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SINGLE-STAGE EVALUATION OF HIGHLY-LOADED HIGH-MACH-NUMBER COMPRESSOR STAGES
VI. DATA AND PERFORMANCE OF CANTILEVERED STATOR

By

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PRATT & WHITNEY AIRCRAFT DIVISION
UNITED AIRCRAFT CORPORATION

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16. Abstract

A compressor stage with a rotor tip speed of 1600 ft/sec was tested to evaluate its performance with a cantilevered stator and a rotating inner shroud beneath the stator. Both the rotor blades and the stator vanes were composed of multiple circular arc airfoil sections. Comparison of data taken during this test of the cantilevered stator and previous tests with the same compressor and airfoil geometry in a shrouded stator configuration showed only slight differences in stage performance with no significant effect on overall efficiency. However, the severity of the stator wake near the rotating hub was decreased at all flows including the near surge condition. Stall and wise open discharge corrected weight flows were the same as for the shrouded stator configuration.

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FOREWORD

This report was prepared by the Pratt & Whitney Aircraft Division of United Aircraft Corporation, East Hartford, Connecticut, to present data and performance of a compressor stage with a cantilevered stator and a rotating inner shroud beneath the stator.

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CANTILEVERED STATOR

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SUMMARY

A compressor stage with a rotor tip speed of 1600 ft/sec was tested to evaluate its performance with a cantilevered stator and a rotating inner shroud beneath the stator. Both the rotor blades and the stator vanes were composed of multiple circular arc airfoil sections.

Comparison of data taken during this test of the cantilevered stator and previous tests with the same compressor and airfoil geometry in a shrouded stator configuration showed only slight differences in stage performance with no significant effect on overall efficiency. However, the severity of the stator wake near the rotating hub was decreased at all flows including the near surge condition. Stall and wide open discharge corrected weight flows were the same as for the shrouded stator configuration.

INTRODUCTION

Results from research compressors have shown that compressor rotor blades can be designed to operate with high aerodynamic blade loading and/or high inlet relative Mach number and still achieve good efficiency with acceptable stall margin. There is, however, a severe penalty in stage efficiency due to stator endwall losses.

As part of Contract NAS3-10482, a stator endwall treatment test program was initiated to investigate the effectiveness of various types of endwall treatments for reducing stator losses and increasing the stator stall-free range of operation. The basic compressor stage used for this program had a design rotor tip speed of 1600 ft/sec and demonstrated a stage pressure ratio of 1.946 and a stage efficiency of 84.5 percent. Stator endwall treatments tested previously under this contract included (1) suction through a slit located at the intersection of the stator suction surface and the I.D. wall (Reference 1), (2) blowing from tubes located at the intersection of the stator suction surface and the inner and outer walls (Reference 2), (3) suction through annular slots located in the inner and outer wall at the stator leading edge (Reference 2), and (4) combined blowing and annular suction (Reference 2). To evaluate the effect of these endwall treatments on the stator range, the stator vanes in each test were restaggered four degrees open (increased incidence) with respect to the design stagger. Results indicate however, that the restagger was not sufficient to cause stator stall at design speed (References 1 and 2). The restaggered stator with no endwall treatment is referred to herein as the baseline configuration.

The final configuration to be evaluated is that of a cantilevered stator and rotating inner shroud. The results of tests from this configuration are reported herein.

TEST APPARATUS AND PROCEDURE

TEST COMPRESSOR

The compressor used in this program, Figure 1, was a highly loaded, high Mach number single stage compressor with no inlet guide vanes, 30 MCA rotor blades and 44 MCA stator vanes. It is the same compressor stage used in the work presented in Reference 3 except that a rotating inner shroud and cantilevered stator replaced the shrouded stator. A photograph of the assembled cantilevered stators and rotating inner shroud is shown in Figure 2. The purpose of the rotating shroud was to reduce the boundary layer build up on the inner wall. The original-design stator airfoil sections were restacked on the leading edge to allow the vanes to deflect free of the rotating shroud and the rotating shroud was coated with an abrasive material to insure rapid abrasion of the vanes if rubbing did occur.

The stator vanes were restaggered 4 degrees open, the same as were the vanes of References 1 and 2. The intent of the restagger in previous tests was to promote stator stall from which the effects of endwall treatment could be better evaluated. Results from References 1 and 2 proved that the 4 degree stagger was not sufficient to cause stator stall. The restagger of the stator vanes in the present tests are, however, consistent with Reference 1 and 2. The restaggered shrouded stator with no endwall treatment (Reference 2) is referred to herein as the baseline configuration.

A summary of rotor and stator design geometry is provided in Table 1, including the 4 degree stator restagger. Design details of the basic compressor stage are given in Reference 4. The design aerodynamics are tabulated in Table 5, Appendix 3. Table headings are identified in Table 4, Appendix 3.

INSTRUMENTATION AND CALIBRATION

Axial and circumferential location of instrumentation for measuring aerodynamic performance is shown in Figures 3 and 4. Photographs of typical instrumentation are shown in Figure 5.

Airflow was measured within 1 percent, using a flow nozzle designed to ISA specification. Compressor speed was measured with an electromagnetic pickup that counts the number of gear teeth passing in an interval of time and converts the count into revolutions per minute. Measurement accuracy is better than 0.2 percent of indicated speed between 4,000 rpm and 13,000 rpm.

All temperatures were measured using chromel-alumel Type K thermocouples and recorded in millivolts by the automatic data-acquisition system. Temperature elements were calibrated over their full operating-temperature range for Mach number and total-pressure effects. The thermocouple leads were calibrated for each temperature element. Overall RMS temperature accuracy was estimated to be ±1.0°F.

TABLE 1

MCA ROTOR AND STATOR DESIGN PARAMETERS

ROTOR – STATORS 8 AND 9

% Span	Dia – 1	Dia – 2	β^* 8	β^* 9	β^* 8ss	β^* sh	Solidity
5 (hub)	17.47	19.77	48.97	1.87	55.40	45.74	2.276
10	18.47	20.41	49.59	9.63	56.02	46.76	2.173
15	19.47	21.05	50.44	16.51	56.59	47.76	2.080
30	22.31	22.96	53.77	29.73	57.87	50.53	1.855
50	25.79	25.52	56.40	42.30	59.30	54.68	1.638
70	28.95	28.08	59.08	50.53	61.07	59.17	1.476
85	31.29	29.99	61.63	54.11	62.96	63.01	1.379
90	31.88	30.63	62.53	55.10	63.65	64.18	1.355
95 (tip)	32.50	31.27	63.21	55.84	64.14	64.96	1.332

STATOR – STATIONS 10 AND 11

% Span	Dia – 1	Dia – 2	β^* 10	β^* 11	β^* 10ss	β^* sh	Solidity
5 (hub)	20.41	21.49	39.23	-16.41	42.15	34.47	2.010
10	21.01	21.96	38.27	-15.44	41.21	32.62	1.959
15	21.59	22.43	37.42	-14.89	40.36	30.94	1.911
30	23.31	23.90	35.44	-15.22	38.44	27.18	1.781
50	25.60	25.89	33.60	-16.04	36.72	24.01	1.632
70	27.82	27.90	32.45	-17.48	35.68	22.38	1.508
85	29.41	29.38	32.12	-19.91	35.44	22.82	1.430
90	29.91	29.86	32.15	-21.40	35.48	23.36	1.407
95 (tip)	30.38	30.29	32.33	-23.69	35.69	24.40	1.387

NOTE: Symbol definitions appear in Appendix 2.

Disk probes and combination probes were calibrated for Mach number as a function of indicated static-to-total pressure ratio, with pitch angle as a parameter. Total pressure recovery and yaw angle deviation were calibrated as functions of Mach number and pitch angle. Total temperature recoveries for the combination probes were calibrated as functions of Mach number and pitch angle.

All pressures from probes, fixed rakes, and static taps were measured with transducers and recorded in millivolts by the automatic data-acquisition system. The accuracy of the pressure readings was ± 0.1 percent of the full-scale value.

Instrumentation for overall and blade element performance is listed in Table 2.

TABLE 2

PERFORMANCE AND BLADE ELEMENT INSTRUMENTATION

Instrumentation Plane Location		Parameter	Type and Quantity
Station 0	Plenum chamber	P	6 pressure taps on plenum wall
		T	6 bare-wire thermocouples
Station 1	Bellmouth instrumentation ring	p	4 O.D. wall static tap
Station 7	Rotor inlet (within 1/2 chord)	P, p, β	1 disk traverse probe traversed to 9 radial positions*
		p	4 O.D. and 4 I.D. wall static taps
Station 9.1	Stator inlet instrumentation plane	P, p, T, β	2 combination probes traversed to 15 radial positions.** (Boundary layer survey only)
Station 10	Stator leading edge	p	4 O.D. and 4 I.D. wall static taps equally spaced and located on extension of midchannel lines
		p	4 O.D. and 4 I.D. wall static taps spaced across one vane gap.
Station 12	Stator exit	P	2 circumferential wake rakes (15 element) traversed to 9 radial positions* (each wake rake spans at least one vane gap at O.D.)
		T	7 fixed radial rakes each with temperature sensors at 9 radial positions.* 6 rakes spaced circumferentially to obtain readings evenly distributed across a vane gap. The 7th rake is a duplicate of the midgap rake and is 180° from one other midgap rake.
		P, p, T, β	1 combination probe traversed to 9 radial positions,* 1 combination probe traversed to 15 radial positions** and to 15 tangential positions across one vane gap (Boundary layer survey only)
		p	4 O.D. and 4 I.D. wall static taps positioned on an extension of the mid-channel line
		p	4 O.D. and 4 I.D. wall static taps spaced across one vane gap

TABLE 2 (Cont'd)			
Instrumentation Plane Location		Parameter	Type and Quantity
Station 13	Downstream of stator	P	1 fixed 13 element tangential rake

*The nine radial positions of each axial station are defined by the intersection of the axial station and the design stream lines which pass through 5, 10, 15, 30, 50, 70, 85, 90 and 95 percent of the passage height at the rotor trailing edge.

**The fifteen radial positions for boundary layer surveys were defined by the intersection of the axial station and design streamlines passing through 2.5, 3.75, 7.5, 92.5, 96.25 and 97.5 percent of the passage height at the rotor trailing edge in addition to the nine radial positions listed above.

Instrumentation which recorded continuously during excursions into stall, including high response hot film probes for detecting rotating stall, is listed in Table 3.

TABLE 3

STALL INSTRUMENTATION

- Inlet flow nozzle upstream static pressure
- Inlet flow nozzle downstream static pressure
- Inlet flow nozzle ΔP
- Inlet flow nozzle temperature
- Plenum total pressure
- Rotor exit O.D. static pressure
- Stator exit O.D. static pressure
- Average rig discharge total pressure
- Rig mechanical speed

In addition, the following parameters were recorded on one fourteen-channel magnetic tape during the rotating stall survey.

- 4 selected rotor strain gages
- 4 selected stator strain gages
- 3 hotfilm sensors located at the rotor leading edge at 25, 50, and 85 percent of the passage height from the hub.
- Stator exit O.D. static pressure
- Rig mechanical speed

Proximity and strain gage instrumentation was used to detect excessive stresses and rubbing. Four proximity sensors were mounted on the nonrotating inner duct support to detect axial and radial movements of the rotating shroud. Strain gages were mounted in the rotating inner shroud to measure vibratory hoop and bending stresses. Thermocouples were mounted in the ends of the cantilevered vanes to detect interference between vane and shroud.

TEST PROCEDURE

A brief shakedown test was run to verify the structural integrity of the test apparatus. Levels of vibratory stresses on the blades and vanes and the rotating shroud were recorded during accelerations and decelerations between 50 and 100 percent of design speed with wide open throttle, part throttle, and near stall throttle setting. Two stator vane resonances were encountered, one just above 70 percent of design speed in which peak stresses of 18,000 psi were recorded, and the other near 85 percent of design speed where peak stresses of 24,000 psi were measured. Both speeds were avoided during the remainder of the test program. No interference rubbing between the vanes and rotating parts occurred during the test. Aerodynamic performance tests were then run with uniform inlet flow at speeds of 50, 70, 90, and 100 percent of design speed. Stall flows were measured for each of these speeds. Overall performance was measured at 24 operating points by total pressure wake rakes at nine diameters at the stator trailing edge. The rotor inlet disk probe and one stator exit combination probe was radially traversed to nine positions for 12 of the 24 operating points.

Boundary layer surveys were conducted for 5 of the 24 operating points. A boundary layer survey point is described as one in which two combination probes at the stator inlet were traversed to fifteen radial positions, and one combination probe at the stator exit was traversed tangentially across the stator vane gap at each of the fifteen radial positions. Four boundary layer survey points were taken at 100 percent of design speed, and one point at 90 percent of design speed.

Rotating stall surveys were conducted to determine the point of initiation of rotating stall and the radial extent of the stall zones. As the discharge throttle was closed from wide open to stall for each of the aforementioned speeds, fluctuations in mass flow (ρ Vm) at the rotor inlet were measured by means of a hot film probe having sensors at 25, 50, and 85 percent span from the hub. Measurements from strain gages located on selected rotors and stators, a speed signal, the measurements from a stator exit wall static pressure tap and the mass flow fluctuations measured by the hot film probes were recorded simultaneously on the same recording device.

CALCULATION PROCEDURES

Data were aerodynamically corrected and mass flow averaged in the same manner as discussed in Reference 3 (uniform inlet flow). Overall performance and blade element calculations (Appendix I) were made using stator exit total pressure wake rake data. Blade element data were calculated by a flowfield calculation program and used peak wake rake values from stator exit wake rakes to describe the rotor exit pressure. For comparative purposes, data from the stator exit combination probes which were traversed both tangentially and radially during the boundary layer surveys, were also used to calculate overall performance.

Contour plots of total and static pressure, air angle, meridional velocity, and total temperature were generated from stator exit tangential and radially traversed probe measurements. Meridional velocity was calculated from the absolute velocity using the measured yaw angle and assumed design pitch angle. The absolute velocity was calculated from the measurement of total and static pressure and total temperature.

RESULTS AND DISCUSSION

The results of the centilevered stator test are presented in the form of overall performance, stator gapwise distributions of total pressure, blade element performance and contour plots of stator survey data.

In an effort to evaluate the effects of the cantilevered stator (rotating hub) on stage performance, it is necessary to make some comparisons of data from the cantilevered stator configuration to that from the baseline configuration (restaggered shrouded stator with no endwall treatment) reported in Reference 2. The comparisons are based on overall performance, stage spanwise distributions of total pressure ratio and efficiency near the peak efficiency point at design speed, and blade element total loss parameter for 5, 10, 15, 30 and 50 percent span locations at design speed.

All data from the cantilevered stator configuration are presented in tabular form in Appendix 3. All of the baseline data are presented in tabular form in Reference 2.

Overall Performance

Overall rotor and stage performance are presented in Figures 6 and 7 respectively for the cantilevered and baseline (Reference 2) stator configurations. The solid lines and circles represent the baseline data and the square symbols represent the data from the cantilevered stator configuration. There is a slight difference in rotor overall performance for the cantilevered stator configuration as compared to the baseline data (Figure 6). However, the rotor exit total pressure is based on the peak wake rake pressure at the stator exit and could be affected by changes in the gapwise distribution of total pressure in the vicinity of the rotating hub. Stage overall performance comparisons between the cantilevered and baseline configurations are shown in Figure 7.

The comparison shows practically no difference in overall stage performance for 50, 70, and 100 percent design speed, but shows a slight improvement in efficiency (1 to 1-½ points) for the 90 percent speed. The stall limit line is identical for the two configurations.

A comparison of spanwise distribution of stage overall performance for the baseline and cantilevered stator configurations is presented in Figure 8 at the near peak efficiency condition for design speed. This data is from the boundary layer survey instrumentation (tangential and radially traversed combination probes at the stator exit) and shows no significant changes in the spanwise distribution of stage performance for the two configurations at peak efficiency conditions.

Stator Exit Gapwise Distribution of Total Pressure

Stator exit gapwise total pressure comparisons are presented in Figures 9, 10 and 11 for near surge, peak efficiency and wide open throttle conditions. Severity of stator vane wakes near the hub is decreased with the cantilevered stator. At five percent span, peak to peak variation of the wake is decreased approximately 40 percent at all flow conditions. The effect is limited to the 10 percent of span nearest the hub. From 10 percent span outward, the total pressure profile is changed slightly, but the severity of the stator wake remains the same for both cantilevered and shrouded configurations. The rotating hub could be beneficial for following blade rows in a multistage application, and could improve stage stall range in cases where stall range is limited by stator hub stall.

Blade Element Performance

Blade element total pressure loss coefficient, diffusion factor and deviation angle versus suction surface incidence are presented at 50, 70, 90 and 100 percent design speed for the rotor and stator in Figures 12 and 13 respectively. The data are also included in tabular form in Appendix 3. At 100 percent design speed, plots of total loss parameter versus suction surface incidence angle are compared for the baseline and cantilevered stator configurations. The comparisons are made for the 5, 10, 15, 30 and 50 percent span elements and are presented in Figures 14 and 15 for rotor and stator respectively.

The rotor blade element loss parameter for the cantilevered stator configurations differs substantially from that of the baseline configuration at the 5, 10, and 15 percent span locations (Figure 13). There are no substantial differences in the rotor loss parameter incidence angle characteristics for the configurations at 30 and 50 percent span locations. The change in incidence angle loss characteristics of the rotor for the 5, 10 and 15 percent span locations is a result of the change in the circumferential distribution of total pressure behind the stator vanes due to the rotating hub (cantilevered stator configuration).

The blade element total loss parameter for the cantilevered stator is substantially different from that of the baseline stator configuration (Figure 15) for the 5, 10, and 15 percent span locations. There are no substantial differences in stator loss parameter incidence angle characteristics for the 30 and 50 percent span locations. The change in the loss parameter incidence angle characteristic for the two stator configurations is again the result of the change in circumferential distribution of stator exit total pressure due to the rotating stator hub.

A change in the circumferential distribution of the stator exit total pressure affects both the rotor and stator blade element data because (as discussed in the Calculation Procedure) the peak wake rake pressure at the stator exit is used for the rotor exit and stator inlet total pressure. Therefore, both rotor and stator diffusion factors, losses and rotor deviation angle, and stator incidence angle are affected by a change in the circumferential distribution of stator exit total pressure.

Contour Plots at Stator Exit

Tangential traverses were made at the stator exit for part throttle, maximum efficiency and near stall operating points at design speed and at the near stall point at 90 percent of design speed. Measurements of total and static pressure, total temperature, and absolute air angle were recorded at 3.8, 4.9, 5, 9, 8.4, 11.0, 15.4, 31.0, 51.2, 72.7, 87.8, 92.8, 94.1, 95.3, 96.6, and 97.4 percent of passage height from the hub. Tangential spacing gave 15 readings across a stator gap at about 90 percent span and 11 readings at about 4 percent span. These measurements were used to calculate velocity vectors and to construct contour plots showing patterns of pressure and temperature ratio, airflow angle, and meridional velocity at the stator exit instrumentation plane. These contours are shown in Figures 16 through 20.

Rapid Response Hot-Film Data

Traces of hot film probe measurements of rotor leading edge pressure fluctuations during a 100 percent design speed surge are shown in Figure 21. The tip region appears to stall slightly sooner than the midspan or hub region. Duration of the surge pulse was 0.13 sec. No obvious rotating stall pattern was seen.

SUMMARY REMARKS

The overall stage performance for the cantilevered stator configuration showed no significant improvements over that for the baseline configuration. Increased gapwise mixing near the rotating hub reduced the circumferential variation of flow conditions near the hub, but the radial profiles of circumferentially mass averaged pressure ratio and efficiency were nearly identical to those obtained with the baseline stator. However, the severity of the stator wake near the rotating hub was decreased at all flows including the near surge condition. This could be of some benefit in following blade rows in a multistage application or could possibly improve stage range in those cases where stage range is controlled by stator hub stall.

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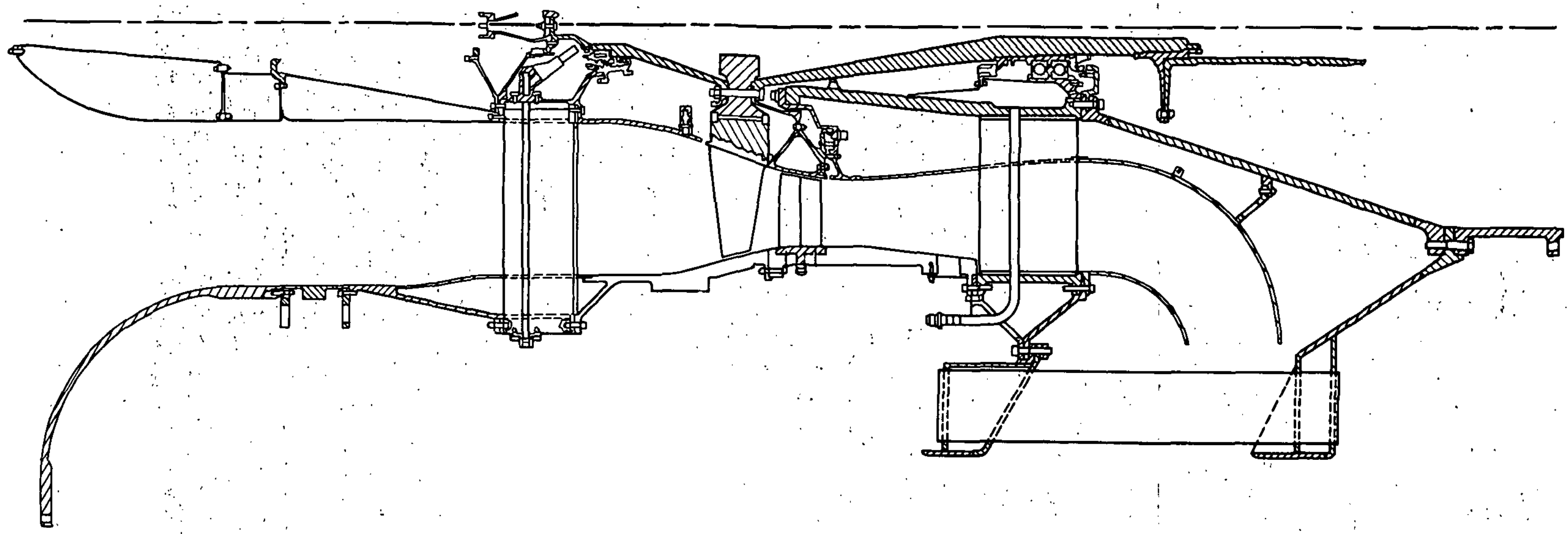


Figure 1 Cross Section of Test Compressor

Figure 2   Cantilevered Stator and Rotating Shroud Assembly

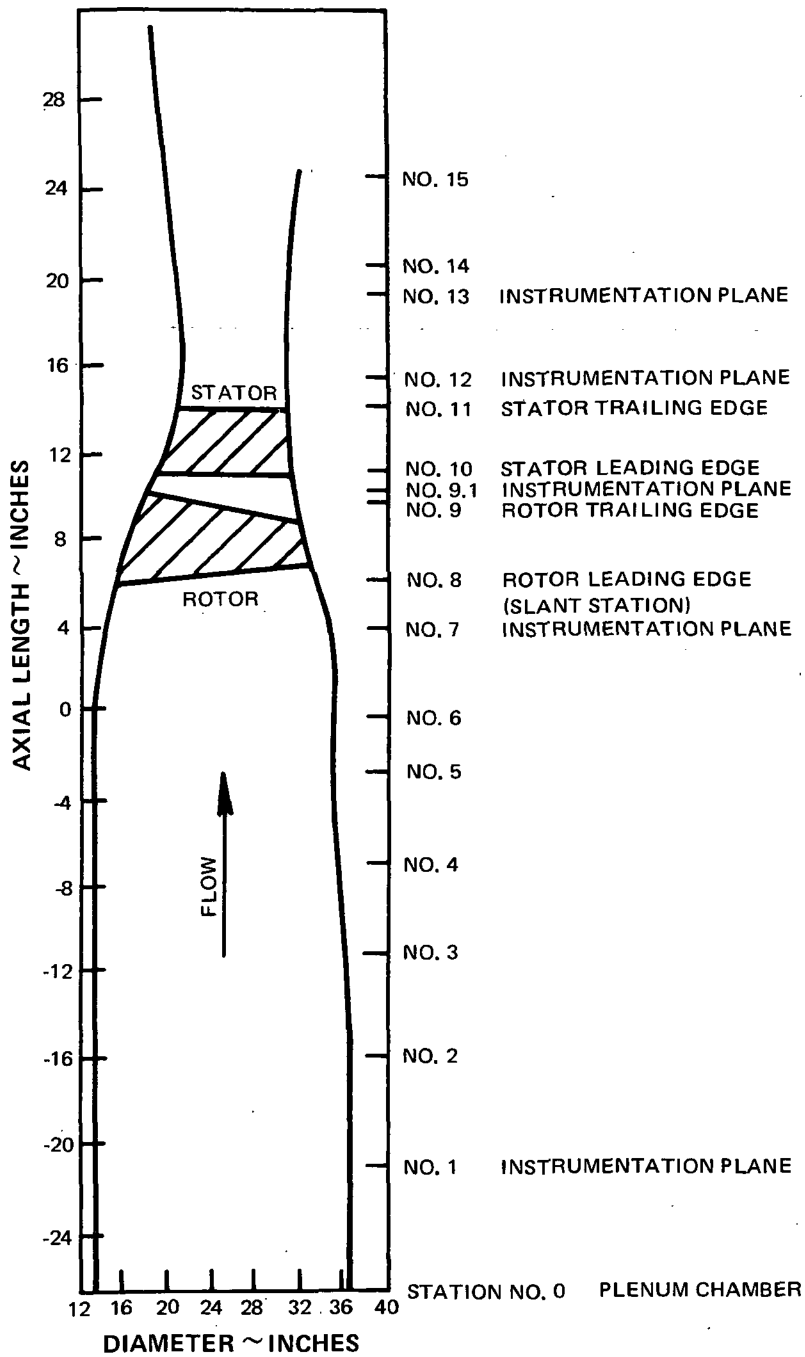


Figure 3 Axial Station Number Designation and Location of Instrumentation

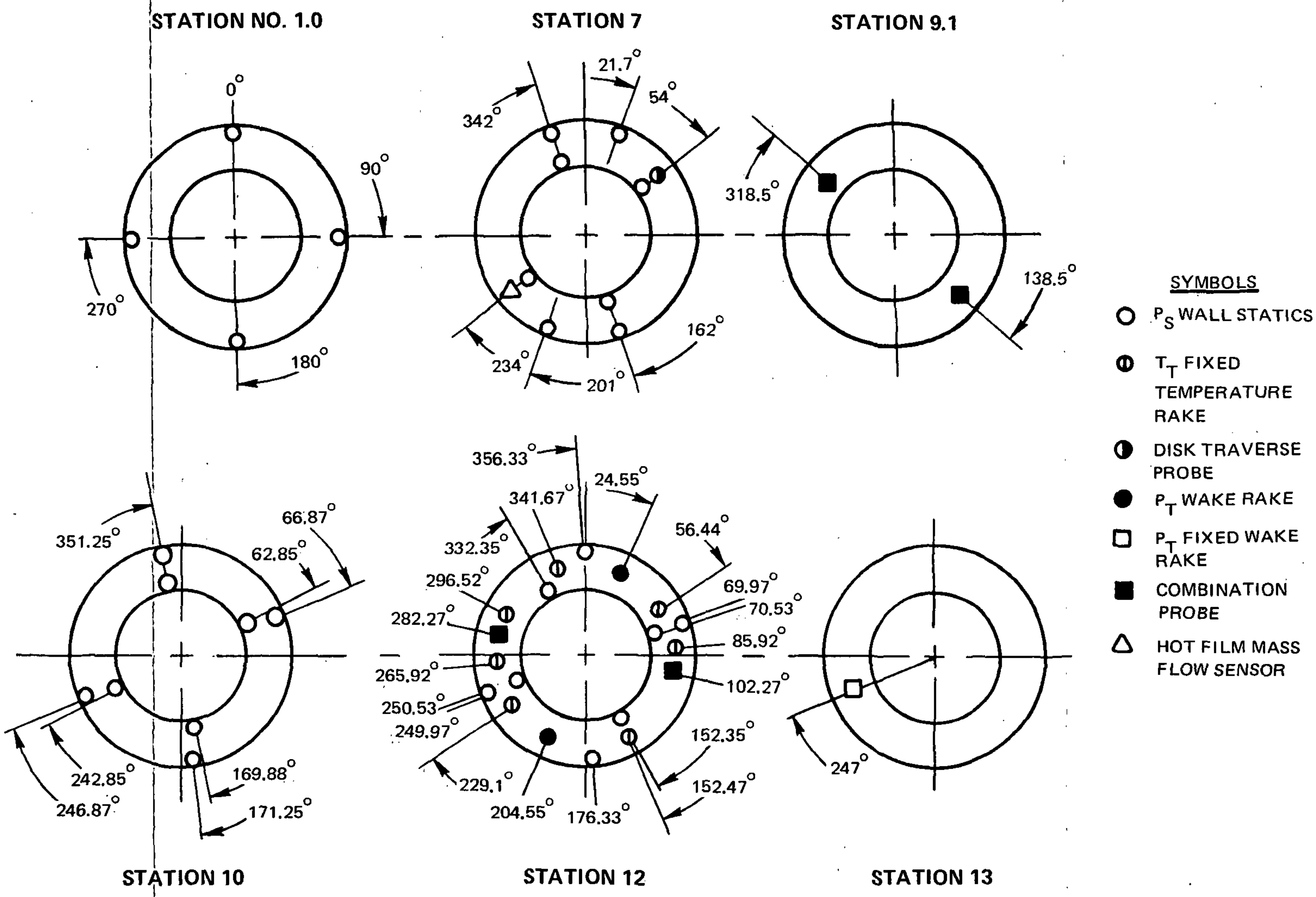
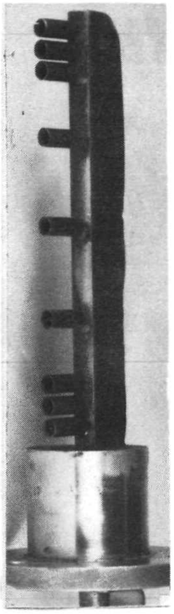


Figure 4 Circumferential Location of Instrumentation, Viewed From Rear



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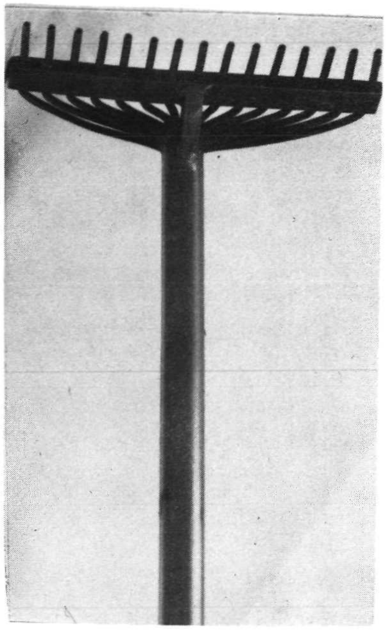
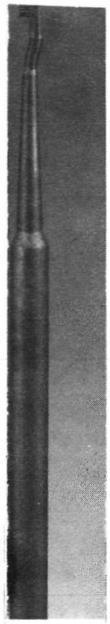
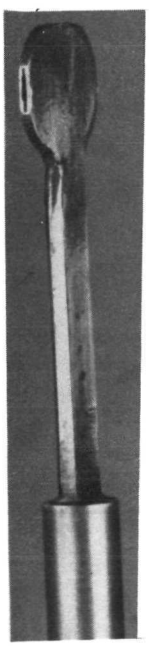
RADIAL
TEMPERATURE
RAKE



XPN-1815
(b)
TRAVERSABLE
TOTAL PRESSURE
RAKE



XPN-660
(c)
COMBINATION
PROBE



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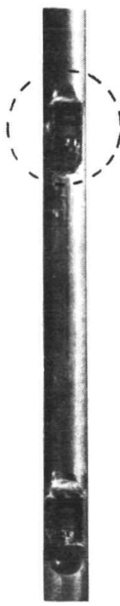
(d)
TRAVERSABLE
DISK
PROBE



XP-19285
(e)
HOT
FILM
PROBE

XP-19286

Figure 5 Photographs of Typical Instrumentation

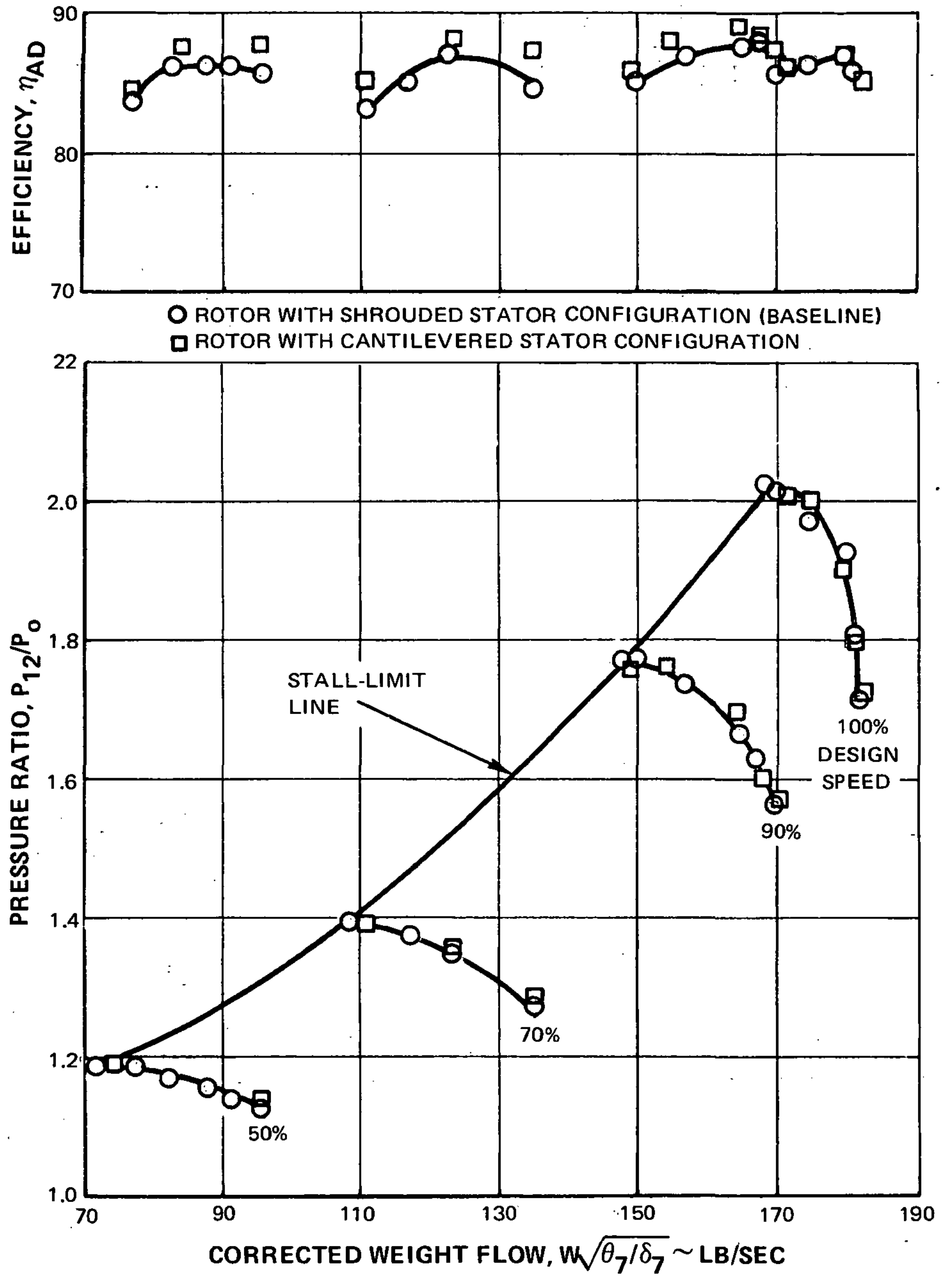


Figure 6 Rotor Overall Performance Comparison Cantilevered Versus Shrouded Stator

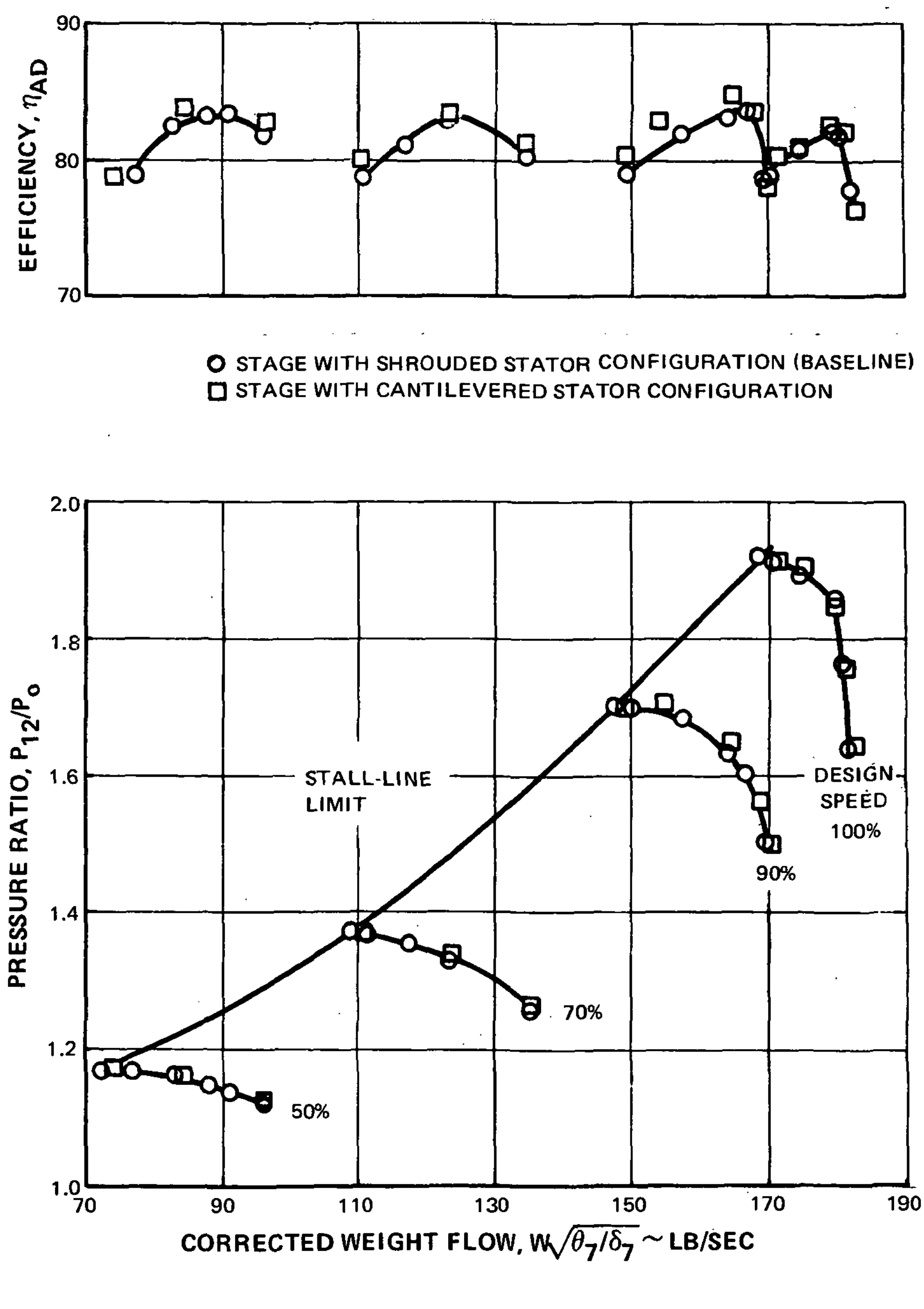


Figure 7 Stage Overall Performance Comparison Cantilevered Versus Shrouded Stator

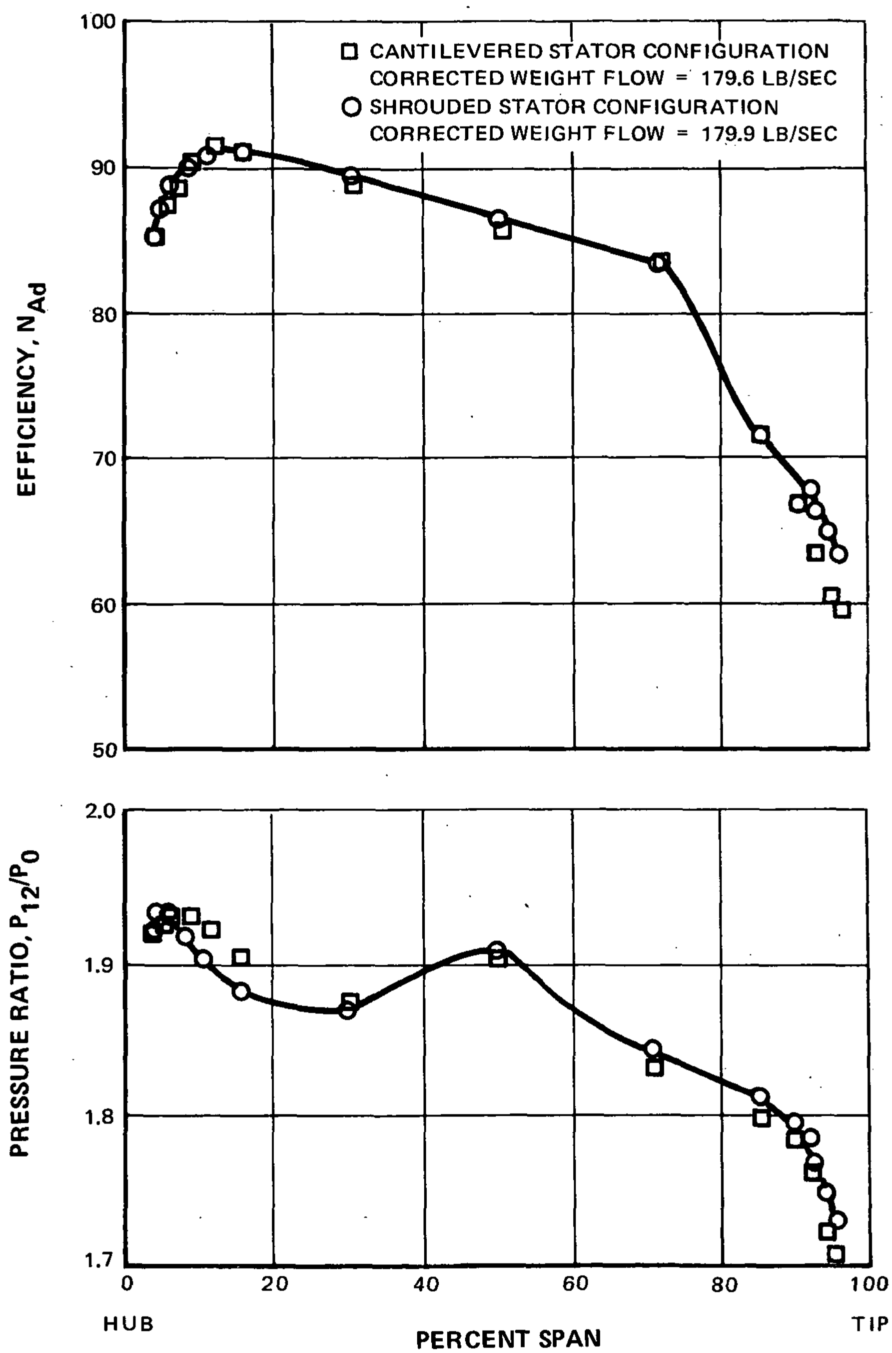


Figure 8 Comparison of Stage Spanwise Performance
Cantilevered Versus Shrouded Stator
Tangential Probe Data - 100 Percent Design Speed

