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TWO-STAGE FAN
III. DATA AND PERFORMANCE WITH ROTOR TIP CASING TREATMENT UNIFORM AND DISTORTED INLET FLOWS

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16. Abstract

A two-stage fan with a 1st-stage rotor design tip speed of 1450 ft/sec [442 m/sec], a design pressure ratio of 2.8, and corrected flow of 184.2 lbm/sec [83.55 kg/sec] was tested with axial skewed slots in the casings over the tips of both rotors. The variable-stagger stators were set in the nominal positions.

Casing treatment improved stall margin by nine percentage points at 70 percent speed, but decreased stall margin, efficiency, and flow by small amounts at design speed. Treatment improved first-stage performance at low speed only and decreased second-stage performance at all operating conditions.

Casing treatment did not affect the stall line with tip radially distorted flow but improved stall margin with circumferentially distorted flow. Casing treatment increased the attenuation for both types of inlet flow distortion.

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FOREWORD

This report was prepared for the National Aeronautics and Space Administration, Lewis Research Center, under Contract NAS3-13494 to present data and performance of a two-stage fan tested with a redesigned 2nd-stage rotor, axial skewed slots in the casings over the tips of both rotors, and with the resettable stators in their nominal positions. Mr. R. S. Ruggeri was the NASA Project Manager for this effort, and Mr. H. V. Marman was the P&WA Program Manager. This report was prepared by G. D. Burger, T. R. Hodges, and M. J. Keenan with contributions from B. Gray, A. Finke, J. Rawlins, A. Merrow, C. Klein and other P&WA personnel.

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TWO-STAGE FAN
III. DATA AND PERFORMANCE WITH ROTOR TIP CASING TREATMENT, UNIFORM AND DISTORTED INLET FLOW

G. D. Burger, T. R. Hodges and M. J. Keenan
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SUMMARY

Tests were conducted on a highly loaded, two-stage fan designed for a tip speed of 1450 ft/sec [442 m/sec] and an overall pressure ratio of 2.8. The purpose of the tests was to determine detailed aerodynamic performance of the fan with rotor tip casing treatment. The casing treatment consisted of axial skewed slots located over the tips of both rotors. Fan performance data were obtained for uniform and for distorted inlet flows. The data obtained in a previous test of the fan without casing treatment was used for determining the effects of the casing treatment.

With uniform inlet flow, casing treatment improved stall margin at part speed without reducing efficiency or flow; at 70 percent of design speed stall margin increased from 17% with the solid casing to 26%. At design speed, stall margin decreased from 12% with the solid casing to 10%. The adiabatic efficiency on the operating line was 82.2% at design speed with casing treatment, which is 1.5 percentage points less than the design value and 2.8 percentage points below the value obtained with solid casing. At design speed and pressure ratio, the fan achieved a corrected flow of 183.5 lbm/sec [83.3 kg/sec] which is 0.4% below the design value of 184.2 lbm/sec [83.55 kg/sec].

First-stage pressure ratio and efficiency were increased by casing treatment at 70 percent of design speed but were decreased at design speed. Second-stage pressure ratio and efficiency were decreased by casing treatment at all speeds. These results indicate that better overall fan performance would probably have been achieved with casing treatment over the 1st-stage rotor and a solid casing over the 2nd-stage rotor.

Casing treatment caused significant differences in radial profiles of pressure and temperature ratios. These profiles resulted in unusual radial patterns of blade-element performance parameters, particularly for the 2nd-stage rotor in which loss apparently decreased between 85 percent span and the tip.

A screen-generated, tip-radial distortion, covering approximately the outer 40 percent of the inlet annulus area and with a distortion parameter, $(P_{max} - P_{min})/P_{max}$, of 0.14 at design corrected flow, increased stall margin at design speed from 10% with undistorted flow to 16%. At 70 percent of design speed, distortions generated by the same screen reduced stall margin from 26% to 15%; efficiency levels were the same as with undistorted flow. The distortion was completely attenuated at design speed for near-stall and midrange data points, and approximately half of the distortion was attenuated at wide-open throttle.

A circumferentially distorted inlet flow, covering approximately a 90-degree segment of the fan inlet annulus area and with a peak distortion parameter of 0.13 at 99 percent of design corrected flow, increased stall margin by two percentage points at design speed and did not change overall performance at 70 percent of design speed. Stall pressure ratio at design speed was lower with the distortion, but the fan could be throttled to a lower flow before stalling.

In general, casing treatment improved stall margin relative to the solid casing in operating regimes where rotor tip loadings caused stall. Thus, at low speed where the 1st-stage rotor tip was highly loaded, casing treatment increased the stall margin, but no benefit was obtained at design speed where loadings at the hub of the second stage caused stall.

INTRODUCTION

An extensive program has been conducted by NASA on high speed, highly loaded, single-stage fans. Based on demonstrations of good performance at high speeds and loadings in single stages, a two-stage, highly loaded, high-speed fan was designed, fabricated, and tested. The objectives of the two-stage fan program were to evaluate the stage matching problems, distortion tolerance, response to stator adjustment, and effectiveness of casing treatment for such a fan. Design tip speed for the two-stage fan was 1450 ft/sec [442 m/sec]; design pressure ratio was 2.8; tip diameter was 31.0 in. [0.787m], and the hub-tip ratio at the inlet to the 1st-stage rotor was 0.4. Design corrected flow per unit annulus area at the 1st-stage rotor leading edge was 42.0 lbm/sec-ft^2 [205 kg/sec-m^2], giving a design corrected flow of 184.2 lbm/sec [83.55 kg/sec]. Details of the aerodynamic and mechanical designs are given in Reference 1.

Good aerodynamic performance was documented during the first test of this two-stage fan. However, this first test was abbreviated due to flutter on the 2nd-stage rotor blades and cracking of the root leading edges of some stator vanes. Results of the first test are reported in detail in Reference 2.

The 2nd-stage rotor blades were redesigned with partspan shrouds to eliminate flutter, and the fan was rebuilt with these redesigned blades. A radially skewed pressure ratio profile was also incorporated into this redesign with the objective of increasing stall margin. Hub pressure ratio was raised to increase flow velocities at the hub, thereby reducing critical blade-element loadings. Steps were also taken to eliminate stator cracking. Additional 1st-stage stator vanes were fabricated to insure that all vanes in the rebuild would meet the design thickness specifications. Stator leading edge pressure sensors were not used on either stator in the rebuild to avoid stress concentrations, since the data from the first build had shown that stator discharge instrumentation provides the same information as the leading edge sensors with good accuracy. Design details of the 2nd-stage rotor with the partspan shroud are given in Reference 3.

The modified two-stage fan was tested with solid casings to document performance with stators set at their design stagger angles. Tests were run with uniform inlet flow and with tip-radial, hub-radial, and circumferential inlet distortions. Results of these tests are reported in detail in Reference 3.

Stator stagger angle optimization tests with solid casings were conducted at 70 percent, 100 percent, and 105 percent of design speed with uniform inlet flow to obtain increased overall fan efficiency and stall margin. Results of these tests are reported in detail in Reference 4.

Axial skewed slots in the casings over the rotor tips have been shown to be an effective means of improving stall margin when critical loadings occur at rotor blade tips, while causing only a small penalty in operating line efficiency. Casing treatment can be particularly beneficial when inlet flow distortions are present. Casing inserts with axial skewed slots were therefore designed to replace the smooth casings over the rotor tips. Slot configurations were based on designs used successfully in previous NASA test programs (ref. 5 and 6). Casing treatment tests were conducted with uniform inlet flow at 70 percent, 85 percent, and 100 percent of design speed and with tip-radial and circumferential inlet distortions at 70 percent and 100 percent of design speed.

This report presents the test results obtained with the modified two-stage fan with stators set at their design stagger angles and with casing treatment consisting of axial skewed slots over both rotors.

The symbols used in this report and performance parameters are defined in Appendix A.

APPARATUS

AERODYNAMIC DESIGN

The two-stage fan test arrangement is shown schematically in Figure 1, and a detailed description of the aerodynamic and mechanical design of the fan is given in Reference 1. A detailed description of the redesigned 2nd-stage rotor used in this test is given in Reference 3.

Design performance parameters at the design point are summarized in Table I.

TABLE I – DESIGN OVERALL PERFORMANCE PARAMETERS

Corrected Speed: $N/\sqrt{\theta}$ = 10720 rpm - Corrected Flow: $W\sqrt{\theta}/\delta$ = 184.20 lbm/sec [83.55 kg/sec]

	PRESSURE RATIO		ADIABATIC EFFICIENCY (%)	
	Local	Cumulative	Local	Cumulative
Rotor 1	1.786	1.786	89.4	89.4
Stator 1	.976	1.742	–	85.3
Rotor 2	1.655	2.884	89.9	86.5
Stator 2	.971	2.80	–	83.7

The fan was designed without inlet-guide-vanes (IGV) but with the provision for adding a variable camber IGV at a later date. Stators were designed with the ability for resetting at different stagger angles without requiring removal of the fan from the test stand. Both stators were designed to turn the flow to the axial direction (design position). The tip diameter of the 1st-stage rotor inlet was selected as 31 inches [0.787 m] to permit use of existing hardware and to allow adequate horsepower margin for the drive engine. With a required 1st-stage rotor tip speed of 1450 ft/sec [442 m/sec], the design speed corrected to standard inlet conditions was 10,720 rpm. The inlet inner case diameter was held at a minimum of 10 inches [0.254 m] to provide clearance for the front bearing compartment. The specific flow at the inlet to the 1st-stage rotor was set at 42.0 lbm/sec-ft^2 [205 kg/sec-m^2], consistent with advanced fan technology. This, with the specified hub-tip ratio of 0.4 and the chosen tip diameter, yielded a design inlet corrected flow of 184.2 lbm/sec [83.55 kg/sec].

The average Mach number at the fan exit was approximately 0.5, a practical value for thrust augmentation.

Flowpath convergence and wall curvature between inlet and exit were used to control velocity profiles and blade aerodynamic loadings (diffusion factors) near the walls. Design loadings were similar to those for which good single-stage performance has been obtained, as explained in Reference 1.

Blockages were included in the aerodynamic design to account for boundary layer growth on the casing walls and for presence of the rotor partspan shrouds. Boundary layer displacement thickness at the 1st-stage rotor inlet was assumed equal to that measured downstream of inlet bellmouths used in research programs at Pratt & Whitney Aircraft. Growth of the wall displacement thickness through the blade rows of the two-stage fan was estimated using a correlation developed by W. T. Hanley (ref. 7) wherein growth along the casing walls is chiefly a function of wall static pressure gradient. To account for the presence of partspan shrouds, a blockage equal to the percent of total annulus area occupied by the shroud was applied at the exit of each rotor and the inlet of the following stator, and half this amount was used at the inlet of each rotor. No allowance for shroud blockage was applied at the 1st-stage or 2nd-stage stator exits. Total blockage inputs to the streamline analysis calculation at various axial locations were computed as the sum of end-wall blockages and shroud blockages and were applied equally to all stream tubes.

The axial spacings between rotor and stator of both the 1st-stage and 2nd-stage were held to a minimum, as shown in the flowpath drawing in Figure 2, which is in line with actual engine design practice. A spacing of slightly more than one inch [0.0254 m] was allowed between stages to provide room for radial and tangential traverse instrumentation at the exit of the 1st-stage stator. Coordinates of blade edges at the hub and tip are given in Figure 2. The differences between the coordinates of the original and redesigned 2nd-stage rotor are due to changes in blade edge location. Flowpath walls were not changed.

Rotor and stator blade sections for both stages of the fan were multiple-circular-arc (MCA) airfoils designed on conical surfaces which approximate stream surfaces of revolution. Blade setting angles were determined from design flow angles and incidence and deviation angle criteria described in Reference 1. Blade chords were chosen to be consistent with moderate axial lengths, acceptable loadings, and structural requirements. Airfoil leading and trailing edge radii and blade thicknesses were chosen to provide mechanical integrity while maintaining adequate flow area. A partspan shroud was located at 61 percent span on the 1st-stage rotor and at 60 percent span on the redesigned 2nd-stage rotor. A view of a rotor and stator for each blade row of the two-stage fan is shown in Figure 3.

Design details of the 1st-stage rotor, the 1st-stage stator, the original 2nd-stage rotor, and the 2nd-stage stator, including manufacturing sections defined on planes normal to the stacking line, are given in Reference 1. Details of the redesigned 2nd-stage rotor are given in Reference 3. A summary of important design parameters of blades and vanes is given in Table II. Stator velocity vectors calculated for the negatively sloped total pressure profile of the redesigned 2nd-stage rotor showed that both stators would be satisfactory for tests with the redesigned rotor.

TABLE II – BLADE AND VANE GEOMETRIC PARAMETERS

	FIRST-STAGE		SECOND-STAGE	
	Rotor	Stator	Rotor (Redesign)	Stator
Number of airfoils	28	46	60	59
Aspect ratio[1]	2.48	2.75	2.63	2.20
Hub chord, inch [meter]	3.62 [0.092]	2.75 [0.070]	2.10 [0.053]	2.22 [0.056]
Tip chord, inch [meter]	4.55 [0.116]	3.10 [0.079]	1.89 [0.048]	2.45 [0.062]
Hub solidity	2.38	2.52	2.24	2.25
Tip solidity	1.33	1.55	1.27	1.66

[1] Average length/axially projected hub chord

ROTOR TIP CASING TREATMENT

Rotor tip casing treatment, consisting of axial skewed slots partitioned into front and rear sections of equal length, was used over each rotor. The casing treatment design is shown schematically in Figure 4, and the geometric design parameters are listed in Table III. The slot partitions were centered on the blade stacking line of each rotor.

TABLE III – CASING TREATMENT DESIGN PARAMETERS

	Rotor 1	Rotor 2
Number of slots[1]	252	476
Slot Width / Land width (Circumferential)	2.0	2.083
Slot Width / Slot depth[2]	5.0	10.
Axial Projected Chord		
slot leading edge (%)	19.2	16.8
slot trailing edge (%)	82.1	85.5
Width of Axial Partition / Total Axial Length	0.1147	0.1067
Slot Area / Total Area	0.5902	0.6036

1 Each slot divided into equal front and rear sections

2 Width measured normal to direction of slot sides, depth measured in direction of slot sides.

MECHANICAL DESIGN

Predicted rotor and stator stresses due to static and dynamic loads are well within the capabilities of the materials selected. Rotor blades were fabricated from AMS 4928 (titanium alloy); stator vanes were fabricated from AMS 5613 (stainless steel); and disks, spacers, and hubs were fabricated from AMS 6415 (low alloy steel). The 1st-stage rotor blades have partspan shrouds at 61 percent span from the hub to avoid resonances, and the redesigned 2nd-stage rotor blades, used in the test described herein, have partspan shrouds at 60 percent span from the hub to avoid flutter. An oil damped front bearing was incorporated as a result of the initial tests which revealed incipient critical speed problems. Mechanical design of the original fan configuration is described in detail in Reference 1, and details of the rotor redesign and oil damped bearing design are given in Reference 3.

TEST FACILITY

The test program was carried out in a sea-level compressor test stand (Figure 5) that was equipped with a gas turbine drive engine with a 2.1:1 gearbox to provide speed-range capability. Airflow entered the rig through a calibrated nozzle. A 72 ft [21.9 m] straight section of 42 in. [1.07 m] diameter pipe ran from the nozzle to a 90 in. [2.29 m] diameter inlet plenum. A wire mesh screen and an "egg crate" structure located in the plenum provided a uniform total pressure profile to the compressor. The airflow was exhausted from the compressor into a toroidal collector and then into a 6 ft [1.83 m] diameter discharge stack. The stack contained a 6 ft [1.83 m] diameter valve to provide back pressure, or throttling, for the test compressor. Two smaller valves, a 24 in. [0.61 m] and a 12 in. [0.305 m], located in the bypass lines provided fine adjustment of back pressure.

The desired inlet distortion patterns were generated by means of screens attached to a 1 in. x 1 in. [0.0254 m x 0.0254 m] mesh base-screen of 1/8 inch [0.0032 m] diameter wire. A rotatable case with 12 struts located 33 in. [0.84 m] upstream of the rotor leading edge was used to support the base screen. Sketches of the tip-radial and circumferential distortion screens are shown in Figure 6. These screens are identical to those used during the distortion studies reported in Reference 3.

Rotor strain-gage and inlet hub static pressure instrumentation leads were routed through the nonrotating nose fairing. Ten struts, 14 inches [0.356 meters] upstream of the rotor leading edge, supported the forward bearing and the assembly for the strain-gage slip-ring. Eight struts located 11 inches [0.28 meters] downstream of the stator trailing edge supported the rear bearing.

INSTRUMENTATION AND CALIBRATION

Airflow to the compressor was measured by means of a calibrated nozzle designed to the standards of the ISO (International Organization for Standards). Airflow measurements were within one percent accuracy. The compressor speed was measured by means of an impulse type pickup. The pickup was an electromagnetic device which counted the number of gear teeth that passed within an interval of time and converted the count to RPM. Between 4,000 rpm and 12,000 rpm, accuracy was within 0.2%.

All temperatures were measured using chromel-alumel, type K thermocouples and were recorded in millivolts by means of an automatic data acquisition system. Temperature elements were calibrated for Mach number over their full operating range. Effects of total pressure level on temperature recovery were accounted for by using the corrections found in Reference 8. The thermocouple leads were calibrated for each temperature element. Overall rms temperature accuracy was estimated to be ±1.0°F [±0.56°K].

Wedge probes which measured total pressure, static pressure, and air angle and combination probes which measured total pressure, total temperature, static pressure, and air angle 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. Accuracy of the measured air angles was within 1.0 degree.

All pressures from probes, fixed rakes, and static taps were measured with transducers and recorded in millivolts by an automatic data acquisition system. The accuracy of the pressure was ±0.1 of the full scale value. All pressures from instrument locations upstream of the 1st-stage rotor trailing edge were measured using 15 lbf/in.^{2} [1.033×10^5 N/m^2] full-scale transducers. Pressures from the trailing edge of the 1st-stage rotor and from all downstream locations were measured using 50 lbf/in.^{2} [3.46×10^5 N/m^2] full-scale transducers. Two proximity detectors, located over the tips of each rotor blade at midchord, were used to monitor blade tip clearance.

Photographs of typical instrumentation are shown in Figure 7, and the axial and circumferential positions of the instrumentation are shown in Figures 8 and 9, respectively. Instrumentation for measuring overall and blade element performance data is listed in Table IV.

TABLE IV – PERFORMANCE AND BLADE ELEMENT INSTRUMENTATION

INSTRUMENT PLANE LOCATION	PARAMETER	TYPE AND QUANTITY
Sta. 0 - - Inlet Plenum Chamber	p	6 pressure taps on plenum wall
	T	6 bare wire chromel-alumel thermocouples
Sta. 6 - - Rotor 1 Inlet (2.25 in. [0.0673 m] upstream of Rotor 1)	p	6 O.D. and I.D. wall static taps.
	†P, p & air angle β	2 wedge radial traverse probes spaced 180° apart circumferentially.
	P	two radial rakes with sensors at 10, 30, 50, 70, and 90 percent span (distortion tests only)
Sta. 8 - - Rotor 1 Exit (approx. halfway between Rotor 1 T.E. and Stator 1 L.E.)	††p	4 O.D. wall static taps approximately equally spaced circumferentially.
Sta. 11 - - Stator 1 Exit (halfway between T.E. of Stator 1 and L.E. of Rotor 2)	††p	4 O.D. and 4 I.D. wall static taps, approximately equally spaced circumferentially.
	†T, P, p, & air angle β	Two NASA combination probes - one with circumferential traverse of one vane gap, plus radial traverse, and second probe with radial traverse at midgap.
Sta. 14 - - Rotor 2 Exit	††p	4. O.D. and I.D. wall static taps, approximately equally spaced circumferentially.
Sta. 16 - - Fan Discharge (within ½ chord downstream of Stator 2)	††p	4 O.D. and 4 I.D. wall static taps approximately equally spaced circumferentially.
	†P, p, & air angle β	2 wedge probes, radial traverse, approxmately 180° apart and located at vane midchannel.
	†T	2 wake rakes located approximately 180° apart, radially traversed; 10 elements across stator gap.
	†p	2 wake rakes located approximately 180° apart, radially traversed; 13 elements across stator gaps.
Sta. 17 - - Rig Exit	P	One circumferential P rake, 5 elements located at 50 percent span (used for setting points).

† 11 radial locations for uniform inlet flow tests (5, 10, 15, 30, 50, 60, 65, 70, 85, 90, and 95% of passage height); 5 radial locations for distorted inlet flow tests (10, 30, 50, 70, and 90% of passage height).

†† Static pressure taps ahead of and behind stators are located on approximate extensions of mean channel streamlines.

The eleven radial positions at each axial station were defined by the intersection of the axial station and the streamlines for the redesigned fan which passed through 5, 10, 15, 30, 50, 60, 65, 70, 85, 90,and 95 percent of the passage height at the 1st-stage rotor trailing edge. Five radial positions were used for the radial distortion tests. These five positions were located on the streamlines which passed through 10, 30, 50, 70, and 90 percent of the passage height at the trailing edge of the 1st-stage rotor. The radial locations at which these streamlines passed the leading and trailing edges of each blade row are given in Table XII of Appendix B.

The parameters listed in Table V were used to detect and evaluate rotating stall and were recorded continually during excursions into stall. When operating near or within the stall region, two hot-film probes, located at the fan inlet and exit (Stations 6 and 16) with sensors at 25, 50, and 85 percent of passage height from the hub, were used to record velocity fluctuations continuously on a multichannel tape recorder.

TABLE V – STALL TRANSIENT INSTRUMENTATION

INSTRUMENTATION PLANE LOCATION	PARAMETER	TYPE AND QUANTITY
Inlet Nozzle	p	1 static tap downstream and 1 static tap upstream of inlet nozzle
	Δp	A Δp transducer sensing the differential pressure between the upstream and downstream nozzle static pressures
	T	One nozzle temperature
Sta. 0 – Plenum	p	One plenum static tap
	T	One plenum temperature
Sta. 6 – Rotor Inlet	V	One hot-film probe
Rotor 1, Stator 1, and Rotor 2 Exit	p	One O.D. static tap each location
Rotor Blades	Stress	Strain-gages
Stator Blades	Stress	Strain-gages
Sta. 16 – Fan Discharge	p	One O.D. static tap
	V	One hot-film probe
Sta. 17 – Fan Discharge	P	One circumferential pressure rake at 50 percent span
Gearbox	N	Impulse pick-up

Accelerometers were used to measure shaft vibration and stationary and rotating critical parts were instrumented with strain-gages to determine levels of vibratory stress over the operating range of the compressor.

PROCEDURES

TEST PROCEDURES

The mechanical integrity of the test compressor had been established during extensive shakedown tests conducted with solid casings (ref. 3), and no flutter limits or shaft vibration problems were encountered over the full operating range. A brief shakedown test was conducted with uniform inlet flow after installation of the casing treatment, and no excessive stresses or flutter limits were encountered.

