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TRANSONIC FAN/COMPRESSOR ROTOR DESIGN STUDY

Volume II

D.E. Parker and M.R. Simonson
General Electric Company
Aircraft Engine Business Group
Advanced Technology Programs Dept.
Cincinnati, Ohio 45215

February 1982

Final Report for Period September 1980 - February 1982

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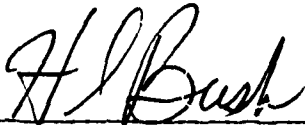


ARTHUR J. WENNERSTROM
Chief, Compressor Research Group



WALKER H. MITCHELL
Chief, Technology Branch

FOR THE COMMANDER



H. IVAN BUSH
Director, Turbine Engine Division

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This volume describes the aerodynamic design details of the Phase I Rotor. The Phase I rotor has the tip airfoil maximum thickness located at 40% of meanline length as compared with 70% for the baseline rotor. The location of maximum thickness varied linearly with radius to 56% of meanline length at the hub, which is the same as the baseline rotor.

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VOLUME II

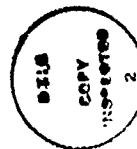
PHASE I ROTOR DESIGN

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 II

TABLE OF CONTENTS

SECTION		PAGE
VII.	DESIGN OF PHASE I ROTOR	1
	1. Introduction	1
	2. Design Procedure	1
VIII.	DETAILS OF PHASE I ROTOR DESIGN	12
	1. Circumferential Average Flow Solution	12
	2. Streamsurface Blade Coordinates	42
	3. Plane Section Blade Coordinates	51
IX.	REFERENCES	111

VOLUME II

LIST OF ILLUSTRATIONS

FIGURE		PAGE
19.	Comparison of Phase I Rotor Hub Contour to Baseline Rotor Hub Contour	3
20.	Phase I Rotor Static Pressure Distribution	5
21.	Phase I Rotor Intrablade Work Distribution	6
22.	Phase I Rotor Incidence Angle Versus Fractional Immersion	7
23.	Phase I Rotor Deviation Angle Versus Fractional Immersion	7
24.	Phase I Rotor Intrablade Departure Angle Distribution	8
25.	Phase I Rotor Streamsurface Tip Section Compared with Baseline Design	9
26.	Phase I Rotor Deviation Angle Minus Reference Deviation Angle Compared with Data Match	10
27.	Phase I Stator Incidence Angle Compared with Data Match	10
28.	Phase I Rotor Throat Margin Compared with Data Match	11
29.	Compressor Flowpath with Calculation Stations	13
30.	Stacked Phase I Rotor Streamsurface Sections	43
31.	Stacked Phase I Rotor Plane Sections	57

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	

LIST OF SYMBOLS AND ABBREVIATIONS

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 VII

DESIGN OF PHASE I ROTOR

1. INTRODUCTION

The specification of the chordwise location of airfoil maximum thickness of the transonic/compressor rotors has often been defined more on the basis of historical practice than on a knowledge of its aerodynamic effect. Research by NASA in the 1950's generally indicated that as relative inlet Mach numbers rose, it was desirable to move the location of maximum thickness aft on an airfoil.

The early work, however, was done with airfoils having significant positive camber. Today, many airfoils have little overall relative turning in the tip region, and frequently have S-shaped meanlines: negative camber followed by some positive camber. In some cases, a forward shift in maximum airfoil thickness may help achieve the desired airfoil suction surface shape, with a less S-shaped meanline. There is also incentive to move the maximum thickness forward to make the blade more capable of withstanding a bird strike without excessive damage.

To get more definitive aerodynamic data on the effect of the location of airfoil maximum thickness, the Phase I blade has been designed with the maximum thickness located at 40% and the Phase II blade with maximum thickness at 55%, compared with the baseline rotor which has its tip maximum thickness at 70% of meanline length.

2. DESIGN PROCEDURE

The "data match" circumferential average flow solution, which was previously described in Vol. I, was used as a starting point for the design of the Phase I rotor. The annulus blockage used in the internal blade calculation stations was adjusted to be consistent with the forward shift of the airfoil maximum thickness. The assumed chordwise distribution of work was iteratively adjusted to obtain a calculated chordwise distribution of static pressure similar to that of the data match calculations of the baseline rotor. Also the blade meanline departure angles (the difference between the air angle and the meanline angle) were adjusted to maintain the same throat

area and flow induction capacity as the baseline blade. To adjust for the increased blade blockage in the forward half of the blade, and to better match the data match static pressure distribution in the hub, the hub contour internally within the rotor was modified slightly relative to the baseline rotor. The two hub contours are compared in Figure 19.

After each modification to the chordwise work distribution and/or departure angles, revised blade annulus blockage and blade lean angles were calculated and input to the circumferential Average Flow Determination (CAFD) computer program for the next iteration.

The rotor exit radial distribution of total pressure and temperature was maintained the same as the data match of the baseline rotor.

The resulting streamline static pressure distribution for the Phase I blade is compared with the data match of the baseline rotor on Figure 20.

The assumed streamline work input (as a fraction of the total streamline work) is plotted versus percent axial projection in Figure 21. 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.

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 then, was used as a guide in setting the suction surface angle in the flow induction region.

To satisfy the same flow induction capacity as the baseline blade, it was required to use larger meanline incidence angles as a result of the larger blade leading edge wedge angle resulting from the forward location of maximum thickness. Phase I blade incidence angles are shown on Figure 22.

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

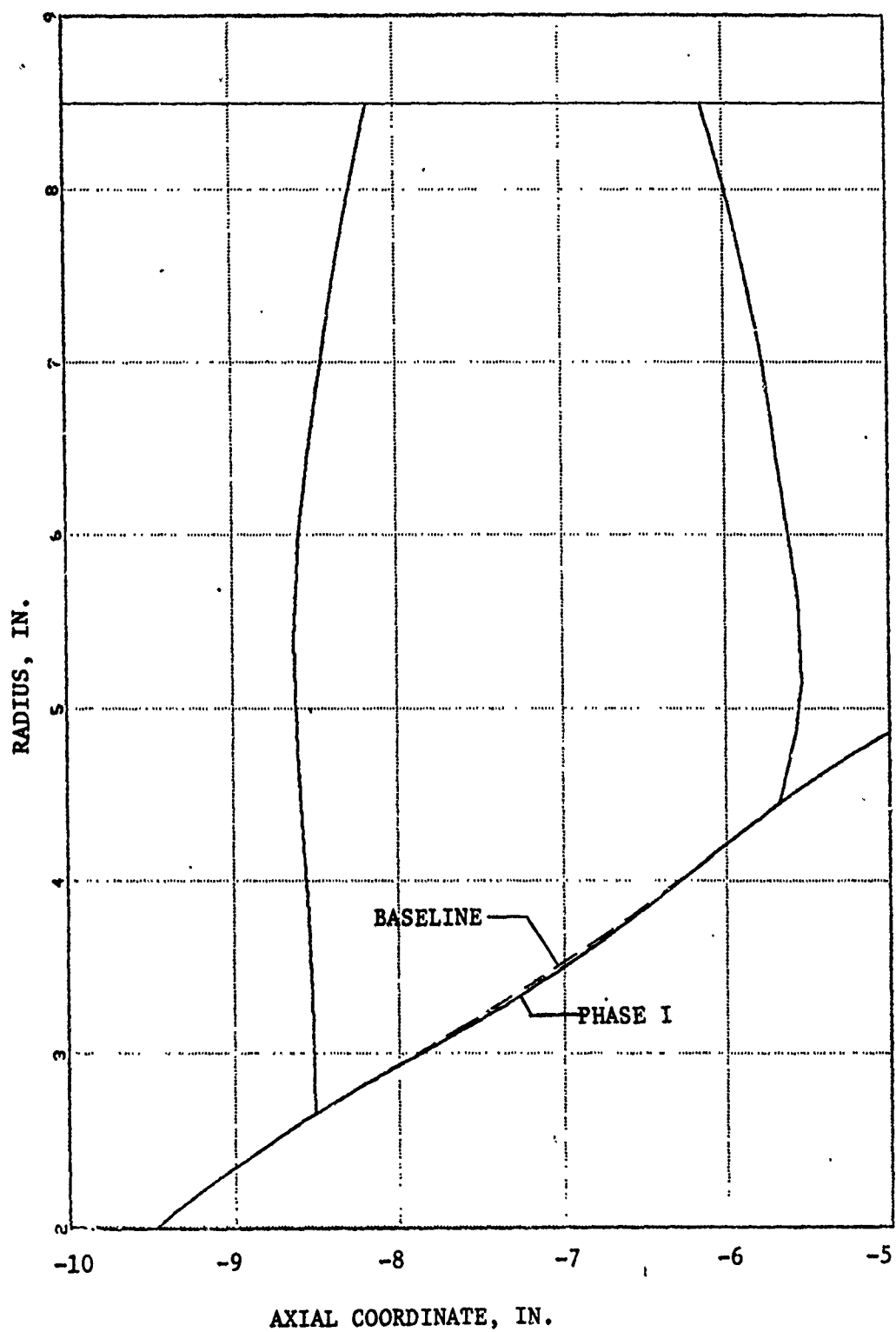


Figure 19. Comparison of Phase I Rotor Hub Contour to Baseline Rotor Hub Contour

set of vectors which would produce the same circulation as the actual blade taking into account the change in streamline radius and meridional 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 I blade. Phase I Rotor deviation angles are shown on Figure 23. A plot of departure angles for each streamsurface section is shown in Figure 24. Once the intra-blade work distribution was chosen these departure angles were required to satisfy the desired incidence angles, deviation angles, and passage area ratios. The resulting streamsurface tip section of the Phase I rotor is compared to that of the baseline rotor in Figure 25. The "deviation angle minus reference deviation angle" for the Phase I rotor was kept essentially the same as the data match analysis although there are some small differences. Figure 26 shows the "delta deviation" compared to the data match of the baseline design.

If the performance of a new rotor design is to be accurately evaluated by comparing overall stage performance with the baseline design then it is important that the stator have nearly the same entering conditions in both cases. Figure 27 shows a comparison of the Phase I stator incidence angles with the data match base. As can be seen the differences are small.

Figure 28 shows the radial distribution of Phase I rotor throat margin and compares it to the data match case. 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 27 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 VIII.

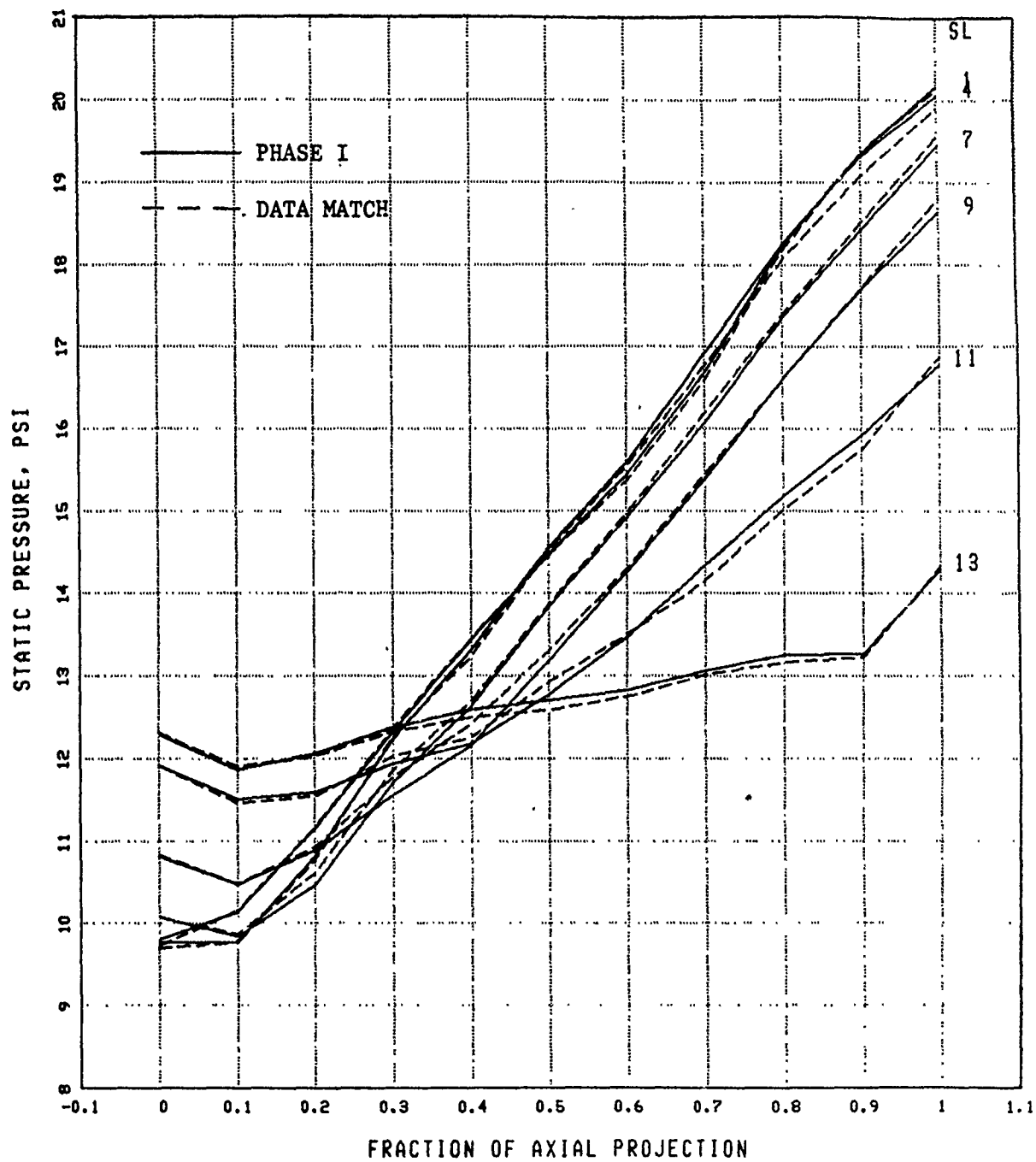


Figure 20. Phase I Rotor Static Pressure Distribution

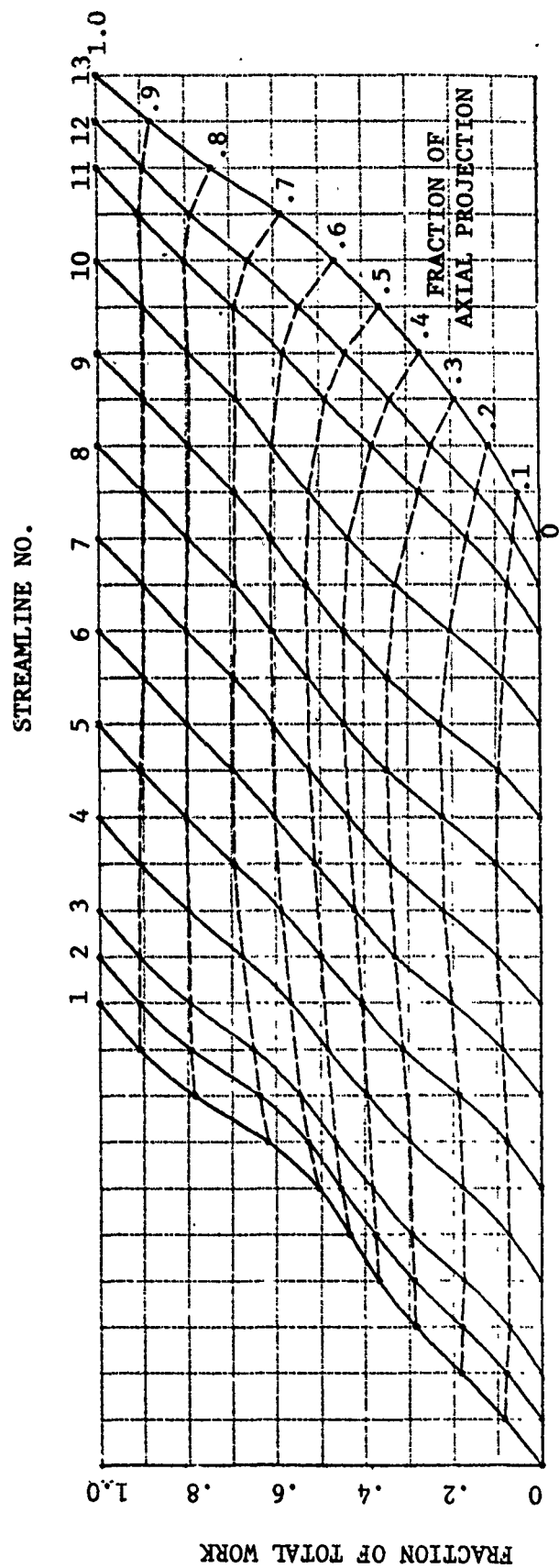


Figure 21. Phase I Rotor Intrablade Work Distribution

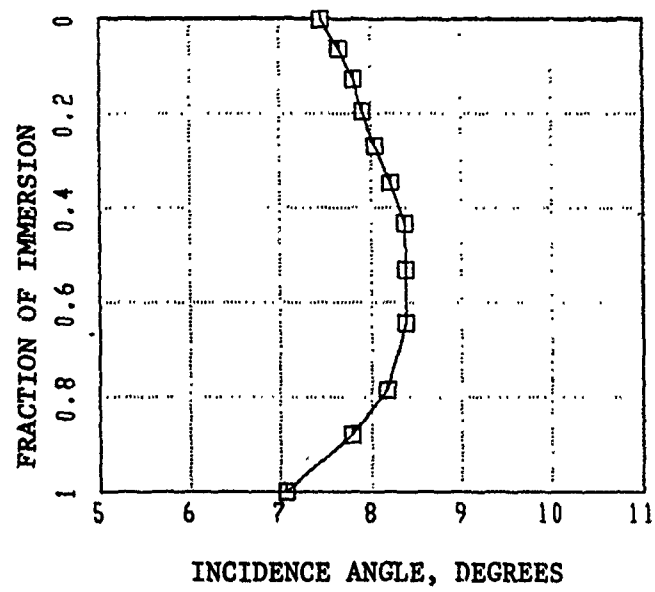


Figure 22. Phase I Rotor Incidence Angle Versus Fractional Immersion

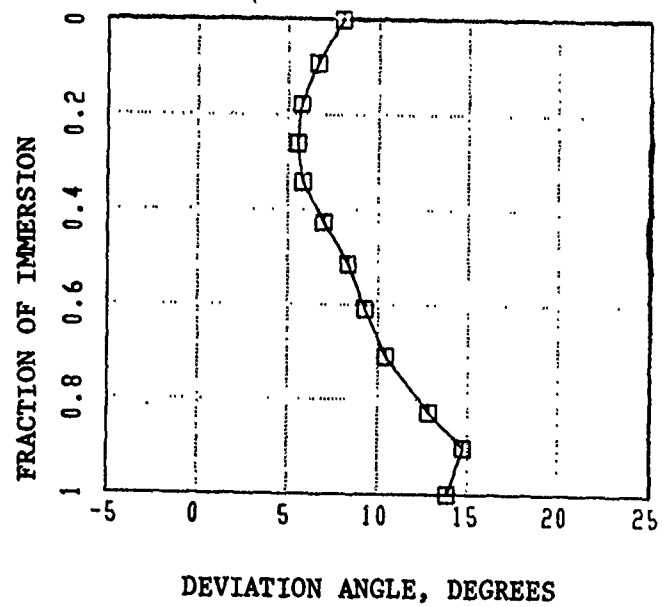


Figure 23. Phase I Rotor Deviation Angle Versus Fractional Immersion

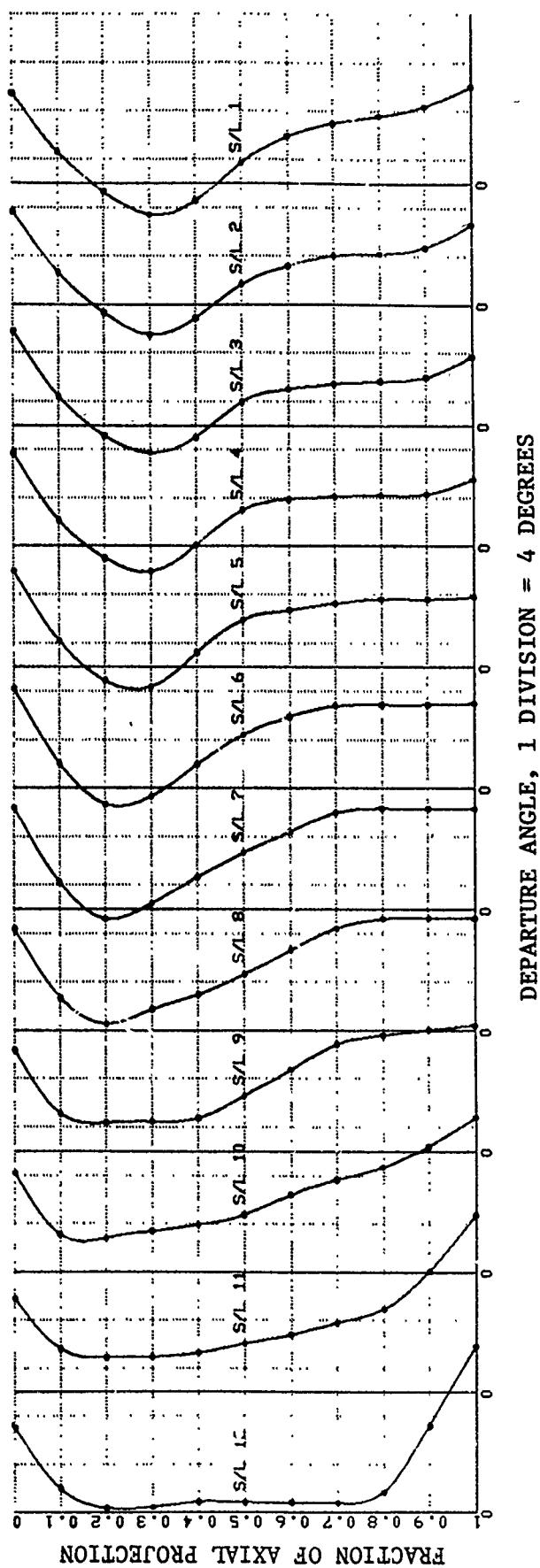


Figure 24 Phase I Rotor Intrablade Departure Angle Distribution

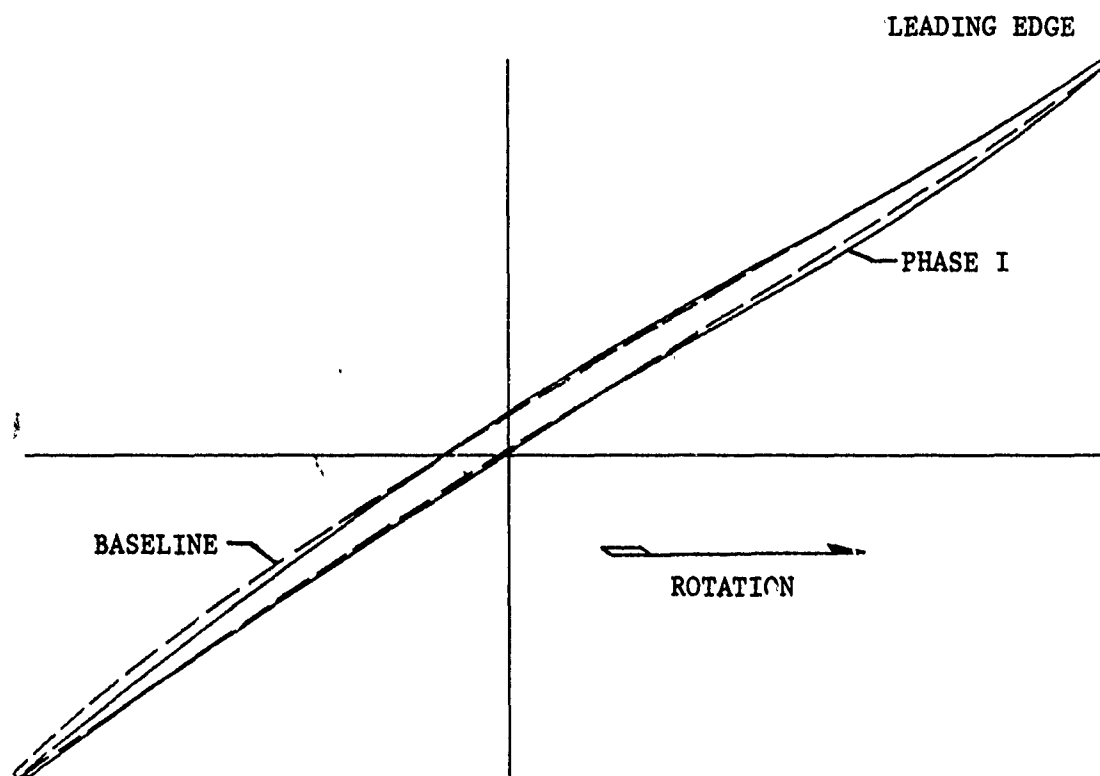


Figure 25 Phase I Rotor Streamsurface Tip Section Compared With Baseline Design

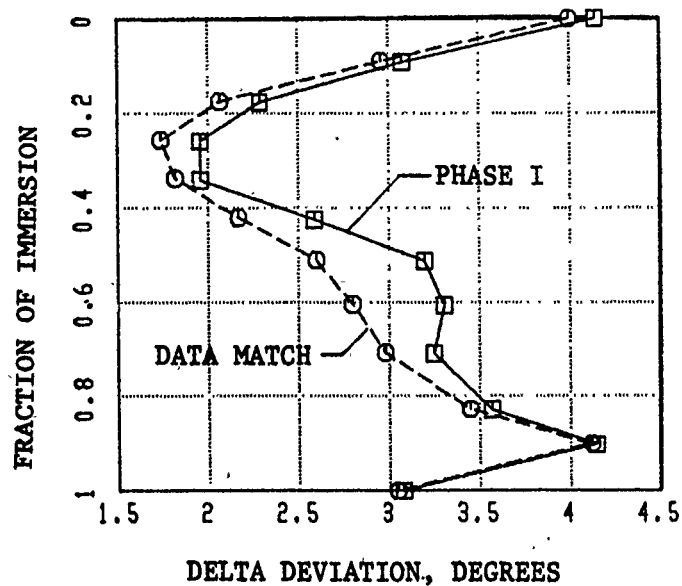


Figure 26 Phase I Rotor Deviation Angle Minus Reference Deviation Angle Compared With Data Match

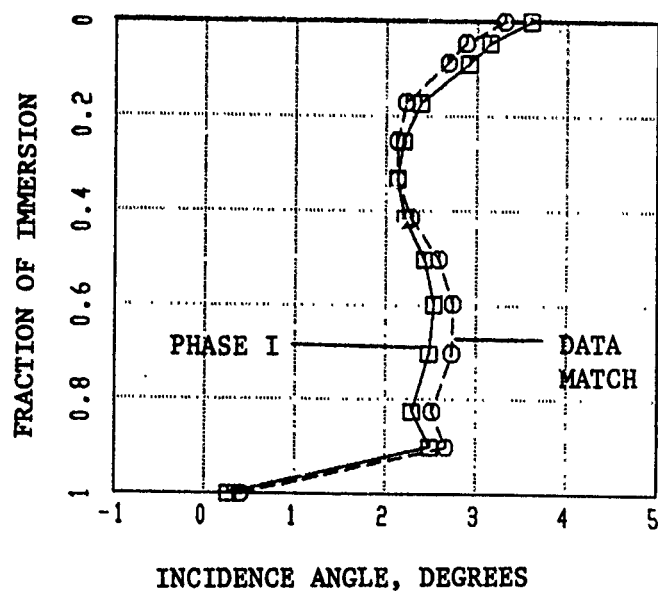


Figure 27 Phase I Stator Incidence Angle Compared With Data Match

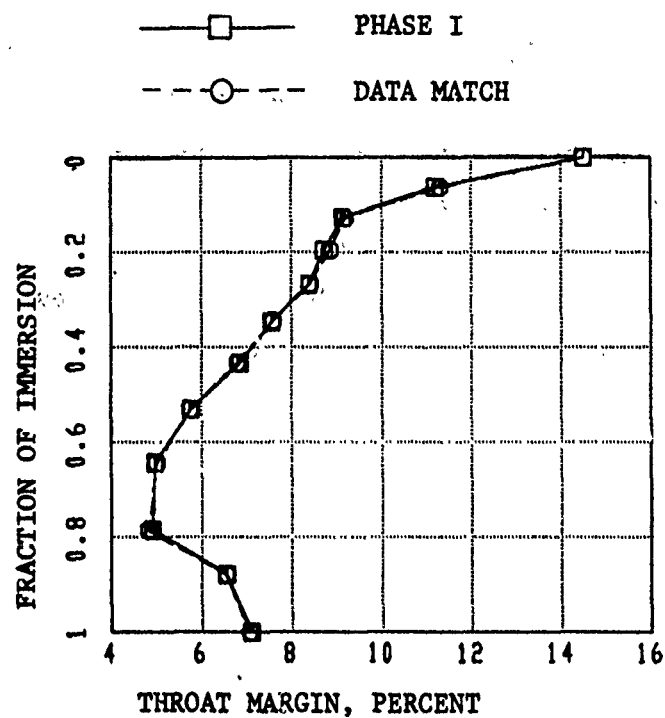


Figure 28. Phase I Rotor Throat Margin Compared With Data Match

SECTION VIII
DETAILS OF PHASE I 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 29 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 I rotor blade forces are included at the end of this tabulation.