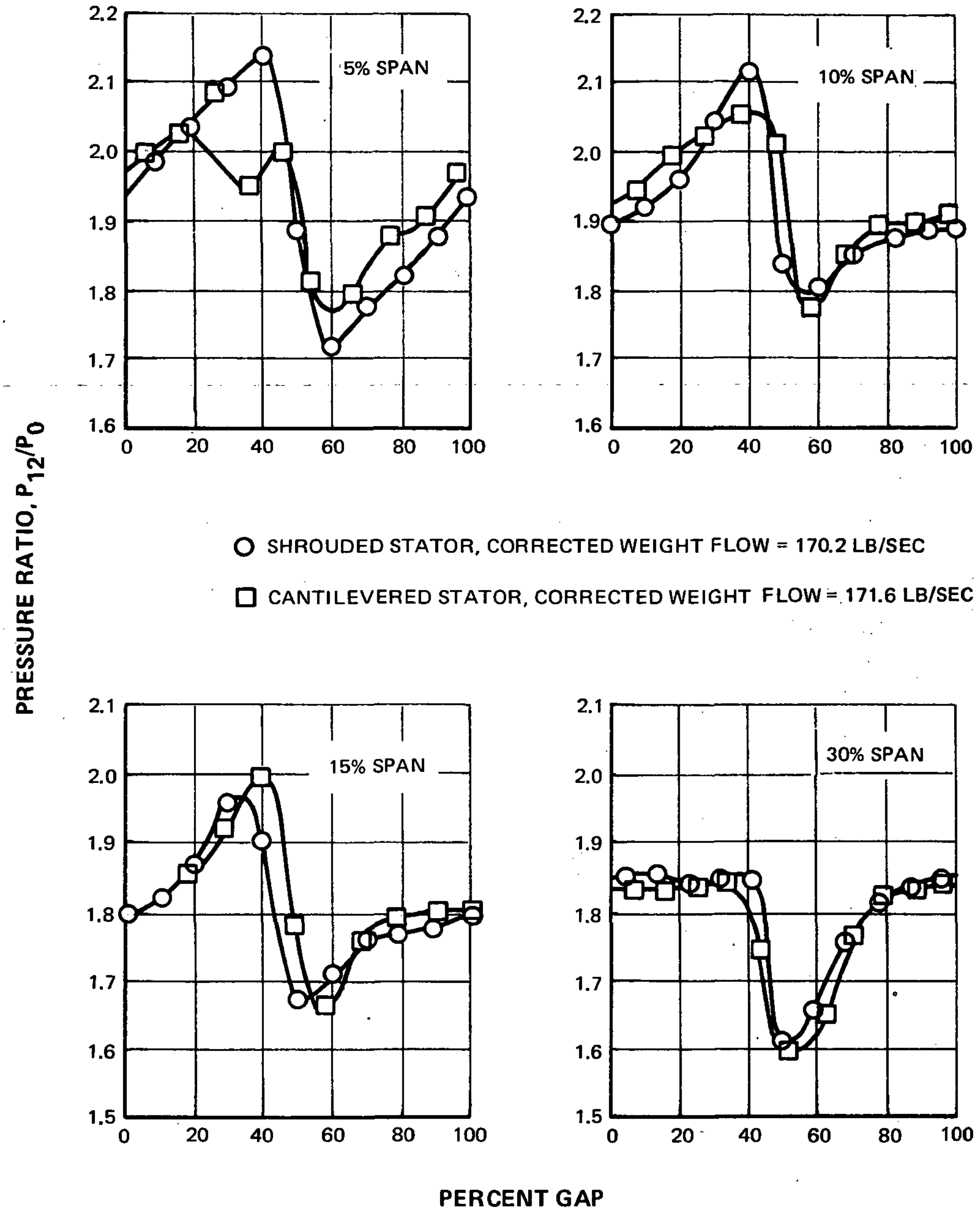


Figure 9 Stator Exit Gapwise Total Pressure Distribution, Cantilevered Versus Shrouded Stator Near Stall Flow Condition, 100 Percent Design Speed

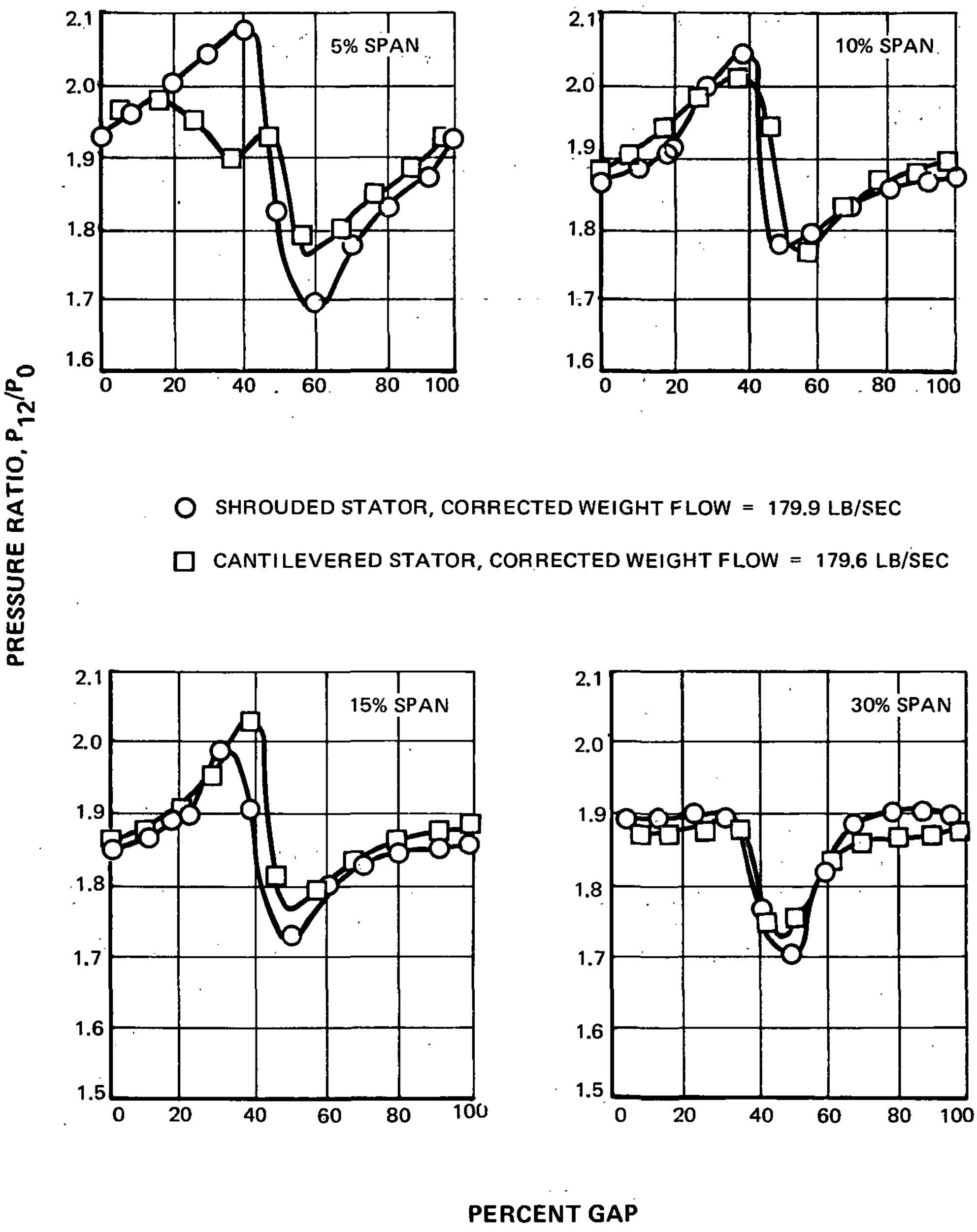


Figure 10 Stator Exit Gapwise Total Pressure Distribution, Cantilevered Versus Shrouded Stator Peak Efficiency Flow Conditions; 100 Percent Design Speed

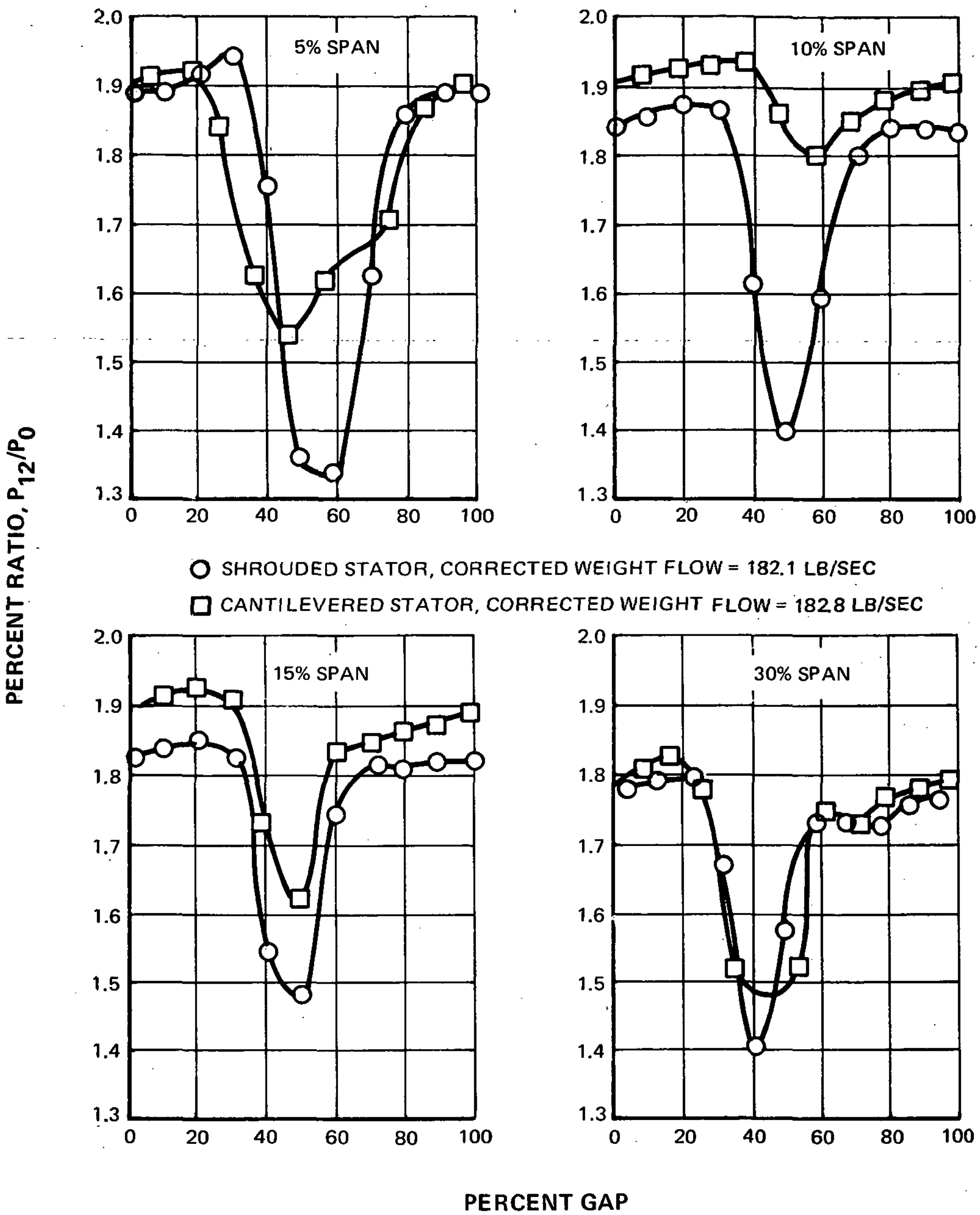


Figure 11 Stator Exit Gapwise Total Pressure Distribution, Cantilevered Versus Shrouded Stator Wide Open Throttle Condition, 100 Percent Design Speed