Rotating stall surveys were conducted at 70 percent, 85 percent, and 100 percent of design speed. Data from the hot-film probes and selected rotor and stator strain-gages along with a speed signal and stator exit O.D. static pressure were recorded simultaneously by a multichannel tape recorder. The other transient parameters shown in Table V were recorded at 1.5 second intervals as the fan stage was throttled toward stall; approximately 100 scans were made by the automatic recording system from wide-open throttle to the minimum flow condition.

Fan overall and blade-element performance was obtained for 14 data points with uniform inlet flow at 70 percent, 85 percent, and 100 percent of design speed and for six data points at 70 percent and 100 percent of design speed with tip-radial distortion. At each speed, data points were taken between the maximum flow attainable and the low-flow stability limit. Hub distortion tests were not conducted because rotor tip casing treatment is not likely to improve performance with a hub distortion. Also, the 2nd-stage rotor strain-gages had become inoperable, and indications of a resonance (at low stress levels) had been detected with hub distortion during the solid-casing tests. With circumferential inlet distortion, three-data points at 70 percent of design speed and three data-points at design speed were taken to determine overall performance and velocity distribution data at the fan inlet and fan exit. Measurements were made at approximately 30-degree increments around the circumference for three data-points (one at 70 percent speed and two at design speed) and at approximately 90-degree increments for the remaining three points.

DATA REDUCTION TECHNIQUES

All steady-state performance data were automatically recorded in millivolts on computer cards and then converted to engineering units, corrected, and used to calculate overall and blade element parameters as described in the following sections.

Data Correction and Averaging

The data obtained from impact tube type total pressure probes (fixed radial rakes and traversing wake rakes) located in supersonic flow were corrected for shock loss.

Wedge probes were used to measure total pressure, air angle, and static pressure. Mach number was determined from calibrations of measured total and static pressure. The measured total pressure and flow angle from these probes were corrected using Mach number calibration curves for individual probes. The resulting calibrated Mach number and corrected total pressure were then used in conjunction with standard air-property tables to calculate static pressure.

Combination probes were used to measure total pressure, air angle, static pressure, and total temperature. Corrections were based on probe calibrations similar to those previously described for wedge probes but with an additional calibration of total temperature recovery versus Mach number.

All thermocouple signals were converted to temperature measurements using wire calibrations for individual sensors. These temperature measurements were converted into total temperature using calibrations of total-temperature recovery versus Mach number for individual sensors and the pressure-level correction given in Reference 8.

The total pressure impact tube on the NASA combination probe used to traverse the first-stage exit failed during testing, indicating a sudden deterioration in first-stage performance. The probe was recalibrated before being repaired so that the data taken with the damaged probe could be corrected. Some difficulty was experienced in obtaining a satisfactory calibration of the damaged probe. This questionable recalibration affected all blade-element performance parameters and the first-stage overall performance for those data points taken with the damaged probe. Performance parameter tabulations are marked for data points taken with the damaged probe. Fan overall performance measurements were not affected.

For tests with uniform inlet flow, circumferential total pressure distributions obtained at the exits of the 1st-stage and 2nd-stage stators were mass-flow averaged at each radial position using the corresponding measured distribution of total temperature and a constant circumferential static pressure determined by linearly interpolating between static pressure measurements from wall static taps or from wedge probe traverses. The arithmetic average of the three highest values from the circumferential total pressure distribution measured across the passage between adjacent stator vanes at each radial location was chosen to represent the free-stream or stator inlet pressure at the appropriate percent of span. A circumferentially mass-flow averaged total temperature was also calculated at each radial position using measured circumferential distributions of total temperature and pressure and static pressure linearly interpolated between wedge probe or inner and outer wall static tap measurements. Circumferentially mass-flow averaged temperatures from the two temperature wake rakes at the 2nd-stage stator exit were arithmetically averaged for each radial location. During tests with solid casings, one pressure wake rake did not traverse properly for some data points. Comparison of measurements made when both rakes were functioning properly showed excellent agreement. This agreement was also obtained in tests with casing treatments. On the basis of this, only data from the pressure rake that worked consistently for all tests were used in the calculation of performance parameters for points tested with uniform and radially distorted inlet flows.

Air angles measured by circumferential traverses at the exit of the 1st-stage stator were mass flow averaged at each radial location. Air angles measured by the two wedge-probes at the exit of the 2nd-stage stator were arithmetically averaged at each radial location.

For tests with tip radially distorted inlet flow, radial traverses at the exit of the 1st-stage stator were made at midgap – combined circumferential and radial traverses were used for the uniform inlet flow tests. Ratios of midgap measurements to gapwise mass-flow averaged total pressure and temperature and free-stream total pressure were correlated for uniform inlet flow data. These correlations were then used to calculate overall performance and blade-element parameters for the 1st-stage rotor and stator with radially distorted inlet flow. An example of one of the pressure correlations is shown in Figure 10. This technique was also used in the analysis of tests with inlet distortions conducted with solid casings (ref. 3). The major disadvantage of this method is that the calculated stator 1 total pressure loss does not vary with incidence angle. The resulting error is largest for open-throttle and near-stall data points. Fan overall performance data were not affected by inaccuracies inherent in this method.

For tests with circumferentially distorted inlet flow, fan inlet total pressure was calculated by radially mass-flow averaging the measurements made by each fixed rake and arithmetically averaging these radial mass-flow averages. This arithmetic average included inlet rake measurements made at all rotations of the circumferential inlet distortion screen. First-stage and 1st-stage rotor performance with circumferentially distorted flow is not presented. It was not possible to check measurements made by the damaged probe since the "redundant" probe was in a different flow region. Fan exit total pressures and temperatures were measured by means of wake-rake traverses at all rotations of the distortion screen. Total pressures and temperatures were each circumferentially mass-flow averaged for each rake at each radial location. These values were radially mass-flow averaged at each rake position relative to the screen. Overall average total pressure and temperature were calculated by arithmetically averaging the circumferentially and radially mass-flow averaged values for each wake rake position.

Performance Parameter Calculations

Overall and blade element performance parameters were calculated for uniform and radially distorted inlet flows by means of a flowfield analysis computer program. All parameters were corrected to standard day conditions. Inputs to the flowfield program are listed in Table VI.

Total pressures and temperatures were ratioed to compressor inlet values (Station 6). Compressor inlet total pressure was assumed equal to the inlet plenum pressure for tests with uniform inlet flow. For tests with distorted inlet flows, overall pressures were ratioed to the mass-flow average of the total pressures measured by the rakes at the fan inlet. Temperatures were always ratioed to the inlet plenum temperature.

TABLE VI – INPUT PARAMETERS TO FLOWFIELD PROGRAM

LOCATION	PARAMETER
Compressor Inlet (Station 0, Figure 6)	1) Corrected mass flow 2) Corrected rotor speed
Rotor 1 Inlet Instrument Plane (Station 6)	1) Total pressure ratio[1] versus radius 2) Constant radial blockage factor
Stator 1 Inlet (Station 9)	1) Total pressure ratio versus radius 2) Constant radial blockage factor
Stator 1 Exit Instrument Plane (Station 11)	1) Total temperature ratio versus radius 2) Total pressure ratio versus radius 3) Constant radial blockage factor 4) Absolute air angle versus radius
Stator 2 Inlet (Station 14)	1) Total pressure ratio versus radius 2) Constant radial blockage factor
Stator 2 Exit Instrument Plane (Station 16)	1) Total temperature ratio versus radius 2) Total pressure ratio versus radius 3) Constant radial blockage factor 4) Absolute air angle versus radius

[1] Ratio = 1.0 for uniform inlet flow. For radial distortions, ratio is local value of total pressure divided by mass-flow average of total pressure at Station 6.

A blockage factor was used at each axial location to improve the accuracy of the static pressure and velocity calculations of the flowfield program. Blockages were applied equally to all stream-tubes at each of the axial locations. Axial distributions of flow blockage factors were selected so that the hub and tip static pressures obtained from the flowfield calculations gave the best agreement with the wall average pressure for a representative midthrottle operating point at design speed. As shown in Table VII, the flow blockage factors used in the data reduction flowfield calculation were the same as those used in the redesign of the 2nd-stage rotor except at the trailing edge of the 2nd-stage stator where three percent blockage was added to the calculation for data reduction. These values are the same as those that had been used to reduce the data from the design stator-setting test reported in Reference 3 – details of the blockage selection and static pressure comparisons are given in that reference.

TABLE VII – ANNULUS BLOCKAGES

STATION	DATA REDUCTION (%)	REDESIGN (%)
Rotor 1 Leading Edge	2.4	2.4
Rotor 1 Trailing Edge	4.1	4.1
Stator 1 Leading Edge	4.1	4.1
Stator 1 Trailing Edge	2.8	2.8
Rotor 2 Leading Edge	2.8	2.8
Rotor 2 Trailing Edge	5.3	5.3
Stator 2 Leading Edge	5.3	5.3
Stator 2 Trailing Edge and Downstream	6.5	3.5

All static pressure distributions and air angles behind the rotor were calculated by the streamline flowfield computer program, assuming axisymmetric flow and using mass flow continuity, radial equilibrium, and energy equations. Curvature, enthalpy, and entropy gradient terms were included in the equilibrium calculations. Aerodynamic conditions at the blade edges were calculated by translating the measured data from the instrument plane along streamlines to the blade edges. Blade element parameters were calculated for airfoil sections lying on conical surfaces defined by the intersections of design streamlines and the blade edges. Calculations were made on design streamlines passing through the 1st-stage rotor trailing edge at 5, 10, 15, 30, 50, 60, 65, 70, 85, 90,and 95 percent of the passage height for uniform inlet flow and at 10, 30, 50, 70,and 90 percent for radially distorted inlet flow. Blade-edge stations were input to the flowfield calculation as slanted straight lines which closely approximated the meridional profiles of the manufactured blade edges. In addition to the blade element parameters, the output of the flowfield analysis program also includes overall performance of the 1st-stage rotor blade row, the first stage, the first stage plus the 2nd-stage rotor, the 2nd-stage rotor, and the complete two-stage fan. Blade-element performance data for uniform and radially distorted flow tests are tabulated in Appendixes C and D. Accumulated overall performance to the exit of each blade row is tabulated at the bottom of the blade element data sheet for that blade row.

RESULTS AND DISCUSSION

UNIFORM INLET FLOW

Fan Overall Performance

An overall performance map for the two-stage fan with uniform inlet flow is shown in Figure 11 for the configuration with casing treatment (axial skewed slots) over both rotors. For comparison, fan performance with solid rotor-casings has been included as dashed lines. As shown in the figure, the rotor casing treatment improved stall margin at 70 percent of design speed; however, at design speed there were significant performance penalties in terms of fan pressure ratio, efficiency, flow, and stall margin. There were also performance penalties at 85 percent of design speed but to a lesser degree than at design. Performance parameters at 70 percent, 85 percent, and 100 percent of design speed are compared in Table VIII.

TABLE VIII – COMPARISON OF PERFORMANCE PARAMETERS WITH ROTOR TIP CASING TREATMENT AND SOLID CASING FOR UNIFORM INLET FLOW

	CASING TREATMENT	SOLID CASING
DESIGN SPEED		
Peak Efficiency (%)	82.3	85.4
Peak Pressure Ratio	2.947	3.043 (at stall)
Maximum Inlet Corrected Airflow (% Design)	99.9	100.8
Stall Margin (%)	10	12
85% OF DESIGN SPEED		
Peak Efficiency (%)	84.7	85.5
Peak Pressure Ratio	2.255	2.269 (at stall)
Maximum Inlet Corrected Airflow (% Design)	83.7	84.4
Stall Margin (%)	16	16
70% OF DESIGN SPEED		
Peak Efficiency (%)	84.2	84.9
Peak Pressure Ratio	1.735 (at stall)	1.735 (at stall)
Maximum Inlet Corrected Airflow (% Design)	67.3	67.7
Stall Margin (%)	26	17

At 70 percent of design speed where the most probable cause of stall was high aerodynamic loading in the tip region of the 1st-stage rotor, as explained in Reference 3, the flow range was extended by the use of rotor casing treatment, resulting in a higher value of stall margin. At design speed where the most probable cause of stall was high loadings on the rotor and stator hubs of the 2nd-stage, casing treatment had an adverse effect on stall margin. The reduction in stall pressure ratio at design speed was due to increased losses with casing treatment and not to a reduction in work input. Figure 12 shows that work input (temperature rise) was increased by casing treatment for near-stall conditions over the entire speed range tested. Stalls at all speeds were abrupt, appearing as cyclic surges. At design speed the surge cycle period was 2.0 seconds. At 70 percent of design speed the period was 0.9 seconds.

Stall margin values were calculated for all speeds using the constant throttle operating line shown in Figure 11. This operating line passes through the design point and corresponds to a fixed-area fan nozzle. Nozzle Mach numbers were determined by a ratio of static pressure to total pressure equal to the reciprocal of the fan overall total pressure ratio. The nozzle flow was corrected to inlet conditions based on the selected pressure ratio and a temperature ratio derived from test efficiencies. Stall flows, pressure ratios, and calculated stall margins for uniform inlet flow are listed in Table XIV of Appendix C. Flow capacity was not affected by casing treatment at 70 percent of design speed but was reduced at higher speeds. At design speed and pressure ratio, the corrected air flow was 183.5 lbm/sec [83.3 kg/sec], which is approximately 0.6% below the design flow of 184.2 lbm/sec [83.22 kg/sec] and 1% below the flow of 185.3 lbm/sec [83.72 kg/sec] obtained with solid casings. Maximum flow at design speed was also reduced by approximately 1%. At 85 percent of design speed, operating line flow was reduced by 0.6% and maximum flow by approximately 1%.

Efficiency on the operating line was unchanged by casing treatment at 70 percent of design speed but was reduced by 0.7 percentage points at 85 percent of design speed. At design speed and pressure ratio, adiabatic efficiency was 82.2% which is 1.5 percentage points below the design goal and 2.8 percentage points below the efficiency obtained with solid casings. Peak efficiency at design speed was 82.3% at a pressure ratio of 2.93. With solid casings the peak efficiency was 85.4% at a pressure ratio of 2.86.

Fan total pressure recovery ratio, defined as the ratio of actual fan pressure ratio to the ideal fan pressure ratio derived from the measured total temperature ratio, was lower with casing treatment than with solid casings, as shown by Figure 13. Overall temperature ratio was also lower with casing treatment, except near stall, as shown by a comparison of temperature ratio versus corrected flow at design speed (Figure 12). The combination of lower total pressure recovery (higher loss) and lower temperature ratio (less work input) explains the loss in pressure ratio with casing treatment. The lower efficiency at design speed is due to the increased loss.

Overall Performance of the First-Stage Rotor and First Stage

The 1st-stage rotor had a higher pressure ratio and efficiency with casing treatment than with solid casings at 70 percent and 85 percent of design speed, as shown by the overall performance data presented in Figure 14. Casing treatment improved adiabatic efficiency by approximately 10 percentage points at 70 percent of design speed when the rotor was near stall, decreasing to no benefit at wide-open throttle. At design speed, pressure ratio near stall was reduced from 1.86 with solid casings to 1.84 with casing treatment, and adiabatic efficiency was reduced approximately 1.5 percentage points at the design pressure ratio. Nondimensional plots of pressure coefficient and efficiency versus flow coefficient (Figure 15) illustrate more clearly the trend of higher pressure ratios and efficiencies at low speed and lower pressure ratios and efficiencies at high speed.

At design speed 1st-stage rotor work input was not changed by casing treatment, as shown by the plot of rotor total temperature ratio versus corrected flow for solid and treated rotor casings (Figure 16). Hence, the efficiency drop with treatment at design speed was caused by higher 1st-stage rotor losses; the magnitude of the peak efficiency loss was approximately 1.5 percentage points.

The first-stage pressure coefficients at 70 percent and 85 percent of design speed were higher with casing treatment than with solid casings despite higher stator losses with the casing treatment. This difference between stator loss levels can be seen by comparing the nondimensional performance plot for the 1st-stage rotor (Figure 15) with the first-stage performance plot (Figure 17). The improvement in first-stage efficiency with casing treatment at 70 percent of design speed was smaller than for the rotor alone but near stall it was still approximately 7 percentage points. Casing treatment reduced first-stage pressure ratio and adiabatic efficiency at design speed due to increased losses in both the rotor and stator; adiabatic efficiency was reduced by approximately 2.5 percentage points. Pressure ratio differences at part speed were small, as shown by the first-stage overall performance data presented in Figure 18.

Overall Performance of the Second-Stage Rotor and Second Stage

Nondimensional performance plots for the 2nd-stage rotor and second stage (Figures 19 and 20) show that pressure coefficients with casing treatment for both the rotor and stage were lower than those obtained without casing treatment although casing treatment did provide slightly lower values of flow coefficient. The corresponding lower second-stage pressure ratios caused a small reduction in fan overall pressure ratio with casing treatment at 85 percent of design speed and no change at 70 percent of design speed although the first-stage pressure coefficients increased for both speeds. The general lack of improvement in second-stage pressure ratio and efficiency is probably due to the fact that critical loadings at the tip of the 2nd-stage rotor were not reached with solid casings. Since the improvement in first-stage pressure coefficient was not accompanied by any benefit in overall performance, the fan overall performance data indicates that better fan performance would have been obtained with casing treatment only over the 1st-stage rotor.

Blade-Element Performance

Spanwise Comparisons

Temperature ratio and pressure ratio versus span are presented in Figures 21 and 22 for the 1st-stage and 2nd-stage rotors and for the overall fan at near-stall and peak-efficiency points at design speed with and without casing treatment. Casing treatment caused an apparent redistribution of work input (temperature rise) such that the total-temperature ratio for the 1st-stage rotor increased from about 70 percent span to the tip. The temperature ratio of the 2nd-stage rotor with casing treatment increased in the region between 50 percent and 85 percent of span but decreased in the region from 85 percent span to the tip.

For the near-stall points (Figure 22), the 1st-stage pressure ratio with casing treatment was lower from the hub to about 85 percent span than without casing treatment and higher from there to the tip. For the 2nd-stage rotor, casing treatment reduced the pressure ratio from 50 percent to 90 percent span; however, at 90 percent span the pressure ratio with casing treatment increased sharply and exceeded the solid casing values from 95 percent span to the tip. This increase in pressure ratio near the tip is believed to be primarily the result of radial mixing (particle paths crossing streamlines). The combined effect of casing treatment on overall fan pressure ratio, as shown by the near-stall points, dropped the level of pressure ratio over the entire span but reduced the gradient of decreasing pressure ratio from 90 percent span to the tip.

Meridional velocity profiles at the second-stage inlet for design speed, near-stall data points (Figure 23) have a higher velocity near the tip with casing treatment, consistent with the reduced work input at the tip of the 2nd-stage rotor. The velocity profiles between 50 percent and 85 percent span are nearly identical, however, and do not explain how casing treatment caused higher work input in this region. The change in work input distribution is also believed to be primarily the result of increased radial mixing and to a lesser extent to the change in axial velocity distribution. Casing treatment increased the rise in overall fan temperature in the tip region.

The efficiency profiles that resulted from the measured pressure and temperature distributions are shown in Figure 24. These profiles show a drop in 1st-stage rotor efficiency with casing treatment for the outer 30 percent of span. The profiles for the 2nd-stage rotor with casing treatment show an efficiency deficit starting at approximately midspan; however, the efficiency increases sharply in the tip region due to the pressure increase and temperature decrease in this region. The improbable rise in efficiency outboard of 70 percent span is a strong indication that flow was transported radially across streamlines. The region of low efficiency between 60 percent and 95 percent span at the fan exit resulted in the loss in fan average overall-efficiency with casing treatment.

The large differences in temperature and pressure profiles in the tip region between the solid and treated casings at design speed are less evident at 85 percent and 70 percent speed. Figures 25 and 26 show the resulting radial profiles of efficiency for similar solid casing and casing treatment points at 85 percent and 70 percent speeds, respectively, showing smaller differences in the efficiency profiles of both rotors and of profiles at the fan exit.

Variations of Blade-Element Parameters with Incidence Angle

Blade-element plots of deviation angle, diffusion factor, and deviation angle versus suction surface incidence angle at 11 radial locations for rotor 1, stator 1, rotor 2, and stator 2 are presented in Figures 27 through 30, respectively. The solid line represents design speed performance for solid casings and is based on data given in Reference 3. (Radial distortion blade element data on parts b, d, e, h, and j of these figures are discussed in the Tip Radially Distorted Inlet Flow section of this report.) Although radial mixing of the flow was indicated in spanwise profiles of pressure and temperature (Figures 21 and 22), blade-element performance parameters were calculated assuming no mixing. Tabulations of blade-element data are given in Appendix C.

Rotor 1: The blade-element data for the 1st-stage rotor (Figure 27) shows that the narrow range of incidence angles at design speed was extended about one degree on the stall side (higher incidence) with casing treatment. Increased flow range provided a wider range of blade-element incidence angles which gave a better definition of increasing loss at extremes of high and low incidence angles. At design speed with casing treatment, losses increased with both low and high incidence angles, whereas with solid casings the losses increased only at low incidence angles. At 85 percent to 95 percent of span, losses were higher and deviations lower with casing treatment over the entire design speed incidence angle range, causing the rise in tip temperature ratio seen in Figure 21 and the corresponding efficiency penalty. The range of incidence angles increased with decreasing speed and the level of minimum loss decreased, both with casing treatment and with solid casings. The near-stall values of tip loading were higher with casing treatment, especially at 70 percent speed. Casing treatment raised the level of critical tip-loading, allowing the fan to operate at lower flows at 70 percent speed.

The calculated loss coefficients were negative for blade elements near the hub for certain data points with casing treatment, similar to those calculated with solid casings. These negative losses are attributed to two causes: 1) low temperature rise at low speeds magnified the effect of any temperature measurement errors and 2) temperature and pressure sensors were offset radially and the interpolations in regions of steep radial gradients may not have matched temperatures and pressures accurately. Distribution of loss between rotors and stators is not believed to be the source of the problem since stator losses appear to be reasonable for these points.

Stator 1: The blade-element data for the 1st-stage stator (Figure 28) shows that loss coefficients were relatively insensitive to incidence angle or speed near the hub with levels generally higher with casing treatment than with the solid casing. At design speed the portion of the span influenced by the 1st-stage rotor partspan shroud had lower losses with casing treatment than with the solid casings and shifted to higher incidences, indicating a decrease in flow through this region. At part speeds, stator loss patterns were nearly identical with treated and solid casings.

Diffusion factor levels were essentially the same for solid and treated casings except from 90 percent to 95 percent of span where near-stall values were higher at all speeds with tip treatment. At 70 percent speed where the levels of the stator 1 tip diffusion factor may have initiated fan stall, with casing treatment a diffusion factor of 0.663 was attained at 90 percent span at an incidence of 18.3 degrees compared to the solid casing test value of 0.580 at an incidence angle of 16.7 degrees.

Deviation angles were slightly higher with casing treatment than with solid casings at design speed. Agreement with design values of deviation angle was generally within about two degrees.

