

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PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0 ETA 0.

SECTION NO 12 SECTION MM RHO 3.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
15	0.09796	-0.75135	0.07989	-0.64186	0.29534
16	0.10344	-0.67778	0.03723	-0.57130	0.26761
17	0.10857	-0.60354	-0.00276	-0.49842	0.24201
18	0.11337	-0.52871	-0.04004	-0.42612	0.21850
19	0.11785	-0.45352	-0.07457	-0.35418	0.19697
20	0.12203	-0.37820	-0.10649	-0.28238	0.17716
21	0.12592	-0.30284	-0.13601	-0.21061	0.15885
22	0.12957	-0.22759	-0.16339	-0.13873	0.14185
23	0.13302	-0.15238	-0.18894	-0.06681	0.12601
24	0.13633	-0.07691	-0.21290	0.00484	0.11143
25	0.13955	-0.00103	-0.23533	0.07609	0.09827
26	0.14276	0.07582	-0.25617	0.14637	0.08691
27	0.14599	0.15400	-0.27510	0.21531	0.07781
28	0.14932	0.23477	-0.29153	0.28167	0.07180
29	0.15280	0.31931	-0.30427	0.34426	0.06979
30	0.15635	0.41116	-0.31052	0.39954	0.07292
31	0.15974	0.51173	-0.30497	0.44610	0.08141
32	0.16211	0.62125	-0.27895	0.48370	0.09425
33	0.16212	0.73426	-0.22245	0.51781	0.11126
34	0.15751	0.83867	-0.12840	0.56054	0.13991
35	0.14663	0.92316	-0.00030	0.62317	0.19826
36	0.12942	0.99126	0.16673	0.70220	0.29818
37	0.11034	1.03705	0.35446	0.77902	0.43638
38	0.08807	1.05686	0.46943	0.82335	0.53629
39	0.08807	1.04591	0.54234	0.88151	0.59810
40	0.08807	0.96934	0.60629	0.96934	0.60629

LE RAD 0.02283 CENTER AT ALPHA -1.46482 UPSILON 0.67446
TE RAD 0.12235 CENTER AT ALPHA 0.93601 UPSILON 0.48856

7PC

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 12 SECTION MM RHO 3.0000

CHORD	STAGGER	CAMBER
2.4535	1.921	112.788

AREA 0.825787 SURFACE ARC LENGTH 6.33790

	ALPHA	UPSILON
SECTION C G.	0.07163	0.09684
STREAMSURFACE SECTION C.G.	0.04746	-0.00208
BLADE AXIS	0.04746	-0.00208
STACKING AXIS (RADIAL)	-0.00220	0.

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 13 SECTION NN RHO 2.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.46882	33.562	0.05425	0.61515
2	-1.39730	32.688	0.07405	0.56913
3	-1.25552	31.044	0.11166	0.48240
4	-1 11563	29.700	0.14623	0.40131
5	-0.97756	28.602	0.17755	0.32448
6	-0.82745	26.838	0.20863	0.24504
7	0 66594	23.586	0.23936	0.16815
8	0 50689	19.689	0.26725	0.10468
9	0 35076	16.206	0.29321	0 05397
10	-0.19835	13.969	0.31808	0.01253
11	0 05013	12.201	0.34336	-0.02258
12	0 09293	9.546	0.37065	-0.05060
13	0 22978	4.638	0.40044	-0.06734
14	0 35853	-5.816	0.43204	-0.06288
15	0 47909	-24.620	0.45815	-0.01881
16	0.58868	-44.823	0.45888	0.08613
17	0.68575	-59.575	0.41672	0.26778
18	0.77100	-69.205	0.34123	0.54196
19	0.83404	-74.459	0.26425	0.85610

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.02343	-1.46882	0.61515	32.937
2	0.0250	0.03032	-1.41125	0.57802	32.585
3	0 0500	0.03709	-1.35368	0.54180	31.765
4	0.0750	0.04368	-1.29611	0.50665	31 067
5	0 1000	0.05010	-1.23854	0.47235	30.520
6	0 1250	0.05633	-1.18097	0.43874	30.047
7	0.1500	0.06236	-1.12339	0.40573	29.623
8	0 1750	0.06817	-1.06582	0.37325	29.229
9	0 2000	0.07378	-1.00825	0.34130	28.831
10	0.2300	0.08023	-0.93916	0.30366	28.308
11	0 2600	0.08641	-0.87008	0.26700	27.547
12	0.2900	0.09236	-0.80099	0.23172	26.512
13	0 3200	0.09809	-0.73191	0.19820	25.214
14	0 3500	0.10362	-0.66282	0.16678	23.642
15	0.3800	0.10895	-0.59373	0.13775	21.932
16	0 4100	0.11412	-0.52465	0.11113	20.208
17	0.4400	0.11916	-0.45556	0.08686	18.533