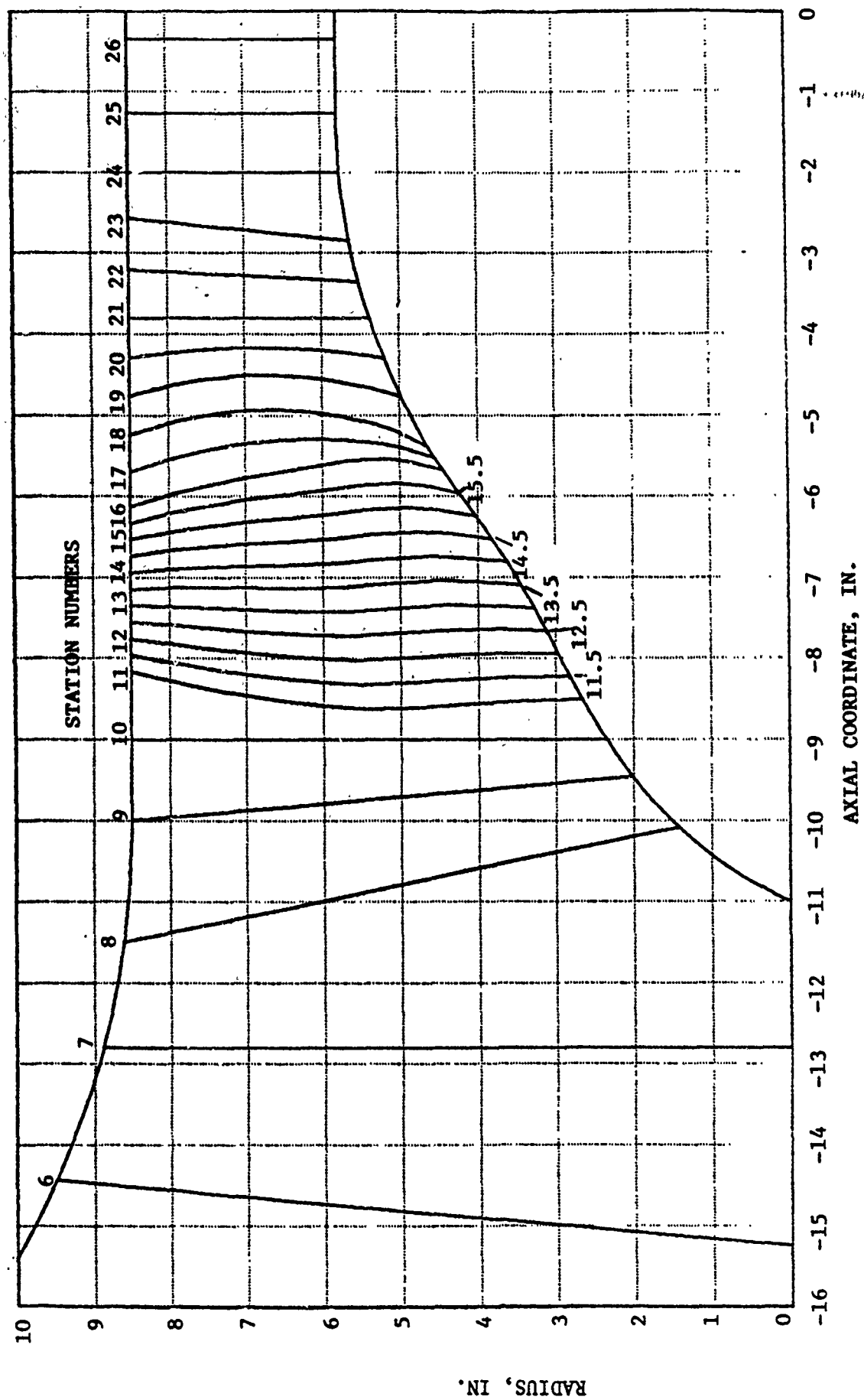


Figure 29. Compressor Flowpath With Calculation Stations

INLET		I= 1		STA= 5.000		AFLOW= 478.13		D+C=O.		FREE	
WTF= 61.365		OPTX=DDP		PHI		CURV		VM		CU	
PSIC		Z		R		CURV		VM		CU	
PSIC		Z		R		CURV		VM		CU	
0.	-18.800	13.207	-50.10	0.0831	150.4	0.	0.	0.	0.	0.135	0.135
0.050	-18.800	12.564	-43.54	0.	181.0	0.	0.	0.	0.	0.163	0.163
0.100	-18.800	12.020	-40.31	0.	195.9	0.	0.	0.	0.	0.176	0.176
0.200	-18.800	11.027	-34.70	0.	218.6	0.	0.	0.	0.	0.196	0.196
0.300	-18.800	10.099	-29.90	0.	237.1	0.	0.	0.	0.	0.213	0.213
0.400	-18.800	9.193	-25.65	0.	252.4	0.	0.	0.	0.	0.227	0.227
0.500	-18.800	8.277	-21.78	0.	265.2	0.	0.	0.	0.	0.25	0.25
0.600	-18.800	7.319	-18.16	0.	275.9	0.	0.	0.	0.	0.241	0.241
0.700	-18.800	6.277	-14.68	0.	284.9	0.	0.	0.	0.	0.25	0.25
0.800	-18.800	5.083	-11.18	0.	292.5	0.	0.	0.	0.	0.264	0.264
0.900	-18.800	3.569	-7.34	0.	298.9	0.	0.	0.	0.	0.270	0.270
0.950	-18.800	2.516	-4.91	0.	301.6	0.	0.	0.	0.	0.272	0.272
1.000	-18.800	0.000	0.	0.	303.9	0.	0.	0.	0.	0.274	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	181.0	0.163	195.9	0.176	218.6	0.196	237.1	0.213	252.4	0.227
2	0.997	14.427	14.696	518.7	85.33	2224.5	1.997	181.0	0.163	195.9	0.176	218.6	0.196	237.1	0.213	252.4	0.227	265.2	0.239
3	0.997	14.382	14.696	518.7	84.72	2130.2	1.913	195.9	0.176	218.6	0.196	237.1	0.213	252.4	0.227	265.2	0.239	275.9	0.248
4	0.997	14.305	14.696	518.7	83.59	1958.1	1.760	218.6	0.196	237.1	0.213	252.4	0.227	265.2	0.239	275.9	0.248	284.9	0.257
5	0.997	14.237	14.696	518.7	82.42	1797.9	1.617	237.1	0.213	252.4	0.227	265.2	0.239	275.9	0.248	284.9	0.257	298.9	0.270
6	0.997	14.177	14.696	518.7	81.16	1641.9	1.477	252.4	0.227	265.2	0.239	275.9	0.248	284.9	0.257	298.9	0.270	301.6	0.272
7	0.997	14.124	14.696	518.7	79.71	1484.6	1.337	265.2	0.239	275.9	0.248	284.9	0.257	298.9	0.270	301.6	0.272	303.9	0.274
8	0.997	14.077	14.696	518.7	77.94	1320.6	1.190	275.9	0.248	284.9	0.257	298.9	0.270	301.6	0.272	303.9	0.274		
9	0.997	14.037	14.696	518.7	75.57	1143.7	1.031	284.9	0.257	298.9	0.270	301.6	0.272	303.9	0.274				
10	0.997	14.002	14.696	518.7	71.94	943.5	0.850	298.9	0.270	301.6	0.272	303.9	0.274						
11	0.997	13.972	14.696	518.7	64.61	697.2	0.629	301.6	0.272	303.9	0.274								
12	0.997	13.959	14.696	518.7	55.81	536.8	0.484	303.9	0.274										
13	0.997	13.947	14.696	518.7	0.00	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
WTF= 61.365 I= 2 OPTX=DPP R PHI CURV VM CU ALPHAM FREE D*H=0.
PSIC Z OPTX=DPP R PHI CURV VM CU ALPHAM MM ABH=0.
0. -14.431 9.481 -24.96 -0.0952 514.6 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 467.7 0. 0. 0.426
0.500 -14.650 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 2.235 -2.57 -0.0189 398.2 0. 0. 0.361
1.000 -15.250 0.000 0. 0. 387.6 0. 0. 0.351

SL BLOBLK PS PT TT BETAM VREL MREL VABS MABS
1 0.997 12.623 14.696 518.7 72.90 1750.4 1.601 514.6 0.471
2 0.997 12.677 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 72.00 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 70.41 1394.8 1.271 467.7 0.426
7 0.997 13.042 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 13.428 14.696 518.7 44.72 560.4 0.508 398.2 0.361
13 0.997 13.493 14.696 518.7 0.00 387.6 0.351 387.6 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
 WTF= 61.365 I= 3 MTIP= 27 AFLOW= 244.35 D=C=0. D*H=0.
 PSIC Z OPTX=DPP PHI CURV VM CU ALPHAM ABH=0.
 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 -0.0794 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 -0.0679 563.9 0. 0. 0.518
 0.500 -12.800 6.468 -7.60 -0.0628 547.6 0. 0. 0.502
 0.600 -12.800 5.837 -5.80 -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 455.9 0. 0. 0.415
 0.950 -12.800 2.206 3.54 -0.0760 428.7 0. 0. 0.390
 1.000 -12.800 0.000 0. 0. 383.6 0. 0. 0.347

SL BLDBLK PS PT TT BETAM VREL MREL VABS MABS
 1 0.998 11.715 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 11.844 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 1452.3 1.337 579.6 0.533
 6 0.998 12.235 14.696 518.7 65.56 1363.0 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 62.75 1158.6 1.061 530.4 0.486
 9 0.998 12.649 14.696 518.7 60.45 1036.9 0.948 511.3 0.468
 10 0.998 12.819 14.696 512.7 56.84 893.1 0.815 488.4 0.446
 11 0.998 13.051 14.696 518.7 49.86 707.2 0.644 455.9 0.415
 12 0.998 13.234 14.696 518.7 42.25 579.1 0.526 428.7 0.390
 13 0.998 13.517 14.696 518.7 0.00 383.6 0.347

STA 7.000 MASS AVERAGED PROPERTIES
 PT= 14.696 TT= 518.69 GAMMA=1.4017 PT-RAT= 1.000
 RCU= 0. VM= 539.1 CZ= 532.1 MM=0.495 MABS=0.495 MREL=1.109

INLET STA= 8.000 AFLOW= 224.06 D+C=O. FREE
 WTF= 61.365 I= 4 OPTV=FREE ITYPE=O INBR=O ABC=O. ABH=O.
 PSIC Z R CURV VM CU ALPHAM MM

0.	-11.499	8.608	-8.21	-0.0953	711.9	0.	0.	0.665
0.050	-11.461	8.412	-7.49	-0.0964	703.1	0.	0.	0.656
0.100	-11.421	8.211	-6.86	-0.0909	693.7	0.	0.	0.646
0.200	-11.339	7.790	-5.59	-0.0815	675.6	0.	0.	0.628
0.300	-11.250	7.341	-4.25	-0.0743	658.6	0.	0.	0.611
0.400	-11.155	6.858	-2.78	-0.0694	642.1	0.	0.	0.595
0.500	-11.052	6.333	-1.10	-0.0667	625.0	0.	0.	0.578
0.600	-10.938	5.753	0.89	-0.0666	606.3	0.	0.	0.560
0.700	-10.809	5.096	3.37	-0.0695	583.9	0.	0.	0.538
0.800	-10.656	4.320	6.69	-0.0768	554.6	0.	0.	0.509
0.900	-10.459	3.318	12.10	-0.0935	510.6	0.	0.	0.467
0.950	-10.323	2.629	17.76	-0.1212	468.1	0.	0.	0.427
1.000	-10.086	1.421	47.99	0.1910	434.0	0.	0.	0.395

SL BDBLK PS PT TT BETAM VREL MREL VABS MABS

1	0.997	10.920	14.696	518.7	64.89	1677.5	1.567	711.9	0.665
2	0.997	11.004	14.696	518.7	64.66	1642.5	1.533	703.1	0.656
3	0.997	11.092	14.696	518.7	64.42	1606.4	1.497	693.7	0.646
4	0.997	11.260	14.696	518.7	63.83	1531.7	1.424	675.6	0.628
5	0.997	11.416	14.696	518.7	63.05	1453.3	1.349	658.6	0.611
6	0.997	11.565	14.696	518.7	62.05	1370.0	1.269	642.1	0.595
7	0.997	11.716	14.696	518.7	60.78	1280.5	1.184	625.0	0.578
8	0.997	11.879	14.696	518.7	59.15	1182.5	1.091	606.3	0.560
9	0.997	12.069	14.696	518.7	57.00	1072.2	0.987	583.9	0.538
10	0.997	12.310	14.696	518.7	53.96	942.7	0.866	554.6	0.509
11	0.997	12.654	14.696	518.7	48.91	776.9	0.710	510.6	0.467
12	0.997	12.965	14.696	518.7	44.75	659.1	0.601	468.1	0.427
13	0.997	13.199	14.696	518.7	30.02	501.2	0.456	434.0	0.395

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 AFLOW= 211.86 D+C=O. FREE D+H=O.
 WTF= 61.365 I= 5 OPTX=53 MTIP=53 OPTV=FREE ITYPE=O INBR=O ABC=O. ABL=O.
 PSIC Z R PHI CURV VM CU ALPHAM MM

0.	-9.999	8.500	0.	0.	758.2	0.	0.712
0.050	-9.984	8.315	-1.11	-0.0541	751.2	0.	0.705
0.100	-9.968	8.125	-0.89	-0.0523	743.3	0.	0.697
0.200	-9.935	7.727	-0.29	-0.0504	729.6	0.	0.683
0.300	-9.900	7.304	0.58	-0.0506	715.6	0.	0.669
0.400	-9.862	6.851	1.73	-0.0526	700.5	0.	0.653
0.500	-9.821	6.358	3.25	-0.0568	682.9	0.	0.636
0.600	-9.776	5.816	5.20	-0.0630	661.3	0.	0.614
0.700	-9.725	5.201	7.75	-0.0714	633.5	0.	0.586
0.800	-9.665	4.475	11.18	-0.0795	596.6	0.	0.550
0.900	-9.587	3.542	16.60	-0.0812	546.2	0.	0.501
0.950	-9.536	2.919	21.63	-0.0406	515.4	0.	0.472
1.000	-9.460	2.011	38.65	0.1881	511.5	0.	0.468

SL BLDLK PS PT TT BETAM VREL MREL VABS MABS

1	0.996	10.473	14.696	518.7	63.19	1680.7	1.579	758.2	0.712
2	0.996	10.541	14.696	518.7	62.89	1648.5	1.548	751.2	0.705
3	0.996	10.619	14.696	518.7	62.60	1615.0	1.515	743.3	0.697
4	0.996	10.751	14.696	518.7	61.85	1546.5	1.448	729.6	0.683
5	0.996	10.885	14.696	518.7	60.96	1474.3	1.378	715.6	0.669
6	0.996	11.029	14.696	518.7	59.91	1397.2	1.303	700.5	0.653
7	0.996	11.193	14.696	518.7	58.68	1313.5	1.223	682.9	0.636
8	0.996	11.392	14.696	518.7	57.20	1220.9	1.133	661.3	0.614
9	0.996	11.642	14.696	518.7	55.39	1115.2	1.032	633.5	0.586
10	0.996	11.961	14.696	518.7	52.93	989.7	0.912	596.6	0.550
11	0.996	12.377	14.696	518.7	48.85	830.1	0.762	546.2	0.501
12	0.996	12.617	14.696	518.7	44.99	728.7	0.667	515.4	0.472
13	0.996	12.647	14.696	518.7	34.75	622.5	0.569	511.5	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= 655.3 MM=0.617 MASS=0.617 MREL=1.178

INLET STA= 10.000 AFLOW= 204.14 D=C=O. D=H=O. FREE
 WTF= 61.365 I= 6 MTIP= 66 UPTY=FREE ITYPE=O INBR=O ABC=O. ABH=O.
 PSIC Z OPTX=DPP R PHI CURV VM CU ALPHAM MM

0.	-9.000	8.500	0.	0.	772.2	0.	0.	0.727
0.050	-9.000	8.317	0.32	0.0031	772.5	0.	0.	0.727
0.100	-9.000	8.130	0.61	-0.0019	772.5	0.	0.	0.727
0.200	-9.000	7.742	1.37	-0.0114	770.1	0.	0.	0.725
0.300	-9.000	7.332	2.38	-0.0195	764.4	0.	0.	0.719
0.400	-9.000	6.895	3.74	-0.0287	754.7	0.	0.	0.709
0.500	-9.000	6.423	5.51	-0.0391	739.7	0.	0.	0.693
0.600	-9.000	5.905	7.85	-0.0551	716.8	0.	0.	0.670
0.700	-9.000	5.319	10.79	-0.0731	682.7	0.	0.	0.635
0.800	-9.000	4.626	14.48	-0.0891	635.0	0.	0.	0.588
0.900	-9.000	3.733	19.56	-0.0861	574.8	0.	0.	0.529
0.950	-9.000	3.141	23.67	-0.0821	535.8	0.	0.	0.491
1.000	-9.000	2.340	32.46	0.1922	544.1	0.	0.	0.499

SL BLOBLK PS PT TT BETAM VREL MREL VABS MABS

1	0.994	10.334	14.696	518.7	62.76	1687.1	1.588	772.2	0.727
2	0.994	10.332	14.696	518.7	62.24	1658.6	1.562	772.5	0.727
3	0.994	10.331	14.696	518.7	61.70	1629.4	1.534	772.5	0.727
4	0.994	10.355	14.696	518.7	60.59	1568.3	1.476	770.1	0.725
5	0.994	10.411	14.696	518.7	59.42	1502.8	1.413	764.4	0.719
6	0.994	10.507	14.696	518.7	58.19	1431.8	1.345	754.7	0.709
7	0.994	10.653	14.696	518.7	56.87	1353.5	1.269	739.7	0.693
8	0.994	10.874	14.696	518.7	55.48	1264.8	1.182	716.8	0.670
9	0.994	11.195	14.696	518.7	53.97	1160.7	1.080	682.7	0.635
10	0.994	11.628	14.696	518.7	52.12	1034.2	0.957	635.0	0.588
11	0.994	12.145	14.696	518.7	48.90	874.3	0.804	574.8	0.529
12	0.994	12.460	14.696	518.7	45.97	770.9	0.707	535.8	0.491
13	0.994	12.394	14.696	518.7	37.19	683.0	0.627	544.1	0.499

STA 10.000 MASS AVERAGED PROPERTIES
 PT= 14.696 TT= 518.69 GAMMA=1.1018 PT-RAT= 1.000 TT-RAT= 1.000
 RCU= 0. VM= 705.7 CZ= 694.3 MM=0.660 MABS=0.660 MREL=1.216

ROTOR1 STA= 11.000 AFLOW= 197.55 D=C=O. LE ROTOR
 WTF= 61.365 I= 7 MTIP= 79 OPTV=FREE ITYPE=4 INBR=3 ABC=O. ABH=O.
 PSIC Z R PHI CURV VM CU ALPHAM MM
 0. -8.166 8.500 0. 0. 825.2 0. 0. 0.783
 0.050 -8.204 8.321 0.30 -0.0019 826.4 0. 0. 0.784
 0.100 -8.243 8.139 0.60 0.0024 827.3 0. 0. 0.785
 0.200 -8.322 7.760 1.44 0.0078 828.8 0. 0. 0.787
 0.300 -8.397 7.360 2.70 0.0008 826.5 0. 0. 0.784
 0.400 -8.466 6.933 4.35 -0.0108 817.0 0. 0. 0.774
 0.500 -8.531 6.473 6.43 -0.0292 797.8 0. 0. 0.754
 0.600 -8.592 5.966 9.02 -0.0440 766.2 0. 0. 0.721
 0.700 -8.624 5.396 12.22 -0.0564 723.3 0. 0. 0.677
 0.800 -8.604 4.735 16.31 -0.0663 671.1 0. 0. 0.624
 0.900 -8.548 3.904 21.72 -0.0699 601.7 0. 0. 0.555
 0.950 -8.526 3.360 25.69 -0.0528 557.9 0. 0. 0.512
 1.000 -8.507 2.653 31.03 0.1665 556.1 0. 0. 0.511

SL BLDLCK PS PT TT BETAM VREL MREL VABS MABS
 1 0.990 9.801 14.696 518.7 61.18 1712.0 1.624 825.2 0.783
 2 0.990 9.789 14.696 518.7 60.63 1685.0 1.599 826.4 0.784
 3 0.990 9.780 14.696 518.7 60.06 1657.4 1.573 827.3 0.785
 4 0.990 9.764 14.696 518.7 58.82 1600.7 1.519 828.8 0.787
 5 0.990 9.787 14.696 518.7 57.53 1539.5 1.461 826.5 0.784
 6 0.990 9.884 14.696 518.7 56.27 1471.2 1.394 817.0 0.774
 7 0.990 10.078 14.696 518.7 55.07 1393.3 1.316 797.8 0.754
 8 0.990 10.393 14.696 518.7 53.95 1302.1 1.225 766.2 0.721
 9 0.990 10.811 14.696 518.7 52.78 1195.9 1.119 723.3 0.677
 10 0.990 11.302 14.696 518.7 51.23 1071.8 0.996 671.1 0.624
 11 0.990 11.918 14.696 518.7 48.87 914.7 0.844 601.7 0.555
 12 0.990 12.283 14.696 518.7 46.75 814.2 0.748 557.9 0.512
 13 0.990 12.298 14.696 518.7 40.10 726.9 0.668 556.1 0.511

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= 754.0 CZ= 739.9 MM=0.710 MABS=0.710 MREL=1.259

ROTOR1
 WTF= 61.365 I= 8 STA= 11.500
 PSIC Z OPTX=TT R PHI OPTY=PT AFLOW= 178.74 IN ROTOR
 D=H=O.
 ABH=O.
 MM
 0.050 -7.963 8.500 0. 0. 855.5 49.2 3.29 0.805
 0.100 -7.991 8.322 0.13 0.0290 860.3 46.6 3.10 0.811
 0.200 -8.020 8.141 0.38 0.0311 865.5 42.6 2.82 0.817
 0.300 -8.083 7.765 1.21 0.0254 885.2 43.3 2.80 0.839
 0.400 -8.143 7.372 2.59 0.0150 899.6 46.1 2.93 0.854
 0.500 -8.198 6.954 4.44 -0.0010 905.3 52.8 3.34 0.860
 0.600 -8.251 6.505 6.71 -0.0058 897.6 62.2 3.96 0.850
 0.700 -8.301 6.014 9.29 0.0114 871.5 66.7 4.38 0.822
 0.800 -8.324 5.463 12.53 0.0205 835.9 68.4 4.68 0.785
 0.900 -8.299 4.827 16.79 0.0128 786.1 66.9 4.87 0.734
 0.950 -8.247 4.027 22.09 0.0299 714.8 68.4 5.47 0.663
 1.000 -8.231 3.504 25.56 0.0662 674.4 66.0 5.59 0.623
 -8.224 2.815 28.62 0.0917 656.4 68.9 5.99 0.606

SL BLDLK PS PT TT BETAM VREL MREL VABS MABS
 1 0.944 10.130 15.543 531.0 59.47 1684.3 1.584 856.9 0.806
 2 0.944 10.059 15.522 530.1 58.83 1662.1 1.566 861.6 0.812
 3 0.943 9.959 15.468 528.9 58.16 1640.8 1.549 866.6 0.818
 4 0.940 9.768 15.509 528.6 56.29 1595.2 1.511 886.3 0.840
 5 0.935 9.649 15.570 528.7 54.36 1543.9 1.466 900.8 0.855
 6 0.927 9.662 15.688 529.5 52.37 1482.8 1.408 906.9 0.861
 7 0.917 9.840 15.830 530.6 50.42 1408.8 1.335 899.7 0.852
 8 0.907 10.134 15.846 530.5 48.77 1322.4 1.248 874.1 0.825
 9 0.898 10.475 15.784 529.7 46.98 1225.1 1.151 838.7 0.788
 10 0.886 10.899 15.643 528.2 44.96 1110.8 1.038 788.9 0.737
 11 0.865 11.512 15.500 526.8 41.94 961.0 0.891 718.1 0.666
 12 0.847 11.795 15.364 525.5 39.31 871.7 0.805 677.7 0.626
 13 0.812 11.865 15.248 524.4 33.10 783.5 0.723 660.0 0.609

STA 11.500 MASS AVERAGED PROPERTIES
 PT= 15.623 TT= 528.92 GAMMA=1.4018 PT-RAT= 1.063 TT-RAT= 1.020
 RCU= 347.5 VM= 841.2 CZ= 824.5 MM=0.792 MABS=0.794 MREL=1.275

ROTOR1 STA= 12.000 AFLOW= 166.91 D+C=O. D+H=O. ABH=O.
 WTF= 61.365 I= 9 MTIP=105 ITYPE=5 INBR=3 CU ALPHAM MM
 PSIC Z OPTX=TT PHI CURV VM VABS MABS
 0. -7.759 8.500 0. 0. 830.2 106.3 7.30 0.767
 0.050 -7.778 8.322 -0.19 0.0239 836.3 105.3 7.18 0.774
 0.100 -7.798 8.141 -0.03 0.0342 842.5 102.3 6.92 0.781
 0.200 -7.844 7.770 0.84 0.0280 866.8 104.5 6.88 0.807
 0.300 -7.889 7.383 2.32 0.0222 892.3 111.4 7.12 0.834
 0.400 -7.931 6.975 4.38 0.0090 915.3 124.2 7.73 0.858
 0.500 -7.971 6.538 6.66 0.0121 927.6 138.8 8.51 0.870
 0.600 -8.010 6.061 9.19 0.0007 917.4 148.0 9.17 0.860
 0.700 -8.024 5.529 12.33 0.0026 891.4 161.6 10.28 0.832
 0.800 -7.995 4.918 16.40 0.0309 845.8 161.0 10.78 0.787
 0.900 -7.946 4.148 21.58 0.0252 777.7 152.4 11.09 0.720
 0.950 -7.936 3.642 24.84 0.0116 731.9 149.3 11.53 0.675
 1.000 -7.940 2.965 27.61 0.0178 686.8 150.2 12.33 0.632

SL BDBLK PS PT TT BETAM VREL MREL VABS MABS
 1 0.913 11.147 16.562 545.3 59.22 1622.2 1.499 837.0 0.773
 2 0.912 11.103 16.605 544.5 58.47 1599.4 1.480 842.9 0.780
 3 0.911 11.018 16.592 543.2 57.73 1578.2 1.464 848.7 0.787
 4 0.907 10.810 16.707 542.6 55.61 1534.8 1.430 873.1 0.813
 5 0.899 10.614 16.869 542.9 53.17 1488.5 1.392 899.2 0.841
 6 0.886 10.487 17.111 544.2 50.40 1436.1 1.346 923.7 0.866
 7 0.869 10.458 17.323 545.4 47.58 1375.1 1.290 937.9 0.880
 8 0.853 10.579 17.354 545.1 45.13 1300.3 1.219 929.2 0.871
 9 0.840 10.882 17.391 545.0 42.41 1207.2 1.127 905.9 0.840
 10 0.824 11.197 17.095 542.0 39.89 1102.4 1.026 861.0 0.801
 11 0.795 11.592 16.588 537.3 36.69 969.9 0.898 792.5 0.734
 12 0.774 11.860 16.302 534.7 33.98 882.7 0.814 747.0 0.689
 13 0.733 12.059 15.985 531.8 28.52 781.6 0.719 703.0 0.647

STA 12.000 MASS AVERAGED PROPERTIES
 PT= 16.930 TT= 542.65 GAMMA=1.4018 PT-RAT= 1.152 TT-RAT= 1.046
 RCU= 813.7 VM= 863.5 CZ= 846.4 MM=0.805 MABS=0.815 MREL=1.230

ROTOR1 STA= 12.500
 WTF= 61.365 I=10 MTIP=118 AFLOW= 158.62 D=C=O. D*H=O.
 PSIC Z OPTX=TT PHI CURV VM CU ALPHAM MM
 0. -7.556 8.500 0. 0. 793.5 166.3 11.84 0.720
 0.050 -7.565 8.321 -0.32 -0.0021 800.7 168.7 11.90 0.727
 0.100 -7.576 8.141 -0.30 0.0074 809.6 172.0 11.99 0.736
 0.200 -7.605 7.772 0.52 0.0194 828.8 175.8 11.97 0.756
 0.300 -7.635 7.392 2.05 0.0145 855.3 187.6 12.37 0.783
 0.400 -7.663 6.995 4.07 0.0304 882.3 202.1 12.90 0.811
 0.500 -7.691 6.570 6.37 0.0244 902.4 214.6 13.38 0.832
 0.600 -7.719 6.108 9.06 0.0150 912.2 229.2 14.10 0.844
 0.700 -7.724 5.595 12.13 0.0202 908.1 244.2 15.05 0.841
 0.800 -7.690 5.006 15.89 0.0243 881.3 253.2 16.03 0.815
 0.900 -7.645 4.265 21.24 0.0112 814.6 246.2 16.81 0.751
 0.950 -7.641 3.778 24.84 -0.0116 769.7 248.2 17.88 0.708
 1.000 -7.657 3.114 27.97 -0.0568 702.4 236.8 18.63 0.644

IN ROTOR
 VABS MABS
 810.7 0.735
 818.3 0.743
 827.6 0.753
 847.3 0.773
 875.6 0.802
 905.2 0.832
 927.6 0.856
 940.6 0.870
 940.4 0.870
 917.0 0.848
 851.0 0.784
 808.7 0.744
 741.3 0.680

SL BLDLCK PS PT TT BETAM VREL MREL VABS MABS
 1 0.889 12.334 17.672 560.3 59.25 1551.9 1.407 810.7 0.735
 2 0.889 12.348 17.821 560.0 58.37 1526.6 1.386 818.3 0.743
 3 0.889 12.338 17.968 559.9 57.37 1501.5 1.365 827.6 0.753
 4 0.884 12.235 18.175 558.9 55.27 1455.0 1.328 847.3 0.773
 5 0.874 12.093 18.477 559.5 52.56 1406.8 1.288 875.6 0.802
 6 0.860 11.916 18.767 560.3 49.48 1358.0 1.248 905.2 0.832
 7 0.841 11.717 18.912 560.2 46.32 1306.5 1.205 927.6 0.856
 8 0.823 11.588 18.983 559.9 42.93 1245.9 1.152 940.6 0.870
 9 0.806 11.558 18.949 558.9 39.29 1173.4 1.086 940.4 0.870
 10 0.785 11.653 18.662 556.0 35.57 1083.5 1.002 917.0 0.848
 11 0.752 11.940 17.930 549.6 31.87 959.2 0.884 851.0 0.784
 12 0.728 12.147 17.541 546.3 28.53 876.1 0.805 808.7 0.744
 13 0.682 12.381 16.873 540.4 24.00 768.9 0.705 741.3 0.680

STA 12.500 MASS AVERAGED PROPERTIES
 PT= 18.411 TT= 557.42 GAMMA=1.4017 PT-RAT= 1.253 TT-RAT= 1.075
 RCU= 1315.6 VM= 854.8 CZ= 837.7 MM=0.786 MABS=0.810 MREL=1.162

ROTOR1 STA= 13.000
 WTF= 61.365 I=11 MTIP=131 AFLOW= 153.32 D+C=O. D+H=O.
 PSIC Z R OPTX=TT OPTY=PT PHI CURV VM CU ALPHAM MM ABH=O.

IN ROTOR	1	2	3	4	5	6	7	8	9	10	11	12	13
0.050	-7.352	8.500	0.	0.	749.8	214.3	15.95	0.669					
0.100	-7.351	8.320	-0.43	0.0199	762.7	219.4	16.05	0.682					
0.200	-7.354	8.139	-0.47	0.0192	775.1	223.4	16.08	0.694					
0.300	-7.366	7.774	0.23	0.0228	803.2	232.1	16.12	0.723					
0.400	-7.381	7.401	1.73	0.0292	833.4	242.5	16.22	0.753					
0.500	-7.396	7.013	3.67	0.0221	864.2	256.4	16.52	0.785					
0.600	-7.412	6.601	6.07	0.0125	887.7	272.4	17.06	0.810					
0.700	-7.428	6.154	8.76	0.0206	906.1	291.1	17.81	0.830					
0.800	-7.424	5.658	11.81	0.0161	914.4	309.9	18.72	0.840					
0.900	-7.385	5.092	15.61	0.0070	902.0	329.7	20.08	0.830					
0.950	-7.344	4.382	21.24	-0.0109	848.6	331.1	21.32	0.780					
1.000	-7.346	3.915	25.26	-0.0332	806.0	330.7	22.31	0.740					
	-7.374	3.269	29.72	-0.1324	723.5	320.1	23.87	0.661					

SL BLD8LK PS PT TT BETAM VREL MREL VABS MABS
 1 0.879 13.445 18.591 572.3 59.75 1488.3 1.329 779.8 0.696
 2 0.879 13.454 18.830 572.4 58.59 1463.3 1.309 793.7 0.710
 3 0.879 13.433 19.025 572.2 57.42 1439.4 1.290 806.7 0.723
 4 0.874 13.323 19.395 571.8 54.83 1394.3 1.255 836.0 0.752
 5 0.866 13.118 19.702 571.5 51.92 1351.1 1.221 867.9 0.785
 6 0.852 12.867 19.994 571.6 48.63 1307.5 1.188 901.4 0.819
 7 0.831 12.632 20.203 571.6 45.15 1258.8 1.148 928.5 0.847
 8 0.810 12.384 20.321 571.4 41.26 1205.3 1.104 951.7 0.871
 9 0.788 12.165 20.297 570.3 36.98 1144.7 1.052 965.5 0.887
 10 0.763 12.090 20.097 568.1 32.24 1066.4 0.981 960.4 0.883
 11 0.729 12.183 19.289 561.4 27.52 956.8 0.879 910.9 0.837
 12 0.702 12.280 18.719 556.8 24.08 882.9 0.810 871.2 0.800
 13 0.653 12.596 17.850 549.5 19.54 767.7 0.702 791.1 0.723

STA 13.000 MASS AVERAGED PROPERTIES
 PT= 19.656 TT= 569.16 GAMMA=1.4016 PT-RAT= 1.337 TT-RAT= 1.097
 RCU= 1714.7 VM= 848.1 CZ= 830.6 MM=0.772 MABS=0.812 MREL=1.114

ROTOR1 STA= 13.500 AFLOW= 150.88 D*H=0. D*H=0.
 WTF= 61.365 MTIP=144 ITYPE=5 INBR=3 ABC=0. ABH=0.
 PSIC Z OPTX=TT PHI CURV VM CU ALPHAM MM
 0. -7.148 8.500 0. 0. 700.6 252.3 19.81 0.617
 0.050 -7.138 8.318 -0.48 -0.0117 720.3 264.8 20.19 0.635
 0.100 -7.131 8.137 -0.55 -0.0067 733.8 272.8 20.39 0.648
 0.200 -7.127 7.774 0.01 0.0091 763.1 285.5 20.51 0.677
 0.300 -7.127 7.407 1.38 0.0194 794.9 297.8 20.54 0.708
 0.400 -7.128 7.029 3.40 0.0127 824.8 311.9 20.71 0.739
 0.500 -7.132 6.630 5.79 0.0230 849.1 327.6 21.10 0.764
 0.600 -7.137 6.198 8.44 0.0177 868.2 343.9 21.61 0.785
 0.700 -7.124 5.720 11.59 0.0094 882.1 366.6 22.57 0.801
 0.800 -7.081 5.177 15.64 -0.0102 879.5 392.6 24.06 0.801
 0.900 -7.043 4.500 21.63 -0.0313 848.6 413.1 25.96 0.774
 0.950 -7.051 4.057 26.05 -0.0519 817.2 413.0 26.81 0.747
 1.000 -7.091 3.439 32.15 -0.1167 752.1 404.1 28.25 0.687

IN ROTOR
 VABS MABS
 744.7 0.656
 767.4 0.677
 782.8 0.691
 814.8 0.723
 848.9 0.756
 881.8 0.790
 910.1 0.819
 933.9 0.844
 955.3 0.867
 963.2 0.877
 943.8 0.861
 915.6 0.836
 853.8 0.779

SL BLDLK PS PT TT BETAM VREL MREL
 1 0.883 14.480 19.337 581.8 60.68 1430.9 1.261
 2 0.883 14.538 19.763 583.5 59.09 1402.2 1.237
 3 0.883 14.579 20.074 584.0 57.75 1375.3 1.215
 4 0.878 14.545 20.596 584.0 54.92 1327.7 1.177
 5 0.871 14.361 20.990 583.6 51.78 1284.8 1.145
 6 0.856 14.118 21.308 583.2 48.39 1242.0 1.112
 7 0.836 13.839 21.505 582.6 44.77 1196.1 1.076
 8 0.814 13.504 21.536 581.4 40.81 1147.2 1.037
 9 0.790 13.188 21.547 580.4 36.08 1091.5 0.991
 10 0.764 12.956 21.392 578.5 30.64 1022.2 0.931
 11 0.728 12.776 20.743 573.4 24.17 930.2 0.849
 12 0.699 12.664 20.036 568.0 20.34 871.5 0.796
 13 0.648 12.701 18.981 559.6 15.09 779.0 0.711

STA 13.500 MASS AVERAGED PROPERTIES
 PT= 20.889 TT= 580.28 GAMMA=1.4015 PT-RAT= 1.421 TT-RAT= 1.119
 RCU= 2093.2 VM= 818.1 CZ= 799.9 MM=0.736 MABS=0.796 MREL=1.053

ROTOR1
 WTF= 61.365 I=13 STA= 14.000
 PSIC Z OPTX=TT R PHI OPTV=PT AFLOW= 149.38 D=C=O. IN ROTOR
 0. -6.945 8.500 0. 0. 0.0162 661.1 294.0 23.97 0.576
 0.050 -6.925 8.316 -0.31 -0.0162 682.8 308.6 24.32 0.595
 0.100 -6.909 8.135 -0.47 -0.0058 699.4 319.3 24.54 0.610
 0.200 -6.888 7.774 -0.04 -0.0014 732.7 334.1 24.51 0.642
 0.300 -6.873 7.413 1.30 -0.0085 767.4 350.4 24.54 0.676
 0.400 -6.861 7.045 3.25 0.0073 797.6 366.3 24.67 0.706
 0.500 -6.852 6.658 5.50 0.0125 816.4 377.9 24.84 0.726
 0.600 -6.846 6.240 8.21 0.0094 832.1 394.4 25.36 0.744
 0.700 -6.824 5.781 11.51 -0.0002 843.2 417.5 26.34 0.757
 0.800 -6.777 5.263 15.84 -0.0122 845.2 447.6 27.91 0.762
 0.900 -6.742 4.621 22.30 -0.0414 833.0 481.1 30.01 0.754
 0.950 -6.756 4.204 27.13 -0.0626 817.4 495.6 31.23 0.742
 1.000 -6.808 3.624 34.17 -0.0917 777.5 491.3 32.29 0.708