Rotor 2: Blade-element data for the 2nd-stage rotor (Figure 29) shows that the hub loadings at design speed with casing treatment did not reach as high a level as with the solid casings. The maximum diffusion factor with casing treatment was 0.59 near the hub and partspan shroud but with solid casing it was 0.64. Since a diffusion factor value of about 0.65 is associated with stall, with solid casing the hub of the 2nd-stage rotor was a probable cause of stall. It is not clear which blade element(s) initiated stall at design speed with casing treatment. There is evidence of choking at design speed with treated casings, similar to trends with solid casings, as shown by the sharp increase in loss with decreasing incidence near the hub. This choking evidence suggests that the 2nd-stage rotor limited the fan flow. Loss levels with casing treatment were slightly higher at the hub and significantly higher from midspan to 88 percent of span, dropping to below the solid casing losses at 94 percent of span.

Deviation angles with casing treatment were approximately two degrees lower over the entire span than with solid casings. The most probable explanation for this apparent change in deviation angle level is insufficient blockage assumed in the streamline calculation of blade-element velocity vectors for the casing treatment test points. For consistency, the same blockages were used for solid and treated casing data analysis. The reduced level of deviation angles with treatment is an indication that effective blockage was higher with casing treatment. A second indication of increased blockage is the incidence angle at which the 2nd-stage stator choked. Figure 30b shows that at design speed, the 2nd-stage stator hub (7 percent span) choked at approximately 1.5 degrees higher incidence angle in the casing treatment test.

Stator 2: The blade-element data for the 2nd-stage stator (Figure 30) shows an abrupt rise in loss with increasing negative incidence angle over the inner half of the vane span. This abrupt rise in loss indicates choke, and it occurred at all speeds. Blade elements in the outer half of the vane span did not have these abruptly changing losses; instead, the losses increased steadily as the incidence angles decreased below design values. This loss pattern is similar to that observed with the solid casings.

An abrupt decrease in deviation accompanied the rises in loss with decreasing incidence angle. The deviation angle changes may be a result of large stator wakes reaching the gapwise location of the probe and affecting the angle measurement. Loss and loading levels at design speed were generally in good agreement over most of the span both for treated and untreated casings. A shift to lower incidence near the tip occurred with treated casings with a corresponding rise in losses on the choke side.

TIP RADIALLY DISTORTED INLET FLOW

The radial-distortion screen shown schematically in Figure 6 was used to generate an axisymmetric total pressure defect that covered approximately 40 percent of the annulus area at the fan inlet. At design speed the distortion parameter, $(P_{max} - P_{min})/P_{max}$), was 0.15 with maximum flow and 0.13 with near-stall flow. Figure 31 shows the spanwise distribution of total pressure at the fan inlet for the flow range from wide-open throttle to near-stall flows at design speed.

Overall Performance

Overall performance for the fan, the first stage, and the 1st-stage rotor is shown in Figures 32, 33, and 34, respectively. Fan performance with tip radially distorted inlet flow and casing treatment is compared to the uniform inlet flow performance with casing treatment and to the solid casing performance with tip radially distorted inlet flow. At design speed, tip radially distorted flow increased stall margin from 10% with uniform inlet flow to 16%. At 70 percent of design speed, the tip distortion reduced stall margin from 23% to 15%.

Comparison of performance curves for tip radially distorted flow with treated and solid rotor casings shows that the stall lines are nearly the same. At design speed, casing treatment decreased flow so that the operating-line pressure ratio was 2.79 compared to 2.82 without casing treatment. The operating-line efficiency with casing treatment decreased from 84.7% for solid casings to 82.0%. Casing treatment increased stall margin slightly from 15% to 16%. At 70 percent of design speed, flow increased slightly so that the pressure ratio on the operating line increased from 1.69 with solid casings to 1.71 with casing treatment. The pressure ratio at stall was also higher with casing treatment, but stall occurred at a higher flow to give approximately the same stall line. Stall margin based on the operating line decreased from 18% with the solid casing to 15% with casing treatment. The operating-line efficiency decreased from 84.1% with solid casings to 83.8% with casing treatment.

Performance of the first stage and the 1st-stage rotor with uniform and with tip radially distorted inlet flows with and without casing treatment are compared in Figures 33 and 34. At design speed with casing treatment, a higher pressure ratio was obtained at stall with this distortion than with the undistorted flow; however, the pressure ratio was no higher than that obtained with solid casings. The solid casings gave a higher efficiency and flow capacity than the treated casings. The distortion reduced stall pressure ratio at 70 percent speed, but the pressure ratios were higher for the entire 70 percent speed line with casing treatment than with solid casings with the same distortion. The increases in first-stage pressure ratio and efficiency at 70 percent speed with casing treatment and the reduction at design speed are consistent with observed effects of casing treatment on fan overall performance.

Blade-Element Performance

Spanwise Comparison

Spanwise profiles of stage total pressure ratio for near-stall conditions at design speed with uniform and tip radially distorted flow are compared in Figure 35. Each value of pressure ratio in Figure 35 is equal to a local value of exit total pressure divided by a local value of inlet total pressure, where both pressures lie on the same streamline. The resulting pressure ratio profile does not represent a profile of absolute total pressure. The spanwise profile for tip radially distorted flow with solid rotor casings (ref. 3) is also shown. The figure shows that the outer portion of the span of the first stage with casing treatment had a higher pressure ratio with the distortion. It also shows that for the same tip distortion, the radial gradient of first-stage pressure ratio was steeper from midspan to the tip with casing treatment.

The total-pressure defect at the 1st-stage hub with tip radially distorted flow with casing treatment was not seen in tests with solid casings nor with undistorted flow with casing treatment. An incorrect value of total pressure may be the reason for this apparent defect. Total pressures at the inlet and exit of the 1st-stage stator were based on midgap measurements at the stator exit, corrected using the correlation of gap-averaged and free-stream total pressures versus midgap total pressures, as explained in the section Data Correction and Averaging (pg. 10). The correlation may be inaccurate for this operating condition. A local high-pressure ratio at the 2nd-stage hub apparently compensated for this defect.

Variations of Blade Element Parameters With Incidence Angle

Deviation angle, diffusion factor, and loss coefficient versus incidence angle are plotted in Figures 27 through 30 for each blade row at five radial positions together with data from uniform inlet-flow tests. Complete tabulations of blade element data are given in Appendix D.

Rotor 1: At design speed the 1st-stage rotor operated at lower incidence angles from 10 percent to 70 percent of span with tip radially distorted flow than with undistorted flow (Figure 27). The data shows that losses increased sharply at these lower incidence angles. This sharp increase in losses indicates that tip distortion forced flow towards the hub which tended to choke this region. This flow shift also resulted in higher positive incidences with distortion at 90 percent of span for both 70 percent and 100 percent of design speed. The highest diffusion factor reached was 0.6 at 90 percent span for the 70 percent speed near-stall point, much lower than the 0.71 value obtained with uniform inlet flow. This indicates that the reduction in stall margin at 70 percent of design speed with distortion was not due to 1st-stage rotor stall.

Stator 1: Blade element data (Figure 28) with distortion shows that the 1st-stage stator had the highest diffusion factors near stall of any blade row at both 70 percent and 100 percent of design speed. At design speed the diffusion factor at 9 percent span was 0.65. This loading occurred at an incidence angle that was two degrees higher than at the near-stall uniform-inlet-flow point which had a diffusion factor of 0.55. At 70 percent of design speed the 1st-stage stator tip reached a diffusion factor of 0.67, the same high loading value as with uniform inlet flow (Figure 28j). The distortion caused the diffusion factor to reach its loading limit at a higher flow (lower incidence), causing the loss in fan stall margin.

Losses were in good agreement with uniform inlet flow values across the span for both speeds tested.

Rotor 2: The blade-element data for the 2nd-stage rotor (Figure 29) shows an unusual amount of scatter. This is particularly true of loss coefficient data at 8 percent and 25 percent of span. This scatter and the negative losses calculated at these spans for both speeds do not appear to have resulted from an improper division of loss between rotor 2 and stator 2 but is more likely associated with temperatures or pressures from correlated first-stage exit data, as explained in the section Data Correction and Averaging (pg. 10). Design speed loadings were much lower with distortion at all spans while loadings were essentially the same at 70 percent of design speed. A maximum diffusion factor of 0.59 occurred at 88 percent span for the 70 percent speed near-stall point.

Stator 2: The blade element loss and deviation data for the 2nd-stage stator (Figure 30) agree very well with data from undistorted flow tests at both speeds. However, design speed loadings were much lower, never exceeding a value of 0.5.

Attenuation of Radial Distortion

Attenuations of tip-radial distortion through the two-stage fan with casing treatment were calculated for the three data points at design speed. Due to radial variations in total pressure present in the design profiles (uniform inlet flow) at the first-stage exit and at the fan exit, an attenuation parameter, A_r, at a given station x was defined

$$\frac{A_{r,x}}{100} = 1 - \frac{(\Delta P/P)_{test,x} - (\Delta P/P)_{design,x}}{(\Delta P/P)_{test,inlet}}.$$

where $\Delta P/P = (P_{max} - P_{min})/P_{max}$

The minimum pressure is determined by the local minimum in the distorted region. A negative sign is attached to each $\Delta P/P$ for which the pressure in the hub region exceeds the pressure in the tip region. Thus the design $\Delta P/P$ at the fan exit is negative since the design exit total pressure is higher at the hub than at the tip. The $\Delta P/P$ at the inlet is negative for the tip distortion. Any time the test $\Delta P/P$ at the first-stage or fan exit matches the design $\Delta P/P$, the distortion is considered fully attenuated and the value of A_r = 100. Negative values of A_r represent amplified distortions, values of A_r between 0 and 100 represent the percentages of attenuation, and values greater than 100 represent over-attenuated distortions. Table IX presents a summary of attenuation parameters calculated at design speed for tip radially distorted inlet flow. Figure 36 compares spanwise total pressure profiles at the fan inlet, first-stage exit, and fan exit for these data points with the profiles for undistorted flow and with the profiles for tip radially distorted flow and solid casings. Pressures were ratioed to the average fan inlet total pressure. The figure shows profiles of absolute pressure, not profiles of pressure ratio along streamlines. The shapes of the total pressure profiles at the first-stage exit and fan exit are not markedly different for uniform and distorted inlet flow. At the first-stage exit, the total pressures at the hub with tip distortion were generally higher with solid casings than with casing treatment. This difference was smaller at the fan exit than at the first-stage exit. Pressure differences at the tip were small for all three fan configurations. The combination of lower pressure at the hub and normal pressure at the tip resulted in attenuation parameters over 100 percent for the midrange and near-stall data points. Casing treatment increased the amount of attenuation at the near-stall design speed data point to 103.7% compared to 86.7% with solid casings. At wide-open throttle, attenuation was approximately the same as with solid casings.

It should be noted that the first-stage data for all radial distortion tests were affected by a damaged combination probe at the first-stage exit. Although the recalibration of the probe in its damaged condition was used to reduce these data, first-stage performance and all blade-element data must be treated with some caution.

TABLE IX – ATTENUATION PARAMETERS AT DESIGN SPEED FOR TIP RADIALLY DISTORTED INLET FLOW

THROTTLE SETTING	$(\Delta P/P)_{test,\,x}$	$(\Delta P/P)_{design,\,x}$	$A_{r,x}$
ROTOR 1, INLET (x = 6)			
Wide-open	-0.141	0	0%
Midrange	-0.140	0	0%
Near stall	-0.134	0	0%
FIRST-STAGE EXIT (x = 11)			
Wide-open	-0.126	0.021	-4.2%
Midrange	-0.113	0.021	4.2%
Near stall	-0.041	0.021	53.8%
FAN EXIT (x = 16)			
Wide-open	-0.157	-0.092	53.9%
Midrange	-0.04	-0.092	137.2%
Near stall	-0.087	-0.092	103.7%

CIRCUMFERENTIALLY DISTORTED INLET FLOW

The circumferential inlet-distortion was generated by means of the screen shown schematically in Figure 6. A distortion pattern was generated which covered approximately a 90-degree segment of the annulus area at the inlet of the 1st-stage rotor. At a near operating-line data point at design speed, the screen provided distortion parameters, $(P_{max} - P_{min})/P_{max}$, of 0.115 at 10 percent span, 0.136 at 50 percent span, and 0.135 at 90 percent span. Inlet, total pressure profiles for this data point are shown in Figure 37.

Fan Overall Performance

Overall performance for the fan with circumferentially distorted inlet flow with and without casing treatment is shown in Figure 38; performance with casing treatment and uniform flow is also shown. At design speed, the stall margin was about 12% with treated casings and circumferentially distorted inlet flow; with uniform inlet flow, the stall margin was 10%. With solid casings, stall margin with circumferentially distorted flow was about 10%; it was 12% with uniform flow – indicating that at design speed casing treatment reduced the sensitivity to circumferential distortion. Peak adiabatic efficiency with treated casings was 81.6% with circumferentially distorted flow; it was 82.3% with uniform flow. With solid casings, efficiency was 81.8% with circumferential distortion and 85.4% with uniform flow.

At 70 percent of design speed, stall margin with circumferentially distorted inlet flow was approximately 25% with casing treatment and 17% with solid casings, about the same values attained with uniform flow. Peak adiabatic efficiency with circumferentially distorted inlet flow was 81.4% with casing treatment and 80.9% with solid casings; efficiency with uniform flow was 84.0% with casing treatment and 84.5% with solid casings.

The overall performance presented in Figure 38 is based on data from two different sets of screen rotation†. The solid symbols in the figure are points with data from 12 circumferential locations (30-degree intervals) relative to the screen while the open symbols are points with only four circumferential locations (90-degree intervals) relative to the screen. To evaluate the effects of using four locations instead of 12, four sets of performance parameters were calculated from a 12-location point (a near-design point). One set of calculations used data from all 12-locations, and three sets of calculations used data from only four of the 12 locations; each set utilized a different group. The results of these calculations are present in Table X. The four-location points are labeled A, B, or C for identification purposes. The maximum difference between fan overall pressure ratios was approximately 0.01, and the maximum difference between efficiencies was approximately three percentage points. The four-location data points (open symbols) shown in Figure 38 used the combination identified in Table X as "A".

TABLE X – COMPARISON OF PERFORMANCE OBTAINED WITH THE TWELVE-LOCATION AND FOUR-LOCATION DATA ACQUISITION METHODS

	Fan Pressure Ratio	Fan Adiabatic Efficiency (%)
12-Location	2.819	81.56
4-Location A	2.817	80.15
B	2.814	80.97
C	2.827	83.32

† Only two probes were used, and these probes were held in a circumferentially fixed location relative to the case. To obtain the additional measurements, the screen was rotated relative to the fixed probes.

Overall performance parameters for circumferential distortion data points are based on averages of measurements obtained at different circumferential positions relative to the distortion screen and not on the axisymmetric streamline calculating procedures used for uniform and radial-distortion flow data points. The two methods for calculating overall performance are described in the Data Correction and Averaging section of this report (pg. 10). The difference in performance obtained with the two methods is small. To determine representative differences, pressure ratio and efficiency for the near-design data point with uniform inlet flow were calculated using both techniques. With the method employed for circumferentially distorted flow, the pressure ratio was 0.006 higher and efficiency was 0.12 percentage points higher.

Circumferential Distributions of Flowfield Parameters

Circumferential distributions of static pressures at design speed are shown in Figures 39 and 40. The static pressures were measured by means of taps on the outer case and inner hub at five axial locations between the distortion screen and the 1st-stage rotor inlet. The profiles show regions of lower static pressure behind the screen. The reversed pattern on the outer wall approximately midway between the screen and the rotor inlet was probably due to the support strut immediately downstream of this axial location (Figure 8). No pattern reversal was seen at the hub at any axial location (Figure 40). Static pressure patterns were nearly identical to the patterns caused by the circumferential distortion in tests with solid casings (ref. 3).

Circumferential distributions of total pressure ratio, static pressure ratio, absolute Mach number, relative flow angle, absolute flow angle, and velocity components at the fan inlet and fan exit are presented in Appendix E, Tables XXII and XXIII; circumferential distributions of total temperature ratio for the fan exit are presented in Appendix E, Table XXIV. Figures 41 and 42 show distributions for all these parameters at 10 percent, 50 percent, and 90 percent of span at design speed. Of interest in these plots is the almost complete attenuation of total pressure distortion at 50 percent and 90 percent of span and the apparent amplification at the hub. The attenuation of the pressure distortion was accompanied by the generation of a temperature distortion. At the fan exit, the temperature downstream of the inlet pressure distortion was locally higher than the average for all spanwise positions (Figure 42). These figures also show the possibility of inaccuracies in performance parameters based on measurements at four circumferential positions compared to twelve.

The circumferential patterns of total temperature and pressure were similar in shape to those obtained in tests with solid casings (ref. 3).

Attenuation of Circumferential Distortion

Distortion attenuation is summarized in Table XI for data points obtained with the 12-location method. The attenuation parameter for circumferential distortion, A_c, at station x is defined

$$\frac{A_{c,x}}{100} = 1 - \frac{(\Delta P/P)_x}{(\Delta P/P)_{inlet}}$$

where $\Delta P/P = \dfrac{P_{max} - P_{min}}{P_{max}}$

Negative values for A_c represent amplified distortions, and positive values represent percent attenuation. The values of A_c in Table XI indicate that a sizeable net attenuation occurred through the fan, except near the hub. The value of $\Delta P/P$ at 10 percent span at the fan exit is approximately twice the fan inlet value at design speed and approximately 2.5 times the fan inlet value at 70 percent speed.

TABLE XI – ATTENUATION PARAMETERS FOR CIRCUMFERENTIALLY DISTORTED INLET FLOW

	SPAN (%)	$(\Delta P/P)_{inlet}$	$A_{c,16}$
70 PERCENT DESIGN SPEED (Near Stall)			
$W\sqrt{\theta}/\delta$ = 96.0 lbm/sec	10	0.032	−166
[43.5 kg/sec]	50	0.036	25
P_r = 1.713	90	0.033	23
DESIGN SPEED (Midrange)			
$W\sqrt{\theta}/\delta$ = 180.6 lbm/sec	10	0.113	−110
[81.9 kg/sec]	50	0.136	74
P_r = 2.819	90	0.134	57
DESIGN SPEED (Near Stall)			
$W\sqrt{\theta}/\delta$ = 177.4 lbm/sec	10	0.112	−107
[80.5 kg/sec]	50	0.131	75
P_r = 2.847	90	0.130	55

SUMMARY OF RESULTS

Tests of a two-stage fan having a 1st-stage rotor tip speed of 1450 ft/sec [442 m/sec] and casing treatment consisting of axial skewed slots over the tip of both rotors produced the following significant results:

1. With uniform inlet flow, casing treatment over the rotor tips decreased stall margin from 12% to 10% at design speed, caused negligible change at 85 percent speed, and increased stall margin from 17% to 25% at 70 percent of design speed.

2. Operating-line adiabatic efficiency at design speed was reduced from 85% with the solid casing to 82.2% with casing treatment. At 85 percent speed, efficiency dropped from 85.5% to 84.7% with casing treatment. The 70 percent of design speed efficiency was essentially unchanged.

3. Operating-line flow capacity was reduced with casing treatment approximately 1.0% at design speed and 0.6% at 85 percent of design speed. No change occurred at 70 percent of design speed.

4. Casing treatment increased first-stage pressure ratio and efficiency at 70 percent and 85 percent of design speed at low flow coefficients. Second-stage efficiency was reduced by casing treatment for all operating conditions. Better overall fan performance would likely have been achieved with casing treatment over the 1st-stage rotor and solid casing over the 2nd-stage rotor.

5. Significant differences in radial profiles of pressure and temperature ratios were measured with casing treatment as compared to those obtained with solid casings.

6. With tip radially distorted inlet flow and casing treatment, the fan maintained the same efficiency levels as with uniform inlet flow but with a six percentage point increase in stall margin at design speed and an eight percentage point decrease at 70 percent of design speed. The stall line was approximately the same as that obtained with tip distortion and solid casings. The tip-radial distortion was attenuated for all operating conditions. Distortion was attenuated to a greater degree with casing treatment than with solid casings.

7. With circumferentially distorted inlet flow and casing treatment, design speed stall margin was 2.3 percentage points greater than with uniform inlet flow, but little change occurred at 70 percent of design speed. Casing treatment improved stall margin by 1.5 percentage points at design speed and 10 percentage points at 70 percent of design speed with this distortion, while efficiencies and pressure ratios remained essentially the same as with solid casings. Casing treatment increased attenuation of circumferential distortions at the tip and midspan but increased distortion amplification at the hub.