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PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 13 SECTION NN RHO 2.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA•
18	0 4700	0.12410	-0.38648	0.06471	17.065
19	0.5000	0.12898	-0.31739	0.04434	15.823
20	0 5300	0.13384	-0.24830	0.02545	14.802
21	0 5600	0.13874	0.17922	0.00773	13.995
22	0.5900	0.14376	-0.11013	-0.00898	13.171
23	0 6200	0.14900	-0.04105	-0.02456	12.238
24	0.6500	0.15455	0.02804	-0.03882	11.017
25	0 6800	0.16044	0.09712	-0.05130	9.392
26	0 7100	0 16674	0.16621	-0.06134	6.949
27	0.7400	0 17350	0.23530	-0.06768	3.338
28	0.7700	0.18075	0.30438	-0.06844	-2.609
29	0 8000	0.18820	0.37347	-0.06011	-11.623
30	0 8300	0.19505	0.44255	-0.03809	-24.098
31	0 8600	0.19958	0.51164	0.00395	-38.380
32	0 8900	0.19880	0.58073	0.07544	-52.607
33	0 9200	0.18902	0.64981	0.18869	-63.383
34	0 9500	0 16920	0.71890	0.35586	-71.247
35	0 9750	0.14472	0.77647	0.56599	-77.401
36	1.0000	0.11412	0.83404	0.85610	-79.357

CHORD	STAGGER	CAMBER
2 3154	-5.973	112.295

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

		UPPER		LOWER	
PT	T/C	ALPHA	UPSILON	ALPHA	UPSILON
1	0 02343	-1.46882	0.61515	-1.46882	0.61515
2	0.02343	-1.47299	0.59187	-1.44979	0.62832
3	0 02343	-1.46266	0.57505	-1.42980	0.62590
4	0 03032	-1.43016	0.54844	-1.39235	0.60760
5	0.03709	-1.37629	0.50529	-1.33107	0.57831
6	0 04368	-1.32221	0.46333	-1.27001	0.54997
7	0 05010	-1.26799	0.42239	-1.20908	0.52232
8	0 05633	-1.21362	0.38229	-1.14831	0.49519
9	0 06236	-1.15908	0.34297	-1.08771	0.46848
10	0 06817	-1.10436	0.30438	-1.02728	0.44213
11	0 07378	-1.04944	0.26647	-0.96706	0.41612
12	0.08023	-0.98321	0.22188	-0.89512	0.38544
13	0.08641	-0.91634	0.17831	-0.82381	0.35570
14	0 09236	-0.84872	0.13604	-0.75326	0.32740

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PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 13 SECTION NN RHO 2.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.09809	-0.78028	0.09545	-0.68353	0.30094
16	0.10362	-0.71093	0.05689	-0.61471	0.27667
17	0.10895	-0.64085	0.02075	-0.54662	0.25476
18	0.11412	-0.57028	-0.01285	-0.47901	0.23511
19	0.11916	-0.49941	-0.04393	-0.41172	0.21766
20	0.12410	-0.42864	-0.07264	-0.34432	0.20206
21	0.12898	-0.35811	-0.09933	-0.27668	0.18800
22	0.13384	-0.28789	-0.12436	-0.20872	0.17525
23	0.13874	-0.21806	-0.14812	-0.14038	0.16358
24	0.14376	-0.14805	-0.17103	-0.07221	0.15308
25	0.14900	-0.07761	-0.19314	-0.00448	0.14402
26	0.15455	-0.00615	-0.21445	0.06223	0.13680
27	0.16044	0.06681	-0.23456	0.12744	0.13196
28	0.16674	0.14286	-0.25295	0.18956	0.13028
29	0.17350	0.22360	-0.26821	0.24699	0.13285
30	0.18075	0.31391	-0.27749	0.29486	0.14060
31	0.18820	0.41736	-0.27352	0.32957	0.15330
32	0.19505	0.53475	-0.24422	0.35035	0.16805
33	0.19958	0.65510	-0.17718	0.36818	0.18507
34	0.19880	0.76358	-0.06433	0.39787	0.21520
35	0.18902	0.84546	0.09064	0.45417	0.28673
36	0.16920	0.90439	0.29288	0.53341	0.41884
37	0.14472	0.93998	0.52945	0.61296	0.60254
38	0.11412	0.95438	0.69939	0.66467	0.75523
39	0.11412	0.93299	0.78762	0.72766	0.83626
40	0.11412	0.83404	0.85610	0.83404	0.85610