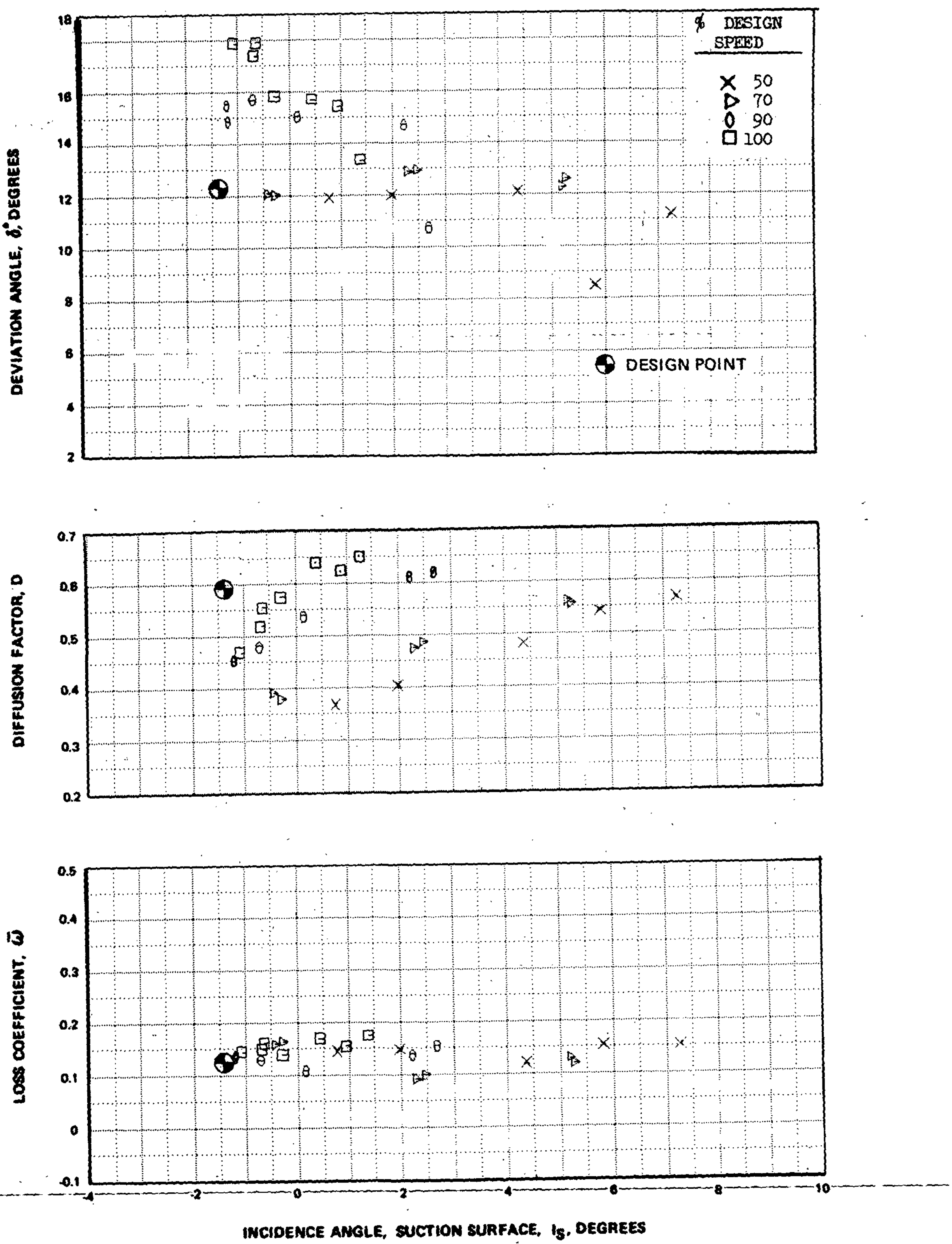


Figure 12a Rotor Blade Element Performance, 5% Span

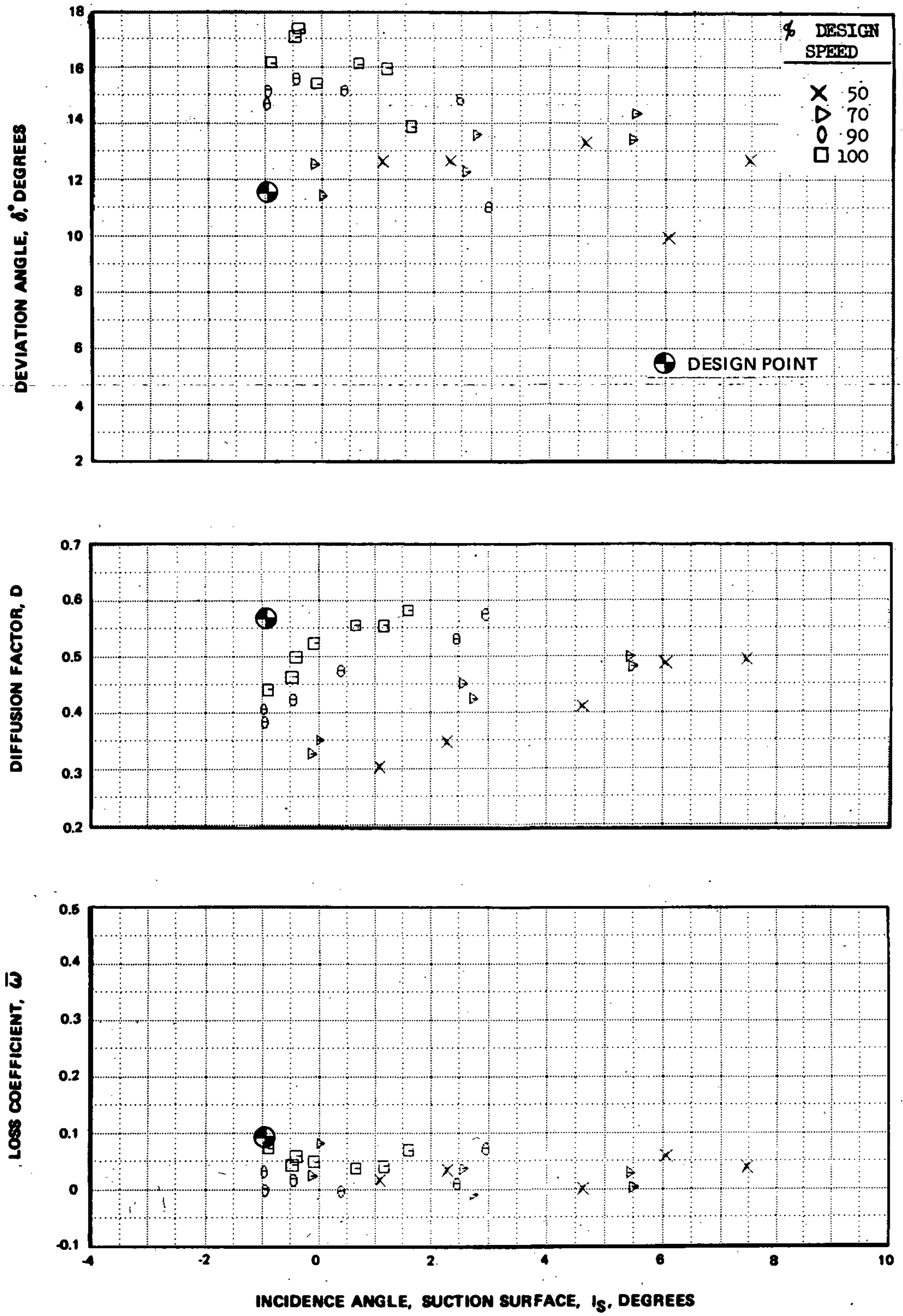


Figure 12b Rotor Blade Element Performance, 10% Span

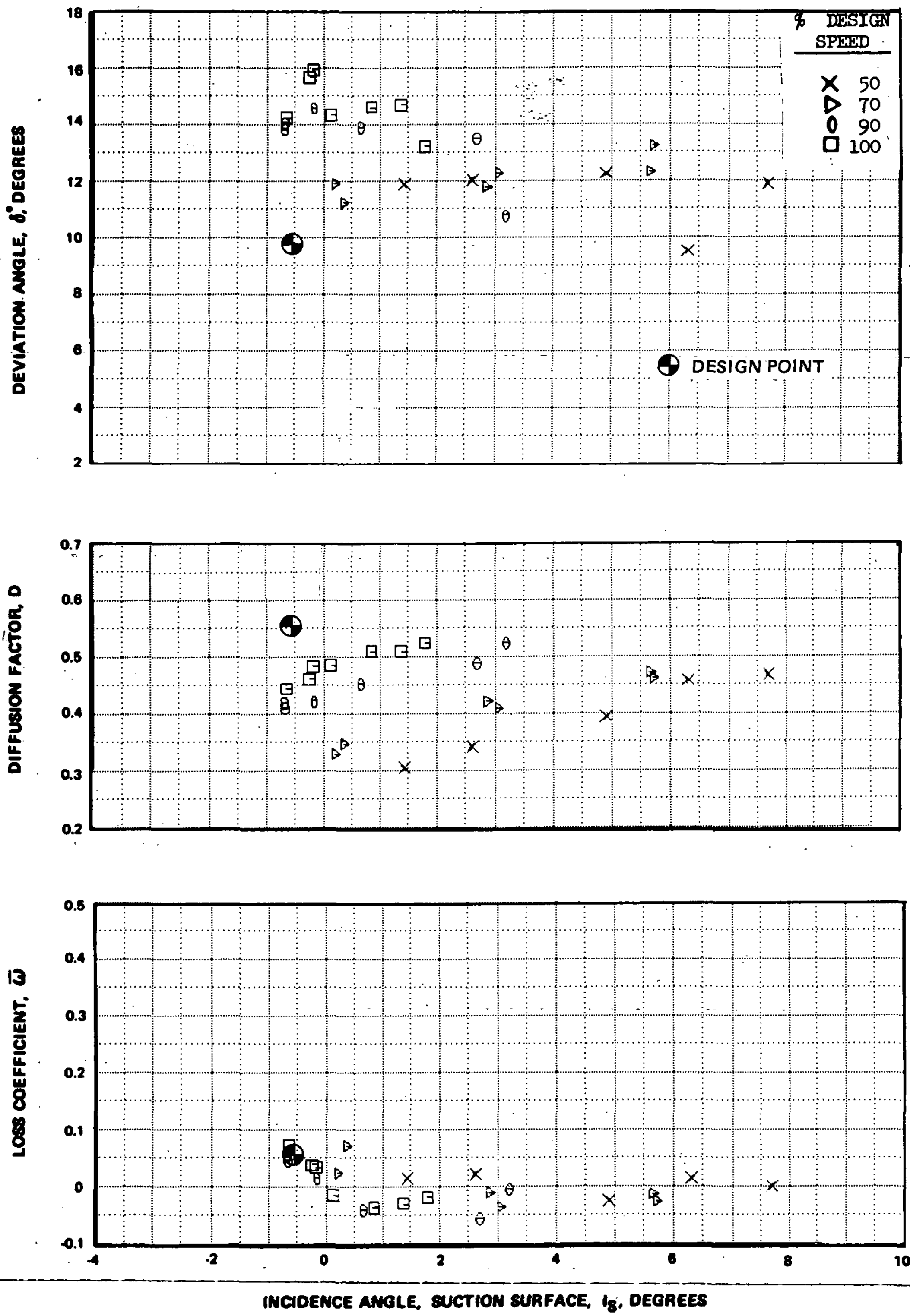


Figure 12c Rotor Blade Element Performance, 15% Span

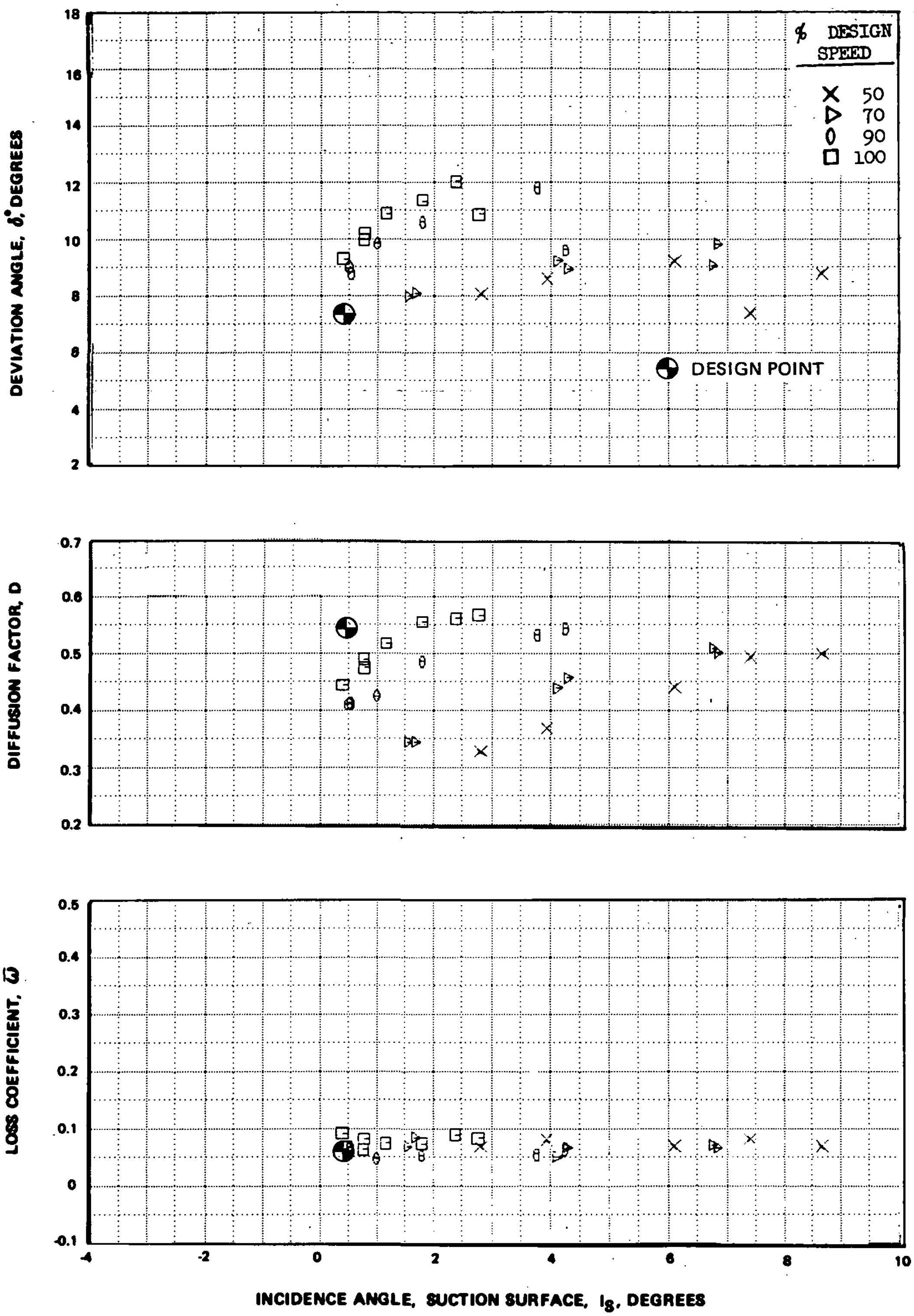


Figure 12d Rotor Blade Element Performance, 30% Span

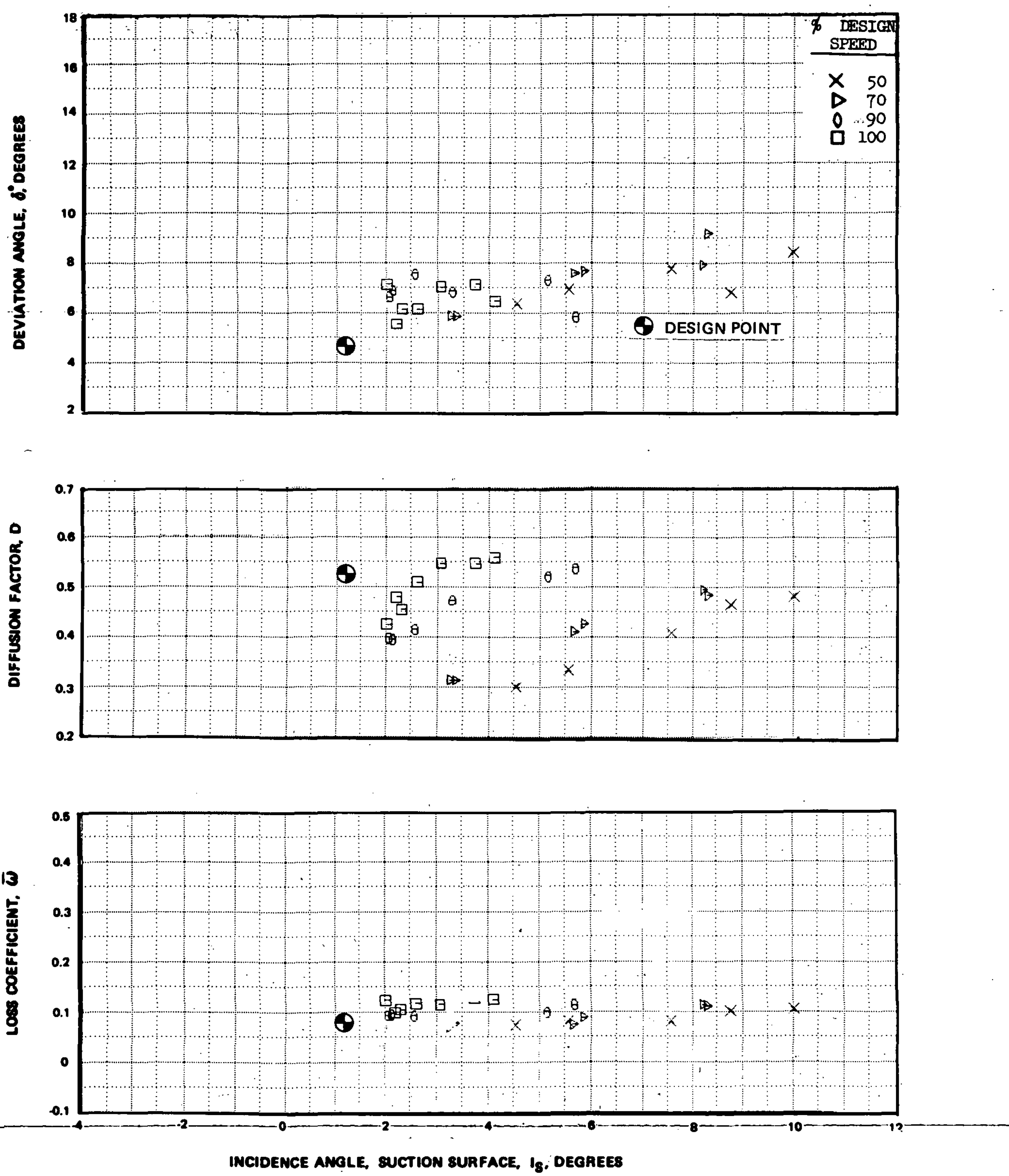


Figure 12e Rotor Blade Element Performance, 50% Span

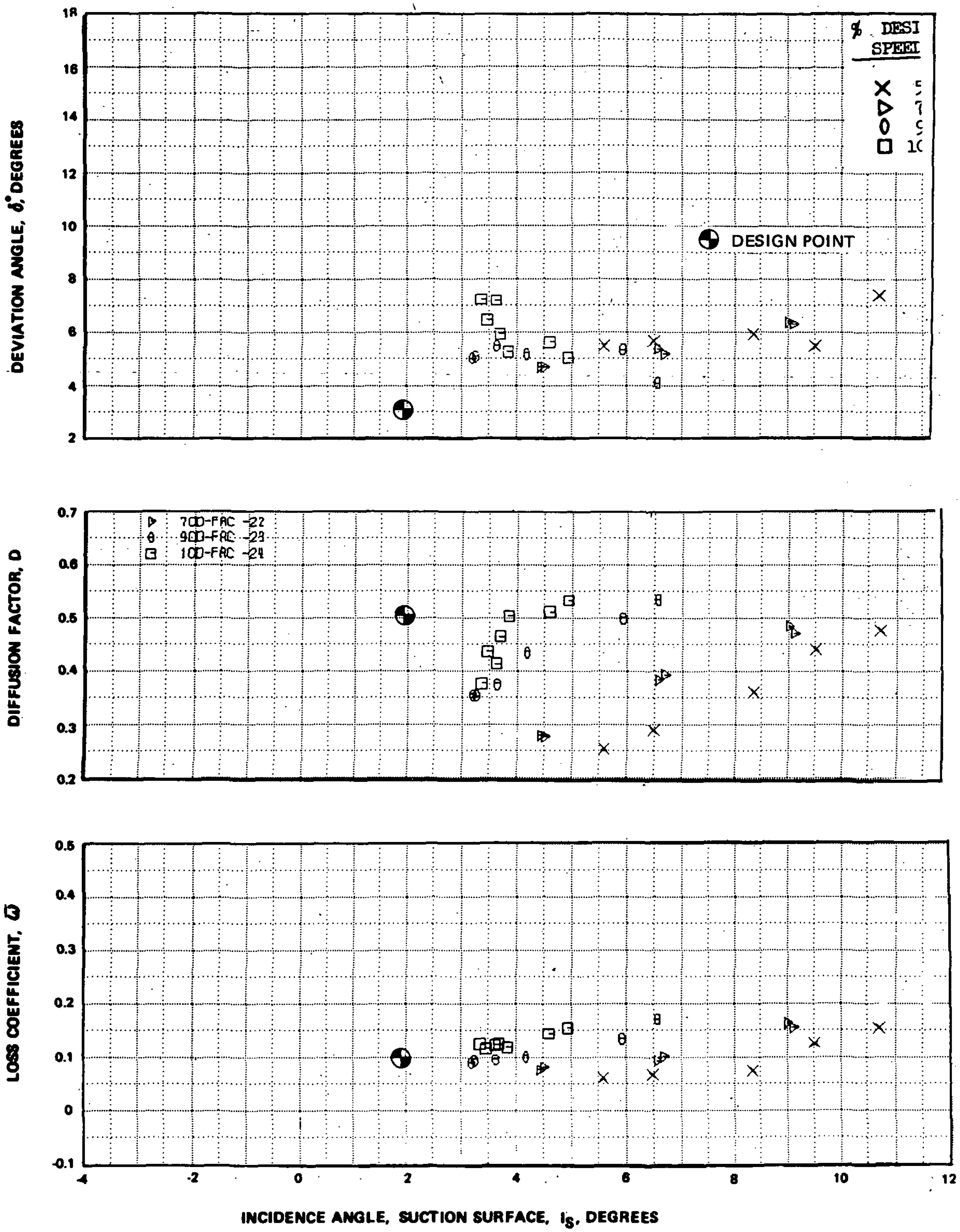


Figure 12f Rotor Blade Element Performance, 70% Span

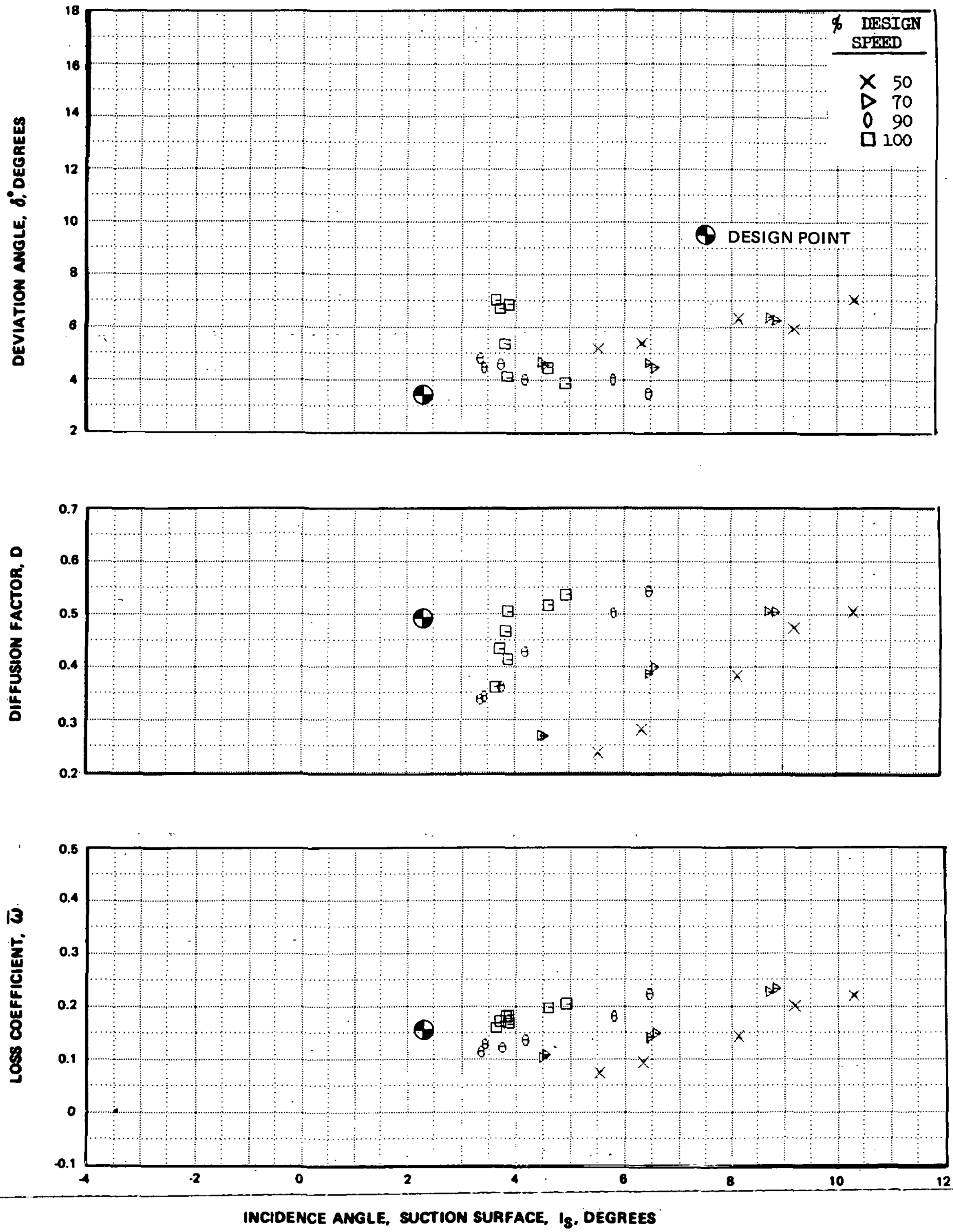


Figure 12g Rotor Blade Element Performance, 85% Span

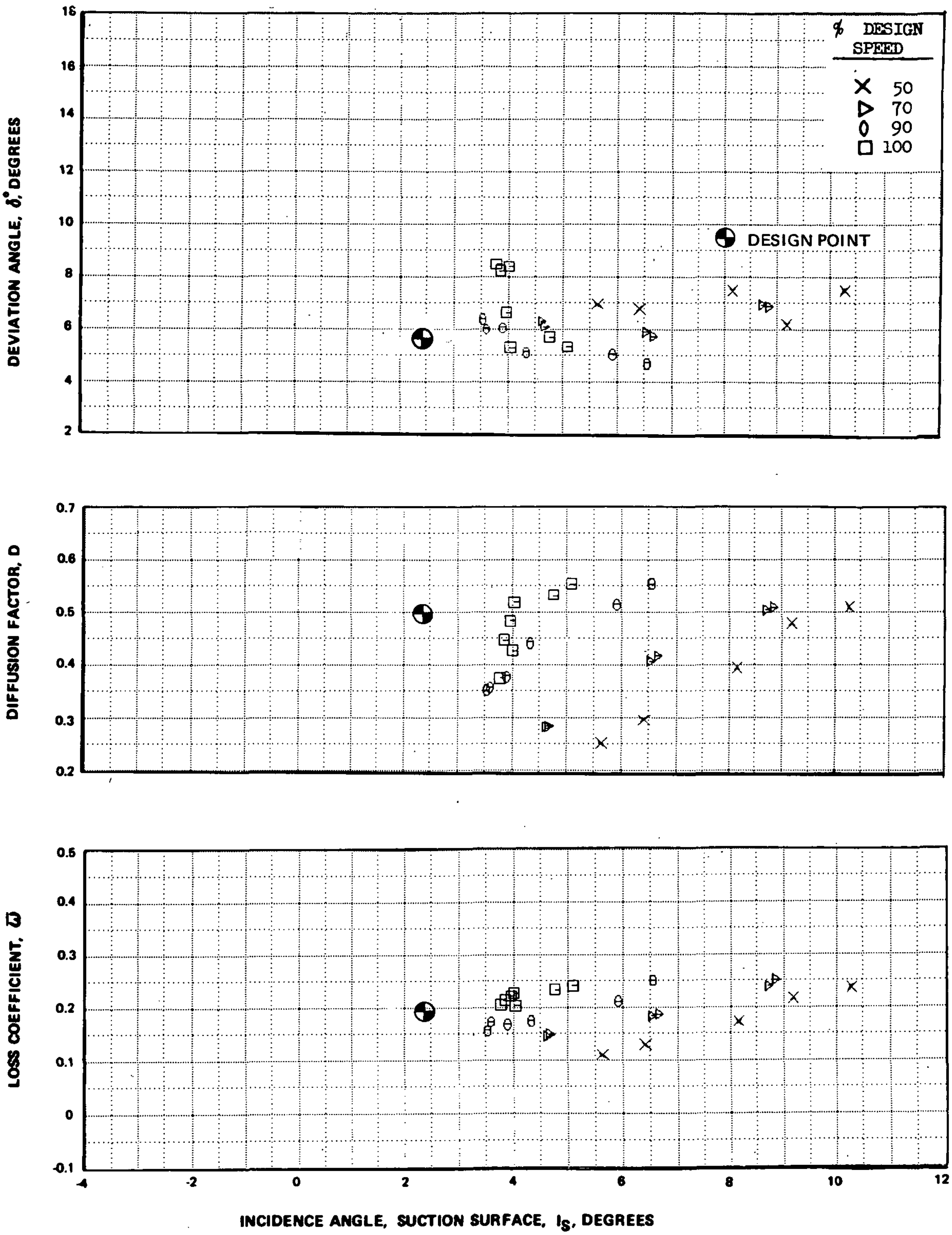


Figure 12h Rotor Blade Element Performance, 90% Span

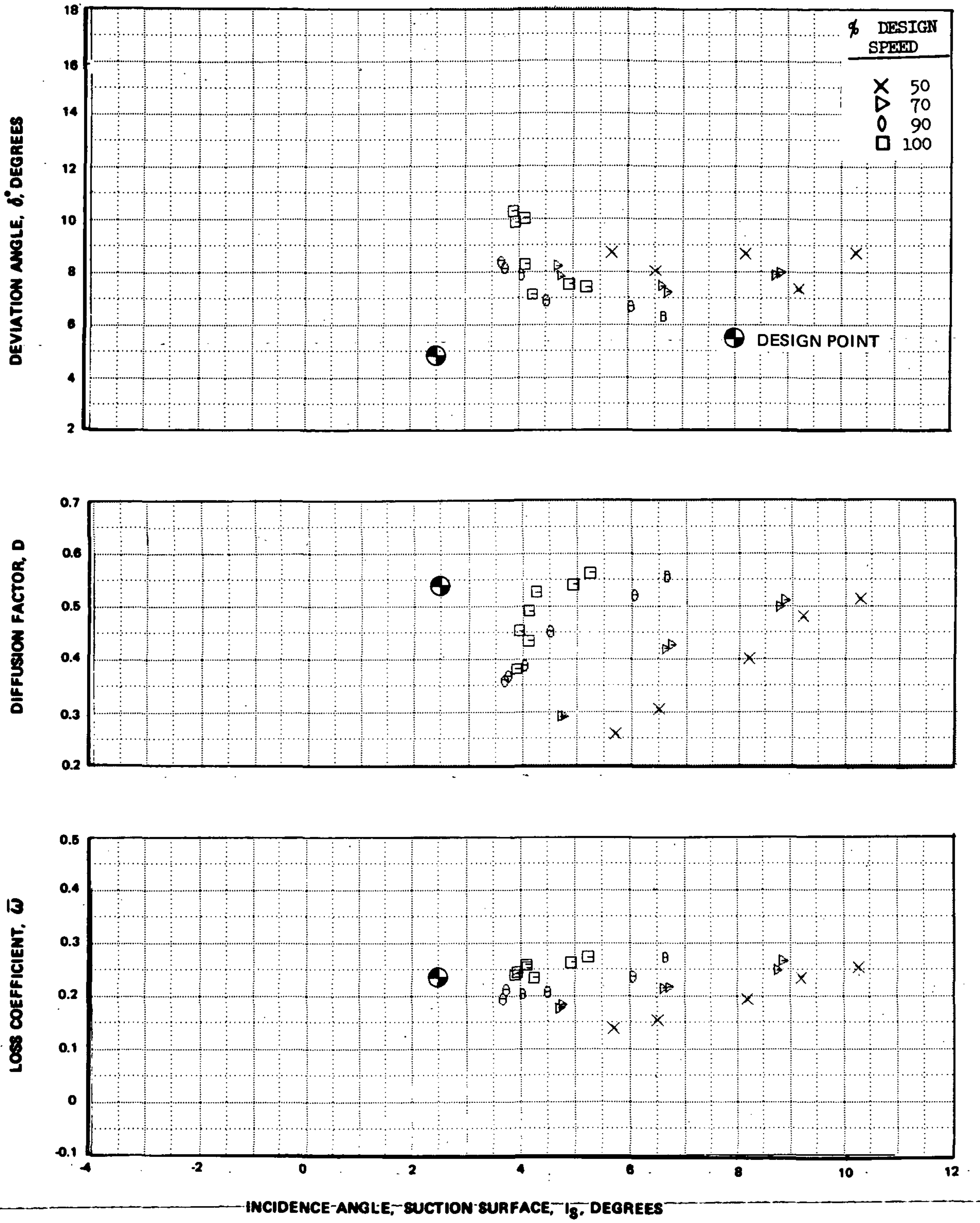


Figure 12i Rotor Blade Element Performance, 95% Span

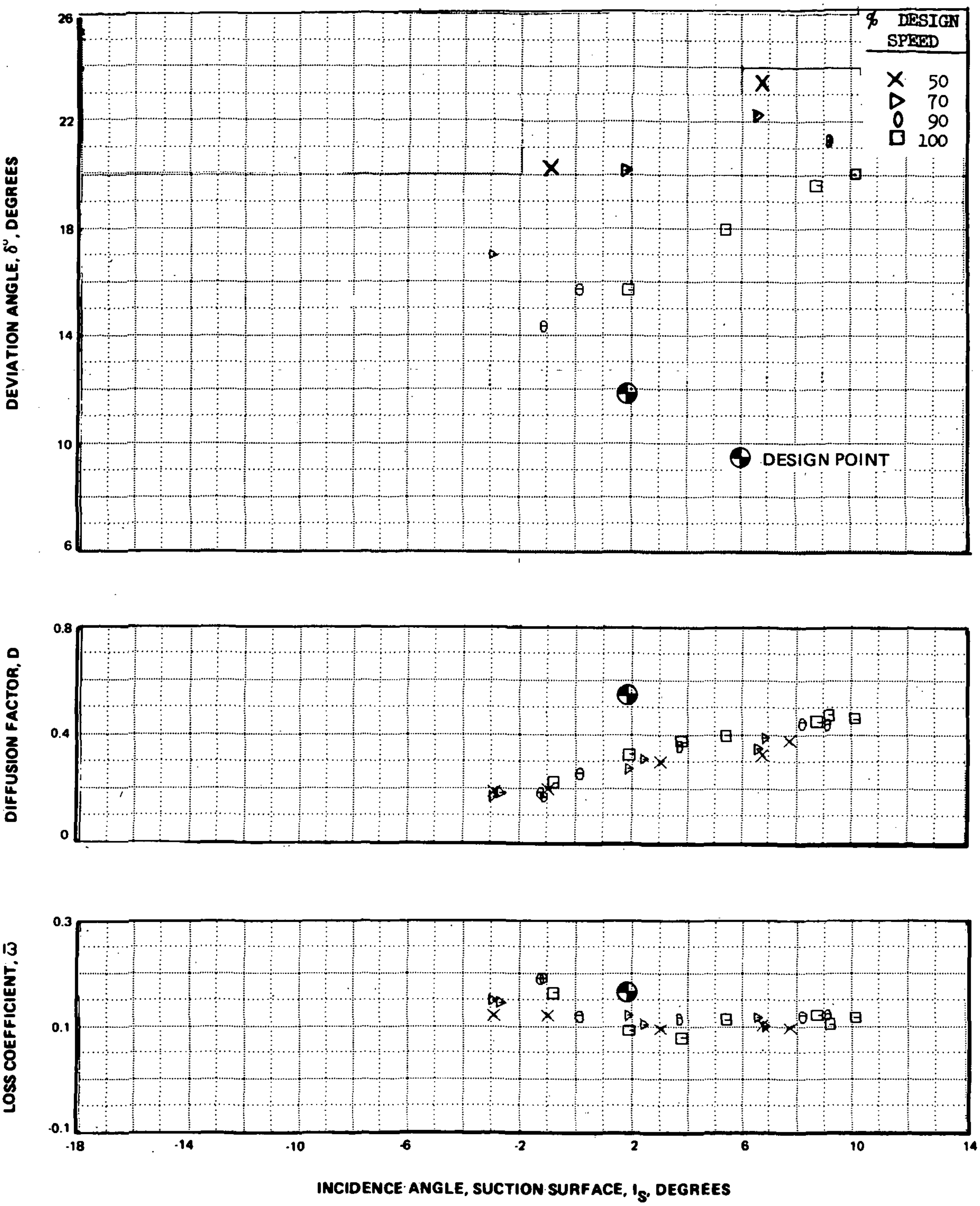


Figure 13a Stator Blade Element Performance, 5% Span

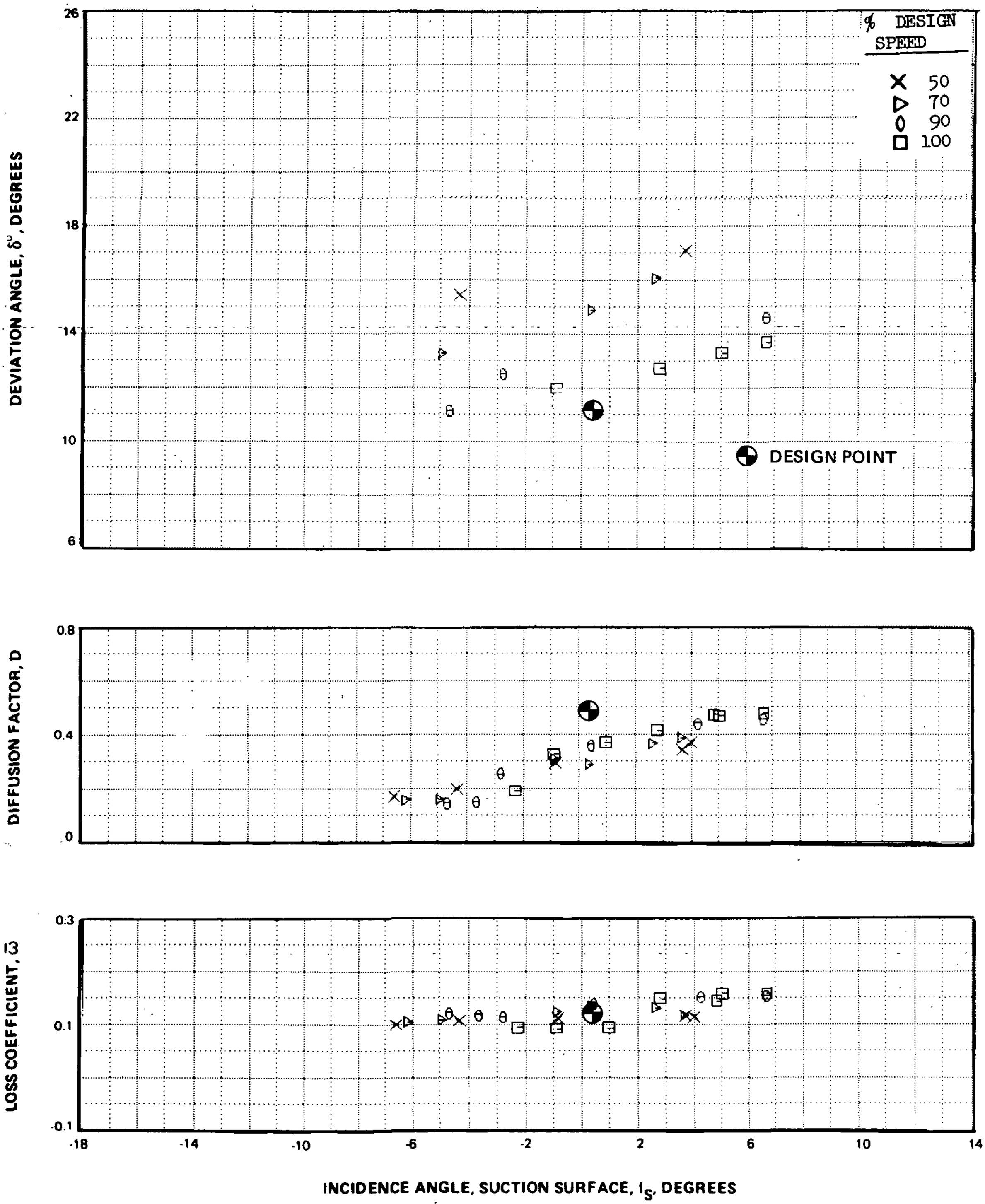


Figure 13b Stator Blade Element Performance, 10% Span

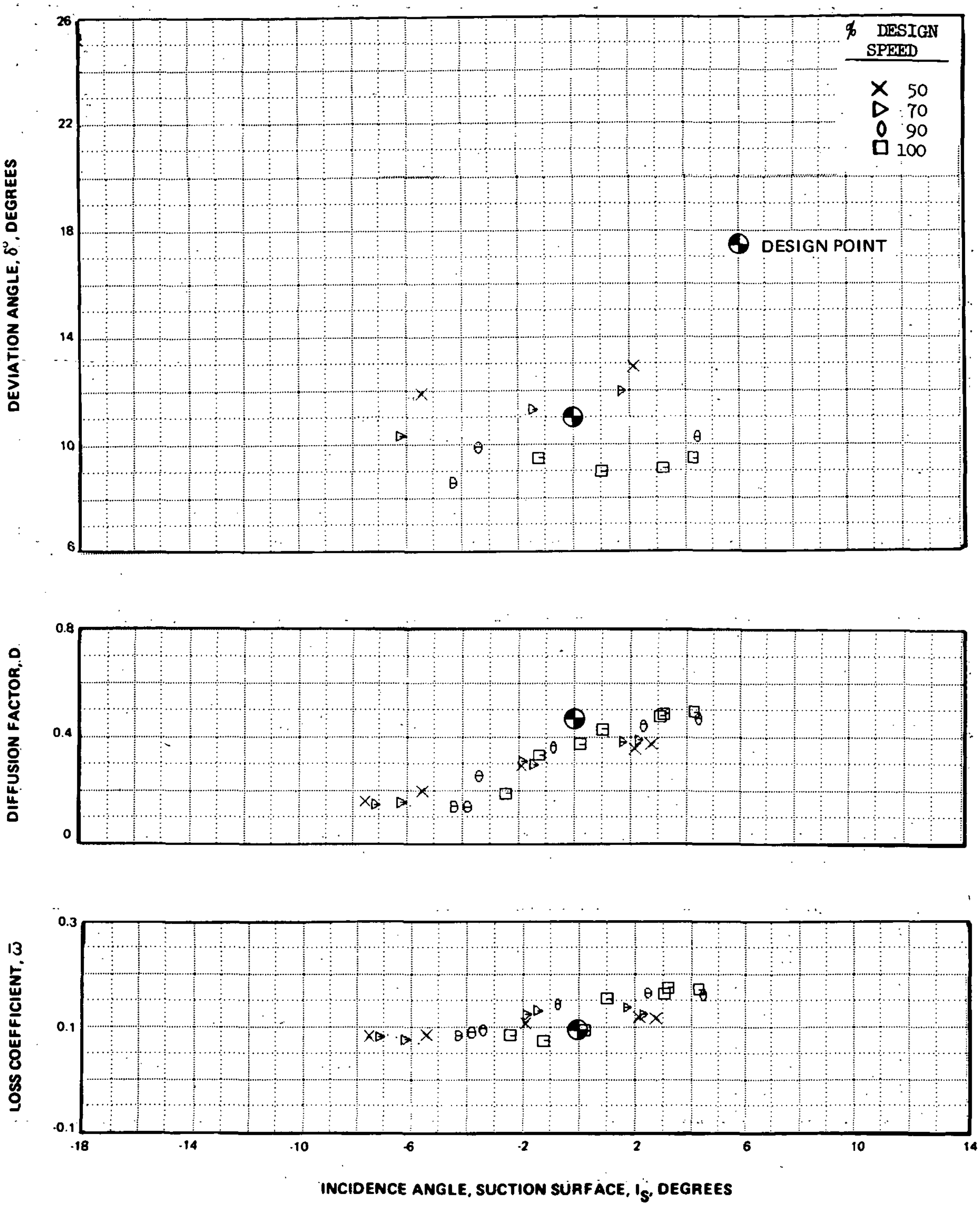


Figure 13c Stator Blade Element Performance, 15% Span

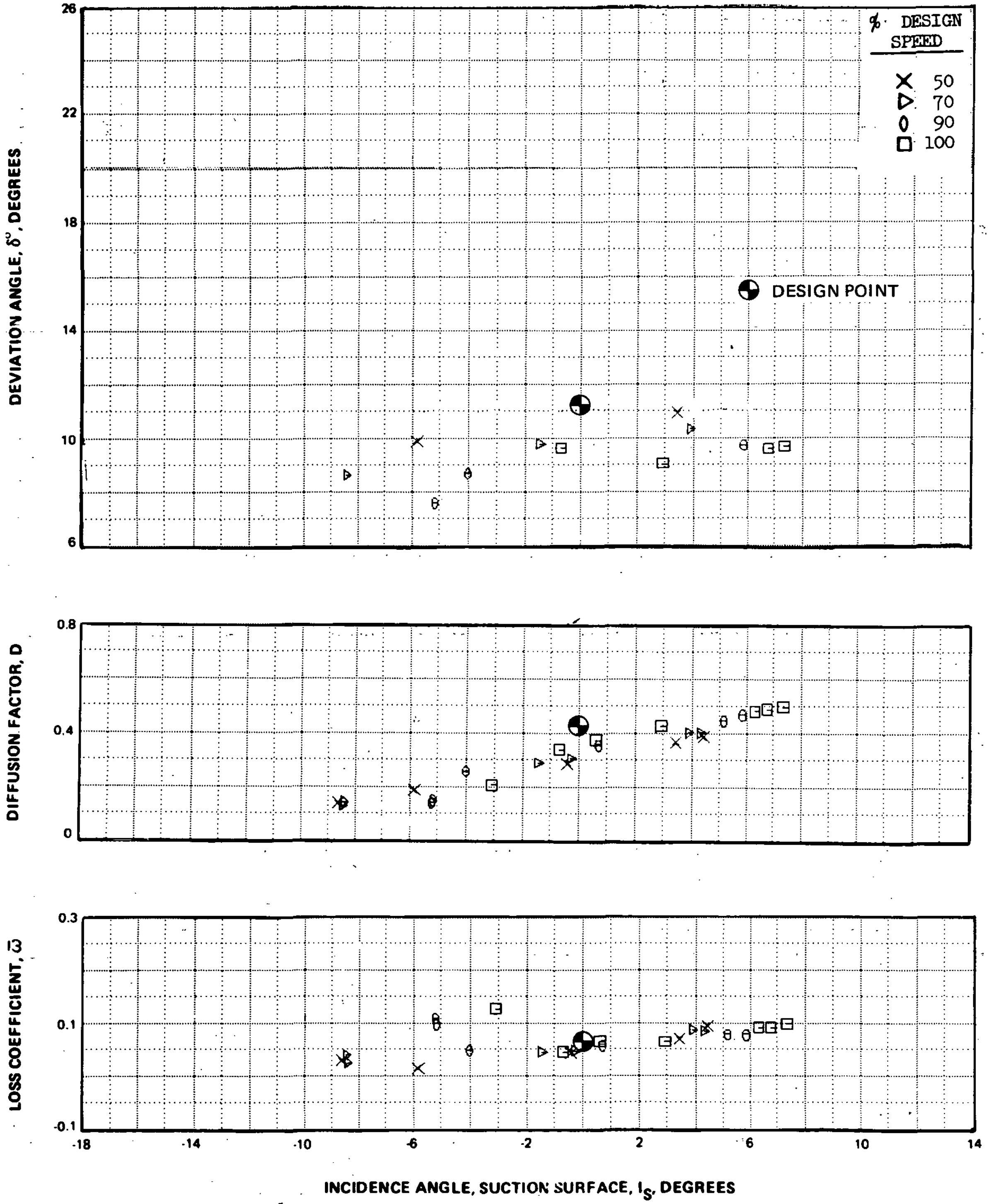


Figure 13d Stator Blade Element Performance, 30% Span

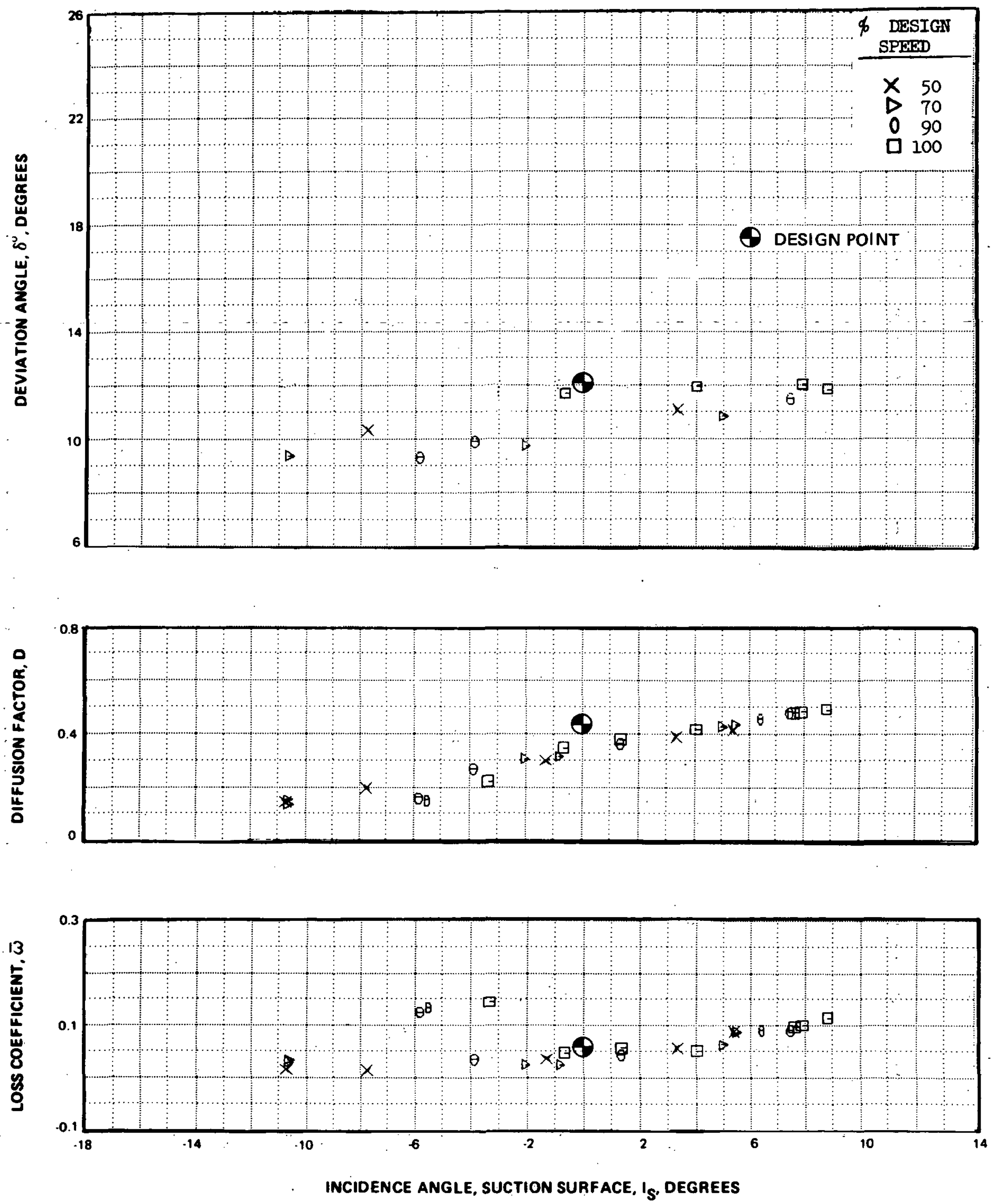


Figure 13e Stator Blade Element Performance, 50% Span

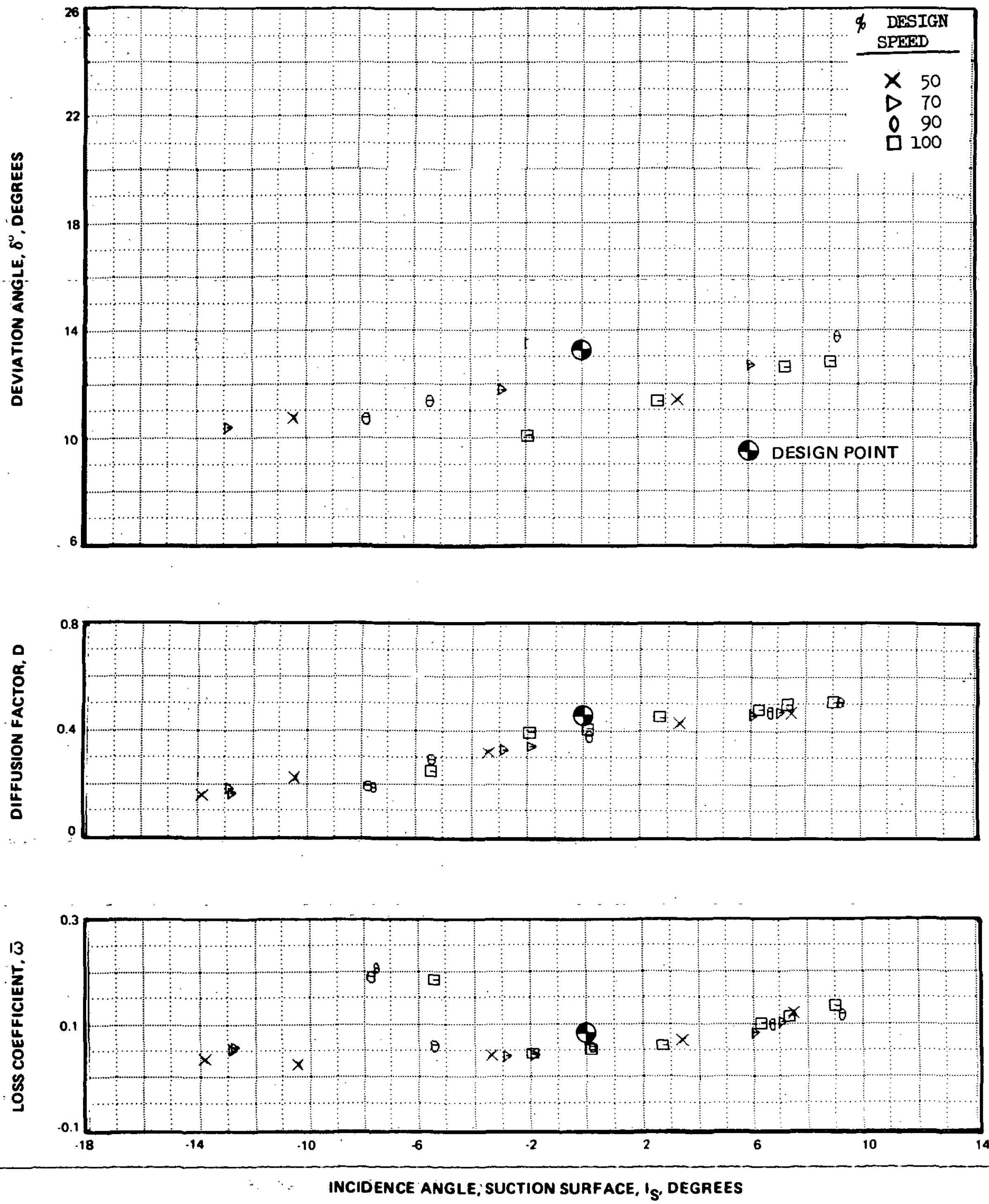


Figure 13f Stator Blade Element Performance, 70% Span

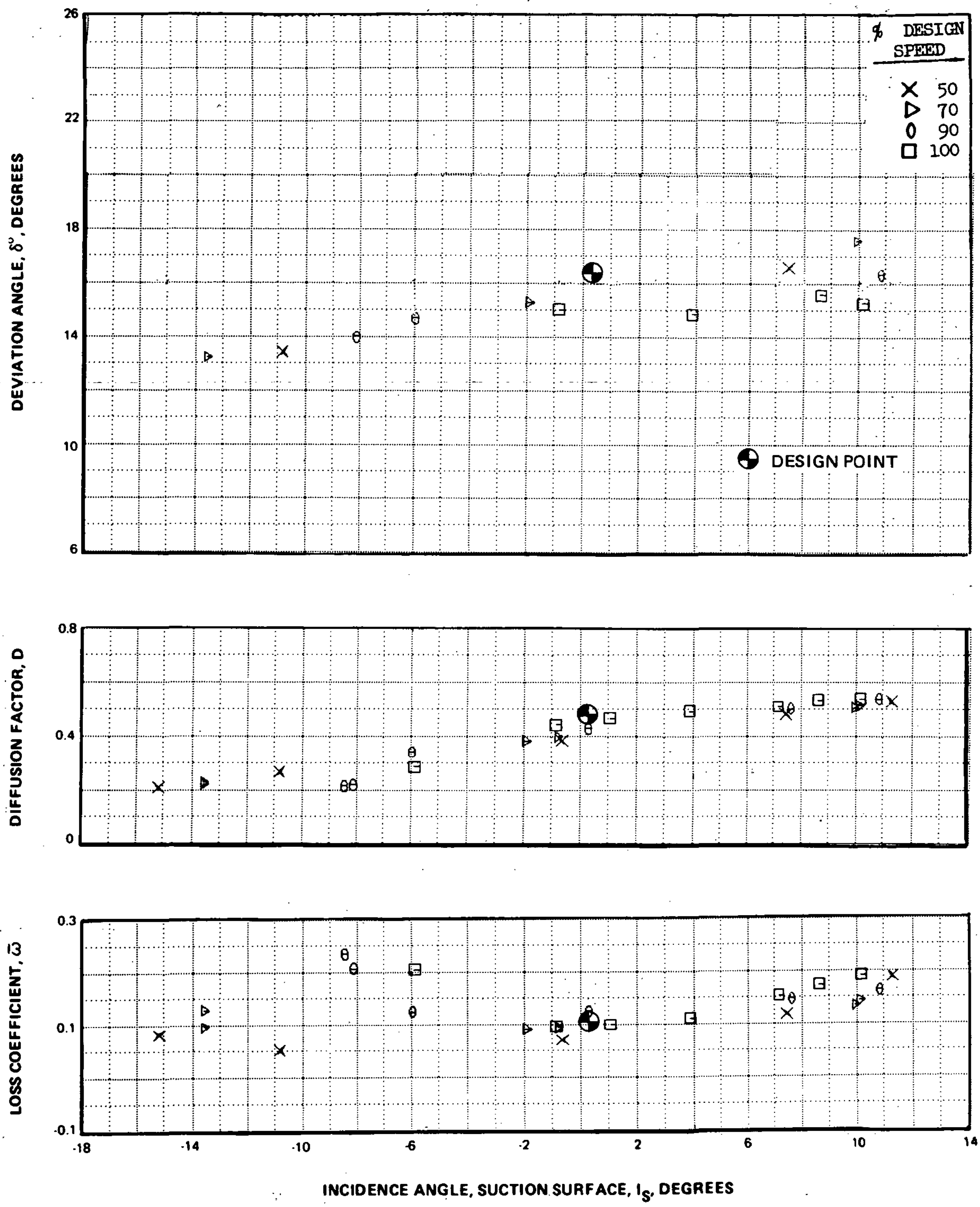


Figure 13g Stator Blade Element Performance, 85% Span

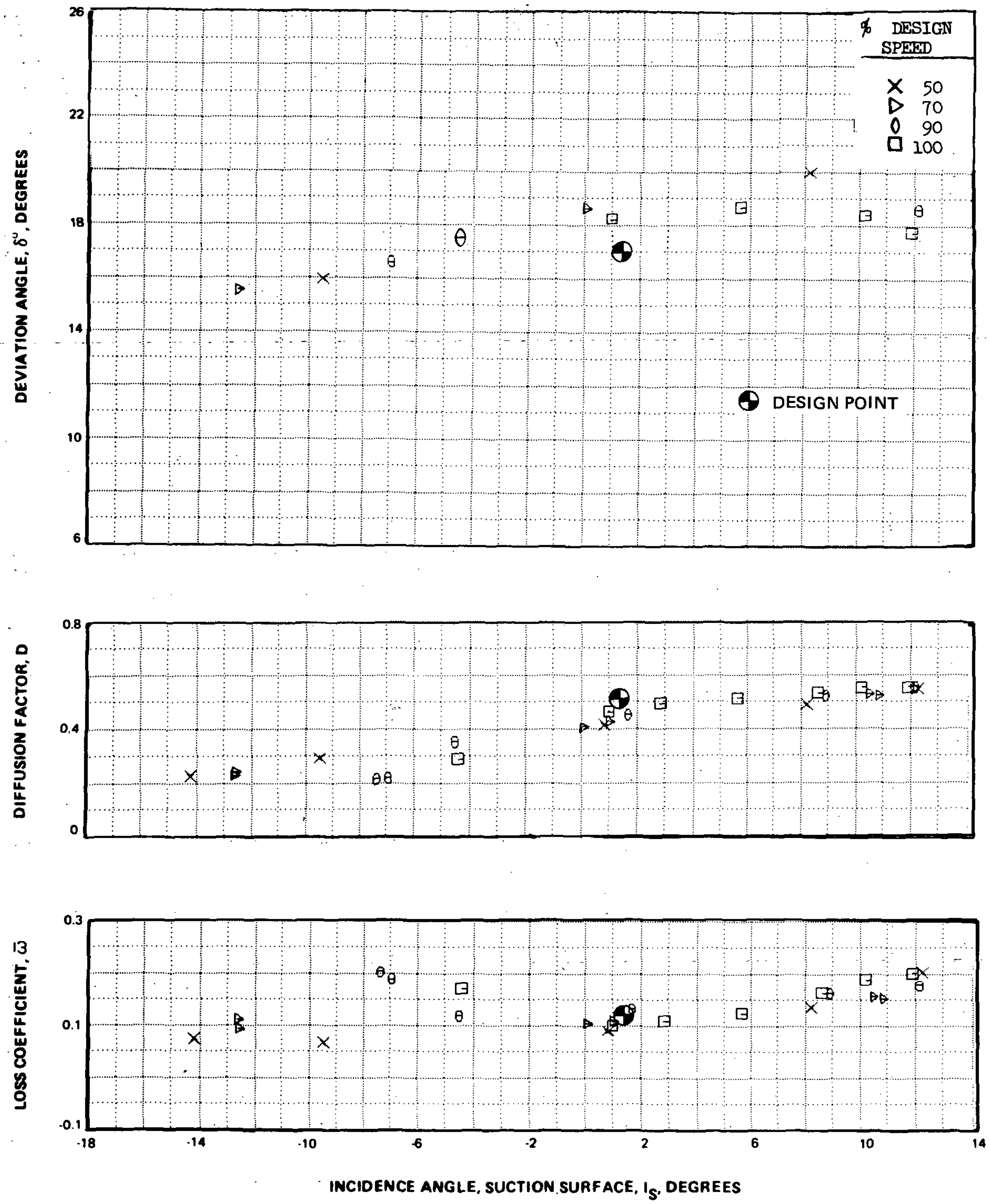


Figure 13h Stator Blade Element Performance, 90% Span

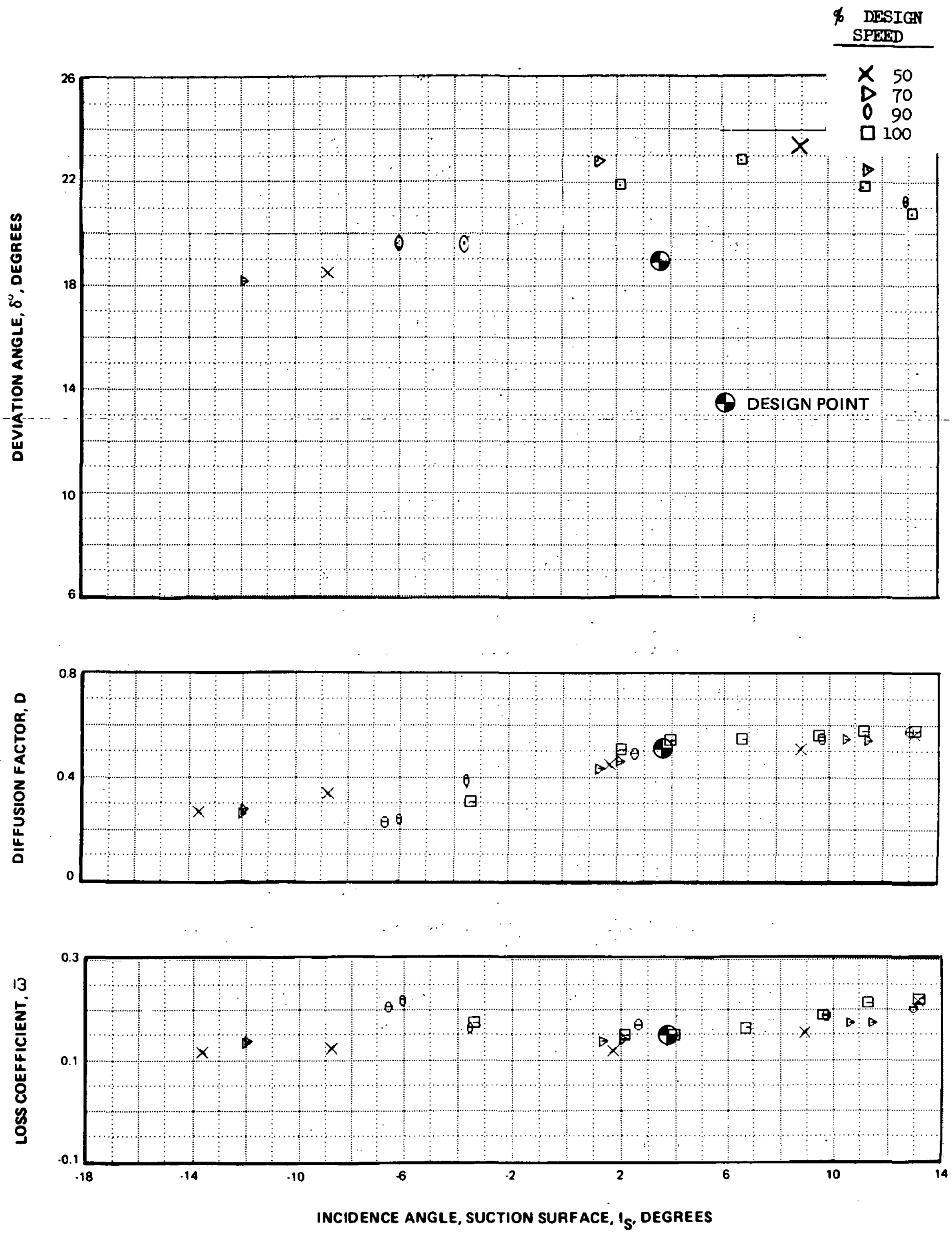


Figure 13i Stator Blade Element Performance, 95% Span

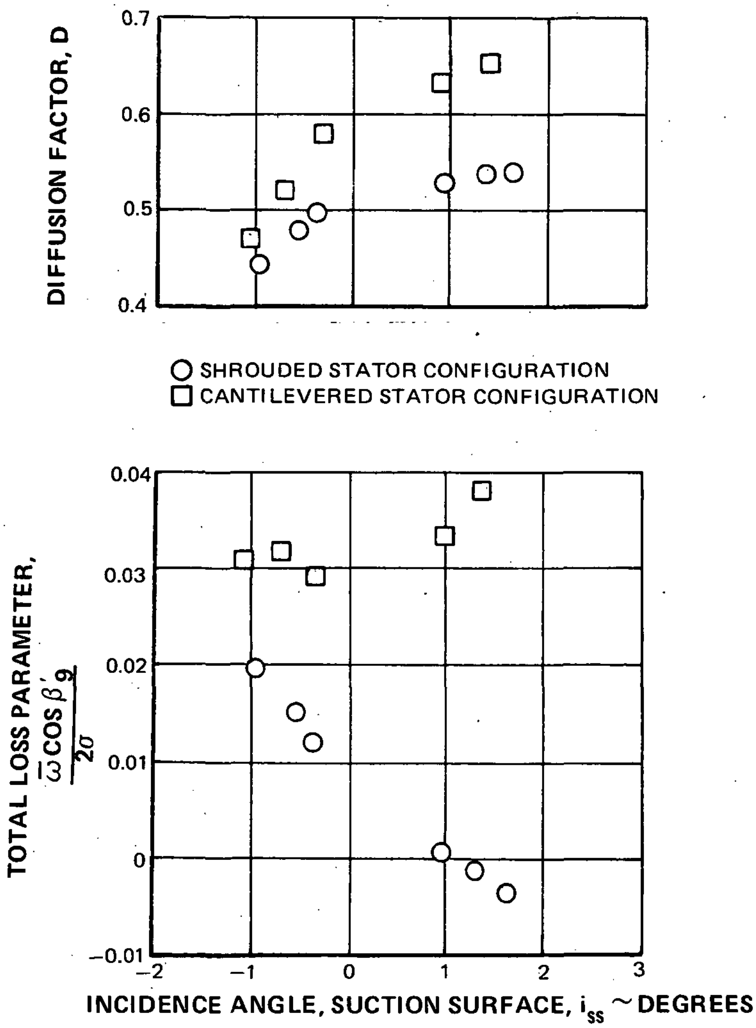


Figure 14a Rotor Blade Element Performance, Cantilevered Versus Shrouded Stator – 5 Percent Span at Design Speed

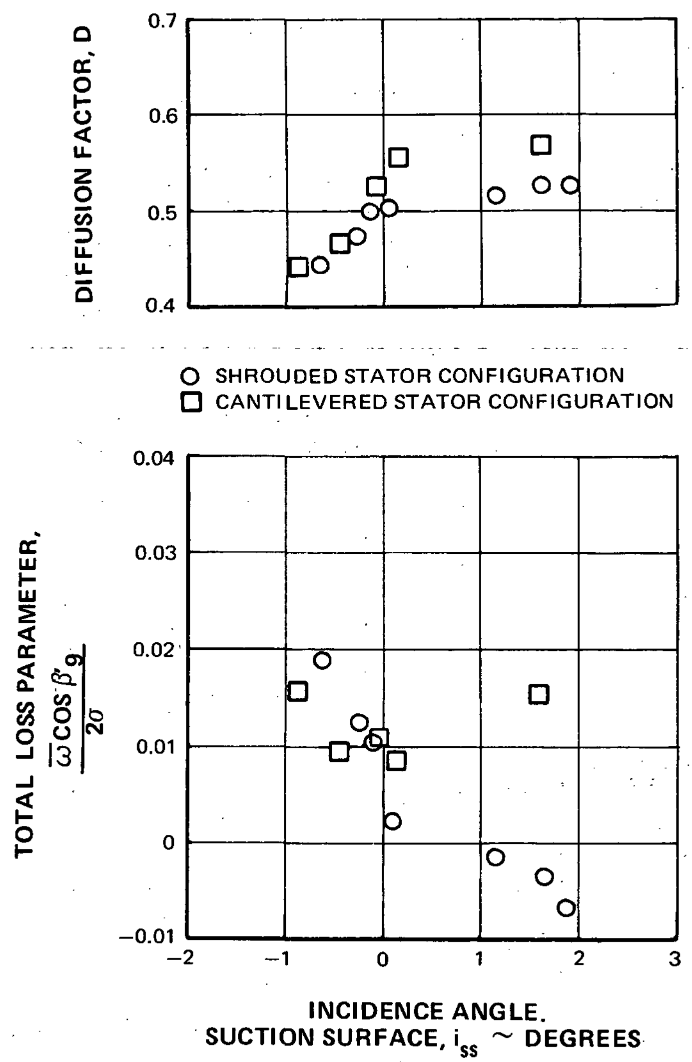


Figure 14b Rotor Blade Element Performance, Cantilevered Versus Shrouded Stator – 10 Percent Span at Design Speed

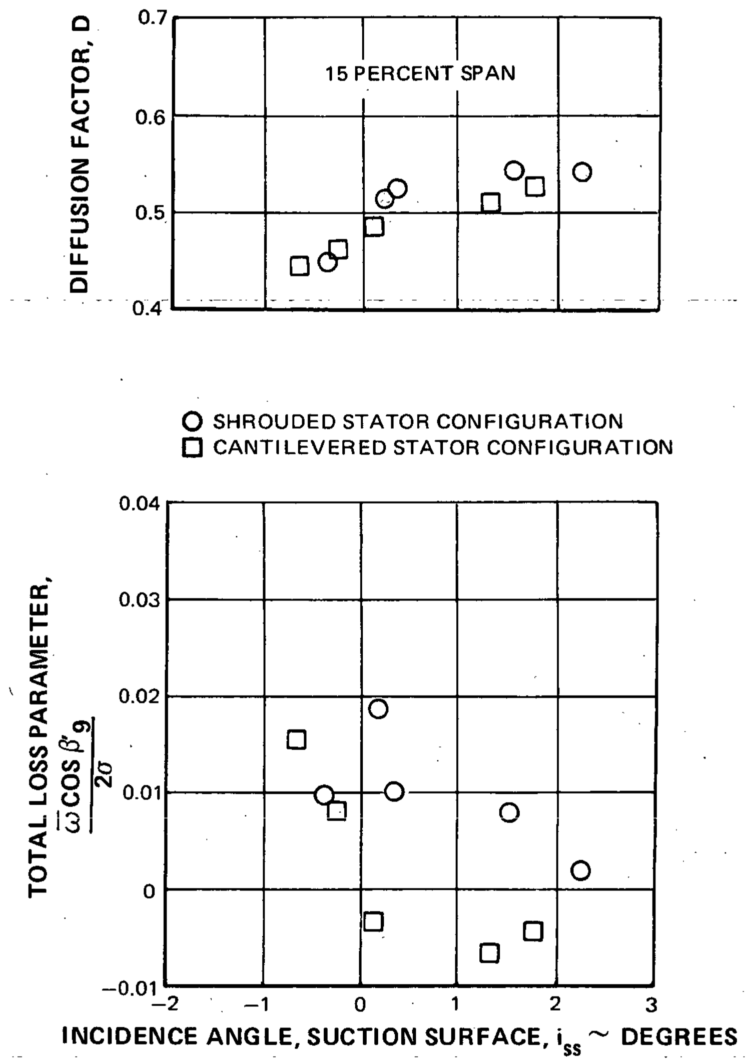


Figure 14c Rotor Blade Element Performance, Cantilevered Versus Shrouded Stator — 15 Percent Span at Design Speed

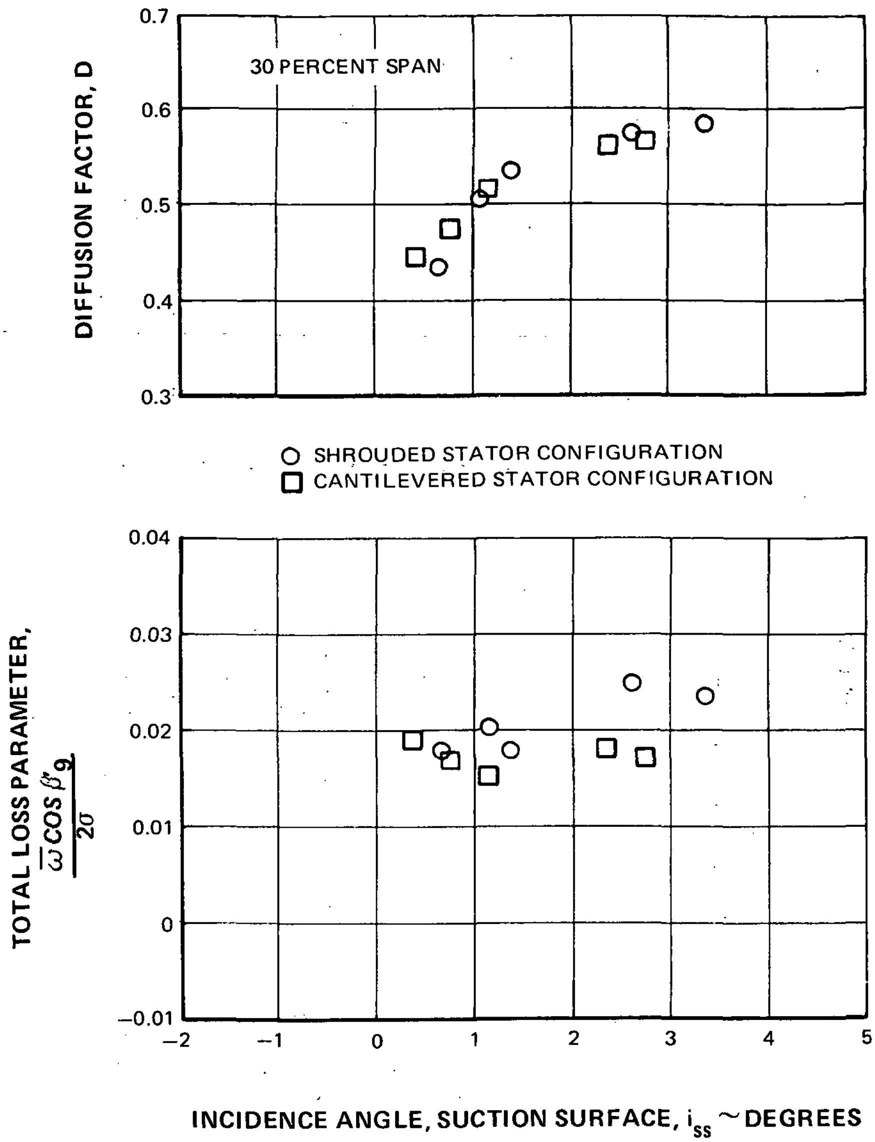


Figure 14d Rotor Blade Element Performance, Cantilevered Versus Shrouded Stator – 30 Percent Span at Design Speed