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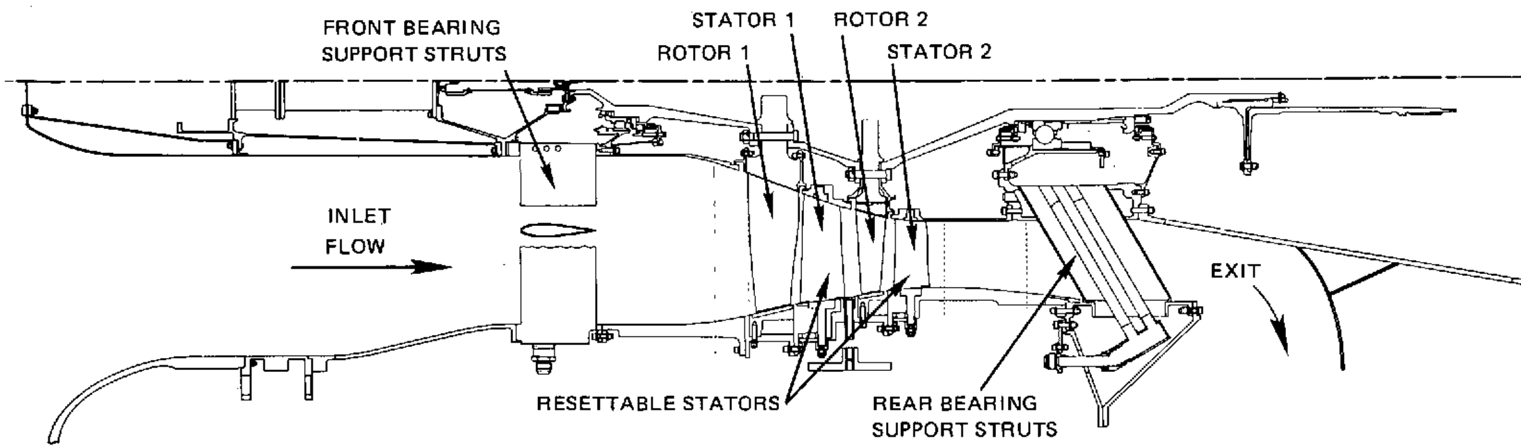


Figure 1 Schematic of Two-Stage Fan Test Arrangement

DIMENSION IN INCHES (METERS)

	DIAMETER		AXIAL DISTANCE FROM ROTOR 1 LEADING EDGE	
STA	I.D.	O.D.	z - I.D.	z - O.D.
4	10.00 (0.254)	32.48 (0.825)	-5.20 (-0.132)	-5.20 (-0.132)
5	10.26 (0.261)	32.33 (0.821)	-3.70 (-0.094)	-3.70 (-0.094)
6	10.94 (0.278)	31.96 (0.811)	-2.245 (-0.057)	-2.245 (-0.057)
7	12.40 (0.315)	31.00 (0.787)	0.0 (0.0)	0.42 (0.011)
8	14.84 (0.377)	29.93 (0.760)	3.30 (0.084)	2.75 (0.070)
9	15.22 (0.387)	29.67 (0.754)	3.80 (0.097)	3.45 (0.088)
10	16.85 (0.428)	28.96 (0.736)	6.15 (0.156)	6.33 (0.161)
11	17.18 (0.436)	28.82 (0.752)	6.75 (0.172)	6.75 (0.172)
*12	17.39 (0.442)	28.58 (0.726)	7.23 (0.184)	7.57 (0.192)
** 12	17.39 (0.442)	28.55 (0.725)	7.23 (0.184)	7.65 (0.194)
*13	18.35 (0.467)	28.12 (0.714)	9.20 (0.234)	8.82 (0.224)
** 13	18.37 (0.467)	28.14 (0.715)	9.27 (0.236)	8.76 (0.223)
14	18.58 (0.472)	27.90 (0.709)	9.80 (0.249)	9.59 (0.244)
15	18.90 (0.480)	27.60 (0.701)	11.85 (0.301)	11.93 (0.303)
16	18.90 (0.480)	27.60 (0.701)	13.50 (0.343)	13.50 (0.343)

*ORIGINAL
**REDESIGN } DENOTES CHANGES IN AXIAL POSITION DUE TO REDESIGN

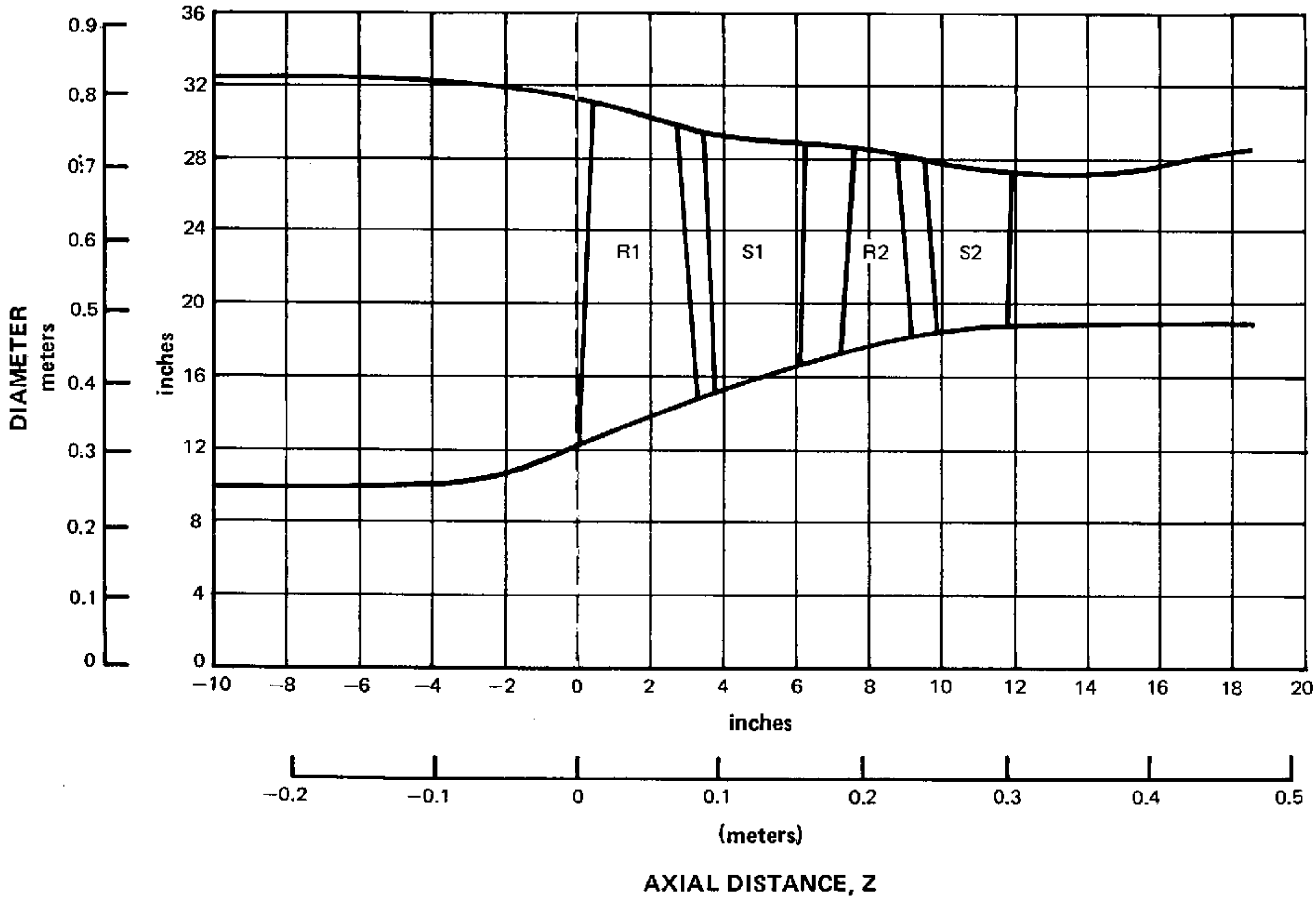
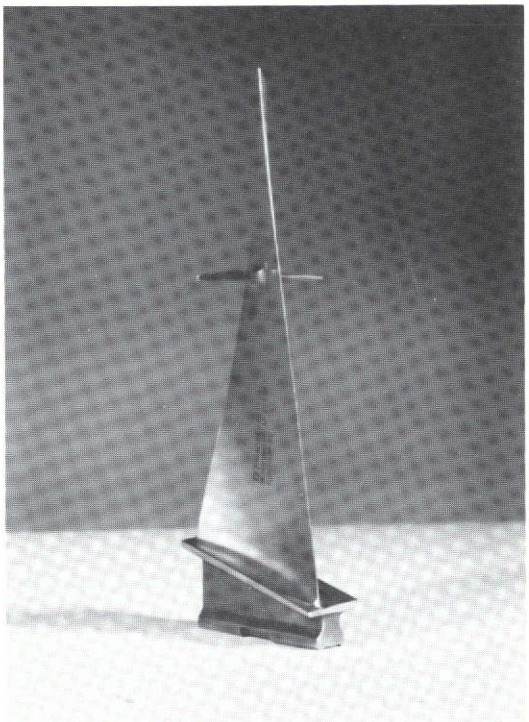
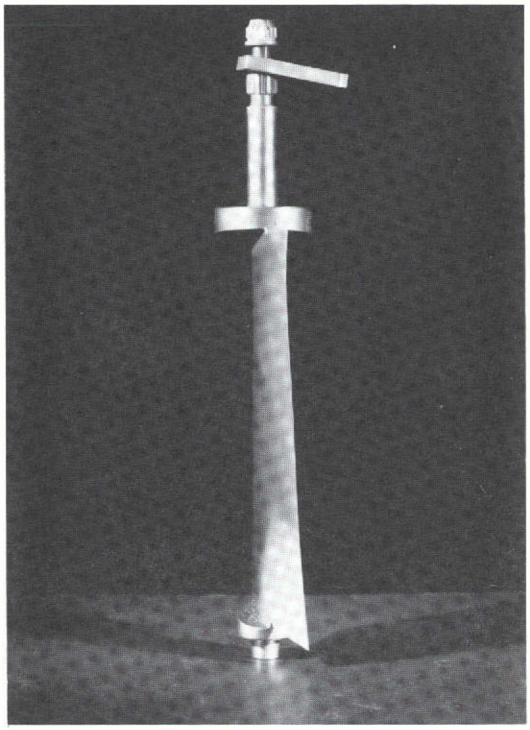


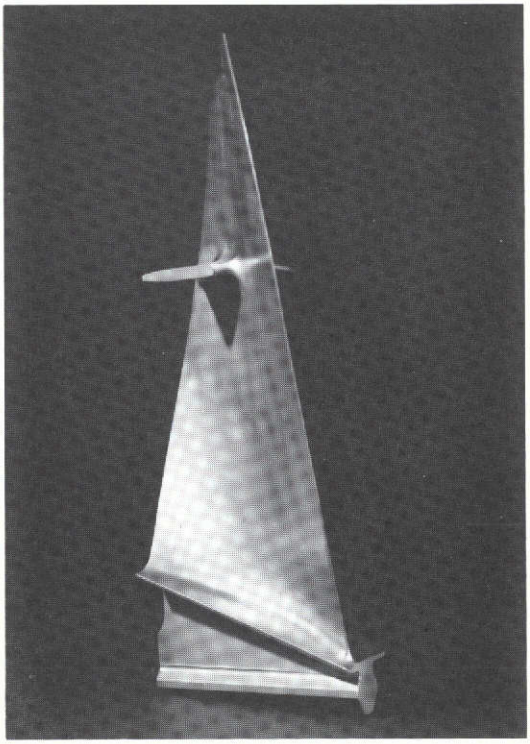
Figure 2 Fan Flowpath



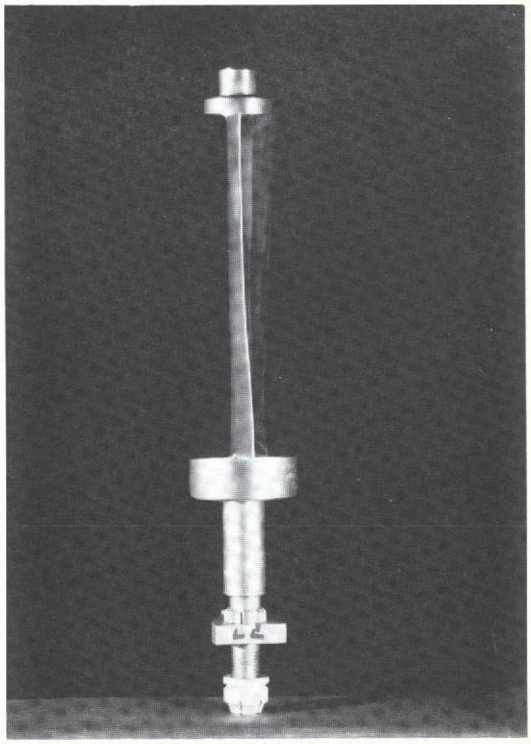
First-Stage Blade



First-Stage Vane



Second-Stage Redesigned Blade



Second-Stage Vane

Figure 3 Blades and Vanes Employed in the Two-Stage Fan

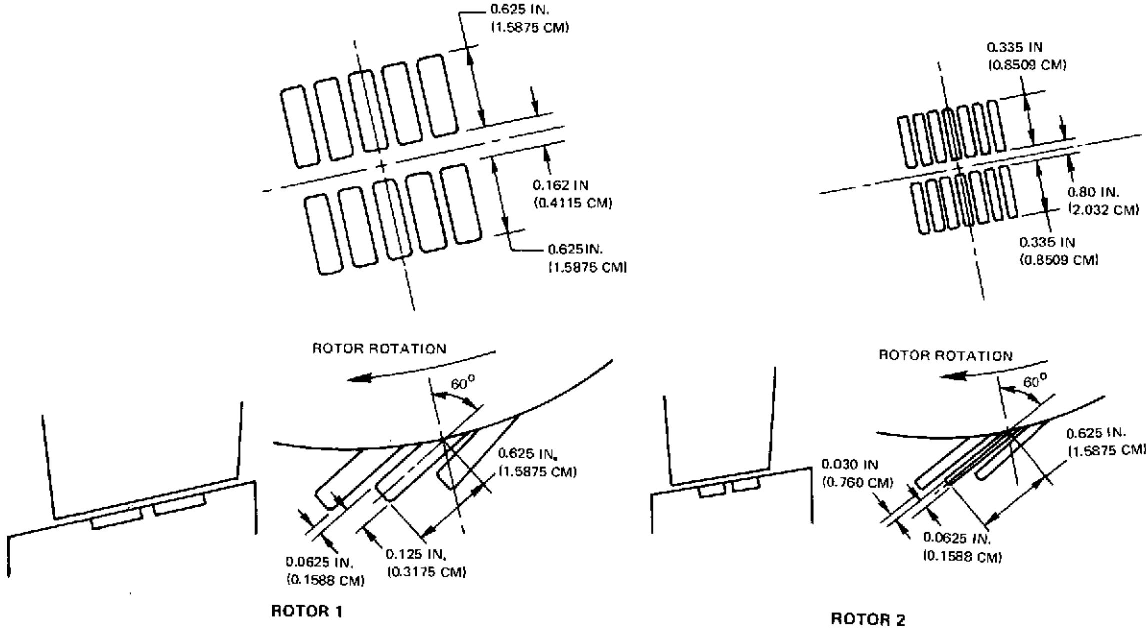


Figure 4 Sketch of Rotor Tip Casing Treatments

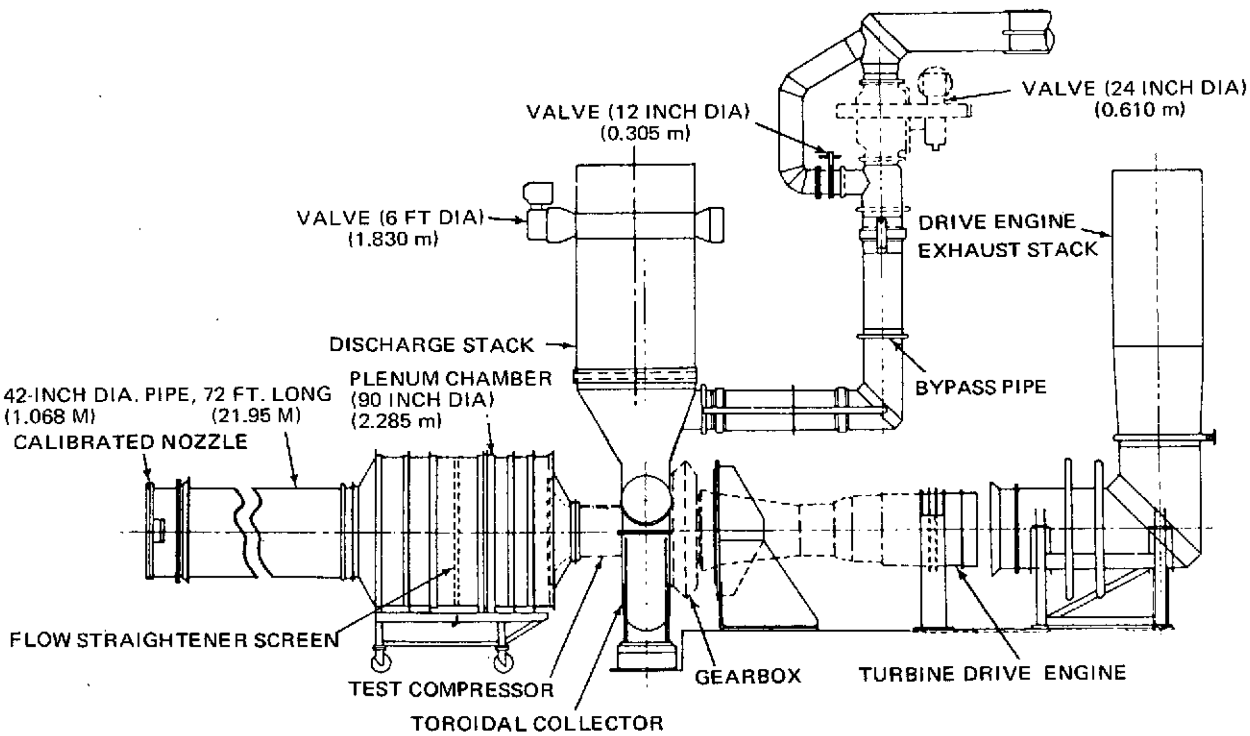
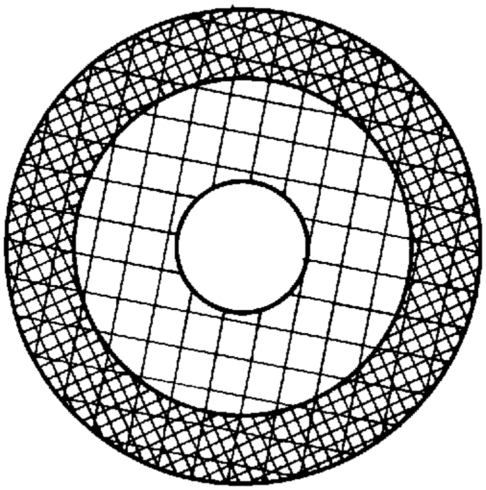
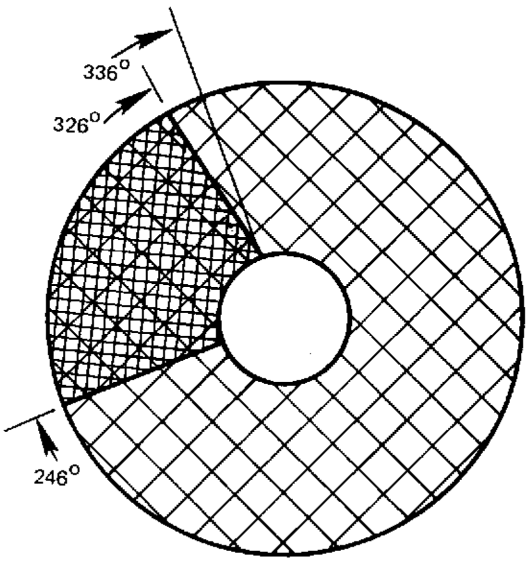


Figure 5 Schematic of Compressor Test Facility



TIP-RADIAL SCREEN

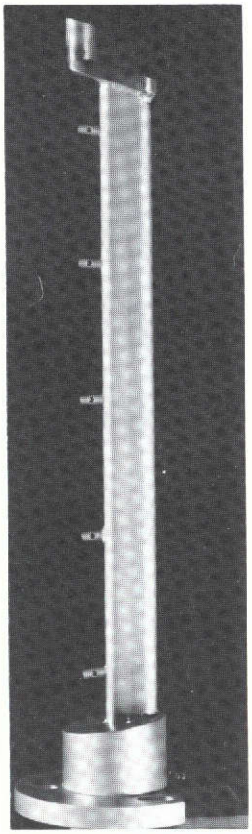
39.8 PERCENT OF ANNULUS AREA COVERED
1 0.5 X 0.5 X 0.062 IN. (.0127 X .0127 X .0016 m)
1 0.25 X 0.25 X 0.062 in. (.0064 X .0064 X .0016 m)
2 .0625 X .0625 X .017 in. (.0016 X .0016 X .0004 m)
BASE 1 X 1 X .125 IN. (.0254 X .0254 X .0032 m)



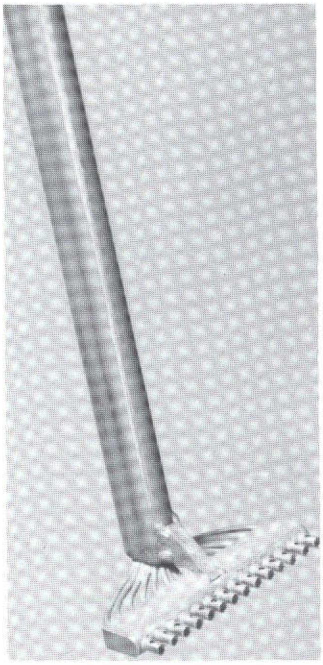
CIRCUMFERENTIAL SCREEN

22.9 PERCENT OF ANNULUS AREA COVERED
1 .5 X .5 X .062 IN. (.0127 X .0127 X .0016 m)
1 .25 X .25 X .062 IN. (.0064 X .0064 X .0016 m)
4 .0625 X .0625 X .017 IN. (.0016 X .0016 X .0004 m)
2 .0625 X .0625 X .017 IN. (.0016 X .0016 X .0004 m) (COVERS 0 - 20% SPAN)
BASE 1 X 1 X .125 IN. (.0254 X .0254 X .0032 m)

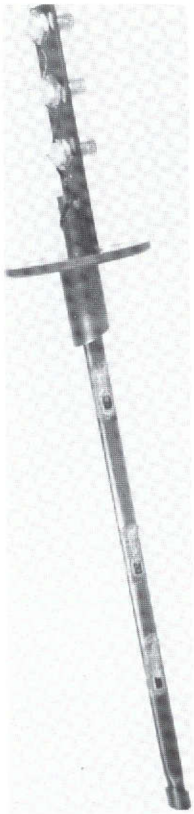
Figure 6 Sketch of Distortion Screens



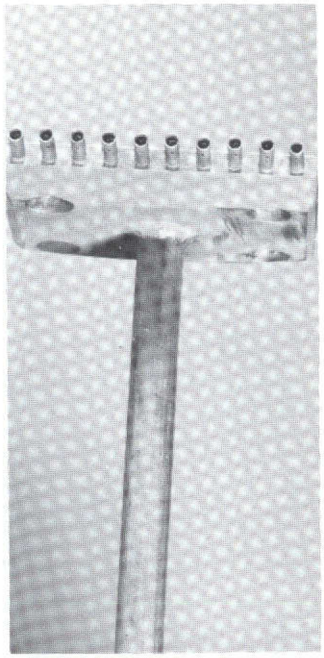
A. Fan Inlet
Total Pressure
Rake Probe



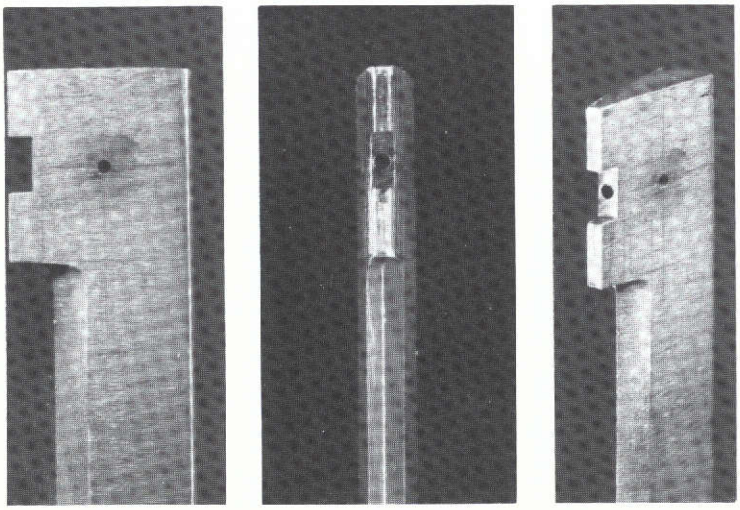
B. Stator 2 Exit Total Pressure
Wake Probe