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.888	15.440	20.174	592.2	61.27	1375.4	1.197	723.5	0.630
2	0.888	15.532	20.687	594.2	59.49	1345.1	1.172	749.3	0.653
3	0.887	15.595	21.093	595.1	57.93	1317.3	1.150	768.9	0.671
4	0.883	15.580	21.730	595.1	54.78	1270.4	1.114	805.3	0.706
5	0.876	15.428	22.266	595.1	51.30	1227.3	1.081	843.6	0.743
6	0.864	15.199	22.657	594.6	47.71	1185.4	1.049	877.7	0.777
7	0.846	14.915	22.751	592.7	44.31	1140.9	1.015	899.6	0.800
8	0.827	14.587	22.764	591.1	40.34	1091.7	0.976	920.9	0.823
9	0.805	14.256	22.746	589.7	35.56	1036.5	0.930	940.9	0.845
10	0.780	13.926	22.625	588.0	29.65	972.5	0.877	956.4	0.862
11	0.744	13.476	22.104	584.1	21.87	897.6	0.813	961.9	0.871
12	0.714	13.158	21.519	580.0	16.77	853.7	0.775	955.9	0.868
13	0.662	12.826	20.328	571.1	10.80	791.5	0.721	919.7	0.838

STA 14.000 MASS AVERAGED PROPERTIES
 PT= 22.107 TT= 590.86 GAMMA=1.4014 PT-RAT= 1.504 TT-RAT= 1.139
 RCU= 2453.2 VM= 789.4 CZ= 770.6 MM=0.703 MABS=0.784 MREL=0.997

ROTOR1 I=14 STA= 14.500 IN ROTOR
 WTF= 61.365 OPTX=TT AFLOW= 148.88 D+C=0. D+H=0.
 PSIC Z R PHI CURV VM CU ALPHAM MM
 0. -6.741 8.500 0. 0. 622.6 360.9 30.10 0.534
 0.050 -6.712 8.315 -0.24 0.0044 642.2 373.4 30.17 0.551
 0.100 -6.687 8.133 -0.36 -0.0106 656.8 381.7 30.16 0.565
 0.200 -6.648 7.774 0.08 -0.0155 695.0 399.4 29.88 0.601
 0.300 -6.618 7.419 1.40 -0.0054 734.2 414.3 29.44 0.638
 0.400 -6.593 7.060 3.16 0.0041 762.9 422.4 28.97 0.668
 0.500 -6.572 6.684 5.41 -0.0015 780.4 431.4 28.93 0.687
 0.600 -6.554 6.282 8.17 -0.0051 790.7 444.4 29.34 0.699
 0.700 -6.523 5.842 11.60 -0.0107 800.3 468.5 30.34 0.710
 0.800 -6.472 5.350 16.17 -0.0233 802.1 498.9 31.88 0.715
 0.900 -6.441 4.747 23.08 -0.0411 807.8 557.2 34.60 0.725
 0.950 -6.461 4.359 28.30 -0.0590 804.9 579.4 35.75 0.726
 1.000 -6.525 3.823 35.75 -0.0685 793.1 588.6 36.58 0.721

SL BLDLCK PS PT TT BETAM VREL MREL VABS MABS
 1 0.897 16.676 21.561 608.9 61.34 1298.2 1.113 719.6 0.617
 2 0.897 16.804 22.100 610.0 59.59 1268.6 1.089 742.8 0.638
 3 0.896 16.894 22.510 610.0 58.06 1241.5 1.068 759.7 0.654
 4 0.892 16.912 23.315 610.0 54.45 1195.4 1.033 801.6 0.693
 5 0.887 16.707 23.888 609.1 50.63 1157.5 1.007 843.0 0.733
 6 0.877 16.395 24.113 606.4 47.18 1122.5 0.982 872.1 0.763
 7 0.863 16.076 24.138 603.5 43.79 1081.1 0.951 891.7 0.784
 8 0.848 15.740 24.039 600.8 40.03 1032.6 0.913 907.0 0.802
 9 0.831 15.389 24.018 599.2 35.11 978.2 0.868 927.3 0.823
 10 0.809 14.995 23.867 597.2 29.03 917.4 0.818 944.6 0.842
 11 0.776 14.338 23.760 596.5 19.15 855.1 0.767 981.4 0.881
 12 0.747 13.800 23.210 593.0 13.27 827.0 0.746 991.8 0.894
 13 0.696 13.058 22.032 584.9 6.19 797.7 0.725 987.7 0.897

STA 14.500 MASS AVERAGED PROPERTIES
 PT= 23.556 TT= 603.10 GAMMA=1.4012 PT-RAT= 1.603 TT-RAT= 1.163
 RCU= 2869.8 VM= 754.2 CZ= 734.7 MM=0.664 MABS=0.774 MREL=0.933

ROTOR 1		STA= 15.000				AFLOW= 148.57				IN ROTOR			
WTF= 61.365		I=15		MTIP=183		ITYPE=5		INBR=3		D+C=0.		D+H=0.	
PSIC	Z	R	PT	PHI	CURV	VM	CU	ALPHAM	MM	ABH=0.	MM	ABH=0.	MM
0.	-6.538	8.500	0.	0.	0.	580.6	457.1	38.21	0.489				
0.050	-6.499	8.314	-0.44	0.0291	600.6	463.2	37.64	0.507					
0.100	-6.465	8.132	-0.51	0.0337	618.0	465.2	36.97	0.523					
0.200	-6.409	7.775	0.22	-0.0054	661.2	470.8	35.45	0.564					
0.300	-6.364	7.426	1.61	-0.0230	701.7	478.7	34.30	0.603					
0.400	-6.325	7.075	3.39	-0.0343	728.0	484.1	33.62	0.630					
0.500	-6.292	6.711	5.64	-0.0271	744.2	495.6	33.66	0.647					
0.600	-6.263	6.324	8.40	-0.0225	753.0	509.8	34.10	0.658					
0.700	-6.224	5.905	11.92	-0.0251	758.8	531.0	34.98	0.666					
0.800	-6.168	5.439	16.62	-0.0269	765.5	566.4	36.50	0.676					
0.900	-6.140	4.878	23.68	-0.0227	784.2	631.0	38.82	0.698					
0.950	-6.166	4.521	29.00	-0.0140	801.2	667.1	39.78	0.719					
1.000	-6.241	4.031	36.90	-0.0425	808.7	709.3	41.25	0.733					

SL		BLDBLK		PS		PT		TT		BETAM		VREL		MREL		VABS		MABS	
1	0.907	18.219	23.648	632.9	60.90	1193.6	1.005	738.9	0.622										
2	0.906	18.329	24.151	631.9	59.11	1170.0	0.987	758.5	0.640										
3	0.906	18.359	24.493	629.9	57.50	1150.0	0.974	773.5	0.655										
4	0.903	18.237	25.132	626.3	53.74	1117.8	0.954	811.7	0.692										
5	0.899	17.955	25.599	623.2	49.84	1088.2	0.935	849.5	0.730										
6	0.893	17.649	25.790	619.4	46.39	1055.6	0.913	874.3	0.756										
7	0.883	17.355	25.884	616.5	42.78	1013.9	0.882	894.1	0.778										
8	0.873	17.002	25.783	613.5	38.83	966.7	0.845	909.3	0.795										
9	0.861	16.605	25.652	610.9	33.96	914.9	0.803	926.2	0.813										
10	0.845	16.098	25.572	609.3	27.20	860.7	0.760	952.3	0.840										
11	0.818	15.166	25.544	609.2	16.33	817.1	0.727	1006.5	0.896										
12	0.792	14.326	25.191	607.4	9.27	811.8	0.728	1042.6	0.935										
13	0.743	13.260	24.388	602.8	0.15	808.7	0.733	1075.7	0.975										

STA 15.000 MASS AVERAGED PROPERTIES
PT= 25.358 TT= 617.70 GAMMA=1.4010 PT-RAT= 1.726 TT-RAT= 1.191
RCU= 3367.1 VM= 721.2 CZ= 701.0 MM=0.628 MABS=0.775 MREL=0.866

ROTOR1 STA= 15.500 AFLOW= 148.40 D+C=O. D+H=O. ABH=O.
 WTF= 61.365 I=16 MTIP=196 OPTV=PT I-/PE=5 INBR=3 ABC=O. IN ROTOR
 PSIC Z OPTX=TT PHI CURV VM CU ALPHAM MM
 0. -6.334 8.500 0. 0. 545.0 530.1 44.21 0.453
 0.050 -6.285 8.312 -0.73 0.0184 570.8 532.3 43.00 0.476
 0.100 -6.242 8.129 -0.68 -0.0070 593.0 533.7 41.99 0.497
 0.200 -6.170 7.776 0.52 -0.0384 639.0 536.5 40.02 0.540
 0.300 -6.110 7.434 2.19 -0.0571 678.3 540.5 38.55 0.577
 0.400 -6.057 7.092 4.13 -0.0619 703.5 543.0 37.67 0.603
 0.500 -6.012 6.740 6.40 -0.0664 717.1 553.7 37.67 0.618
 0.600 -5.972 6.368 9.10 -0.0604 722.3 570.5 38.30 0.625
 0.700 -5.924 5.969 12.53 -0.0447 726.6 593.8 39.26 0.632
 0.800 -5.863 5.532 17.19 -0.0350 735.3 629.0 40.55 0.643
 0.900 -5.838 5.011 23.94 -0.0050 762.9 693.7 42.28 0.674
 0.950 -5.871 4.686 29.02 0.0120 789.2 732.4 42.86 0.704
 1.000 -5.958 4.245 36.75 0.0575 836.2 798.1 43.67 0.757

SL BLOBLK PS PT TT BETAM VREL MREL VABS MABS
 1 0.918 19.344 25.307 651.1 60.67 1112.5 0.924 760.3 0.632
 2 0.918 19.406 25.799 648.7 58.59 1095.1 0.913 780.5 0.651
 3 0.917 19.418 26.195 646.2 56.64 1078.5 0.903 797.8 0.668
 4 0.916 19.301 26.884 641.3 52.60 1052.0 0.888 834.3 0.705
 5 0.914 19.022 27.326 636.8 48.67 1027.1 0.874 867.4 0.738
 6 0.911 18.707 27.477 631.9 45.20 998.4 0.856 888.7 0.762
 7 0.906 18.421 27.558 628.4 41.56 958.3 0.826 906.0 0.781
 8 0.901 18.101 27.511 625.5 37.45 909.9 0.788 920.4 0.797
 9 0.895 17.687 27.409 622.9 32.32 859.8 0.748 938.3 0.816
 10 0.886 17.075 27.302 621.0 25.27 813.1 0.712 967.7 0.847
 11 0.870 15.921 27.270 620.9 14.02 786.4 0.695 1031.2 0.911
 12 0.848 14.909 26.961 619.6 6.82 794.8 0.709 1076.7 0.960
 13 0.801 13.273 26.567 618.3 -3.36 837.6 0.758 1155.9 1.047

STA 15.500 MASS AVERAGED PROPERTIES
 PT= 27.088 TT= 630.96 GAMMA=1.4008 PT-RAT= 1.843 TT-RAT= 1.216
 RCU= 3819.2 VM= 696.4 CZ= 675.8 MM=0.601 MABS=0.785 MREL=0.812

ROTOR1 STA= 16.000
 WTF= 61.365 I=17 MTIP=209 AFLOW= 148.43 D+C=O. D+H=O.
 PSIC Z R PHI CURV VM CU ALPHAM MM ABH=O.
 0. -6.131 8.500 0. 0. 513.6 583.6 48.65 0.423
 0.050 -6.072 8.309 -0.50 -0.0573 552.1 585.9 46.70 0.457
 0.100 -6.020 8.127 -0.12 -0.0810 579.2 586.8 45.37 0.481
 0.200 -5.931 7.780 1.46 -0.0984 627.7 590.6 43.26 0.526
 0.300 -5.856 7.446 3.34 -0.1001 661.0 595.6 42.02 0.558
 0.400 -5.790 7.114 5.30 -0.0900 682.9 602.8 41.43 0.581
 0.500 -5.732 6.774 7.50 -0.0708 692.8 613.3 41.52 0.592
 0.600 -5.680 6.417 10.04 -0.0502 697.2 630.9 42.15 0.599
 0.700 -5.624 6.038 13.16 -0.0271 702.3 655.9 43.04 0.606
 0.800 -5.559 5.627 17.33 0.0191 714.1 691.1 44.06 0.621
 0.900 -5.537 5.144 23.42 0.0603 731.9 746.6 45.57 0.642
 0.950 -5.576 4.847 27.60 0.1353 752.3 791.8 46.46 0.665
 1.000 -5.675 4.449 34.61 0.1558 783.6 868.6 47.95 0.702

SL BLDBLK PS PT TT BETAM VREL MREL VABS MABS
 1 0.926 20.164 26.560 664.4 60.73 1050.5 0.865 777.4 0.640
 2 0.927 20.140 27.120 661.7 57.91 1039.3 0.860 805.1 0.666
 3 0.927 20.128 27.560 658.8 55.65 1026.4 0.853 824.5 0.685
 4 0.927 20.052 28.390 653.7 51.26 1003.0 0.841 861.9 0.723
 5 0.928 19.898 28.940 649.0 47.38 976.1 0.824 889.7 0.751
 6 0.928 19.696 29.280 644.7 43.70 944.6 0.803 910.9 0.774
 7 0.928 19.448 29.380 640.8 40.04 904.9 0.773 925.3 0.791
 8 0.928 19.110 29.350 637.7 35.73 858.8 0.737 940.3 0.807
 9 0.928 18.643 29.280 635.1 30.25 813.0 0.702 961.0 0.829
 10 0.928 17.922 29.160 633.0 22.92 775.3 0.674 993.7 0.863
 11 0.930 16.780 28.920 631.6 12.42 749.4 0.657 1045.5 0.917
 12 0.914 15.812 28.770 631.5 4.83 755.0 0.667 1092.1 0.965
 13 0.875 14.296 28.650 632.3 -6.08 788.0 0.706 1169.9 1.048

STA 16.000 MASS AVERAGED PROPERTIES
 PT= 28.783 TT= 643.26 GAMMA=1.4006 PT-RAT= 1.959 TT-RAT= 1.240
 RCU= 4238.7 VM= 673.8 CZ= 654.3 MM=0.577 MABS=0.798 MREL=0.764

AVERAGE BLADE SPEED ACC PT ACC TT EFFICIENCY AXIAL
 PCT IMM RAD IN OUT RATIO RATIO AD. POLY VEL R
 0. 8.500 1500.0 1500.0 1.8073 1.2809 0.656 0.683 0.622
 3.7 8.315 1468.5 1466.3 1.8454 1.2757 0.694 0.719 0.668
 7.4 8.133 1436.2 1434.2 1.8753 1.2701 0.729 0.752 0.700
 14.8 7.770 1369.4 1372.9 1.9318 1.2603 0.796 0.814 0.757
 22.2 7.403 1298.8 1313.9 1.9692 1.2512 0.851 0.864 0.799
 29.8 7.023 1223.5 1255.3 1.9924 1.2429 0.897 0.906 0.835
 37.9 6.623 1142.2 1195.4 1.9992 1.2354 0.930 0.937 0.866
 46.6 6.192 1052.8 1132.5 1.9971 1.2294 0.953 0.957 0.907
 56.2 5.717 952.3 1065.5 1.9924 1.2244 0.971 0.973 0.967
 67.1 5.181 835.6 993.0 1.9842 1.2204 0.982 0.984 1.058
 80.3 4.524 689.0 907.8 1.9679 1.2177 0.981 0.983 1.201
 88.8 4.104 593.0 855.3 1.9577 1.2175 0.974 0.976 1.326
 100.0 3.551 468.2 785.1 1.9495 1.2190 0.960 0.964 1.354

FREE STA= 17.000
 WTF= 61.365 I=18 MTIP=222 AFLOW= 146.32 D*H=0. FREE
 PSIC Z R OPTX=DPP PHI OPTY=FREE ITYPE=O INBR=O CU ALPHAM D*H=0.
 0. -5.700 8.500 0. 0. 501.7 583.6 49.32 0.413
 0.050 -5.638 8.311 0.87 -0.0524 552.8 585.8 46.66 0.457
 0.100 -5.585 8.134 1.75 -0.0690 587.9 586.3 44.92 0.489
 0.200 -5.497 7.799 3.49 -0.0647 644.9 589.1 42.41 0.541
 0.300 -5.427 7.479 5.13 -0.0459 679.5 593.0 41.11 0.575
 0.400 -5.372 7.159 6.73 -0.0292 702.7 598.9 40.44 0.598
 0.500 -5.331 6.832 8.46 -0.0121 714.9 608.2 40.39 0.612
 0.600 -5.304 6.487 10.51 0.0070 720.9 624.2 40.89 0.620
 0.700 -5.294 6.116 13.12 0.0310 726.2 647.5 41.72 0.628
 0.800 -5.304 5.706 16.73 0.0597 729.1 681.5 43.07 0.634
 0.900 -5.351 5.223 22.34 0.1262 734.0 735.3 45.05 0.643
 0.950 -5.405 4.933 25.96 0.1644 741.3 777.9 46.38 0.653
 1.000 -5.520 4.552 32.88 0.1656 719.9 848.9 49.70 0.638

SL BLDLTK PS PT TT BETAM VREL MREL VABS MABS
 1 0.940 20.260 26.533 664.4 61.30 1044.7 0.859 769.6 0.633
 2 0.940 20.114 27.093 661.7 57.89 1039.9 0.861 805.4 0.667
 3 0.940 20.014 27.532 658.8 55.30 1032.7 0.859 830.3 0.691
 4 0.940 19.854 28.390 653.7 50.68 1017.7 0.854 873.5 0.733
 5 0.940 19.683 28.940 649.0 46.93 995.0 0.842 901.8 0.763
 6 0.940 19.470 29.280 644.7 43.40 967.1 0.823 923.3 0.786
 7 0.940 19.204 29.380 640.8 39.89 931.6 0.798 938.6 0.803
 8 0.940 18.863 29.350 637.7 35.84 889.2 0.765 953.5 0.820
 9 0.940 18.419 29.280 635.1 30.74 844.9 0.730 972.9 0.841
 10 0.940 17.841 29.160 633.0 24.05 795.4 0.694 998.1 0.868
 11 0.940 16.903 28.920 631.6 14.25 757.3 0.663 1039.0 0.910
 12 0.940 16.144 28.770 631.5 7.12 747.1 0.658 1074.6 0.947
 13 0.940 15.319 28.564 632.3 -3.62 721.3 0.639 1113.1 0.987

STA 17.000 MASS AVERAGED PROPERTIES
 PT= 28.777 TT= 643.26 GAMMA=1.4006 PT-RAT= 1.958 TT-RAT= 1.240
 RCU= 4238.7 VM= 686.2 CZ= 667.6 MM=0.588 MABS=0.803 MREL=0.778

STATOR STA= 18.000 LE STATOR
 WTF= 61.365 I=19 MTIP=235 AFLOW= 141.54 D=C=O. D=H=O.
 PSIC Z OPTX=DPP PHI OPTY=FREE ITYPE=1 INBR=4 ABC=O. ABH=O.
 0. -5.250 8.500 0. 0. 545.3 583.6 46.89 0.451
 0.050 -5.192 8.322 1.58 -0.0031 586.7 585.0 44.92 0.487
 0.100 -5.142 8.153 2.73 -0.0084 617.3 585.0 43.46 0.515
 0.200 -5.062 7.831 4.48 -0.0151 671.3 586.7 41.16 0.565
 0.300 -5.003 7.521 5.90 -0.0166 705.8 589.6 39.88 0.598
 0.400 -4.961 7.210 7.27 -0.0163 730.0 594.7 39.17 0.623
 0.500 -4.937 6.891 8.77 -0.0144 744.4 602.9 39.01 0.639
 0.600 -4.933 6.556 10.56 -0.0115 753.7 617.6 39.33 0.650
 0.700 -4.953 6.194 12.88 -0.0070 762.9 639.3 39.97 0.662
 0.800 -5.004 5.793 16.11 0.0094 770.9 671.2 41.05 0.673
 0.900 -5.108 5.319 21.17 0.0298 773.8 722.1 43.02 0.680
 0.950 -5.202 5.028 24.71 0.0295 759.9 763.2 45.12 0.670
 1.000 -5.375 4.643 31.23 0.3271 802.6 832.3 46.04 0.717

SL BLDLK PS PT TT BETAM VREL MREL VABS MABS
 1 0.940 19.815 26.533 664.4 59.20 1066.9 0.880 799.4 0.660
 2 0.940 19.753 27.093 661.7 56.42 1060.6 0.880 828.5 0.687
 3 0.940 19.688 27.532 658.8 54.13 1053.6 0.878 850.5 0.709
 4 0.940 19.543 28.390 653.7 49.83 1040.7 0.876 891.6 0.750
 5 0.940 19.364 28.940 649.0 46.26 1020.9 0.866 919.7 0.780
 6 0.940 19.136 29.280 644.7 42.87 996.1 0.850 941.5 0.804
 7 0.940 18.845 29.380 640.8 39.48 964.4 0.828 957.9 0.822
 8 0.940 18.472 29.350 637.7 35.58 926.8 0.800 974.5 0.841
 9 0.940 17.997 29.280 635.1 30.75 887.6 0.770 995.3 0.863
 10 0.940 17.385 29.160 633.0 24.49 847.1 0.739 1022.2 0.892
 11 0.940 16.536 28.920 631.6 15.64 803.6 0.706 1058.4 0.930
 12 0.940 16.099 28.770 631.5 9.28 769.9 0.679 1076.9 0.949
 13 0.940 14.508 28.564 632.3 -0.92 802.7 0.717 1156.3 1.033

STA 18.000 MASS AVERAGED PROPERTIES
 PT= 28.777 TT= 643.26 GAMMA=1.4007 PT-RAT= 1.958 TT-RAT= 1.240
 RCU= 4238.7 VM= 719.3 CZ= 700.7 MM=0.618 MABS=0.822 MREL=0.810

STATOR STA= 19.000
 WTF= 61.365 I=20 MTIP=248 AFLOW= 126.02 IN STATOR
 PSIC Z R OPTX=DPP PHI DPTV=BETM ITYPE=2 INBR=4 D+C=O. ABC=O. D*H=O. ABH=O.
 CURV VM CU ALPHAM MM
 0 -4.770 8.500 0 0 0.0336 611.6 373.6 31.42 0.501
 0.050 -4.723 8.334 1.17 0.0336 640.9 382.9 30.86 0.527
 0.100 -4.683 8.174 2.13 0.0541 664.6 389.6 30.38 0.549
 0.200 -4.616 7.866 3.74 0.0727 710.4 405.1 29.69 0.593
 0.300 -4.566 7.566 5.17 0.0744 743.1 416.8 29.29 0.625
 0.400 -4.531 7.265 6.61 0.0696 767.9 428.0 29.13 0.650
 0.500 -4.512 6.957 8.20 0.0603 784.6 438.8 29.22 0.668
 0.600 -4.508 6.635 10.07 0.0514 799.3 452.2 29.50 0.684
 0.700 -4.524 6.292 12.25 0.0491 817.1 472.7 30.05 0.704
 0.800 -4.565 5.918 15.31 0.0522 840.2 503.5 30.93 0.729
 0.900 -4.641 5.494 19.48 0.0885 872.9 546.6 32.05 0.764
 0.950 -4.696 5.253 22.41 0.1161 899.0 575.2 32.61 0.791
 1.000 -4.770 4.975 26.23 0.1265 931.4 614.0 33.40 0.826

SL BLDLCK PS PT TT BETAM VREL MREL VABS MABS
 1 0.875 21.025 26.533 664.4 61.50 1281.7 1.049 716.7 0.587
 2 0.877 21.009 27.093 661.7 59.50 1262.6 1.038 746.5 0.614
 3 0.878 20.960 27.532 658.8 57.74 1245.1 1.029 770.4 0.637
 4 0.879 20.792 28.390 653.7 54.15 1212.9 1.012 817.8 0.682
 5 0.880 20.557 28.940 649.0 51.02 1181.3 0.993 852.0 0.716
 6 0.881 20.269 29.280 644.7 48.04 1148.5 0.972 879.1 0.744
 7 0.880 19.929 29.380 640.8 45.15 1112.6 0.948 899.0 0.766
 8 0.880 19.515 29.350 637.7 41.96 1074.8 0.920 918.3 0.786
 9 0.878 18.959 29.280 635.1 37.97 1036.5 0.892 944.0 0.813
 10 0.875 18.190 29.160 633.0 32.77 999.3 0.866 979.5 0.849
 11 0.867 17.074 28.920 631.6 25.85 970.0 0.849 1029.9 0.901
 12 0.857 16.282 28.770 631.5 21.37 965.4 0.850 1067.3 0.939
 13 0.837 15.272 28.564 632.3 15.82 968.0 0.858 1115.6 0.989

STA 19.000 MASS AVERAGED PROPERTIES
 PT= 28.777 TT= 643.26 GAMMA=1.4005 PT-RAT= 1.958 TT-RAT= 1.240
 RCU= 3076.0 VM= 777.2 CZ= 759.7 MM=0.663 MABS=0.768 MREL=0.943

STATOR STA= 21.000
 WTF= 61.365 I=22 MTIP=274 AFLOW= 115.13 IN STATOR
 PSIC Z OPTX=DPP PHI CURV VM CU ALPHAM MM D+H=O.
 0. -3.800 8.500 0. 0. 671.2 169.8 14.20 0.548
 0.050 -3.800 8.346 0.56 0.0032 702.3 175.4 14.02 0.576
 0.100 -3.800 8.196 1.13 0.0057 725.3 178.9 13.86 0.598
 0.200 -3.800 7.905 2.32 0.0111 767.2 185.5 13.59 0.638
 0.300 -3.800 7.621 3.59 0.0180 793.5 189.2 13.41 0.664
 0.400 -3.800 7.337 4.95 0.0261 811.4 191.6 13.29 0.683
 0.500 -3.800 7.047 6.43 0.0355 821.4 192.8 13.21 0.695
 0.600 -3.800 6.748 8.10 0.0463 829.3 193.8 13.16 0.704
 0.700 -3.800 6.435 10.00 0.0583 839.4 196.9 13.20 0.715
 0.800 -3.800 6.107 12.22 0.0724 852.2 203.7 13.44 0.729
 0.900 -3.800 5.756 14.99 0.0984 869.1 213.3 13.79 0.746
 0.950 -3.800 5.570 16.64 0.1117 881.9 218.2 13.90 0.758
 1.000 -3.800 5.376 18.63 0.1266 896.7 223.2 13.98 0.772

SL BLDBLK PS PT TT BETAM VREL MREL VABS MABS
 1 0.849 21.366 26.533 664.4 63.23 1489.9 1.216 692.3 0.565
 2 0.850 21.343 27.093 661.7 61.57 1475.3 1.211 723.9 0.594
 3 0.851 21.318 27.532 658.8 60.22 1460.3 1.204 747.0 0.616
 4 0.853 21.259 28.390 653.7 57.61 1432.3 1.191 789.3 0.656
 5 0.855 21.180 28.940 649.0 55.53 1401.8 1.174 815.7 0.683
 6 0.856 21.070 29.280 644.7 53.66 1369.4 1.153 833.7 0.702
 7 0.858 20.723 29.350 637.7 50.24 1296.8 1.128 843.7 0.714
 8 0.859 20.454 29.280 635.1 48.20 1259.3 1.073 862.2 0.734
 9 0.858 20.092 29.160 633.0 45.72 1220.7 1.044 876.2 0.749
 10 0.855 19.574 28.920 631.6 42.72 1182.9 1.015 894.9 0.768
 11 0.854 19.225 28.770 631.5 40.93 1167.3 1.003 908.5 0.781
 12 0.852 18.818 28.564 632.3 38.97 1153.4 0.993 924.1 0.796

STA 21.000 MASS AVERAGED PROPERTIES
 PT= 28.777 TT= 643.26 GAMMA=1.4003 PT-RAT= 1.958 TT-RAT= 1.240
 RCU= 1351.4 VM= 809.4 CZ= 799.1 MM=0.683 MABS=0.703 MREL=1.119

STA= 22.000
 WTF= 61.365 I=23 OPTX=287 AFLOW= 114.71 IN STATOR D=C=O. D*H=O.
 PSIC Z R PHI CURV VM CU ALPHAM MM ABH=O.
 0. -3.204 8.500 0. 0. 663.1 83.6 7.19 0.540
 0.050 -3.211 8.351 0.55 -0.0031 694.9 86.3 7.08 0.569
 0.100 -3.218 8.207 1.06 -0.0015 717.8 87.8 6.97 0.590
 0.200 -3.232 7.927 2.03 0.0070 760.0 90.6 6.79 0.630
 0.300 -3.246 7.653 3.05 0.0160 786.4 91.8 6.66 0.657
 0.400 -3.259 7.380 4.16 0.0249 804.3 92.5 6.56 0.675
 0.500 -3.272 7.102 5.39 0.0335 814.0 92.5 6.48 0.686
 0.600 -3.287 6.815 6.77 0.0434 821.1 92.6 6.43 0.695
 0.700 -3.301 6.516 8.36 0.0552 830.0 93.5 6.43 0.705
 0.800 -3.316 6.203 10.37 0.0581 840.2 95.8 6.51 0.716
 0.900 -3.333 5.870 12.74 0.0645 848.3 98.9 6.65 0.724
 0.950 -3.341 5.635 14.00 0.0825 854.0 100.6 6.72 0.730
 1.000 -3.350 5.512 15.23 0.1249 864.0 102.6 6.77 0.739

STA 22.000 MASS AVERAGED PROPERTIES
 PT= 28.777 TT= 643.26 GAMMA=1.4002 PT-RAT= 1.958 TT-RAT= 1.240
 RCU= 653.6 VM= 798.7 CZ= 791.5 MM=0.672 MABS=0.676 MREL=1.184

STATOR STA= 23.000
 I=24 MTIP=300 AFLOW= 118.17 TE STATOR
 WTF= 61.365 OPTX=DPP PHI DTY=BETM ITYPE=3 INBR=4 D=C=O. D*H=O.
 PSIC Z R CURV VM CU ALPHAM MM ABH=O.

0.	-2.567	8.500	0.	0.	658.1	0.	0.536
0.050	-2.581	8.357	0.50	0.0063	685.2	0.	0.560
0.100	-2.595	8.218	0.92	0.0091	702.8	0.	0.577
0.200	-2.622	7.947	1.69	0.0125	744.8	0.	0.616
0.300	-2.648	7.682	2.46	0.0184	770.2	0.	0.642
0.400	-2.674	7.418	3.29	0.0268	788.1	0.	0.660
0.500	-2.700	7.150	4.21	0.0379	797.4	0.	0.671
0.600	-2.728	6.874	5.25	0.0506	803.1	0.	0.678
0.700	-2.756	6.587	6.46	0.0656	811.7	0.	0.687
0.800	-2.785	6.290	8.03	0.0938	831.5	0.	0.707
0.900	-2.816	5.976	9.89	0.1249	831.5	0.	0.708
0.950	-2.833	5.809	10.80	0.1318	831.7	0.	0.708
1.000	-2.850	5.631	11.52	0.1267	820.0	0.	0.697

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.940	21.481	26.109	664.4	66.31	1638.0	1.333	658.1	0.536
2	0.940	21.483	26.581	661.7	65.08	1626.2	1.330	685.2	0.560
3	0.940	21.478	26.910	658.8	64.14	1611.6	1.323	702.8	0.577
4	0.940	21.462	27.731	653.7	62.03	1587.9	1.314	744.8	0.616
5	0.940	21.431	28.269	649.0	60.40	1559.2	1.299	770.2	0.642
6	0.940	21.375	28.639	644.7	58.95	1528.0	1.280	788.1	0.660
7	0.940	21.284	28.781	640.8	57.71	1492.6	1.256	797.4	0.671
8	0.940	21.147	28.769	637.7	56.49	1454.8	1.228	803.1	0.678
9	0.940	20.958	28.750	635.1	55.07	1417.8	1.201	811.7	0.687
10	0.940	20.667	28.851	633.0	53.17	1386.9	1.179	831.5	0.707
11	0.940	20.220	28.250	631.6	51.74	1343.0	1.143	831.5	0.708
12	0.940	19.938	27.860	631.5	50.95	1320.0	1.124	831.7	0.708
13	0.940	19.635	27.159	632.3	50.47	1288.4	1.095	820.0	0.697

STA 23.000 MASS AVERAGED PROPERTIES
 PT= 28.163 TT= 643.26 GAMMA=1.4001 PT-RAT= 1.916 TT-RAT= 1.240
 RCU= 0. VM= 782.6 CZ= 778.4 MM=0.657 MABS=0.657 MREL=1.244

PCT	IMM	RAD	BLADE SPEED		ACC PT	ACC TT	EFFICIENCY		AXIAL	
			IN	OUT			RATIO	AD.	POLY	VEL R
0.	8.500				1.7766	1.2809	0.635	0.663	1.205	
4.8	8.340				1.8087	1.2757	0.669	0.696	1.168	
9.4	8.186				1.8311	1.2701	0.699	0.723	1.140	
18.2	7.889				1.8870	1.2603	0.765	0.785	1.112	
26.7	7.601				1.9236	1.2512	0.818	0.834	1.096	
35.3	7.314				1.9488	1.2429	0.865	0.877	1.087	
44.0	7.021				1.9584	1.2354	0.900	0.909	1.081	
53.1	6.715				1.9576	1.2294	0.923	0.930	1.079	
62.7	6.391				1.9563	1.2244	0.942	0.948	1.085	
73.1	6.042				1.9632	1.2204	0.965	0.968	1.112	
84.8	5.648				1.9223	1.2177	0.944	0.949	1.135	
91.6	5.419				1.8957	1.2175	0.923	0.929	1.184	
100.0	5.137				1.8480	1.2190	0.876	0.887	1.171	

EXIT STA= 24.000
 I=25
 WTF= 61.365 OPTX=DPP R
 PSIC Z
 0.050 -2.000 8.500
 0.100 -2.000 8.361
 0.200 -2.000 7.963
 0.300 -2.000 7.706
 0.400 -2.000 7.450
 0.500 -2.000 7.192
 0.600 -2.000 6.927
 0.700 -2.000 6.654
 0.800 -2.000 6.373
 0.900 -2.000 6.077
 0.950 -2.000 5.921
 1.000 -2.000 5.757

STA= 24.000
 MTIP=313
 OPTX=FREE
 PHI
 0.32
 0.63
 1.18
 1.68
 2.16
 2.64
 3.13
 3.63
 4.11
 4.60
 4.85
 5.28

AFLOW= 116.57
 ITYPE=O
 CURV
 0.0040
 0.0080
 0.0159
 0.0234
 0.0313
 0.0402
 0.0510
 0.0644
 0.0793
 0.0997
 0.1151
 0.1260

INBR=O
 VM
 675.7
 702.4
 719.7
 761.5
 787.9
 807.1
 817.9
 824.8
 834.8
 854.0
 850.7
 848.6
 835.5

D+C=O.
 ABC=O.
 CU
 0.
 0.
 0.
 0.
 0.
 0.
 0.
 0.
 0.
 0.
 0.
 0.