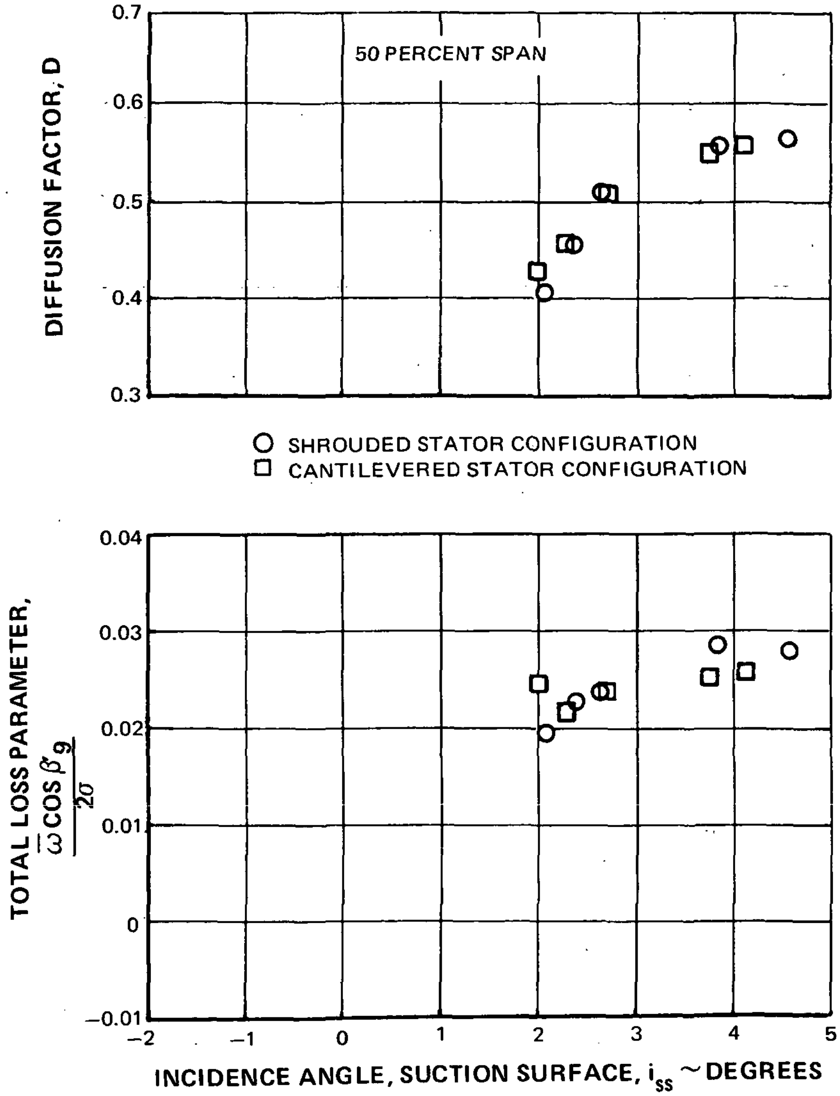


Figure 14e Rotor Blade Element Performance, Cantilevered Versus Shrouded Stator – 50 Percent Span at Design Speed

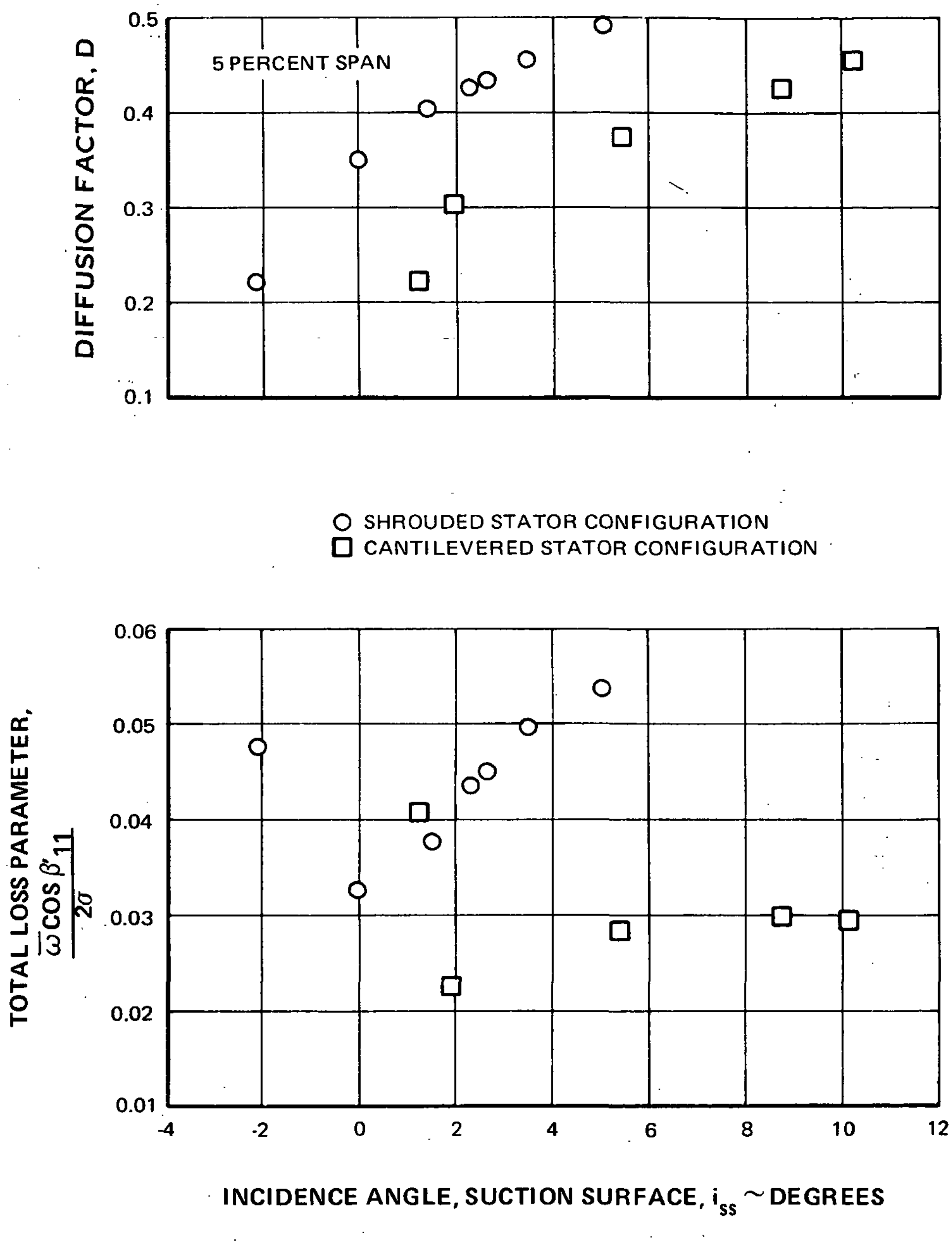


Figure 15a Stator Blade Element Performance, Cantilevered Versus Shrouded Stator – 5 Percent Span at Design Speed

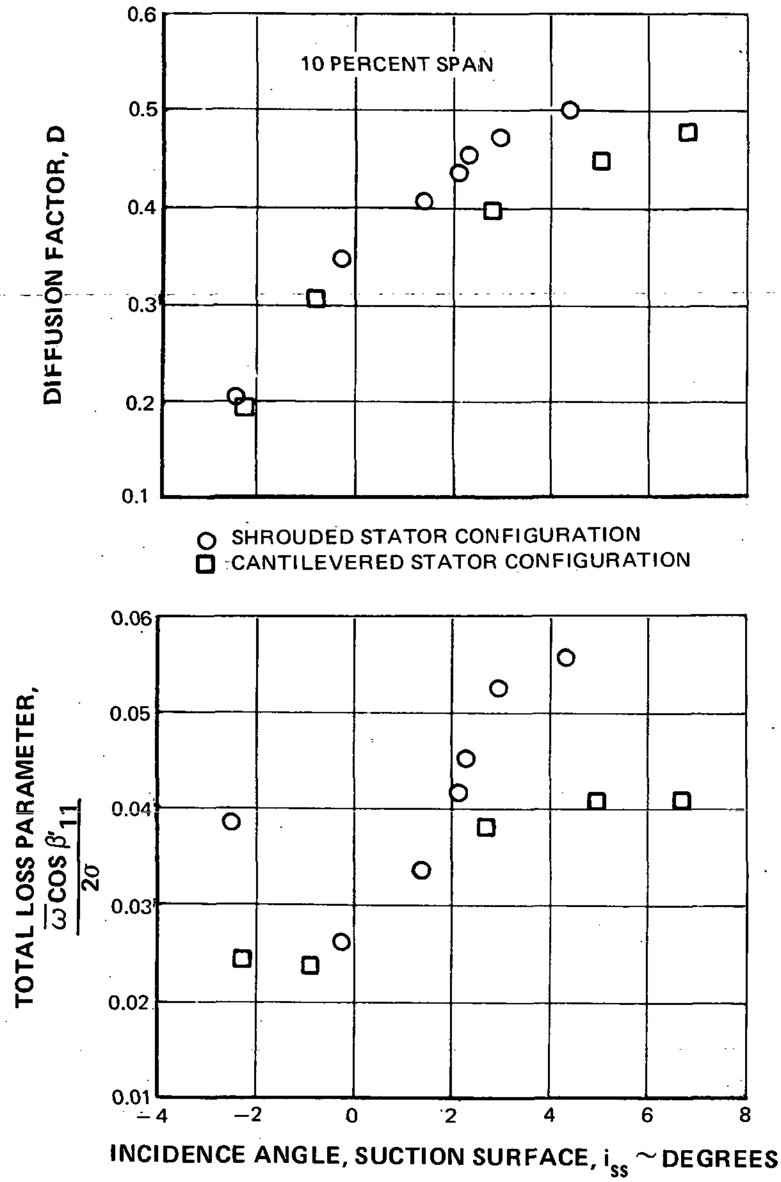


Figure 15b Stator Blade Element Performance, Cantilevered Versus Shrouded Stator – 10 Percent Span at Design Speed

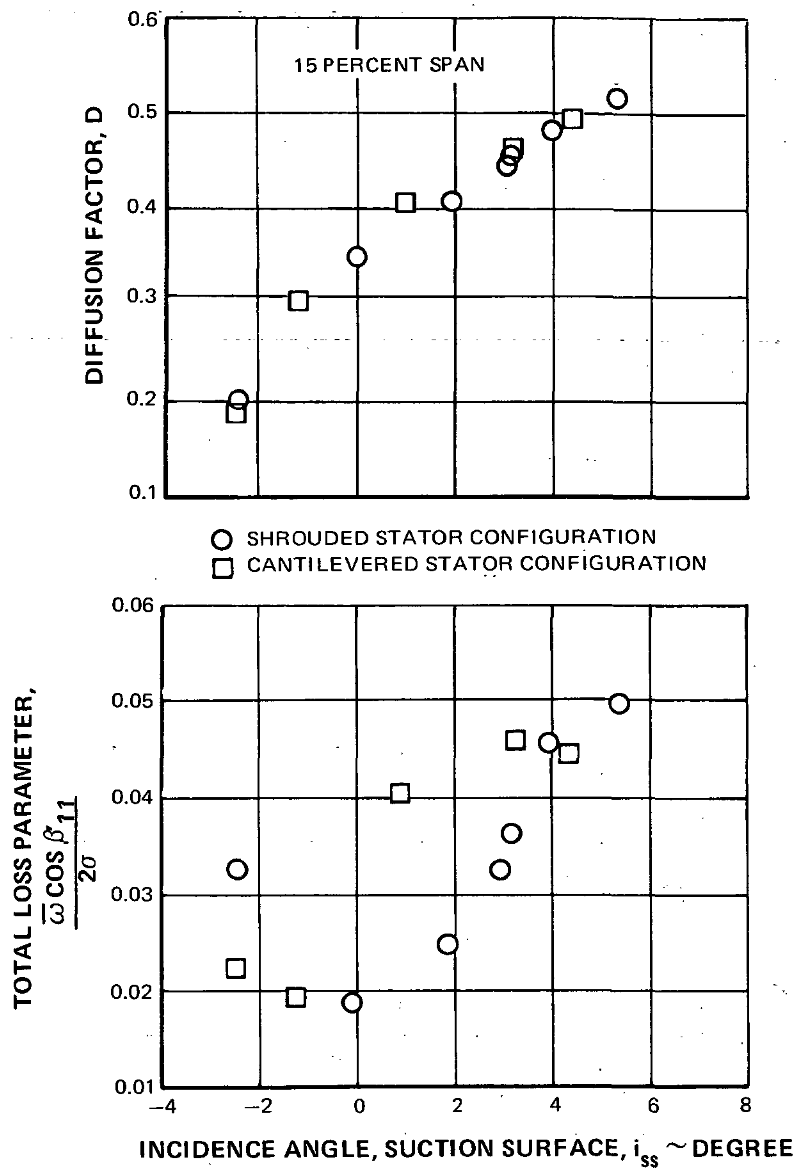


Figure 15c Stator Blade Element Performance, Cantilevered Versus Shrouded Stator – 15 Percent Span at Design Speed

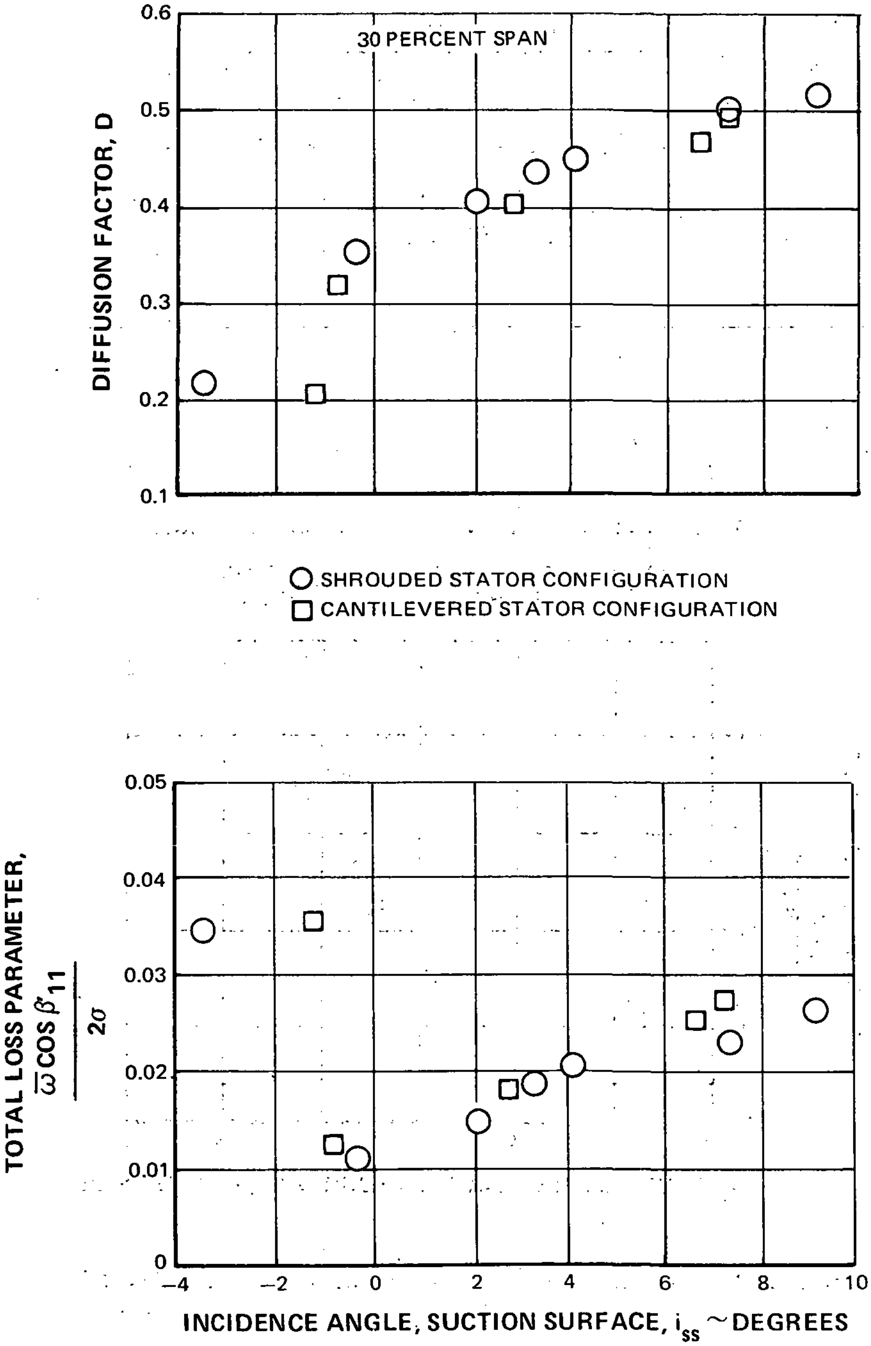


Figure 15d Stator Blade Element Performance, Cantilevered Versus Shrouded Stator – 30 Percent Span at Design Speed

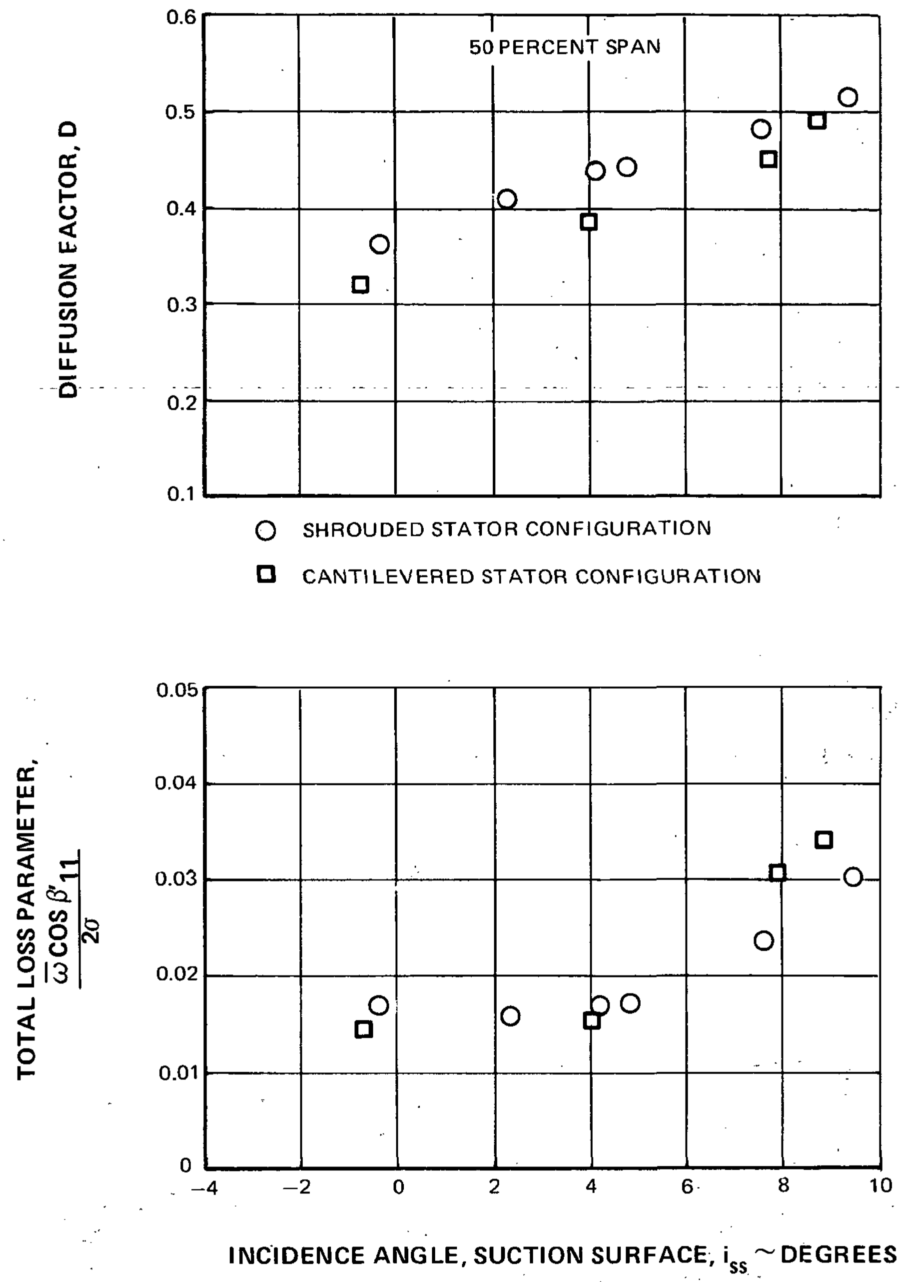


Figure 15e Stator Blade Element Performance, Cantilevered Versus Shrouded Stator – 50 Percent Span at Design Speed

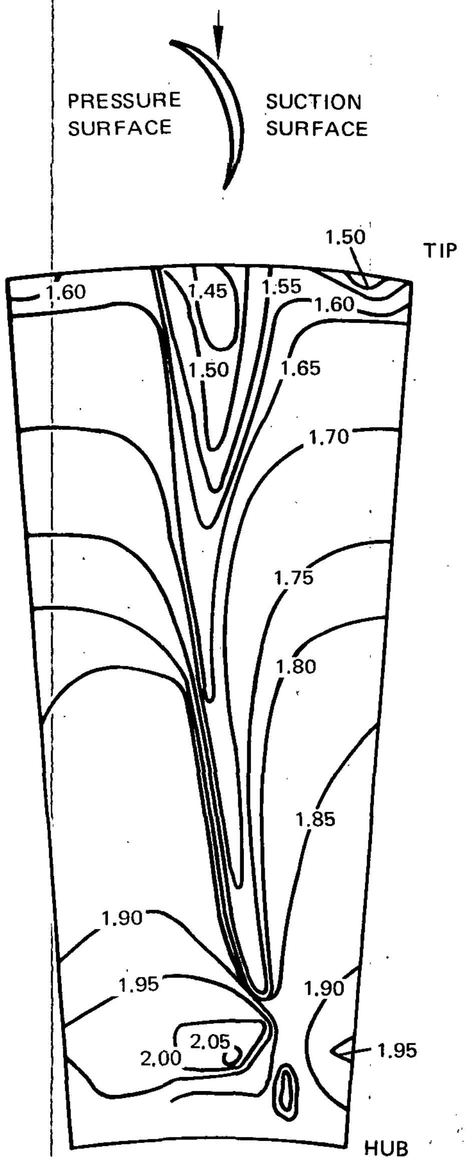
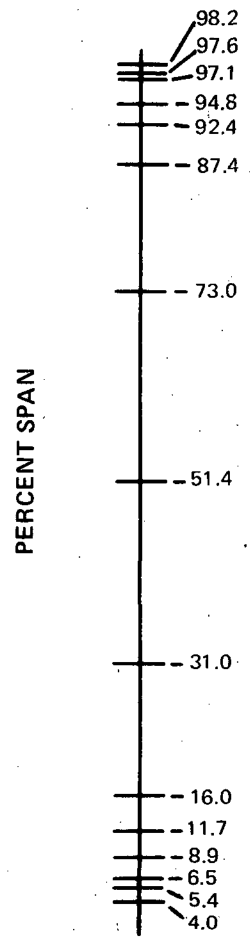


Figure 16a Total Pressure Ratio Stator Exit Contour Plots, 100 Percent Design Speed, 181.3 Pounds Per Second Flow Rate



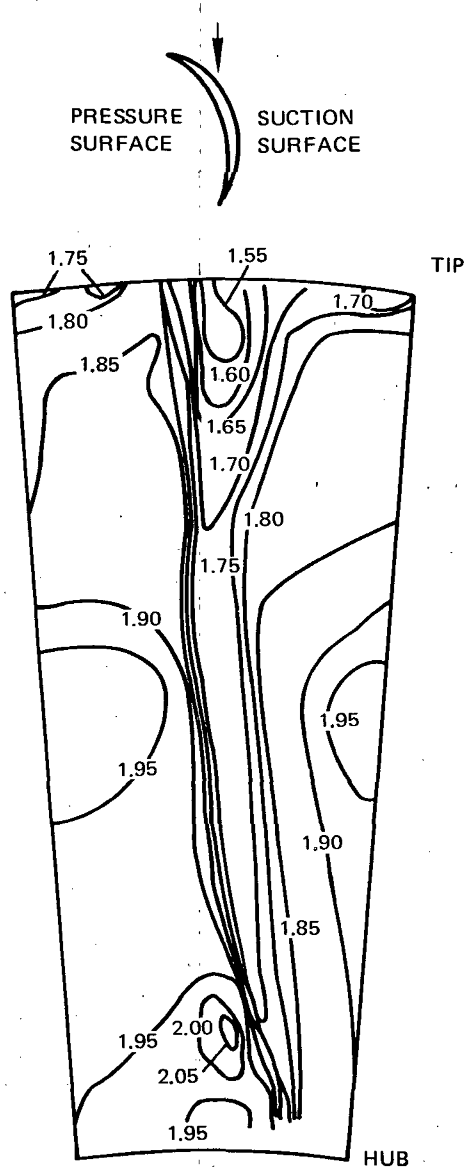


Figure 16b. Total Pressure Ratio Stator Exit Contour Plots, 100 Percent Design Speed, 179.6 Pounds Per Second Flow Rate

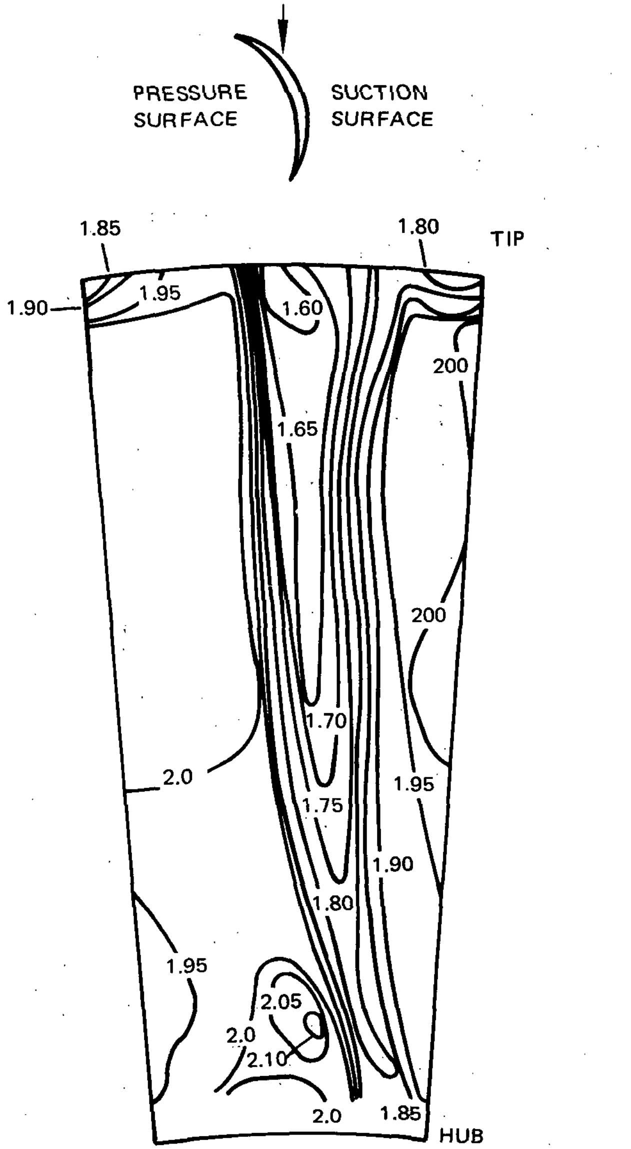
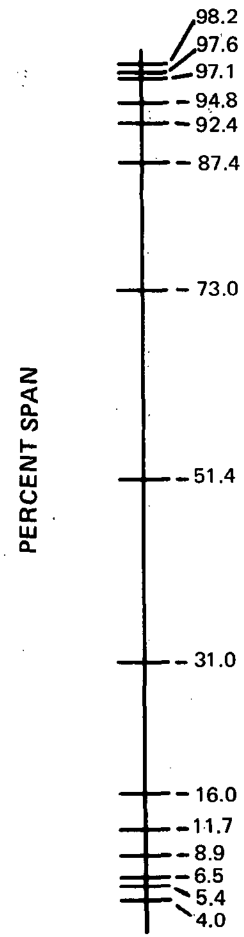


Figure 16c. Total Pressure Ratio Stator Exit Contour Plots, 100 Percent Design Speed, 171.6 Pounds Per Second Flow Rate



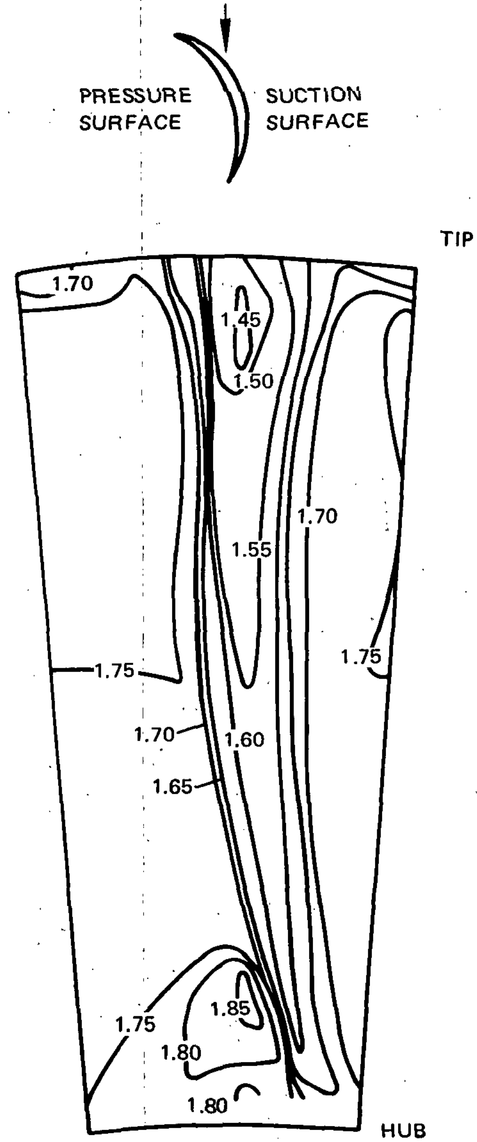


Figure 16d Total Pressure Ratio Stator Exit Contour Plots, 90 Percent Design Speed, 149.2 Pounds Per Second Flow Rate

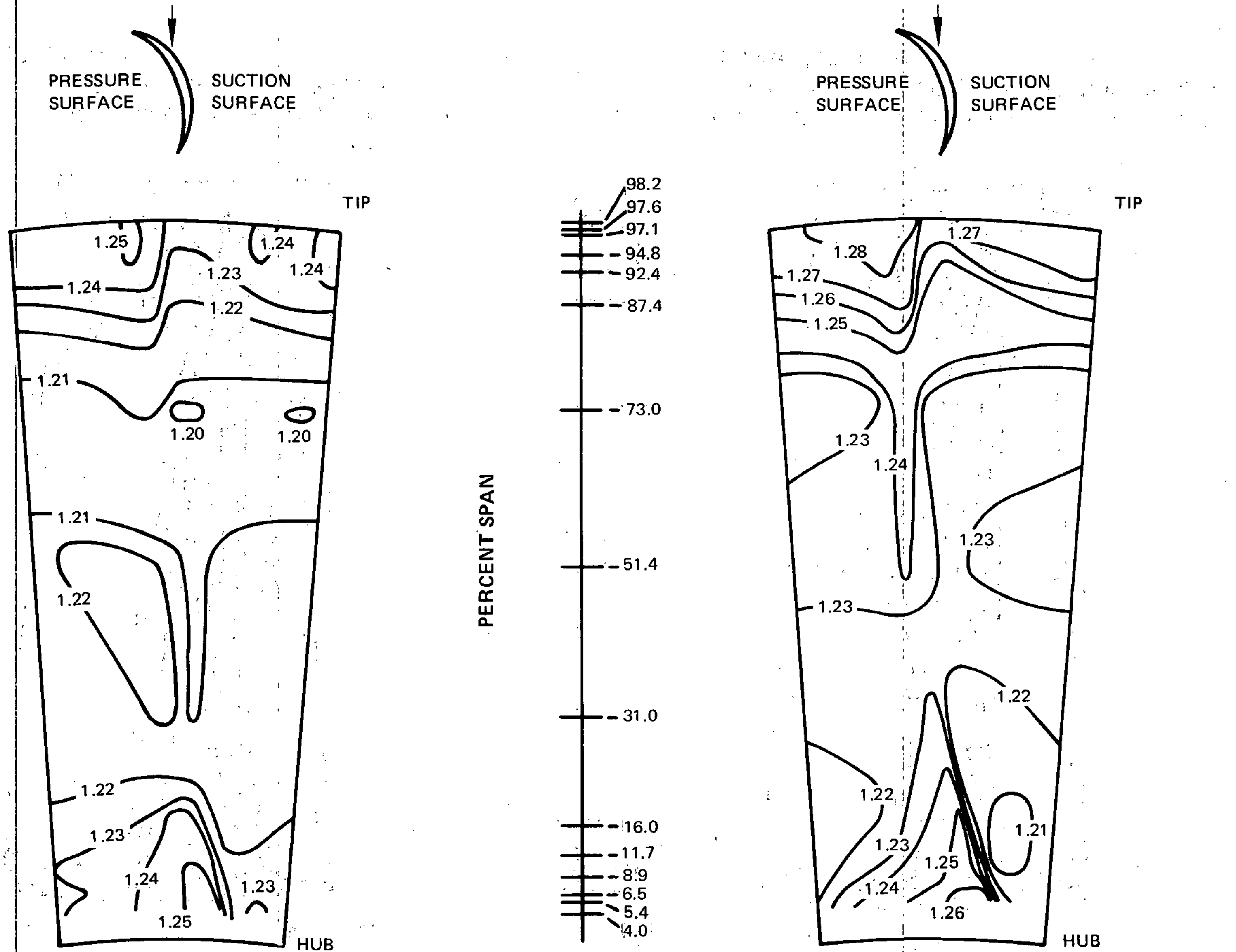
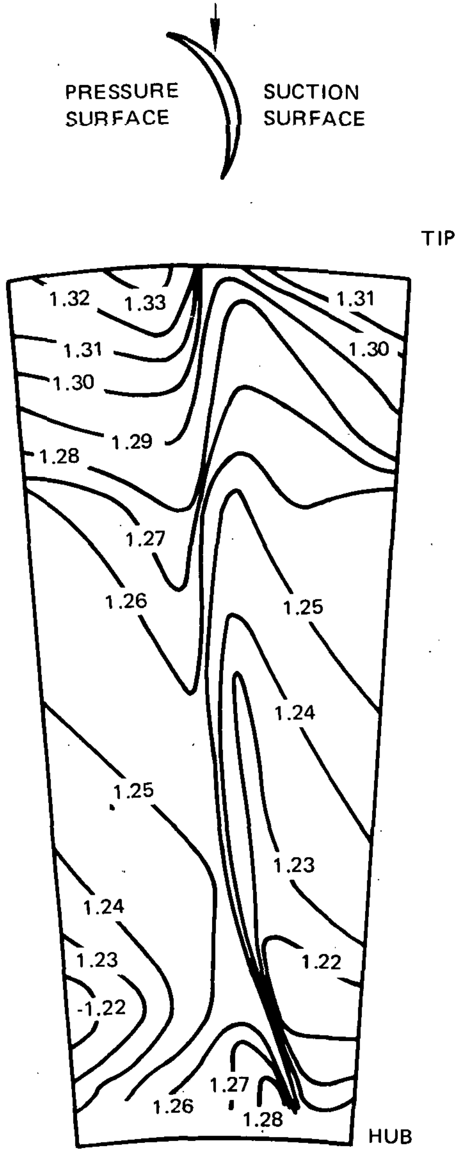
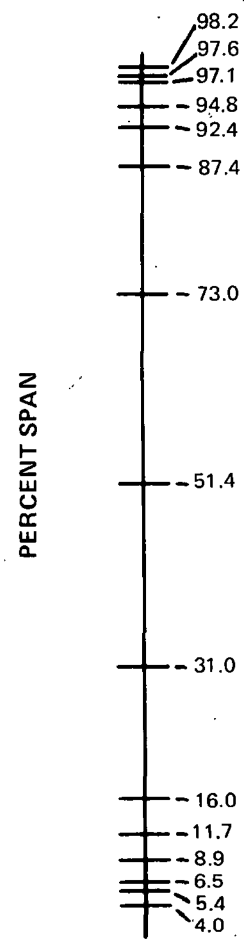


Figure 17a Total Temperature Ratio Stator Exit Contour Plots, 100 Percent Speed, 181.3 Pounds Per Second Flow Rate

Figure 17b Total Temperature Ratio Stator Exit Contour Plots, 100 Percent Speed, 179.6 Pounds Per Second Flow Rate





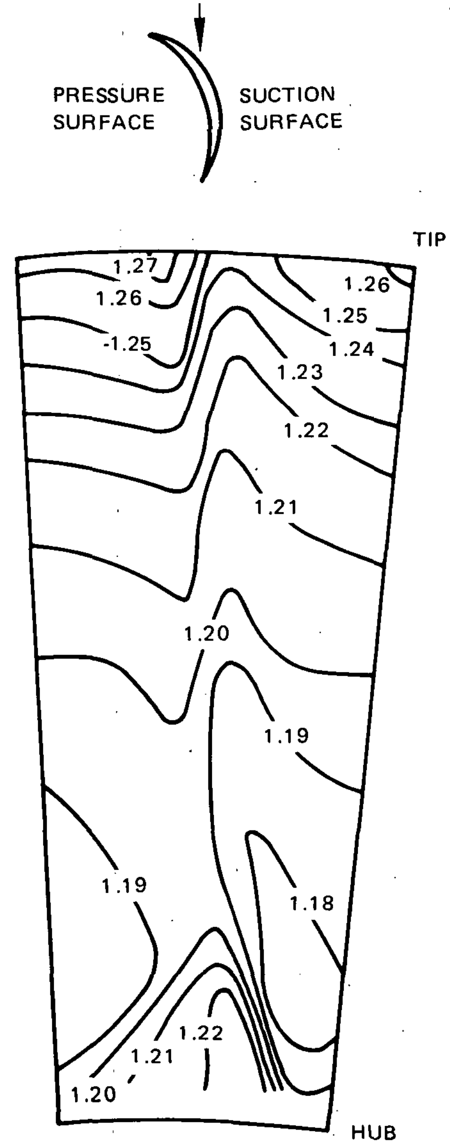
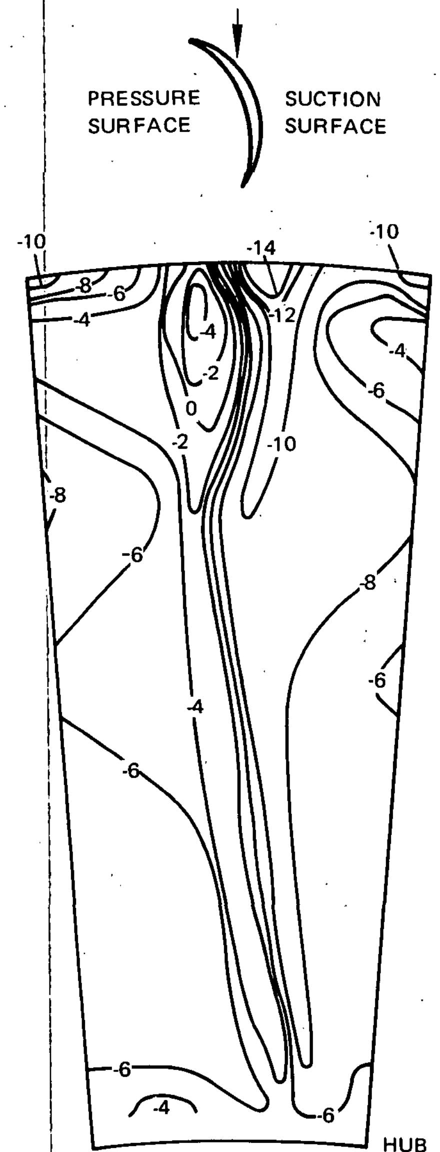
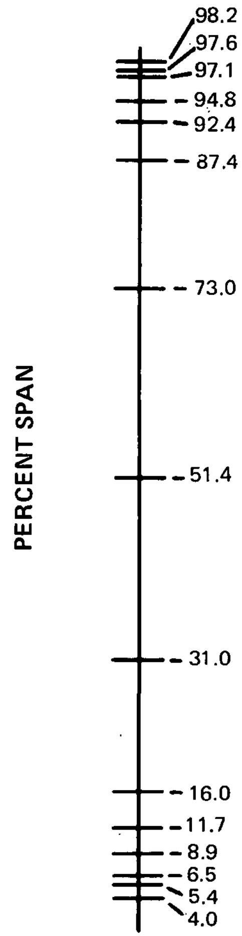


Figure 17c Total Temperature Ratio Stator Exit Contour Plots, 100 Percent Speed, 171.6 Pounds Per Second Flow Rate

Figure 17d Total Temperature Ratio Stator Exit Contour Plots, 90 Percent Speed, 149.2 Pounds Per Second Flow Rate





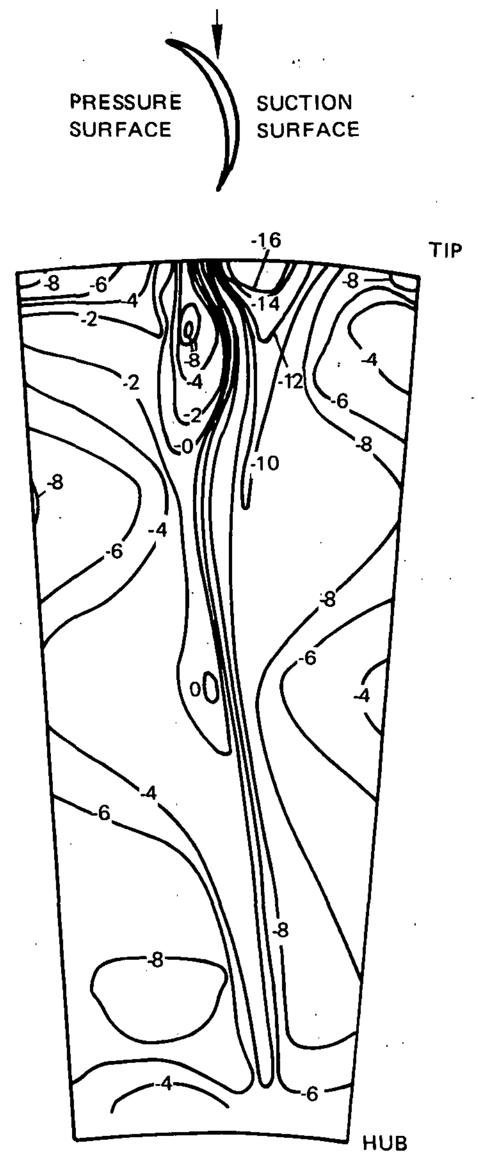


Figure 18a Stator Exit Absolute Air Angle, Stator Exit Contour Plots, 100 Percent Speed, 181.3 Pounds Per Second Flow Rate

Figure 18b Stator Exit Absolute Air Angle, Stator Exit Contour Plots, 100 Percent Speed, 179.6 Pounds Per Second Flow Rate

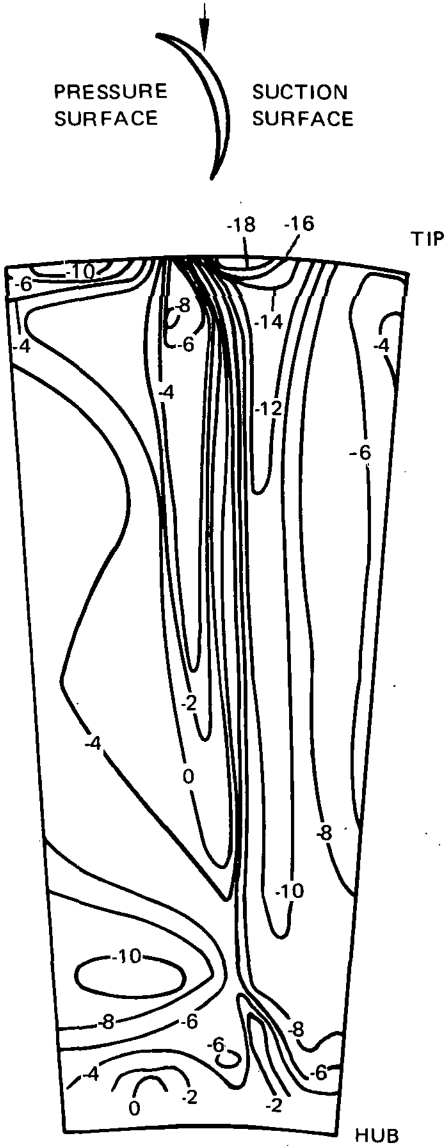
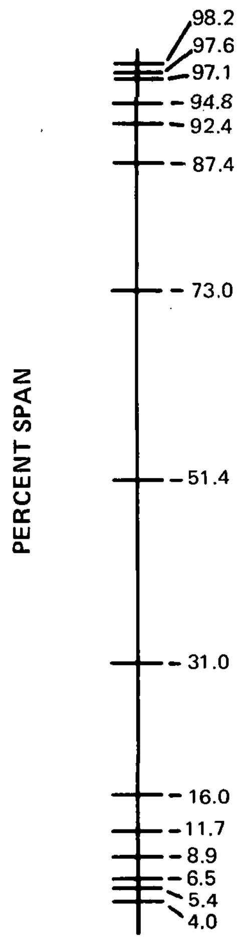


Figure 18c Stator Exit Absolute Air Angle, Stator Exit Contour Plots, 100 Percent Speed, 171.6 Pounds Per Second Flow Rate



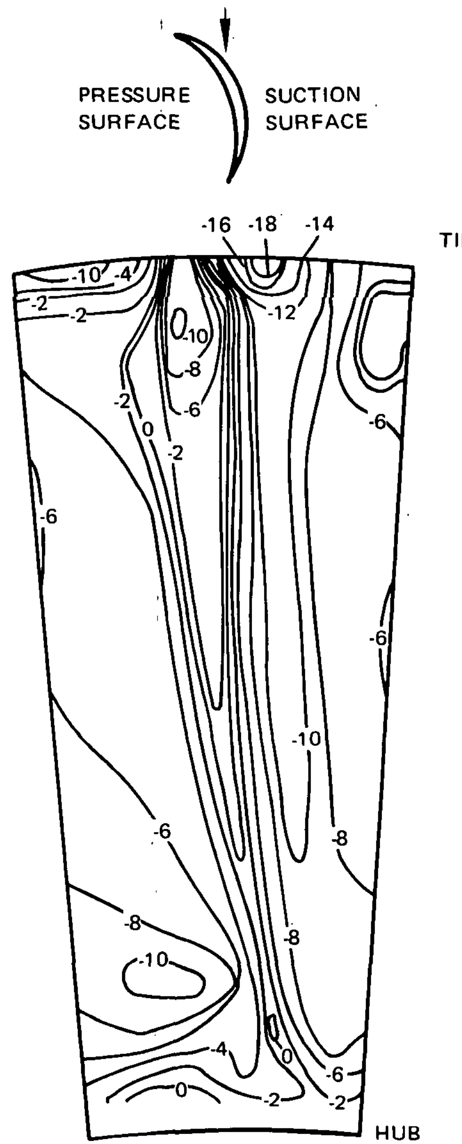


Figure 18d Stator Exit Absolute Air Angle, Stator Exit Contour Plots, 90 Percent Speed, 149.2 Pounds Per Second Flow Rate