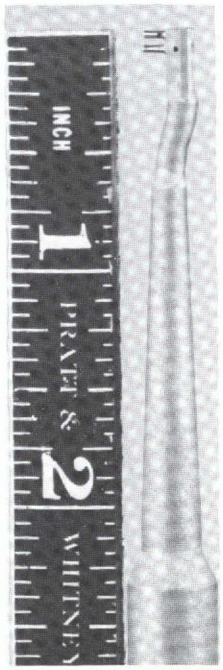
C. Fan Inlet
Hot Film
Probe



D. Stator 2 Exit Total Temperature Wake Rake



E. Fan Inlet & Static Exit Traverse Wedge Probes



F. Stator 1 Exit
NASA Combination Probe

Figure 7 Typical Instrumentation Employed in Two-Stage Fan Tests

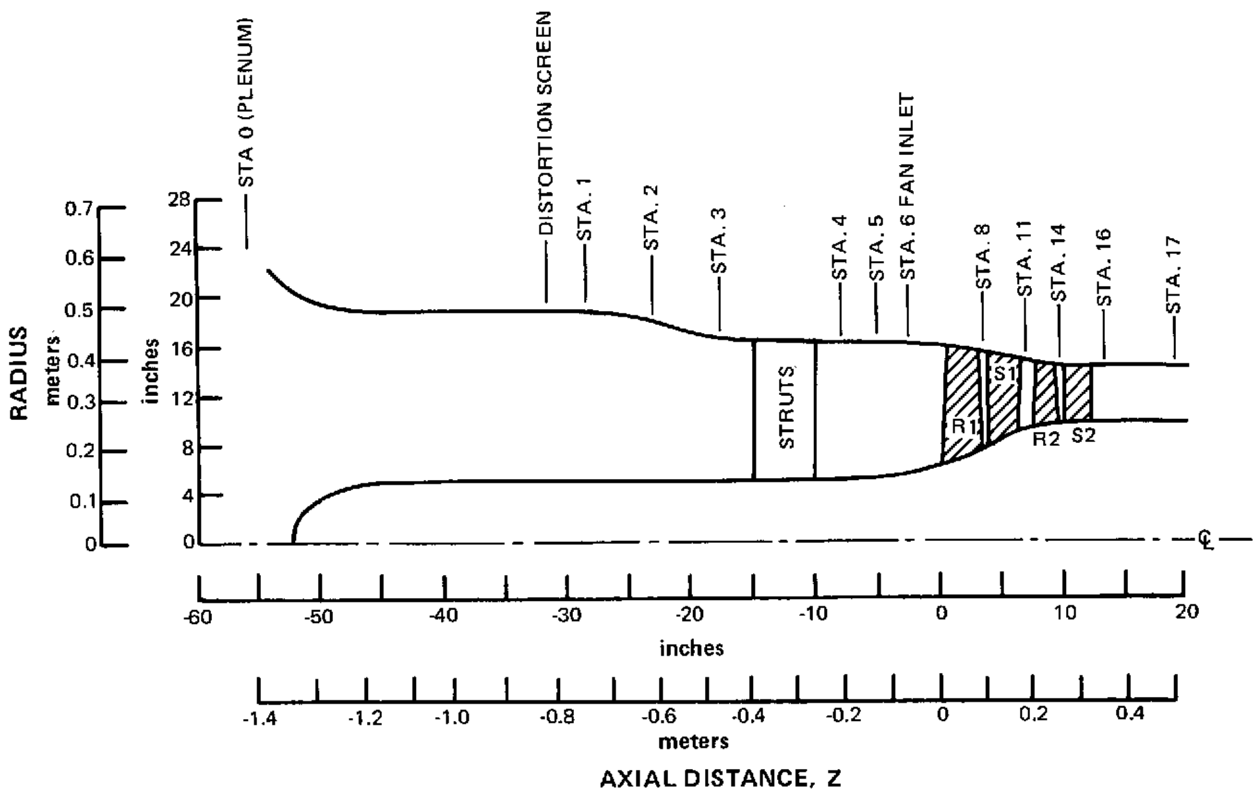


Figure 8 Axial Locations of Instrumentation

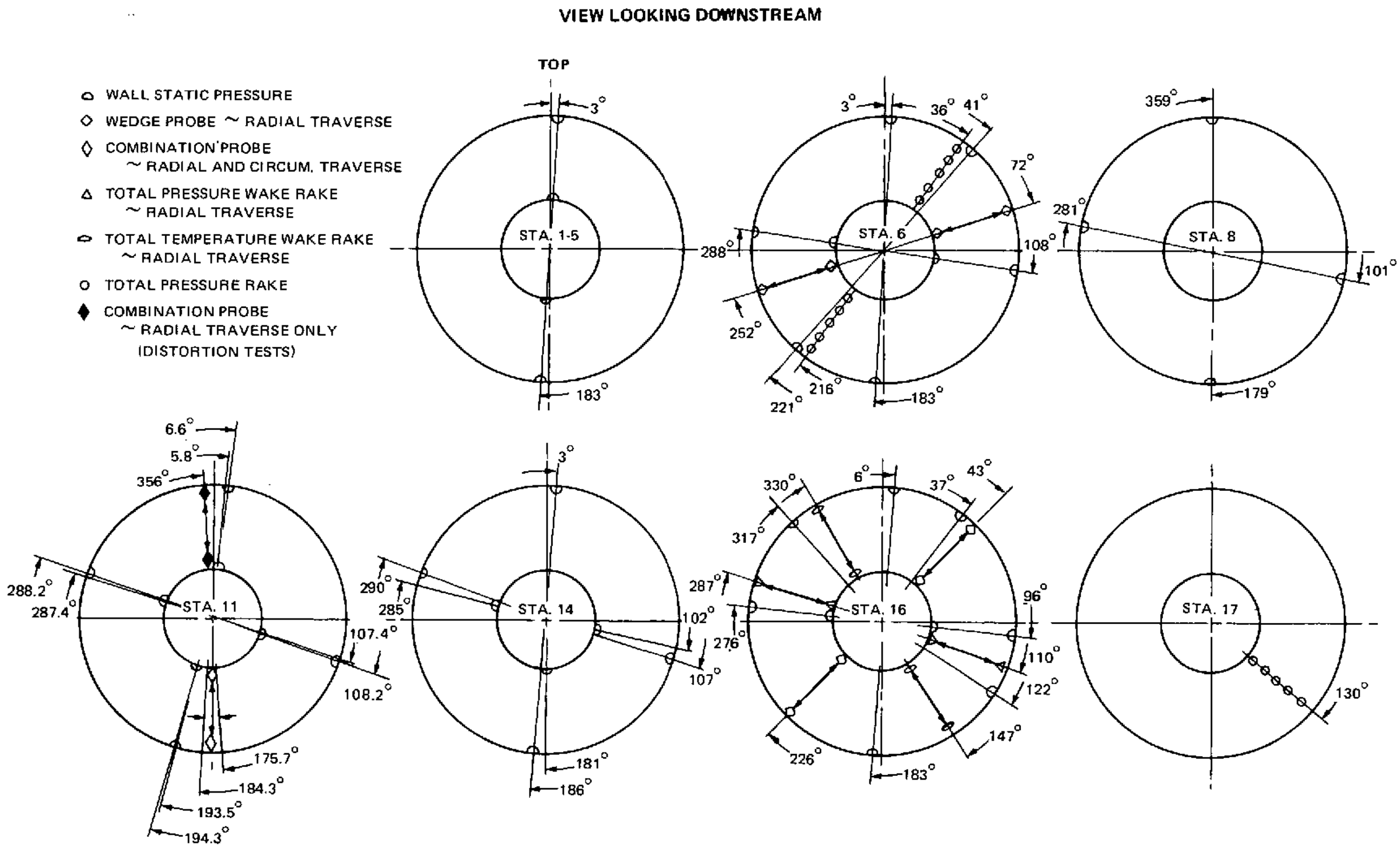


Figure 9 Circumferential Locations of Instrumentation

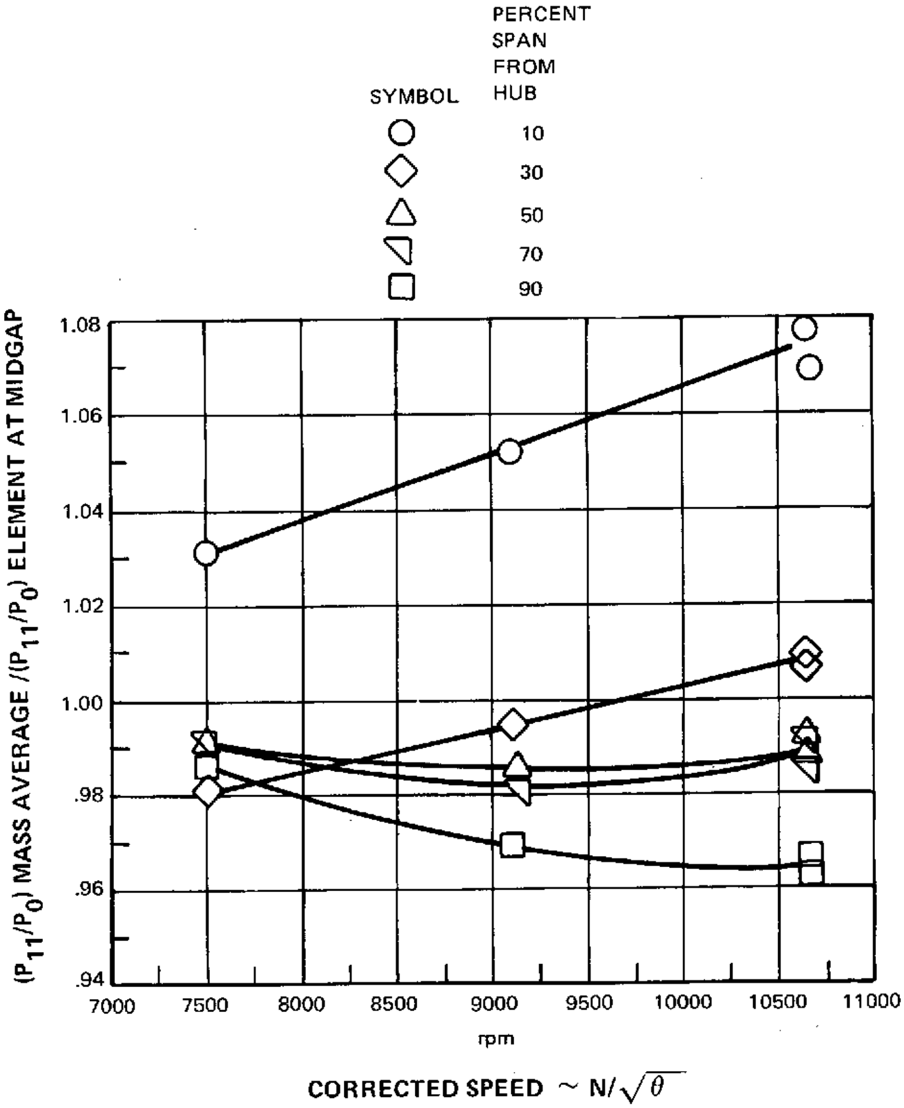


Figure 10 Correlation Used for Radial Distortion Streamline Analysis

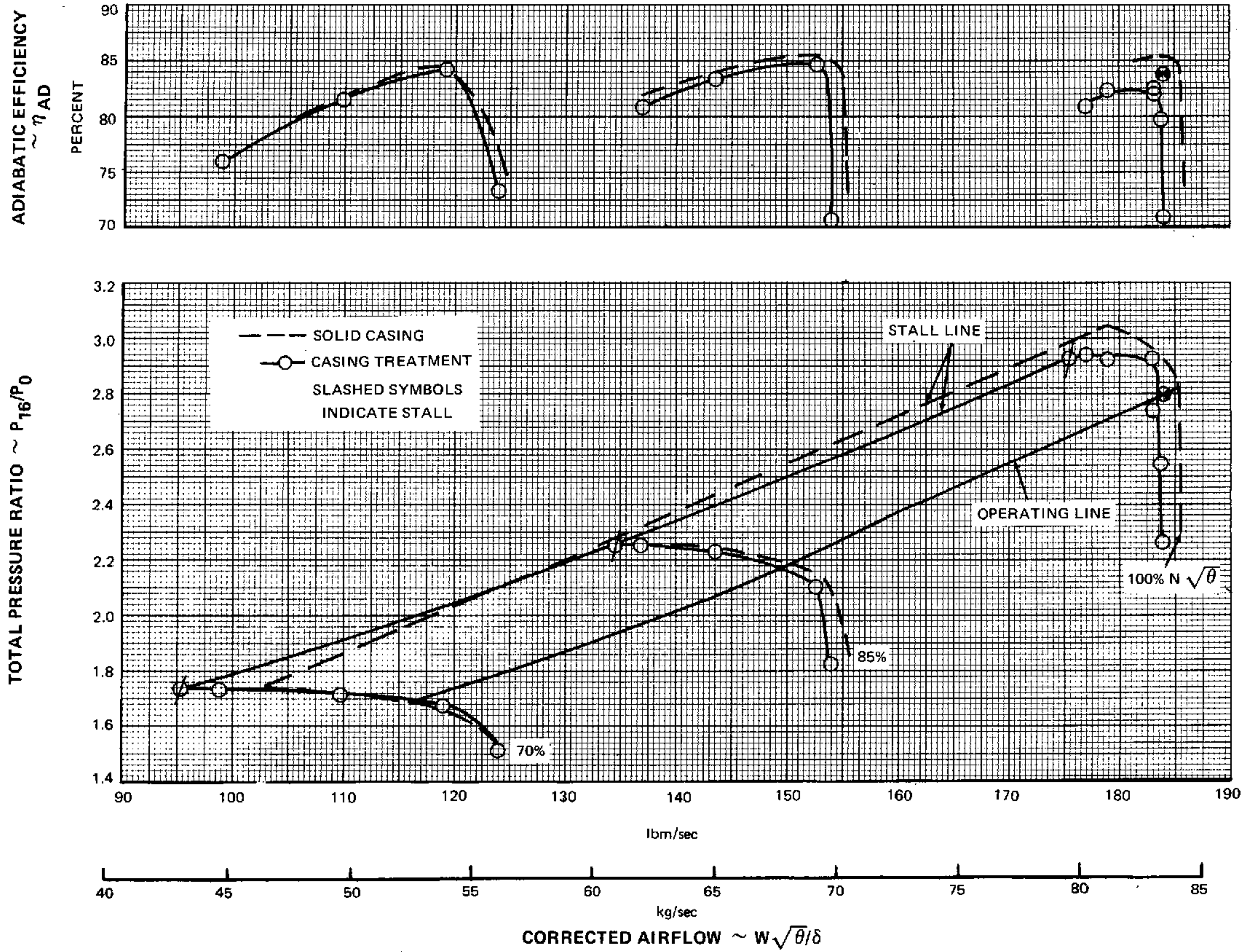


Figure 11 Fan Overall Performance With Uniform Inlet Flow With Casing Treatment – Performance With Solid Casings Shown for Comparison

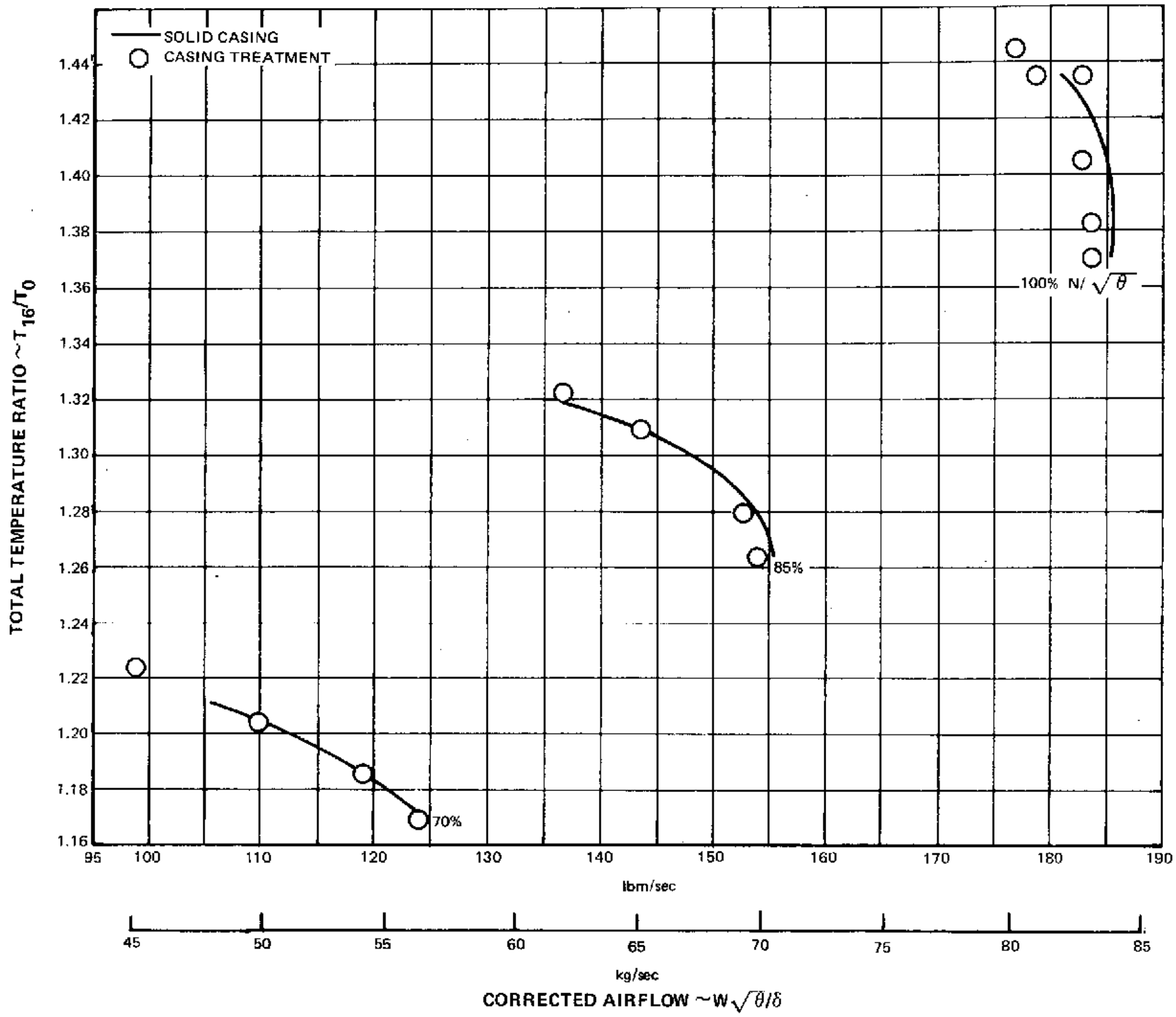


Figure 12 Fan Overall Total Temperature Ratio Data Versus Corrected Flow With Casing Treatment for Uniform Inlet Flow – Solid Casing Curves Shown for Comparison

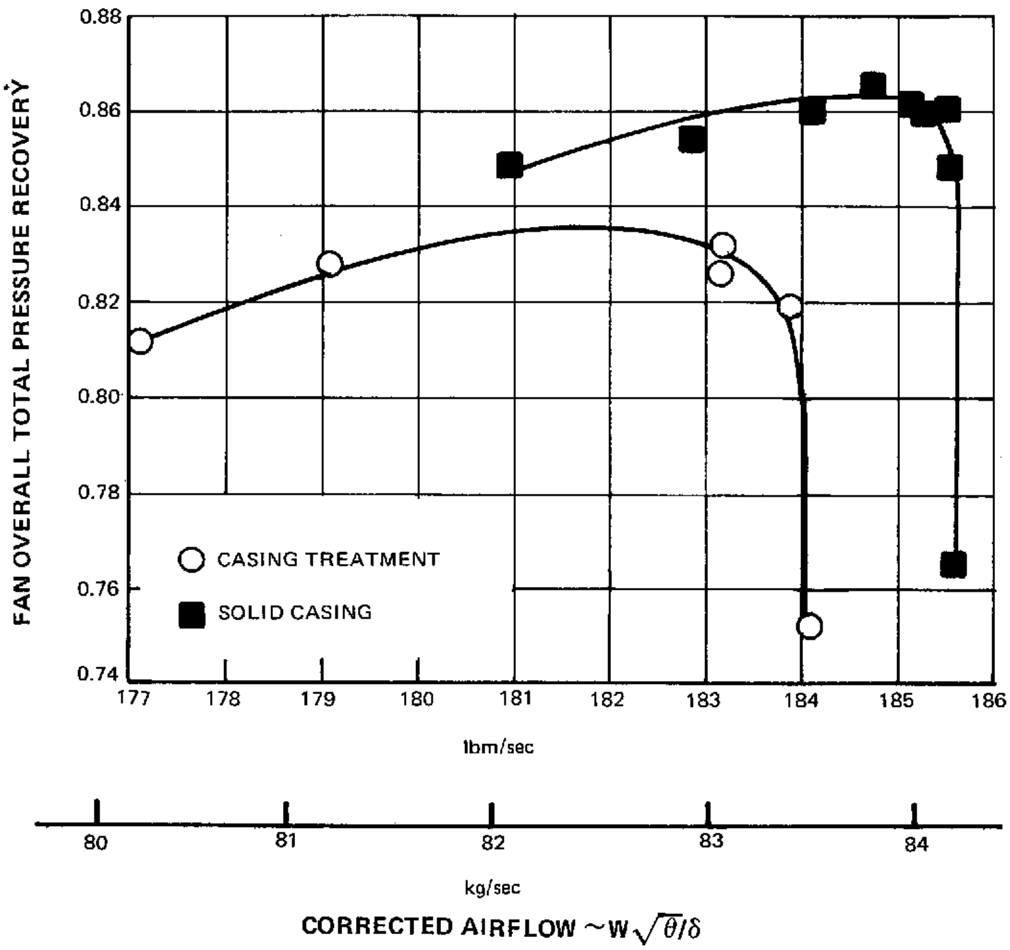


Figure 13 Fan Overall Total Pressure Recovery Versus Corrected Flow at Design Speed for Uniform Inlet Flow With Casing Treatment and With Solid Casings