FREE
 D+H=O.
 ABH=O.
 MM
 0.551
 0.575
 0.592
 0.631
 0.658
 0.678
 0.690
 0.698
 0.709
 0.728
 0.726
 0.724
 0.711

SL BLDLCK PS PT TT
 1 0.950 21.247 26.109 664.4
 2 0.950 21.244 26.581 661.7
 3 0.950 21.236 26.910 658.8
 4 0.950 21.203 27.731 653.7
 5 0.950 21.145 28.269 649.0
 6 0.950 21.058 28.639 644.7
 7 0.950 20.939 28.781 640.8
 8 0.950 20.778 28.769 637.7
 9 0.950 20.562 28.750 635.1
 10 0.950 20.274 28.851 633.0
 11 0.950 19.891 28.250 631.6
 12 0.950 19.652 27.860 631.5
 13 0.950 19.381 27.159 632.3

BETAM VREL MREL VABS MABS
 65.75 1645.2 1.341 675.7 0.551
 64.55 1634.2 1.338 702.4 0.575
 63.63 1620.3 1.332 719.7 0.592
 61.54 1598.3 1.325 761.5 0.631
 59.91 1571.6 1.312 787.9 0.658
 58.45 1542.7 1.295 807.1 0.678
 57.20 1509.9 1.273 817.9 0.690
 55.99 1474.6 1.248 824.8 0.698
 54.59 1440.7 1.223 834.8 0.709
 52.79 1412.1 1.204 854.0 0.728
 51.58 1368.9 1.168 850.7 0.726
 50.92 1346.1 1.148 848.6 0.724
 50.56 1315.4 1.120 835.5 0.711

STA 24.000 MASS AVERAGED PROPERTIES
 TT= 643.26 GAMMA=1.4002 PT-RAT= 1.916 TT-RAT= 1.240
 RCU= O. VM= 801.9 CZ= 800.8 MM=0.674 MABS=0.674 MREL=1.261

EXIT STA= 25.000
 WTF= 61.365 I=26 MTIP=326 AFLOW= 116.27 D+C=O. D+H=O.
 PSIC Z OPTX=DDP R PHI CURV VM CU ALPHAM MM
 0. -1.270 8.500 0. 0. 693.1 0. 0. 0.566
 0.050 -1.270 8.365 0.19 0.0025 718.8 0. 0. 0.590
 0.100 -1.270 8.232 0.36 0.0048 735.5 0. 0. 0.606
 0.200 -1.270 7.974 0.66 0.0092 775.4 0. 0. 0.644
 0.300 -1.270 7.722 0.91 0.0136 799.8 0. 0. 0.668
 0.400 -1.270 7.470 1.13 0.0181 816.7 0. 0. 0.686
 0.500 -1.270 7.216 1.32 0.0229 824.4 0. 0. 0.696
 0.600 -1.270 6.954 1.47 0.0280 827.3 0. 0. 0.700
 0.700 -1.270 6.684 1.58 0.0335 831.7 0. 0. 0.706
 0.800 -1.270 6.406 1.62 0.0398 843.1 0. 0. 0.718
 0.900 -1.270 6.112 1.54 0.0464 828.0 0. 0. 0.705
 0.950 -1.270 5.956 1.41 0.0493 817.6 0. 0. 0.695
 1.000 -1.270 5.790 0.00 0.1263 798.1 0. 0. 0.676

FREE
 D+H=O.
 ABH=O.

SL BLDLK PS PT TT BETAM VREL MREL VABS MABS
 1 0.956 21.014 26.109 664.4 65.20 1652.4 1.349 693.1 0.566
 2 0.956 21.012 26.581 661.7 64.03 1641.8 1.347 718.8 0.590
 3 0.956 21.006 26.910 658.8 63.15 1628.3 1.341 735.5 0.606
 4 0.956 20.986 27.731 653.7 61.14 1606.6 1.334 775.4 0.644
 5 0.956 20.950 28.269 649.0 59.59 1580.0 1.320 799.8 0.668
 6 0.956 20.898 28.639 644.7 58.22 1550.7 1.303 816.7 0.686
 7 0.956 20.827 28.781 640.8 57.08 1516.9 1.280 824.4 0.696
 8 0.956 20.734 28.769 637.7 56.01 1480.1 1.253 827.3 0.700
 9 0.956 20.615 28.750 635.1 54.81 1443.3 1.225 831.7 0.706
 10 0.956 20.466 28.851 633.0 53.28 1410.2 1.201 843.1 0.718
 11 0.956 20.280 28.250 631.6 52.49 1359.7 1.157 828.0 0.705
 12 0.956 20.173 27.860 631.5 52.12 1331.6 1.132 817.6 0.695
 13 0.956 19.989 27.159 632.3 52.01 1296.6 1.099 798.1 0.676

STA 25.000 MASS AVERAGED PROPERTIES
 PT= 28.163 TT= 643.26 GAMMA=1.4002 PT-RAT= 1.916 TT-RAT= 1.240
 RCU= 0. VM= 803.2 CZ= 803.0 MM=0.675 MABS=0.675 MREL=1.264

EXIT STA= 26.000
 WTF= 61.365 I=27 OPTX=DPP AFLOW= 116.28 D=C=O. D+H=O.
 PSIC Z OPTX=DPP PHI CURV VM CU ALPHAM ABH=O.
 0. -0.350 8.500 0. 0. 711.0 0. 0. 0.581
 0.050 -0.350 8.367 0.11 -0.0000 735.8 0. 0. 0.605
 0.100 -0.350 8.236 0.21 -0.0000 751.6 0. 0. 0.620
 0.200 -0.350 7.981 0.37 -0.0000 789.3 0. 0. 0.656
 0.300 -0.350 7.731 0.49 -0.0000 811.0 0. 0. 0.679
 0.400 -0.350 7.482 0.57 -0.0000 824.4 0. 0. 0.693
 0.500 -0.350 7.229 0.61 -0.0000 827.9 0. 0. 0.699
 0.600 -0.350 6.968 0.61 -0.0000 825.4 0. 0. 0.698
 0.700 -0.350 6.698 0.54 -0.0000 822.9 0. 0. 0.698
 0.800 -0.350 6.418 0.39 -0.0000 825.8 0. 0. 0.702
 0.900 -0.350 6.120 0.11 -0.0000 799.3 0. 0. 0.678
 0.950 -0.350 5.961 -0.10 -0.0000 781.7 0. 0. 0.662
 1.000 -0.350 5.791 0. 0. 748.9 0. 0. 0.631

SL BLDLTK PS PT TT BETAM VREL MREL VABS MABS
 1 0.956 20.768 26.109 664.4 64.64 1660.0 1.358 711.0 0.581
 2 0.956 20.768 26.581 661.7 63.51 1649.7 1.355 735.8 0.605
 3 0.956 20.767 26.910 658.8 62.65 1636.3 1.350 751.6 0.620
 4 0.956 20.767 27.731 653.7 60.73 1614.5 1.342 789.3 0.656
 5 0.956 20.767 28.269 649.0 59.27 1587.2 1.328 811.0 0.679
 6 0.956 20.768 28.639 644.7 58.02 1556.6 1.309 824.4 0.693
 7 0.956 20.768 28.781 640.8 57.02 1520.8 1.284 827.9 0.699
 8 0.956 20.767 28.769 637.7 56.13 1481.0 1.253 825.4 0.698
 9 0.956 20.767 28.750 635.1 55.15 1440.3 1.221 822.9 0.698
 10 0.956 20.766 28.851 633.0 53.90 1401.6 1.191 825.8 0.702
 11 0.956 20.765 28.250 631.6 53.50 1343.6 1.139 799.3 0.678
 12 0.956 20.765 27.860 631.5 53.38 1310.6 1.109 781.7 0.662
 13 0.956 20.765 27.155 632.3 53.76 1266.9 1.068 748.9 0.631

STA 26.000 MASS AVERAGED PROPERTIES
 PT= 28.163 TT= 643.26 GAMMA=1.4002 PT-RAT= 1.916 TT-RAT= 1.240
 RCU= 0. VM= 801.4 CZ= 801.3 MM=0.573 MASS=0.673 MREL=1.263

Phase I 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	0.	-300.7	-388.6	6.2
2	8.315	0.185	-303.9	-392.7	4.4
3	8.133	0.367	-308.0	-397.8	-2.4
4	7.770	0.730	-309.9	-394.7	-27.3
5	7.403	1.097	-307.4	-378.7	-42.4
6	7.023	1.477	-300.1	-355.0	-34.5
7	6.623	1.877	-289.1	-323.6	-19.6
8	6.192	2.308	-276.5	-292.6	-13.1
9	5.717	2.783	-264.2	-254.1	-16.2
10	5.181	3.319	-246.5	-207.6	-16.4
11	4.524	3.976	-214.5	-139.5	-17.1
12	4.104	4.396	-187.4	-86.0	-23.7
13	3.551	4.949	-166.8	-47.3	-28.3

NET TORQUE= -8081.5 IN-LB
NET TAN. FORCE= -1290.7 LB
NET AXIAL FORCE= -1289.8 LB
NET RADIAL FORCE= -99.3 LB

2. STREAMSURFACE BLADE COORDINATES

Figure 30 shows the stacked Phase I 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.

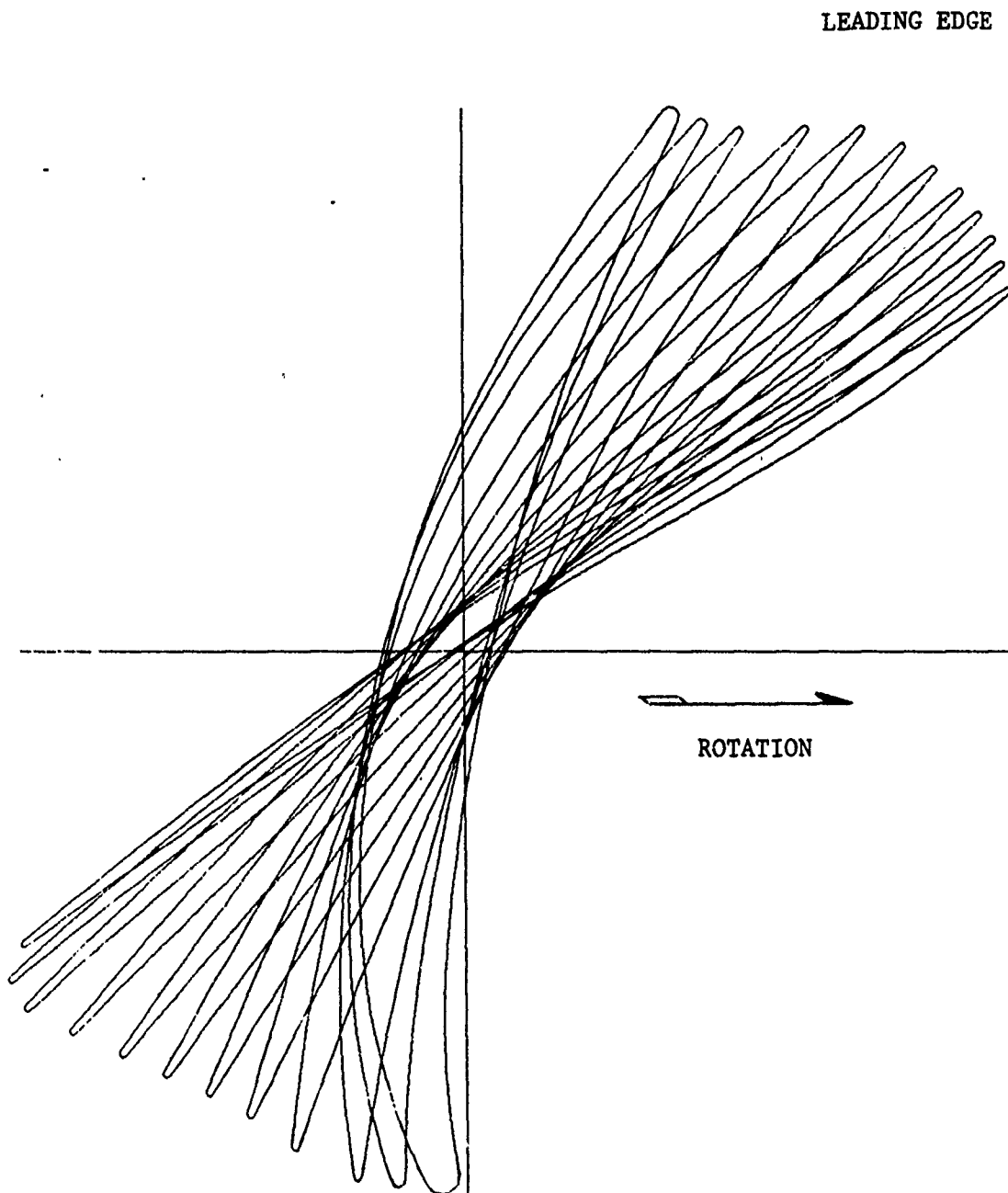


Figure 30. Stacked Phase I Rotor Streamsurface Sections

PHASE I 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.	-1.12890	1.78796	-53.732	0.01809	1	-1.12890	1.78796	-1.12890	1.78796									
2	0.02500	-1.07801	1.71757	-54.533	0.02802	2	-1.13274	1.78152	-1.12139	1.78964									
3	0.05000	-1.02713	1.64510	-55.314	0.03731	3	-1.13130	1.77503	-1.11584	1.78633									
4	0.07500	-0.97624	1.57049	-56.092	0.04591	4	-1.08942	1.70944	-1.06660	1.72570									
5	0.10000	-0.92535	1.49365	-56.877	0.05388	5	-1.04247	1.63448	-1.01178	1.65571									
6	0.12500	-0.87446	1.41447	-57.664	0.06121	6	-0.99529	1.55768	-0.95718	1.58330									
7	0.15000	-0.82358	1.33285	-58.443	0.06784	7	-0.94791	1.47893	-0.90279	1.50837									
8	0.17500	-0.77269	1.24874	-59.201	0.07379	8	-0.90032	1.39810	-0.84861	1.43084									
9	0.20000	-0.72180	1.16213	-59.920	0.07904	9	-0.85248	1.31510	-0.79467	1.35061									
10	0.23000	-0.66074	1.05499	-60.696	0.08441	10	-0.80438	1.22985	-0.74100	1.26763									
11	0.26000	-0.59967	0.94469	-61.332	0.08873	11	-0.75600	1.14232	-0.68760	1.18193									
12	0.29000	-0.53861	0.83190	-61.762	0.09202	12	-0.69754	1.03433	-0.62393	1.07564									
13	0.32000	-0.47754	0.71769	-61.930	0.09431	13	-0.63860	0.92340	-0.56074	0.96597									
14	0.35000	-0.41648	0.60328	-61.853	0.09566	14	-0.57914	0.81013	-0.49807	0.85367									
15	0.38000	-0.35541	0.48976	-61.556	0.09617	15	-0.51915	0.69551	-0.43593	0.73988									
16	0.41000	-0.29435	0.37810	-61.070	0.09593	16	-0.45865	0.58071	-0.37430	0.62584									
17	0.44000	-0.23328	0.26900	-60.436	0.09504	17	-0.39769	0.46686	-0.31313	0.51266									
18	0.47000	-0.17222	0.16286	-59.731	0.09358	18	-0.33632	0.35489	-0.25237	0.40130									
19	0.50000	-0.11115	0.05967	-59.043	0.09160	19	-0.27461	0.24555	-0.19195	0.29244									
20	0.53000	-0.05009	-0.04088	-58.427	0.08917	20	-0.21263	0.13927	-0.13180	0.18644									
21	0.56000	0.01098	-0.13922	-57.915	0.08634	21	-0.15043	0.03611	-0.07187	0.08323									
22	0.59000	0.07204	-0.23581	-57.495	0.08314	22	-0.08807	-0.06422	-0.01210	-0.01753									
23	0.62000	0.13311	-0.33098	-57.139	0.07961	23	-0.02559	-0.16215	0.04755	-0.11629									
24	0.65000	0.19417	-0.42494	-56.827	0.07578	24	0.03699	-0.25815	0.10710	-0.21347									
25	0.68000	0.25524	-0.51783	-56.535	0.07169	25	0.09967	-0.35258	0.16655	-0.30938									
26	0.71000	0.31630	-0.60971	-56.244	0.06736	26	0.16246	-0.44567	0.22589	-0.40421									
27	0.74000	0.37737	-0.70055	-55.934	0.06282	27	0.22534	-0.53760	0.28514	-0.49807									
28	0.77000	0.43843	-0.79032	-55.614	0.05812	28	0.28830	-0.62842	0.34431	-0.59100									
29	0.80000	0.49950	-0.87902	-55.297	0.05328	29	0.35135	-0.71815	0.40339	-0.68296									
30	0.83000	0.56056	-0.96669	-54.984	0.04833	30	0.41445	-0.80673	0.46242	-0.77391									
31	0.86000	0.62163	-1.05335	-54.678	0.04328	31	0.47760	-0.89419	0.52140	-0.86386									
32	0.89000	0.68269	-1.13904	-54.370	0.03816	32	0.54077	-0.98056	0.58036	-0.95282									
33	0.92000	0.74376	-1.22375	-54.055	0.03300	33	0.60397	-1.06587	0.63929	-1.04084									
34	0.95000	0.80483	-1.30747	-53.730	0.02783	34	0.66719	-1.15016	0.69820	-1.12793									
35	0.97500	0.85571	-1.37648	-53.454	0.02353	35	0.73040	-1.23344	0.75712	-1.21407									
36	1.00000	0.90660	-1.44478	-53.173	0.01923	36	0.79361	-1.31570	0.81604	-1.29924									
						37	0.84626	-1.38348	0.86516	-1.36947									
						38	0.89295	-1.44299	0.90873	-1.43119									
						39	0.93881	-1.49657	0.94050	-1.48790									
						40	0.98660	-1.54478	0.96660	-1.54478									

CHORD 3.82020 CAMBER 0.559 STAGGER -57.803

PHASE I 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.	-1.20533	1.76078	-52.407	0.01878	1	-1.20533	1.76078	-1.20533	1.76078
2	0.02500	-1.14976	1.68756	-53.197	0.02871	2	-1.20915	1.75401	-1.19759	1.76269
3	0.05000	-1.09420	1.61223	-53.970	0.03808	3	-1.20748	1.74732	-1.19176	1.75938
4	0.07500	-1.03863	1.53474	-54.741	0.04679	4	-1.16126	1.67896	-1.13827	1.69616
5	0.10000	-0.98306	1.45500	-55.519	0.05489	5	-1.10959	1.60104	-1.07880	1.62343
6	0.12500	-0.92750	1.37290	-56.296	0.06235	6	-1.05773	1.52124	-1.01953	1.54825
7	0.15000	-0.87193	1.28837	-57.057	0.06916	7	-1.00569	1.43946	-0.96044	1.47054
8	0.17500	-0.81636	1.20141	-57.779	0.07531	8	-0.95343	1.35560	-0.90156	1.39020
9	0.20000	-0.76080	1.11208	-58.436	0.08078	9	-0.90095	1.26957	-0.84291	1.30718
10	0.23000	-0.69412	1.00205	-59.104	0.08641	10	-0.84822	1.18133	-0.78451	1.22148
11	0.26000	-0.62744	0.88945	-59.597	0.09099	11	-0.79521	1.09094	-0.72638	1.13322
12	0.29000	-0.56076	0.77513	-59.850	0.09454	12	-0.73119	0.97987	-0.65704	1.02424
13	0.32000	-0.49408	0.66031	-59.813	0.09707	13	-0.66668	0.86642	-0.58820	0.91247
14	0.35000	-0.42740	0.54627	-59.516	0.09866	14	-0.60163	0.75138	-0.51988	0.79887
15	0.38000	-0.36072	0.43407	-59.004	0.09937	15	-0.53603	0.63590	-0.45212	0.68471
16	0.41000	-0.29404	0.32449	-58.332	0.09930	16	-0.46991	0.52124	-0.38488	0.57129
17	0.44000	-0.22736	0.21796	-57.569	0.09854	17	-0.40331	0.40848	-0.31812	0.45966
18	0.47000	-0.16068	0.11457	-56.799	0.09718	18	-0.33629	0.29842	-0.25178	0.35056
19	0.50000	-0.09400	0.01402	-56.116	0.09530	19	-0.26894	0.19154	-0.18577	0.24438
20	0.53000	-0.02732	0.08421	-55.565	0.09292	20	-0.20134	0.08796	-0.12002	0.14117
21	0.56000	0.03936	-0.18069	-55.163	0.09010	21	-0.13355	-0.01255	-0.05444	0.04058
22	0.59000	0.10604	-0.27595	-54.866	0.08688	22	-0.06564	-0.11048	0.01100	-0.05793
23	0.62000	0.17272	-0.37026	-54.614	0.08330	23	0.00239	-0.20643	0.07634	-0.15496
24	0.65000	0.23940	-0.46375	-54.391	0.07938	24	0.07052	-0.30095	0.14157	-0.25096
25	0.68000	0.30608	-0.55650	-54.187	0.07515	25	0.13877	-0.39438	0.20668	-0.34614
26	0.71000	0.37276	-0.64859	-53.997	0.07065	26	0.20714	-0.48686	0.27167	-0.44064
27	0.74000	0.43944	-0.74004	-53.808	0.06591	27	0.27561	-0.57849	0.33656	-0.53451
28	0.77000	0.50612	-0.83083	-53.599	0.06096	28	0.34419	-0.66935	0.40134	-0.62782
29	0.80000	0.57280	-0.92086	-53.343	0.05584	29	0.41285	-0.75950	0.46604	-0.72058
30	0.83000	0.63948	-1.00996	-53.024	0.05058	30	0.48159	-0.84892	0.53066	-0.81274
31	0.86000	0.70616	-1.09791	-52.624	0.04522	31	0.55041	-0.93753	0.59520	-0.90420
32	0.89000	0.77284	-1.18445	-52.129	0.03980	32	0.61928	-1.02517	0.65969	-0.99475
33	0.92000	0.83952	-1.26930	-51.529	0.03435	33	0.68820	-1.11164	0.72413	-1.08419
34	0.95000	0.90620	-1.35221	-50.835	0.02892	34	0.75714	-1.19667	0.78855	-1.17224
35	0.97500	0.96177	-1.41967	-50.199	0.02444	35	0.82608	-1.27999	0.85297	-1.25862
36	1.00000	1.01734	-1.48557	-49.526	0.01999	36	0.89500	-1.36134	0.91741	-1.34308
						37	0.95238	-1.42749	0.97116	-1.41185
						38	1.00305	-1.48462	1.01866	-1.47133
						39	1.00932	-1.48793	1.02093	-1.47824
						40	1.01734	-1.48557	1.01734	-1.48557

CHORD 3.93435 CAMBER 2.882 STAGGER -55.602

PHASE I ROTOR

NB 20

MERIDIONAL AIRFOIL GEOMETRY, - STREAMLINE 4

MEANLINE DATA					SURFACE COORDINATES				
PT	PCT X	Y	B+M	T(M)	PT	XS	YS	XP	YP
1	0.	1.73396	-51.014	0.01937	1	-1.28523	1.73396	-1.28523	1.73396
2	0.02500	1.65910	-51.752	0.03019	2	-1.28900	1.72686	-1.27729	1.73613
3	0.05000	1.58226	-52.472	0.04041	3	-1.28713	1.72000	-1.27118	1.73287
4	0.07500	1.50341	-53.185	0.04995	4	-1.23730	1.64976	1.21359	1.66845
5	0.10000	1.42249	-53.895	0.05884	5	-1.18168	1.56995	-1.14963	1.59457
6	0.12500	1.33945	-54.594	0.06707	6	-1.12586	1.48844	-1.08587	1.51838
7	0.15000	1.25427	-55.270	0.07463	7	-1.06985	1.40515	-1.02231	1.43983
8	0.17500	1.16699	-55.900	0.08148	8	-1.01363	1.32002	-0.95896	1.35888
9	0.20000	1.07772	-56.463	0.08760	9	-0.95717	1.23301	-0.89584	1.27553
10	0.23000	0.98628	-57.016	0.09397	10	-0.90045	1.14415	-0.83299	1.18983
11	0.26000	0.85685	-57.395	0.09923	11	-0.84344	1.05352	-0.77042	1.10192
12	0.29000	0.74429	-57.538	0.10338	12	-0.77460	0.94270	-0.69578	0.99385
13	0.32000	0.63172	-57.394	0.10643	13	-0.70524	0.83012	-0.62165	0.88359
14	0.35000	0.52035	-56.985	0.10844	14	-0.63531	0.71654	-0.54809	0.77203
15	0.38000	0.41118	-56.352	0.10947	15	-0.56479	0.60304	-0.47513	0.66039
16	0.41000	0.30497	-55.545	0.10960	16	-0.49368	0.49081	-0.40275	0.54989
17	0.44000	0.20214	-54.635	0.10893	17	-0.42203	0.38086	-0.33091	0.44151
18	0.47000	0.10274	-53.738	0.10756	18	-0.34991	0.27397	-0.25954	0.33598
19	0.50000	0.00533	-52.982	0.10557	19	-0.27740	0.17062	-0.18856	0.23367
20	0.53000	-0.08780	-52.423	0.10301	20	-0.20460	0.07093	-0.11787	0.13455
21	0.56000	-0.18041	-52.074	0.09994	21	-0.13164	-0.02545	-0.04735	0.03810
22	0.59000	-0.27209	-51.846	0.09639	22	-0.05857	-0.11921	0.02307	-0.05639
23	0.62000	-0.36307	-51.639	0.09239	23	0.01458	-0.21112	0.09341	-0.14969
24	0.65000	-0.45337	-51.428	0.08800	24	0.08784	-0.30186	0.16364	-0.24231
25	0.68000	-0.54298	-51.206	0.08325	25	0.16126	-0.39174	0.23371	-0.33440
26	0.71000	-0.63186	-50.971	0.07818	26	0.23483	-0.48081	0.30363	-0.42594
27	0.74000	-0.71998	-50.720	0.07282	27	0.30853	-0.56906	0.37341	-0.51690
28	0.77000	-0.80727	-50.445	0.06722	28	0.38235	-0.65648	0.44308	-0.60725
29	0.80000	-0.89367	-50.137	0.06142	29	0.45628	-0.74303	0.51264	-0.69692
30	0.83000	-0.97906	-49.781	0.05546	30	0.53029	-0.82868	0.58212	-0.78587
31	0.86000	-1.06329	-49.360	0.04938	31	0.60437	-0.91336	0.65152	-0.87399
32	0.89000	-1.14616	-48.847	0.04322	32	0.67852	-0.99697	0.72087	-0.96116
33	0.92000	-1.22737	-48.219	0.03702	33	0.75270	-1.07938	0.79017	-1.04721
34	0.95000	-1.30666	-47.484	0.03084	34	0.82691	-1.16038	0.85945	-1.13193
35	0.97500	-1.37111	-46.807	0.02573	35	0.90112	-1.23971	0.92873	-1.21504
36	1.00000	-1.43401	-46.089	0.02054	36	0.97530	-1.31708	0.99803	-1.29624
					37	1.03708	-1.37992	1.05583	-1.36231
					38	1.09143	-1.43393	1.10675	-1.41923
					39	1.09810	-1.43695	1.10950	-1.42622
					40	1.10624	-1.43401	1.10624	-1.43401

CHORD 3.96927 CAMBER 4.925 STAGGER -52.951

PHASE I ROTOR

NE 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.	-1.36095	1.68911	-49.624	0.01959	1	-1.36095	1.68911	-1.36095	1.68911									
2	0.02500	-1.29738	1.61343	-50.313	0.03215	2	-1.36462	1.68182	-1.35296	1.69152									
3	0.05000	-1.23382	1.53591	-50.976	0.04403	3	-1.36258	1.67491	-1.34667	1.68841									
4	0.07500	-1.17025	1.45658	-51.609	0.05517	4	-1.30975	1.60317	-1.28501	1.62370									
5	0.10000	-1.10668	1.37547	-52.208	0.06561	5	-1.25092	1.52205	-1.21671	1.54978									
6	0.12500	-1.04312	1.29265	-52.768	0.07530	6	-1.19187	1.43945	-1.14863	1.47371									
7	0.15000	-0.97955	1.20821	-53.282	0.08420	7	-1.13261	1.35537	-1.10807	1.39557									
8	0.17500	-0.91598	1.12224	-53.752	0.09227	8	-1.07309	1.26987	-1.01314	1.31544									
9	0.20000	-0.85242	1.03485	-54.174	0.09952	9	-1.01329	1.18304	-0.94580	1.23338									
10	0.23000	-0.77614	0.92835	-54.580	0.10709	10	-0.95319	1.09496	-0.87878	1.14952									
11	0.26000	-0.69985	0.82055	-54.813	0.11342	11	-0.89276	1.00572	-0.81207	1.06397									
12	0.29000	-0.62357	0.71236	-54.757	0.11847	12	-0.81977	0.89731	-0.73250	0.95938									
13	0.32000	-0.54729	0.60515	-54.313	0.12224	13	-0.74520	0.78787	-0.65351	0.85323									
14	0.35000	-0.47101	0.50035	-53.541	0.12479	14	-0.67195	0.67818	-0.57520	0.74554									
15	0.38000	-0.39473	0.39890	-52.548	0.12618	15	-0.59694	0.56950	-0.49765	0.64081									
16	0.41000	-0.31845	0.30123	-51.468	0.12651	16	-0.52120	0.46327	-0.42083	0.53743									
17	0.44000	-0.24217	0.20720	-50.442	0.12589	17	-0.44482	0.36054	-0.34465	0.43727									
18	0.47000	-0.16589	0.11636	-49.535	0.12442	18	-0.36794	0.26182	-0.26897	0.34063									
19	0.50000	-0.08961	0.02815	-48.788	0.12218	19	-0.29070	0.16711	-0.19364	0.24729									
20	0.53000	-0.01333	-0.05803	-48.213	0.11925	20	-0.21322	0.07599	-0.11856	0.15674									
21	0.56000	0.06295	-0.14273	-47.802	0.11569	21	-0.13557	-0.01210	-0.04366	0.06840									
22	0.59000	0.13923	-0.22639	-47.492	0.11155	22	-0.05779	-0.09776	0.03113	-0.01829									
23	0.62000	0.21551	-0.30921	-47.217	0.10687	23	0.02009	-0.18159	0.10580	-0.10388									
24	0.65000	0.29179	-0.39126	-46.956	0.10170	24	0.09811	-0.26408	0.18034	-0.18871									
25	0.68000	0.36807	-0.47257	-46.702	0.09611	25	0.17629	-0.34550	0.25472	0.27292									
26	0.71000	0.44435	-0.55317	-46.450	0.09012	26	0.25462	-0.42597	0.32895	-0.35655									
27	0.74000	0.52063	-0.63305	-46.197	0.08378	27	0.33309	-0.50552	0.40304	-0.43961									
28	0.77000	0.59691	-0.71223	-45.932	0.07712	28	0.41169	-0.58421	0.47701	-0.52212									
29	0.80000	0.67319	-0.79064	-45.644	0.07021	29	0.49040	-0.66205	0.55086	-0.60406									
30	0.83000	0.74947	-0.86823	-45.323	0.06309	30	0.56920	-0.73905	0.62467	-0.68541									
31	0.86000	0.82575	-0.94489	-44.955	0.05580	31	0.64809	-0.81519	0.69829	-0.76610									
32	0.89000	0.90203	-1.02050	-44.526	0.04838	32	0.72704	-0.89041	0.77190	-0.84605									
33	0.92000	0.97831	-1.09489	-44.024	0.04088	33	0.80604	-0.96464	0.84546	-0.92515									
34	0.95000	1.05459	-1.16791	-43.457	0.03336	34	0.88507	-1.03775	0.91900	-1.00326									
35	0.97500	1.11816	-1.22761	-42.945	0.02712	35	0.96410	-1.10959	0.99252	-1.08020									
36	1.00000	1.18173	-1.28622	-42.410	0.02089	36	1.04312	-1.18002	1.06607	-1.15580									
						37	1.10892	-1.23753	1.12740	-1.21768									
						38	1.16672	-1.28716	1.18133	-1.27121									
						39	1.17371	-1.28974	1.18453	-1.27810									
						40	1.18173	-1.28622	1.18173	-1.28622									