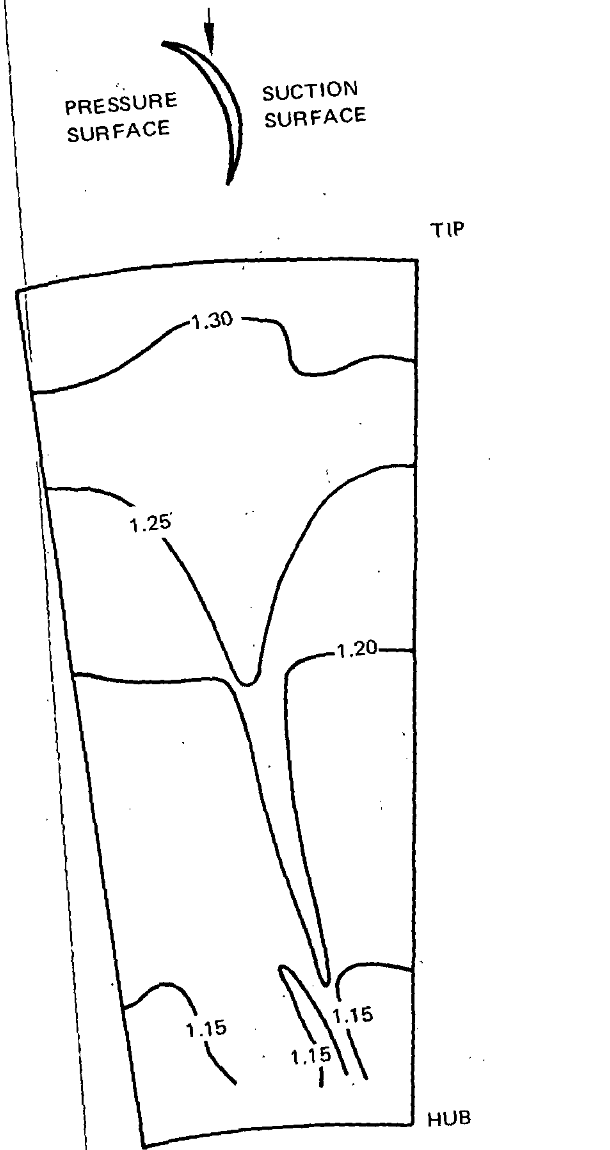
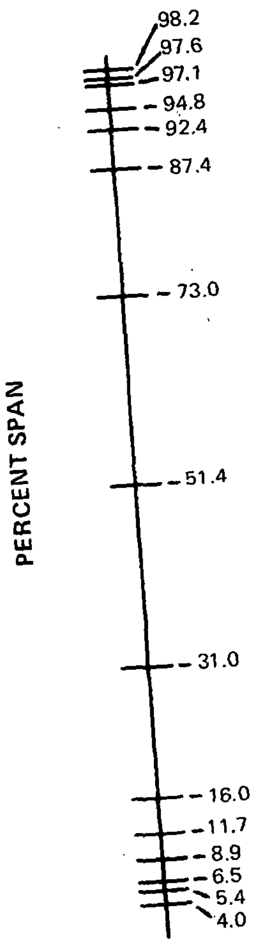


Figure 19a Static Pressure Ratio, Stator Exit Contour Plots, 100 Percent Speed, 181.3 Pounds Per Second Flow Rate



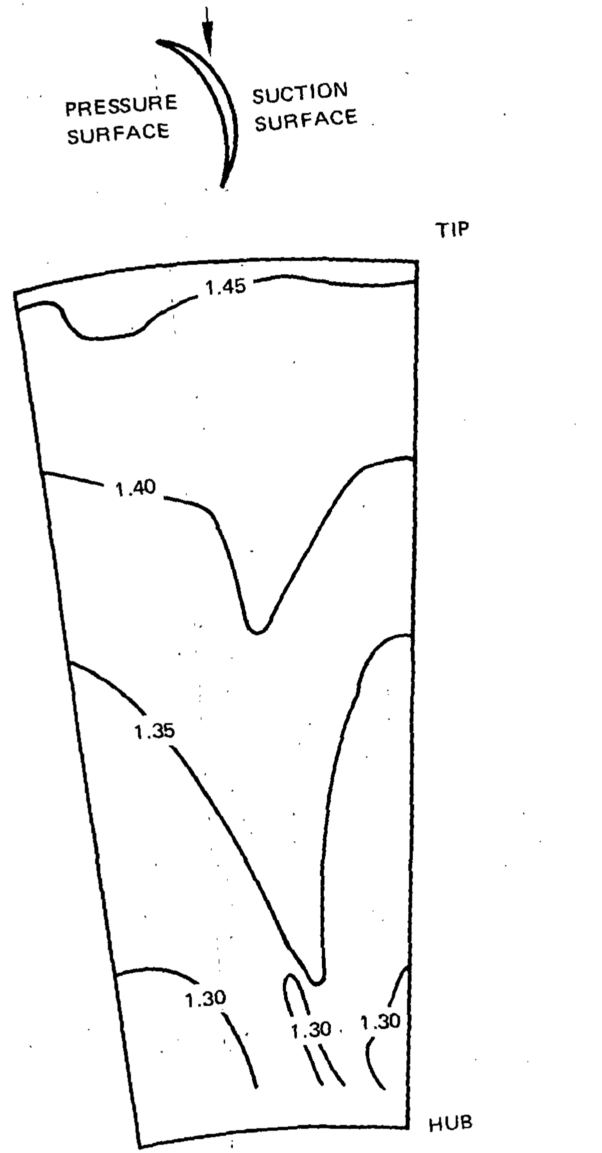


Figure 19b Static Pressure Ratio, Stator Exit Contour Plots, 100 Percent Speed, 179.6 Pounds Per Second Flow Rate

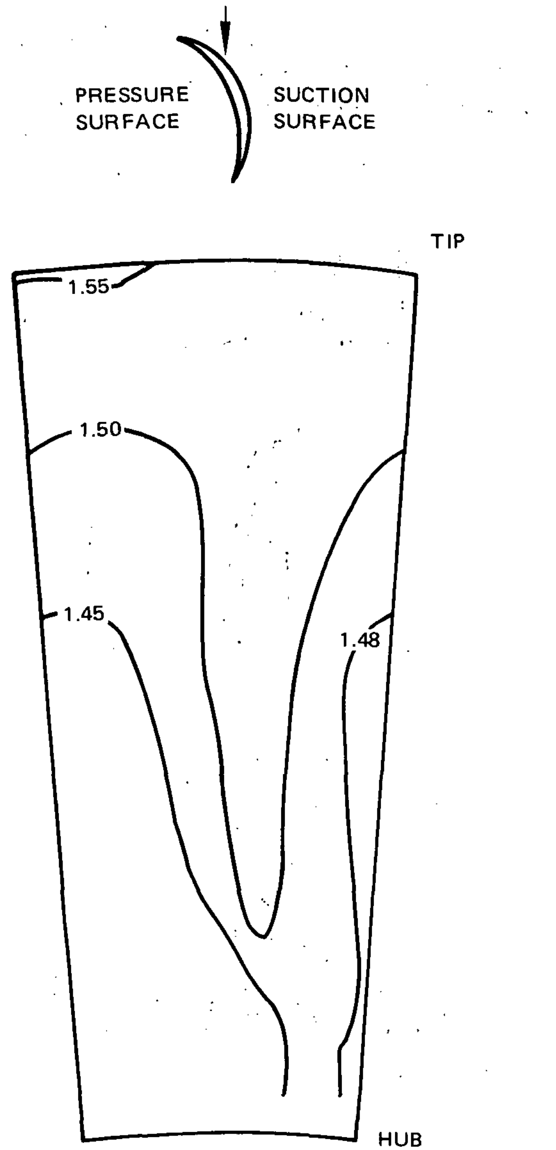
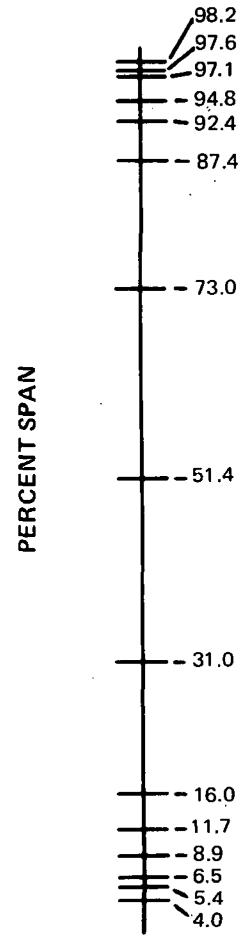


Figure 19c Static Pressure Ratio, Stator Exit Contour Plots, 100 Percent Speed, 171.6 Pounds Per Second Flow Rate



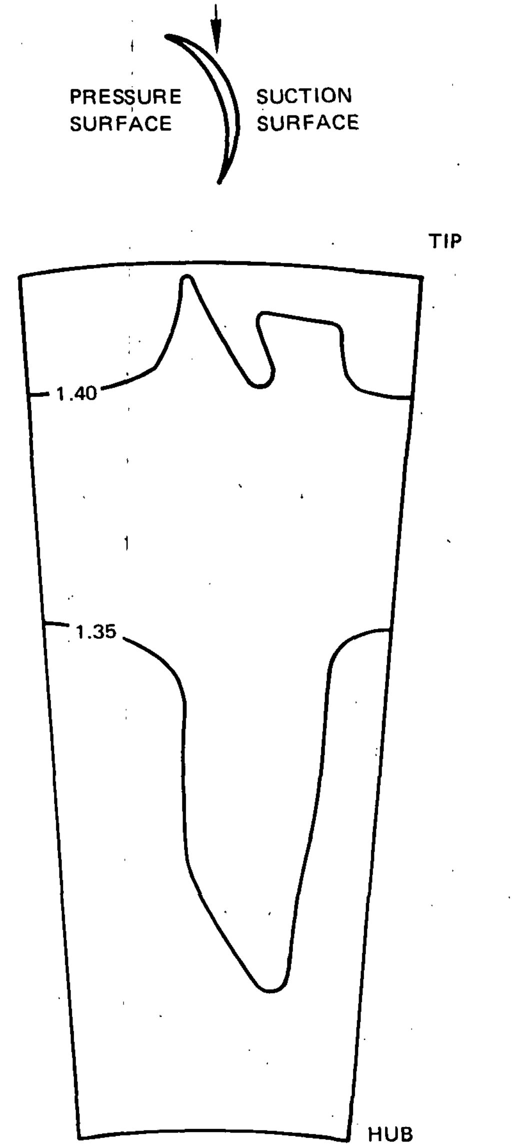


Figure 19d Static Pressure Ratio, Static Exit Contour Plots, 90 Percent Speed, 149.2 Pounds Per Second Flow Rate

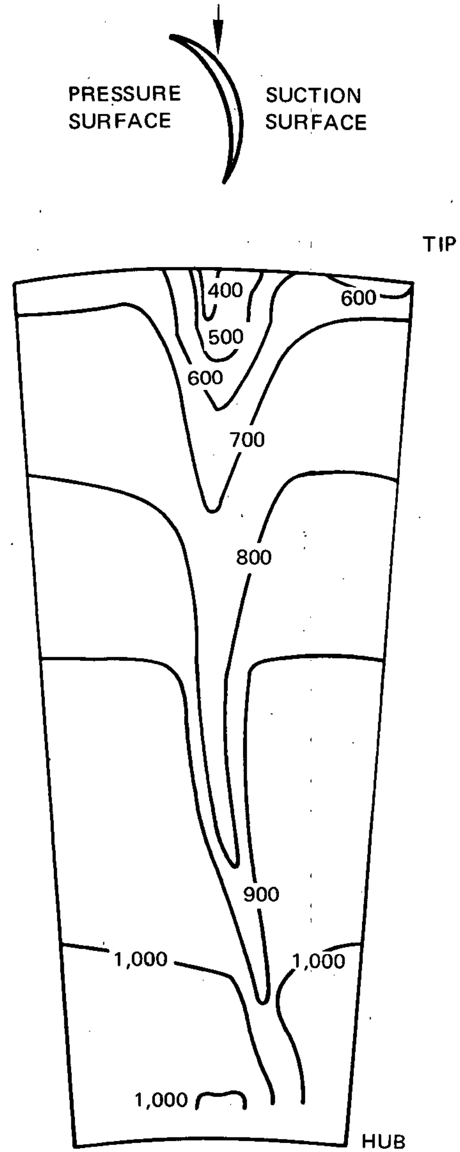
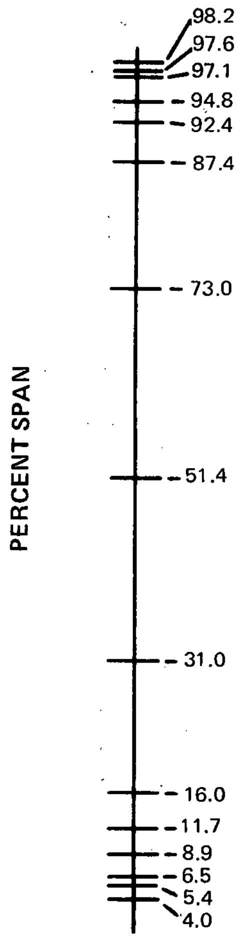


Figure 20a Meridional Velocity, Stator Exit Contour Plots, 100 Percent Speed, 181.3 Pounds Per Second Flow Rate



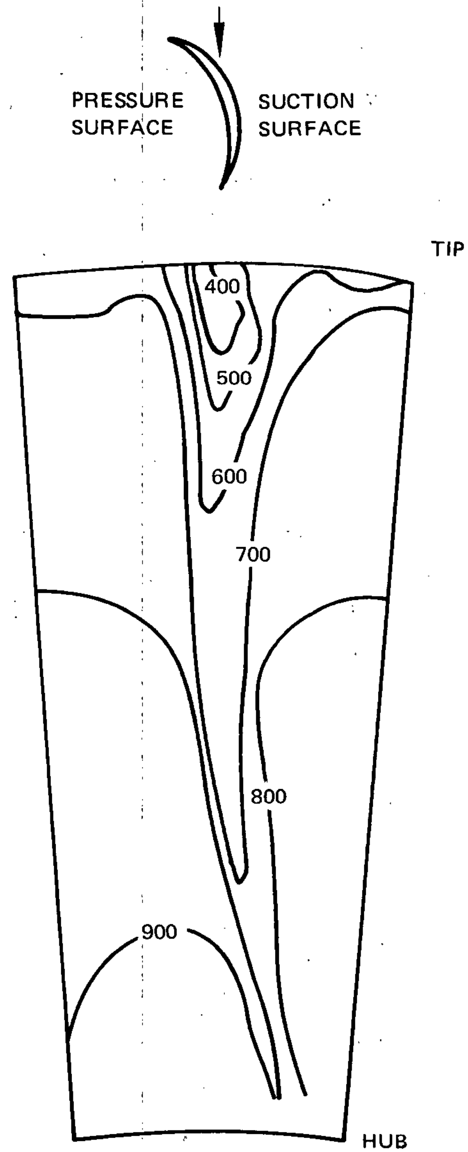


Figure 20b Meridional Velocity, Stator Exit Contour Plots, 100 Percent Speed, 179.6 Pounds Per Second Flow Rate

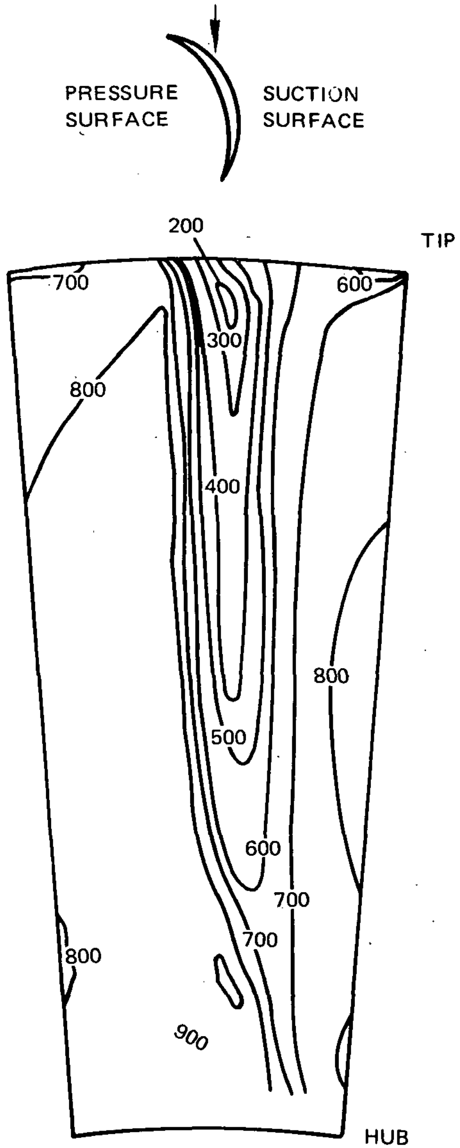
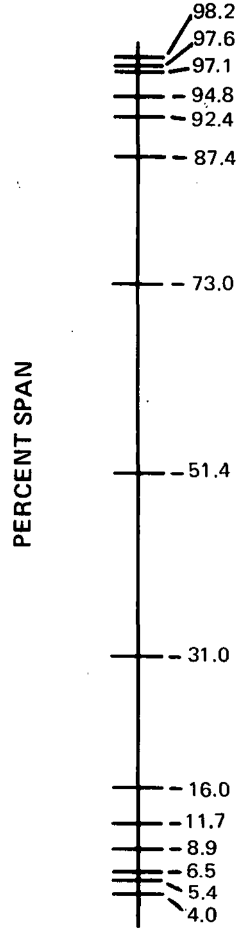


Figure 20c Meridional Velocity, Stator Exit Contour Plots, 100 Percent Speed, 171.6 Pounds Per Second Flow Rate



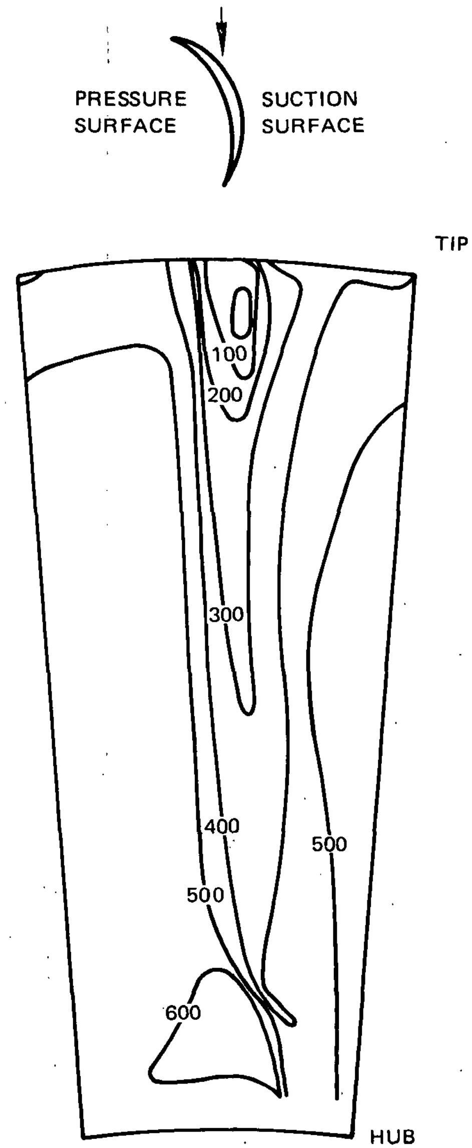


Figure 20d Meridional Velocity, Stator Exit Contour Plots, 90 Percent Speed, 149.2 Pounds Per Second Flow Rate

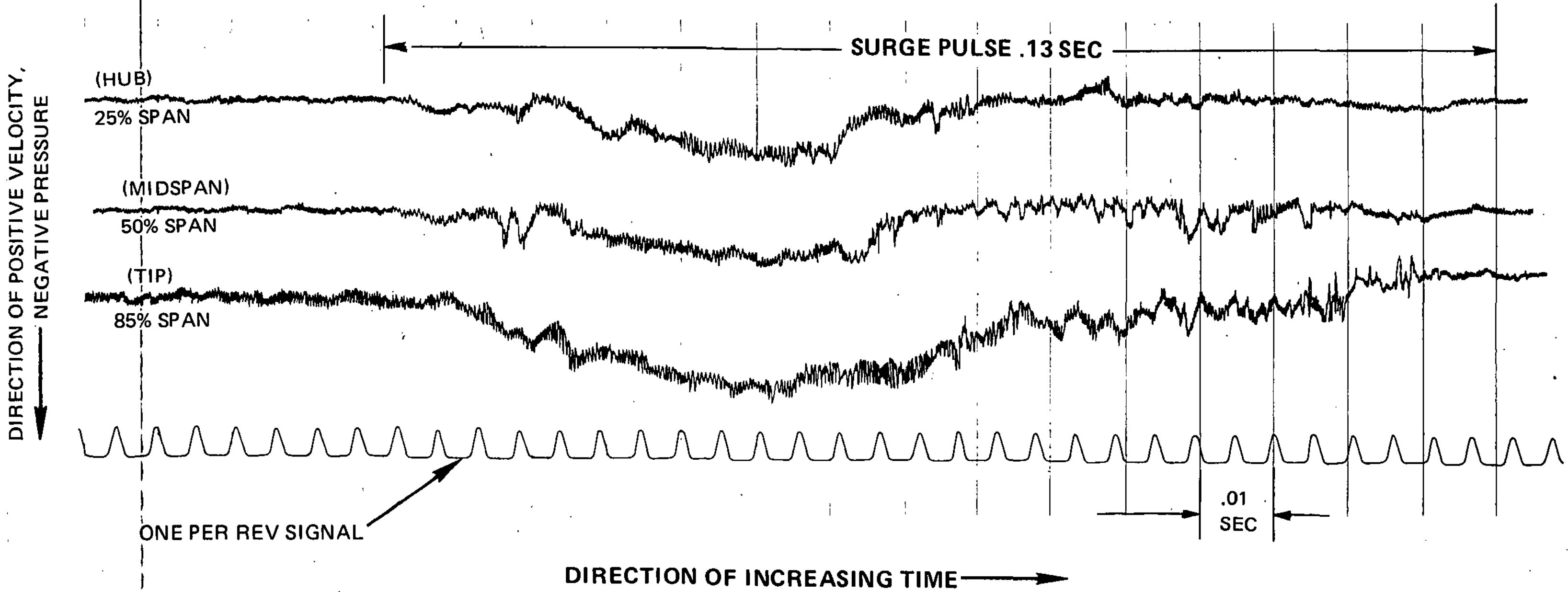


Figure 21 Oscillograph Trace of Typical Surge Cycle at 100 Percent Design Speed

APPENDIX 1

PERFORMANCE PARAMETERS

a) Relative total temperature

$$T'_8 = t_8 \left[1 + \frac{\gamma - 1}{2} (M'_8)^2\right] \qquad \text{(rotor in)}$$

$$T'_9 = T'_8 + \left[\frac{(\omega r_8)^2 - (\omega r_9)^2}{\frac{2\gamma}{\gamma - 1} Rg_c}\right] \qquad \text{(rotor out)}$$

b) Incidence angle based on mean camber line

$$i_m = \beta'_8 - \beta'^*_8 \qquad \text{(rotor)}$$

$$i_m = \beta_{10} - \beta^*_{10} \qquad \text{(stator)}$$

c) Deviation

$$\delta° = \beta'_9 - \beta'^*_9 \qquad \text{(rotor)}$$

$$\delta° = \beta_{11} - \beta^*_{11} \qquad \text{(stator)}$$

d) Diffusion factor

$$D = 1 - \frac{V'_9}{V'_8} + \frac{r_9 V_{\theta 9} - r_8 V_{\theta 8}}{(r_8 + r_9)\, \sigma V'_8} \qquad \text{(rotor)}$$

$$D = 1 - \frac{V_{11}}{V_{10}} + \frac{r_{10} V_{\theta 10} - r_{11} V_{\theta 11}}{(r_{10} + r_{11})\, \sigma V_{10}} \qquad \text{(stator)}$$

e) Loss coefficient

$$\bar{\omega} = \frac{P'_8 \left[\frac{T'_9}{T'_8}\right]^{\frac{\gamma}{\gamma - 1}} - P'_9}{P'_8 - p_8} \qquad \text{(rotor)}$$

$$\bar{\omega} = \frac{P_{10} - P_{11}}{P_{10} - p_{10}} \qquad \text{(stator)}$$

f) Loss parameter

$$\frac{\bar{\omega} \cos \beta'_9}{2\sigma} \qquad \text{(rotor)}$$

$$\frac{\bar{\omega} \cos \beta_{11}}{2\sigma} \qquad \text{(stator)}$$

g) Polytropic efficiency

1) $$\eta_p = \frac{\frac{\gamma-1}{\gamma} \ln \left[\frac{P_9}{P_7}\right]}{\ln \left[\frac{T_9}{T_0}\right]} \qquad \text{(rotor)}$$

2) $$\eta_p = \frac{\frac{\gamma-1}{\gamma} \ln \left[\frac{p_{11}}{p_{10}}\right]}{\ln \left[\frac{t_{11}}{t_{10}}\right]} \qquad \text{(stator)}$$

h) Adiabatic efficiency

$$\eta_{ad} = \frac{\left[\frac{P_9}{P_7}\right]^{\frac{\gamma-1}{\gamma}} - 1}{\left[\frac{T_{12}}{T_0}\right] - 1} \qquad \text{(rotor)}$$

$$\eta_{ad} = \frac{\left[\frac{P_{12}}{P_7}\right]^{\frac{\gamma-1}{\gamma}} - 1}{\left[\frac{T_{12}}{T_0}\right] - 1} \qquad \text{(stage)}$$

i) Wake blockage factor

$$\overline{K} = \frac{\sum_{1}^{n} \rho AV}{n} \Bigg/ \rho AV_{avg}$$

where n is number of tangential traverse points equally spaced across a stator gap and ρAV_{avg} is calculated from mass flow averaged values of P, p, and T at that radius

APPENDIX 2

SYMBOLS

A	-	area, ft^2
A_{an}	-	annulus area, ft^2
A_f	-	frontal area, ft^2
c	-	chord length, in
D	-	diffusion factor
g_c	-	conversion factor, 32.17 $lb_m ft/lb\ sec^2$
i_m	-	incidence angle, angle between inlet air direction and line tangent to blade mean camber line at leading edge, degrees (labelled INCM, Table 4)
i_s	-	incidence angle, angle between inlet air direction and line tangent to blade suction surface at leading edge, degrees (labelled INCS, Table 4)
M	-	Mach number
N	-	rotor speed, rpm ($N/\sqrt{\theta}$ labelled NCOR, Table 4)
P	-	total pressure, psfa
p	-	static pressure, psfa
r	-	radius, ft
R	-	gas constant for air, ft lb/lb_m °R
S	-	blade spacing, in
T	-	total temperature, °R
t	-	static temperature, °R
t/c	-	thickness-to-chord ratio
U	-	rotor speed, ft/sec
V	-	air velocity, ft/sec

Vm - meridional velocity $(Vr^2 + Vz^2)^{1/2}$, ft/sec (labelled VM, Table 4)

W - weight flow, lbs/sec

β - absolute air angle, $\cot^{-1}$ $(Vm/V\theta)$, degrees (labelled B, Table 4)

β' - relative air angle, $\cot^{-1}$ $(Vm/V\theta')$, degrees (labelled B', Table 4)

γ - ratio of specific heats for air, 1.4

$\Delta\beta$ - air turning angle, degrees

$\Delta\beta^*$ - camber angle, degrees

δ - ratio of inlet total pressure to standard pressure of 2116.22 lbs/ft^2

$\delta°$ - deviation angle, angle between exit air direction and tangent to blade mean camber line at trailing edge, degrees

ϵ - angle between tangent to streamline projected on meridional plane and axial direction, degrees

η - efficiency, %

θ - ratio of inlet total temperature to standard temperature of 518.6°R

ρ - mass density, $lbs\text{-}sec^2/ft^4$

σ - solidity, ratio of chord to spacing

$\bar{\omega}$ - total pressure loss coefficient (labelled OMEGA - B, Table 4)

ω - angular velocity of rotor, radians/sec

Superscripts:

' - relative to moving blades

* - designates blade metal angle

Subscripts:

ad - adiabatic

p - polytropic or profile

r	-	radial direction
m	-	meridional direction (in z-r plane)
sh	-	shock
ss	-	suction surface
z	-	axial direction
θ	-	tangential direction (labelled O, Table 4)
0	-	plenum chamber
7	-	instrument plane upstream of rotor
8	-	station at rotor leading edge
9	-	station at rotor trailing edge
10	-	station at stator leading edge
11	-	station at stator trailing edge
12	-	instrument plane downstream of stator

APPENDIX 3

BLADE-ELEMENT AND OVERALL PERFORMANCE

Table 4 Identification of Tables
Table 5 Design Data
Tables 6-9 Test Data

TABLE 4

IDENTIFICATION OF BLADE-ELEMENT OVERALL PERFORMANCE COLUMN HEADINGS

ROTOR

% SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5 to 95	ϵ_8	ϵ_9	V_8	V_9	V_{m8}	V_{m9}	$V_{\theta 8}$	$V_{\theta 9}$	β_8	β_9	M_8	M_9	U_8	U_9	M'_8	M'_9	V'_8	V'_9

% SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC
5 to 95	i_{s8}	i_{m8}	$\delta°_9$	$\Delta\beta$	$\rho_8 V_{m8}$	$\rho_9 V_{m9}$	D	$\bar{\omega}$	$\frac{\bar{\omega}\cos\beta'_9}{2\sigma}$	$\frac{P_9}{P_8}$	η_p	η_{ad}	β'_8	β'_9	$V'_{\theta 8}$	$V'_{\theta 9}$

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC/SQ FT.
$\frac{T_9}{T_0}$	$\frac{P_9}{P_0}$	η_{ad}	η_p	$\frac{w\sqrt{\theta}}{\delta A_{an}}$

STATOR

% SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2
5 to 95	ϵ_{10}	ϵ_{11}	V_{10}	V_{11}	V_{m10}	V_{m11}	$V_{\theta 10}$	$V_{\theta 11}$	β_{10}	β_{11}	M_{10}	M_{11}

STAGE PARAMETERS

PT2/ PT1	TT2/ TT1
$\frac{P_{11}}{P_0}$	$\frac{T_{11}}{T_o}$

% SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATIC-ST	%EFF-P TOT-STG	%EFF-A TOT-STG
5 to 95	i_{s10}	i_{m10}	$\delta°_{11}$	$\Delta\beta$	$\rho_{10} V_{m10}$	$\rho_{11} V_{m11}$	D	$\bar{\omega}$	$\frac{\bar{\omega}\cos\beta_{11}}{2\sigma}$	$\frac{P_{11}}{P_{10}}$	η_p	η_p	η_{ad}

STAGE PARAMETERS

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
$\frac{N}{\sqrt{\theta}}$	$\frac{W\sqrt{\theta}}{\delta}$	$\frac{T_{11}}{T_0}$	$\frac{P_{11}}{P_0}$	η_{ad}	η_p

TABLE 5
BLADE ELEMENT AND OVERALL PERFORMANCE DESIGN DATA

ROTOR

% SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5			615.494	970.440	615.490	580.18	0	777.90	.0	53.29	.569	.834	844.1	957.6	.9653	.5218	1044.7	607.39
10			625.705	946.940	625.705	600.49	0	732.19	.0	50.65	.579	.813	893.0	988.3	1.0087	.5607	1090.4	652.85
15			636.763	926.804	636.763	604.91	0	702.17	.0	49.26	.590	.795	941.5	1019.2	1.0527	.5856	1136.6	682.97
30			668.382	877.741	668.382	592.25	0	647.81	.0	47.57	.621	.747	1077.8	1111.5	1.1788	.6405	1268.2	752.20
50			697.536	829.215	697.536	574.46	0	597.98	.0	46.15	.651	.700	1244.7	1236.5	1.3308	.7250	1426.8	858.92
70			702.305	801.681	702.305	561.56	0	572.13	.0	45.54	.655	.671	1397.6	1361.0	1.4597	.8103	1564.1	968.37
85			686.769	793.611	686.769	554.34	0	567.91	.0	45.70	.640	.659	1505.9	1453.8	1.5417	.8680	1655.1	1045.08
90			678.618	795.003	678.618	537.71	0	585.56	.0	47.44	.631	.657	1539.2	1483.6	1.5654	.8644	1682.2	1046.70
95			670.550	800.046	670.550	493.36	0	629.81	.0	51.93	.623	.654	1571.0	1513.8	1.5880	.8270	1708.1	1012.35

% SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC
5	-1.40	4.65	12.20	36.69			.5936	.1257	.0263	2.0	.9276	.9155	53.91	17.22	-844.1	-179.7
10	-0.96	4.72	10.75	31.88			.5642	.0931	.0197	2.0	.9414	.9424	54.99	23.11	-893.0	-256.1
15	-0.55	4.70	9.80	28.27			.5537	.0662	.0141	2.0	.9542	.9529	55.94	27.67	-945.5	-317.0
30	.40	4.46	7.50	20.13			.5462	.0580	.0123	2.0	.9515	.9471	58.20	38.07	-1077.8	-463.7
50	1.22	4.03	4.60	12.71			.5252	.0729	.0149	2.0	.9290	.9223	60.74	48.03	-1244.7	-638.5
70	1.89	3.70	3.10	8.77			.5031	.1097	.0215	2.0	.8848	.8758	63.33	54.56	-1397.6	-788.9
85	2.29	3.45	3.42	7.52			.4910	.1514	.0291	2.0	.8364	.8260	65.49	57.97	-1505.9	-885.9
90	2.37	3.40	3.80	7.12			.5045	.1964	.0373	2.0	.7941	.7850	66.21	59.09	-1539.2	-898.0
95	2.50	3.32	4.40	5.38			.5443	.2377	.0426	2.0	.7562	.7153	66.89	61.51	-1571.0	-884.0

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WCI/AI LBM/SEC SQFT
1.247	2.0	88.7	89.8	42.04

STATOR

% SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5			1010.79	663.52	675.09	663.52	752.30	0	48.10	0	.873	.550	1.8655	1.2372
10			992.99	690.19	693.11	690.19	711.08	0	45.74	0	.858	.575	1.9002	1.2324
15			978.26	699.94	698.84	699.94	684.55	0	44.41	0	.845	.585	1.9242	1.2302
30			944.83	704.91	696.66	704.91	638.25	0	42.50	0	.812	.589	1.9544	1.2313
50			916.00	694.70	694.58	694.70	597.17	0	40.69	0	.782	.578	1.9585	1.2376
70			905.67	685.34	696.37	685.34	579.05	0	39.75	0	.767	.567	1.9466	1.2510
85			910.49	675.22	701.25	675.22	580.71	0	39.63	0	.767	.554	1.9282	1.2676
90			916.81	670.46	692.46	670.46	600.86	0	40.95	0	.768	.547	1.9158	1.2851
95			927.39	663.86	662.65	663.86	648.80	0	44.40	0	.769	.535	1.9063	1.2997

% SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	1.95	4.82	11.80	48.10			.5245	.165	.0410	.9331	.7666	82.13	83.75
10	.40	3.33	11.05	45.74			.4838	.123	.0314	.9503	.8039	86.54	87.85
15	0	3.0	11.00	44.41			.4641	.097	.0254	.9624	.8311	89.23	90.35
30	0	3.1	11.25	42.50			.4410	.065	.0183	.9771	.8776	91.14	92.07
50	0	3.2	12.05	40.69			.4397	.061	.0187	.9792	.8764	89.00	90.15
70	0	3.3	13.40	39.75			.4543	.080	.0265	.9733	.8413	83.39	85.08
85	.31	3.62	15.43	39.63			.4810	.110	.0385	.9641	.7985	79.98	78.41
90	1.45	4.73	17.00	40.95			.5013	.125	.0444	.9579	.7735	71.46	74.13
95	3.80	7.00	18.90	44.40			.5365	.150	.0540	.9532	.7521	67.41	70.40

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
11,110.0	187.1	1.247	1.936	84.2	85.6

TABLE 6.1
BLADE ELEMENT AND OVERALL PERFORMANCE
50% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VƟ-1 FT/SEC	VƟ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.761	15.277	217.1	513.6	217.1	299.1	.0	417.5	.0	54.2	.1951	.4551	422.6	478.3	.4271	.2704	475.1	305.2
10	13.112	12.974	221.0	503.0	221.0	329.2	.0	393.3	.0	48.9	.1987	.4451	446.8	493.8	.4492	.3098	498.5	348.7
15	10.329	10.745	224.7	489.0	224.7	337.2	.0	354.2	.0	46.2	.2021	.4337	471.0	509.3	.4693	.3292	521.9	371.1
30	2.597	4.676	231.8	435.2	231.8	300.8	.0	314.5	.0	46.2	.2085	.3849	539.9	555.6	.5285	.3409	587.6	385.6
50	-5.892	-2.377	232.6	392.7	232.6	274.9	.0	280.5	.0	45.6	.2092	.3464	624.0	617.5	.5990	.3937	666.0	434.9
70	-12.636	-8.821	227.0	370.0	227.0	251.2	.0	271.7	.0	47.1	.2041	.3254	700.6	679.3	.6622	.4210	736.4	478.8
85	-15.567	-13.070	221.0	368.5	221.0	228.6	.0	289.1	.0	51.1	.1987	.3229	757.2	725.7	.7092	.4317	788.8	492.9
90	-17.218	-14.226	219.6	366.3	219.6	219.9	.0	293.0	.0	52.7	.1974	.3204	771.4	741.1	.7211	.4367	802.1	499.7
95	-17.575	-15.178	219.3	359.6	219.3	206.4	.0	294.4	.0	54.6	.1962	.3141	786.4	756.6	.7336	.4422	816.1	506.7

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VƟ'-1 FT/SEC	VƟ'-2 FT/SEC
5	7.25	13.58	11.23	51.29	16.29	23.71	.5675	.1521	.0330	1.2209	91.77	91.59	62.68	11.40	-422.6	-60.8
10	7.46	13.99	12.66	44.64	16.57	26.30	.4935	.0392	.0085	1.2213	97.60	97.59	63.52	18.88	-446.9	-113.5
15	7.68	13.77	11.90	39.76	16.84	27.05	.4670	.0002	.0000	1.2175	99.91	99.96	64.32	24.56	-471.0	-155.1
30	8.67	12.74	8.77	28.02	17.35	24.21	.4999	.0689	.0145	1.1954	93.45	93.34	66.68	38.66	-539.9	-241.1
50	10.01	12.67	8.41	18.85	17.41	22.15	.4816	.1049	.0202	1.1800	87.46	87.22	69.64	50.78	-624.0	-337.0
70	10.71	12.53	7.39	13.94	17.01	20.19	.4765	.1550	.0277	1.1733	79.33	78.92	72.18	58.24	-700.5	-407.6
85	10.32	11.54	7.04	11.77	16.57	18.29	.5045	.2202	.0378	1.1758	71.03	70.41	73.68	61.91	-757.2	-436.7
90	10.28	11.35	7.49	10.59	16.47	17.58	.5099	.2370	.0393	1.1762	63.86	68.19	74.11	63.52	-771.4	-448.2
95	10.27	11.17	8.73	8.81	16.38	16.48	.5129	.2528	.0395	1.1747	66.63	65.91	74.47	65.66	-786.4	-462.2

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.0501	1.1891	84.46	84.79	15.70

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VƟ-1 FT/SEC	VƟ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	13.866	4.508	529.0	434.9	341.0	433.8	404.4	-30.2	50.2	-3.9	.4893	.3830	1.2042	1.0641
10	11.986	4.137	519.5	424.6	366.5	423.6	368.1	-29.5	45.4	-3.9	.4614	.3746	1.2021	1.0594
15	10.603	3.844	505.1	411.6	370.2	410.6	345.1	-28.6	43.2	-4.0	.4495	.3631	1.1977	1.0578
30	7.099	2.976	456.1	371.4	334.7	370.5	309.8	-25.9	42.9	-4.0	.4039	.3272	1.1828	1.0551
50	2.974	1.916	417.7	336.8	310.3	335.9	279.6	-23.5	42.0	-4.0	.3690	.2961	1.1706	1.0557
70	-.887	1.038	400.8	312.0	292.2	311.2	274.3	-21.8	43.2	-4.0	.3531	.2735	1.1615	1.0594
85	-3.967	.690	405.4	301.6	277.9	300.9	295.1	-21.0	46.9	-4.0	.3559	.2633	1.1573	1.0675
90	-5.124	.667	405.8	299.3	272.9	298.5	300.3	-20.9	47.9	-4.0	.3558	.2609	1.1563	1.0699
95	-5.364	.683	402.3	292.3	264.6	291.6	303.0	-20.4	49.0	-4.0	.3523	.2546	1.1537	1.0715

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	7.74	10.55	12.51	54.13	26.86	34.93	.3766	.0981	.0244	.9863	71.76	85.13	85.46
10	3.97	6.90	11.52	49.30	29.09	34.30	.3708	.1148	.0293	.9845	67.59	90.97	91.15
15	2.73	5.67	10.92	47.13	29.50	33.31	.3736	.1176	.0307	.9849	67.04	91.62	91.78
30	4.41	7.41	11.25	46.83	26.74	30.10	.3880	.0995	.0265	.9900	73.20	87.79	87.97
50	5.36	9.49	12.03	46.02	24.80	27.28	.4147	.0874	.0267	.9922	76.13	82.77	83.09
70	7.52	10.75	13.45	47.19	23.28	25.14	.4663	.1205	.0398	.9901	70.68	73.69	74.18
85	11.28	14.60	15.89	50.73	21.99	24.10	.5294	.1883	.0657	.9842	59.52	63.17	63.88
90	12.25	15.58	17.40	51.86	21.55	23.85	.5447	.2023	.0718	.9830	57.41	60.70	61.45
95	13.16	16.53	19.68	53.04	20.87	23.25	.5639	.2175	.0783	.9821	55.65	58.36	59.14

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
5546.	74.04	1.0601	1.1749	78.49	78.92

TABLE 6.2
BLADE ELEMENT AND OVERALL PERFORMANCE
50% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
	15.748	15.288	225.2	522.1	225.2	311.6	.0	419.0	.0	53.1	.2025	.4432	412.5	464.8	.4225	.2797	469.9	315.3
	13.106	11.011	229.2	509.7	229.2	335.2	.0	384.0	.0	48.7	.2061	.4525	436.1	481.9	.4430	.3100	492.6	349.2
	10.368	10.817	233.0	495.0	233.0	344.3	.0	355.7	.0	45.8	.2096	.4396	459.7	497.0	.4435	.3305	515.4	372.2
	2.827	4.874	240.4	434.7	240.4	309.9	.0	309.8	.0	45.4	.2163	.3848	526.9	542.3	.5210	.3394	579.1	383.4
	-5.770	-1.956	242.0	399.1	242.0	285.3	.0	271.8	.0	43.6	.2177	.3481	609.0	602.6	.5896	.3860	655.3	436.9
	-12.087	-8.441	237.2	371.4	237.2	271.5	.0	253.4	.0	42.9	.2134	.3275	683.7	663.0	.6510	.4333	723.7	491.4
	-16.300	-12.852	231.2	360.4	231.2	240.7	.0	268.2	.0	47.5	.2080	.3165	739.0	708.2	.6964	.4404	774.3	501.5
	-16.999	-14.045	229.7	358.4	229.7	234.2	.0	271.8	.0	48.8	.2066	.3147	752.9	723.3	.7079	.4462	787.1	508.7
	-17.965	-15.078	228.4	351.1	228.4	221.3	.0	272.6	.0	50.5	.2051	.3076	767.4	738.4	.7200	.4519	800.7	515.8

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC
5	5.81	12.24	8.50	52.57	16.87	24.54	.5922	.1530	.0335	1.2158	91.70	91.52	61.23	8.66	-412.5	-47.9
10	6.05	12.48	9.95	45.94	17.14	26.59	.4868	.0584	.0130	1.2148	96.40	96.36	62.11	16.17	-436.1	-97.9
15	6.31	12.39	9.52	40.76	17.43	27.44	.4580	.0132	.0029	1.2108	99.00	99.03	62.95	22.19	-459.7	-141.3
30	7.39	11.96	7.39	28.11	17.96	29.36	.4928	.0820	.0176	1.1846	92.17	92.04	65.40	37.28	-526.9	-232.5
50	8.77	11.42	6.83	19.19	18.07	22.85	.4645	.1008	.0201	1.1704	87.75	87.54	68.39	49.21	-609.0	-330.8
70	9.50	11.33	5.46	19.66	17.73	21.79	.4409	.1259	.0217	1.1433	82.29	81.97	70.97	56.31	-683.7	-409.6
85	9.19	10.41	5.96	11.72	17.31	19.16	.4740	.2012	.0358	1.1606	71.89	71.35	72.55	60.83	-739.0	-440.0
90	9.18	10.25	6.17	10.50	17.20	18.63	.4783	.2170	.0376	1.1610	69.73	69.13	73.01	62.21	-752.9	-451.5
95	9.20	10.10	7.36	9.12	17.10	17.58	.4811	.2327	.0383	1.1588	67.30	66.66	73.41	64.29	-767.4	-465.9