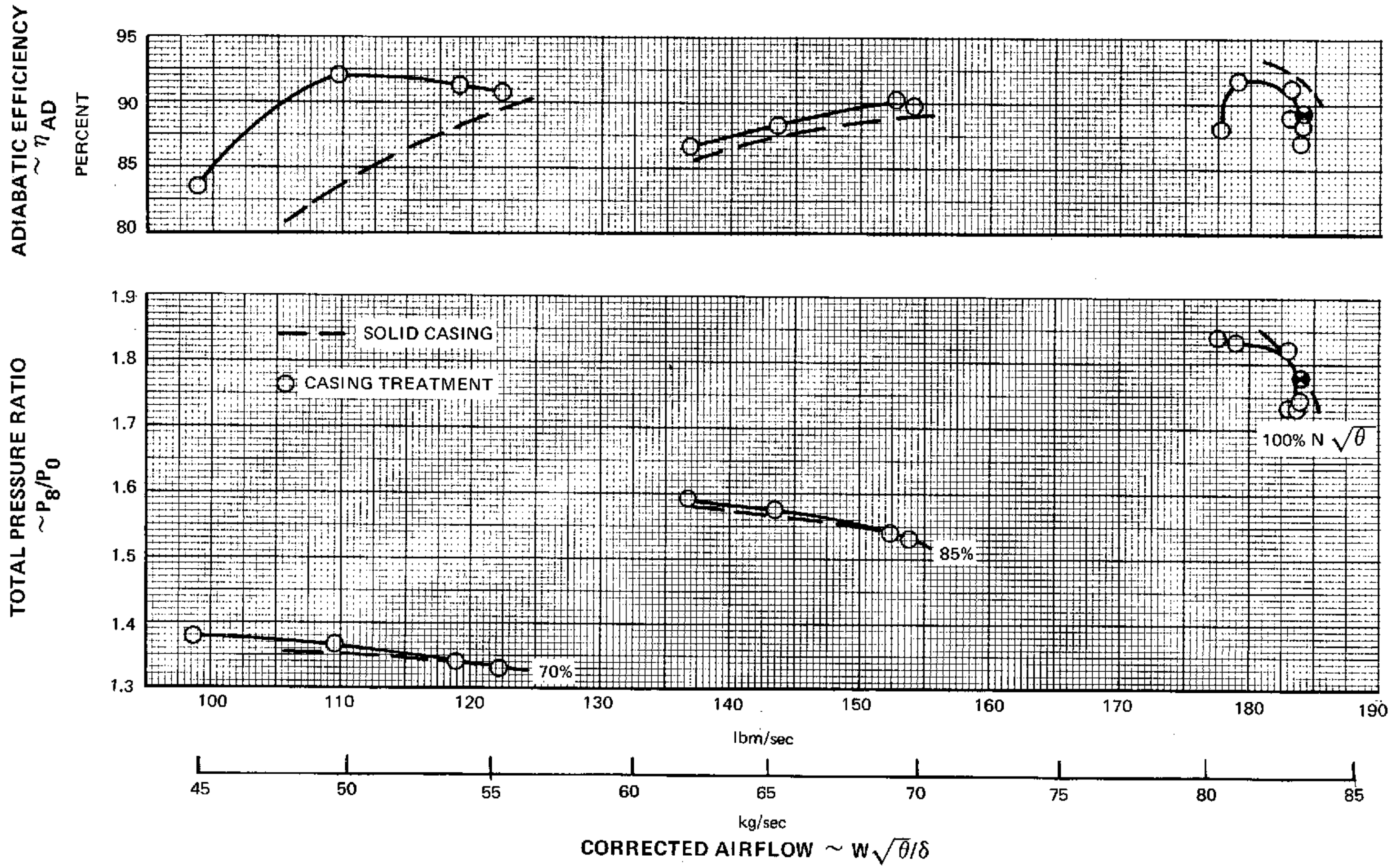


Figure 14 Rotor 1 Performance With Uniform Inlet Flow and Casing Treatment – Performance With Solid Casing Shown for Comparison

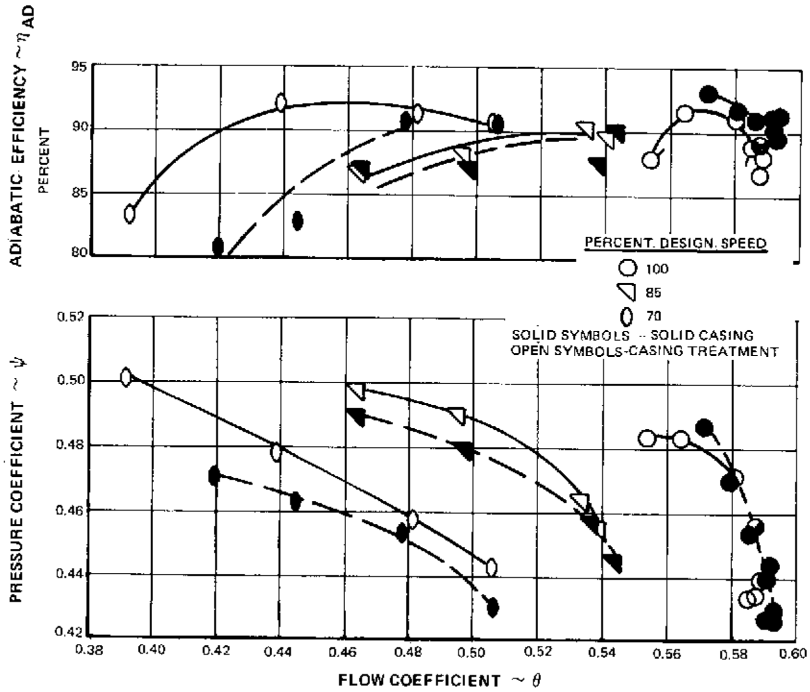


Figure 15 Rotor 1 Pressure Coefficient and Adiabatic Efficiency Versus Flow Coefficient for Uniform Inlet Flow With Casing Treatment – Solid Casing Shown for Comparison

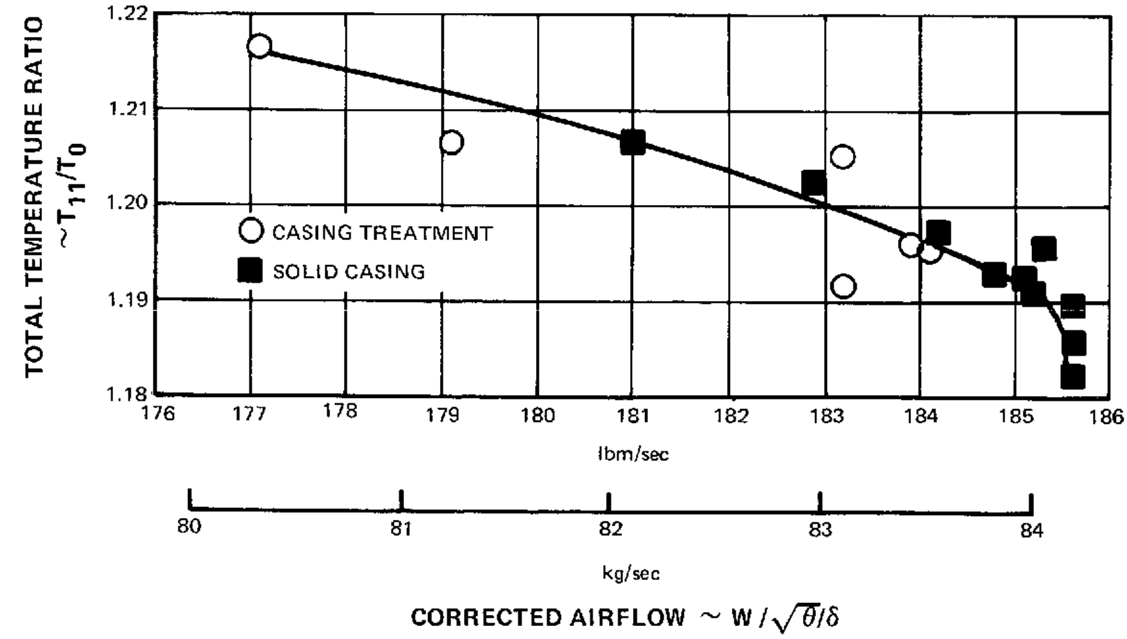


Figure 16 Rotor 1 Total Temperature Ratio Versus Corrected Flow at Design Speed for Uniform Inlet Flow With Casing Treatment and Solid Casings

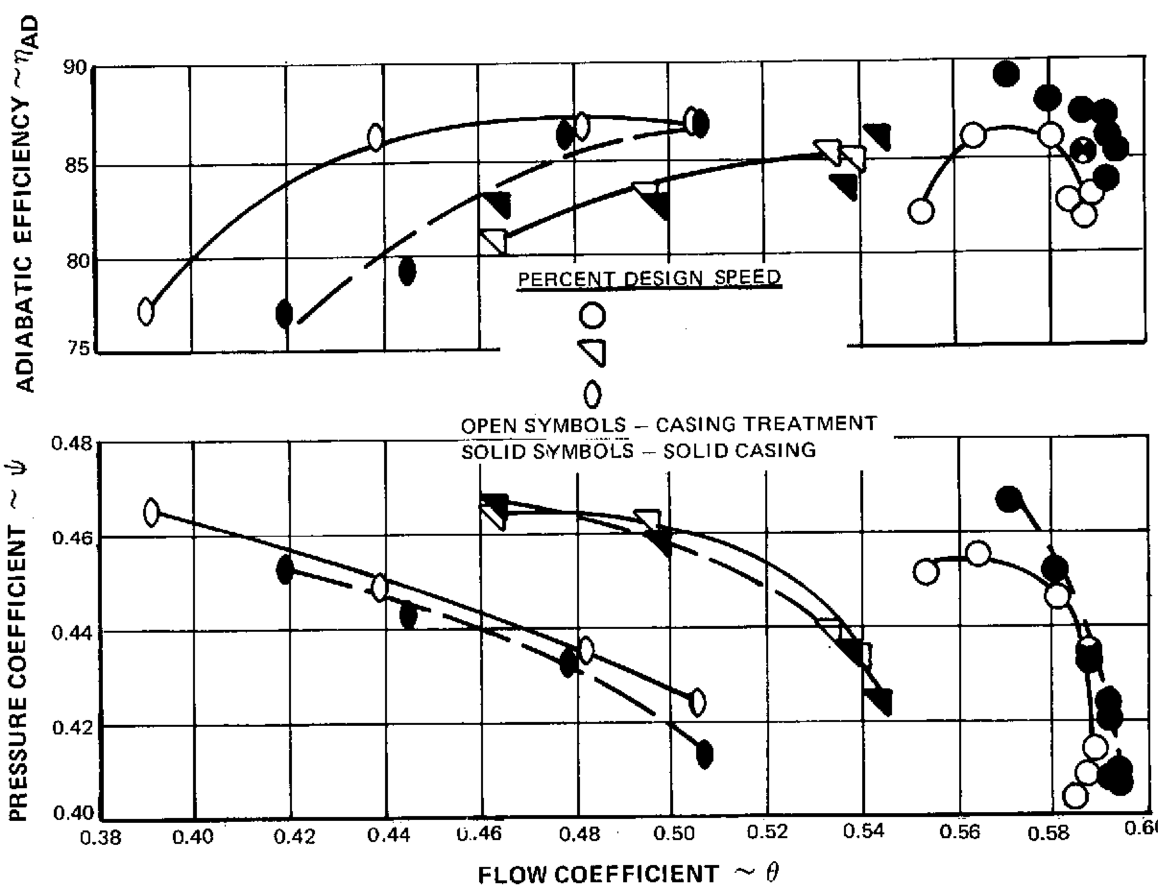


Figure 17 First-Stage Pressure Coefficient and Adiabatic Efficiency Versus Flow Coefficient for Uniform Inlet Flow With Casing Treatment and With Solid Casings

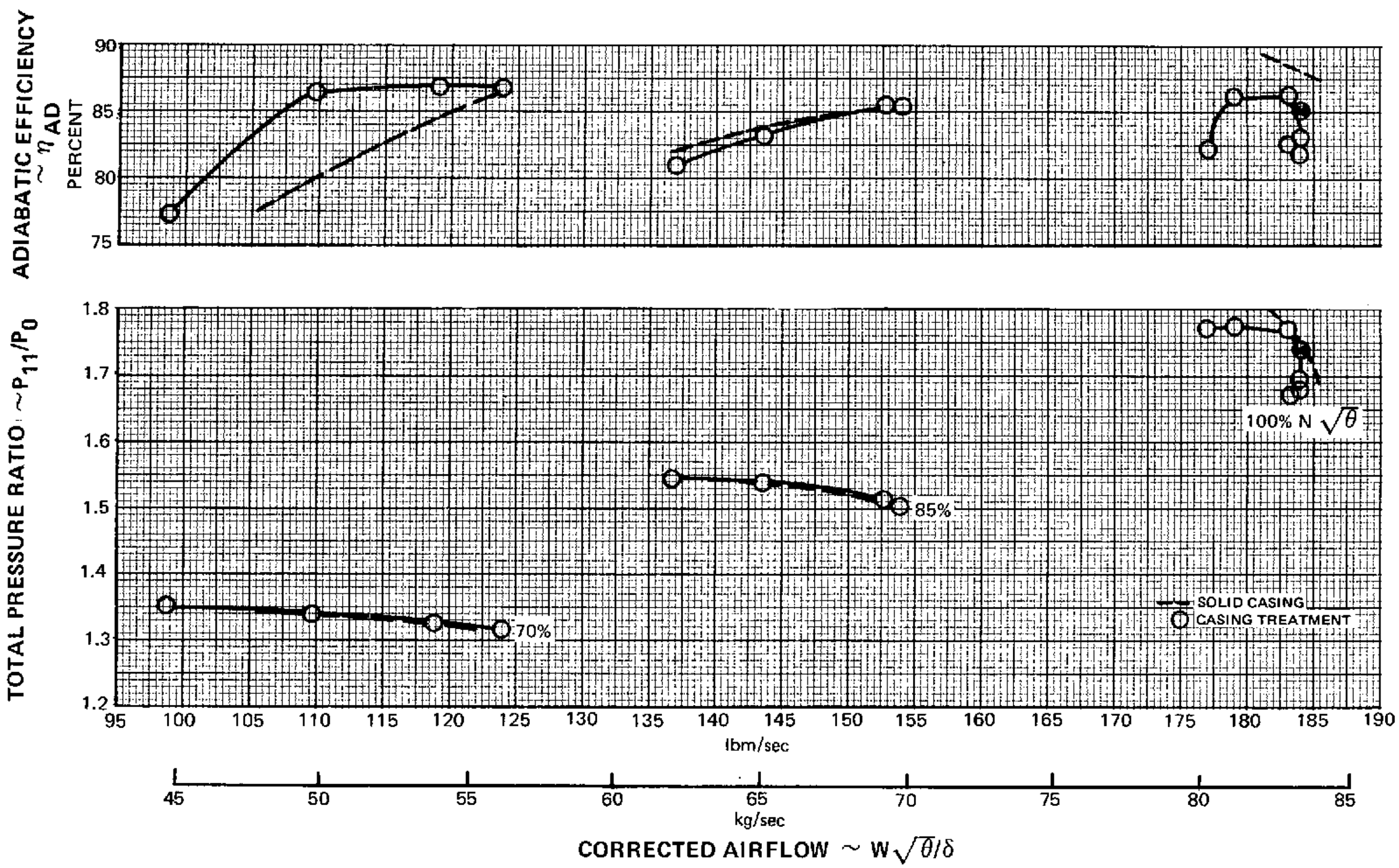


Figure 18 First-Stage Performance for Uniform Inlet Flow and Casing Treatment – Performance With Solid Casings Shown for Comparison

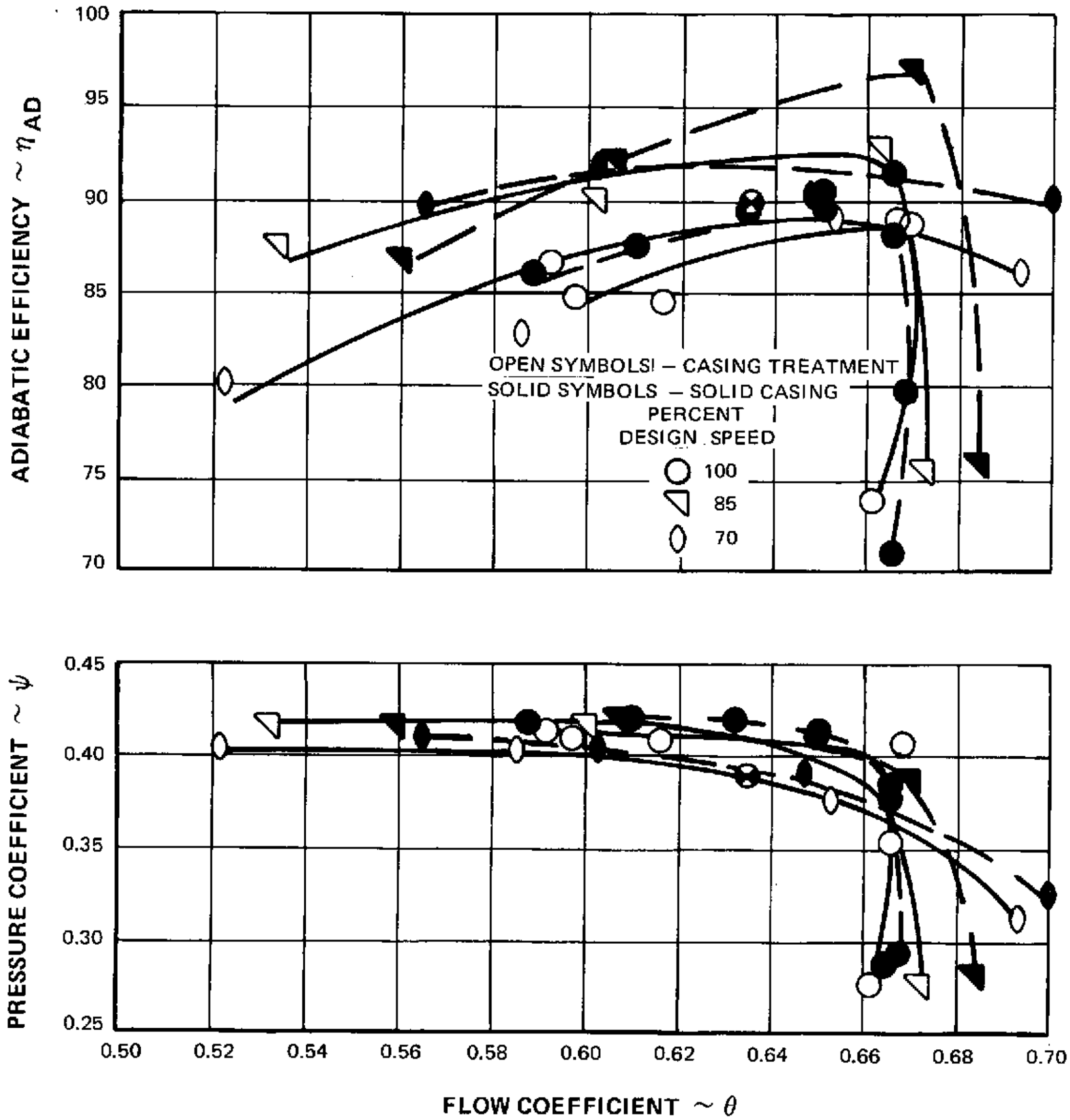


Figure 19 Rotor 2 Pressure Coefficient and Adiabatic Efficiency Versus Flow Coefficient for Uniform Inlet Flow With Casing Treatment and With Solid Casing

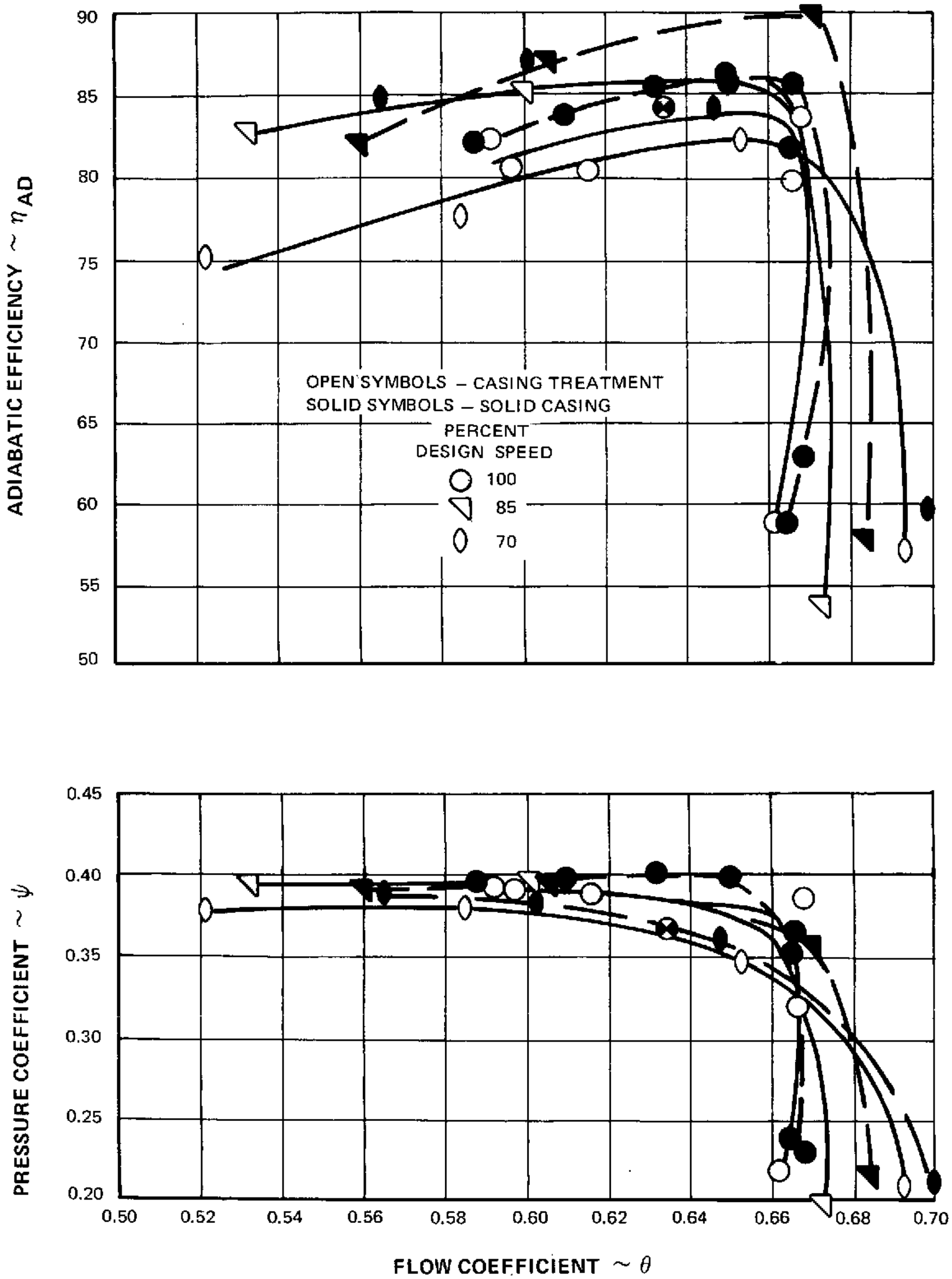


Figure 20 Second-Stage Pressure Coefficient and Adiabatic Efficiency Versus Flow Coefficient for Uniform Inlet Flow With Casing Treatment and With Solid Casing