LE RAD 0.03048 CENTER AT ALPHA -1.44326 UPSILON 0.59855

TE RAD 0.14855 CENTER AT ALPHA 0.80622 UPSILON 0.71018

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03590 R 0. MU 0. ETA 0.

SECTION NO 13 SECTION NN RHO 2.5000

CHORD	STAGGER	CAMBER
2.3154	-5 973	112.295

AREA 0.901998 SURFACE ARC LENGTH 6.36995

	ALPHA	UPSILON
SECTION C.G.	0 10801	0.17811
STREAMSURFACE SECTION C.G	0.09643	0.00804
BLADE AXIS	0.09643	0.00804
STACKING AXIS (RADIAL)	-0.00220	0.

PHASE IV ROTOR

STAGE 4. ROTOR NB 20

SECT	NO	RHO	CHORD	STAGGER	CAMBER	TM C	ZETA1*	ZETA2*
AA	1	8.50000	4.0427	61.30	-2.96	0.02390	57.44	60.40
BB	2	8.00000	3.9874	56.44	1 96	0.02569	55.32	53.36
CC	3	7.50000	3.9732	52.14	6.51	0.03047	53.70	47.20
DD	4	7.00000	3.9560	48.25	11.50	0.03889	52 28	40.78
EE	5	6.50000	3.9030	44.23	18.18	0.05072	51.22	33.04
FF	6	6.00000	3.7722	38.88	29.01	0 06260	50.43	21.41
GG	7	5.50000	3.6707	33.24	44.70	0.07219	49.19	4.49
HH	8	5.00000	3.4580	27.11	65.17	0.08385	47.44	-17.73
JJ	9	4.50000	3.1643	21.98	87 57	0.09610	45.68	-41.89
KK	10	4 00000	2.8749	16.12	100.12	0.11188	43.95	-56.17
LL	11	3.50000	2.6370	9 32	108.99	0.12893	41.79	67.20
MM	12	3.00000	2.4535	1.92	112.79	0.16212	38.38	-74.41
NN	13	2.50000	2.3154	-5.97	112.29	0.19958	32.94	-79.36

THE COORDINATES FOR THIS BLADE WERE PUT ON TAPE

IN THE SAME ORDER AS PRINTED ABOVE

SECTION XXI

CONCLUSIONS

The aerodynamic design of a series of five transonic compressor rotors was carried out under this contract. Each of the five designs is parametrically related to the baseline rotor documented in Technical Report AFAPL-TR-79-2078.

These rotors provide a matrix of aerodynamic designs that will help define the sensitivity of transonic blade rows to several design variables when tested in the future.

SECTION XXII

REFERENCES

1. A.J. Wennerstrom, and W.A. Buzzell, Redesign of a Rotor for a 1500 ft/sec Transonic, High-Through-Flow, Single-Stage Axial-Flow Compressor with Low Hub/Tip Ratio, Air Force Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio 45433, AFAPL-TR-2078, September 1979.

2. George R. Frost, Richard M. Hearsey, Arthur J. Wennerstrom, A Computer Program for the Specification of Axial Compressor Airfoils, Aerospace Research Laboratories, Wright-Patterson Air Force Base, Ohio 45433, ARL 72-0171,

3. Richard M. Hearsey, A Revised Computer Program for Axial Compressor Design Volume I, Aerospace Research Laboratories, Wright-Patterson Air Force Base, Ohio 45433, ARL TF 75-0001, January 1975.

4. Arthur J. Wennerstrom, Personal Communication to L.H. Smith of General Electric Company, September 12, 1980.