CHORD 3.91380 CAMBER 7.214 STAGGER -49.483

PHASE I ROTOR

NR 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.	-1.43240	1.62617	-48.221	0.01963	1	-1.43240	1.62617	-1.43240	1.62617									
2	0.02500	-1.36534	1.55039	-48.761	0.03479	2	-1.43593	1.61872	-1.42445	1.62882									
3	0.05000	-1.29829	1.47319	-49.279	0.04922	3	-1.43377	1.61184	-1.41800	1.62590									
4	0.07500	-1.23123	1.39460	-49.768	0.06282	4	-1.37842	1.53893	-1.35226	1.56186									
5	0.10000	-1.16417	1.31469	-50.219	0.07560	5	-1.31694	1.45714	-1.27963	1.48925									
6	0.12500	-1.09711	1.23356	-50.623	0.08754	6	-1.25521	1.37432	-1.20726	1.41489									
7	0.15000	-1.03006	1.15133	-50.975	0.09855	7	-1.19322	1.29051	-1.13512	1.33888									
8	0.17500	-0.96300	1.06814	-51.272	0.10862	8	-1.13095	1.20579	-1.06328	1.26133									
9	0.20000	-0.89594	0.98415	-51.508	0.11773	9	-1.06834	1.12030	-0.99177	1.18235									
10	0.23000	-0.81547	0.88261	-51.676	0.12735	10	-1.00537	1.03416	-0.92063	1.10212									
11	0.26000	-0.73500	0.78076	-51.656	0.13549	11	-0.94201	0.94751	-0.84987	1.02079									
12	0.29000	-0.65453	0.67952	-51.327	0.14211	12	-0.86542	0.84312	-0.76552	0.92209									
13	0.32000	-0.57406	0.58018	-50.586	0.14718	13	-0.78813	0.73874	-0.68187	0.82279									
14	0.35000	-0.49359	0.48402	-49.519	0.15076	14	-0.71000	0.63512	-0.59906	0.72392									
15	0.38000	-0.41312	0.39175	-48.275	0.15290	15	-0.63092	0.53345	-0.51721	0.62690									
16	0.41000	-0.33265	0.30347	-47.044	0.15328	16	-0.55093	0.43508	-0.43626	0.53296									
17	0.44000	-0.25218	0.21865	-46.005	0.15328	17	-0.47018	0.34087	-0.35606	0.44263									
18	0.47000	-0.17172	0.13655	-45.168	0.15173	18	-0.38890	0.25110	-0.27641	0.35584									
19	0.50000	-0.09125	0.05659	-44.490	0.14918	19	-0.30732	0.16542	-0.19705	0.27188									
20	0.53000	-0.01078	-0.02168	-43.942	0.14572	20	-0.22552	0.08307	-0.11791	0.19004									
21	0.56000	0.06369	-0.09861	-43.500	0.14141	21	-0.14352	0.00338	-0.03897	0.10981									
22	0.59000	0.15016	-0.17447	-43.126	0.13632	22	-0.06134	-0.07414	0.03978	0.03078									
23	0.62000	0.23063	-0.24939	-42.787	0.13052	23	0.02102	-0.14990	0.11836	-0.04733									
24	0.65000	0.31110	-0.32345	-42.465	0.12408	24	0.10357	-0.22421	0.19676	-0.12472									
25	0.68000	0.39157	-0.39669	-42.146	0.11705	25	0.18630	-0.29728	0.27496	-0.20150									
26	0.71000	0.47204	-0.46910	-41.822	0.10951	26	0.26922	-0.36921	0.35299	-0.27768									
27	0.74000	0.55251	-0.54069	-41.488	0.10149	27	0.35230	-0.44008	0.43084	-0.35329									
28	0.77000	0.63298	-0.61142	-41.143	0.09307	28	0.43553	-0.50990	0.50855	-0.42830									
29	0.80000	0.71345	-0.68130	-40.792	0.08431	29	0.51889	-0.57870	0.58612	-0.50268									
30	0.83000	0.79392	-0.75030	-40.435	0.07527	30	0.60236	-0.64647	0.66359	-0.57638									
31	0.86000	0.87439	-0.81844	-40.076	0.06600	31	0.68591	-0.71321	0.74099	-0.64938									
32	0.89000	0.95486	-0.88571	-39.720	0.05653	32	0.76951	-0.77895	0.81833	-0.72165									
33	0.92000	1.03533	-0.95215	-39.370	0.04692	33	0.85314	-0.84369	0.89563	-0.79318									
34	0.95000	1.11579	-1.01777	-39.024	0.03724	34	0.93679	-0.90745	0.97292	-0.86397									
35	0.97500	1.18285	-1.07185	-38.738	0.02915	35	1.02044	-0.97029	1.05021	-0.93401									
36	1.00000	1.24991	-1.12537	-38.451	0.02105	36	1.10407	-1.03224	1.12752	-1.00331									
						37	1.17373	-1.08321	1.19197	-1.06048									
						38	1.23482	-1.12746	1.24854	-1.11020									
						39	1.24210	-1.12951	1.25219	-1.11692									
						40	1.24991	-1.12537	1.24991	-1.12537									

CHORD

3.84262

CAMBER

9.770

STAGGER

-45.730

PHASE I ROTOR

NR 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.	-1.50326	1.54405	-46.856	0.01923	1	-1.50326	1.54405	-1.50326	1.54405									
2	0.02500	-1.43286	1.46838	-47.267	0.03757	2	-1.50659	1.53661	-1.49551	1.54688									
3	0.05000	-1.36245	1.39164	-47.661	0.05514	3	-1.50437	1.52989	-1.48906	1.54422									
4	0.07500	-1.29205	1.31386	-48.032	0.07182	4	-1.44665	1.45563	-1.41906	1.48113									
5	0.10000	-1.22164	1.23510	-48.371	0.08761	5	-1.38283	1.37307	-1.34207	1.41021									
6	0.12500	-1.15124	1.15547	-48.659	0.10245	6	-1.31875	1.28985	-1.26535	1.33787									
7	0.15000	-1.08083	1.07512	-48.874	0.11628	7	-1.25438	1.20600	-1.18890	1.26420									
8	0.17500	-1.01043	0.99431	-48.975	0.12901	8	-1.18970	1.12163	-1.11277	1.18931									
9	0.20000	-0.94002	0.91343	-48.923	0.14060	9	-1.12462	1.03688	-1.03704	1.11336									
10	0.23000	-0.85553	0.81691	-48.642	0.15291	10	-1.05909	0.95197	-0.96176	1.03665									
11	0.26000	-0.77105	0.72175	-48.111	0.16341	11	-0.99301	0.86724	-0.88703	0.95962									
12	0.29000	-0.68656	0.62877	-47.333	0.17208	12	-0.91297	0.76639	-0.79815	0.86742									
13	0.32000	-0.60208	0.53864	-46.330	0.17891	13	-0.83187	0.66720	-0.71022	0.77631									
14	0.35000	-0.51759	0.45187	-45.178	0.18394	14	-0.74983	0.57045	-0.62330	0.68708									
15	0.38000	-0.43310	0.36861	-43.981	0.18723	15	-0.66678	0.47687	-0.53737	0.60041									
16	0.41000	-0.34862	0.28870	-42.855	0.18885	16	-0.58282	0.38704	-0.45236	0.51670									
17	0.44000	-0.26413	0.21165	-41.898	0.18887	17	-0.49811	0.30125	-0.36809	0.43598									
18	0.47000	-0.17965	0.13694	-41.089	0.18740	18	-0.41284	0.21947	-0.28440	0.35792									
19	0.50000	-0.09516	0.06421	-40.374	0.18456	19	-0.32720	0.14136	-0.20107	0.28194									
20	0.53000	-0.01067	-0.00680	-39.727	0.18045	20	-0.24123	0.06632	-0.11806	0.20756									
21	0.56000	0.07381	-0.07626	-39.130	0.17522	21	-0.15494	-0.00609	-0.03538	0.13451									
22	0.59000	0.15830	-0.14432	-38.584	0.16894	22	-0.06834	-0.07620	0.04699	0.06259									
23	0.62000	0.24279	-0.21112	-38.090	0.16172	23	0.01852	-0.14422	0.12910	-0.00830									
24	0.65000	0.32727	-0.27680	-37.645	0.15362	24	0.10562	-0.21035	0.21098	-0.07829									
25	0.68000	0.41176	-0.34149	-37.243	0.14476	25	0.19290	-0.27476	0.29267	-0.14748									
26	0.71000	0.49624	-0.40529	-36.879	0.13519	26	0.28036	-0.33763	0.37418	-0.21598									
27	0.74000	0.58073	-0.46829	-36.543	0.12499	27	0.36795	-0.39911	0.45556	-0.28387									
28	0.77000	0.66522	-0.53053	-36.216	0.11424	28	0.45568	-0.45936	0.53681	-0.35122									
29	0.80000	0.74970	-0.59202	-35.877	0.10301	29	0.54352	-0.51850	0.61794	-0.41808									
30	0.83000	0.83419	-0.65273	-35.520	0.09137	30	0.63147	-0.57662	0.69896	-0.48445									
31	0.86000	0.91867	-0.71263	-35.149	0.07940	31	0.71952	-0.63376	0.77989	-0.55029									
32	0.89000	1.00316	-0.77171	-34.782	0.06718	32	0.80765	-0.68992	0.86073	-0.61555									
33	0.92000	1.08765	-0.83001	-34.438	0.05475	33	0.89582	-0.74509	0.94153	-0.68017									
34	0.95000	1.17213	-0.88759	-34.116	0.04220	34	0.98400	-0.79930	1.02232	-0.74412									
35	0.97500	1.24254	-0.93506	-33.858	0.03169	35	1.07216	-0.85259	1.10313	-0.80743									
36	1.00000	1.31294	-0.98206	-33.604	0.02116	36	1.16030	-0.90506	1.18397	-0.87012									
						37	1.23371	-0.94821	1.25137	-0.92190									
						38	1.29793	-0.98557	1.31037	-0.96687									
						39	1.30544	-0.98693	1.31455	-0.97335									
						40	1.31294	-0.98206	1.31294	-0.98206									

CHORD 3.78315 CAMBER 13.252 STAGGER -41.892

PHASE I 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.	-1.57268	1.44253	-45.585	0.01841	1	-1.57268	1.44253	-1.57268	1.44253	
2	0.02500	-1.49905	1.36700	-45.874	0.03920	2	-1.57574	1.43530	-1.56532	1.44543	
3	0.05000	-1.42542	1.29073	-46.140	0.05926	3	-1.57351	1.42891	-1.55904	1.44307	
4	0.07500	-1.35180	1.21380	-46.362	0.07848	4	-1.51312	1.35325	-1.48498	1.38064	
5	0.10000	-1.27817	1.13635	-46.521	0.09687	5	-1.44679	1.27019	-1.40406	1.31126	
6	0.12500	-1.20454	1.05859	-46.593	0.11432	6	-1.38020	1.18672	-1.32340	1.24088	
7	0.15000	-1.13091	0.98077	-46.548	0.13072	7	-1.31331	1.10303	-1.24302	1.16968	
8	0.17500	-1.05728	0.90330	-46.337	0.14597	8	-1.24606	1.01931	-1.16301	1.09786	
9	0.20000	-0.98365	0.82667	-45.912	0.15996	9	-1.17836	0.93582	-1.08346	1.02573	
10	0.23000	-0.89530	0.73662	-45.124	0.17496	10	-1.11008	0.85291	-1.00448	0.95369	
11	0.26000	-0.80694	0.64945	-44.063	0.18791	11	-1.04110	0.77103	-0.92621	0.88232	
12	0.29000	-0.71859	0.56572	-42.843	0.19877	12	-0.95729	0.67490	-0.83331	0.79835	
13	0.32000	-0.63023	0.48554	-41.596	0.20758	13	-0.87228	0.58194	-0.74160	0.71696	
14	0.35000	-0.54188	0.40877	-40.390	0.21438	14	-0.78617	0.49284	-0.65101	0.63859	
15	0.38000	-0.45353	0.33509	-39.279	0.21920	15	-0.69914	0.40792	-0.56133	0.56316	
16	0.41000	-0.36517	0.26410	-38.304	0.22207	16	-0.61134	0.32713	-0.47242	0.49041	
17	0.44000	-0.27682	0.19536	-37.487	0.22298	17	-0.52291	0.25025	-0.38414	0.41993	
18	0.47000	-0.18846	0.12847	-36.778	0.22201	18	-0.43399	0.17697	-0.29635	0.35123	
19	0.50000	-0.10011	0.06322	-36.115	0.21923	19	-0.34467	0.10689	-0.20897	0.28382	
20	0.53000	-0.01175	0.00048	-35.465	0.21481	20	-0.25492	0.03956	-0.12200	0.21738	
21	0.56000	0.07660	-0.06266	-34.811	0.20890	21	-0.16472	-0.02533	-0.03550	0.15177	
22	0.59000	0.16496	-0.12336	-34.165	0.20162	22	-0.07407	-0.08796	0.05056	0.08700	
23	0.62000	0.25331	-0.18263	-33.544	0.19309	23	0.01697	-0.14842	0.13623	0.02309	
24	0.65000	0.34167	-0.24055	-32.954	0.18342	24	0.10834	-0.20677	0.22157	-0.03995	
25	0.68000	0.43002	-0.29721	-32.398	0.17275	25	0.19996	-0.26309	0.30666	-0.10216	
26	0.71000	0.51837	-0.35271	-31.880	0.16116	26	0.29178	-0.31750	0.39155	-0.16359	
27	0.74000	0.60673	-0.40715	-31.399	0.14877	27	0.38374	-0.37014	0.47630	-0.22428	
28	0.77000	0.69508	-0.46060	-30.946	0.13566	28	0.47582	-0.42114	0.56093	-0.28429	
29	0.80000	0.78344	-0.51311	-30.508	0.12192	29	0.56797	-0.47064	0.64548	-0.34366	
30	0.83000	0.87179	-0.56473	-30.081	0.10767	30	0.66020	-0.51877	0.72996	-0.40242	
31	0.86000	0.96015	-0.61548	-29.666	0.09298	31	0.75249	-0.56563	0.81439	-0.46059	
32	0.89000	1.04850	-0.66540	-29.269	0.07795	32	0.84481	-0.61131	0.89878	-0.51815	
33	0.92000	1.13686	-0.71454	-28.896	0.06264	33	0.93714	-0.65588	0.98316	-0.57508	
34	0.95000	1.22521	-0.76294	-28.543	0.04715	34	1.02945	-0.69940	1.06756	-0.63140	
35	0.97500	1.29884	-0.80276	-28.259	0.03417	35	1.12172	-0.74196	1.15199	-0.68711	
36	1.00000	1.37247	-0.84210	-27.978	0.02116	36	1.21395	-0.78366	1.23648	-0.74223	
						37	1.29075	-0.81781	1.30693	-0.78771	
						38	1.35780	-0.84722	1.36851	-0.82709	
						39	1.36544	-0.84775	1.37325	-0.83322	
						40	1.37247	-0.84210	1.37247	-0.84210	

CHORD 3.72739 CAMBER 17.607 STAGGER -37.802

PHASE I 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.	-1.62751	1.30702	-44.404	0.01815	1	-1.62751	1.30702	-1.62751	1.30702	
2	0.02500	-1.55076	1.23175	-44.482	0.04013	2	-1.63038	1.29980	-1.62033	1.31004	
3	0.05000	-1.47402	1.15632	-44.519	0.06166	3	-1.62806	1.29356	-1.61405	1.30786	
4	0.07500	-1.39728	1.08090	-44.467	0.08259	4	-1.56482	1.21744	-1.53670	1.24607	
5	0.10000	-1.32053	1.00578	-44.283	0.10293	5	-1.49564	1.13434	-1.45240	1.17830	
6	0.12500	-1.24379	0.93134	-43.943	0.12222	6	-1.42620	1.05143	-1.36835	1.11037	
7	0.15000	-1.16704	0.85799	-43.430	0.14061	7	-1.35643	0.96897	-1.28463	1.04258	
8	0.17500	-1.09030	0.78617	-42.749	0.15787	8	-1.28519	0.88734	-1.20138	0.97534	
9	0.20000	-1.01356	0.71623	-41.911	0.17390	9	-1.21538	0.80694	-1.11871	0.90905	
10	0.23000	-0.92146	0.63522	-40.727	0.19136	10	-1.14388	0.72820	-1.03672	0.84413	
11	0.26000	-0.82937	0.55774	-39.405	0.20679	11	-1.07163	0.65152	-0.95548	0.78094	
12	0.29000	-0.73728	0.48388	-38.057	0.22012	12	-0.98389	0.56272	-0.85904	0.70773	
13	0.32000	-0.64518	0.41342	-36.798	0.23131	13	-0.89500	0.47785	-0.76374	0.63763	
14	0.35000	-0.55309	0.34597	-35.662	0.24037	14	-0.80512	0.39722	-0.66943	0.57054	
15	0.38000	-0.46100	0.28113	-34.654	0.24726	15	-0.71446	0.32081	-0.57591	0.50604	
16	0.41000	-0.36890	0.21855	-33.758	0.25193	16	-0.62316	0.24833	-0.48302	0.44362	
17	0.44000	-0.27681	0.15794	-32.949	0.25434	17	-0.53130	0.17943	-0.39070	0.38283	
18	0.47000	-0.18472	0.09912	-32.190	0.25445	18	-0.43890	0.11382	-0.29891	0.32327	
19	0.50000	-0.09263	0.04198	-31.446	0.25228	19	-0.34598	0.05123	-0.20765	0.26466	
20	0.53000	-0.00053	-0.01352	-30.698	0.24800	20	-0.25250	-0.00855	-0.11694	0.20679	
21	0.56000	0.09156	-0.06737	-29.939	0.24180	21	-0.15843	-0.06563	-0.02682	0.14959	
22	0.59000	0.18365	-0.11961	-29.188	0.23385	22	-0.06384	-0.12014	0.06277	0.09310	
23	0.62000	0.27575	-0.17029	-28.467	0.22431	23	0.03122	-0.17214	0.15190	0.03739	
24	0.65000	0.36784	-0.21951	-27.780	0.21331	24	0.12663	-0.22169	0.24067	-0.01753	
25	0.68000	0.45993	-0.26735	-27.127	0.20101	25	0.22229	-0.26888	0.32920	-0.07170	
26	0.71000	0.55202	-0.31389	-26.502	0.18753	26	0.31813	-0.31387	0.41755	-0.12514	
27	0.74000	0.64412	-0.35921	-25.904	0.17302	27	0.41411	-0.35680	0.50576	-0.17790	
28	0.77000	0.73621	-0.40336	-25.328	0.15759	28	0.51018	-0.39781	0.59387	-0.22998	
29	0.80000	0.82830	-0.44640	-24.773	0.14135	29	0.60632	-0.43703	0.68191	-0.28139	
30	0.83000	0.92040	-0.48838	-24.236	0.12442	30	0.70250	-0.47458	0.76992	-0.33214	
31	0.86000	1.01249	-0.52933	-23.717	0.10692	31	0.79869	-0.51057	0.85792	-0.38223	
32	0.89000	1.10458	-0.56931	-23.217	0.08898	32	0.89486	-0.54510	0.94593	-0.43165	
33	0.92000	1.19667	-0.60835	-22.737	0.07069	33	0.99099	-0.57828	1.03399	-0.48038	
34	0.95000	1.28877	-0.64651	-22.270	0.05218	34	1.08704	-0.61019	1.12212	-0.52842	
35	0.97500	1.36551	-0.67764	-21.887	0.03666	35	1.18301	-0.64095	1.21034	-0.57576	
36	1.00000	1.44226	-0.70817	-21.506	0.02111	36	1.27888	-0.67065	1.29866	-0.62236	
						37	1.35868	-0.69465	1.37235	-0.66063	
						38	1.42824	-0.71505	1.43672	-0.69359	
						39	1.43589	-0.71464	1.44207	-0.69923	
						40	1.44226	-0.70817	1.44226	-0.70817	

CHORD 3.67212 CAMBER 22.899 STAGGER -33.284

PHASE I ROTOR

NB 20

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 10

MEANLINE DATA					SURFACE COORDINATES					
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.63033	1.12706	-42.850	0.02070	1	-1.63033	1.12706	-1.63033	1.12706
2	0.02500	-1.55100	1.05354	-42.795	0.04299	2	-1.63338	1.11872	-1.62227	1.13073
3	0.05000	-1.47167	0.98023	-42.668	0.06514	3	-1.63054	1.11170	-1.61503	1.12843
4	0.07500	-1.39234	0.90744	-42.380	0.08694	4	-1.56561	1.03777	-1.53640	1.06931
5	0.10000	-1.31302	0.83566	-41.849	0.10820	5	-1.49375	0.95629	-1.44960	1.00418
6	0.12500	-1.23369	0.76555	-41.050	0.12873	6	-1.42164	0.87533	-1.36304	0.93955
7	0.15000	-1.15436	0.69769	-39.992	0.14835	7	-1.34911	0.79536	-1.27692	0.87596
8	0.17500	-1.07503	0.63255	-38.778	0.16691	8	-1.27596	0.71700	-1.19142	0.81409
9	0.20000	-0.99570	0.57022	-37.531	0.18428	9	-1.20203	0.64087	-1.10669	0.75452
10	0.23000	-0.90051	0.49901	-36.078	0.20349	10	-1.12730	0.56749	-1.02276	0.69760
11	0.26000	-0.80531	0.43135	-34.738	0.22081	11	-1.05183	0.49715	-0.93957	0.64329
12	0.29000	-0.71012	0.36687	-33.504	0.23618	12	-0.96042	0.41677	-0.84059	0.58124
13	0.32000	-0.61492	0.30523	-32.345	0.24953	13	-0.86822	0.34063	-0.74240	0.52208
14	0.35000	-0.51973	0.24623	-31.243	0.26074	14	-0.77530	0.26840	-0.64493	0.46534
15	0.38000	-0.42453	0.18969	-30.179	0.26970	15	-0.68167	0.19983	-0.54817	0.41064
16	0.41000	-0.32934	0.13549	-29.129	0.27634	16	-0.58735	0.13477	-0.45211	0.35769
17	0.44000	-0.23414	0.08358	-28.078	0.28054	17	-0.49232	0.07311	-0.35674	0.30626
18	0.47000	-0.13895	0.03391	-27.034	0.28221	18	-0.39660	0.01480	-0.26208	0.25618
19	0.50000	-0.04376	-0.01360	-26.015	0.28130	19	-0.30017	-0.04018	-0.16812	0.20734
20	0.53000	0.05144	-0.05905	-25.028	0.27793	20	-0.20309	-0.09178	-0.07481	0.15959
21	0.56000	0.14663	-0.10253	-24.080	0.27227	21	-0.10544	-0.14000	0.01793	0.11280
22	0.59000	0.24183	-0.14417	-23.172	0.26450	22	-0.00735	-0.18496	0.11023	0.06687
23	0.62000	0.33702	-0.18406	-22.305	0.25480	23	0.09109	-0.22682	0.20218	0.02176
24	0.65000	0.43222	-0.22230	-21.472	0.24329	24	0.18979	-0.26575	0.29387	-0.02258
25	0.68000	0.52741	-0.25897	-20.664	0.23012	25	0.28867	-0.30192	0.38537	-0.06619
26	0.71000	0.62261	-0.29412	-19.871	0.21544	26	0.38769	-0.33550	0.47674	-0.10910
27	0.74000	0.71780	-0.32779	-19.087	0.19938	27	0.48681	-0.36663	0.56801	-0.15131
28	0.77000	0.81299	-0.36001	-18.316	0.18209	28	0.58599	-0.39542	0.65922	-0.19282
29	0.80000	0.90819	-0.39083	-17.564	0.16368	29	0.68520	-0.42200	0.75040	-0.23358
30	0.83000	1.00338	-0.42029	-16.834	0.14429	30	0.78438	-0.44641	0.84161	-0.27358
31	0.86000	1.09858	-0.44845	-16.124	0.12400	31	0.88349	-0.46886	0.93289	-0.31280
32	0.89000	1.19377	-0.47535	-15.431	0.10296	32	0.98249	-0.48935	1.02428	-0.35124
33	0.92000	1.28897	-0.50101	-14.749	0.08127	33	1.08136	-0.50801	1.11580	-0.38889
34	0.95000	1.38416	-0.52547	-14.072	0.05903	34	1.18008	-0.52497	1.20747	-0.42572
35	0.97500	1.46349	-0.54494	-13.507	0.04015	35	1.27862	-0.54031	1.29931	-0.46171
36	1.00000	1.54282	-0.56358	-12.940	0.02109	36	1.37699	-0.55410	1.39134	-0.49684
						37	1.45880	-0.56446	1.46818	-0.52543
						38	1.52996	-0.57270	1.53527	-0.54976
						39	1.53744	-0.57104	1.54136	-0.55470
						40	1.54282	-0.56358	1.54282	-0.56358

CHORD 3.59544 CAMBER 29.910 STAGGER -28.049

PHASE I ROTOR

NR 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.	-1.62293	0.91225	-40.702	0.02560	1	-1.62293	0.91225	-1.62293	0.91225									
2	0.02500	-1.54148	0.84256	-40.394	0.04868	2	-1.62632	0.90172	-1.61317	0.91717									
3	0.05000	-1.46003	0.77369	-40.021	0.07155	3	-1.62251	0.89321	-1.60405	0.91470									
4	0.07500	-1.37858	0.70588	-39.504	0.09404	4	-1.55726	0.82402	-1.52571	0.86110									
5	0.10000	-1.29714	0.63955	-38.774	0.11601	5	-1.48304	0.74629	-1.43703	0.80109									
6	0.12500	-1.21569	0.57520	-37.805	0.13725	6	-1.40850	0.66960	-1.34867	0.74216									
7	0.15000	-1.13424	0.51333	-36.601	0.15760	7	-1.33346	0.59433	-1.26081	0.68417									
8	0.17500	-1.05279	0.45430	-35.245	0.17693	8	-1.25775	0.52098	-1.17362	0.62942									
9	0.20000	-0.97134	0.39823	-33.832	0.19516	9	-1.18122	0.45007	-1.08725	0.57659									
10	0.23000	-0.87360	0.33480	-32.135	0.21546	10	-1.10384	0.38205	-1.00174	0.52655									
11	0.26000	-0.77586	0.27535	-30.490	0.23396	11	-1.02567	0.31718	-0.91701	0.47929									
12	0.29000	-0.67813	0.21962	-28.895	0.25058	12	-0.93091	0.24357	-0.81630	0.42603									
13	0.32000	-0.58039	0.16740	-27.336	0.26522	13	-0.83522	0.17455	-0.71651	0.37616									
14	0.35000	-0.48265	0.11851	-25.824	0.27782	14	-0.73867	0.10993	-0.61759	0.32931									
15	0.38000	-0.38491	0.07274	-24.375	0.28830	15	-0.64128	0.04960	-0.51949	0.28521									
16	0.41000	-0.28717	0.02987	-23.002	0.29657	16	-0.54316	-0.00653	-0.42214	0.24355									
17	0.44000	-0.18943	-0.01032	-21.710	0.30254	17	-0.44440	-0.05856	-0.32542	0.20404									
18	0.47000	-0.09170	-0.04801	-20.474	0.30611	18	-0.34512	-0.10663	-0.22923	0.16636									
19	0.50000	0.00604	-0.08334	-19.270	0.30720	19	-0.24539	-0.15086	-0.13348	0.13022									
20	0.53000	0.10378	-0.11637	-18.080	0.30579	20	-0.14523	-0.19140	-0.03816	0.09537									
21	0.56000	0.20152	-0.14717	-16.893	0.30194	21	-0.04465	-0.22833	0.05673	0.06165									
22	0.59000	0.29926	-0.17574	-15.703	0.29575	22	0.05633	-0.26172	0.15123	0.02898									
23	0.62000	0.39700	-0.20213	-14.507	0.28732	23	0.15765	-0.29162	0.24539	-0.00271									
24	0.65000	0.49473	-0.22633	-13.313	0.27675	24	0.25924	-0.31810	0.33928	-0.03339									
25	0.68000	0.59247	-0.24839	-12.131	0.26414	25	0.36101	-0.34120	0.43298	-0.06305									
26	0.71000	0.69021	-0.26836	-10.968	0.24957	26	0.46287	-0.36099	0.52660	-0.09167									
27	0.74000	0.78795	-0.28630	-9.827	0.23311	27	0.56472	-0.37751	0.62022	-0.11928									
28	0.77000	0.88569	-0.30223	-8.684	0.21484	28	0.66647	-0.39087	0.71395	-0.14586									
29	0.80000	0.98342	-0.31614	-7.519	0.19482	29	0.76806	-0.40114	0.80784	-0.17145									
30	0.83000	1.08116	-0.32802	-6.331	0.17311	30	0.86947	-0.40842	0.90191	-0.19604									
31	0.86000	1.17890	-0.33783	-5.132	0.14982	31	0.97068	-0.41271	0.99617	-0.21937									
32	0.89000	1.27664	-0.34559	-3.951	0.12503	32	1.07162	-0.41405	1.09071	-0.24199									
33	0.92000	1.37438	-0.35135	-2.810	0.09877	33	1.17220	-0.41244	1.18560	-0.26322									
34	0.95000	1.47212	-0.35520	-1.698	0.07094	34	1.27233	-0.40795	1.28095	-0.28322									
35	0.97500	1.55357	-0.35696	-0.782	0.04655	35	1.37196	-0.40068	1.37680	-0.30203									
36	1.00000	1.63501	-0.35742	0.131	0.02158	36	1.47107	-0.39065	1.47317	-0.31975									
						37	1.55325	-0.38024	1.55388	-0.33369									
						38	1.62435	-0.36937	1.62475	-0.34500									
						39	1.63135	-0.36651	1.63156	-0.34878									
						40	1.63501	-0.35742	1.63501	-0.35742									

CHORD 3.49661 CAMBER 40.833 STAGGER -21.292

PHASE I 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.	-1.64701	0.79605	-38.965	0.03474	1	-1.64701	0.79605	-1.64701	0.79605									
2	0.02500	-1.56445	0.73014	-38.229	0.05714	2	-1.65114	0.78153	-1.63409	0.80312									
3	0.05000	-1.48189	0.66601	-37.445	0.07927	3	-1.64561	0.77025	-1.62153	0.80016									
4	0.07500	-1.39933	0.60373	-36.596	0.10101	4	-1.58213	0.70770	-1.54677	0.75259									
5	0.10000	-1.31677	0.54344	-35.665	0.12226	5	-1.50599	0.63454	-1.45779	0.69747									
6	0.12500	-1.23421	0.48528	-34.642	0.14288	6	-1.42944	0.56318	-1.36922	0.64428									
7	0.15000	-1.15165	0.42941	-33.518	0.16272	7	-1.35241	0.49377	-1.28113	0.59311									
8	0.17500	-1.06909	0.37596	-32.297	0.18169	8	-1.27482	0.42650	-1.19360	0.54406									
9	0.20000	-0.98653	0.32507	-30.985	0.19973	9	-1.19658	0.36157	-1.10672	0.49724									
10	0.23000	-0.88746	0.26750	-29.322	0.22001	10	-1.11763	0.29917	-1.02055	0.45275									
11	0.26000	-0.78839	0.21377	-27.612	0.23871	11	-1.03794	0.23946	-0.93512	0.41068									
12	0.29000	-0.68931	0.16379	-25.940	0.25569	12	-0.94133	0.17158	-0.83359	0.36341									
13	0.32000	-0.59024	0.11728	-24.375	0.27088	13	-0.84371	0.10801	-0.73307	0.31953									
14	0.35000	-0.49117	0.07392	-22.906	0.28419	14	-0.74524	0.04882	-0.63339	0.27875									
15	0.38000	-0.39210	0.03349	-21.504	0.29556	15	-0.64614	-0.00609	-0.53435	0.24064									
16	0.41000	-0.29303	-0.00418	-20.126	0.30489	16	-0.54648	-0.05697	-0.43586	0.20481									
17	0.44000	-0.19395	-0.03914	-18.745	0.31203	17	-0.44627	-0.10401	-0.33793	0.17098									
18	0.47000	-0.09488	-0.07144	-17.375	0.31704	18	-0.34548	-0.14732	-0.24057	0.13896									
19	0.50000	0.00419	-0.10117	-16.032	0.31969	19	-0.24410	-0.18690	-0.14381	0.10862									
20	0.53000	0.10326	-0.12841	-14.718	0.31995	20	-0.14222	-0.22273	-0.04754	0.07384									
21	0.56000	0.20233	-0.15324	-13.429	0.31778	21	-0.03995	-0.25480	0.04833	0.05246									
22	0.59000	0.30141	-0.17573	-12.149	0.31325	22	0.06262	-0.28313	0.14390	0.02632									
23	0.62000	0.40048	-0.19590	-10.861	0.30643	23	0.16543	-0.30779	0.23923	0.00130									
24	0.65000	0.49955	-0.21374	-9.548	0.29738	24	0.26844	-0.32885	0.33437	-0.02262									
25	0.68000	0.59862	-0.22921	-8.191	0.28617	25	0.37161	-0.34637	0.42935	-0.04543									
26	0.71000	0.69769	-0.24223	-6.770	0.27285	26	0.47488	-0.36037	0.52421	-0.06711									
27	0.74000	0.79677	-0.25269	-5.276	0.25746	27	0.57823	-0.37084	0.61901	-0.08758									
28	0.77000	0.89584	-0.26051	-3.736	0.24006	28	0.68161	-0.37770	0.71378	-0.10675									
29	0.80000	0.99491	-0.26562	-2.171	0.22071	29	0.78493	-0.38088	0.80860	-0.12451									
30	0.83000	1.09398	-0.26801	-0.584	0.19940	30	0.88802	-0.38028	0.90366	-0.14073									
31	0.86000	1.19305	-0.26763	1.035	0.17618	31	0.99073	-0.37590	0.99909	-0.15535									
32	0.89000	1.29213	-0.26439	2.719	0.15115	32	1.09297	-0.36770	1.09500	-0.16831									
33	0.92000	1.39120	-0.25816	4.498	0.12433	33	1.19464	-0.35570	1.19146	0.17955									
34	0.95000	1.49027	-0.24874	6.380	0.09540	34	1.29571	-0.33988	1.28854	-0.18890									
35	0.97500	1.57283	-0.23831	8.022	0.06956	35	1.39607	-0.32013	1.38632	-0.19618									
36	1.00000	1.65539	-0.22545	9.692	0.04286	36	1.49557	-0.29614	1.48497	-0.20134									
37						37	1.57768	-0.27275	1.56798	-0.20387									
38						38	1.63849	-0.25345	1.63055	-0.20443									
39						39	1.65094	-0.24434	1.64603	-0.20974									
40						40	1.65539	-0.22545	1.65539	-0.22545									

CHORD 3.45678 CAMBER 48.657 STAGGER -17.198

PHASE I 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.	-1.68351	0.69765	-33.040	0.05298	1	-1.68351	0.69765	-1.68351	0.69765	
2	0.02500	-1.59952	0.64345	-32.621	0.07293	2	-1.68748	0.67516	-1.66494	0.71037	
3	0.05000	-1.51553	0.59017	-32.148	0.09291	3	-1.67723	0.65887	-1.64558	0.70774	
4	0.07500	-1.43154	0.53792	-31.615	0.11279	4	-1.61918	0.61274	-1.57986	0.67417	
5	0.10000	-1.34755	0.48680	-31.026	0.13240	5	-1.54025	0.55084	-1.49081	0.62951	
6	0.12500	-1.26356	0.43692	-30.374	0.15160	6	-1.46110	0.48989	-1.40198	0.58594	
7	0.15000	-1.17957	0.38839	-29.645	0.17028	7	-1.38167	0.43007	-1.31343	0.54353	
8	0.17500	-1.09558	0.34138	-28.806	0.18834	8	-1.30188	0.37152	-1.22523	0.50231	
9	0.20000	-1.01158	0.29610	-27.832	0.20569	9	-1.22168	0.31439	-1.13745	0.46239	
10	0.23000	-0.91079	0.24435	-26.489	0.22546	10	-1.14095	0.25886	-1.05020	0.42390	
11	0.26000	-0.81001	0.19573	-24.989	0.24397	11	-1.05960	0.20515	-0.96357	0.38704	
12	0.29000	-0.70922	0.15042	-23.419	0.26104	12	-0.96108	0.14345	-0.86051	0.34524	
13	0.32000	-0.60843	0.10839	-21.850	0.27658	13	-0.86154	0.08517	-0.75847	0.30630	
14	0.35000	-0.50764	0.06954	-20.313	0.29050	14	-0.76109	0.03065	-0.65734	0.27019	
15	0.38000	-0.40685	0.03372	-18.830	0.30272	15	-0.65990	-0.01996	-0.55696	0.23675	
16	0.41000	-0.30606	0.00074	-17.416	0.31315	16	-0.55806	-0.06667	-0.45722	0.20576	
17	0.44000	-0.20527	-0.02957	-16.062	0.32170	17	-0.45570	-0.10954	-0.35800	0.17698	
18	0.47000	-0.10448	-0.05733	-14.747	0.32829	18	-0.35292	-0.14866	-0.25920	0.15014	
19	0.50000	-0.00369	-0.08265	-13.454	0.33283	19	-0.24977	-0.18414	-0.16077	0.12501	
20	0.53000	0.09710	-0.10557	-12.172	0.33520	20	-0.14627	-0.21607	-0.06270	0.10141	
21	0.56000	0.19789	-0.12615	-10.906	0.33536	21	-0.04241	-0.24450	0.03503	0.07920	
22	0.59000	0.29868	-0.14444	-9.671	0.33328	22	0.06176	-0.26941	0.13244	0.05826	
23	0.62000	0.39946	-0.16050	-8.433	0.32897	23	0.16616	-0.29080	0.22961	0.03851	
24	0.65000	0.50025	-0.17429	-7.123	0.32251	24	0.27068	-0.30871	0.32667	0.01983	
25	0.68000	0.60104	-0.18561	-5.670	0.31394	25	0.37534	-0.32321	0.42359	0.00221	
26	0.71000	0.70183	-0.19418	-4.007	0.30335	26	0.48026	-0.33430	0.52025	-0.01428	
27	0.74000	0.80262	-0.19960	-2.110	0.29077	27	0.58553	-0.34182	0.61655	-0.02941	
28	0.77000	0.90341	-0.20149	-0.010	0.27624	28	0.69124	-0.34548	0.71243	-0.04288	
29	0.80000	1.00420	-0.19953	2.268	0.25978	29	0.79727	-0.34488	0.80797	-0.05431	
30	0.83000	1.10499	-0.19341	4.705	0.24135	30	0.90339	-0.33961	0.90343	-0.06337	
31	0.86000	1.20578	-0.18284	7.284	0.22099	31	1.00934	-0.32932	0.99906	-0.06974	
32	0.89000	1.30657	-0.16755	9.987	0.19881	32	1.11489	-0.31368	1.09509	-0.07314	
33	0.92000	1.40736	-0.14725	12.802	0.17474	33	1.21979	-0.29245	1.19177	-0.07324	
34	0.95000	1.50815	-0.12163	15.737	0.14821	34	1.32381	-0.26545	1.28933	-0.06965	
35	0.97500	1.59214	-0.09596	18.261	0.12403	35	1.42672	-0.23245	1.38800	-0.06205	
36	1.00000	1.67613	-0.06617	20.782	0.09882	36	1.52825	-0.19296	1.48805	-0.05030	
						37	1.61157	-0.15485	1.57270	-0.03706	
						38	1.64870	-0.13623	1.61168	-0.02980	
						39	1.67352	-0.11116	1.64895	-0.03517	
						40	1.67613	-0.06617	1.67613	-0.06617	

CHORD 3.44537 STAGGER 53.822 CAMBER -12.809

3. PLANE SECTION BLADE COORDINATES

Figure 31 shows the stacked Phase I 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.