T0/T0 INLET	P0/P0 INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.0546	1.1785	85.11	85.40	17.36

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/PT1	TT2/TT1
5	13.913	4.590	538.9	496.7	359.5	493.2	405.8	55.9	49.2	7.1	.4788	.3941	1.1977	1.0628
10	12.028	4.167	527.6	434.7	374.4	434.5	371.7	12.4	45.0	1.4	.4691	.3839	1.1948	1.0587
15	10.608	3.869	513.5	421.5	379.7	421.2	346.3	-19.6	42.6	-2.0	.4564	.3723	1.1901	1.0565
30	6.989	2.974	457.6	381.4	341.0	380.3	305.1	-28.7	41.9	-4.3	.4057	.3365	1.1752	1.0539
50	2.658	1.873	421.6	349.6	322.9	348.3	271.0	-30.7	40.0	-5.0	.3731	.3081	1.1640	1.0526
70	-1.054	1.056	405.6	328.6	314.7	326.8	255.8	-34.7	39.1	-6.1	.3583	.2891	1.1563	1.0540
85	-4.008	.696	402.2	310.6	294.6	310.1	273.8	-17.9	43.0	-3.3	.3591	.2721	1.1491	1.0612
90	-5.193	.662	403.5	307.5	291.8	307.4	278.6	-7.5	43.8	-1.4	.3598	.2690	1.1477	1.0633
95	-6.412	.675	399.5	297.9	288.4	297.9	280.5	-.6	44.8	-.1	.3510	.2403	1.1441	1.0647

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	6.74	9.66	23.51	42.12	27.73	35.39	.3256	.1026	.0254	.9852	49.46	84.32	84.67
10	3.65	6.58	17.09	43.42	29.49	34.87	.3921	.1172	.0299	.9837	45.83	89.04	89.26
15	2.14	5.08	12.90	44.56	29.98	33.89	.3565	.1185	.0310	.9843	46.62	90.34	90.52
30	3.44	6.43	10.93	46.18	27.03	30.67	.3479	.0696	.0195	.9926	78.78	87.73	87.95
50	3.32	6.46	11.07	44.95	25.64	28.10	.3881	.0572	.0175	.9948	82.51	84.40	84.68
70	3.43	6.67	11.38	45.17	24.93	26.31	.4268	.0688	.0227	.9942	80.84	78.59	78.97
85	7.47	10.79	16.57	46.29	23.17	24.75	.4820	.1198	.0418	.9900	71.59	66.30	66.90
90	8.19	11.52	20.00	45.20	22.90	24.48	.4906	.1369	.0487	.9886	68.73	63.56	64.21
95	8.90	12.27	23.57	44.89	22.28	23.67	.5085	.1556	.0562	.9873	66.32	60.74	61.43

NCORR INLET RPM	WCORR INLET LBM/SEC	T0/T0 INLET	P0/P0 INLET	EFF-AD INLET %	EFF-P INLET %
6412.	76.96	1.0546	1.1676	80.19	80.56

TABLE 6.3
BLADE ELEMENT AND OVERALL PERFORMANCE
50% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.734	15.296	244.6	528.5	244.6	341.7	.0	403.3	.0	49.5	.2201	.4694	422.4	478.1	.4393	.3106	488.2	349.8
10	13.063	12.996	249.0	517.4	249.0	370.4	.0	361.2	.0	44.1	.2241	.4601	446.6	493.6	.4602	.3497	511.4	393.3
15	10.296	10.802	253.2	501.5	253.2	373.7	.0	334.4	.0	41.7	.2279	.4460	470.8	509.0	.4812	.3668	534.6	412.4
30	2.838	4.934	261.0	436.3	261.0	325.6	.0	290.4	.0	41.7	.2350	.3865	539.7	555.4	.5398	.3721	599.5	419.8
50	-5.019	-1.754	263.1	395.5	263.1	307.3	.0	248.9	.0	39.0	.2369	.3499	623.8	617.2	.6096	.4245	677.0	479.7
70	-11.855	-8.236	258.7	370.7	258.7	300.4	.0	217.2	.0	35.7	.2329	.3279	700.3	679.0	.6721	.4872	746.5	550.9
85	-15.474	-12.857	252.3	350.8	252.3	270.3	.0	223.7	.0	39.0	.2271	.3092	756.9	725.4	.7181	.5023	797.8	569.9
90	-17.222	-14.103	250.6	339.5	250.6	252.1	.0	227.3	.0	41.6	.2256	.2988	771.1	740.8	.7297	.5034	810.8	572.1
95	-17.587	-15.120	249.2	329.5	249.2	235.9	.0	228.6	.0	43.7	.2243	.2887	786.0	756.3	.7421	.5080	824.5	578.0

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC
5	4.36	10.79	12.13	47.52	18.26	26.85	.4819	.1206	.0261	1.2156	92.89	92.75	59.78	12.26	-422.4	-74.9
10	4.62	11.05	13.30	41.15	18.58	29.34	.4102	.0015	.0003	1.2149	99.98	100.04	60.68	19.52	-446.6	-132.3
15	4.91	10.99	12.24	36.64	18.87	29.71	.3937	-.0258	-.0056	1.2090	101.92	102.03	61.55	24.91	-470.8	-174.6
30	6.10	10.17	9.21	25.00	19.42	25.90	.4413	.0697	.0146	1.1778	92.65	92.54	64.10	39.11	-539.7	-265.0
50	7.56	10.22	7.77	17.05	19.57	24.49	.4082	.0808	.0158	1.1618	89.02	88.85	67.19	50.14	-623.8	-368.3
70	8.35	10.18	5.95	13.03	19.26	23.36	.3616	.0752	.0140	1.1521	87.44	87.25	69.82	56.90	-700.3	-461.8
85	8.14	9.36	6.33	10.30	18.80	21.43	.3837	.1435	.0252	1.1437	75.58	75.17	71.50	61.20	-756.9	-501.7
90	8.16	9.23	7.46	8.53	19.69	19.94	.3953	.1720	.0285	1.1393	70.83	70.34	71.99	63.49	-771.1	-513.5
95	8.19	9.09	8.70	6.77	18.59	18.62	.4008	.1929	.0302	1.1353	67.13	66.60	72.40	65.63	-786.0	-527.7

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.0523	1.1590	87.85	88.05	19.82

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	13.939	4.527	551.1	489.2	388.8	488.0	390.6	-34.0	45.5	-3.9	.4904	.4330	1.1979	1.0619
10	12.101	4.155	540.7	476.6	412.5	475.4	349.5	-33.2	40.5	-3.9	.4818	.4226	1.1946	1.0565
15	10.697	3.843	525.3	462.1	412.0	461.0	325.8	-32.2	38.5	-4.0	.4680	.4097	1.1893	1.0545
30	6.922	2.848	464.7	418.2	366.4	417.2	285.9	-29.1	38.0	-4.0	.4127	.3702	1.1713	1.0517
50	2.306	1.643	428.5	382.9	349.4	382.0	248.0	-25.7	35.4	-4.0	.3900	.3396	1.1573	1.0492
70	-1.420	.827	410.9	359.8	347.5	358.9	219.2	-25.1	32.2	-4.0	.3643	.3180	1.1475	1.0473
85	-4.078	.539	403.3	335.0	328.9	334.2	229.2	-23.4	34.8	-4.0	.3538	.2950	1.1365	1.0524
90	-5.193	.540	393.3	320.8	316.9	320.0	232.9	-22.4	36.4	-4.0	.3472	.2820	1.1306	1.0543
95	-5.404	.610	387.0	305.7	307.4	305.0	235.2	-21.3	37.6	-4.0	.3413	.2684	1.1247	1.0555

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATO-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	3.02	5.94	12.51	49.41	30.26	38.40	.2988	.0962	.0239	.9855	57.89	85.61	85.92
10	-.86	2.07	11.52	44.47	32.36	37.56	.2927	.1111	.0283	.9838	53.53	92.49	92.62
15	-1.92	1.02	10.92	42.48	32.43	36.51	.2923	.1065	.0278	.9852	55.20	93.21	93.32
30	-.42	2.58	11.25	42.00	28.85	33.21	.2858	.0436	.0122	.9952	77.91	89.58	89.75
50	-1.31	1.82	12.03	39.35	27.55	30.45	.3000	.0361	.0110	.9966	82.77	86.74	86.95
70	-3.42	-.19	13.45	36.25	27.38	28.61	.3201	.0404	.0134	.9965	83.36	84.90	85.13
85	-.67	2.54	15.89	38.83	25.70	26.43	.3829	.0701	.0244	.9942	77.56	71.26	71.71
90	.83	4.16	17.40	40.43	24.67	25.23	.4153	.0900	.0319	.9928	74.18	65.87	66.40
95	1.71	5.09	19.68	41.59	23.87	23.98	.4496	.1190	.0428	.9908	69.64	61.57	62.15

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
5543.	83.41	1.0523	1.1607	83.76	84.04

TABLE 6.4
BLADE ELEMENT AND OVERALL PERFORMANCE
50% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.712	15.279	268.0	550.1	268.0	384.1	.0	393.8	.0	45.5	.2414	.4898	421.7	477.3	.4500	.3500	499.7	393.1
10	13.022	12.993	272.9	539.0	272.9	408.0	.0	352.3	.0	40.6	.2458	.4806	445.8	492.7	.4709	.3847	522.7	431.5
15	10.287	10.835	277.4	516.1	277.4	404.0	.0	321.2	.0	38.3	.2499	.4400	470.0	508.1	.4917	.3968	545.7	445.1
30	7.979	5.018	286.0	449.9	286.0	363.0	.0	265.7	.0	36.2	.2578	.3999	538.7	554.9	.5498	.4123	609.9	463.8
50	-9.874	-1.678	288.7	405.8	288.7	342.7	.0	217.9	.0	32.4	.2603	.3605	622.6	616.1	.6187	.4670	686.3	525.8
70	-11.551	-7.971	284.4	373.7	284.4	320.2	.0	178.7	.0	28.4	.2564	.3319	699.0	677.8	.6802	.5306	754.7	597.3
85	-16.158	-12.609	277.9	353.3	277.9	310.5	.0	168.5	.0	28.0	.2504	.3134	755.5	724.1	.7254	.5646	805.0	636.5
90	-17.009	-13.918	276.1	334.7	276.1	284.9	.0	171.4	.0	30.4	.2488	.2959	769.7	739.5	.7368	.5635	817.8	636.4
95	-17.492	-15.025	274.5	319.0	274.5	268.1	.0	172.7	.0	32.4	.2473	.2821	789.6	754.9	.7489	.5668	831.2	641.0

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC
5	1.98	8.41	12.00	45.74	19.91	29.47	.4036	.1480	.0320	1.2042	90.63	90.44	57.41	12.17	-421.7	-83.5
10	2.28	8.71	12.64	39.48	20.25	31.75	.3466	.0356	.0078	1.2029	97.39	97.37	58.34	18.86	-445.8	-140.4
15	2.62	8.70	12.03	34.56	20.56	31.53	.3408	.0217	.0047	1.1915	98.02	98.03	59.26	24.70	-470.0	-186.9
30	3.74	8.01	8.57	23.49	21.16	28.36	.3682	.0810	.0171	1.1574	90.40	90.27	61.95	38.46	-538.7	-288.7
50	5.56	8.21	6.93	15.88	21.35	26.80	.3352	.0804	.0160	1.1370	87.19	87.03	65.18	49.30	-622.6	-398.7
70	6.47	8.29	5.65	11.44	21.05	25.66	.2893	.0477	.0127	1.1218	86.08	85.94	67.94	56.50	-699.0	-499.1
85	6.34	7.56	5.40	9.93	20.60	24.21	.2812	.0931	.0168	1.1119	78.92	78.68	69.70	60.27	-755.5	-555.6
90	6.41	7.48	6.79	7.41	20.48	22.28	.2962	.1291	.0219	1.1038	70.88	70.55	70.24	62.83	-769.7	-568.1
95	6.49	7.39	8.04	5.72	20.37	20.77	.3045	.1548	.0248	1.0977	64.98	64.59	70.70	64.97	-789.6	-587.2

T0/T0 INLET	P0/P0 INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.0451	1.1438	87.00	87.17	20.55

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/PT1	TT2/TT1
5	14.008	4.556	580.0	547.5	437.0	546.3	381.9	36.5	41.5	3.8	.5178	.4873	1.1799	1.0604
10	12.195	4.171	569.0	538.9	455.6	538.9	340.8	-.3	37.0	-.0	.5087	.4806	1.1800	1.0549
15	10.724	3.815	547.4	523.5	449.4	522.8	312.5	-27.3	35.0	-3.0	.4892	.4670	1.1740	1.0521
30	6.752	2.715	486.3	478.6	410.0	474.5	261.6	-44.6	32.6	-5.3	.4335	.4264	1.1541	1.0470
50	2.041	1.490	447.1	435.9	391.2	433.8	216.5	-43.1	28.9	-5.7	.3983	.3880	1.1343	1.0427
70	-1.866	.607	423.4	403.4	383.2	400.7	180.1	-47.1	25.2	-6.7	.3773	.3590	1.1183	1.0386
85	-4.475	.397	413.4	376.4	375.9	374.4	172.1	-42.4	24.7	-6.5	.3680	.3346	1.1051	1.0395
90	-5.477	.432	400.8	357.4	360.2	355.8	175.7	-33.9	26.1	-5.4	.3563	.3168	1.0962	1.0410
95	-6.557	.550	392.3	334.6	349.8	333.2	177.7	-30.2	27.1	-5.2	.3484	.2961	1.0866	1.0420

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	-.99	1.93	20.21	37.71	33.30	41.40	.1985	.1211	.0301	.9798	-2.84	80.31	80.72
10	-4.34	-1.41	15.43	37.08	34.98	41.17	.1971	.1078	.0276	.9826	-9.05	88.34	88.55
15	-5.45	-2.51	11.91	37.96	34.60	40.10	.1989	.0855	.0229	.9871	-2.38	90.17	90.33
30	-5.86	-2.87	9.91	37.90	31.59	36.73	.1868	.0198	.0041	.9987	38.90	88.97	89.13
50	-7.73	-4.60	10.35	34.61	30.16	33.51	.1983	.0133	.0041	.9986	70.16	85.99	86.17
70	-10.48	-7.25	10.75	31.89	29.49	30.96	.2219	.0232	.0076	.9978	74.96	84.21	84.38
85	-10.84	-7.53	13.43	31.12	28.76	28.80	.2671	.0513	.0178	.9955	69.72	73.54	73.83
90	-9.50	-6.17	15.96	31.55	27.44	27.26	.2923	.0673	.0238	.9944	67.71	65.08	65.45
95	-8.79	-5.42	18.50	32.27	26.54	25.44	.3382	.1224	.0440	.9902	57.28	57.37	57.79

NCORR INLET RPM	WCORR INLET LBM/SEC	T0/T0 INLET	P0/P0 INLET	EFF-AD INLET %	EFF-P INLET %
5533.	91.17	1.0451	1.1370	83.04	83.27

TABLE 6.5
BLADE ELEMENT AND OVERALL PERFORMANCE
50% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.708	15.280	283.0	567.0	283.0	409.1	.0	392.6	.0	43.6	.2550	.5055	425.0	481.0	.4602	.3731	510.5	418.5
10	17.036	12.991	289.1	556.8	288.1	435.8	.0	345.6	.0	38.3	.2597	.4973	449.3	496.5	.4812	.4116	533.7	460.9
15	10.257	10.835	292.9	532.0	292.9	428.5	.0	315.2	.0	36.2	.2641	.4749	473.6	512.1	.5021	.4210	556.9	471.6
30	2.915	4.995	302.0	465.1	302.0	389.0	.0	254.9	.0	33.2	.2725	.4143	542.9	558.7	.5674	.4396	621.3	493.6
50	-5.120	-1.783	304.7	418.3	304.7	365.2	.0	203.9	.0	29.7	.2749	.3723	627.5	620.9	.6293	.4933	697.5	554.3
70	-11.812	-8.092	299.7	381.4	299.7	345.9	.0	160.7	.0	24.8	.2703	.3396	704.4	683.1	.6905	.5579	765.3	626.6
85	-16.432	-12.748	292.6	360.3	292.6	330.0	.0	144.4	.0	23.2	.2638	.3205	761.4	729.7	.7355	.5979	815.7	671.9
90	-17.293	-14.081	290.7	334.2	290.7	301.4	.0	144.4	.0	25.3	.2621	.2968	775.7	745.2	.7469	.5970	828.4	672.2
95	-17.675	-15.135	289.0	310.8	289.0	275.6	.0	143.7	.0	27.2	.2606	.2756	790.7	760.8	.7590	.5994	841.9	675.8

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC
5	.76	7.19	11.92	44.10	20.95	31.38	.3664	.1451	.0314	1.2048	90.48	90.28	56.19	12.09	-425.0	-88.3
10	1.08	7.51	12.63	38.23	21.31	33.70	.3032	.0174	.0039	1.2040	98.68	98.70	57.13	18.85	-449.3	-149.9
15	1.43	7.51	11.88	33.52	21.63	33.21	.3047	.0146	.0032	1.1904	98.54	98.56	58.07	24.55	-473.6	-196.9
30	2.81	6.98	8.06	22.87	22.26	30.17	.3280	.0682	.0145	1.1537	91.36	91.25	60.82	37.95	-542.9	-303.9
50	4.54	7.20	6.39	15.40	22.44	28.30	.3002	.0740	.0149	1.1292	87.16	87.02	64.17	48.77	-627.5	-417.0
70	5.58	7.41	5.47	10.74	22.10	26.79	.2541	.0609	.0114	1.1097	85.88	85.76	67.06	56.32	-704.4	-522.4
85	5.54	6.76	5.20	8.83	21.62	25.48	.2370	.0729	.0133	1.0983	80.53	80.37	68.90	60.07	-761.4	-585.3
90	5.63	6.70	6.96	6.46	21.48	23.18	.2506	.1100	.0186	1.0869	70.20	69.94	69.46	63.00	-775.7	-600.9
95	5.71	6.61	8.73	4.27	21.37	21.12	.2592	.1391	.0218	1.0774	61.81	61.49	69.92	65.66	-790.7	-617.1

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.0423	1.1359	87.74	87.88	21.60

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/PT1	TT2/TT1
5	14.025	4.554	601.5	589.2	466.0	587.8	380.7	-41.0	39.6	-3.9	.5380	.5264	1.1789	1.0606
10	12.235	4.166	591.0	582.1	486.7	590.7	335.3	-40.5	34.8	-3.9	.5296	.5213	1.1807	1.0544
15	10.771	3.804	567.7	563.5	477.7	562.1	306.8	-39.2	32.9	-4.0	.5084	.5045	1.1722	1.0515
30	6.825	2.714	506.0	513.0	439.4	511.7	250.9	-35.7	29.8	-4.0	.4521	.4587	1.1478	1.0454
50	2.199	1.446	464.0	468.0	417.2	466.8	203.1	-32.6	25.9	-4.0	.4142	.4180	1.1257	1.0403
70	-1.769	.573	435.9	428.1	404.7	427.0	151.9	-29.9	21.8	-4.0	.3894	.3823	1.1047	1.0348
85	-4.352	.385	425.5	394.6	399.2	393.6	147.4	-27.5	20.3	-4.0	.3802	.3518	1.0874	1.0340
90	-5.318	.427	407.6	375.1	379.8	374.2	147.9	-26.2	21.4	-4.0	.3636	.3339	1.0782	1.0347
95	-6.440	.549	393.0	349.1	364.1	348.2	117.9	-24.3	22.2	-4.0	.3501	.3102	1.0668	1.0351

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	-2.89	.03	12.51	43.50	35.17	43.66	.1904	.1214	.0302	.9783	-185.68	79.48	79.90
10	-6.59	-3.65	11.52	38.75	37.04	43.57	.1690	.3999	.0255	.9927	-472.86	89.48	89.67
15	-7.56	-4.62	10.92	36.84	36.43	42.33	.1600	.0828	.0216	.9867	3302.93	90.24	90.40
30	-8.67	-5.67	11.25	33.75	33.53	38.76	.1390	.0289	.0081	.9962	171.36	88.60	88.75
50	-10.73	-7.59	12.03	29.94	31.81	35.45	.1415	.3160	.0049	.9982	166.84	85.56	85.72
70	-13.85	-10.52	13.45	25.82	30.78	32.44	.1594	.3327	.0108	.9968	2.42	82.99	83.14
85	-15.19	-11.87	15.89	24.32	30.20	29.78	.2108	.0821	.0286	.9923	38.10	71.48	71.72
90	-14.24	-10.91	17.40	25.36	28.58	28.22	.2274	.0741	.0263	.9936	50.43	62.83	63.13
95	-13.65	-10.27	19.68	26.23	27.28	26.17	.2682	.1165	.0419	.9906	46.43	53.24	53.58

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
5575.	95.75	1.0423	1.1278	82.71	82.93

TABLE 7.1

BLADE ELEMENT AND OVERALL PERFORMANCE

70% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.750	15.306	331.4	715.5	331.4	427.3	.0	573.9	.0	53.1	.2994	.6279	593.2	671.4	.6139	.3847	679.5	438.3
10	13.081	13.029	337.6	696.6	337.6	467.9	.0	516.0	.0	47.6	.3051	.6127	627.1	693.1	.6437	.4401	712.2	500.3
15	10.283	10.825	343.6	677.6	343.6	475.4	.0	482.8	.0	45.3	.3106	.5960	661.1	714.8	.6736	.4652	745.0	528.9
30	2.602	4.850	354.8	601.2	354.8	417.5	.0	432.5	.0	46.0	.3209	.5254	757.8	779.9	.7569	.4747	836.7	543.1
50	-5.523	-2.005	356.6	543.0	356.6	379.9	.0	387.9	.0	45.6	.3226	.4722	875.9	866.7	.8556	.5315	945.7	611.2
70	-12.150	-8.441	349.1	529.1	349.1	367.6	.0	380.6	.0	45.8	.3157	.4578	983.3	953.5	.9436	.5090	1043.4	680.7
85	-16.379	-12.882	340.0	524.0	340.0	331.0	.0	406.3	.0	50.3	.3073	.4498	1062.8	1018.6	1.0086	.5975	1115.8	696.0
90	-17.070	-14.077	337.7	518.9	337.7	317.1	.0	410.7	.0	51.9	.3052	.4444	1082.7	1040.2	1.0251	.6036	1134.2	704.9
95	-17.490	-15.093	335.6	509.5	335.6	300.5	.0	411.4	.0	53.5	.3033	.4354	1103.7	1062.0	1.0425	.6124	1153.6	716.6

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	$EFF-P TOT-ST	$EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC
5	5.25	11.68	12.59	47.91	24.24	35.24	.5569	.1199	.0259	1.4649	93.55	93.22	60.67	12.76	-593.2	-97.5
10	5.47	11.90	14.36	40.95	24.66	39.16	.4803	.0026	.0006	1.4621	99.91	99.93	61.53	20.58	-627.1	-177.0
15	5.72	11.80	13.21	36.48	25.05	40.08	.4602	-.0265	-.0058	1.4540	101.77	101.90	62.36	25.87	-661.1	-231.9
30	6.82	10.89	9.83	25.11	25.78	35.31	.5012	.0668	.0139	1.4019	93.88	93.61	64.83	39.72	-757.8	-347.3
50	8.30	10.95	9.18	16.37	25.90	32.19	.4837	.1110	.0211	1.3688	87.54	87.01	67.92	51.55	-875.9	-478.7
70	9.09	10.92	6.32	13.39	25.41	31.07	.4718	.1594	.0284	1.3672	81.14	80.32	70.57	57.17	-983.3	-572.9
85	8.83	10.05	6.25	11.07	24.81	27.71	.5044	.2325	.0409	1.3695	72.03	70.79	72.19	61.12	-1062.8	-612.3
90	8.83	9.90	6.86	9.76	24.66	26.50	.5093	.2513	.0426	1.3686	69.78	68.44	72.66	62.90	-1082.7	-629.5
95	8.86	9.76	7.98	8.16	24.53	26.07	.5103	.2668	.0429	1.3651	67.75	66.34	73.07	64.91	-1103.7	-650.5

TO/TO INLET	PO/PO INLET	EFF-AD INLET $	EFF-P INLET $	#CI/AI LBM/SEC SQFT
1.1170	1.3935	85.00	85.66	24.91

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	13.947	4.550	740.2	598.2	488.8	594.9	555.8	62.9	49.0	5.9	.6514	.5189	1.4220	1.1237
10	12.147	4.206	722.8	580.5	522.2	580.4	499.7	6.1	44.0	.6	.6377	.5051	1.4160	1.1136
15	10.827	3.941	704.6	561.6	524.4	560.9	470.6	-28.6	42.1	-2.9	.6215	.4886	1.4058	1.1107
30	7.407	3.129	633.9	510.1	469.3	508.3	426.0	-43.6	42.3	-4.9	.5557	.4425	1.3780	1.1083
50	3.111	2.067	582.5	465.2	435.5	463.3	386.7	-42.1	41.6	-5.2	.5083	.4022	1.3551	1.1080
70	-.802	1.195	577.4	452.4	431.0	450.8	384.2	-37.4	41.7	-4.7	.5016	.3893	1.3493	1.1165
85	-3.843	.763	582.7	439.0	409.4	438.7	414.6	-17.5	45.4	-2.3	.5026	.3746	1.3400	1.1330
90	-5.067	.710	582.0	432.1	401.8	432.0	420.9	-10.6	46.4	-1.4	.5009	.3678	1.3355	1.1373
95	-6.349	.700	577.7	420.9	393.0	420.8	423.4	-8.3	47.3	-1.1	.4963	.3576	1.3287	1.1402

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	$EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	6.56	9.48	22.39	43.08	39.75	50.50	.3509	.1179	.0292	.9709	70.39	85.62	86.28
10	2.61	5.54	16.07	43.40	43.08	49.83	.3642	.1313	.0336	.9687	67.56	92.06	92.41
15	1.66	4.60	11.97	45.01	43.55	48.31	.3836	.1380	.0361	.9685	66.49	92.35	92.68
30	3.88	6.87	10.35	47.20	39.08	43.90	.4005	.0877	.0245	.9834	77.59	88.66	89.13
50	4.94	8.07	10.84	46.79	36.28	40.02	.4259	.0621	.0190	.9900	84.34	89.06	89.70
70	6.04	9.28	12.70	46.46	35.70	38.67	.4583	.0833	.0275	.9869	80.23	76.75	77.60
85	9.92	13.24	17.60	47.72	33.46	37.03	.5062	.1356	.0474	.9785	71.15	65.62	66.98
90	10.84	14.17	20.01	47.84	32.72	36.29	.5214	.1532	.0545	.9759	68.55	62.80	64.25
95	11.42	14.80	22.55	48.43	31.91	36.21	.5416	.1721	.0621	.9733	66.09	60.35	61.87

NCORR INLET RPM	#CORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET $	EFF-P INLET $
7783.	110.43	1.1170	1.3666	79.78	80.62

TABLE 7.2
BLADE ELEMENT AND OVERALL PERFORMANCE
70% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.274	15.326	335.5	723.4	335.5	429.2	.0	582.3	.0	53.4	.3032	.6345	598.8	677.7	.6203	.3857	686.4	439.7
10	13.141	13.072	341.8	706.9	341.8	464.7	.0	532.7	.0	48.7	.3090	.6210	633.1	699.6	.6504	.4338	719.5	493.8
15	10.383	10.882	347.8	690.0	347.8	478.2	.0	497.4	.0	46.0	.3145	.6064	667.4	721.5	.6806	.4642	752.6	528.2
30	2.727	4.908	359.6	613.6	359.6	422.7	.0	444.8	.0	46.4	.3254	.5359	765.0	787.3	.7649	.4751	845.3	544.1
50	-5.532	-2.027	361.9	562.1	361.9	390.2	.0	404.6	.0	46.0	.3275	.4883	894.2	874.9	.8646	.5309	955.4	611.1
70	-12.189	-8.452	354.2	536.2	354.2	364.6	.0	393.1	.0	47.0	.3205	.4631	992.6	962.5	.9534	.5841	1053.9	676.2
85	-16.206	-12.771	345.3	528.1	345.3	332.1	.0	410.6	.0	50.5	.3122	.4529	1072.9	1028.2	1.0191	.6014	1127.1	701.3
90	-16.892	-13.961	343.1	520.7	343.1	321.3	.0	409.7	.0	51.4	.3101	.4458	1093.0	1050.1	1.0357	.6134	1145.6	716.4
95	-17.385	-15.317	340.9	510.6	340.9	308.1	.0	407.1	.0	52.5	.3082	.4364	1114.1	1072.0	1.0532	.6263	1165.1	732.8

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	PHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC
5	5.18	11.61	12.27	48.16	24.51	35.40	.5621	.1298	.0281	1.4747	93.05	92.69	60.61	12.44	-598.8	-95.4
10	5.41	11.84	13.41	41.84	24.93	38.87	.4996	.0296	.0065	1.4747	98.24	98.17	61.47	19.63	-633.1	-167.0
15	5.66	11.74	12.32	37.31	25.33	40.36	.4710	-.0138	-.0030	1.4697	100.89	100.96	62.30	24.98	-667.4	-224.1
30	6.73	10.80	9.08	25.76	26.10	35.84	.5088	.0705	.0148	1.4190	93.68	93.39	64.74	38.98	-765.0	-342.5
50	8.19	10.84	7.93	17.51	26.24	33.17	.4943	.1137	.0272	1.3910	87.63	87.07	67.81	50.31	-884.2	-470.3
70	9.00	10.83	6.38	13.25	25.75	30.92	.4853	.1630	.0299	1.3812	80.51	79.64	70.48	67.23	-992.6	-569.4
85	8.71	9.94	6.37	10.84	25.16	27.96	.5059	.2278	.0400	1.3872	77.77	71.53	72.07	61.24	-1072.9	-617.7
90	8.71	9.78	6.94	9.56	25.02	27.03	.5036	.2391	.0404	1.3800	71.14	69.84	72.54	62.98	-1093.0	-640.4
95	8.75	-9.65	7.91	8.12	24.88	25.90	.4997	.2493	.0402	1.3762	69.67	68.20	72.96	64.84	-1114.1	-664.9

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.1210	1.4089	85.05	85.73	25.23

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	13.912	4.506	747.9	603.0	491.1	601.6	564.0	-41.9	49.3	-3.9	.6578	.5226	1.4374	1.1253
10	12.047	4.123	733.2	588.1	520.9	586.7	515.9	-40.9	45.0	-3.9	.6461	.5110	1.4329	1.1132
15	10.671	3.826	716.9	570.7	528.4	569.3	484.6	-39.7	42.7	-4.0	.6319	.4959	1.4241	1.1150
30	7.173	2.949	646.5	517.4	475.4	516.1	438.1	-36.0	42.7	-4.0	.5664	.4481	1.3936	1.1124
50	2.930	1.885	601.4	474.2	446.0	473.0	403.3	-33.1	42.1	-4.0	.5242	.4091	1.3702	1.1178
70	-.985	1.034	584.8	452.6	429.6	451.5	396.8	-31.6	42.7	-4.0	.5072	.3886	1.3581	1.1216
85	-4.111	.658	587.0	442.2	411.1	441.1	419.0	-30.8	45.6	-4.0	.5058	.3769	1.3504	1.1358
90	-5.293	.638	584.2	434.4	406.2	433.4	419.9	-30.3	46.1	-4.0	.5027	.3697	1.3454	1.1364
95	-6.480	.666	579.4	424.1	400.1	423.1	419.0	-29.6	46.5	-4.0	.4979	.3604	1.3391	1.1421

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	PHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	6.84	9.76	12.51	53.23	39.95	51.39	.3896	.1007	.0250	.9747	75.02	86.26	80.91
10	3.58	6.51	11.52	48.91	42.95	50.62	.3857	.1179	.0301	.9712	71.25	91.60	91.99
15	2.27	5.21	10.92	46.67	43.91	49.32	.3896	.1238	.0323	.9710	70.12	92.48	92.81
30	4.29	7.29	11.25	46.71	39.67	44.81	.4022	.0848	.0238	.9835	78.76	88.53	89.02
50	5.45	8.59	12.03	46.12	37.27	40.99	.4327	.0863	.0264	.9853	79.23	82.83	83.54
70	7.06	10.29	13.45	46.73	35.69	38.81	.4687	.1031	.0341	.9834	76.44	75.18	76.20
85	10.11	13.43	15.89	49.62	33.78	37.40	.5151	.1426	.0498	.9772	69.67	66.04	67.41
90	10.47	13.80	17.40	50.07	33.29	36.62	.5308	.1573	.0558	.9751	67.57	63.98	65.42
95	10.63	14.00	19.68	50.50	32.73	35.64	.5478	.1722	.0620	.9732	65.70	62.12	63.61

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
7857.	111.86	1.1210	1.3803	79.72	80.59

TABLE 7.3
BLADE ELEMENT AND OVERALL PERFORMANCE
70% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.755	15.339	371.5	739.1	371.5	481.9	.0	560.4	.0	49.1	.3364	.6512	595.3	673.7	.6354	.4361	701.7	495.0
10	13.098	13.095	378.6	725.1	378.6	517.7	.0	507.7	.0	44.2	.3429	.6403	629.3	695.5	.6653	.4863	734.4	550.7
15	10.345	10.938	385.3	704.9	385.3	522.7	.0	472.9	.0	42.0	.3492	.6223	663.4	717.3	.6953	.5095	767.2	577.0
30	2.929	5.122	398.2	616.8	398.2	456.8	.0	414.5	.0	42.2	.3612	.5409	760.4	782.6	.7786	.5144	858.4	586.6
50	-4.771	-1.507	402.3	558.5	402.3	427.8	.0	359.0	.0	40.0	.3651	.4881	878.9	869.7	.8771	.5823	966.6	666.2
70	-11.311	-7.778	396.8	533.4	396.8	470.0	.0	328.9	.0	37.9	.3599	.4650	986.7	956.8	.9646	.6586	1063.5	755.4
85	-16.036	-12.493	387.6	520.1	387.6	400.0	.0	332.4	.0	39.1	.3514	.4513	1066.5	1022.1	1.0286	.6917	1134.8	797.3
90	-16.941	-13.861	385.0	504.1	385.0	371.0	.0	341.3	.0	42.1	.3489	.4358	1036.5	1043.8	1.0447	.6868	1152.7	794.5
95	-17.475	-15.010	382.6	487.5	382.6	344.4	.0	345.1	.0	44.7	.3467	.4202	1107.5	1065.7	1.0618	.6884	1171.8	798.7

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC
5	2.46	8.89	12.96	44.76	26.86	39.11	.4861	.0587	.0213	1.4567	94.28	94.00	57.89	13.13	-595.3	-113.3
10	2.73	9.16	13.58	38.99	27.32	47.63	.4249	-.0098	-.0021	1.4630	100.71	100.78	58.79	19.80	-629.3	-187.7
15	3.03	9.11	12.27	34.73	27.74	43.35	.4098	-.0358	-.0078	1.4494	102.58	102.75	59.67	24.93	-663.4	-244.4
30	4.27	8.34	8.94	23.44	28.55	37.92	.4566	.0680	.0143	1.3820	93.32	93.04	62.27	38.84	-760.4	-368.1
50	5.83	8.48	7.65	15.43	28.81	35.65	.4273	.0889	.0174	1.3468	89.07	88.63	65.45	50.03	-878.9	-510.7
70	6.68	8.61	6.19	12.12	28.47	35.03	.3937	.1004	.0190	1.3351	85.82	85.27	68.16	56.04	-986.7	-627.9
85	6.55	7.78	4.47	10.57	27.89	33.17	.3992	.1485	.0276	1.3298	78.46	77.62	69.91	59.34	-1066.5	-689.7
90	6.63	7.70	5.73	8.69	27.73	30.58	.4168	.1875	.0330	1.3187	73.08	72.04	70.46	61.77	-1086.5	-702.5
95	6.71	7.61	7.22	6.77	27.67	28.27	.4265	.2162	.0358	1.3089	68.93	67.77	70.92	64.15	-1107.5	-720.6

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.1066	1.3677	87.82	88.32	27.77

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	2	PT2/ PT1	TT2/ TT1
5	13.977	4.522	774.6	676.0	552.5	674.3	542.9	-47.0	44.9	-3.9	.6853	.5915	1.4175	1.1242
10	12.167	4.146	761.8	659.2	581.7	657.6	491.9	-45.9	40.5	-3.9	.6756	.5783	1.4121	1.1122
15	10.784	3.835	742.3	639.5	582.0	638.0	460.7	-44.5	38.6	-4.0	.6581	.5609	1.4010	1.1087
30	7.056	2.855	661.7	583.8	520.7	582.3	408.2	-40.7	38.2	-4.0	.5828	.5104	1.3671	1.1040
50	2.298	1.625	611.3	538.3	495.7	537.0	357.8	-37.5	35.8	-4.0	.5368	.4697	1.3400	1.1022
70	-1.733	.760	597.3	515.9	496.6	514.6	337.0	-36.0	33.8	-4.0	.5237	.4491	1.3252	1.1011
85	-4.359	.491	597.5	490.8	491.7	489.6	339.4	-34.2	34.7	-4.0	.5217	.4247	1.3060	1.1009
90	-5.358	.512	588.6	473.7	473.2	472.5	350.0	-33.0	36.6	-4.0	.5123	.4084	1.2939	1.1151
95	-6.469	.595	579.9	451.1	458.5	450.0	355.0	-31.5	37.9	-4.0	.5035	.3878	1.2794	1.1132

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	2.39	5.31	12.51	48.78	43.92	55.06	.3117	.1054	.0262	.9717	62.25	86.54	87.16
10	-.92	2.01	11.52	44.42	46.89	54.31	.3091	.1237	.0315	.9675	57.68	92.41	92.74
15	-1.89	1.05	10.92	42.52	47.22	52.93	.3111	.1232	.0322	.9690	58.22	93.12	93.41
30	-.28	2.71	11.25	42.14	42.29	48.57	.3043	.0476	.0133	.9902	80.74	89.92	90.32
50	-.86	2.28	12.03	39.81	40.33	44.90	.3159	.0255	.0078	.9955	89.69	87.08	87.57
70	-1.90	1.34	13.45	37.77	40.29	42.91	.3402	.0410	.0136	.9930	85.38	82.89	83.52
85	-.81	2.50	15.89	38.69	39.46	40.32	.3975	.0952	.0332	.9839	73.22	72.22	73.21
90	1.01	4.34	17.40	40.61	37.66	38.63	.4272	.1089	.0386	.9822	71.69	66.49	67.65
95	2.05	5.42	19.68	41.92	36.28	36.56	.4629	.1401	.0504	.9778	67.45	61.79	63.06

WCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
7811.	123.11	1.1066	1.3476	83.51	84.16

TABLE 7.4
BLADE ELEMENT AND OVERALL PERFORMANCE
70% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.733	15.341	371.8	738.8	371.8	487.5	.0	555.1	.0	48.5	.3367	.6515	591.4	669.3	.6326	.4416	698.5	500.7
10	13.090	13.117	378.8	725.2	378.8	504.6	.0	520.9	.0	45.7	.3432	.6397	625.2	690.9	.6623	.4697	731.0	532.5
15	10.406	10.980	385.4	702.4	385.4	515.8	.0	476.8	.0	42.6	.3493	.6199	659.1	712.6	.6920	.5005	763.5	567.1
30	3.013	5.143	398.7	612.2	398.7	462.4	.0	401.3	.0	40.9	.3616	.5377	755.5	777.5	.7749	.5235	854.2	596.1
50	-4.848	-1.549	403.0	555.6	403.0	433.9	.0	347.0	.0	38.6	.3657	.4864	873.2	864.0	.8726	.5909	961.7	674.9
70	-11.475	-7.873	397.1	526.7	397.1	420.5	.0	317.1	.0	36.8	.3602	.4598	980.3	950.5	.9593	.6639	1057.6	760.3
85	-16.165	-12.584	387.6	512.7	387.6	401.2	.0	319.2	.0	37.9	.3519	.4456	1059.5	1015.4	1.0227	.6985	1128.2	803.6
90	-17.060	-13.941	385.0	496.5	385.0	371.1	.0	329.9	.0	41.2	.3489	.4299	1079.4	1037.0	1.0387	.6914	1146.0	798.6
95	-17.547	-15.059	382.6	478.6	382.6	342.1	.0	334.7	.0	44.0	.3467	.4130	1100.3	1058.7	1.0556	.6911	1164.9	800.7

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC
5	2.27	8.70	12.91	44.61	26.88	39.47	.4740	.0915	.0197	1.4525	94.66	94.40	57.69	13.08	-591.4	-114.2
10	2.55	8.98	12.28	40.11	27.33	41.28	.4510	.0368	.0081	1.4529	97.65	97.55	58.61	18.50	-625.2	-170.1
15	2.86	8.94	11.79	35.05	27.75	42.57	.4206	-.0112	-.0025	1.4410	100.84	100.92	59.50	24.45	-659.1	-235.8
30	4.09	8.16	9.21	22.99	28.58	38.34	.4387	.0510	.0107	1.3728	94.85	94.65	62.09	39.11	-755.5	-376.2
50	5.65	8.31	7.60	15.30	28.85	36.07	.4118	.0749	.0147	1.3378	90.51	90.14	65.28	49.97	-873.2	-517.0
70	6.55	8.38	5.39	11.78	28.48	34.94	.3823	.0936	.0177	1.3218	86.32	85.81	68.02	56.24	-980.3	-633.5
85	6.44	7.67	4.64	10.29	27.89	33.14	.3862	.1405	.0260	1.3141	78.87	78.07	69.81	59.51	-1059.5	-696.3
90	6.52	7.59	5.89	8.43	27.72	30.45	.4064	.1836	.0321	1.3038	72.84	71.84	70.35	61.92	-1079.4	-707.1
95	6.60	7.50	7.48	6.40	27.57	27.93	.4181	.2156	.0353	1.2930	68.17	67.03	70.81	64.41	-1100.3	-724.0

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.1031	1.3568	88.42	88.88	27.79

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	14.020	4.538	774.5	680.8	557.4	679.3	537.7	45.2	44.3	3.8	.6858	.5965	1.4050	1.1193
10	12.170	4.141	762.1	665.6	571.3	665.6	504.4	-6.7	41.7	-.6	.6753	.5837	1.4005	1.1142
15	10.712	3.815	740.4	645.8	577.2	644.5	463.7	-40.5	39.0	-3.6	.6564	.5668	1.3897	1.1082
30	6.986	2.845	658.0	592.6	526.1	589.9	395.2	-56.7	37.0	-5.5	.5805	.5196	1.3587	1.1000
50	2.160	1.634	609.1	546.7	501.4	543.4	345.9	-59.8	34.6	-6.3	.5358	.4782	1.3312	1.0962
70	-1.611	.780	591.4	518.8	497.4	516.3	320.1	-51.3	32.8	-5.7	.5193	.4527	1.3126	1.0968
85	-4.259	.510	590.7	492.4	492.7	490.8	325.9	-39.5	33.6	-4.6	.5167	.4272	1.2928	1.1049
90	-5.270	.524	581.9	475.6	473.5	475.0	338.3	-23.1	35.7	-2.8	.5073	.4110	1.2808	1.1105
95	-6.414	.600	572.2	450.9	456.9	450.9	344.3	-6.9	37.2	-.9	.4974	.3884	1.2651	1.1139

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	1.87	4.79	20.20	40.56	49.18	54.92	.2734	.1216	.0303	.9673	54.31	85.60	86.24
10	.31	3.24	14.90	42.27	45.75	54.25	.2907	.1350	.0345	.9646	50.68	88.54	89.04
15	-1.48	1.46	11.31	42.53	46.61	52.89	.2993	.1315	.0344	.9670	51.66	91.21	91.58
30	-1.47	1.52	9.77	42.43	42.65	48.86	.2882	.0450	.0126	.9908	78.54	91.60	91.92
50	-2.08	1.05	9.74	40.87	40.69	45.12	.3048	.0246	.0075	.9957	88.51	88.58	88.97
70	-2.90	.33	11.77	38.44	40.19	42.74	.3303	.0383	.0126	.9936	84.94	83.51	84.09
85	-1.95	1.37	15.29	38.15	39.37	40.16	.3830	.0913	.0318	.9849	72.61	72.69	73.63
90	.05	3.38	18.61	38.44	37.51	38.56	.4091	.1040	.0369	.9833	71.29	66.43	67.54
95	1.29	4.67	22.80	38.05	35.96	36.36	.4336	.1375	.0496	.9787	66.66	61.11	62.39

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
7759.	123.18	1.1031	1.3366	83.90	84.51