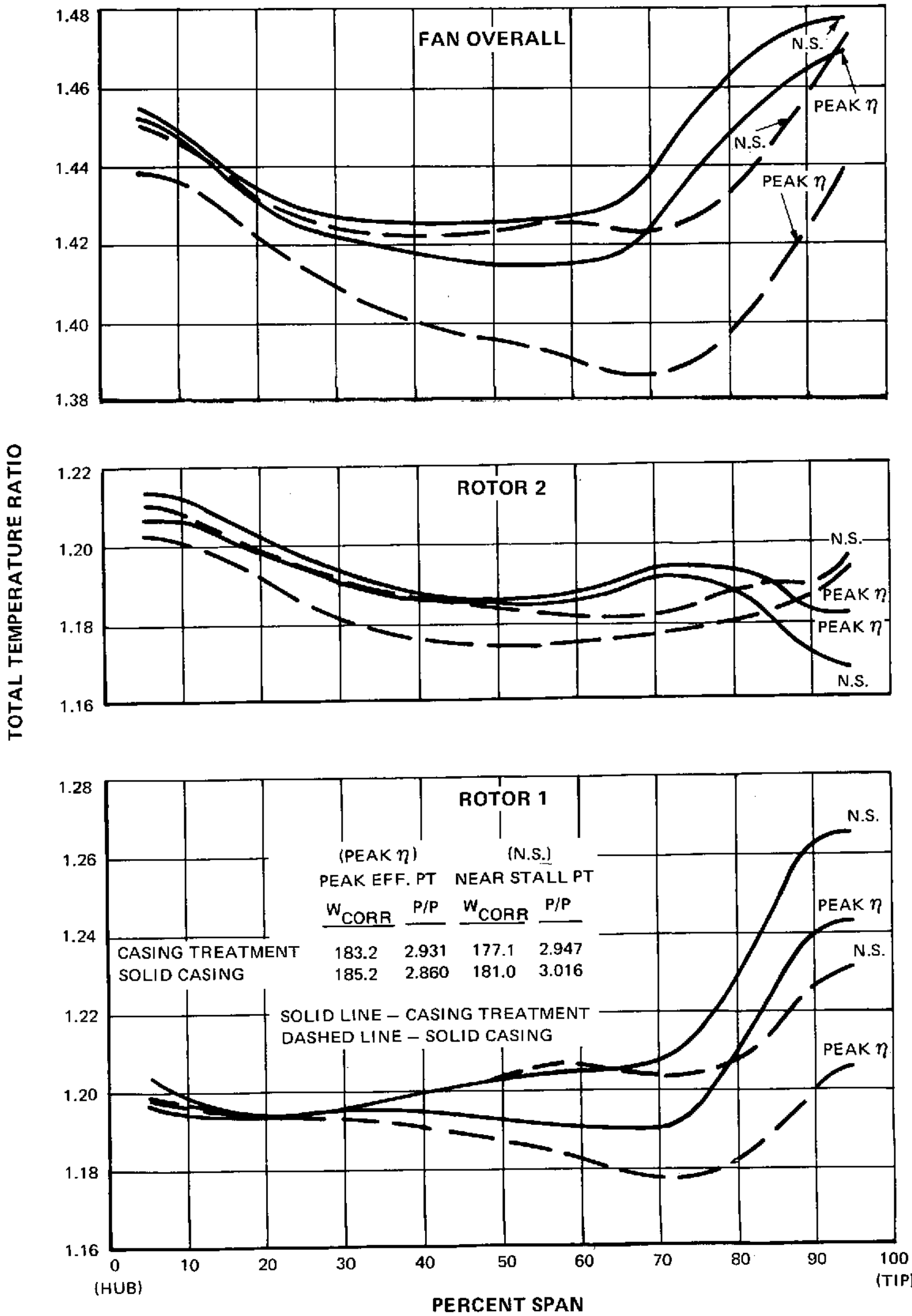
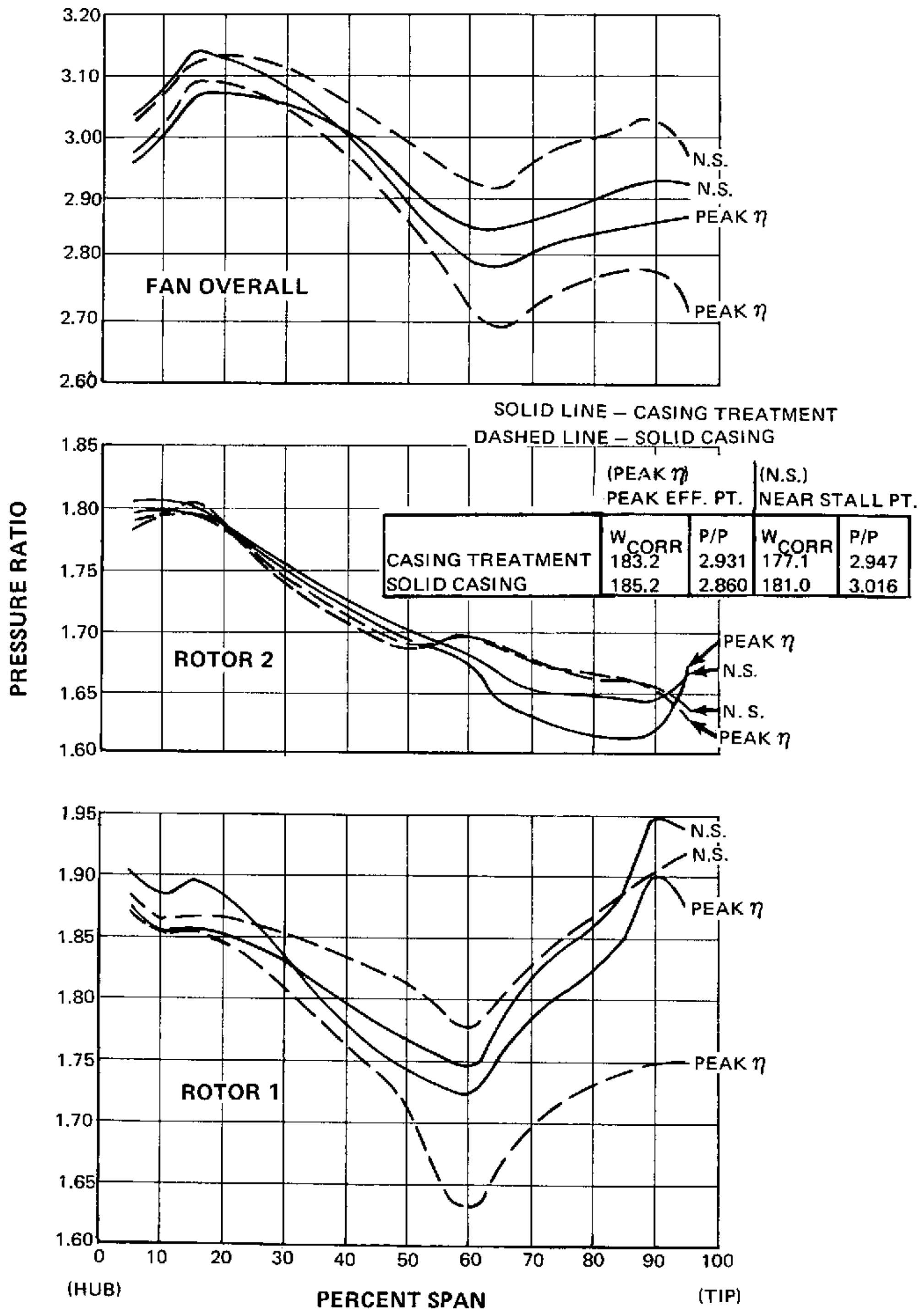


Figure 21 Fan, Rotor 1, and Rotor 2 Total Temperature Ratio Versus Span at Design Speed for Uniform Inlet Flow With Casing Treatment and With Solid Casings



	(PEAK η) PEAK EFF. PT.		(N.S.) NEAR STALL PT.	
	W_{CORR}	P/P	W_{CORR}	P/P
CASING TREATMENT	183.2	2.931	177.1	2.947
SOLID CASING	185.2	2.860	181.0	3.016

Figure 22 Fan, Rotor 1, and Rotor 2 Total Pressure Ratio Versus Span at Design Speed for Uniform Inlet Flow With Casing Treatment and With Solid Casings

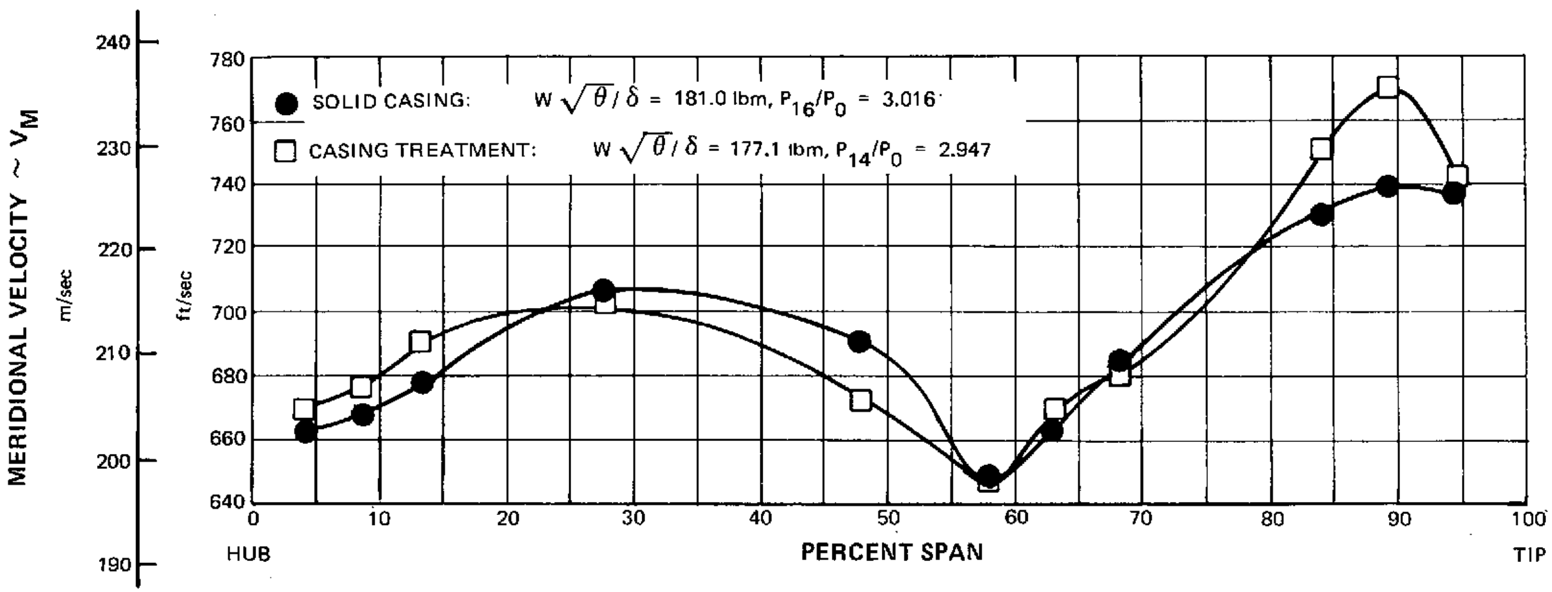


Figure 23 Comparison of Radial Profiles of Meridional Velocity Entering Rotor 2, With Casing Treatment and With Solid Casings for Near-Stall Data Points at Design Speed for Uniform Inlet Flow

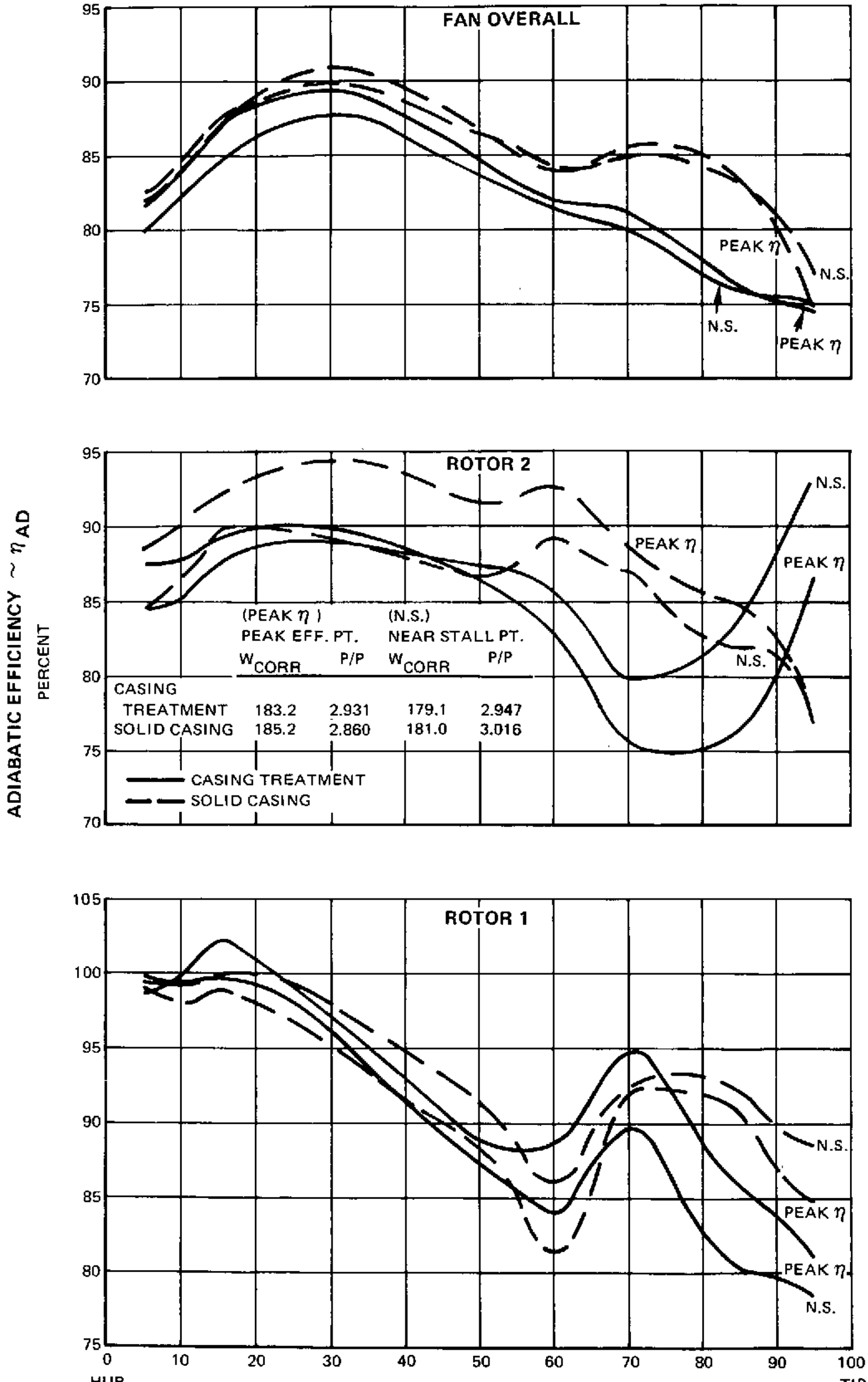


Figure 24 Fan, Rotor 1, and Rotor 2 Adiabatic Efficiency Versus Span at Design Speed With Casing Treatment and With Solid Casings

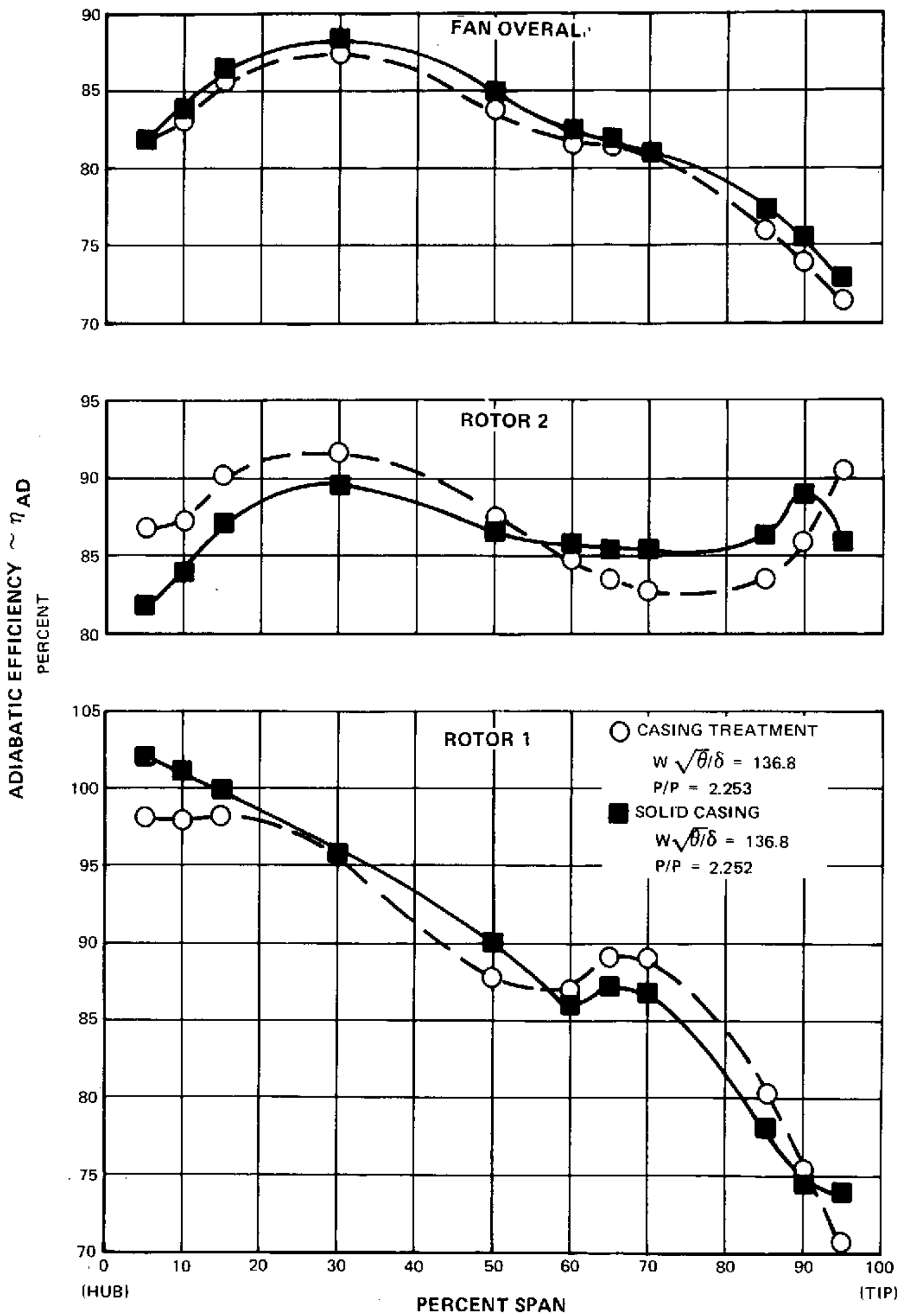


Figure 25 Fan, Rotor 1, and Rotor 2 Adiabatic Efficiency Versus Span at 85 Percent Speed for Uniform Inlet Flow at Near-Stall Data Points With Casing Treatment and With Solid Casings

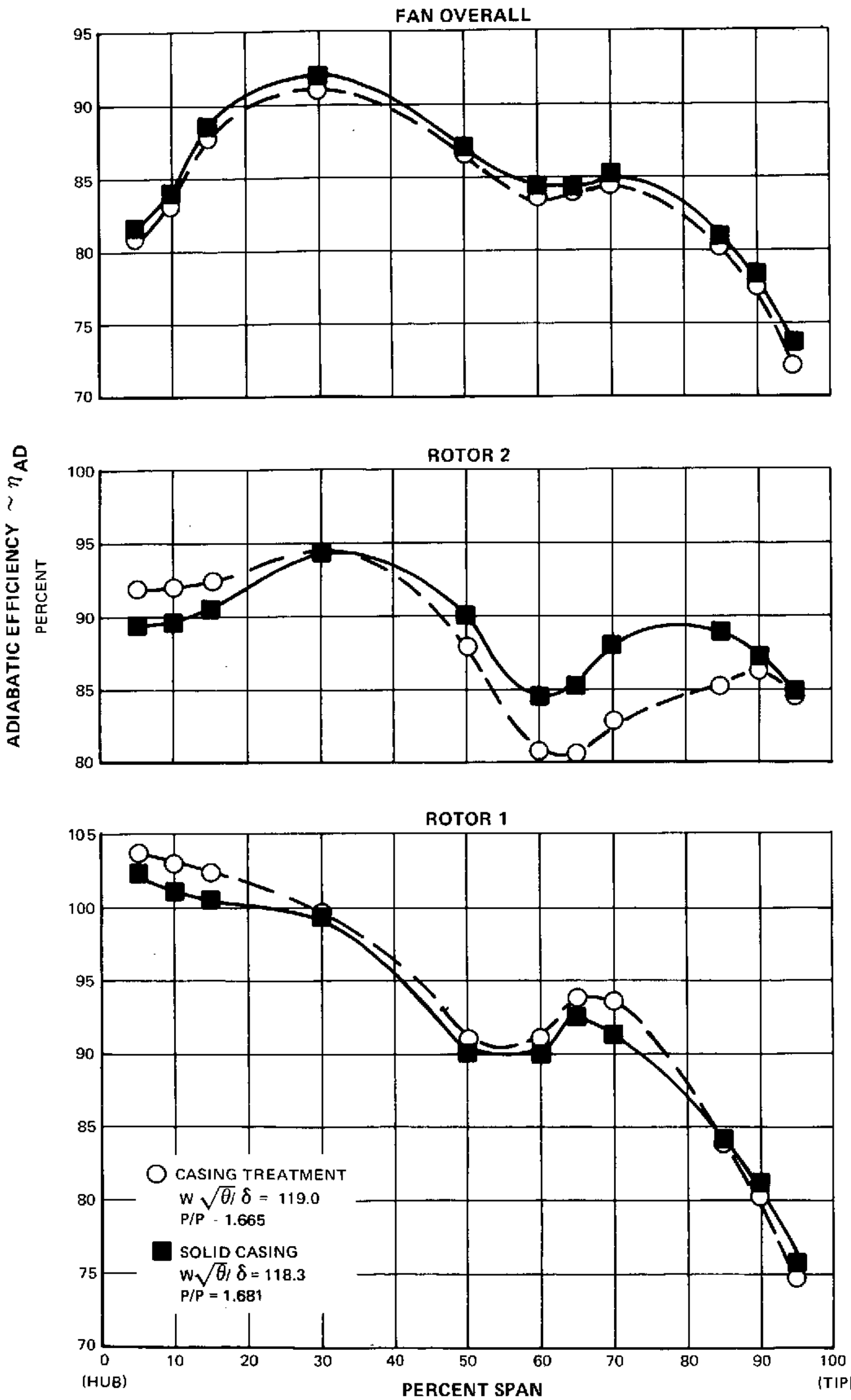


Figure 26 Fan, Rotor 1, and Rotor 2 Adiabatic Efficiency Versus Span at 70 Percent Speed for Uniform Inlet Flow at Peak Efficiency Data Points With Casing Treatment and With Solid Casings