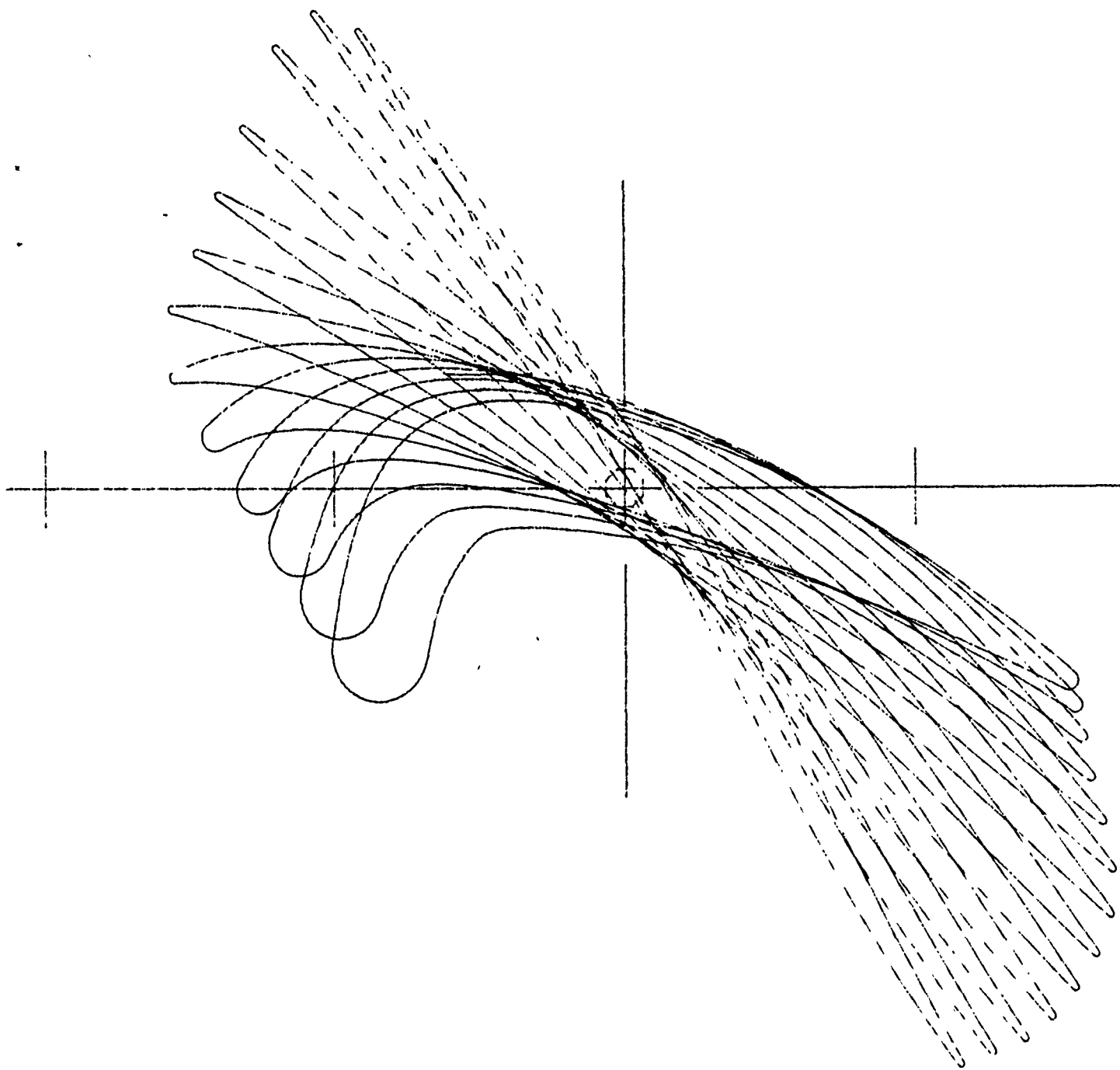


Figure 31. Stacked Phase I Rotor Plane Sections

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. ETA 0.
 SECTION NO 1 SECTION AA RHO 8.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.09072	55.896	0.01807	1.78981
2	-1.04499	56.592	0.02826	1.72115
3	-0.95238	57.934	0.04646	1.57692
4	-0.85840	59.264	0.06184	1.42256
5	-0.76282	60.552	0.07440	1.25750
6	-0.65585	61.774	0.08490	1.06303
7	-0.53731	62.528	0.09235	0.83794
8	-0.41699	62.318	0.09586	0.60671
9	-0.29537	61.282	0.09602	0.37949
10	-0.17326	59.782	0.09361	0.16309
11	-0.05111	58.423	0.08917	-0.04079
12	0.07067	57.522	0.08312	-0.23532
13	0.19180	56.946	0.07576	-0.42335
14	0.31176	56.493	0.06733	-0.60620
15	0.43038	55.999	0.05807	-0.78398
16	0.54759	55.511	0.04827	-0.95628
17	0.66296	55.131	0.03811	-1.12352
18	0.77650	54.920	0.02780	-1.28642
19	0.86957	54.941	0.01918	-1.41994

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00480	-1.09072	1.78981	56.212
2	0.0250	0.00770	-1.04171	1.71618	56.627
3	0.0500	0.01036	-0.99270	1.64069	57.386
4	0.0750	0.01276	-0.94369	1.56299	58.123
5	0.1000	0.01496	-0.89469	1.48309	58.819
6	0.1250	0.01693	-0.84568	1.40106	59.466
7	0.1500	0.01869	-0.79667	1.31691	60.102
8	0.1750	0.02024	-0.74767	1.23057	60.735
9	0.2000	0.02157	-0.69866	1.14203	61.318
10	0.2300	0.02291	-0.63985	1.03311	61.929
11	0.2600	0.02395	-0.58104	0.92177	62.351
12	0.2900	0.02473	-0.52223	0.80892	62.559
13	0.3200	0.02524	-0.46342	0.69565	62.523
14	0.3500	0.02553	-0.40462	0.58317	62.232
15	0.3800	0.02561	-0.34581	0.47250	61.773
16	0.4100	0.02551	-0.28700	0.36424	61.181
17	0.4400	0.02525	-0.22819	0.25882	60.497

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA. O.
 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		0.02486	-0.16938	0.15643	59.744
19	0.5000		0.02434	-0.11057	0.05709	59.026
20	0.5300		0.02372	-0.05176	-0.03972	58.439
21	0.5600		0.02299	0.00705	-0.13454	57.960
22	0.5900		0.02217	0.06585	-0.22776	57.556
23	0.6200		0.02127	0.12466	-0.31967	57.228
24	0.6500		0.02029	0.18347	-0.41055	56.972
25	0.6800		0.01923	0.24228	-0.50065	56.763
26	0.7100		0.01811	0.30109	-0.59004	56.559
27	0.7400		0.01693	0.35990	-0.67874	56.342
28	0.7700		0.01569	0.41871	-0.76664	56.081
29	0.8000		0.01441	0.47752	-0.85363	55.809
30	0.8300		0.01309	0.53632	-0.93984	55.600
31	0.8600		0.01174	0.59513	-1.02546	55.432
32	0.8900		0.01035	0.65394	-1.11053	55.234
33	0.9200		0.00894	0.71275	-1.19506	55.113
34	0.9500		0.00751	0.77156	-1.27934	55.091
35	0.9750		0.00631	0.82057	-1.34961	55.123
36	1.0000		0.00510	0.86957	-1.41994	55.134

CHORD 3.7610 STAGGER 58.586 CAMBER 1.078

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00480	-1.09072	1.78981	-1.09072	1.78981
2	0.00480	-1.09483	1.78350	-1.08315	1.79119
3	0.00480	-1.09367	1.77697	-1.07771	1.78768
4	0.00770	-1.05380	1.70821	-1.02962	1.72415
5	0.01036	-1.00911	1.63019	-0.97630	1.65118
6	0.01276	-0.96408	1.55032	-0.92331	1.57567
7	0.01496	-0.91875	1.46853	-0.87062	1.49766
8	0.01693	-0.87311	1.38488	-0.81825	1.41724
9	0.01859	-0.82715	1.29939	-0.76620	1.33443
10	0.02024	-0.78086	1.21196	-0.71447	1.24917
11	0.02157	-0.73425	1.12256	-0.66307	1.16150
12	0.02291	-0.67786	1.01284	-0.60184	1.05338
13	0.02395	-0.62094	0.90086	-0.54114	0.94267
14	0.02473	-0.56350	0.78750	-0.48096	0.83035

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.
SECTION NO 1 SECTION AA RHG 8.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.02524	-0.50554	0.67375	-0.42131	0.71756
16	0.02553	-0.44709	0.56080	-0.36214	0.60584
17	0.02561	-0.38823	0.44973	-0.30338	0.49528
18	0.02551	-0.32902	0.34112	-0.24497	0.38736
19	0.02525	-0.26952	0.23543	-0.18686	0.28220
20	0.02486	-0.20976	0.13288	-0.12900	0.17999
21	0.02434	-0.14982	0.03353	-0.07132	0.08065
22	0.02372	-0.08976	-0.06306	-0.01376	-0.01638
23	0.02299	-0.02960	-0.15748	0.04369	-0.11161
24	0.02217	0.03067	-0.25012	0.10104	-0.20539
25	0.02127	0.09103	-0.34132	0.15829	-0.29802
26	0.02029	0.15149	-0.43134	0.21546	-0.38976
27	0.01923	0.21203	-0.52047	0.27253	-0.48083
28	0.01811	0.27267	-0.60881	0.32951	-0.57127
29	0.01693	0.33340	-0.69638	0.38639	-0.66109
30	0.01569	0.39422	-0.78310	0.44319	-0.75017
31	0.01441	0.45510	-0.86886	0.49993	-0.83840
32	0.01309	0.51601	-0.95375	0.55664	-0.92593
33	0.01174	0.57696	-1.03798	0.61330	-1.01294
34	0.01035	0.63795	-1.12162	0.66993	-1.09944
35	0.00894	0.69896	-1.20468	0.72654	-1.18545
36	0.00751	0.75997	-1.28742	0.78314	-1.27125
37	0.00631	0.81083	-1.35639	0.83030	-1.34283
38	0.00510	0.85602	-1.41770	0.87218	-1.40647
39	0.00510	0.86179	-1.42147	0.87370	-1.41317
40	0.00510	0.86957	-1.41994	0.86957	-1.41994
LE RAD	0.00963	CENTER AT ALPHA	-1.08535	UPSILON	1.78181
TE RAD	0.00984	CENTER AT ALPHA	0.86395	UPSILON	-1.41186

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z	-7.03620	R	O.	MU	O.	ETA	O.
STAGE	1.	ROTOR		NB	20		
SECTION NO	1	SECTION AA		RHO	8.5000		
CHORD	3.7610	STAGGER		CAMBER	1.078		
AREA	0.263103	SURFACE ARC LENGTH		7.55250			
SECTION C.G.		ALPHA		UPSILON			
STREAMSURFACE SECTION C.G.		-0.19974		0.25908			
BLADE AXIS		-0.19877		0.25407			
STACKING AXIS (RADIAL)		-0.19877		0.25407			
		-0.00100		0.			

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. ETA 0.
 SECTION NO 2 SECTION BB RHO 8.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.19549	54.088	0.01903	1.75041
2	-1.14366	54.764	0.02912	1.67803
3	-1.03888	56.049	0.04746	1.52596
4	-0.93244	57.306	0.06331	1.36397
5	-0.82425	58.453	0.07662	1.19166
6	-0.70356	59.380	0.08817	0.99106
7	-0.56980	59.674	0.09682	0.76325
8	-0.43447	58.945	0.10141	0.53447
9	-0.29786	57.453	0.10236	0.31367
10	-0.16068	55.713	0.10031	0.10566
11	-0.02335	54.466	0.09595	-0.09066
12	0.11355	53.940	0.08967	-0.28036
13	0.24988	53.683	0.08182	-0.46660
14	0.38512	53.534	0.07267	-0.65011
15	0.51907	53.428	0.06252	-0.83087
16	0.65111	53.199	0.05170	-1.00820
17	0.78120	52.668	0.04054	-1.18045
18	0.90908	51.739	0.02939	-1.34551
19	1.01411	50.780	0.02031	-1.47626

62

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00487	-1.19549	1.75041	54.088
2	0.0250	0.00761	-1.14025	1.67320	54.779
3	0.0500	0.01016	-1.08501	1.59385	55.522
4	0.0750	0.01251	-1.02977	1.51238	56.187
5	0.1000	0.01467	-0.97453	1.42891	56.816
6	0.1250	0.01664	-0.91929	1.34344	57.432
7	0.1500	0.01842	-0.86405	1.25594	58.029
8	0.1750	0.02002	-0.80881	1.16644	58.601
9	0.2000	0.02143	-0.75357	1.07506	59.067
10	0.2300	0.02287	-0.68728	0.96352	59.455
11	0.2600	0.02404	-0.62099	0.85069	59.642
12	0.2900	0.02494	-0.55471	0.73748	59.624
13	0.3200	0.02559	-0.48842	0.62487	59.365
14	0.3500	0.02599	-0.42213	0.51400	58.840
15	0.3800	0.02618	-0.35584	0.40580	58.153
16	0.4100	0.02616	-0.28955	0.30068	57.355
17	0.4400	0.02597	-0.22327	0.19886	56.513

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 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	0.02563	-0.15698	0.10022	55.679
19	0.5000	0.02515	-0.09069	0.00447	54.969
20	0.5300	0.02454	-0.02440	-0.08919	54.490
21	0.5600	0.02383	0.04188	-0.18153	54.179
22	0.5900	0.02300	0.10817	-0.27296	53.953
23	0.6200	0.02208	0.17446	-0.36378	53.801
24	0.6500	0.02107	0.24075	-0.45417	53.699
25	0.6800	0.01997	0.30704	-0.54429	53.627
26	0.7100	0.01880	0.37332	-0.63415	53.544
27	0.7400	0.01756	0.43961	-0.72374	53.465
28	0.7700	0.01625	0.50590	-0.81312	53.419
29	0.8000	0.01490	0.57219	-0.90238	53.368
30	0.8300	0.01349	0.63848	-0.99131	53.221
31	0.8600	0.01205	0.70476	-1.07964	52.993
32	0.8900	0.01059	0.77105	-1.16714	52.702
33	0.9200	0.00912	0.83734	-1.25359	52.312
34	0.9500	0.00764	0.90363	-1.33859	51.761
35	0.9750	0.00641	0.95887	-1.40803	51.242
36	1.0000	0.00519	1.01411	-1.47626	50.780

CHORD 3.9107
 STAGGER 55.597
 CAMBER 3.308

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00487	-1.19549	1.75041	-1.19549	1.75041
2	0.00487	-1.19956	1.74364	-1.18758	1.75213
3	0.00487	-1.19808	1.73681	-1.18176	1.74862
4	0.00761	-1.15241	1.66462	-1.12809	1.68179
5	0.01016	-1.10139	1.58260	-1.06863	1.60510
6	0.01251	-1.05009	1.49876	-1.00944	1.52599
7	0.01467	-0.99854	1.41321	-0.95052	1.44461
8	0.01664	-0.94671	1.32592	-0.89186	1.36095
9	0.01842	-0.89461	1.23687	-0.83349	1.27502
10	0.02002	-0.84222	1.14604	-0.77539	1.18683
11	0.02143	-0.78952	1.05352	-0.71762	1.09660
12	0.02287	-0.72580	0.94079	-0.64876	0.98625
13	0.02404	-0.66156	0.82693	-0.58043	0.87445
14	0.02494	-0.59678	0.71282	-0.51263	0.76214

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.
SECTION NO 2 SECTION BB RHO 8.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.02559	-0.53146	0.59938	-0.44537	0.65036
16	0.02599	-0.46562	0.48771	-0.37864	0.54030
17	0.02618	-0.39932	0.37879	-0.31236	0.43281
18	0.02616	-0.33263	0.27309	-0.24648	0.32828
19	0.02597	-0.26562	0.17084	-0.18091	0.22688
20	0.02563	-0.19836	0.07197	-0.11559	0.12848
21	0.02515	-0.13098	-0.02376	-0.05043	0.03270
22	0.02454	-0.06347	-0.11706	0.01467	-0.06131
23	0.02383	0.00411	-0.20880	0.07966	-0.15426
24	0.02300	0.07181	-0.29943	0.14454	-0.24650
25	0.02208	0.13962	-0.38928	0.20930	-0.33828
26	0.02107	0.20755	-0.47856	0.27395	-0.42978
27	0.01997	0.27559	-0.56745	0.33848	-0.52113
28	0.01880	0.34376	-0.65599	0.40289	-0.61231
29	0.01756	0.41203	-0.74418	0.46719	-0.70330
30	0.01625	0.48038	-0.83206	0.53142	-0.79418
31	0.01490	0.54881	-0.91976	0.59556	-0.88500
32	0.01349	0.61734	-1.00711	0.65961	-0.97562
33	0.01205	0.68594	-1.09383	0.72359	-1.06545
34	0.01059	0.75457	-1.17969	0.78753	-1.15489
35	0.00912	0.82323	-1.26449	0.85144	-1.24269
36	0.00764	0.89190	-1.34783	0.91535	-1.32935
37	0.00641	0.94909	-1.41588	0.96864	-1.40018
38	0.00519	0.99960	-1.47499	1.01579	-1.46183
39	0.00519	1.00593	-1.47849	1.01792	-1.46887
40	0.00519	1.01411	-1.47626	1.01411	-1.47626
LE RAD	0.01009	CENTER AT ALPHA	-1.18957	UPSILON	1.74224
TE RAD	0.01043	CENTER AT ALPHA	1.00751	UPSILON	-1.46816

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z	-7.03620	R	O.	MU	O.	ETA	O.
STAGE	1.	ROTOR		NB	20		
SECTION NO	2	SECTION BB		RHO	8.0000		
CHORD	3.9107	STAGGER		CAMBER	3.308		
AREA	0.288309	SURFACE ARC LENGTH		7.85357			
SECTION C.G.		ALPHA		UPSILON			
STREAMSURFACE SECTION C.G.		-0.18399		0.19135			
BLADE AXIS		-0.18485		0.19120			
STACKING AXIS (RADIAL)		-0.18485		0.19120			
		-0.00100		0.			

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.
 STAGE 1. ROTOR NB 20
 SECTION NO 3 SECTION CC RHO 7.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.29948	52.349	0.01980	1.71047
2	-1.24238	52.958	0.03111	1.63559
3	-1.12703	54.083	0.05208	1.47934
4	-1.00996	55.094	0.07071	1.31448
5	-0.89125	55.898	0.08676	1.14146
6	-0.75889	56.436	0.10108	0.94355
7	-0.61264	56.307	0.11236	0.72266
8	-0.46466	54.935	0.11889	0.50530
9	-0.31539	52.743	0.12097	0.30075
10	-0.16547	50.651	0.11928	0.11111
11	-0.01515	49.301	0.11456	-0.06737
12	0.13507	48.742	0.10736	-0.24010
13	0.28511	48.489	0.09808	-0.41027
14	0.43459	48.375	0.08711	-0.57677
15	0.58317	48.357	0.07480	-0.74605
16	0.73068	48.346	0.06152	-0.91216
17	0.87690	48.174	0.04768	-1.07646
18	1.02171	47.608	0.03366	-1.23717
19	1.14127	46.848	0.02208	-1.36700

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00504	-1.29948	1.71047	52.349
2	0.0250	0.00811	-1.23846	1.63038	53.030
3	0.0500	0.01101	-1.17744	1.54841	53.634
4	0.0750	0.01372	-1.11642	1.46466	54.201
5	0.1000	0.01624	-1.05540	1.37921	54.735
6	0.1250	0.01858	-0.99438	1.29210	55.240
7	0.1500	0.02073	-0.93337	1.20343	55.673
8	0.1750	0.02267	-0.87235	1.11346	56.023
9	0.2000	0.02441	-0.81133	1.02243	56.295
10	0.2300	0.02622	-0.73811	0.91215	56.518
11	0.2600	0.02772	-0.66488	0.80137	56.506
12	0.2900	0.02892	-0.59166	0.69124	56.208
13	0.3200	0.02980	-0.51844	0.58295	55.605
14	0.3500	0.03040	-0.44522	0.47772	54.677
15	0.3800	0.03072	-0.37200	0.37638	53.613
16	0.4100	0.03079	-0.29877	0.27895	52.498
17	0.4400	0.03064	-0.22555	0.18541	51.437

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.
STAGE 1. ROTOR NB 20

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	0.03029	-0.15233	0.09513	50.493
19	0.5000	0.02976	-0.07911	0.00755	49.749
20	0.5300	0.02907	-0.00588	-0.07813	49.260
21	0.5600	0.02823	0.06734	-0.16263	48.939
22	0.5900	0.02726	0.14056	-0.24635	48.729
23	0.6200	0.02615	0.21378	-0.32956	48.587
24	0.6500	0.02494	0.28701	-0.41242	48.482
25	0.6800	0.02362	0.36023	-0.49502	48.416
26	0.7100	0.02220	0.43345	-0.57749	48.390
27	0.7400	0.02070	0.50667	-0.65993	48.388
28	0.7700	0.01911	0.57989	-0.74237	48.390
29	0.8000	0.01747	0.65312	-0.82482	48.394
30	0.8300	0.01576	0.72634	-0.90728	48.396
31	0.8600	0.01402	0.79956	-0.98970	48.354
32	0.8900	0.01224	0.87278	-1.07186	48.213
33	0.9200	0.01044	0.94601	-1.15349	47.996
34	0.9500	0.00863	1.01923	-1.23444	47.736
35	0.9750	0.00713	1.08025	-1.30124	47.402
36	1.0000	0.00562	1.14127	-1.36700	46.848

CHORD 3.9279 STAGGER 51.582 CAMBER 5.500

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00504	-1.29948	1.71047	-1.29948	1.71047
2	0.00504	-1.30352	1.70329	-1.29131	1.71251
3	0.00504	-1.30178	1.69624	-1.28512	1.70905
4	0.00811	-1.25119	1.62079	-1.22573	1.63986
5	0.01101	-1.19485	1.53558	-1.16003	1.56123
6	0.01372	-1.13827	1.44891	-1.09457	1.48042
7	0.01624	-1.08145	1.36079	-1.02936	1.39763
8	0.01858	-1.02436	1.27129	-0.96441	1.31290
9	0.02073	-0.96691	1.18048	-0.89975	1.22638
10	0.02267	-0.90927	1.08858	-0.83543	1.13834
11	0.02441	-0.85121	0.99583	-0.77145	1.04903
12	0.02622	-0.78105	0.88374	-0.69516	0.94055
13	0.02772	-0.71029	0.77133	-0.61948	0.83141
14	0.02892	-0.63886	0.65965	-0.54447	0.72282

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.

SECTION NO 3 SECTION CC RHO 7.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.02980	-0.56674	0.54989	-0.47014	0.61602
16	0.03040	-0.49393	0.44320	-0.39651	0.51224
17	0.03072	-0.42057	0.34059	-0.32342	0.41217
18	0.03079	-0.34675	0.24218	-0.25079	0.31581
19	0.03064	-0.27261	0.14789	-0.17849	0.22292
20	0.03029	-0.19823	0.05728	-0.10643	0.13298
21	0.02976	-0.12372	-0.03022	-0.03449	0.04532
22	0.02907	-0.04914	-0.11539	0.03737	-0.04087
23	0.02823	0.02553	-0.19905	0.10915	-0.12621
24	0.02726	0.10035	-0.28166	0.18079	-0.21104
25	0.02615	0.17526	-0.36354	0.25230	-0.29559
26	0.02494	0.25034	-0.44488	0.32368	-0.37995
27	0.02362	0.32553	-0.52581	0.39492	-0.46424
28	0.02220	0.40085	-0.60645	0.46605	-0.54854
29	0.02070	0.47628	-0.68692	0.53706	-0.63294
30	0.01911	0.55183	-0.76730	0.60796	-0.71744
31	0.01747	0.62747	-0.84760	0.67877	-0.80204
32	0.01576	0.70319	-0.92783	0.74949	-0.88672
33	0.01402	0.77899	-1.00800	0.82013	-0.97141
34	0.01224	0.85486	-1.08788	0.89071	-1.05584
35	0.01044	0.93077	-1.16721	0.96124	-1.13977
36	0.00863	1.00668	-1.24584	1.03177	-1.22304
37	0.00713	1.06994	-1.31071	1.09055	-1.29176
38	0.00562	1.12539	-1.36673	1.14207	-1.35117
39	0.00562	1.13255	-1.37005	1.14488	-1.35866
40	0.00562	1.14127	-1.36700	1.14127	-1.36700
LE RAD	0.01053	CENTER AT ALPHA	-1.29306	UPSILON	1.70213
TE RAD	0.01141	CENTER AT ALPHA	1.13347	UPSILON	-1.35867

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN	Z	-7.03620	R	0.	MU	0.	ETA	0.
STAGE	1.	ROTOR			NB	20		
SECTION NO	3	SECTION CC			RHO	7.5000		
CHORD	3.9279	STAGGER			CAMBER	5.500		
		51.582						
AREA	0.336214	SURFACE ARC LENGTH				7.69553		
SECTION C.G.		ALPHA			UPSILON			
STREAMSURFACE SECTION C.G.		-0.18161			0.19023			
BLADE AXIS		-0.19593			0.20195			
STACKING AXIS (RADIAL)		-0.19593			0.20195			
		-0.00100			0.			

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.
 STAGE 1. ROTOR NB 20
 SECTION NO 4 SECTION DD RHO 7.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.38949	50.828	0.02000	1.64278
2	-1.32784	51.328	0.03383	1.56642
3	-1.20319	52.173	0.05990	1.40848
4	-1.07713	52.766	0.08355	1.24431
5	-0.94952	53.093	0.10436	1.07547
6	-0.80757	53.114	0.12356	0.88625
7	-0.65082	52.278	0.13953	0.67992
8	-0.49242	49.954	0.14974	0.48277
9	-0.33288	47.062	0.15424	0.30241
10	-0.17236	44.910	0.15363	0.13667
11	-0.01126	43.509	0.14871	-0.01980
12	0.15011	42.583	0.14011	-0.17044
13	0.31175	41.895	0.12835	-0.31711
14	0.47340	41.321	0.11396	-0.46065
15	0.63478	40.800	0.09742	-0.60134
16	0.79599	40.305	0.07929	-0.73931
17	0.95688	39.842	0.05996	-0.87468
18	1.11744	39.414	0.03980	-1.00758
19	1.25096	39.072	0.02255	-1.11683

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00524	-1.38949	1.64278	50.828
2	0.0250	0.00911	-1.32348	1.56098	51.336
3	0.0500	0.01280	-1.25747	1.47784	51.770
4	0.0750	0.01629	-1.19146	1.39337	52.211
5	0.1000	0.01959	-1.12545	1.30765	52.568
6	0.1250	0.02268	-1.05943	1.22102	52.800
7	0.1500	0.02555	-0.99342	1.13378	52.971
8	0.1750	0.02818	-0.92741	1.04604	53.103
9	0.2000	0.03058	-0.86140	0.95802	53.145
10	0.2300	0.03313	-0.78219	0.85247	53.049
11	0.2600	0.03531	-0.70297	0.74778	52.665
12	0.2900	0.03710	-0.62376	0.64518	51.937
13	0.3200	0.03850	-0.54455	0.54583	50.866
14	0.3500	0.03951	-0.46533	0.45082	49.445
15	0.3800	0.04015	-0.38612	0.36059	48.002
16	0.4100	0.04044	-0.30690	0.27467	46.667
17	0.4400	0.04042	-0.22769	0.19241	45.537

ZPC

PHASE 1 ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.
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	0.04010	-0.14848	0.11297	44.660
19	0.5000	0.03952	-0.06926	0.03568	43.952
20	0.5300	0.03869	0.00995	-0.03990	43.383
21	0.5600	0.03764	0.08916	-0.11412	42.903
22	0.5900	0.03638	0.16838	-0.18720	42.495
23	0.6200	0.03492	0.24759	-0.25932	42.140
24	0.6500	0.03328	0.32680	-0.33060	41.832
25	0.6800	0.03148	0.40602	-0.40115	41.555
26	0.7100	0.02954	0.48523	-0.47106	41.301
27	0.7400	0.02745	0.56445	-0.54034	41.049
28	0.7700	0.02526	0.64366	-0.60901	40.786
29	0.8000	0.02296	0.72287	-0.67704	40.531
30	0.8300	0.02057	0.80209	-0.74448	40.297
31	0.8600	0.01811	0.88130	-0.81138	40.063
32	0.8900	0.01558	0.96051	-0.87771	39.815
33	0.9200	0.01300	1.03973	-0.94347	39.597
34	0.9500	0.01037	1.11894	-1.00881	39.448
35	0.9750	0.00815	1.18495	-1.06300	39.305
36	1.0000	0.00591	1.25096	-1.11683	39.072

CHORD 3.8194 STAGGER 46.264 CAMBER 11.756

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00524	-1.38949	1.64278	-1.38949	1.64278
2	0.00524	-1.39342	1.63537	-1.38130	1.64510
3	0.00524	-1.39152	1.62829	-1.37488	1.64180
4	0.00911	-1.33706	1.55011	-1.30990	1.57185
5	0.01280	-1.27667	1.46271	-1.23827	1.49296
6	0.01629	-1.21604	1.37431	-1.16687	1.41243
7	0.01959	-1.15516	1.28491	-1.09574	1.33039
8	0.02268	-1.09394	1.19483	-1.02493	1.24721
9	0.02555	-1.03237	1.10440	-0.95448	1.16316
10	0.02818	-0.97045	1.01373	-0.88438	1.07835
11	0.03058	-0.90812	0.92300	-0.81468	0.99304
12	0.03313	-0.83275	0.81444	-0.73163	0.89050
13	0.03531	-0.75658	0.70689	-0.64936	0.78868
14	0.03710	-0.67954	0.60150	-0.56798	0.68886

ZPC

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. ETA 0.
SECTION NO 4 SECTION DD RHO 7.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.03850	-0.60157	0.49943	-0.48752	0.59283
16	0.03951	-0.52266	0.40176	-0.40801	0.49988
17	0.04015	-0.44310	0.30929	-0.32914	0.41189
18	0.04044	-0.36308	0.22167	-0.25073	0.32767
19	0.04042	-0.28278	0.13834	-0.17261	0.24647
20	0.04010	-0.20230	0.05850	-0.09465	0.16744
21	0.03952	-0.12164	-0.01865	-0.01689	0.09001
22	0.03869	-0.04080	-0.09360	0.06070	0.01380
23	0.03764	0.04023	-0.16678	0.13810	-0.06147
24	0.03638	0.12145	-0.23842	0.21530	-0.13598
25	0.03492	0.20285	-0.30876	0.29233	-0.20987
26	0.03328	0.28442	-0.37795	0.36919	-0.28324
27	0.03148	0.36614	-0.44614	0.44590	-0.35616
28	0.02954	0.44800	-0.51343	0.52246	-0.42868
29	0.02745	0.53002	-0.57988	0.59888	-0.50081
30	0.02526	0.61215	-0.64552	0.67517	-0.57249
31	0.02296	0.69438	-0.71036	0.75136	-0.64371
32	0.02057	0.77668	-0.77445	0.82750	-0.71452
33	0.01811	0.85904	-0.83785	0.90356	-0.78491
34	0.01558	0.94146	-0.90057	0.97957	-0.85485
35	0.01300	1.02390	-0.96260	1.05555	-0.92434
36	0.01037	1.10636	-1.02410	1.13152	-0.99352
37	0.00815	1.17510	-1.07504	1.19481	-1.05097
38	0.00591	1.23475	-1.11892	1.24970	-1.10055
39	0.00591	1.24256	-1.12119	1.25351	-1.10778
40	0.00591	1.25096	-1.11683	1.25096	-1.11683
LE RAD	0.01075	CENTER AT ALPHA	-1.38271	UPSILON	1.63444
TE RAD	0.01186	CENTER AT ALPHA	1.24176	UPSILON	-1.10935

ZPC

PHASE 1 ROTOR

STAGE	1.	ROTOR		NB	20
COORD SYSTEM ORIGIN Z	-7.03620	R	O.	MU	O.
				ETA	O.
SECTION NO	4	SECTION DD		RHO	7.0000
CHORD	3.8194	STAGGER		CAMBER	
		46.264		11.756	
AREA	0.410323	SURFACE ARC LENGTH		7.70075	
		ALPHA		UPSILON	
SECTION C.G.		-0.18156		0.21303	
STREAMSURFACE SECTION C.G.		-0.20669		0.22671	
BLADE AXIS		-0.20669		0.22671	
STACKING AXIS (RADIAL)		-0.00100		0.	