TABLE 7.5
BLADE ELEMENT AND OVERALL PERFORMANCE
70% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	V0-1 FT/SEC	V0-2 FT/SEC	B-1 DEGREE
5	15.726	15.358	411.3	789.0	411.3	567.1	.0	548.5	.0
10	13.053	13.147	419.2	776.0	419.2	589.3	.0	504.9	.0
15	10.366	11.065	426.6	738.5	426.6	579.8	.0	457.3	.0
30	3.148	5.344	441.9	646.5	441.9	536.4	.0	361.0	.0
50	-4.914	-1.469	448.0	590.2	448.0	512.8	.0	292.1	.0
70	-11.807	-7.961	441.1	542.5	441.1	485.5	.0	242.0	.0
85	-16.460	-12.701	430.2	511.2	430.2	458.9	.0	225.2	.0
90	-17.300	-14.042	427.2	480.2	427.2	423.0	.0	227.3	.0
95	-17.677	-15.117	424.7	450.1	424.7	388.3	.0	227.7	.0

% Span	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	43.8	.3734	.7002	593.6	671.8	.6556	.5151	722.2	580.3
10	40.4	.3808	.6896	627.6	693.5	.6856	.5499	754.7	618.7
15	38.1	.3877	.6557	661.6	715.3	.7154	.5635	787.2	634.6
30	33.9	.4021	.5724	758.3	780.4	.7986	.6028	877.7	660.9
50	29.6	.4078	.5220	876.5	867.3	.8960	.6816	984.3	770.6
70	26.3	.4013	.4794	984.0	954.1	.9810	.7618	1078.3	861.9
85	25.7	.3911	.4507	1063.5	1019.3	1.0429	.8087	1147.2	917.2
90	27.9	.3863	.4219	1083.5	1040.9	1.0586	.8058	1164.7	917.0
95	30.1	.3859	.3943	1104.4	1062.7	1.0753	.8067	1183.3	920.9

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	V0'-1 FT/SEC	V0'-2 FT/SEC
5	-.30	6.13	12.01	42.95	29.36	43.60	.3798	.1639	.0355	1.4203	89.66	89.17	55.13	12.18	-593.6	-123.3
10	.00	6.43	11.41	38.43	29.85	46.85	.3501	.0819	.0181	1.4205	94.13	93.87	56.06	17.63	-627.6	-188.6
15	.35	6.43	11.21	33.11	30.30	45.34	.3471	.0713	.0157	1.3894	94.09	93.64	56.99	23.87	-661.6	-257.9
30	1.67	5.74	8.11	21.68	31.21	42.18	.3452	.0843	.0179	1.3143	90.20	89.85	59.68	38.00	-758.3	-419.4
50	3.36	6.02	5.88	14.73	31.57	40.41	.3121	.0774	.0157	1.2723	88.00	87.43	62.99	48.26	-876.5	-575.2
70	4.49	6.31	4.69	10.42	31.17	38.14	.2777	.0809	.0155	1.2348	84.27	83.84	65.96	55.54	-984.0	-712.1
85	4.54	5.76	4.59	8.44	30.51	35.81	.2682	.1090	.0202	1.2103	76.72	76.13	67.90	59.46	-1063.5	-794.1
90	4.65	5.73	6.12	6.32	30.34	32.76	.2823	.1498	.0260	1.1896	67.84	67.09	68.48	62.16	-1083.5	-813.7
95	4.76	5.66	7.84	4.20	30.18	29.89	.2919	.1835	.0297	1.1711	60.34	59.49	68.96	64.77	-1104.9	-835.0

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.0863	1.2835	85.68	84.13	30.38

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	V0-1 FT/SEC	V0-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/PT1	TT2/TT1
5	14.107	4.552	841.8	825.9	652.9	825.8	531.3	8.1	39.5	.6	.7522	.7364	1.3545	1.1183
10	12.337	4.142	829.1	823.0	669.5	822.3	489.1	-32.3	36.4	-2.2	.7419	.7361	1.3680	1.1112
15	10.844	3.761	794.9	800.6	658.8	798.0	444.8	-64.1	34.2	-4.6	.7108	.7166	1.3549	1.1040
30	6.865	2.636	712.2	730.7	617.1	725.8	355.5	-84.5	30.0	-6.6	.6350	.6531	1.3090	1.0899
50	2.308	1.434	664.0	673.4	596.8	668.9	291.0	-77.9	26.0	-6.6	.5916	.6006	1.2621	1.0809
70	-1.544	.631	630.9	621.6	581.8	616.9	244.1	-76.6	22.8	-7.1	.5622	.5535	1.2205	1.0737
85	-4.175	.433	617.4	578.2	573.1	574.3	229.7	-67.0	21.9	-6.6	.5495	.5126	1.1854	1.0741
90	-5.199	.465	598.0	554.9	550.9	552.0	232.8	-56.7	23.0	-5.9	.5307	.4904	1.1677	1.0763
95	-6.375	.569	580.7	520.6	531.3	518.2	234.2	-49.8	23.9	-5.5	.5140	.4584	1.1441	1.0778

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	-2.96	-.04	17.00	38.95	48.51	59.14	.1689	.1492	.0372	.9534	-240.46	76.61	77.66
10	-4.98	-2.05	13.25	38.63	50.32	59.86	.1595	.1095	.0280	.9666	-50.91	84.34	84.98
15	-6.23	-3.29	10.32	38.77	49.75	58.64	.1535	.0760	.0198	.9783	410.18	87.20	87.70
30	-8.45	-5.46	8.62	36.61	46.85	54.12	.1422	.0256	.0071	.9940	136.19	87.70	88.12
50	-10.69	-7.55	9.39	32.62	45.34	50.18	.1522	.0289	.0088	.9939	185.03	85.10	85.59
70	-12.90	-9.47	10.37	29.85	43.87	46.22	.1806	.0513	.0169	.9901	-44.63	79.52	80.04
85	-13.61	-10.30	13.24	28.54	42.66	42.65	.2284	.0961	.0334	.9823	24.56	67.37	68.09
90	-12.61	-9.28	15.54	28.85	40.60	40.72	.2420	.0932	.0330	.9838	36.62	59.51	60.34
95	-11.96	-8.59	18.19	29.41	38.84	37.95	.2791	.1371	.0493	.9776	35.69	50.52	51.40

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
7789.	134.68	1.0863	1.263	80.16	80.77

TABLE 7.6
BLADE ELEMENT AND OVERALL PERFORMANCE
70% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	~~15.759~~	~~15.356~~	~~413.3~~	784.4	413.3	560.2	.0	549.2	.0	44.2	.3753	~~.6958~~	~~593.4~~	~~671.6~~	~~.6566~~	~~.5086~~	~~723.1~~	~~573.4~~
10	13.095	13.135	421.3	772.5	421.3	598.4	.0	488.6	.0	39.0	.3828	.6875	627.4	693.3	.6866	.5628	755.7	632.4
15	10.369	11.036	428.9	737.1	428.9	587.7	.0	445.0	.0	37.0	.3899	.6554	651.3	715.0	.7165	.5750	788.3	646.8
30	3.070	5.295	444.3	648.1	444.3	578.1	.0	361.2	.0	33.9	.4043	.5739	758.1	780.1	~~.7996~~	~~.6038~~	~~878.6~~	~~681.9~~
50	-5.040	-1.537	449.9	590.1	449.9	512.8	.0	292.1	.0	29.6	.4096	.5219	876.2	867.0	.8967	.6813	984.9	770.3
70	-11.947	-8.027	442.7	542.2	442.7	484.9	.0	242.3	.0	26.4	.4028	.4791	983.6	953.8	.9815	.7606	1078.7	860.7
85	-16.597	-12.772	431.5	510.0	431.5	457.9	.0	224.7	.0	25.7	.3923	~~.4497~~	~~1053.2~~	~~1018.9~~	~~1.0432~~	~~.8083~~	~~1147.4~~	~~916.7~~
90	-17.428	-14.118	428.6	477.1	428.6	420.4	.0	225.6	.0	27.9	.3895	.4192	1083.1	1040.6	1.0588	.8058	1164.8	917.0
95	-17.754	-15.165	426.1	444.0	426.1	383.0	.0	224.5	.0	30.1	.3872	.3890	1104.1	1062.3	1.0755	.8071	1183.4	921.2

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC
5	-.44	5.99	12.07	42.75	29.49	43.25	.3901	.1582	.0343	1.4277	90.02	89.55	54.99	12.24	-593.4	-122.4
10	-.14	6.29	12.54	37.16	29.98	46.93	.3278	.0257	.0056	1.4255	98.12	98.05	55.92	18.76	-627.4	-204.7
15	.20	6.28	11.90	32.27	30.44	46.30	.3291	.0238	.0052	1.3956	97.89	97.83	56.84	24.57	~~-661.3~~	~~-270.1~~
30	1.53	5.60	7.99	21.66	31.35	42.51	.3453	.0694	.0148	1.3213	91.91	91.63	59.54	37.88	-758.1	-418.9
50	3.26	5.91	5.87	14.64	31.68	40.55	.3132	.0689	.0140	1.2768	89.32	88.98	62.88	48.25	-876.2	-574.9
70	4.42	6.24	4.69	10.35	31.26	38.20	.2796	.0760	.0146	1.2384	85.23	~~84.83~~	~~65.89~~	~~55.54~~	~~-983.6~~	~~-711.2~~
85	4.48	5.71	4.65	8.32	30.59	35.83	.2688	.1036	.0192	1.2170	77.81	77.25	67.85	59.52	-1063.2	-794.2
90	4.60	5.67	6.32	6.08	30.41	32.65	.2821	.1443	.0249	1.1910	68.81	68.08	68.43	62.35	-1083.1	-815.0
95	4.70	5.60	8.22	3.76	30.26	29.57	.2908	.1776	.0283	1.1709	61.10	60.27	68.90	~~66.15~~	~~-1104.1~~	~~-837.8~~

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.0859	1.2879	87.32	87.72	30.49

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VθV-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	14.059	4.548	838.1	828.5	647.6	826.4	531.9	-57.6	39.8	-3.9	.7485	.7349	~~1.3590~~	~~1.1123~~
10	12.300	4.147	826.1	826.1	677.2	824.1	473.1	-57.5	35.2	-3.9	.7403	.7486	1.3750	1.1075
15	10.861	3.770	793.8	801.8	665.2	799.8	433.1	-55.8	33.3	-4.0	.7107	.7187	1.3590	1.1016
30	6.961	2.569	713.6	731.7	618.6	730.0	355.7	-51.0	30.0	-4.0	.6363	.6540	~~1.3069~~	~~1.0900~~
50	2.399	1.444	663.8	675.3	596.6	673.7	291.1	-47.1	26.0	-4.0	.5914	.6025	1.2657	1.0839
70	-1.514	.596	630.0	622.8	580.5	671.2	244.8	-43.4	22.9	-4.0	.5613	.5545	1.2227	1.0719
85	-4.129	.418	615.6	570.9	571.3	569.6	229.2	-39.8	21.9	-4.0	.5478	.5059	~~1.1809~~	~~1.0738~~
90	-5.125	.464	594.4	550.8	547.7	549.4	231.0	-38.4	23.0	-4.0	.5274	.4867	1.1657	1.0756
95	-6.317	.572	574.5	520.4	526.1	519.2	231.0	-36.3	23.8	-4.0	.5086	.4595	1.1449	1.0736

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	-2.70	.22	12.51	43.69	48.32	59.28	.1824	.1457	.0362	.9548	-462.01	77.46	78.38
10	-6.19	-3.26	11.52	39.14	51.30	60.32	.1561	.1053	.0269	.9690	*******	88.74	89.20
15	-7.19	-4.25	10.92	37.21	50.60	59.01	.1450	.0820	.0214	.9766	344.89	~~90.21~~	~~90.59~~
30	-8.49	-5.49	11.25	33.93	47.18	54.51	.1294	.0386	.0108	.9908	155.40	88.38	89.78
50	-10.67	-7.54	12.03	29.99	45.49	50.63	.1347	.0372	.0098	.9933	173.53	86.18	86.59
70	-12.80	-9.57	13.45	26.87	43.92	46.60	.1601	.0563	.0186	.9832	-135.60	~~80.10~~	~~80.61~~
85	-13.60	-10.28	15.89	25.91	42.68	47.28	.2215	.1283	.0448	.9765	11.39	66.00	66.74
90	-12.65	-9.32	17.40	26.95	40.51	40.56	.2320	.1112	.0394	.9809	25.44	59.33	60.15
95	-12.04	-8.67	19.68	27.83	38.59	38.09	.2609	.1348	.0485	.9783	30.17	51.53	52.40

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
7786.	135.15	1.0859	1.2661	81.21	81.79

TABLE 8.1
BLADE ELEMENT AND OVERALL PERFORMANCE
90% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.970	15.374	462.9	899.9	462.9	499.3	.0	748.6	.0	56.1	.4218	.7782	747.2	845.7	.8009	.4399	878.9	508.7
10	13.522	13.193	472.0	887.5	472.0	539.8	.0	704.5	.0	52.4	.4304	.7693	790.0	873.0	.8391	.4895	920.2	565.5
15	10.870	11.090	481.3	867.2	481.3	573.2	.0	650.8	.0	48.5	.4392	.7520	832.7	900.3	.8777	.5421	961.8	625.1
30	3.473	5.303	500.8	758.4	500.8	503.5	.0	567.1	.0	48.4	.4577	.6518	954.5	992.3	.9852	.5609	1077.9	652.6
50	-4.454	-1.388	508.4	732.1	508.4	486.7	.0	546.8	.0	48.3	.4650	.6237	1103.3	1091.7	1.1111	.6225	1214.8	730.6
70	-11.224	-7.736	501.1	710.2	501.1	459.3	.0	541.7	.0	49.5	.4580	.5991	1238.6	1201.0	1.2213	.6778	1336.1	803.5
85	-15.878	-12.417	488.8	708.2	488.8	437.5	.0	556.9	.0	51.2	.4463	.5919	1338.7	1283.0	1.3013	.7086	1425.2	847.8
90	-16.790	-13.798	485.3	698.2	485.3	410.6	.0	564.6	.0	53.5	.4430	.5809	1363.9	1310.3	1.3215	.7083	1447.6	851.2
95	-17.384	-14.974	482.0	684.5	482.0	383.0	.0	567.3	.0	55.6	.4398	.5673	1390.2	1337.7	1.3428	.7131	1471.4	860.4

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC
5	2.68	9.11	10.75	47.19	32.44	43.32	.6228	.1545	.0335	1.8166	92.16	91.49	58.11	10.91	-747.2	-97.0
10	2.95	9.38	11.00	41.78	32.96	47.80	.5739	.0710	.0157	1.8325	96.03	95.69	59.01	17.23	-790.0	-168.5
15	3.19	9.27	10.75	36.41	33.49	51.69	.5229	-.0056	-.0012	1.8321	100.33	100.37	59.83	23.42	-832.7	-249.5
30	4.24	8.31	9.60	22.75	34.56	46.00	.5435	.0632	.0132	1.7267	94.84	94.45	62.24	39.49	-954.5	-415.2
50	5.68	8.33	5.93	17.10	34.99	44.98	.5375	.1126	.0229	1.7325	89.55	88.73	65.30	48.20	-1103.3	-544.9
70	6.56	8.39	4.09	13.09	34.58	42.40	.5342	.1702	.0332	1.7352	83.03	81.69	68.03	54.94	-1238.6	-659.3
85	6.45	7.68	3.50	11.45	33.90	40.27	.5423	.2224	.0425	1.7523	77.59	75.79	69.82	58.37	-1338.7	-726.2
90	6.54	7.61	4.71	9.62	33.71	37.66	.5525	.2499	.0454	1.7471	74.82	72.91	70.37	60.75	-1363.9	-745.6
95	6.64	7.59	6.32	7.60	33.52	35.05	.5574	.2722	.0465	1.7387	72.47	70.29	70.85	63.25	-1390.2	-770.4

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.2024	1.7541	85.98	87.02	33.65

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	13.696	8.348	929.4	683.9	581.3	681.4	725.1	57.7	51.6	4.8	.8069	.5769	1.7415	1.2030
10	11.660	3.834	919.6	670.5	617.2	670.4	691.6	-10.5	48.0	-.9	.7998	.5671	1.7384	1.1944
15	10.293	3.472	899.7	651.0	639.2	648.9	633.1	-53.0	44.9	-4.6	.7837	.5515	1.7257	1.1867
30	5.899	2.499	801.3	598.9	574.3	596.1	559.9	-57.8	44.3	-5.5	.6921	.5066	1.6903	1.1791
50	2.598	1.342	783.2	589.3	562.0	587.4	545.5	-46.9	44.1	-4.6	.6710	.4953	1.6923	1.1919
70	-1.362	.528	774.9	577.9	548.7	576.7	547.2	-37.3	44.9	-3.7	.6581	.4817	1.6843	1.2093
85	-4.193	.347	786.9	576.2	544.0	575.1	568.5	-35.7	46.3	-3.6	.6631	.4759	1.6794	1.2300
90	-5.249	.427	783.4	565.9	527.9	565.2	578.9	-27.7	47.8	-2.8	.6576	.4654	1.6683	1.2380
95	-6.413	.553	777.2	548.4	513.2	547.9	583.7	-22.2	48.9	-2.3	.6503	.4494	1.6517	1.2434

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	9.13	12.05	21.21	46.82	49.43	64.22	.4365	.1222	.0304	.9576	78.29	84.54	85.68
10	6.65	9.58	14.59	48.92	53.52	63.84	.4552	.1545	.0395	.9471	72.88	88.01	88.88
15	4.43	7.38	10.25	49.51	56.34	62.25	.4686	.1608	.0420	.9467	71.79	90.33	91.02
30	5.83	8.83	9.72	49.79	51.18	57.66	.4666	.0777	.0217	.9788	84.97	90.28	90.95
50	7.47	10.60	11.46	48.70	50.37	56.58	.4784	.0891	.0272	.9768	82.28	84.47	85.55
70	9.26	12.49	13.75	48.63	48.94	54.85	.5043	.1170	.0387	.9705	77.08	76.72	78.33
85	10.83	14.15	16.33	49.89	48.04	53.76	.5371	.1628	.0568	.9584	69.41	69.36	71.47
90	12.15	15.48	18.59	50.56	46.32	52.39	.5537	.1780	.0632	.9552	67.42	66.13	68.43
95	12.98	16.35	21.36	51.19	44.81	50.41	.5764	.2020	.0729	.9501	64.57	63.28	65.73

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
9804.	149.18	1.2024	1.6938	80.22	81.60

TABLE 8.2
BLADE ELEMENT AND OVERALL PERFORMANCE
90% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VØ-1 FT/SEC	VØ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.916	15.432	480.9	885.9	480.9	503.4	.0	728.9	.0	55.2	.4388	.7651	762.6	863.1	.8227	.4500	901.6	521.0
10	13.389	13.263	490.8	878.8	490.8	567.3	.0	671.1	.0	49.6	.4483	.7618	806.3	891.0	.8621	.5275	943.9	608.5
15	10.684	11.155	500.8	863.4	500.8	595.8	.0	624.9	.0	46.2	.4578	.7497	850.0	918.9	.9017	.5769	986.5	669.4
30	3.482	6.472	521.5	748.8	521.5	502.9	.0	554.8	.0	47.8	.4775	.6429	974.3	1002.6	1.0118	.5782	1105.0	673.4
50	-3.977	-1.051	531.3	726.2	531.3	490.9	.0	535.1	.0	47.4	.4849	.6184	1126.1	1114.2	1.1411	.6465	1245.1	759.2
70	-10.507	-7.245	526.6	698.4	526.6	473.2	.0	513.7	.0	47.1	.4824	.5902	1264.2	1225.8	1.2545	.7226	1369.4	855.1
85	-15.316	-11.941	515.3	699.8	516.3	461.8	.0	525.8	.0	48.0	.4716	.5865	1366.4	1309.5	1.3364	.7625	1460.3	909.7
90	-16.387	-13.441	511.6	689.8	511.6	435.8	.0	534.7	.0	50.3	.4680	.5765	1392.1	1337.3	1.3568	.7620	1483.1	913.3
95	-17.218	-14.790	507.9	673.4	507.9	404.6	.0	538.3	.0	52.7	.4646	.5594	1418.9	1365.3	1.3783	.7648	1507.1	920.7

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC
5	2.21	8.64	14.66	42.82	33.46	49.14	.6133	.1371	.0294	1.8177	92.79	92.17	57.64	14.82	-762.6	-134.2
10	2.46	8.89	14.84	37.46	34.02	50.99	.5301	.0089	.0019	1.8433	99.48	99.45	58.52	21.06	-806.3	-219.9
15	2.69	8.77	13.49	33.18	34.57	54.47	.4877	-.0571	-.0124	1.8480	103.67	104.01	59.33	26.15	-850.0	-294.0
30	3.76	7.83	11.78	20.09	35.67	46.31	.6312	.0550	.0111	1.7309	95.39	96.04	61.77	41.67	-974.3	-447.8
50	5.15	7.80	7.31	15.08	36.19	45.68	.5209	.0993	.0196	1.7428	90.61	89.87	64.77	49.69	-1126.1	-579.1
70	5.92	7.75	5.33	11.28	35.94	49.30	.4994	.1343	.0254	1.7413	86.08	84.98	67.40	56.18	-1264.2	-712.2
85	5.80	7.02	4.02	10.26	35.35	43.17	.5019	.1804	.0340	1.7623	81.06	79.52	69.16	58.89	-1366.4	-783.8
90	5.91	6.98	5.02	8.68	35.15	40.57	.5131	.2109	.0379	1.7569	77.93	76.15	69.73	61.05	-1392.1	-802.6
95	6.05	6.95	6.66	6.69	34.95	37.54	.6203	.2366	.0399	1.7448	75.06	73.07	70.26	63.59	-1418.9	-827.0

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.1998	1.7616	88.11	89.00	34.91

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VØ-1 FT/SEC	VØ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/PT1	TT2/TT1
5	13.726	4.505	916.8	693.3	585.0	691.6	705.9	-48.2	50.7	-3.9	.7951	.5857	1.7468	1.2015
10	11.720	4.138	912.3	685.3	640.6	683.7	649.6	-47.7	46.6	-3.9	.7996	.5816	1.7620	1.1899
15	10.311	3.864	896.6	666.3	658.5	664.7	608.5	-46.4	42.9	-4.0	.7820	.5659	1.7406	1.1838
30	6.686	2.999	793.2	602.8	575.1	601.3	546.3	-42.0	43.6	-4.0	.6845	.5102	1.6928	1.1785
50	2.112	1.859	782.0	601.3	571.1	599.9	534.2	-41.9	43.1	-4.0	.6699	.5060	1.7025	1.1915
70	-1.924	.955	770.5	594.2	569.2	592.8	519.3	-41.4	42.4	-4.0	.6660	.4974	1.6985	1.2024
85	-4.634	.597	787.8	596.1	575.8	594.7	537.7	-41.6	43.1	-4.0	.6663	.4949	1.6964	1.2218
90	-5.548	.595	785.0	584.9	561.1	583.4	548.9	-40.8	44.5	-4.0	.6612	.4833	1.6835	1.2303
95	-6.547	.638	777.6	564.5	545.7	563.2	554.1	-37.4	45.6	-4.0	.6528	.4647	1.6636	1.2358

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	8.21	11.13	12.51	54.68	60.26	65.14	.4435	.1191	.0296	.9595	77.34	85.49	86.74
10	4.22	7.16	11.52	49.56	56.34	65.36	.4388	.1513	.0386	.9485	71.64	91.46	92.08
15	2.45	5.39	10.92	46.85	58.78	63.99	.4430	.1639	.0428	.9456	69.67	93.29	93.77
30	5.13	8.13	11.25	47.56	51.58	58.18	.4462	.0780	.0219	.9790	84.22	90.88	91.51
50	6.40	9.53	12.03	47.06	51.54	57.86	.4556	.0895	.0274	.9767	81.15	85.68	86.68
70	6.72	9.95	13.45	46.39	51.29	56.75	.4699	.0988	.0327	.9752	78.86	80.68	82.09
85	7.62	10.94	15.89	47.18	51.39	56.03	.5012	.1474	.0514	.9620	70.15	73.93	75.30
90	8.90	12.23	17.40	48.58	49.69	54.47	.5227	.1623	.0576	.9588	68.24	69.47	71.74
95	9.76	13.12	19.68	49.68	48.03	52.14	.5499	.1864	.0671	.9536	65.44	66.33	68.61

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
10007.	154.78	1.1998	1.7045	82.58	83.82

TABLE 8.3

BLADE ELEMENT AND OVERALL PERFORMANCE

90% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.816	15.428	520.6	910.8	520.6	574.2	.0	707.0	.0	50.7	.4766	.7914	763.4	864.0	.8460	.5172	924.0	595.3
10	13.224	13.267	531.7	897.3	531.7	622.0	.0	646.7	.0	45.9	.4873	.7822	807.1	891.9	.8858	.5829	966.5	668.6
15	10.546	11.176	542.6	873.5	542.6	633.0	.0	601.9	.0	43.4	.4978	.7618	850.8	919.8	.9257	.6178	1009.1	708.4
30	3.442	6.532	565.6	767.3	565.6	555.1	.0	529.8	.0	43.7	.5200	.6626	975.2	1003.6	1.0364	.6302	1127.3	729.8
50	-4.081	-1.002	577.4	728.7	577.4	535.2	.0	494.6	.0	42.7	.5314	.6248	1127.1	1115.3	1.1656	.7026	1266.4	819.6
70	-10.590	-7.192	572.9	686.9	572.9	518.4	.0	450.7	.0	40.8	.5271	.5862	1265.4	1227.0	1.2779	.7967	1389.0	933.5
85	-15.449	-11.951	560.6	678.0	560.6	508.0	.0	449.1	.0	40.8	.5152	.5752	1367.7	1310.8	1.3583	.8485	1478.1	1000.3
90	-16.521	-13.470	556.5	660.6	556.5	476.3	.0	457.8	.0	43.3	.5112	.5576	1393.4	1338.6	1.3782	.8451	1500.4	1001.3
95	-17.303	-14.817	552.4	636.7	552.4	438.2	.0	462.0	.0	46.1	.5072	.5348	1420.3	1366.6	1.3993	.8943	1523.9	1005.2

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC
5	.14	6.57	15.02	40.38	35.63	49.27	.5376	.1067	.0228	1.8024	93.99	93.49	55.56	15.18	-763.4	-157.0
10	.39	6.82	15.16	35.06	36.21	54.59	.4741	-.0037	-.0008	1.8151	100.25	100.29	56.44	21.39	-807.1	-245.2
15	.65	6.73	13.89	30.74	36.77	56.29	.4510	-.0414	-.0089	1.8024	102.85	103.11	57.29	26.56	-850.8	-317.9
30	1.80	5.87	10.58	19.34	37.92	49.71	.4849	.0520	.0107	1.6918	95.31	94.97	59.81	40.47	-975.2	-473.8
50	3.29	5.94	6.83	13.71	38.49	48.34	.4718	.0899	.0179	1.6776	90.65	89.97	62.91	49.20	-1127.1	-620.7
70	4.18	6.01	5.19	9.61	38.28	47.18	.4350	.1015	.0192	1.6547	88.04	87.18	65.66	56.04	-1265.4	-776.3
85	4.17	5.39	4.01	8.65	37.68	46.17	.4279	.1363	.0257	1.6582	83.47	82.28	67.53	58.88	-1367.7	-861.7
90	4.32	5.39	5.12	6.94	37.47	43.00	.4413	.1733	.0311	1.6429	79.03	77.55	68.15	61.16	-1393.4	-880.8
95	4.50	5.40	6.90	4.88	37.27	39.32	.4515	.2071	.0347	1.6217	74.85	73.11	68.70	63.83	-1420.3	-904.6

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.1814	1.6928	89.41	90.14	37.17

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/PT1	TT2/TT1
5	13.872	4.515	955.1	791.8	665.9	789.9	684.7	-55.1	46.1	-3.9	.8351	.6778	1.7279	1.1957
10	11.998	4.132	943.5	774.2	705.7	772.4	626.3	-53.9	41.8	-3.9	.8281	.6652	1.7234	1.1834
15	10.472	3.825	921.2	750.8	710.7	749.0	586.2	-52.2	39.7	-4.0	.8087	.6452	1.7061	1.1772
30	6.622	2.853	827.0	692.8	641.8	691.1	521.6	-48.3	39.1	-4.0	.7193	.5935	1.6619	1.1706
50	1.846	1.598	800.7	676.1	630.5	674.4	493.4	-47.1	38.0	-4.0	.6919	.5765	1.6569	1.1771
70	-2.272	.682	776.9	648.2	629.7	646.6	455.0	-45.2	35.9	-4.0	.6694	.5511	1.6299	1.1776
85	-4.827	.429	786.5	627.0	638.7	625.5	459.0	-43.7	35.8	-4.0	.6748	.5291	1.6034	1.1900
90	-5.666	.472	778.6	610.0	620.7	608.6	470.0	-42.6	37.3	-4.0	.6650	.5122	1.5844	1.1979
95	-6.602	.569	766.8	577.0	601.6	575.6	475.4	-40.2	38.5	-4.0	.6525	.4822	1.5529	1.2027

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	3.68	6.60	12.51	50.07	55.38	70.07	.3588	.1148	.0286	.9580	70.91	86.37	87.36
10	.43	3.36	11.52	45.78	59.96	69.59	.3580	.1391	.0355	.9498	65.94	91.70	92.30
15	-.76	2.18	10.92	43.64	61.07	67.97	.3615	.1433	.0374	.9499	65.40	93.01	93.50
30	.70	3.69	11.25	43.12	55.41	63.29	.3535	.0572	.0160	.9833	83.97	91.49	92.06
50	1.35	4.49	12.03	42.02	54.67	61.81	.3609	.0429	.0131	.9883	87.28	87.57	88.40
70	.20	3.43	13.45	39.87	54.59	59.06	.3788	.0559	.0185	.9855	84.29	84.31	85.33
85	.29	3.61	15.89	39.88	54.78	56.26	.4276	.1252	.0437	.9671	70.69	75.97	77.48
90	1.66	4.99	17.40	41.21	52.67	54.16	.4511	.1320	.0468	.9662	70.37	71.01	72.79
95	2.62	6.00	19.68	42.58	50.59	50.73	.4904	.1685	.0607	.9582	66.11	66.07	68.06

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
10016.	164.76	1.1814	1.6491	84.65	85.66

TABLE 8.4
BLADE ELEMENT AND OVERALL PERFORMANCE
90% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.821	15.429	536.4	925.9	536.4	624.1	.0	684.0	.0	47.4	.4918	.8088	762.1	862.6	.8645	.5670	932.0	649.2
10	13.215	13.276	548.0	911.9	548.0	666.8	.0	622.2	.0	42.8	.5029	.7994	805.8	890.4	.8943	.6300	974.4	718.7
15	10.538	11.228	559.2	875.7	559.2	657.2	.0	578.7	.0	41.2	.5138	.7664	849.4	918.3	.9343	.6476	1016.9	739.8
30	3.342	4.557	583.2	786.2	583.2	611.7	.0	493.8	.0	38.9	.5371	.6841	973.6	1002.0	1.0452	.6920	1134.9	795.2
50	~~-4.566~~	~~-1.161~~	~~594.6~~	~~717.1~~	~~594.6~~	~~567.9~~	~~.0~~	~~437.9~~	~~.0~~	~~37.6~~	~~.5482~~	~~.6199~~	~~1125.3~~	~~1113.5~~	~~1.1734~~	~~.7628~~	~~1272.7~~	~~882.5~~
70	-11.169	-7.483	587.9	676.1	587.9	552.4	.0	389.9	.0	35.0	.5417	.5828	1263.3	1225.0	1.2838	.8631	1393.4	1001.3
85	-16.029	-17.333	573.6	656.6	573.6	537.7	.0	376.8	.0	34.4	.5277	.5635	1365.5	1308.7	1.3627	.9234	1481.0	1075.8
90	-17.006	-13.792	569.3	627.6	569.3	496.0	.0	384.6	.0	37.3	.5235	.5356	1391.1	1336.4	1.3823	.9160	1503.1	1073.3
95	-17.549	-15.000	565.4	595.9	565.4	453.0	.0	387.2	.0	40.1	.5198	.5060	1418.0	1364.4	1.4034	.9147	1526.6	1077.1

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC
5	-.71	5.72	15.69	38.86	36.46	51.71	.4790	.1281	.0273	1.7522	92.37	91.77	54.72	15.86	-762.1	-178.6
10	-.46	5.97	15.57	33.81	37.04	56.46	.4227	.0177	.0038	1.7615	98.81	98.73	55.60	21.79	-805.8	-268.3
15	-.18	5.90	14.56	29.24	37.60	56.10	.4207	.0141	.0030	1.7252	98.89	98.82	56.46	27.22	-849.4	-339.6
30	.99	5.06	9.82	19.29	38.77	52.80	.4246	.0473	.0098	1.6358	95.36	95.05	~~58.99~~	~~39.71~~	~~-973.6~~	~~-908.1~~
50	2.57	5.23	7.55	12.26	39.30	49.13	.4139	.0916	.0180	1.5741	89.12	88.43	62.20	49.92	-1125.3	-678.5
70	3.63	5.46	5.46	8.79	38.99	47.96	.3751	.0962	.0181	1.5431	86.88	86.08	65.10	56.31	-1263.3	-835.2
85	3.73	4.95	4.59	7.63	38.31	46.53	.3615	.1220	.0226	1.5288	82.52	81.47	67.09	59.46	-1365.5	-931.8
90	3.89	4.96	6.04	5.64	38.10	42.51	.3773	.1672	.0291	1.5013	76.08	74.71	67.72	62.08	-1391.1	-951.9
95	4.04	4.94	7.90	3.42	37.91	38.51	.3873	.2042	.0329	1.4731	70.66	69.05	68.25	64.83	-1418.0	-977.2

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WCI/AI INLET LBM/SEC SQFT
1.1621	1.5976	88.35	89.07	37.90

STATOR

% Span	~~EPSI-1~~ DEGREE	~~EPSI-2~~ DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	~~PT2/~~ PT1	~~TT2/~~ TT1
5	13.982	4.484	985.3	897.4	729.3	897.3	662.5	-11.8	42.6	-.7	.8681	.7808	1.6721	1.1891
10	12.160	4.058	972.3	884.9	762.7	883.7	603.0	-46.4	38.6	-3.0	.8599	.7734	1.6782	1.1761
15	10.697	3.683	940.0	861.4	752.3	858.1	563.6	-75.4	37.0	-5.0	.8302	.7528	1.6603	1.1699
30	6.798	2.609	861.4	799.4	710.9	794.1	486.4	-91.7	34.4	-6.6	.7567	.6968	1.6079	1.1586
50	~~2.123~~	~~1.384~~	~~805.2~~	~~744.9~~	~~676.6~~	~~740.6~~	~~436.5~~	~~-80.0~~	32.8	-6.2	.7030	~~.6452~~	~~1.5564~~	~~1.1642~~
70	-1.986	.551	781.4	707.3	675.2	703.3	393.4	-75.1	30.2	-6.1	.6814	.6117	1.5168	1.1531
85	-4.484	.385	781.8	670.9	680.7	668.1	384.5	-60.8	29.5	-5.2	.6801	.5763	1.4741	1.1594
90	-5.385	.440	765.7	651.0	656.4	649.5	394.2	-44.4	31.1	-3.9	.6627	.5565	1.4520	1.1660
95	-6.457	.556	748.5	610.5	633.7	609.7	398.3	-30.7	32.3	-2.9	.6453	.5191	1.4136	1.1697

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	.15	3.07	15.70	43.35	57.85	72.38	.2545	.1196	.0298	.9536	45.71	83.63	84.74
10	-2.81	.12	12.50	41.55	61.75	72.70	.2525	.1138	.0291	.9567	46.50	90.52	91.16
15	-3.42	-.48	9.89	42.00	61.34	71.20	.2556	.0950	.0248	.9656	51.91	91.72	92.27
30	~~-4.02~~	~~-1.02~~	~~8.87~~	~~40.99~~	~~58.52~~	66.85	.2561	.0476	.0133	.9850	~~71.13~~	~~91.61~~	~~92.13~~
50	-3.86	-.73	9.87	38.96	55.64	62.41	.2689	.0346	.0106	.9903	79.58	86.25	87.05
70	-5.43	-2.20	11.35	36.33	55.32	59.07	.2924	.0594	.0196	.9842	72.19	82.56	83.53
85	-5.97	-2.66	14.68	34.73	55.07	55.31	.3404	.1245	.0434	.9670	59.18	73.61	74.98
90	-4.51	-1.18	17.49	35.01	52.38	53.22	.3529	.1183	.0420	.9699	62.86	67.79	69.40
95	-3.56	-.19	20.80	35.20	50.01	49.41	.3909	.1631	.0588	.9604	57.56	61.28	63.08

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
10000.	168.01	1.1621	1.5599	83.56	84.53

TABLE 8.5
BLADE ELEMENT AND OVERALL PERFORMANCE
90% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.808	16.432	545.5	938.6	545.5	650.0	.0	677.2	.0	46.0	.5005	.6222	760.5	860.7	.8588	.5916	935.9	675.4
10	13.183	13.290	557.3	929.5	557.3	689.1	.0	623.8	.0	42.0	.5119	.8168	804.1	888.6	.8987	.6487	978.3	738.2
15	10.522	11.282	568.6	885.7	568.6	666.8	.0	582.9	.0	41.0	.5229	.7759	847.6	916.4	.9386	.6532	1020.6	745.6
30	3.415	5.691	593.5	800.2	593.5	632.7	.0	489.9	.0	37.7	.5471	.6980	971.6	999.9	1.0496	.7088	1138.5	812.6
50	-4.608	-1.062	606.3	731.8	606.3	592.7	.0	429.1	.0	35.9	.5596	.6345	1122.9	1111.1	1.1780	.7835	1276.2	903.6
70	-11.439	-7.568	599.2	682.6	599.2	572.7	.0	371.4	.0	32.8	.5527	.5908	1260.7	1222.4	1.2875	.8878	1395.8	1025.8
85	-16.279	-12.519	583.6	649.3	583.6	547.4	.0	349.3	.0	32.0	.5375	.5600	1362.6	1305.9	1.3652	.9505	1482.3	1102.1
90	-17.205	-13.953	579.1	615.6	579.1	504.5	.0	352.8	.0	34.5	.5331	.5281	1388.2	1333.6	1.3846	.9463	1504.1	1103.0
95	-17.660	-15.097	575.2	577.9	575.2	457.7	.0	362.9	.0	37.3	.5293	.4935	1415.0	1361.5	1.4055	.9457	1527.4	1107.6

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	-1.22	5.21	15.50	38.59	36.92	52.98	.4518	.1324	.0282	1.7371	91.96	91.33	54.20	15.66	-760.5	-183.6
10	-.97	5.46	14.67	34.20	37.51	57.32	.4058	.0315	.0068	1.7523	97.83	97.68	55.09	20.90	-804.1	-264.8
15	-.68	5.40	13.81	29.49	38.07	56.74	.4183	.0525	.0113	1.7019	95.96	95.67	55.96	26.47	-847.6	-333.5
30	.49	4.56	8.97	19.61	39.25	53.65	.4100	.0579	.0122	1.6189	94.24	93.86	58.50	38.87	-971.6	-509.9
50	2.06	4.72	6.61	12.71	39.83	50.43	.3971	.0922	.0185	1.5567	88.77	88.07	61.69	48.98	-1122.9	-682.0
70	3.19	5.01	5.01	8.80	39.51	48.90	.3548	.0896	.0171	1.5145	87.15	86.40	64.66	55.86	-1260.7	-851.0
85	3.35	4.58	4.81	7.03	38.79	46.54	.3381	.1134	.0209	1.4839	82.51	81.54	66.71	59.68	-1362.6	-956.6
90	3.52	4.59	6.37	4.96	38.57	42.48	.3506	.1560	.0269	1.4520	75.80	74.53	67.35	62.40	-1388.2	-980.9
95	3.67	4.57	8.38	2.57	38.38	38.21	.3595	.1933	.0306	1.4193	69.74	68.24	67.88	65.30	-1415.0	-1008.6

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	ACI/AI LBM/SEC SQFT
1.1566	1.5714	87.99	88.70	38.38

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	14.092	4.544	1003.1	996.9	758.9	994.5	655.9	-69.3	41.2	-3.9	.8872	.8809	1.6065	1.1868
10	12.331	4.112	994.5	1011.3	789.3	1008.8	605.0	-70.4	37.7	-3.9	.8825	.9001	1.6626	1.1768
15	10.817	3.681	956.2	986.1	769.4	983.7	567.7	-68.6	36.6	-4.0	.8462	.8769	1.6407	1.1707
30	6.737	2.494	882.0	907.6	738.3	905.4	482.5	-63.2	33.2	-4.0	.7775	.8031	1.5579	1.1569
50	2.096	1.274	826.4	847.5	707.1	845.5	427.7	-59.1	31.2	-4.0	.7246	.7454	1.4934	1.1526
70	-1.733	.585	795.6	790.2	701.8	788.3	374.8	-55.1	28.1	-4.0	.6974	.6924	1.4257	1.1453
85	-4.047	.537	785.5	758.5	700.0	756.6	356.3	-52.9	27.0	-4.0	.6874	.6616	1.3874	1.1468
90	-5.004	.583	766.3	748.3	675.8	746.4	361.3	-52.2	28.2	-4.0	.6677	.6505	1.3745	1.1513
95	-6.214	.642	745.3	724.5	650.8	722.7	363.0	-50.5	29.3	-4.0	.6468	.6273	1.3484	1.1542

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	-1.26	1.66	12.51	45.18	58.93	71.78	.1821	.1898	.0472	.9240	********	77.61	79.02
10	-3.65	-.72	11.52	41.68	62.46	74.89	.1489	.1169	.0298	.9536	343.19	88.40	89.18
15	-3.83	-.89	10.92	40.51	61.13	73.72	.1371	.0896	.0234	.9667	196.53	88.97	89.69
30	-5.23	-2.23	11.25	37.19	59.38	68.85	.1393	.1079	.0302	.9647	226.73	86.08	86.89
50	-5.52	-2.38	12.03	35.15	56.87	64.38	.1511	.1322	.0404	.9613	305.50	79.60	80.69
70	-7.56	-4.33	13.45	32.11	56.24	59.70	.1839	.2061	.0681	.9430	-921.35	73.41	74.67
85	-8.47	-5.16	15.89	31.03	55.29	56.76	.2154	.2339	.0816	.9368	-215.76	66.82	68.28
90	-7.39	-4.06	17.40	32.28	52.65	55.63	.2149	.2019	.0716	.9478	-300.75	62.94	64.53
95	-6.58	-3.21	19.68	33.29	50.11	53.43	.2281	.2053	.0739	.9498	-237.74	57.85	59.55

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
9979.	170.16	1.1566	1.4967	77.95	79.14

TABLE 8.6
BLADE ELEMENT AND OVERALL PERFORMANCE
90% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.805	15.426	546.2	947.6	546.2	654.3	.0	685.6	.0	46.1	.5012	.8301	762.1	862.6	.8604	.5938	937.6	677.9
10	13.153	13.267	558.1	934.7	558.1	706.2	.0	612.3	.0	40.7	.5127	.8231	805.8	890.4	.9004	.6684	980.1	759.0
15	10.442	11.250	569.5	887.8	569.5	674.1	.0	577.7	.0	40.5	.5237	.7784	849.4	918.3	.9405	.6622	1022.6	755.3
30	3.314	5.658	594.1	804.6	594.1	635.6	.0	493.2	.0	37.8	.5477	.7017	973.6	1002.0	1.0515	.7101	1140.5	814.2
50	-4.694	-1.109	605.2	729.2	606.2	592.8	.0	424.7	.0	35.6	.5596	.6325	1125.3	1113.5	1.1799	.7882	1278.2	908.9
70	-11.462	-7.606	598.8	682.9	598.8	574.2	.0	369.6	.0	32.6	.5523	.5912	1263.3	1225.0	1.2895	.8919	1398.1	1030.3
85	-15.293	-12.535	583.1	657.7	583.1	552.2	.0	357.3	.0	32.3	.5370	.5667	1365.5	1308.7	1.3673	.9478	1484.8	1100.8
90	-17.233	-13.956	578.5	624.7	578.5	509.0	.0	362.2	.0	35.0	.5325	.5353	1391.1	1336.4	1.3858	.9419	1506.6	1099.2
95	-17.686	-15.105	574.6	585.6	574.6	459.5	.0	363.1	.0	38.0	.5288	.4993	1418.0	1364.4	1.4078	.9392	1530.0	1101.7

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	-1.20	5.23	14.87	39.19	36.95	53.20	.4524	.1382	.0296	1.7468	91.68	91.03	54.23	15.04	-762.1	-177.1
10	-.95	5.48	15.15	33.74	37.55	58.85	.3834	-.0009	-.0002	1.7592	100.02	100.04	55.11	21.37	-805.8	-278.1
15	-.57	5.91	14.04	29.26	39.11	56.27	.4093	.0454	.0098	1.7006	96.43	96.18	55.97	26.70	-849.4	-340.6
30	.52	4.59	8.78	19.86	39.27	53.68	.4109	.0667	.0140	1.6182	93.38	92.94	58.52	38.67	-973.6	-508.7
50	2.12	4.77	6.88	12.49	39.93	50.23	.3932	.0957	.0191	1.5470	88.20	87.48	61.74	49.26	-1125.3	-688.8
70	3.25	5.08	5.08	8.79	39.49	48.79	.3523	.0948	.0180	1.5069	86.32	85.53	64.72	55.93	-1263.3	-855.4
85	3.42	4.64	4.46	7.45	38.76	46.62	.3426	.1281	.0238	1.4833	80.54	79.46	66.78	59.33	-1365.5	-951.3
90	3.59	4.66	6.00	5.38	38.55	42.54	.3565	.1721	.0300	1.4517	73.78	72.41	67.41	62.03	-1391.1	-974.3
95	3.73	4.63	8.13	2.88	38.36	38.05	.3669	.2114	.0333	1.4175	67.53	65.94	67.94	65.06	-1418.0	-1001.3