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. ETA 0.
SECTION NO 5 SECTION EE RHO 6.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.46638	49.438	0.01980	1.55303
2	-1.40097	49.781	0.03708	1.47607
3	-1.26902	50.354	0.07001	1.31821
4	-1.13561	50.726	0.10029	1.15593
5	-1.00078	50.731	0.12738	0.99066
6	-0.85084	49.941	0.15271	0.80919
7	-0.68548	47.928	0.17411	0.61677
8	-0.51667	45.081	0.18851	0.44261
9	-0.35051	42.276	0.19600	0.28234
10	-0.18141	40.154	0.19688	0.13454
11	-0.01151	38.456	0.19175	-0.00432
12	0.15906	36.956	0.18145	-0.13605
13	0.33009	35.862	0.16670	-0.26163
14	0.50156	34.566	0.14821	-0.38211
15	0.67339	33.618	0.12651	-0.49835
16	0.84557	32.667	0.10215	-0.61082
17	1.01820	31.662	0.07563	-0.71934
18	1.19132	30.662	0.04729	-0.82391
19	1.33601	29.810	0.02250	-0.90824

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00531	-1.46638	1.55303	49.438
2	0.0250	0.01027	-1.39632	1.47057	49.838
3	0.0500	0.01504	-1.32626	1.38708	50.154
4	0.0750	0.01959	-1.25620	1.30272	50.419
5	0.1000	0.02392	-1.18614	1.21764	50.628
6	0.1250	0.02800	-1.11608	1.13202	50.779
7	0.1500	0.03183	-1.04602	1.04610	50.808
8	0.1750	0.03637	-0.97596	0.96031	50.689
9	0.2000	0.03862	-0.90590	0.87519	50.360
10	0.2300	0.04209	-0.82183	0.77486	49.660
11	0.2600	0.04507	-0.73776	0.67748	48.680
12	0.2900	0.04756	-0.65369	0.58386	47.426
13	0.3200	0.04956	-0.56962	0.49455	46.008
14	0.3500	0.05108	-0.48555	0.40975	44.470
15	0.3800	0.05213	-0.40147	0.32929	43.042
16	0.4100	0.05273	-0.31740	0.25249	41.803
17	0.4400	0.05289	-0.23333	0.17877	40.719

ZPC

PHASE 1 ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.
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	0.05264	-0.14926	0.10761	39.786
19	0.5000	0.05200	-0.06519	0.03865	36.939
20	0.5300	0.05101	0.01889	-0.02832	38.155
21	0.5600	0.04970	0.10296	-0.09350	37.417
22	0.5900	0.04808	0.18703	-0.15700	36.723
23	0.6200	0.04618	0.27110	-0.21898	36.077
24	0.6500	0.04403	0.35517	-0.27956	35.484
25	0.6800	0.04164	0.43924	-0.33888	34.937
26	0.7100	0.03904	0.52332	-0.39706	34.433
27	0.7400	0.03625	0.60739	-0.45418	33.963
28	0.7700	0.03327	0.69146	-0.51034	33.523
29	0.8000	0.03012	0.77553	-0.56556	33.070
30	0.8300	0.02683	0.85960	-0.61981	32.583
31	0.8600	0.02341	0.94367	-0.67302	32.082
32	0.8900	0.01987	1.02775	-0.72521	31.580
33	0.9200	0.01622	1.11182	-0.77639	31.089
34	0.9500	0.01247	1.19589	-0.82662	30.620
35	0.9750	0.00927	1.26595	-0.86776	30.225
36	1.0000	0.00603	1.33601	-0.90824	29.810

CHORD 3.7298
STAGGER 41.292
CAMBER 19.628

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00531	-1.46638	1.55303	-1.46638	1.55303
2	0.00531	-1.47014	1.54555	-1.45830	1.55567
3	0.00531	-1.46815	1.53855	-1.45180	1.55252
4	0.01027	-1.41095	1.45822	-1.36169	1.48292
5	0.01504	-1.34779	1.36911	-1.30473	1.40504
6	0.01959	-1.28436	1.27944	-1.22805	1.32589
7	0.02392	-1.22062	1.19935	-1.15166	1.24594
8	0.02800	-1.15654	1.09900	-1.07563	1.16504
9	0.03183	-1.09203	1.00859	-1.00002	1.08361
10	0.03537	-1.02701	0.91852	-0.92492	1.00211
11	0.03862	-0.96136	0.82924	-0.85044	0.92113
12	0.04209	-0.88166	0.72405	-0.76201	0.82567
13	0.04507	-0.80089	0.62198	-0.67463	0.73298
14	0.04756	-0.71901	0.52385	-0.58837	0.64387

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.

SECTION NO 5 SECTION EE RHO 6.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER	UPSILON	LOWER	UPSILON
			ALPHA		ALPHA	
15	0.04956	-0.63612		0.43035	-0.50312	0.55675
16	0.05108	-0.55228		0.34177	-0.41861	0.47773
17	0.05213	-0.46783		0.25823	-0.33512	0.40034
18	0.05273	-0.38295		0.17919	-0.25185	0.32580
19	0.05289	-0.29768		0.10400	-0.16898	0.25353
20	0.05264	-0.21208		0.03217	-0.08643	0.18305
21	0.05200	-0.12614		-0.03678	-0.00423	0.11409
22	0.05101	-0.03989		-0.10313	0.07766	0.04648
23	0.04970	0.04664		-0.16711	0.15927	-0.01989
24	0.04808	0.13342		-0.22887	0.24064	-0.10514
25	0.04618	0.22038		-0.28858	0.32182	-0.14937
26	0.04403	0.30751		-0.34642	0.40283	-0.21270
27	0.04164	0.39477		-0.40255	0.48372	-0.27522
28	0.03904	0.48214		-0.45711	0.56449	-0.33700
29	0.03625	0.56963		-0.51024	0.64515	-0.39812
30	0.03327	0.65720		-0.56206	0.72572	-0.45862
31	0.03012	0.74488		-0.61264	0.80618	-0.51849
32	0.02683	0.83266		-0.66196	0.88655	-0.57765
33	0.02341	0.92049		-0.71001	0.96686	-0.63604
34	0.01987	1.00814		-0.75678	1.04715	-0.69365
35	0.01622	1.09619		-0.80231	1.12744	-0.75048
36	0.01247	1.18404		-0.84663	1.20774	-0.80660
37	0.00927	1.25725		-0.88270	1.27465	-0.85282
38	0.00603	1.32026		-0.91314	1.33230	-0.89219
39	0.00603	1.32834		-0.91400	1.33714	-0.89686
40	0.00603	1.33601		-0.90824	1.33601	-0.90824
LE RAD	0.01080	CENTER AT ALPHA	-1.45937	UPSILON		1.54483
TE RAD	0.01212	CENTER AT ALPHA	1.32549	UPSILON		-0.90221

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z	-7.03620	R	0.	MU	0.	ETA	0.
STAGE	1.	ROTOR			NB	20	
SECTION NO	5	SECTION	EE		RHO	6.5000	
CHORD	3.7298	STAGGER	41.292		CAMBER	19.628	
AREA	0.505076	SURFACE ARC LENGTH			7.55619		
SECTION C.G.		ALPHA		UPSILON			
STREAMSURFACE SECTION C.G.		-0.18298		0.20846			
BLADE AXIS		-0.21253		0.21662			
STACKING AXIS (RADIAL)		-0.21253		0.21662			
		-0.00100		0.			

PHASE 1 ROTOR

COORD SYSTEM ORIGIN 2 -7.03620 R O. MU O. ETA O.
 SECTION NO 6 SECTION FF RHO 6.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.53207	48.313	0.01899	1.44821
2	-1.46347	48.571	0.03919	1.37084
3	-1.32501	48.936	0.07765	1.21307
4	-1.18517	48.944	0.11314	1.05242
5	-1.04390	48.298	0.14509	0.89181
6	-0.89705	46.454	0.17520	0.72057
7	-0.71414	43.360	0.20112	0.54779
8	-0.53984	40.185	0.21955	0.39209
9	-0.36436	37.577	0.23043	0.25074
10	-0.16784	35.597	0.23352	0.11974
11	-0.01043	33.809	0.22903	-0.00326
12	0.16786	31.986	0.21787	-0.11866
13	0.34685	30.211	0.20091	-0.22558
14	0.52659	28.523	0.17894	-0.32781
15	0.70719	26.890	0.15269	-0.42265
16	0.88855	25.238	0.12274	-0.51139
17	1.07096	23.507	0.08964	-0.59405
18	1.25457	21.625	0.05384	-0.67038
19	1.40862	19.852	0.02220	-0.72874

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.00519	0.00519	-1.53207	1.44821	48.313
2	0.0250	0.01110	-1.45855	1.36527	48.563
3	0.0500	0.01678	-1.38503	1.28170	48.755
4	0.0750	0.02220	-1.31152	1.19759	48.927
5	0.1000	0.02737	-1.23800	1.11311	48.983
6	0.1250	0.03227	-1.16448	1.02871	48.875
7	0.1500	0.03688	-1.09097	0.94490	48.583
8	0.1750	0.04116	-1.01745	0.86223	48.088
9	0.2000	0.04509	-0.94393	0.78136	47.304
10	0.2300	0.04933	-0.85571	0.68788	45.943
11	0.2600	0.05301	-0.76749	0.59911	44.383
12	0.2900	0.05614	-0.67927	0.51522	42.715
13	0.3200	0.05874	-0.59105	0.43606	41.099
14	0.3500	0.06081	-0.50283	0.36114	39.598
15	0.3800	0.06235	-0.41461	0.28990	38.272
16	0.4100	0.06334	-0.32639	0.22173	37.141
17	0.4400	0.06380	-0.23817	0.15614	36.139

ZPC

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.
 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	0.06373	-0.14995	0.09278	35.245
19	0.5000	0.06315	-0.06172	0.03146	34.353
20	0.5300	0.06211	0.02650	-0.02782	33.443
21	0.5600	0.06063	0.11472	-0.08510	32.540
22	0.5900	0.05876	0.20294	-0.14043	31.651
23	0.6200	0.05651	0.29116	-0.19388	30.772
24	0.6500	0.05392	0.37933	-0.24551	29.907
25	0.6800	0.05101	0.46760	-0.29539	29.067
26	0.7100	0.04782	0.55582	-0.34361	28.256
27	0.7400	0.04436	0.64404	-0.39024	27.457
28	0.7700	0.04066	0.73226	-0.43531	26.665
29	0.8000	0.03672	0.82048	-0.47884	25.864
30	0.8300	0.03259	0.90870	-0.52085	25.030
31	0.8600	0.02826	0.99692	-0.56130	24.217
32	0.8900	0.02377	1.08514	-0.60020	23.352
33	0.9200	0.01912	1.17336	-0.63750	22.471
34	0.9500	0.01433	1.26159	-0.67316	21.533
35	0.9750	0.01022	1.33510	-0.70156	20.712
36	1.0000	0.00607	1.40862	-0.72874	19.852

CHORD 3.6588
 STAGGER 36.512
 CAMBER 28.461

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00519	-1.53207	1.44821	-1.53207	1.44821
2	0.00519	-1.53557	1.44090	-1.52434	1.45083
3	0.00519	-1.53359	1.43421	-1.51799	1.44808
4	0.01110	-1.47378	1.35183	-1.44333	1.37871
5	0.01678	-1.40811	1.26146	-1.36196	1.30184
6	0.02220	-1.34213	1.17091	-1.28090	1.22428
7	0.02737	-1.27578	1.08025	-1.20022	1.14598
8	0.03227	-1.20896	0.98988	-1.12001	1.06754
9	0.03688	-1.14156	0.90027	-1.04038	0.98953
10	0.04116	-1.07348	0.81193	-0.96142	0.91252
11	0.04509	-1.00456	0.72543	-0.88330	0.83730
12	0.04933	-0.92056	0.62513	-0.79086	0.75053
13	0.05301	-0.83532	0.52981	-0.69966	0.66842
14	0.05614	-0.74894	0.43976	-0.60959	0.59069

ZPC

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.

SECTION NO 6 SECTION FF RHO 6.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.05674	-0.66169	0.35508	-0.52041	0.51705
16	0.06081	-0.57374	0.27543	-0.43192	0.44686
17	0.06235	-0.48525	0.20036	-0.34396	0.37945
18	0.06334	-0.39635	0.12936	-0.25642	0.31411
19	0.06380	-0.30700	0.06188	-0.16933	0.25040
20	0.06373	-0.21722	-0.00244	-0.08267	0.18799
21	0.06315	-0.12692	-0.06392	0.00347	0.12684
22	0.06211	-0.03612	-0.12263	0.08911	0.06698
23	0.06063	0.05505	-0.17860	0.17438	0.00841
24	0.05876	0.14653	-0.23193	0.25934	-0.04893
25	0.05651	0.23827	-0.28270	0.34405	-0.10506
26	0.05392	0.33020	-0.33101	0.42856	-0.16001
27	0.05101	0.42226	-0.37696	0.51294	-0.21382
28	0.04782	0.51441	-0.42067	0.59723	-0.26656
29	0.04436	0.60662	-0.46225	0.68146	-0.31823
30	0.04066	0.69888	-0.50177	0.76564	-0.36884
31	0.03672	0.79117	-0.53930	0.84979	-0.41839
32	0.03259	0.88346	-0.57485	0.93394	-0.46684
33	0.02826	0.97572	-0.60845	1.01813	-0.51415
34	0.02377	1.06790	-0.64011	1.10239	-0.56028
35	0.01912	1.15999	-0.66983	1.18674	-0.60517
36	0.01433	1.25196	-0.69754	1.27121	-0.64877
37	0.01022	1.32849	-0.71906	1.34172	-0.68407
38	0.00607	1.39400	-0.73640	1.40063	-0.71269
39	0.00607	1.40202	-0.73575	1.40785	-0.71852
40	0.00607	1.40862	-0.72874	1.40862	-0.72874
LE RAD	0.01049	CENTER AT ALPHA	-1.52510	UPSILON	1.44037
TE RAD	0.01231	CENTER AT ALPHA	1.39707	UPSILON	-0.72447

ZPC

PHASE 1 ROTOR

STAGE	1.	ROTOR		NB	20
COORD SYSTEM ORIGIN Z	-7.03620	R	0.	MU	0.
				ETA	0.
SECTION NO	6	SECTION FF		RHO	6.0000
CHORD	3.6588	STAGGER		CAMBER	
		36.512		28.461	
AREA	0.582035	SURFACE ARC LENGTH		7.45756	
SECTION C.G.		ALPHA		UPSILON	
STREAMSURFACE SECTION C.G.		-0.17715		0.18590	
BLADE AXIS		-0.20689		0.18518	
STACKING AXIS (RADIAL)		-0.20689		0.18518	
		-0.00100		0.	

ZPC

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. ETA 0.
 SECTION NO 7 SECTION OG RHO 5.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.58098	47.252	0.01813	1.32779
2	-1.50888	47.348	0.03981	1.24933
3	-1.36318	47.292	0.08145	1.09081
4	-1.21584	46.603	0.12037	0.93250
5	-1.06693	45.028	0.15583	0.77881
6	-0.90161	42.352	0.18981	0.62049
7	-0.71977	38.999	0.21998	0.46421
8	-0.53666	36.087	0.24245	0.32391
9	-0.35271	33.704	0.25634	0.19587
10	-0.16800	31.508	0.26263	0.07785
11	0.01745	29.269	0.25961	-0.03087
12	0.20348	26.986	0.24872	-0.13029
13	0.39017	24.734	0.23101	-0.22081
14	0.57749	22.428	0.20731	-0.30271
15	0.76547	19.916	0.17835	-0.37570
16	0.95418	17.103	0.14457	-0.43905
17	1.14336	13.798	0.10603	-0.49168
18	1.33295	9.780	0.06225	-0.53140
19	1.49099	5.755	0.02107	-0.55282

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00503	-1.58098	1.32779	47.252
2	0.0250	0.01144	-1.50418	1.24422	47.480
3	0.0500	0.01762	-1.42738	1.16055	47.411
4	0.0750	0.02357	-1.35059	1.07715	47.299
5	0.1000	0.02928	-1.27379	0.99429	47.013
6	0.1250	0.03473	-1.19699	0.91260	46.476
7	0.1500	0.03988	-1.12019	0.83276	45.703
8	0.1750	0.04471	-1.04339	0.75538	44.689
9	0.2000	0.04919	-0.96659	0.68094	43.494
10	0.2300	0.05408	-0.87443	0.59593	41.841
11	0.2600	0.05844	-0.78227	0.51585	40.134
12	0.2900	0.06223	-0.69011	0.44043	38.460
13	0.3200	0.06547	-0.59795	0.36924	36.940
14	0.3500	0.06814	-0.50579	0.30162	35.627
15	0.3800	0.07024	-0.41363	0.23704	34.424
16	0.4100	0.07175	-0.32147	0.17521	33.300
17	0.4400	0.07266	-0.22931	0.11593	32.204

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. ETA 0.

SECTION NO 7 SECTION OG RHO 5.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.07294	-0.13715	0.05909	31.118
19	0.5000	0.07262	-0.04500	0.00465	30.016
20	0.5300	0.07173	0.04716	-0.04739	28.890
21	0.5600	0.07032	0.13932	-0.09707	27.764
22	0.5900	0.06843	0.23148	-0.14445	26.647
23	0.6200	0.06609	0.32364	-0.18958	25.540
24	0.6500	0.06333	0.41580	-0.23254	24.442
25	0.6800	0.06018	0.50796	-0.27335	23.321
26	0.7100	0.05666	0.60012	-0.31199	22.164
27	0.7400	0.05281	0.69228	-0.34841	20.949
28	0.7700	0.04863	0.78444	-0.38253	19.663
29	0.8000	0.04415	0.87660	-0.41425	18.315
30	0.8300	0.03936	0.96876	-0.44351	16.904
31	0.8600	0.03426	1.06092	-0.47020	15.360
32	0.8900	0.02885	1.15308	-0.49406	13.639
33	0.9200	0.02312	1.24524	-0.51482	11.711
34	0.9500	0.01697	1.33739	-0.53215	9.555
35	0.9750	0.01150	1.41419	-0.54378	7.662
36	1.0000	0.00585	1.49099	-0.55282	5.755

CHORD 3.6019 STAGGER 31.474 CAMBER 41.496

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00503	-1.58098	1.32779	-1.58098	1.32779
2	0.00503	-1.58422	1.32072	-1.57367	1.33043
3	0.00503	-1.58223	1.31438	-1.56752	1.32792
4	0.01144	-1.51937	1.23030	-1.48900	1.25814
5	0.01762	-1.45075	1.13907	-1.40402	1.18203
6	0.02357	-1.38178	1.04836	-1.31939	1.10594
7	0.02928	-1.31236	0.95833	-1.23521	1.03024
8	0.03473	-1.24234	0.86953	-1.15163	0.95567
9	0.03988	-1.17159	0.78261	-1.06878	0.88292
10	0.04471	-1.10001	0.69814	-0.98677	0.81262
11	0.04919	-1.02756	0.61668	-0.90562	0.74520
12	0.05408	-0.95940	0.52337	-0.80945	0.66850
13	0.05844	-0.85011	0.43539	-0.71443	0.59631
14	0.06223	-0.75982	0.35267	-0.62040	0.52820

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN 2 -7.03620 R 0. MU 0. ETA 0.

SECTION NO 7 SECTION OG RHO 5.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.06547	-0.66881	0.27500	-0.52709	0.46348
16	0.06814	-0.57726	0.20186	-0.43430	0.40137
17	0.07024	-0.48515	0.13269	-0.34212	0.34139
18	0.07175	-0.39242	0.06721	-0.25053	0.28321
19	0.07266	-0.29905	0.00521	-0.15958	0.22664
20	0.07294	-0.20504	-0.05337	-0.06926	0.17155
21	0.07262	-0.11042	-0.10859	0.02043	0.11790
22	0.07173	-0.01525	-0.16050	0.10958	0.06572
23	0.07032	0.08033	-0.20914	0.19832	0.01499
24	0.06843	0.17621	-0.25459	0.28675	-0.03430
25	0.06609	0.27233	-0.29697	0.37496	-0.08219
26	0.06333	0.36861	-0.33637	0.46299	-0.12871
27	0.06018	0.46506	-0.37287	0.55086	-0.17383
28	0.05666	0.56162	-0.40650	0.63862	-0.21749
29	0.05281	0.65828	-0.43723	0.72628	-0.25960
30	0.04863	0.75497	-0.46500	0.81391	-0.30005
31	0.04415	0.85161	-0.48974	0.90158	-0.33877
32	0.03936	0.94815	-0.51133	0.98937	-0.37569
33	0.03426	1.04457	-0.52969	1.07726	-0.41070
34	0.02885	1.14082	-0.54455	1.16533	-0.44356
35	0.02312	1.23678	-0.55559	1.25369	-0.47404
36	0.01697	1.33232	-0.56230	1.34247	-0.50201
37	0.01150	1.41143	-0.56431	1.41696	-0.52926
38	0.00585	1.47935	-0.56361	1.48186	-0.53990
39	0.00585	1.48639	-0.56110	1.48860	-0.54430
40	0.00585	1.49099	-0.55282	1.49099	-0.55282
LE RAD	0.01005	CENTER AT ALPHA	-1.57418	UPSILON	1.32039
TE RAD	0.01203	CENTER AT ALPHA	1.47903	UPSILON	-0.55159

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN	Z	-7.03620	R	0.	MU	0.	ETA	0.
SECTION NO	7	SECTION		GG	RHO	5.5000		
CHORD	3.6019	STAGGER			CAMBER			
				31.474	41.496			
AREA	0.646538	SURFACE ARC LENGTH		7.40980				

SECTION C.G.	ALPHA	UPSILON
STREAMSURFACE SECTION C.G.	-0.14018	0.13937
BLADE AXIS	-0.16879	0.12983
STACKING AXIS (RADIAL)	-0.16879	0.12983
	-0.00100	0.

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.
 STAGE 1. ROTOR NB 20
 SECTION NO 8 SECTION HH RHG 5.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.58955	45.788	0.01892	1.18804
2	-1.51252	45.722	0.04109	1.10902
3	-1.35751	45.309	0.08429	0.95102
4	-1.20163	44.020	0.12521	0.79651
5	-1.04535	41.687	0.16276	0.65112
6	-0.87315	38.679	0.19909	0.50573
7	-0.68520	35.695	0.23198	0.36340
8	-0.49742	33.042	0.25732	0.23502
9	-0.30980	30.421	0.27455	0.11892
10	-0.12232	27.696	0.28310	0.01475
11	0.06502	24.939	0.28260	-0.07782
12	0.25202	22.123	0.27385	-0.15913
13	0.43853	19.105	0.25784	-0.22915
14	0.62439	15.724	0.23521	-0.28735
15	0.80912	11.805	0.20617	-0.33252
16	0.99188	6.927	0.17039	-0.36280
17	1.17166	0.731	0.12725	-0.37509
18	1.34671	-7.116	0.07632	-0.36579
19	1.48795	-15.638	0.02844	-0.33746

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00551	-1.58955	1.18804	45.788
2	0.0250	0.01195	-1.51261	1.10912	45.690
3	0.0500	0.01828	-1.43568	1.03042	45.577
4	0.0750	0.02444	-1.35874	0.95226	45.301
5	0.1000	0.03043	-1.28180	0.87511	44.811
6	0.1250	0.03621	-1.20486	0.79963	44.045
7	0.1500	0.04175	-1.12793	0.72643	43.027
8	0.1750	0.04701	-1.05099	0.65616	41.788
9	0.2000	0.05196	-0.97405	0.58903	40.421
10	0.2300	0.05748	-0.88173	0.51761	38.808
11	0.2600	0.06249	-0.78940	0.44040	37.266
12	0.2900	0.06700	-0.69708	0.37196	35.852
13	0.3200	0.07097	-0.60475	0.30685	34.536
14	0.3500	0.07441	-0.51243	0.24482	33.252
15	0.3800	0.07728	-0.42010	0.18573	31.980
16	0.4100	0.07956	-0.32778	0.12953	30.674
17	0.4400	0.08123	-0.23545	0.07620	29.339

ZPC

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.
 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	0.08228	-0.14313	0.02573	27.984
19	0.5000	0.08267	-0.05080	-0.02192	26.616
20	0.5300	0.08243	0.04152	-0.06682	25.249
21	0.5600	0.08160	0.13385	-0.10902	23.875
22	0.5900	0.08021	0.22617	-0.14855	22.466
23	0.6200	0.07830	0.31850	-0.18538	21.015
24	0.6500	0.07589	0.41082	-0.21946	19.503
25	0.6800	0.07299	0.50315	-0.25075	17.914
26	0.7100	0.06963	0.59547	-0.27910	16.205
27	0.7400	0.06572	0.68780	-0.30436	14.366
28	0.7700	0.06148	0.78012	-0.32633	12.378
29	0.8000	0.05666	0.87245	-0.34479	10.192
30	0.8300	0.05123	0.96477	-0.35935	7.666
31	0.8600	0.04533	1.05710	-0.36947	4.788
32	0.8900	0.03874	1.14942	-0.37464	1.563
33	0.9200	0.03146	1.24175	-0.37428	-2.134
34	0.9500	0.02339	1.33407	-0.36733	-6.599
35	0.9750	0.01601	1.41101	-0.35555	-10.883
36	1.0000	0.00828	1.48795	-0.33746	-15.638

CHORD 3.4348 STAGGER 26.367 CAMBER 61.426

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00551	-1.58955	1.18804	-1.58955	1.18804
2	0.00551	-1.59271	1.18056	-1.58203	1.19100
3	0.00551	-1.59044	1.17403	-1.57553	1.18856
4	0.01195	-1.52730	1.09476	-1.49792	1.12346
5	0.01628	-1.45809	1.00845	-1.41326	1.05239
6	0.02444	-1.38850	0.92273	-1.32890	0.98179
7	0.03043	-1.31864	0.83803	-1.24497	0.91219
8	0.03621	-1.24810	0.75493	-1.16162	0.84434
9	0.04175	-1.17625	0.67406	-1.07900	0.77690
10	0.04701	-1.10479	0.59596	-0.99719	0.71636
11	0.05196	-1.03192	0.52108	-0.91619	0.65697
12	0.05748	-0.94359	0.43569	-0.81986	0.58953
13	0.06249	-0.85439	0.35499	-0.72442	0.52581
14	0.06700	-0.76447	0.27870	-0.62969	0.46522

set of vectors which would produce the same circulation as the actual blade taking into account the change in streamline radius and meridional 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 I blade. Phase I Rotor deviation angles are shown on Figure 23. A plot of departure angles for each streamsurface section is shown in Figure 24. Once the intra-blade work distribution was chosen these departure angles were required to satisfy the desired incidence angles, deviation angles, and passage area ratios. The resulting streamsurface tip section of the Phase I rotor is compared to that of the baseline rotor in Figure 25. The "deviation angle minus reference deviation angle" for the Phase I rotor was kept essentially the same as the data match analysis although there are some small differences. Figure 26 shows the "delta deviation" compared to the data match of the baseline design.

If the performance of a new rotor design is to be accurately evaluated by comparing overall stage performance with the baseline design then it is important that the stator have nearly the same entering conditions in both cases. Figure 27 shows a comparison of the Phase I stator incidence angles with the data match base. As can be seen the differences are small.

Figure 28 shows the radial distribution of Phase I rotor throat margin and compares it to the data match case. 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 27 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 VIII.

ZPC

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.
 SECTION NO 8 SECTION HH RHO 5.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.07097	-0.67386	0.20644	-0.53565	0.40726
16	0.07441	-0.58250	0.13796	-0.44236	0.35169
17	0.07728	-0.49039	0.07316	-0.34981	0.29831
18	0.07956	-0.39748	0.01201	-0.25807	0.24705
19	0.08123	-0.30381	-0.04541	-0.16710	0.19782
20	0.08228	-0.20943	-0.09905	-0.07682	0.15051
21	0.08267	-0.11441	-0.14886	0.01281	0.10501
22	0.08243	-0.01886	-0.19486	0.10191	0.06122
23	0.08160	0.07713	-0.23717	0.19057	0.01912
24	0.08021	0.17353	-0.27585	0.27881	-0.02125
25	0.07830	0.27028	-0.31090	0.36672	-0.05985
26	0.07589	0.36731	-0.34231	0.45433	-0.09661
27	0.07299	0.46459	-0.37003	0.54171	-0.13147
28	0.06963	0.56210	-0.39393	0.62884	-0.16427
29	0.06579	0.65976	-0.41382	0.71583	-0.19489
30	0.06148	0.75749	-0.42946	0.80276	-0.22319
31	0.05666	0.85523	-0.44056	0.88967	-0.24902
32	0.05129	0.95302	-0.44665	0.97652	-0.27205
33	0.04533	1.05060	-0.44705	1.06360	-0.29189
34	0.03874	1.14761	-0.44114	1.15124	-0.30814
35	0.03146	1.24376	-0.42827	1.23974	-0.32029
36	0.02339	1.33869	-0.40723	1.32946	-0.32742
37	0.01601	1.41620	-0.38256	1.40582	-0.32854
38	0.00828	1.47861	-0.35719	1.47024	-0.32511
39	0.00828	1.48587	-0.35093	1.48125	-0.32800
40	0.00828	1.48795	-0.33746	1.48795	-0.33746
LE RAD	0.01046	CENTER AT ALPHA	-1.58225	UPSILON	1.18054
TE RAD	0.01681	CENTER AT ALPHA	1.47172	UPSILON	-0.34185

ZPC

PHASE 1 ROTOR

COORD SYSTEM ORIGIN Z	-7.03620	R	0.	MU	0.	ETA	0.
STAGE	1.	ROTOR					
SECTION NO	0	SECTION HH			RHO	5.0000	
CHORD	3.4348	STAGGER	26.367		CAMBER	61.426	
AREA	0.603730	SURFACE ARC LENGTH	7.19492				
SECTION C.G.		ALPHA			UPSILON		
STREAMSURFACE SECTION C.G.		-0.09180			0.08751		
BLADE AXIS		-0.10275			0.06193		
STACKING AXIS (RADIAL)		-0.10275			0.06193		
		-0.00100			0.		

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. ETA 0.
 STAGE 1. ROTOR NB 20
 SECTION NO 9 SECTION JJ RHO 4.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.55874	44.291	0.02101	1.04123
2	-1.47960	44.252	0.04331	0.96411
3	-1.32134	43.835	0.08725	0.81106
4	-1.16353	42.353	0.12920	0.66334
5	-1.00645	39.762	0.16789	0.52665
6	-0.83440	36.646	0.20551	0.39176
7	-0.64767	33.471	0.23992	0.26113
8	-0.46211	30.237	0.26710	0.14599
9	-0.27781	26.997	0.28662	0.04557
10	-0.09480	23.898	0.29813	-0.04132
11	0.08643	20.749	0.30147	-0.11582
12	0.26566	17.347	0.29698	-0.17798
13	0.44220	13.5C5	0.26657	-0.22728
14	0.61558	9.224	0.24106	-0.26283
15	0.78471	3.838	0.20835	-0.28282
16	0.94876	-3.246	0.16738	-0.29434
17	1.10632	-13.155	0.11826	-0.26285
18	1.25653	-26.601	0.07522	-0.20958
19	1.37531	-39.014		-0.13149

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00665	-1.55874	1.04123	44.291
2	0.0250	0.01319	-1.48539	0.96975	44.226
3	0.0500	0.01969	-1.41204	0.89848	44.105
4	0.0750	0.02611	-1.33869	0.82769	43.831
5	0.1000	0.03241	-1.26534	0.75779	43.366
6	0.1250	0.03856	-1.19199	0.68935	42.614
7	0.1500	0.04450	-1.11864	0.62303	41.584
8	0.1750	0.05022	-1.04528	0.55927	40.379
9	0.2000	0.05566	-0.97193	0.49836	39.020
10	0.2300	0.06179	-0.88391	0.42905	37.418
11	0.2600	0.06746	-0.79589	0.36355	35.896
12	0.2900	0.07266	-0.70787	0.30157	34.401
13	0.3200	0.07737	-0.61985	0.24295	32.924
14	0.3500	0.08157	-0.53183	0.18757	31.420
15	0.3800	0.08526	-0.44380	0.13540	29.876
16	0.4100	0.08840	-0.35578	0.08641	28.324
17	0.4400	0.09098	-0.26776	0.04048	26.782

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 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	0.09298	-0.17974	-0.00250	25.272
19	0.5000	0.09439	-0.09172	-0.04268	23.812
20	0.5300	0.09520	-0.00370	-0.08020	22.342
21	0.5600	0.09541	0.08433	-0.11502	20.810
22	0.5900	0.09503	0.17235	-0.14708	19.206
23	0.6200	0.09407	0.26037	-0.17631	17.521
24	0.6500	0.09253	0.34839	-0.20262	15.735
25	0.6800	0.09043	0.43641	-0.22586	13.819
26	0.7100	0.08776	0.52443	-0.24585	11.731
27	0.7400	0.08449	0.61245	-0.26231	9.415
28	0.7700	0.08061	0.70048	-0.27490	6.789
29	0.8000	0.07608	0.78850	-0.28308	3.760
30	0.8300	0.07084	0.87652	-0.28620	0.193
31	0.8600	0.06479	0.96454	-0.28335	-4.016
32	0.8900	0.05779	1.05256	-0.27330	-9.187
33	0.9200	0.04968	1.14058	-0.25421	-15.507
34	0.9500	0.04051	1.22860	-0.22288	-23.946
35	0.9750	0.03229	1.30196	-0.18393	-31.848
36	1.0000	0.02381	1.37531	-0.13149	-39.014

STAGGER 21.786
CAMBER 83.305

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00665	-1.55874	1.04123	-1.55874	1.04123
2	0.00665	-1.56204	1.03284	-1.55047	1.04474
3	0.00665	-1.55933	1.02565	-1.54319	1.04221
4	0.01319	-1.49993	0.95482	-1.47086	0.98459
5	0.01969	-1.43369	0.87614	-1.39039	0.92082
6	0.02611	-1.36726	0.79793	-1.31012	0.85745
7	0.03241	-1.30050	0.72056	-1.23018	0.79502
8	0.03856	-1.23323	0.64452	-1.15074	0.73418
9	0.04450	-1.16530	0.57044	-1.07197	0.67562
10	0.05022	-1.09668	0.49883	-0.99389	0.61971
11	0.05566	-1.02730	0.43004	-0.91657	0.56667
12	0.06179	-0.94323	0.35152	-0.82459	0.50658
13	0.06746	-0.85838	0.27721	-0.73340	0.44989
14	0.07266	-0.77272	0.20686	-0.64301	0.39629

ZPC

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.