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.1575	1.5684	87.10	87.87	38.39

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/PT1	TT2/TT1
5	14.089	4.539	1012.9	1012.5	764.9	1011.8	663.9	-37.9	41.3	-2.1	.8961	.8958	1.6132	1.1894
10	12.374	4.126	1000.2	1020.8	804.7	1017.8	594.1	-78.1	36.7	-4.3	.8896	.9112	1.6639	1.1741
15	10.912	3.707	959.3	997.0	776.9	990.9	563.0	-110.4	36.1	-6.3	.8498	.8884	1.6430	1.1700
30	6.847	2.526	887.1	920.1	742.3	911.8	485.8	-123.2	33.3	-7.7	.7921	.8151	1.5622	1.1581
50	2.195	1.319	825.3	851.5	708.5	845.6	423.3	-99.9	30.8	-6.7	.7240	.7497	1.4880	1.1513
70	-1.664	.636	797.3	797.7	704.7	792.2	372.9	-93.7	27.9	-6.7	.6991	.6997	1.4257	1.1450
85	-4.038	.596	794.5	775.0	706.0	770.9	364.4	-79.6	27.4	-5.9	.6949	.6761	1.3964	1.1506
90	-5.012	.573	776.1	760.1	681.7	757.4	370.9	-64.0	28.6	-4.8	.6756	.6603	1.3778	1.1557
95	-6.224	.629	754.0	725.8	655.0	724.0	373.5	-51.0	29.8	-4.0	.6536	.6272	1.3404	1.1590

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	-1.14	1.78	14.33	43.44	59.19	72.34	.1684	.1902	.0474	.9228	*******	77.26	78.71
10	-4.69	-1.75	11.13	41.04	63.72	75.13	.1434	.1210	.0309	.9514	318.97	89.91	90.59
15	-4.31	-1.37	8.57	42.44	61.57	73.75	.1396	.0839	.0219	.9686	173.02	89.62	90.29
30	-5.19	-2.19	7.57	40.91	59.42	68.85	.1502	.0972	.0271	.9679	189.94	85.94	86.77
50	-5.83	-2.69	9.30	37.57	56.72	64.04	.1591	.1241	.0378	.9636	253.54	79.48	80.56
70	-7.77	-4.54	10.70	34.64	56.15	59.73	.1920	.1890	.0622	.9475	*******	73.55	74.90
85	-8.14	-4.83	13.99	33.25	55.30	57.50	.2190	.2065	.0719	.9432	-290.10	66.52	68.02
90	-6.96	-3.53	16.57	33.47	52.65	56.03	.2193	.1886	.0658	.9504	-322.22	61.65	63.30
95	-6.04	-2.67	19.65	33.87	49.96	52.98	.2404	.2198	.0791	.9454	-188.28	54.93	56.71

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
10000.	170.18	1.1575	1.4975	77.63	78.84

TABLE 9.1
BLADE ELEMENT AND OVERALL PERFORMANCE
100% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VØ-1 FT/SEC	VØ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.968	15.471	547.1	977.4	547.1	528.9	.0	822.3	.0	57.1	.5021	.8360	839.7	950.3	.9197	.4650	1002.2	643.7
10	13.501	13.337	559.1	964.3	559.1	587.1	.0	765.0	.0	52.3	.5137	.8270	887.7	981.0	.9639	.5365	1049.1	625.6
15	10.841	11.271	571.4	945.1	571.4	629.3	.0	705.1	.0	48.1	.5257	.8128	935.8	1011.8	1.0086	.6020	1096.5	700.0
30	3.689	5.658	598.3	836.3	598.3	537.3	.0	640.9	.0	50.0	.5518	.7097	1072.7	1103.9	1.1328	.6019	1228.2	709.3
50	-3.873	-.865	612.9	816.7	612.9	526.4	.0	624.4	.0	49.8	.5662	.6857	1239.8	1226.8	1.2775	.6717	1383.0	800.0
70	-10.612	-7.177	608.3	782.0	608.3	506.2	.0	596.1	.0	49.4	.5616	.6506	1391.9	1349.6	1.4024	.7553	1519.0	907.8
85	-15.621	-12.060	599.0	785.7	599.0	491.4	.0	613.1	.0	50.6	.5477	.6468	1504.4	1441.8	1.4911	.7932	1617.4	963.4
90	-16.687	-13.587	589.4	773.8	589.4	453.9	.0	626.6	.0	53.6	.5431	.6329	1532.7	1472.4	1.5131	.7852	1642.1	959.9
95	-17.401	-14.896	585.0	755.2	585.0	411.7	.0	633.1	.0	56.6	.5388	.6142	1562.3	1503.2	1.5365	.7829	1668.2	962.6

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC
5	1.37	7.80	13.36	43.26	37.00	47.57	.6510	.1760	.0379	2.0421	91.11	90.19	56.79	13.53	-839.7	-128.1
10	1.60	8.03	13.86	37.57	37.60	54.32	.5819	.0694	.0151	2.0682	96.16	95.76	57.65	20.08	-887.7	-216.0
15	1.80	7.88	13.21	32.56	38.20	59.59	.5291	-.0187	-.0041	2.0754	101.12	101.25	58.44	25.88	-935.8	-306.6
30	2.77	6.84	10.86	20.03	39.47	51.51	.5671	.0826	.0169	1.9556	93.60	92.98	60.78	40.75	-1072.7	-463.0
50	4.10	6.75	6.45	14.90	40.13	51.32	.5584	.1297	.0251	1.9877	89.25	88.19	63.72	48.82	-1239.8	-602.4
70	4.94	6.76	5.03	10.53	39.93	49.91	.5322	.1548	.0295	1.9871	85.39	83.94	66.41	55.88	-1391.9	-753.6
85	4.93	6.16	3.87	9.56	39.27	48.41	.5367	.2051	.0388	2.0209	80.45	78.46	68.29	58.74	-1504.4	-828.7
90	5.08	6.15	5.32	7.55	39.06	44.45	.5526	.2415	.0431	2.0121	77.01	74.69	68.91	61.35	-1532.7	-845.8
95	5.23	6.13	7.43	5.08	38.85	40.13	.5628	.2724	.0447	1.9952	74.00	71.41	69.44	64.36	-1562.3	-870.1

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.2535	2.0009	86.32	87.57	38.70

STATOR

RUN NO454, SPEED CODE 10, POINT NO 36

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VØ-1 FT/SEC	VØ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/PT1	TT2/TT1
5	13.651	4.441	1006.8	724.1	616.1	722.6	796.3	46.4	52.6	-3.6	.8648	.6009	1.9529	1.2501
10	11.543	4.037	997.2	707.1	668.9	706.7	739.7	-22.0	48.1	-1.8	.8597	.5891	1.9476	1.2371
15	10.104	3.747	978.2	686.6	696.6	683.5	686.7	-65.0	44.7	-5.4	.8452	.5731	1.9334	1.2282
30	6.484	2.866	881.3	634.0	614.8	631.0	631.4	-61.6	46.8	-5.6	.7520	.5268	1.8917	1.2271
50	1.938	1.699	874.2	649.0	612.8	647.3	623.4	-47.4	45.5	-4.2	.7389	.5357	1.9198	1.2462
70	-1.969	.811	856.9	639.0	609.4	636.9	602.5	-51.4	44.7	-4.6	.7189	.5242	1.9103	1.2586
85	-4.462	.538	877.5	642.1	614.3	640.0	626.6	-51.7	45.7	-4.6	.7298	.5213	1.9069	1.2845
90	-5.342	.564	873.6	632.5	591.5	631.2	642.9	-40.3	47.5	-3.7	.7224	.5105	1.8928	1.2967
95	-6.396	.624	864.8	612.5	568.8	611.7	651.4	-31.5	49.0	-2.9	.7117	.4920	1.8694	1.3050

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	10.12	13.04	20.07	48.96	54.31	72.52	.4599	.1180	.0294	.9546	80.64	84.13	85.53
10	6.68	9.61	13.70	49.83	60.52	71.93	.4787	.1587	.0406	.9394	74.48	88.40	89.41
15	4.28	7.22	9.48	50.12	64.31	70.18	.4935	.1714	.0447	.9362	72.60	90.73	91.53
30	7.35	10.35	9.68	51.35	57.27	64.99	.4985	.0984	.0275	.9693	82.91	87.88	88.90
50	8.80	11.94	11.84	49.66	57.72	66.33	.4917	.1139	.0348	.9654	78.71	83.09	84.54
70	9.02	12.25	12.83	49.30	57.56	64.68	.5072	.1339	.0442	.9610	74.43	78.46	80.30
85	10.15	13.46	15.27	50.27	57.44	63.66	.5395	.1913	.0667	.9429	65.04	71.06	73.52
90	11.90	15.24	17.75	51.16	54.76	62.05	.5548	.2005	.0712	.9412	63.97	67.31	70.05
95	13.17	16.54	20.73	51.90	52.26	59.54	.5772	.2203	.0794	.9369	61.90	64.06	67.02

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
11017.	171.58	1.2535	1.9116	80.11	81.81

TABLE 9.2
BLADE ELEMENT AND OVERALL PERFORMANCE
100% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.915	15.459	562.9	976.7	562.9	547.9	.0	808.6	.0	55.7	.5173	.8357	850.3	962.4	.9372	.4869	1019.7	569.1
10	13.399	13.314	575.5	961.3	575.5	608.8	.0	744.0	.0	50.5	.5296	.8254	899.0	993.5	.9822	.5649	1067.4	657.9
15	10.710	11.237	588.3	942.9	588.3	641.4	.0	691.2	.0	47.0	.5420	.8112	947.7	1024.6	1.0277	.6219	1115.4	722.9
30	3.599	5.637	615.6	832.3	615.6	539.5	.0	633.8	.0	49.6	.5688	.7059	1086.3	1117.9	1.1536	.6147	1248.6	724.8
50	-3.795	-.825	630.5	815.3	630.5	533.9	.0	616.1	.0	49.1	.5835	.6845	1255.5	1242.4	1.3002	.6909	1405.0	822.9
70	-10.499	-7.128	626.1	776.2	626.1	518.6	.0	577.6	.0	47.8	.5792	.6467	1409.5	1366.8	1.4267	.7867	1542.3	944.3
85	-15.518	-12.003	611.4	778.0	611.4	501.1	.0	595.2	.0	49.2	.5646	.6413	1523.5	1460.1	1.5161	.8239	1641.6	999.6
90	-16.582	-13.522	606.5	766.3	606.5	465.9	.0	608.3	.0	52.1	.5599	.6276	1552.1	1491.1	1.5383	.8176	1666.4	998.2
95	-17.331	-14.848	601.9	748.1	601.9	427.4	.0	614.0	.0	54.8	.5553	.6094	1582.1	1522.3	1.5618	.8177	1692.7	1003.8

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC
5	.94	7.37	15.41	40.79	37.79	49.57	.6292	.1554	.0332	2.0500	91.94	91.11	56.37	15.58	-850.3	-153.8
10	1.16	7.59	15.94	35.06	38.40	56.64	.5546	.0405	.0087	2.0712	97.68	97.44	57.22	22.16	-899.0	-249.5
15	1.37	7.45	14.70	30.65	39.00	60.91	.5092	-.0301	-.0064	2.0764	101.86	102.07	58.01	27.36	-947.7	-333.4
30	2.38	6.45	12.01	18.49	40.25	51.65	.5604	.0888	.0178	1.9485	92.96	92.29	60.39	41.90	-1086.3	-484.1
50	3.73	6.39	7.15	13.84	40.90	51.95	.5469	.1260	.0250	1.9821	88.95	87.85	63.36	49.52	-1255.5	-626.2
70	4.59	6.41	5.62	9.59	40.71	51.11	.5114	.1491	.0270	1.9742	86.01	84.64	66.06	56.46	-1409.5	-789.2
85	4.60	5.83	4.46	8.64	40.06	49.25	.5173	.1980	.0368	2.0024	80.60	78.66	67.96	59.33	-1523.5	-865.0
90	4.76	5.83	5.71	6.84	39.84	45.52	.5319	.2340	.0412	1.9933	77.13	74.86	68.58	61.75	-1552.1	-882.8
95	4.93	5.83	7.55	4.65	39.63	41.56	.5405	.2636	.0431	1.9767	74.16	71.63	69.13	64.48	-1582.1	-908.3

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.2512	1.9928	86.57	87.78	39.48

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	13.730	4.488	1009.5	733.1	637.1	731.9	783.0	41.2	51.2	3.2	.8678	.6091	1.9557	1.2490
10	11.708	4.116	997.1	713.6	690.1	713.1	719.8	-27.4	46.4	-2.2	.8610	.5956	1.9482	1.2344
15	10.312	3.853	979.1	692.2	710.7	688.7	673.5	-69.9	43.6	-5.7	.8467	.5784	1.9326	1.2269
30	6.694	3.011	880.7	639.1	621.0	636.0	624.5	-63.0	45.2	-5.6	.7513	.5313	1.8911	1.2273
50	2.022	1.835	876.4	654.9	624.2	653.3	615.1	-45.9	44.6	-4.0	.7410	.5410	1.9222	1.2458
70	-1.920	.932	855.9	639.5	625.9	637.2	583.7	-53.9	43.0	-4.8	.7194	.5257	1.9088	1.2535
85	-4.467	.601	875.8	636.9	629.9	635.1	608.5	-47.8	44.1	-4.3	.7297	.5179	1.8995	1.2796
90	-5.387	.595	872.4	623.6	609.4	622.8	624.3	-32.7	45.8	-3.0	.7228	.5040	1.8817	1.2917
95	-6.444	.635	864.2	600.7	589.7	600.4	631.8	-19.4	47.2	-1.8	.7129	.4831	1.8558	1.2996

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	8.73	11.65	19.62	48.01	56.29	73.28	.4505	.1219	.0303	.9529	79.61	84.70	86.05
10	5.02	7.96	13.29	48.59	62.63	72.50	.4696	.1598	.0408	.9388	73.90	89.47	90.39
15	3.17	6.11	9.12	49.37	65.65	70.56	.4872	.1752	.0457	.9344	71.73	91.19	91.95
30	6.76	9.76	9.60	50.84	57.64	68.33	.4912	.0904	.0253	.9718	84.09	87.74	88.77
50	7.89	11.03	12.01	48.58	58.55	66.87	.4826	.1000	.0306	.9695	81.04	83.41	84.84
70	7.34	10.58	12.61	47.86	58.94	64.86	.4996	.1192	.0377	.9667	78.13	79.92	81.63
85	8.59	11.91	15.58	48.40	58.57	63.27	.5355	.1740	.0607	.9481	68.68	71.83	74.21
90	10.21	13.55	18.40	48.82	56.09	61.29	.5534	.1889	.0671	.9445	66.99	67.79	70.47
95	11.28	14.65	21.83	49.00	53.86	58.50	.5773	.2129	.0768	.9389	64.50	64.39	67.29

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
11157.	175.01	1.2512	1.9096	80.71	82.35

TABLE 9.3
BLADE ELEMENT AND OVERALL PERFORMANCE
100% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VØ-1 FT/SEC	VØ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.961	15.480	571.8	965.9	571.8	533.0	.0	805.5	.0	56.3	.5259	.8259	846.6	958.2	.9398	.4741	1021.6	554.5
10	13.478	13.339	584.8	955.1	584.8	605.1	.0	738.9	.0	50.5	.5386	.8204	895.1	989.2	.9848	.5625	1069.2	654.8
15	10.828	11.286	598.1	990.7	598.1	641.2	.0	688.3	.0	46.9	.5516	.8098	943.6	1020.2	1.0304	.6215	1117.2	722.0
30	3.881	5.782	627.6	834.9	627.6	547.7	.0	632.8	.0	49.1	.5807	.7106	1081.6	1113.1	1.1569	.6185	1250.5	728.5
50	-3.352	-.587	646.0	813.1	646.0	534.3	.0	612.9	.0	48.9	.5988	.6832	1250.1	1237.0	1.3044	.6902	1407.1	821.5
70	-9.989	-6.012	644.4	775.3	644.4	527.8	.0	567.9	.0	46.8	.5973	.6473	~~1403.4~~	~~1360.9~~	~~1.4314~~	~~.7953~~	~~1544.3~~	~~952.5~~
85	-15.141	-11.709	630.6	773.7	630.6	512.8	.0	579.4	.0	47.8	.5836	.6398	1516.9	1453.8	1.5203	.8382	1642.8	1013.6
90	-16.293	-13.293	625.6	761.7	625.6	479.5	.0	591.2	.0	50.4	.5786	.6256	1545.4	1484.7	1.5421	.8334	1667.2	1014.0
95	-17.193	-14.725	620.5	741.2	620.5	439.8	.0	596.7	.0	53.2	.5736	.6058	1576.3	1515.7	1.5651	.8327	1693.1	1018.9

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC
5	.92	6.85	15.72	39.96	38.22	48.10	.6429	.1687	.0359	2.0269	91.16	90.26	55.85	15.89	-846.6	-152.8
10	.64	7.07	16.12	34.35	38.84	56.26	.5560	.0379	.0081	2.0583	97.85	97.63	54.70	22.39	-895.1	-250.3
15	.84	6.92	14.60	30.21	39.46	60.90	.5087	-.0366	-.0079	2.0711	102.30	102.56	57.48	27.26	-943.6	-331.9
30	1.80	5.87	11.36	18.55	40.78	52.59	.5559	.0737	.0149	1.9583	94.17	93.61	59.81	41.25	-1081.6	-480.3
50	3.06	5.72	7.03	13.29	41.55	52.21	.5464	.1148	.0228	1.9855	89.94	88.94	~~62.69~~	~~49.40~~	~~-1250.1~~	~~-624.0~~
70	3.84	5.66	5.26	9.20	41.49	52.49	.5034	.1196	.0226	1.9844	88.33	87.17	65.31	56.11	-1403.4	-793.0
85	3.85	5.08	4.12	8.23	40.90	51.00	.5049	.1679	.0315	2.0105	83.35	81.67	67.21	58.99	-1516.9	-874.4
90	4.03	5.10	5.29	6.54	40.69	47.41	.5184	.2035	.0343	2.0008	79.84	77.82	67.86	61.32	-1545.4	-893.4
95	4.24	5.19	7.16	4.35	40.47	43.28	.5277	.2349	.0389	1.9815	76.63	74.32	68.45	64.09	-1575.3	-919.1

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.2473	1.9956	88.13	89.21	40.09

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VØ-1 FT/SEC	VØ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/PT1	TT2/TT1
5	13.639	4.480	998.6	725.6	623.7	723.8	779.9	-50.5	51.7	-3.9	.8580	.6030	1.9497	1.2468
10	11.525	4.107	991.6	712.2	688.8	710.4	713.3	-49.5	46.2	-3.9	.8567	.5950	1.9501	1.2316
15	10.056	3.824	976.7	692.6	710.0	690.9	670.8	-48.2	43.5	-4.0	.8452	.5792	1.9370	1.2250
30	6.266	2.720	885.8	643.1	629.2	641.5	623.5	-44.8	44.8	-4.0	.7566	.5351	1.8986	1.2260
50	1.555	1.759	876.7	657.3	627.4	656.7	612.4	-45.8	44.3	-4.0	.7420	.5435	1.9272	1.2437
70	-2.373	.886	858.5	651.4	638.4	450.2	574.0	-45.5	42.0	-4.0	.7235	.5377	~~1.9259~~	~~1.2403~~
85	-4.815	.565	876.7	651.8	645.7	450.3	593.0	-45.5	42.7	-4.0	.7332	.5325	1.9193	1.2715
90	-5.641	.568	872.7	639.4	626.8	437.8	607.3	-44.6	44.2	-4.0	.7259	.5193	1.9016	1.2827
95	-6.576	.620	863.8	615.4	607.5	414.0	614.1	-42.9	45.5	-4.0	.7154	.4975	1.8735	1.2900

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	9.20	12.12	12.51	55.59	55.00	72.63	.4751	.1053	.0262	.9599	82.34	85.03	86.35
10	4.80	7.74	11.52	50.14	62.52	72.51	.4730	.1451	.0370	.9448	76.16	90.70	91.62
15	3.06	6.00	10.92	47.46	65.59	71.02	.4789	.1633	.0427	.9391	73.52	92.28	92.95
30	6.32	9.31	11.25	48.74	58.53	66.10	.4833	.0908	.0255	.9713	84.02	88.85	89.79
50	7.61	10.74	12.03	48.27	59.02	67.32	.4792	.0973	.0297	.9702	81.41	~~84.51~~	~~85.85~~
70	6.31	9.55	13.45	45.98	60.52	66.67	.4798	.1013	.0335	.9702	79.82	82.85	84.33
85	7.14	10.48	15.69	46.67	60.55	65.40	.5120	.1533	.0535	.9539	71.09	75.31	77.43
90	8.63	11.96	17.40	48.23	58.18	63.41	.5334	.1646	.0584	.9514	69.80	71.23	73.44
95	9.62	13.00	19.68	49.50	55.94	60.44	.5625	.1881	.0677	.9457	67.26	67.64	70.32

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
11109.	177.72	1.2473	1.9195	82.70	84.19

TABLE 9.4
BLADE ELEMENT AND OVERALL PERFORMANCE
100% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VØ-1 FT/SEC	VØ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.845	15.462	585.2	985.0	585.2	598.3	.0	782.4	.0	52.4	.5390	.8475	843.9	955.1	.9459	.5359	1026.9	622.8
10	13.289	13.328	598.7	972.4	598.7	642.8	.0	729.6	.0	48.4	.5522	.8386	892.2	986.0	.9910	.5969	1074.4	692.1
15	10.627	11.258	612.1	949.7	612.1	668.1	.0	675.0	.0	45.2	.5654	.8205	940.5	1016.8	1.0365	.6484	1122.2	750.5
30	3.455	5.605	641.6	841.2	641.6	585.8	.0	603.7	.0	45.9	.5945	.7181	1078.1	1109.5	1.1624	.6607	1254.5	779.0
50	-4.356	-1.046	657.1	818.3	657.1	575.4	.0	581.9	.0	45.3	.6099	.6919	1246.0	1233.0	1.3075	.7347	1408.7	868.9
70	-11.255	-7.488	649.8	751.9	649.8	544.4	.0	518.6	.0	43.4	.6026	.6323	1398.9	1356.4	1.4305	.8403	1542.4	979.2
85	-16.047	-12.319	632.8	737.1	632.8	516.3	.0	526.1	.0	44.9	.5858	.6139	1512.0	1449.1	1.5172	.8807	1639.1	1057.5
90	-16.970	-13.744	627.8	721.0	627.8	478.2	.0	539.5	.0	46.0	.5809	.5965	1540.4	1479.8	1.5389	.8728	1663.4	1059.9
95	-17.521	-14.962	623.4	700.0	623.4	439.2	.0	545.1	.0	50.7	.5764	.5760	1570.1	1510.8	1.5622	.8730	1689.3	1060.9

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC
5	-.31	6.12	15.82	39.13	38.86	52.92	.5742	.1387	.0295	2.0054	92.43	91.67	55.12	15.99	-843.9	-172.7
10	-.09	6.34	15.40	34.35	39.49	58.26	.5234	.0485	.0104	2.0264	97.10	96.81	55.97	21.62	-892.2	-256.9
15	.13	6.21	14.33	29.77	40.10	61.70	.4847	-.0196	-.0031	2.0213	100.93	101.04	56.77	26.99	-940.5	-341.9
30	1.16	5.22	10.91	18.36	41.37	54.65	.5180	.0753	.0154	1.8990	93.68	93.10	59.16	40.80	-1078.1	-505.8
50	2.61	5.27	6.13	13.73	42.00	54.29	.5096	.1170	.0237	1.9075	89.00	87.98	62.24	48.50	-1246.0	-651.1
70	3.68	5.50	5.93	8.37	41.71	51.90	.4694	.1254	.0233	1.8520	86.45	85.25	65.15	56.78	-1398.9	-837.9
85	3.81	5.03	5.36	6.94	41.00	48.88	.4668	.1812	.0328	1.8475	80.09	78.33	67.17	60.23	-1512.0	-922.9
90	3.96	5.03	6.61	5.15	40.78	44.89	.4823	.2219	.0379	1.8310	75.77	73.67	67.79	62.65	-1540.4	-940.3
95	4.12	5.02	8.31	3.09	40.59	40.97	.4908	.2537	.0403	1.8105	72.28	69.92	68.33	65.29	-1570.1	-965.7

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.2308	1.8988	87.02	88.12	40.51

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VØ-1 FT/SEC	VØ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	13.850	4.501	1028.1	797.9	694.8	797.6	757.8	21.7	47.8	1.5	.8909	.6709	1.9156	1.2394
10	11.891	4.116	1018.1	778.8	733.2	777.9	706.3	-37.4	44.2	-2.7	.8843	.6562	1.9081	1.2282
15	10.432	3.823	996.7	757.7	749.3	753.6	657.3	-78.3	41.4	-5.9	.8671	.6393	1.8936	1.2195
30	6.725	2.916	900.9	705.1	676.8	701.0	594.6	-76.4	41.3	-6.2	.7749	.5929	1.8528	1.2160
50	2.144	1.669	889.9	711.2	679.5	709.4	580.5	-50.9	40.7	-4.1	.7590	.5946	1.8753	1.2301
70	-1.763	.733	843.4	658.5	661.4	654.7	523.9	-70.1	38.4	-6.1	.7167	.5487	1.8181	1.2256
85	-4.349	.460	848.1	636.6	656.3	634.1	537.2	-55.7	39.4	-5.0	.7149	.5249	1.7874	1.2458
90	-5.319	.487	841.6	617.9	634.3	617.2	553.2	-29.6	41.2	-2.7	.7053	.5062	1.7645	1.2573
95	-6.420	.576	831.6	583.8	619.1	583.8	460.8	-8.9	42.6	-.9	.6938	.4757	1.7292	1.2642

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	5.36	8.28	17.98	46.28	59.51	76.03	.3965	.1139	.0284	.9542	77.79	85.16	86.43
10	2.77	5.70	12.75	46.88	64.25	76.17	.4154	.1485	.0379	.9409	71.96	88.75	89.71
15	.97	3.92	8.99	47.30	66.77	73.52	.4282	.1537	.0400	.9404	71.15	91.07	91.82
30	2.90	5.90	9.09	47.54	60.72	68.98	.4245	.0641	.0179	.9790	86.45	89.53	90.38
50	4.03	7.16	11.92	44.80	60.89	69.72	.4163	.0510	.0156	.9838	88.25	85.43	86.64
70	2.69	5.93	11.33	44.48	59.83	64.18	.4518	.0599	.0197	.9827	87.01	82.49	83.87
85	3.88	7.19	14.87	44.40	58.41	60.84	.4999	.1109	.0386	.9680	78.44	73.35	75.39
90	5.61	8.94	18.66	43.96	55.75	58.45	.5128	.1250	.0444	.9648	76.79	68.42	70.79
95	6.70	10.07	22.81	43.44	53.48	54.66	.5456	.1625	.0587	.9564	72.37	64.04	66.65

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
11073.	179.58	1.2308	1.8423	82.56	83.97

TABLE 9.5

BLADE ELEMENT AND OVERALL PERFORMANCE

100% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.847	15.464	596.5	993.3	596.5	646.8	.0	753.8	.0	49.2	.5501	.8587	848.2	960.0	.9562	.5869	1036.9	678.9
10	13.259	13.339	610.3	978.5	610.3	692.6	.0	691.2	.0	44.8	.5636	.8490	896.7	991.0	1.0017	.6548	1084.7	754.7
15	10.586	11.308	624.0	945.3	624.0	685.1	.0	651.3	.0	43.4	.5771	.8186	945.3	1022.0	1.0475	.6746	1132.7	779.0
30	3.357	6.672	654.6	861.0	654.6	636.3	.0	580.0	.0	42.3	.6075	.7393	1083.5	1115.1	1.1747	.7138	1265.9	831.4
50	-5.141	-1.343	670.0	820.6	670.0	623.9	.0	533.0	.0	40.5	.6228	.6997	1252.4	1239.2	1.3203	.8035	1420.3	942.3
70	-12.456	-8.102	657.6	724.0	657.6	562.8	.0	455.4	.0	38.8	.6104	.6142	1406.0	1363.3	1.4408	.9062	1552.2	1068.2
85	-17.015	-12.911	637.6	697.3	637.6	526.3	.0	457.5	.0	40.4	.5908	.5862	1519.7	1456.4	1.5263	.9491	1648.0	1129.1
90	-17.738	-14.225	632.7	670.5	632.7	480.6	.0	467.6	.0	43.8	.5856	.5599	1548.2	1487.4	1.5481	.9414	1672.5	1127.3
95	-17.897	-15.215	629.0	645.1	629.0	439.8	.0	471.9	.0	46.7	.5820	.5359	1578.1	1518.5	1.5719	.9430	1698.8	1135.2

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC
5	-.68	5.75	17.39	37.18	39.39	58.56	.5190	.1490	.0315	1.9520	91.45	90.63	54.74	17.56	-848.2	-206.1
10	-.47	5.96	17.05	32.31	40.02	60.99	.4638	.0437	.0093	1.9669	97.20	96.94	55.59	23.27	-896.7	-299.8
15	-.25	5.84	15.65	28.07	40.62	60.94	.4615	.0381	.0081	1.9335	97.24	96.99	56.39	28.32	-945.3	-370.7
30	.77	4.84	10.17	18.72	41.90	57.37	.4745	.0819	.0169	1.8451	92.74	92.11	58.78	40.06	-1083.5	-535.1
50	2.30	4.95	6.14	13.41	42.51	56.80	.4546	.1046	.0212	1.8225	89.13	88.20	61.92	48.51	-1252.4	-706.2
70	3.62	5.45	7.20	7.06	42.02	51.28	.4126	.1237	.0222	1.7142	84.69	83.51	65.10	58.04	-1406.0	-907.9
85	3.86	5.08	6.87	5.48	41.20	47.33	.4128	.1826	.0315	1.6855	76.96	75.29	67.22	61.74	-1519.7	-999.0
90	4.00	5.07	8.40	3.39	40.99	42.73	.4272	.2265	.0364	1.6561	71.55	69.51	67.82	64.44	-1548.2	-1019.8
95	4.09	4.98	10.02	1.35	40.83	38.79	.4343	.2593	.0385	1.6311	67.50	65.24	68.29	66.94	-1578.1	-1046.5

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.2123	1.7973	88.83	86.93	40.88

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	13.965	4.451	1051.0	887.6	755.9	887.5	730.2	-11.9	44.4	-.8	.9166	.7562	1.8785	1.2319
10	12.133	4.007	1037.8	875.5	792.2	873.9	670.4	-53.7	40.5	-3.5	.9087	.7496	1.8855	1.2179
15	10.671	3.618	1008.4	855.0	783.5	851.2	634.7	-80.9	39.2	-5.4	.8814	.7317	1.8694	1.2132
30	6.767	2.514	934.8	798.1	739.9	794.3	571.3	-78.1	37.7	-5.6	.8106	.6800	1.8158	1.2077
50	2.478	1.309	904.1	765.8	731.4	763.6	531.4	-58.1	36.0	-4.3	.7790	.6492	1.7865	1.2111
70	-1.270	.470	828.3	680.4	689.0	674.8	459.8	-87.5	33.7	-7.4	.7110	.5750	1.6869	1.1983
85	-3.940	.341	820.7	638.8	675.7	636.5	465.9	-54.2	34.7	-4.9	.6993	.5337	1.6356	1.2153
90	-5.010	.397	805.1	614.2	647.5	613.2	478.4	-33.8	36.6	-3.2	.6818	.5100	1.6083	1.2292
95	-6.275	.535	791.0	571.6	624.7	571.2	485.2	-16.8	38.0	-1.7	.6668	.4718	1.5682	1.2301

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	1.90	4.82	15.69	45.12	62.12	78.95	.3261	.0922	.0230	.9614	75.72	85.02	86.26
10	-.90	2.03	12.00	43.96	66.63	79.27	.3269	.0919	.0235	.9621	75.36	91.07	91.82
15	-1.25	1.69	9.49	44.58	66.49	77.77	.3321	.0751	.0196	.9703	79.12	91.71	92.39
30	-.72	2.27	9.64	43.31	63.51	73.21	.3385	.0497	.0125	.9844	86.76	89.39	90.22
50	-.68	2.46	11.40	40.34	63.17	70.36	.3470	.0466	.0142	.9846	86.15	85.33	86.46
70	-1.95	1.29	10.05	41.11	59.21	61.90	.3934	.0492	.0195	.9875	88.26	81.20	82.51
85	-.85	2.46	15.02	39.52	56.87	57.03	.4431	.0967	.0337	.9733	78.87	70.13	72.09
90	.96	4.29	18.24	39.72	53.71	54.27	.4634	.1004	.0357	.9733	79.18	64.83	67.05
95	2.12	5.49	21.99	39.68	51.26	49.94	.5068	.1484	.0536	.9619	73.02	59.40	62.02

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
11129.	181.25	1.2123	1.7580	82.33	83.65

TABLE 9.6
BLADE ELEMENT AND OVERALL PERFORMANCE
100% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	V0-1 FT/SEC	V0-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.939	15.478	595.4	973.1	595.4	608.6	.0	759.4	.0	51.1	.5489	.8383	847.5	959.2	.9850	.5517	1035.7	690.5
10	13.449	13.377	608.9	960.9	608.9	656.3	.0	701.9	.0	46.8	.5622	.8304	896.0	990.2	1.0003	.6194	1083.3	716.8
15	10.849	11.380	622.7	933.3	622.7	660.5	.0	659.4	.0	44.8	.5758	.8060	944.5	1021.2	1.0461	.6503	1131.3	763.0
30	3.732	5.790	654.6	860.9	654.6	624.5	.0	592.6	.0	43.5	.6074	.7377	1082.7	1114.2	1.1740	.6973	1265.2	813.7
50	-4.729	-1.152	672.1	829.2	672.1	611.4	.0	560.0	.0	42.5	.6249	.7044	1251.4	1238.2	1.3207	.7757	1420.5	913.1
70	-12.132	-7.909	661.4	740.1	661.4	550.6	.0	485.4	.0	40.8	.6142	.6253	1409.8	1362.2	1.4419	.8785	1552.8	1039.7
85	-16.852	-12.790	641.6	705.4	641.6	516.6	.0	480.4	.0	42.3	.5946	.5908	1518.4	1455.3	1.5274	.9240	1648.4	1103.3
90	-17.604	-14.127	636.6	680.9	636.6	472.9	.0	490.0	.0	45.6	.5895	.5666	1547.0	1486.2	1.5491	.9176	1672.8	1102.7
95	-17.827	-15.165	632.7	657.0	632.7	433.0	.0	494.1	.0	48.4	.5857	.5439	1576.9	1517.3	1.6727	.9197	1699.1	1111.0

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	V0'-1 FT/SEC	V0'-2 FT/SEC
5	-.64	5.79	17.89	36.73	39.34	52.98	.5556	.1613	.0340	1.9509	90.84	89.96	54.78	18.06	-847.5	-199.8
10	-.91	6.02	17.36	32.06	39.95	58.57	.4986	.0596	.0126	1.9713	96.25	95.89	56.65	23.59	-896.0	-288.3
15	-.19	5.89	15.95	27.83	40.56	59.76	.4837	.0333	.0071	1.9527	97.67	97.45	56.45	28.61	-944.5	-361.8
30	.76	4.83	9.98	18.89	41.70	57.55	.4890	.0625	.0129	1.8907	94.64	94.16	58.77	39.88	-1082.7	-521.6
50	2.19	4.84	8.56	13.88	42.59	56.96	.4797	.0995	.0203	1.8866	90.21	89.32	61.81	47.94	-1251.4	-678.2
70	3.45	5.28	6.47	7.60	42.17	52.29	.4368	.1164	.0213	1.7912	86.48	85.35	64.93	57.32	-1409.8	-876.8
85	3.70	4.92	6.72	5.47	41.37	47.87	.4333	.1712	.0297	1.7559	79.44	77.79	67.06	61.59	-1518.4	-974.9
90	3.84	4.91	8.23	3.40	41.16	43.38	.4468	.2132	.0344	1.7291	74.80	72.50	67.67	64.27	-1547.0	-996.2
95	3.94	4.84	9.86	1.36	40.99	39.43	.4533	.2452	.0367	1.7053	70.71	68.47	68.15	66.79	-1576.9	-1023.2

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.2203	1.8499	87.12	88.17	40.95

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	V0-1 FT/SEC	V0-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	13.824	4.440	1024.9	832.1	713.8	830.1	735.5	-57.9	46.2	-3.9	.8897	.7038	1.8923	1.2333
10	11.865	3.995	1019.6	818.8	752.7	816.8	680.5	-57.0	42.3	-3.9	.8839	.6952	1.8939	1.2209
15	10.372	3.426	990.3	798.5	753.6	796.5	642.6	-55.6	40.6	-4.0	.8623	.6780	1.8782	1.2166
30	6.531	2.593	927.9	757.7	721.3	755.9	583.6	-52.8	39.0	-4.0	.8022	.6419	1.8481	1.2122
50	2.336	1.393	906.2	745.6	713.9	743.8	558.2	-52.0	38.0	-4.0	.7774	.6277	1.8498	1.2218
70	-1.360	.503	837.8	673.0	679.5	671.4	490.0	-46.9	35.8	-4.0	.7157	.5650	1.7601	1.2116
85	-3.996	.332	823.0	626.3	661.7	624.8	489.4	-43.7	36.6	-4.0	.6981	.5204	1.7032	1.2257
90	-5.060	.393	809.0	601.6	634.9	600.1	501.4	-42.0	38.4	-4.0	.6822	.4969	1.6757	1.2347
95	-6.300	.633	798.9	563.0	612.7	561.6	508.0	-39.3	39.8	-4.0	.6682	.4624	1.6387	1.2406

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-S	%EFF-A TOT-STG	%EFF-P TOT-STG
5	3.73	6.65	12.51	50.12	59.80	76.92	.3758	.0784	.0195	.9685	82.29	85.57	86.79
10	.95	3.88	11.52	46.28	64.53	76.94	.3713	.0940	.0240	.9628	78.90	90.56	91.34
15	.17	3.11	10.92	44.57	65.39	75.54	.3725	.0924	.0241	.9697	79.11	91.46	92.16
30	.57	3.56	11.25	42.99	63.58	72.32	.3734	.0650	.0182	.9776	84.24	90.29	91.07
50	1.34	4.47	12.03	42.00	63.34	71.09	.3791	.0577	.0176	.9811	85.12	86.11	87.23
70	.13	3.36	13.45	39.40	60.18	63.90	.4059	.0510	.0169	.9854	87.67	82.82	84.11
85	1.05	4.36	15.89	40.55	57.56	58.19	.4657	.0999	.0348	.9725	79.57	72.79	74.71
90	2.01	6.19	17.40	42.41	54.49	55.21	.4956	.1088	.0386	.9710	78.90	67.68	69.89
95	3.95	7.33	19.68	43.83	52.06	51.08	.5412	.1498	.0539	.9614	73.90	62.94	65.37

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
11120.	181.53	1.2203	1.8097	83.32	84.62

TABLE 9.7
BLADE ELEMENT AND OVERALL PERFORMANCE
100% of Design Speed

ROTOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	15.782	15.465	605.2	1008.8	605.2	693.5	.0	732.7	.0	46.4	.5586	.8768	848.3	960.1	.9618	.6343	1042.1	729.8
10	13.142	13.348	619.4	1001.1	619.4	724.5	.0	690.8	.0	43.5	.5725	.8715	896.9	991.1	1.0075	.6828	1090.0	784.3
15	10.456	11.337	633.3	972.7	633.3	717.1	.0	657.2	.0	42.4	.5862	.8449	945.4	1022.2	1.0534	.6989	1137.9	804.6
30	3.095	5.669	664.3	879.9	664.3	674.4	.0	565.1	.0	40.0	.6171	.7592	1083.7	1115.3	1.1808	.7510	1271.1	870.4
50	-5.400	-1.358	678.6	804.9	678.6	633.3	.0	496.8	.0	38.1	.6315	.6895	1252.6	1239.4	1.3256	.8361	1424.6	976.0
70	-12.410	-4.072	665.7	719.0	665.7	585.7	.0	417.0	.0	35.3	.6185	.6142	1406.2	1363.5	1.4455	.9510	1555.8	1113.1
85	-16.936	-12.925	645.0	682.7	645.0	553.9	.0	399.1	.0	35.2	.5979	.5800	1519.9	1456.6	1.5304	1.0143	1651.1	1193.9
90	-17.706	-14.265	639.7	650.3	639.7	507.6	.0	406.4	.0	38.3	.5926	.5489	1548.4	1487.6	1.5520	1.0082	1675.4	1194.4
95	-17.906	-15.253	635.7	615.5	635.7	460.5	.0	408.3	.0	41.2	.5887	.5168	1578.3	1518.7	1.5756	1.0094	1701.6	1202.1

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC
5	-1.08	5.35	17.87	36.31	39.79	58.05	.4687	.1449	.0305	1.9183	91.38	90.58	54.34	18.04	-848.3	-227.4
10	-.88	5.55	16.16	32.99	40.42	61.86	.4404	.0732	.0157	1.9393	95.21	94.76	55.18	-22.39	-896.9	-300.3
15	-.64	5.44	14.21	29.12	41.02	61.77	.4439	.0720	.0155	1.9120	94.79	94.31	56.00	26.88	-945.4	-365.0
30	.39	4.46	9.31	19.20	42.29	58.97	.4441	.0911	.0190	1.8056	91.60	90.90	58.40	39.20	-1083.7	-550.2
50	2.01	4.66	7.15	12.11	42.84	55.57	.4257	.1223	.0242	1.7246	86.29	85.23	61.63	49.52	-1252.6	-742.6
70	3.35	5.18	7.24	6.74	42.34	51.43	.3769	.1255	.0225	1.6288	83.11	81.94	64.83	58.09	-1406.2	-946.6
85	3.62	4.84	7.01	5.09	41.51	48.19	.3618	.1601	.0275	1.5884	77.29	75.79	66.98	61.88	-1519.9	-1057.6
90	3.77	4.84	8.48	3.08	41.29	43.63	.3749	.2099	.0328	1.5536	71.00	69.19	67.40	64.52	-1548.4	-1081.1
95	3.88	4.78	10.29	.87	41.12	39.20	.3819	.2402	.0353	1.5202	65.91	63.88	68.08	67.22	-1578.3	-1110.4

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT
1.1989	1.7266	84.87	85.96	41.29

STATOR

% Span	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PT2/ PT1	TT2/ TT1
5	19.159	4.518	1075.7	1027.4	808.3	1024.9	709.7	-71.4	41.7	-3.9	.9449	.8955	1.7826	1.2255
10	12.420	4.056	1069.9	1048.7	833.6	1046.1	670.7	-73.0	39.1	-3.9	.9417	.9200	1.8557	1.2189
15	10.933	3.609	1045.3	1027.9	824.1	1025.4	640.4	-71.5	38.0	-4.0	.9182	.9006	1.8377	1.2148
30	7.032	2.444	964.2	934.1	787.3	931.9	556.7	-65.1	35.3	-4.0	.8417	.8121	1.7168	1.2018
50	2.747	1.331	901.9	866.4	753.6	864.3	495.5	-60.4	33.3	-4.0	.7821	.7481	1.6371	1.1967
70	-1.026	.655	837.1	783.6	723.5	781.6	421.2	-59.6	30.2	-4.0	.7249	.6744	1.5373	1.1818
85	-3.589	.572	823.7	748.4	716.5	746.6	406.4	-52.2	29.6	-4.0	.7108	.6401	1.4939	1.1868
90	-4.672	.597	805.1	738.3	689.4	736.8	415.8	-51.5	31.2	-4.0	.6908	.6287	1.4801	1.1941
95	-6.049	.646	785.2	714.6	663.5	712.9	419.8	-49.8	32.5	-4.0	.6706	.6057	1.4531	1.1988

% Span	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PT2/ PT1	%EFF-P STATC-ST	%EFF-A TOT-STG	%EFF-P TOT-STG
5	-.80	2.12	12.51	45.59	69.17	78.61	.2216	.1636	.0907	.9285	-38.17	79.56	81.12
10	-2.29	.64	11.52	43.04	67.38	82.39	.1919	.0954	.0243	.9586	-109.08	88.17	89.13
15	-2.46	.48	10.92	41.95	67.28	81.49	.1889	.0857	.0224	.9643	-144.85	88.28	89.21
30	-3.12	-.12	11.25	39.30	64.94	74.68	.2069	.1270	.0356	.9532	-83.60	82.67	83.91
50	-3.35	-.21	12.03	37.32	62.21	69.34	.2227	.1442	.0441	.9525	-70.17	76.81	78.33
70	-5.46	-2.23	13.45	34.21	59.38	62.55	.2492	.1842	.0609	.9459	-29.88	71.89	73.50
85	-5.89	-2.58	15.89	33.61	57.72	59.03	.2855	.2051	.0716	.9415	-.55	65.05	66.93
90	-4.43	-1.10	17.40	35.18	54.66	57.72	.2892	.1718	.0610	.9530	8.07	61.10	63.14
95	-3.91	-.09	19.48	36.46	51.94	55.36	.3059	.1723	.0621	.9552	13.93	56.68	58.85

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
11131.	182.80	1.1989	1.6411	76.40	77.96

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