SECTION NO 9 SECTION JJ RHO 4.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER	UPSILON	LOWER	UPSILON
			ALPHA		ALPHA	
15	0.07737	-0.68628		0.14035	-0.55341	0.34553
16	0.08157	-0.59901		0.07759	-0.46464	0.29754
17	0.08526	-0.51090		0.01861	-0.37671	0.25219
18	0.08840	-0.42204		-0.03653	-0.28952	0.20934
19	0.09098	-0.33253		-0.08783	-0.20300	0.16879
20	0.09298	-0.24245		-0.13534	-0.11703	0.13034
21	0.09439	-0.15193		-0.17912	-0.03151	0.09375
22	0.09520	-0.06087		-0.21932	0.05348	0.05892
23	0.09541	0.03077		-0.25593	0.13788	0.02589
24	0.09503	0.12296		-0.28886	0.22173	-0.00530
25	0.09407	0.21563		-0.31803	0.30511	-0.03460
26	0.09253	0.30875		-0.34333	0.38803	-0.06191
27	0.09043	0.40229		-0.36459	0.47054	-0.08713
28	0.08776	0.49624		-0.38160	0.55262	-0.11010
29	0.08449	0.59062		-0.39400	0.63429	-0.13063
30	0.08061	0.68542		-0.40136	0.71553	-0.14843
31	0.07608	0.78061		-0.40302	0.79638	-0.16314
32	0.07084	0.87614		-0.39812	0.87690	-0.17428
33	0.06479	0.97171		-0.38545	0.95737	-0.18124
34	0.05779	1.06714		-0.36342	1.03799	-0.18317
35	0.04968	1.16157		-0.32984	1.11960	-0.17858
36	0.04051	1.25458		-0.28137	1.20263	-0.16439
37	0.03229	1.32888		-0.22727	1.27504	-0.14059
38	0.02381	1.37114		-0.18916	1.32086	-0.11938
39	0.02381	1.38309		-0.16825	1.35102	-0.11573
40	0.02381	1.37531		-0.13149	1.37531	-0.13149
LE RAD	0.01162	CENTER AT ALPHA		-1.55042	UPSILON	1.03312
TE RAD	0.04347	CENTER AT ALPHA		1.34084	UPSILON	-0.15799

ZPC

PHASE I ROTOR

COORD SYSTEM ORIGIN Z	-7.03620	R	0.	MU	0.	ETA	0.
STAGE	1.	ROTOR					
SECTION NO	9	SECTION JJ			RHO	4.5000	
CHORD	3.1597	STAGGER	21.786		CAMBER	63.305	
AREA	0.701158	SURFACE ARC LENGTH	S.83135				
		ALPHA			UPSILON		
SECTION C.G.		-0.05003			0.03982		
STREAMSURFACE SECTION C.G.		-0.05164			0.00502		
BLADE AXIS		-0.05164			0.00502		
STACKING AXIS (RADIAL)		-0.00100			0.		

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. ETA 0.
SECTION NO 10 SECTION KK RHO 4.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.52169	43.416	0.02343	0.90475
2	-1.44326	43.326	0.04621	0.83112
3	-1.28727	42.601	0.09087	0.68633
4	-1.13285	40.714	0.13328	0.54878
5	-0.97992	37.819	0.17236	0.42332
6	-0.81328	34.292	0.21056	0.30147
7	-0.63331	30.428	0.24603	0.18671
8	-0.45515	26.778	0.27484	0.08904
9	-0.27902	23.455	0.29671	0.00595
10	-0.10487	20.173	0.3149	-0.06415
11	0.06677	16.845	0.3397	-0.12155
12	0.23554	13.463	0.31904	-0.16698
13	0.40051	9.867	0.31221	-0.20039
14	0.56094	5.454	0.29912	-0.22166
15	0.71584	-1.081	0.28004	-0.22774
16	0.86403	-11.287	0.25327	-0.21197
17	1.00455	-26.109	0.21515	-0.16271
18	1.13702	-42.458	0.16702	-0.06513
19	1.24094	-54.030	0.13008	0.06524

94

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00811	-1.52169	0.90475	43.416
2	0.0250	0.01506	-1.45263	0.83988	43.081
3	0.0500	0.02197	-1.38356	0.77537	42.976
4	0.0750	0.02881	-1.31449	0.71134	42.659
5	0.1000	0.03553	-1.24543	0.64825	42.115
6	0.1250	0.04211	-1.17636	0.58663	41.323
7	0.1500	0.04850	-1.10730	0.52697	40.273
8	0.1750	0.05468	-1.03823	0.46968	39.052
9	0.2000	0.06060	-0.96916	0.41498	37.677
10	0.2300	0.06734	-0.88629	0.35294	35.948
11	0.2600	0.07365	-0.80341	0.29473	34.211
12	0.2900	0.07952	-0.72053	0.24021	32.456
13	0.3200	0.08494	-0.63765	0.18928	30.676
14	0.3500	0.08988	-0.55477	0.14183	28.920
15	0.3800	0.09434	-0.47189	0.09761	27.253
16	0.4100	0.09830	-0.38901	0.05636	25.661
17	0.4400	0.10175	-0.30613	0.01793	24.093

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 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	0.10466	-0.22325	-0.01779	22.532
19	0.5000	0.10703	-0.14037	-0.05082	20.919
20	0.5300	0.10885	-0.05749	-0.08114	19.260
21	0.5600	0.11008	0.02538	-0.10876	17.592
22	0.5900	0.11071	0.10826	-0.13371	15.919
23	0.6200	0.11073	0.19114	-0.15603	14.207
24	0.6500	0.11015	0.27402	-0.17567	12.449
25	0.6800	0.10898	0.35690	-0.19260	10.624
26	0.7100	0.10722	0.43978	-0.20673	8.692
27	0.7400	0.10488	0.52266	-0.21776	6.402
28	0.7700	0.10194	0.60554	-0.22513	3.651
29	0.8000	0.09834	0.68842	-0.22798	0.157
30	0.8300	0.09395	0.77130	-0.22510	-4.444
31	0.8600	0.08846	0.85418	-0.21400	-11.141
32	0.8900	0.08148	0.93705	-0.19144	-19.423
33	0.9200	0.07275	1.01993	-0.15469	-28.432
34	0.9500	0.06250	1.10281	-0.09775	-40.803
35	0.9750	0.05370	1.17188	-0.02534	-50.686
36	1.0000	0.04505	1.24094	0.06524	-53.608

CHORD 2.6874 STAGGER 16.903 CAMBER 97.025

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00811	-1.52169	0.90475	-1.52169	0.90475
2	0.00811	-1.52522	0.89530	-1.51254	0.90884
3	0.00811	-1.52208	0.88734	-1.50435	0.90619
4	0.01506	-1.46748	0.82399	-1.43777	0.85576
5	0.02197	-1.40519	0.75216	-1.36194	0.79858
6	0.02881	-1.34268	0.68075	-1.28631	0.74182
7	0.03553	-1.27983	0.61020	-1.21103	0.68630
8	0.04211	-1.21650	0.54098	-1.13622	0.63228
9	0.04850	-1.15256	0.47355	-1.06203	0.58040
10	0.05468	-1.08796	0.40838	-0.98850	0.53098
11	0.06060	-1.02264	0.34574	-0.91569	0.48422
12	0.06734	-0.94336	0.27424	-0.82922	0.43164
13	0.07365	-0.86319	0.20680	-0.74362	0.38256
14	0.07852	-0.78214	0.14333	-0.65892	0.33708

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. NB O. ETA O.

SECTION NO 10 SECTION KK RHO 4.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.08494	-0.70021	0.08381	-0.57509	0.29474
16	0.08988	-0.61752	0.02824	-0.49202	0.25541
17	0.09434	-0.53428	-0.02348	-0.40952	0.21869
18	0.09830	-0.45047	-0.07156	-0.32755	0.18429
19	0.10175	-0.36610	-0.11617	-0.24617	0.15203
20	0.10466	-0.28115	-0.15736	-0.16535	0.12178
21	0.10703	-0.19555	-0.19516	-0.08520	0.09352
22	0.10885	-0.10933	-0.22949	-0.00566	0.06720
23	0.11008	-0.02265	-0.26024	0.07342	0.04273
24	0.11071	0.06443	-0.28741	0.15210	0.01989
25	0.11073	0.15191	-0.31100	0.23038	-0.00106
26	0.11015	0.23974	-0.33096	0.30830	-0.02038
27	0.10898	0.32789	-0.34724	0.38591	-0.03796
28	0.10722	0.41639	-0.35975	0.46317	-0.05371
29	0.10488	0.50577	-0.36823	0.53954	-0.06729
30	0.10194	0.59617	-0.37200	0.61491	-0.07826
31	0.09834	0.68803	-0.36995	0.68881	-0.08600
32	0.09395	0.78181	-0.36033	0.76079	-0.08987
33	0.08846	0.87885	-0.33930	0.82950	-0.08859
34	0.08148	0.97617	-0.30238	0.89793	-0.08049
35	0.07275	1.06994	-0.24706	0.96992	-0.06233
36	0.06250	1.16178	-0.16606	1.04385	-0.02945
37	0.05370	1.23186	-0.07446	1.11189	0.02378
38	0.04505	1.25956	-0.03085	1.14787	0.06008
39	0.04505	1.27011	0.01014	1.19394	0.07957
40	0.04505	1.24094	0.06524	1.24094	0.06524
LE RAD	0.01302	CENTER AT ALPHA	-1.51222	UPSILON	0.89583
TE RAD	0.07268	CENTER AT ALPHA	1.19749	UPSILON	0.00698

PHASE 1 ROTOR

ZPC

STAGE	1.	ROTOR		NB	20
COORD SYSTEM ORIGIN Z	-7.03620	R	O.	MU	O.
				ETA	O.
SECTION NO	10	SECTION KK		RHO	4.0000
CHORD	2.8874	STAGGER		CAMBER	
		16.903		97.025	
AREA	0.715799	SURFACE ARC LENGTH		6.51846	
SECTION C.G.		ALPHA		UPSILON	
STREAMSURFACE SECTION C.G.		-0.02010		0.01652	
BLADE AXIS		-0.02079		-0.02332	
STACKING AXIS (RADIAL)		-0.02079		-0.02332	
		-0.00100		0.	

ZPC

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. ETA 0.
 SECTION NO 11 SECTION LL RHG 3.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.49725	42.258	0.02960	0.78361
2	-1.42138	41.611	0.05246	0.71483
3	-1.27072	39.723	0.09669	0.58389
4	-1.12171	37.137	0.13833	0.46453
5	-0.97404	34.213	0.17664	0.35825
6	-0.81325	30.866	0.21432	0.25591
7	-0.63981	27.216	0.24984	0.16033
8	-0.46835	23.930	0.27929	0.07934
9	-0.29920	20.844	0.30270	0.01075
10	-0.13256	17.770	0.32016	-0.04650
11	0.03091	14.720	0.33163	-0.09329
12	0.19071	11.515	0.33711	-0.13021
13	0.34610	8.051	0.33664	-0.15725
14	0.49611	3.267	0.33084	-0.17286
15	0.63997	-4.969	0.31947	-0.17123
16	0.77519	-18.623	0.29889	-0.14057
17	0.90105	-36.764	0.26328	-0.06332
18	1.01711	-53.056	0.21748	0.07915
19	1.10656	-62.799	0.18494	0.26197

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.01115	-1.49725	0.78361	42.258
2	0.0250	0.01854	-1.43216	0.72453	42.053
3	0.0500	0.02584	-1.36706	0.66657	41.285
4	0.0750	0.03301	-1.30197	0.61027	40.407
5	0.1000	0.04005	-1.23687	0.55580	39.417
6	0.1250	0.04693	-1.17178	0.50335	38.274
7	0.1500	0.05361	-1.10668	0.45315	36.966
8	0.1750	0.06007	-1.04159	0.40536	35.601
9	0.2000	0.06629	-0.97649	0.35992	34.232
10	0.2300	0.07340	-0.89838	0.30840	32.572
11	0.2600	0.08012	-0.82026	0.26009	30.879
12	0.2900	0.08644	-0.74215	0.21494	29.178
13	0.3200	0.09234	-0.66403	0.17281	27.510
14	0.3500	0.09780	-0.58592	0.13352	25.893
15	0.3800	0.10281	-0.50780	0.09690	24.363
16	0.4100	0.10737	-0.42969	0.06271	22.917
17	0.4400	0.11149	-0.35157	0.03084	21.471

ZPC

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.

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	0.11514	-0.27346	0.00125	20.012
19	0.5000	0.11834	-0.19535	-0.02609	18.573
20	0.5300	0.12106	-0.11723	-0.05127	17.166
21	0.5600	0.12330	-0.03912	-0.07436	15.763
22	0.5900	0.12504	0.03900	-0.09537	14.347
23	0.6200	0.12627	0.11711	-0.11431	12.896
24	0.6500	0.12697	0.19523	-0.13113	11.394
25	0.6800	0.12712	0.27334	-0.14575	9.785
26	0.7100	0.12672	0.35146	-0.15801	8.025
27	0.7400	0.12580	0.42957	-0.16755	5.776
28	0.7700	0.12433	0.50769	-0.17347	2.760
29	0.8000	0.12225	0.58580	-0.17448	-1.545
30	0.8300	0.11928	0.66391	-0.16852	-7.519
31	0.8600	0.11497	0.74203	-0.15210	-16.768
32	0.8900	0.10857	0.82014	-0.11952	-28.523
33	0.9200	0.09952	0.89826	-0.06569	-40.174
34	0.9500	0.08803	0.97637	0.01718	-53.141
35	0.9750	0.07842	1.04147	0.12404	-62.847
36	1.0000	0.06964	1.10656	0.26197	-65.591

CHORD 2.6556 STAGGER 11.328 CAMBER 107.849

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.01115	-1.49725	0.78361	-1.49725	0.78361
2	0.01115	-1.50155	0.77149	-1.48583	0.78898
3	0.01115	-1.49747	0.76154	-1.47531	0.78585
4	0.01854	-1.44865	0.70626	-1.41567	0.74281
5	0.02584	-1.38970	0.64079	-1.34443	0.69235
6	0.03301	-1.33038	0.57690	-1.27355	0.64365
7	0.04005	-1.27064	0.51471	-1.20311	0.59688
8	0.04693	-1.21038	0.45443	-1.13318	0.55227
9	0.05361	-1.14949	0.39627	-1.06367	0.51003
10	0.06007	-1.08802	0.34051	-0.99515	0.47022
11	0.06629	-1.02600	0.28715	-0.92698	0.43268
12	0.07340	-0.95084	0.22627	-0.84591	0.39053
13	0.08012	-0.87486	0.16879	-0.76566	0.35140
14	0.08644	-0.79810	0.11473	-0.68619	0.31516

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. NB 20 ETA O.

SECTION NO 11 SECTION LL RHO 3.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER	UPSILON	LOWER ALPHA	UPSILON
15	0.09234	-0.72067		0.06406	-0.60740	0.28155
16	0.09780	-0.64262		0.01670	-0.52921	0.25035
17	0.10281	-0.56412		-0.02746	-0.45149	0.22125
18	0.10737	-0.48520		-0.06861	-0.37417	0.19402
19	0.11149	-0.40576		-0.10692	-0.29739	0.16859
20	0.11514	-0.32578		-0.14240	-0.22114	0.14491
21	0.11834	-0.24539		-0.17503	-0.14530	0.12286
22	0.12106	-0.16467		-0.20485	-0.06979	0.10231
23	0.12330	-0.08359		-0.23191	0.00536	0.08319
24	0.12504	-0.00214		-0.25622	0.08014	0.06547
25	0.12627	0.07969		-0.27774	0.15453	0.04912
26	0.12697	0.16192		-0.29639	0.22853	0.03414
27	0.12712	0.24463		-0.31208	0.30203	0.02058
28	0.12672	0.32797		-0.32462	0.37495	0.00860
29	0.12580	0.41276		-0.33374	0.44638	-0.00137
30	0.12433	0.49974		-0.33837	0.51563	-0.00858
31	0.12225	0.59018		-0.33674	0.58142	-0.01223
32	0.11928	0.68464		-0.32554	0.64319	-0.01151
33	0.11497	0.78607		-0.29826	0.69799	-0.00593
34	0.10857	0.88898		-0.24618	0.75131	0.00714
35	0.09952	0.98350		-0.16665	0.81301	0.03528
36	0.08803	1.06989		-0.05294	0.88285	0.08729
37	0.07842	1.13412		0.07652	0.94882	0.17156
38	0.06964	1.15761		0.13507	0.98277	0.23001
39	0.06964	1.16125		0.19572	1.03872	0.26821
40	0.06964	1.10656		0.26197	1.10656	0.26197
LE RAD	0.01655	CENTER AT ALPHA	-1.48503	UPSILON		0.77246
TE RAD	0.10032	CENTER AT ALPHA	1.06399	UPSILON		0.17113

ZPC

PHASE I ROTOR

COORD SYSTEM ORIGIN Z	-7.03620	R	O.	MU	O.	ETA	O.
STAGE	1.	ROTOR					
					NB	20	
SECTION NO	11	SECTION LL			RHO	3.5000	
CHORD	2.6556	STAGGER			CAMBER		
		11.328			107.849		
AREA	0.738220	SURFACE ARC LENGTH			6.29382		

SECTION C.G.	ALPHA	UPSILON
STREAMSURFACE SECTION C.G.	0.00461	0.02958
BLADE AXIS	-0.00090	-0.01162
STACKING AXIS (RADIAL)	-0.00090	-0.01162
	-0.00100	O.

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. ETA 0.
 SECTION NO 12 SECTION MM RHG 3.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.48244	39.275	0.04056	0.68883
2	-1.40860	38.105	0.06247	0.63019
3	-1.26224	35.640	0.10462	0.52190
4	-1.11770	33.206	0.14413	0.42459
5	-0.97477	30.902	0.18046	0.33671
6	-0.81929	28.281	0.21659	0.24974
7	-0.65177	25.185	0.25138	0.16622
8	-0.48646	21.993	0.28125	0.09434
9	-0.32358	18.779	0.30646	0.03370
10	-0.16359	15.848	0.32714	-0.01675
11	-0.00730	12.985	0.34321	-0.05839
12	0.14447	9.789	0.35469	-0.09064
13	0.29106	6.327	0.36092	-0.11323
14	0.43113	1.096	0.36255	-0.12396
15	0.56410	-8.812	0.35890	-0.11472
16	0.68634	-25.379	0.34451	-0.06917
17	0.79754	-45.119	0.31140	0.03608
18	0.89721	-60.177	0.26714	0.22343
19	0.97218	-68.304	0.23980	0.45870

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.01645	-1.48244	0.68883	39.275
2	0.0250	0.02384	-1.42107	0.63988	37.951
3	0.0500	0.03114	-1.35971	0.59290	36.918
4	0.0750	0.03829	-1.29834	0.54767	35.854
5	0.1000	0.04531	-1.23698	0.50422	34.753
6	0.1250	0.05216	-1.17561	0.46249	33.684
7	0.1500	0.05883	-1.11425	0.42237	32.667
8	0.1750	0.06529	-1.05298	0.38377	31.683
9	0.2000	0.07153	-0.99152	0.34661	30.717
10	0.2300	0.07873	-0.91788	0.30384	29.562
11	0.2600	0.08560	-0.84424	0.26308	28.359
12	0.2900	0.09214	-0.77060	0.22436	27.108
13	0.3200	0.09834	-0.69696	0.18770	25.820
14	0.3500	0.10418	-0.62332	0.15310	24.496
15	0.3800	0.10966	-0.54968	0.12059	23.141
16	0.4100	0.11478	-0.47604	0.09016	21.755
17	0.4400	0.11957	-0.40241	0.06181	20.365

ZPC

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.

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	0.12401	-0.32877	0.03547	18.987
19	0.5000	0.12810	-0.25513	0.01109	17.669
20	0.5300	0.13184	-0.18149	-0.01151	16.473
21	0.5600	0.13521	-0.10785	-0.03250	15.325
22	0.5900	0.13821	-0.03421	-0.05180	14.025
23	0.6200	0.14084	0.03943	-0.06923	12.587
24	0.6500	0.14306	0.11307	-0.08467	11.092
25	0.6800	0.14480	0.18670	-0.09808	9.520
26	0.7100	0.14602	0.26034	-0.10928	7.740
27	0.7400	0.14678	0.33398	-0.11796	5.584
28	0.7700	0.14707	0.40762	-0.12322	2.399
29	0.8000	0.14684	0.48126	-0.12356	-2.248
30	0.8300	0.14579	0.55490	-0.11633	-9.363
31	0.8600	0.14336	0.62854	-0.09744	-20.278
32	0.8900	0.13839	0.70217	-0.05867	-35.195
33	0.9200	0.12969	0.77581	0.00926	-49.181
34	0.9500	0.11698	0.84945	0.11692	-61.702
35	0.9750	0.10614	0.91082	0.26120	-70.923
36	1.0000	0.09727	0.97218	0.45870	-73.527

CHORD 2.4654 STAGGER 5.356 CAMBER 112.801

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.01645	-1.48244	0.68883	-1.48244	0.68883
2	0.01645	-1.48727	0.67169	-1.46525	0.69749
3	0.01645	-1.48083	0.65838	-1.44883	0.69137
4	0.02384	-1.43915	0.61670	-1.40300	0.66306
5	0.03114	-1.38276	0.56222	-1.33665	0.62359
6	0.03829	-1.32599	0.50941	-1.27069	0.58593
7	0.04531	-1.26881	0.45833	-1.20514	0.55010
8	0.05216	-1.21127	0.40898	-1.13995	0.51599
9	0.05883	-1.15339	0.36132	-1.07510	0.48342
10	0.06529	-1.09515	0.31528	-1.01061	0.45226
11	0.07153	-1.03656	0.27080	-0.94647	0.42241
12	0.07873	-0.96576	0.21943	-0.87000	0.38626
13	0.08560	-0.89436	0.17023	-0.79412	0.35594
14	0.09214	-0.82235	0.12326	-0.71864	0.32546

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. NB 20. ETA 0.

SECTION NO 12 SECTION MM RHO 3.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.09834	-0.74976	0.07858	-0.64416	0.29681
16	0.10418	-0.67657	0.03624	-0.57007	0.26996
17	0.10966	-0.60280	-0.00370	-0.49656	0.24489
18	0.11478	-0.52849	-0.04125	-0.42360	0.22158
19	0.11957	-0.45370	-0.07637	-0.35111	0.19998
20	0.12401	-0.37850	-0.10907	-0.27903	0.18002
21	0.12810	-0.30306	-0.13937	-0.20720	0.16155
22	0.13184	-0.22757	-0.16735	-0.13541	0.14434
23	0.13521	-0.15190	-0.19324	-0.06380	0.12825
24	0.13821	-0.07550	-0.21709	0.00708	0.11349
25	0.14084	0.00159	-0.23867	0.07726	0.10022
26	0.14306	0.07914	-0.25773	0.14699	0.08839
27	0.14480	0.15718	-0.27411	0.21623	0.07796
28	0.14602	0.23610	-0.28764	0.28458	0.06909
29	0.14678	0.31637	-0.29804	0.35159	0.06211
30	0.14707	0.40003	-0.30436	0.41521	0.05791
31	0.14684	0.48836	-0.30443	0.47416	0.05730
32	0.14579	0.58413	-0.29364	0.52566	0.06099
33	0.14336	0.68978	-0.26321	0.56729	0.06832
34	0.13839	0.80049	-0.19807	0.60385	0.08074
35	0.12969	0.89680	-0.09525	0.65483	0.11376
36	0.11698	0.97642	0.04856	0.72248	0.16527
37	0.10614	1.03447	0.21844	0.78716	0.30396
38	0.09727	1.05754	0.30632	0.82169	0.39679
39	0.09727	1.05187	0.38552	0.88453	0.45444
40	0.09727	0.97218	0.45870	0.97218	0.45870
LE RAD	0.02299	CENTER AT ALPHA	-1.46445	UPSILON	0.67451
TE RAD	0.12722	CENTER AT ALPHA	0.93415	UPSILON	0.33729

PHASE 1 ROTOR

ZPC

COORD SYSTEM ORIGIN Z	-7.03620	R	O.	MU	O.	ETA	O.
STAGE	1.	ROTOR					
SECTION NO	12	SECTION MM					
CHORD	2.4654	STAGGER	5.356				
AREA	0.774435	SURFACE ARC LENGTH	6.15902				
		CHAMBER	112.807				
		RHO	3.0000				
		ALPHA	0.02446				
		UPSILON	0.07034				
		SECTION C.G.	0.01723				
		STREAMSURFACE SECTION C.G.	0.01723				
		BLADE AXIS	-0.00100				
		STACKING AXIS (RADIAL)					

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.
SECTION NO 13 SECTION NN RHO 2.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.46853	34.199	0.05414	0.61509
2	-1.39686	33.044	0.07433	0.56814
3	-1.25499	30.913	0.11342	0.48095
4	-1.11491	29.132	0.15016	0.40103
5	-0.97662	27.629	0.18416	0.32662
6	-0.82619	25.806	0.21858	0.25060
7	-0.66428	23.253	0.25267	0.17575
8	-0.50488	20.071	0.28304	0.11093
9	-0.34809	16.682	0.31016	0.05716
10	-0.19464	13.894	0.33410	0.01307
11	-0.04551	11.226	0.35479	-0.02350
12	0.09824	8.045	0.37227	-0.05107
13	0.23602	4.591	0.38521	-0.06922
14	0.36615	-1.078	0.39426	-0.07505
15	0.48823	-12.577	0.39833	-0.05822
16	0.59750	-31.457	0.39013	0.00223
17	0.69404	-51.589	0.35952	0.13547
18	0.77730	-65.150	0.31680	0.36771
19	0.83780	-72.019	0.29466	0.65542

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.02347	-1.46853	0.61509	33.448
2	0.0250	0.03052	-1.41087	0.57721	33.011
3	0.0500	0.03751	-1.35322	0.54048	31.981
4	0.0750	0.04439	-1.29556	0.50512	31.069
5	0.1000	0.05116	-1.23790	0.47092	30.311
6	0.1250	0.05778	-1.18024	0.43767	29.639
7	0.1500	0.06425	-1.12258	0.40527	29.030
8	0.1750	0.07054	-1.06492	0.37365	28.465
9	0.2000	0.07666	-1.00727	0.34275	27.904
10	0.2300	0.08377	-0.93808	0.30663	27.223
11	0.2600	0.09064	-0.86889	0.27161	26.457
12	0.2900	0.09727	-0.79970	0.23781	25.593
13	0.3200	0.10366	-0.73051	0.20537	24.617
14	0.3500	0.10979	-0.66132	0.17445	23.521
15	0.3800	0.11566	-0.59213	0.14520	22.296
16	0.4100	0.12128	-0.52294	0.11777	20.930
17	0.4400	0.12666	-0.45375	0.09231	19.474

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R O. MU O. ETA O.

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	0.13163	-0.38456	0.06280	18.064
19	0.5000	0.13677	-0.31537	0.04714	16.729
20	0.5300	0.14149	-0.24618	0.02711	15.597
21	0.5600	0.14596	-0.17698	0.00840	14.680
22	0.5900	0.15019	-0.10779	-0.00907	13.620
23	0.6200	0.15420	-0.03960	-0.02501	12.268
24	0.6500	0.15800	0.03059	-0.03911	10.770
25	0.6800	0.16146	0.09978	-0.05132	9.230
26	0.7100	0.16447	0.16897	-0.06153	7.506
27	0.7400	0.16707	0.23816	-0.06942	5.459
28	0.7700	0.16932	0.30735	-0.07436	2.451
29	0.8000	0.17117	0.37654	-0.07474	-2.114
30	0.8300	0.17245	0.44573	-0.06793	-9.743
31	0.8600	0.17252	0.51492	-0.04923	-21.273
32	0.8900	0.17008	0.58411	-0.00924	-38.808
33	0.9200	0.15296	0.65330	0.06723	-55.269
34	0.9500	0.14958	0.72249	0.19634	-67.376
35	0.9750	0.13679	0.78014	0.37923	-76.311
36	1.0000	0.12774	0.83780	0.65542	-78.974

CHORD 2.3067 STAGGER -1.002 CAMBER 112.423

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.02347	-1.46853	0.61509	-1.46853	0.61509
2	0.02347	-1.47290	0.59182	-1.44948	0.62806
3	0.02347	-1.46275	0.57499	-1.42949	0.62549
4	0.03052	-1.43005	0.54769	-1.39170	0.60672
5	0.03751	-1.37613	0.50378	-1.33031	0.57717
6	0.04439	-1.32198	0.46127	-1.26913	0.54898
7	0.05116	-1.26768	0.41998	-1.20812	0.52186
8	0.05778	-1.21320	0.37975	-1.14728	0.49559
9	0.06425	-1.15854	0.34048	-1.08662	0.47007
10	0.07054	-1.10370	0.30212	-1.02615	0.44517
11	0.07666	-1.04664	0.26462	-0.96589	0.42088
12	0.08377	-0.98227	0.22072	-0.89388	0.39254
13	0.09064	-0.91546	0.17802	-0.82231	0.36519
14	0.09727	-0.84816	0.13663	-0.75123	0.33899

ZPC

PHASE 1 ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. NB 20. ETA 0.

SECTION NO 13 SECTION NN RHO 2.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.10368	-0.78031	0.09668	-0.68071	0.31406
16	0.10979	-0.71185	0.05835	-0.61078	0.29056
17	0.11566	-0.64273	0.02177	-0.54152	0.26862
18	0.12128	-0.57290	-0.01288	-0.47297	0.24841
19	0.12666	-0.50245	-0.04542	-0.40504	0.23004
20	0.13183	-0.43170	-0.07575	-0.33741	0.21335
21	0.13677	-0.36077	-0.10393	-0.26996	0.19820
22	0.14149	-0.29005	-0.13007	-0.20230	0.18428
23	0.14596	-0.21965	-0.15444	-0.13432	0.17125
24	0.15019	-0.14859	-0.17742	-0.06700	0.15927
25	0.15420	-0.07640	-0.19879	-0.00081	0.14878
26	0.15800	-0.00347	-0.21813	0.06464	0.13991
27	0.16146	0.06991	-0.23512	0.12965	0.13249
28	0.16447	0.14419	-0.24959	0.19374	0.12653
29	0.16707	0.21982	-0.26124	0.25649	0.12239
30	0.16932	0.29899	-0.26946	0.31570	0.12074
31	0.17117	0.38382	-0.27203	0.36925	0.12255
32	0.17245	0.47938	-0.26395	0.41207	0.12809
33	0.17252	0.58711	-0.23465	0.44272	0.13619
34	0.17008	0.70704	-0.16210	0.46117	0.14361
35	0.16296	0.80776	-0.03985	0.49883	0.17431
36	0.14958	0.88172	0.12998	0.56325	0.26270
37	0.13679	0.93343	0.34190	0.62686	0.41657
38	0.12774	0.95702	0.48063	0.66313	0.56290
39	0.12774	0.94115	0.57721	0.73126	0.63974
40	0.12774	0.83780	0.65542	0.83780	0.65542
LE RAL	0.03045	CENTER AT ALPHA	-1.44315	UPSILON	0.59828
TE RAD	0.15355	CENTER AT ALPHA	0.80547	UPSILON	0.50532

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z	-7.03620	R	0.	MU	0.	ETA	0.
STAGE	1.	ROTOR					
SECTION NO	13	SECTION NN		RHO	2.5000		
CHORD	2.3067	STAGGER	-1.002	CAMBER	112.423		
AREA	0.823718	SURFACE ARC LENGTH	6.09552				
		ALPHA		UPSILON			
SECTION C.G.		0.03808		0.12830			
STREAMSURFACE SECTION C.G.		0.03536		0.02822			
BLADE AXIS		0.03536		0.02822			
STACKING AXIS (RADIAL)		-0.00100		0.			

PHASE I ROTOR

ZPC

SECT	NO	STAGE 1. ROTOR			NB	
		RHO	CHORD	STAGGER CAMBER	TM/C	ZETA1* ZETA2*
AA	1	8.50000	3.7610	58.59	1.08	0.02561 56.21 55.13
BB	2	6.00000	3.9107	55.60	3.31	0.02618 54.09 50.76
CC	3	7.50000	3.9279	51.58	5.50	0.03079 52.35 46.85
DD	4	7.00000	3.8194	46.26	11.76	0.04044 50.83 39.07
EE	5	6.50000	3.7298	41.29	19.63	0.05289 49.44 29.81
FF	6	6.00000	3.6588	36.51	28.46	0.06380 48.31 19.85
GG	7	5.50000	3.6019	31.47	41.50	0.07294 47.25 5.76
HH	8	5.00000	3.4348	26.37	61.43	0.08267 45.79 -15.64
JJ	9	4.50000	3.1597	21.79	83.31	0.09541 44.29 -39.01
KK	10	4.00000	2.8874	16.90	97.02	0.11073 43.42 -53.61
LL	11	3.50000	2.6556	11.33	107.85	0.12712 42.26 -65.59
MM	12	3.00000	2.4654	5.36	112.80	0.14707 39.27 -73.53
NN	13	2.50000	2.3067	-1.00	112.42	0.17252 33.45 -78.57