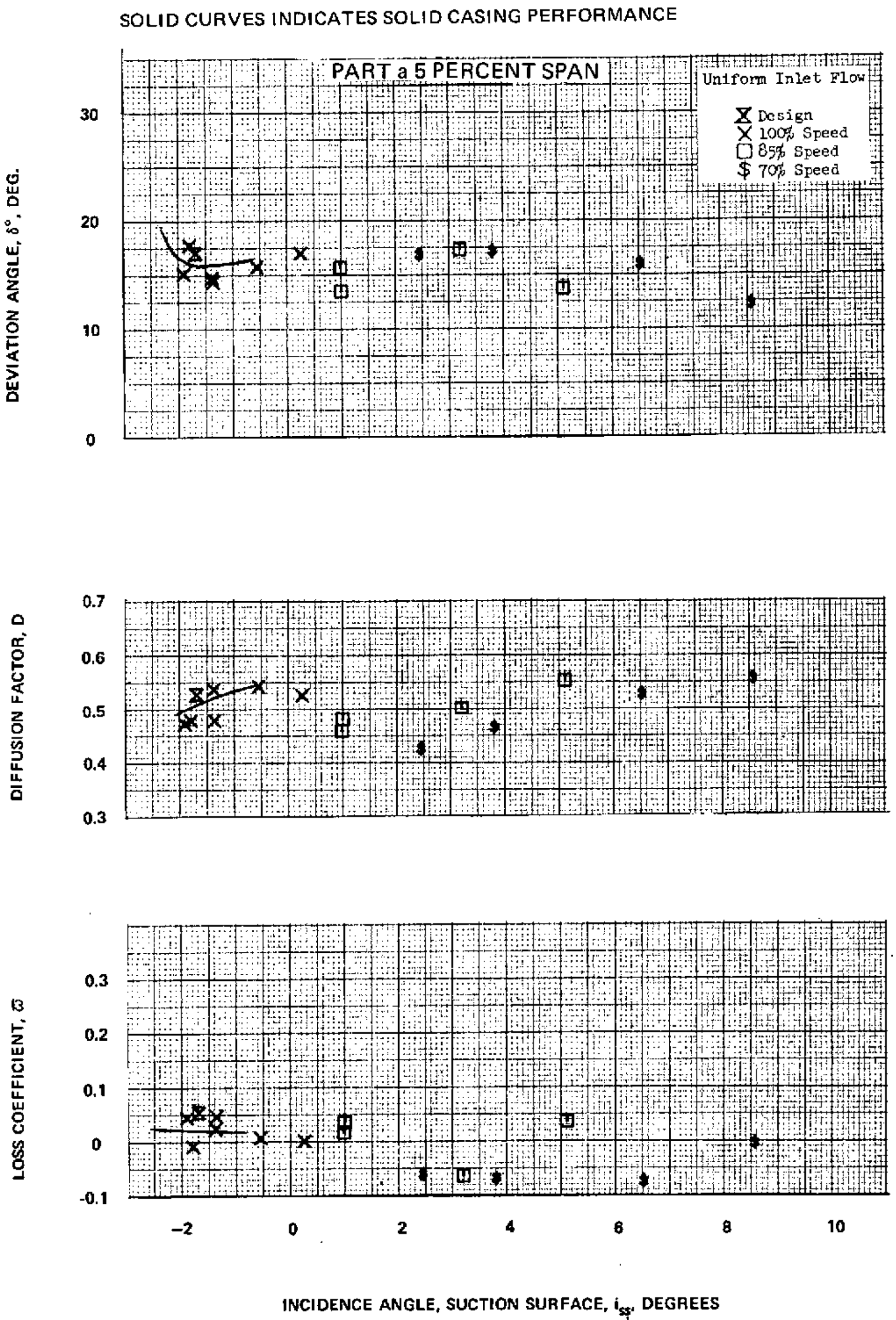


Figure 27 Rotor 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

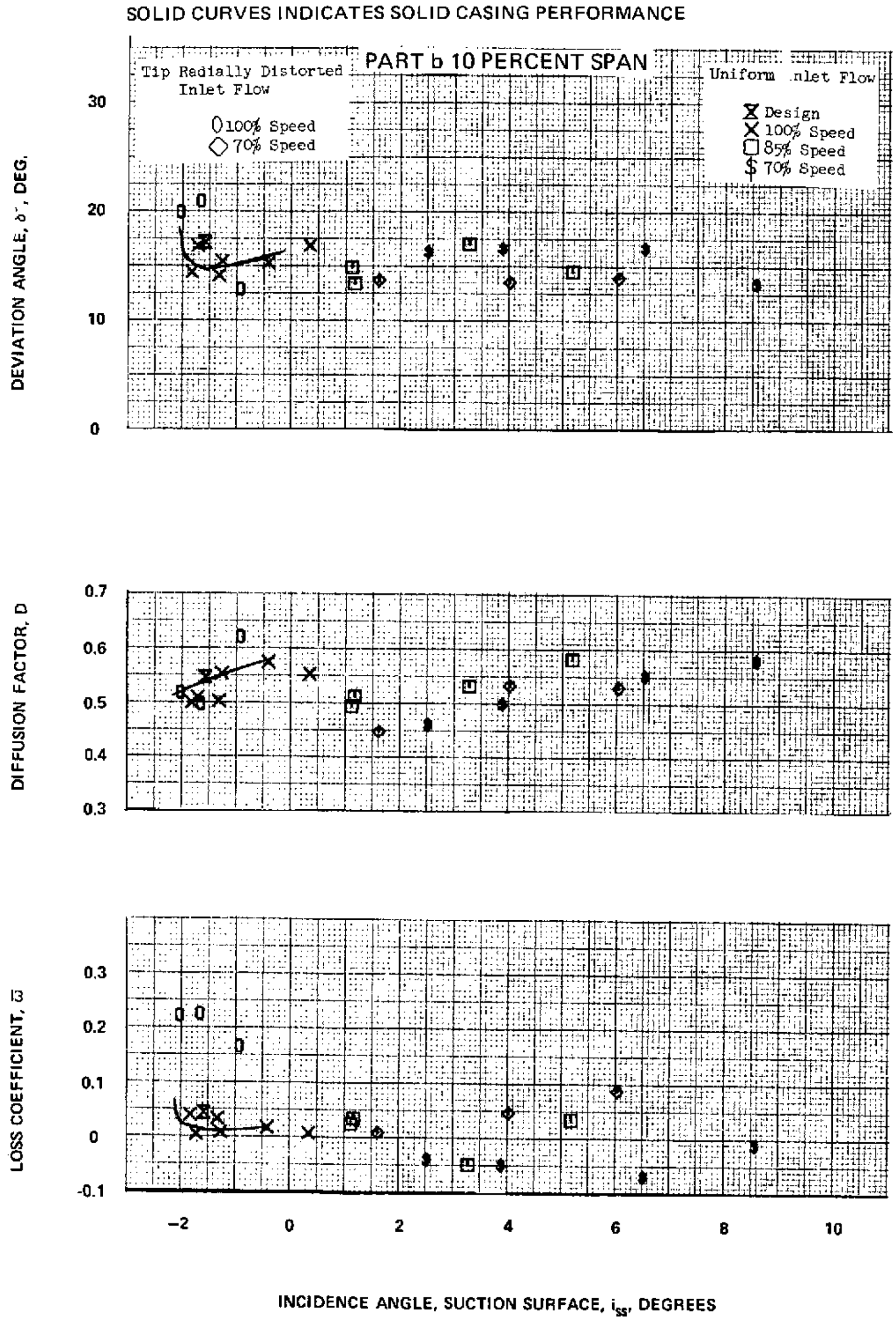


Figure 27 (Cont'd) Rotor 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

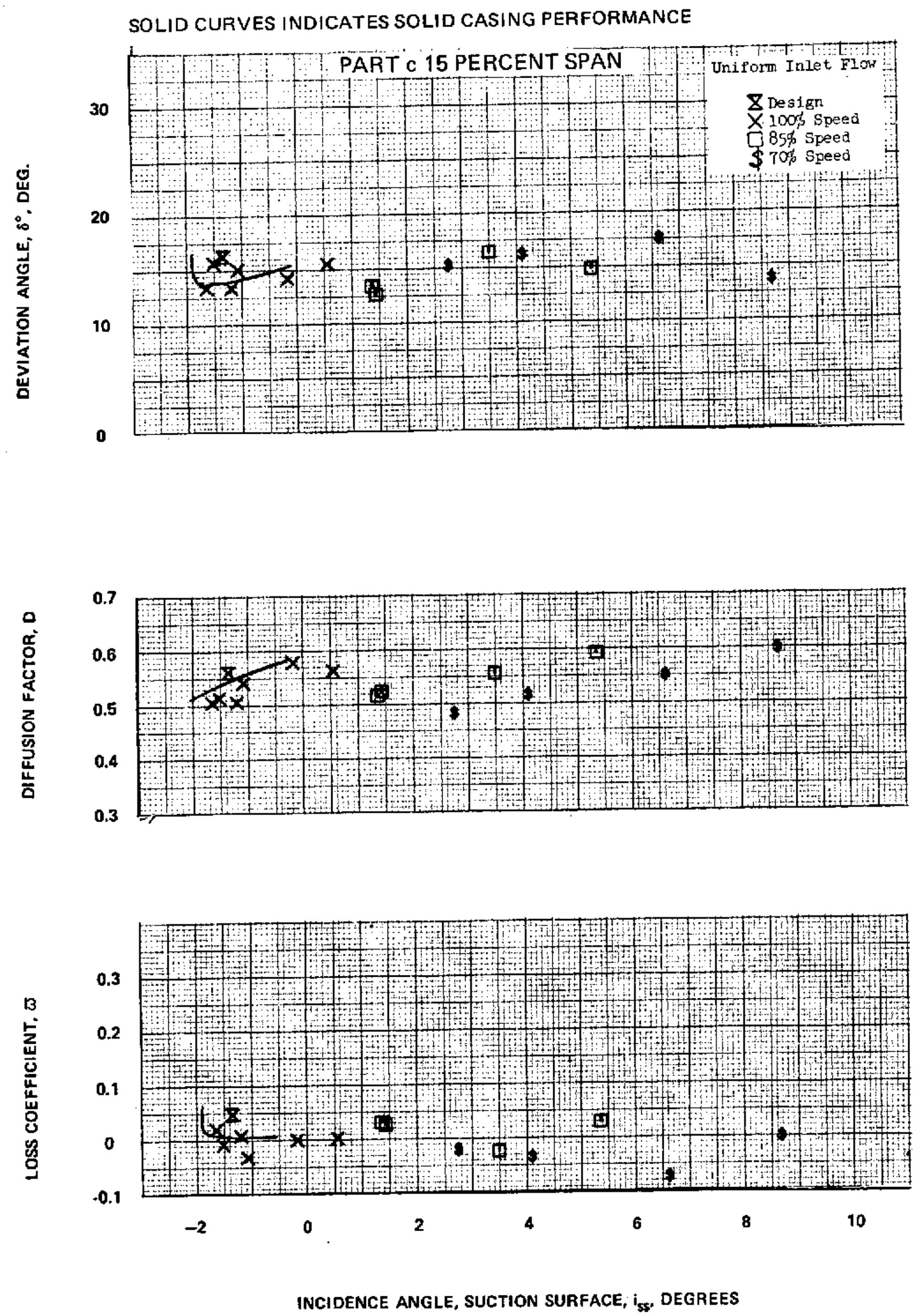


Figure 27 (Cont'd) Rotor 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

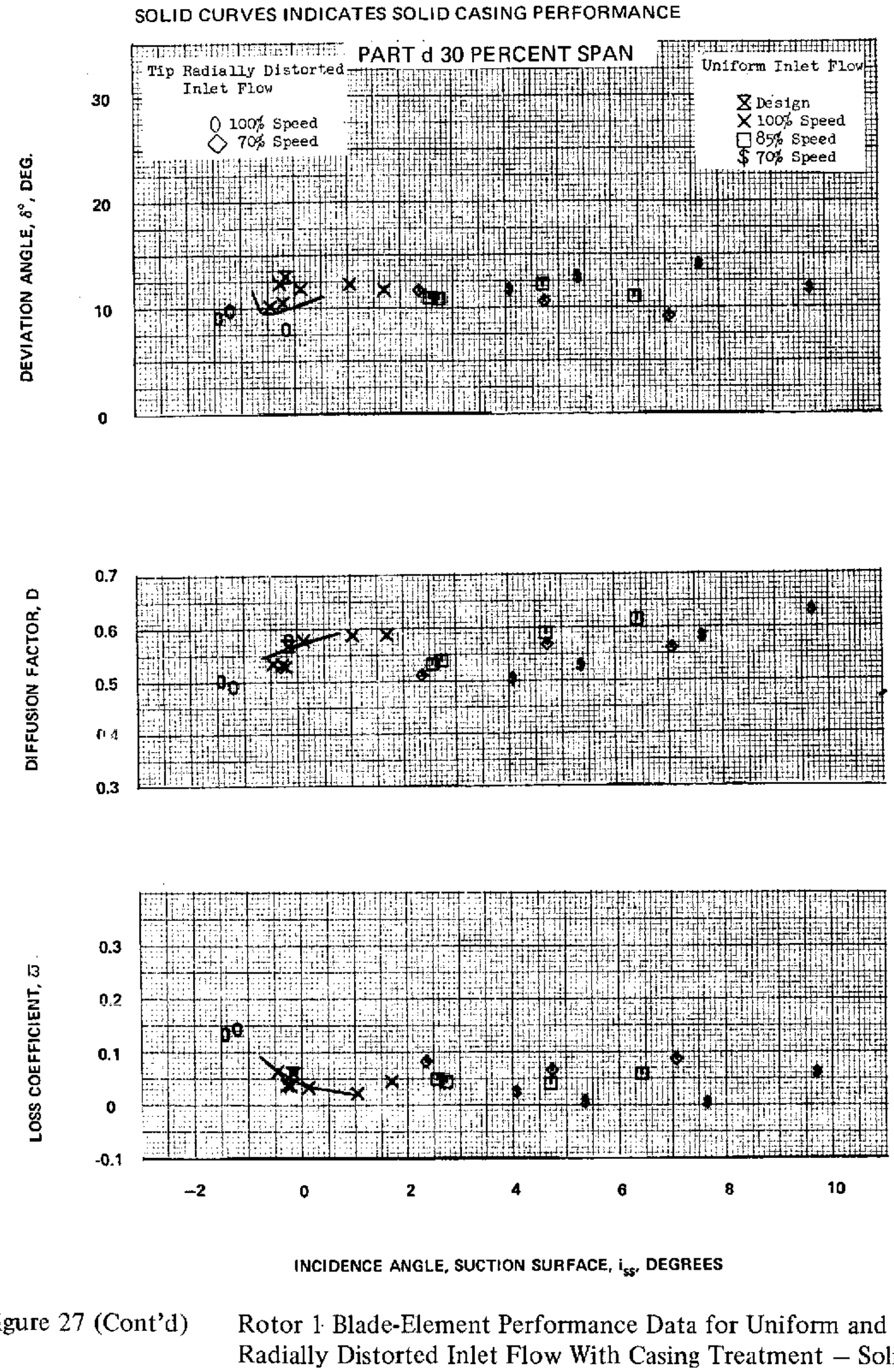


Figure 27 (Cont'd) Rotor 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

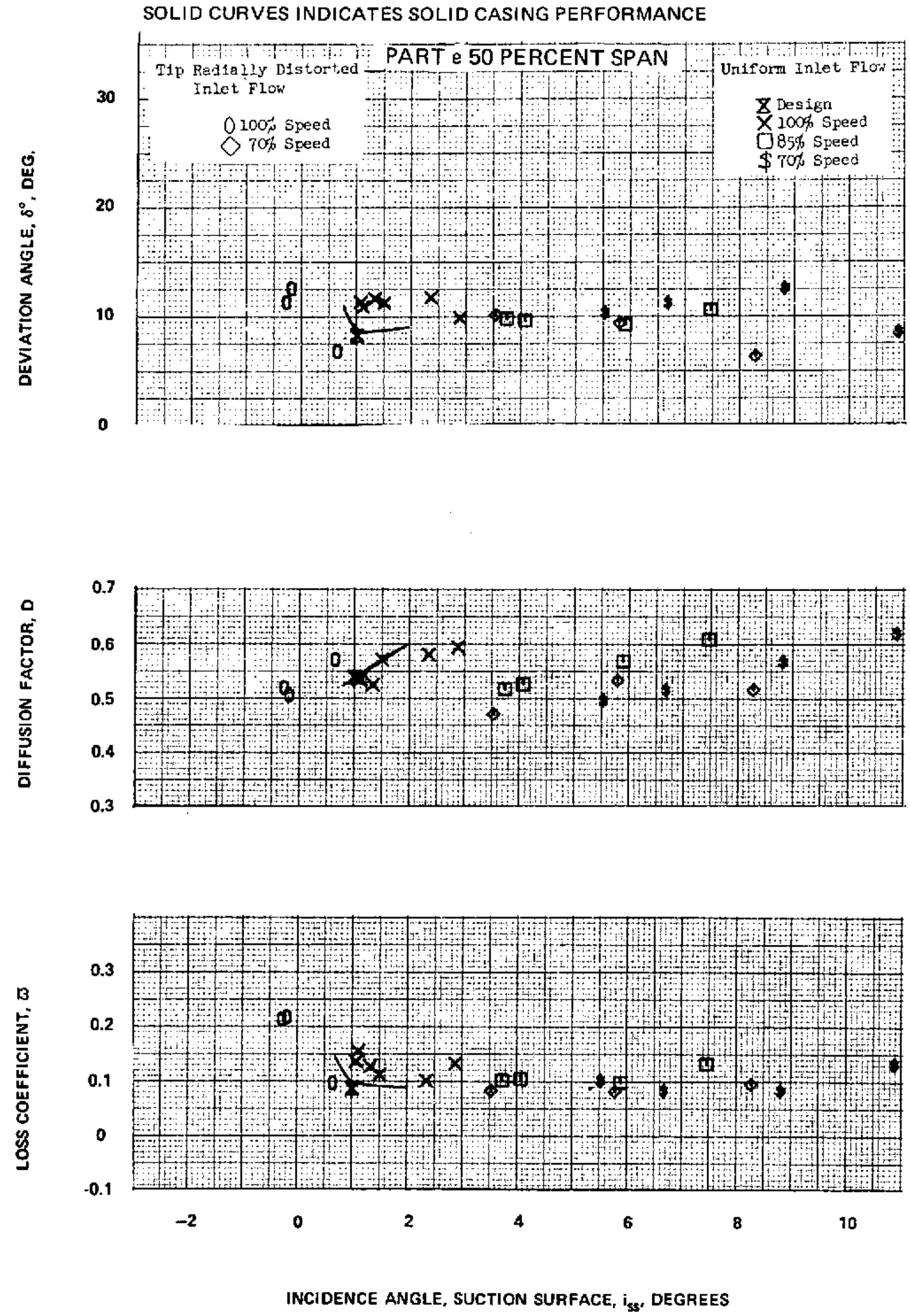


Figure 27 (Cont'd) Rotor 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

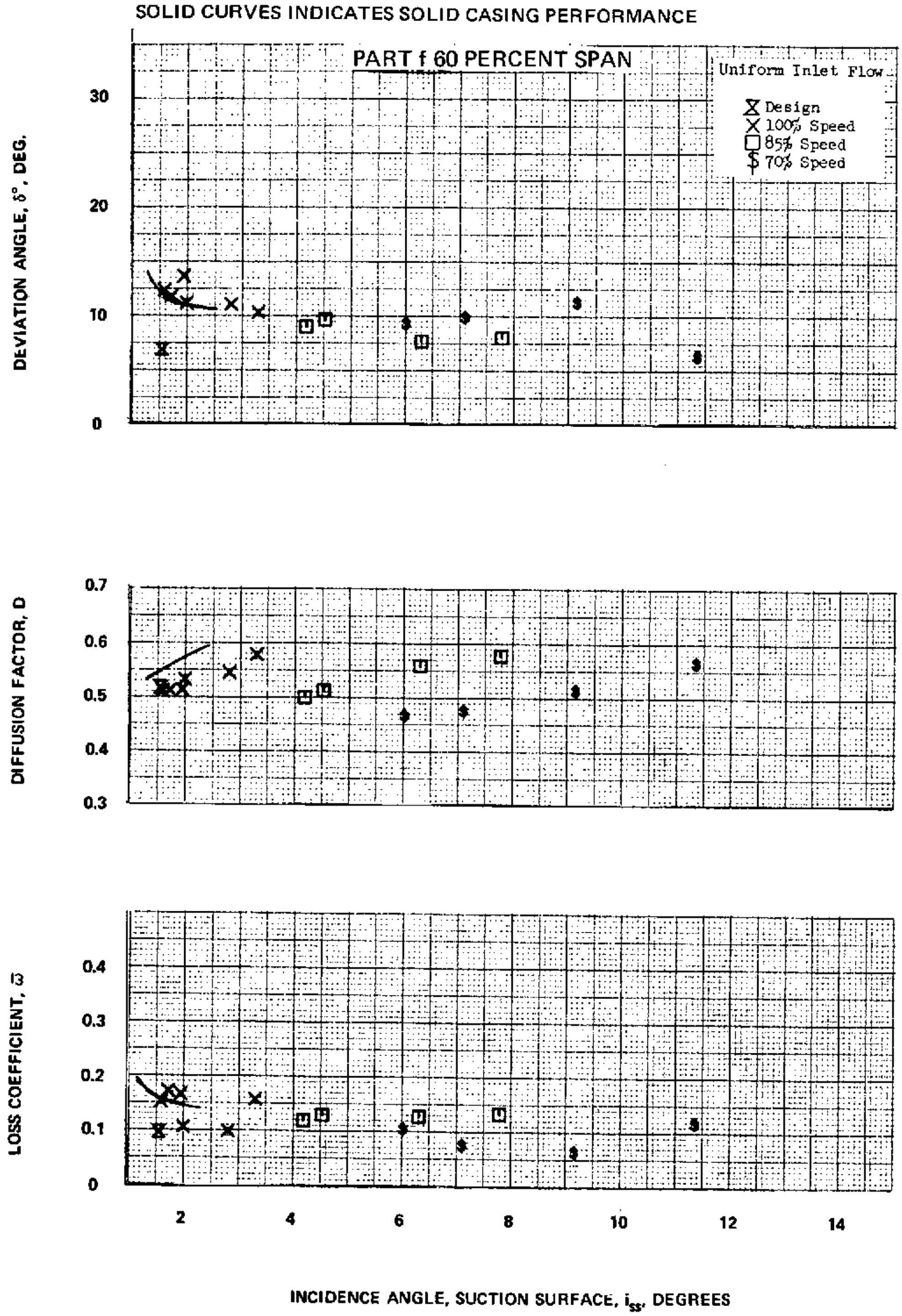


Figure 27 (Cont'd) Rotor 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

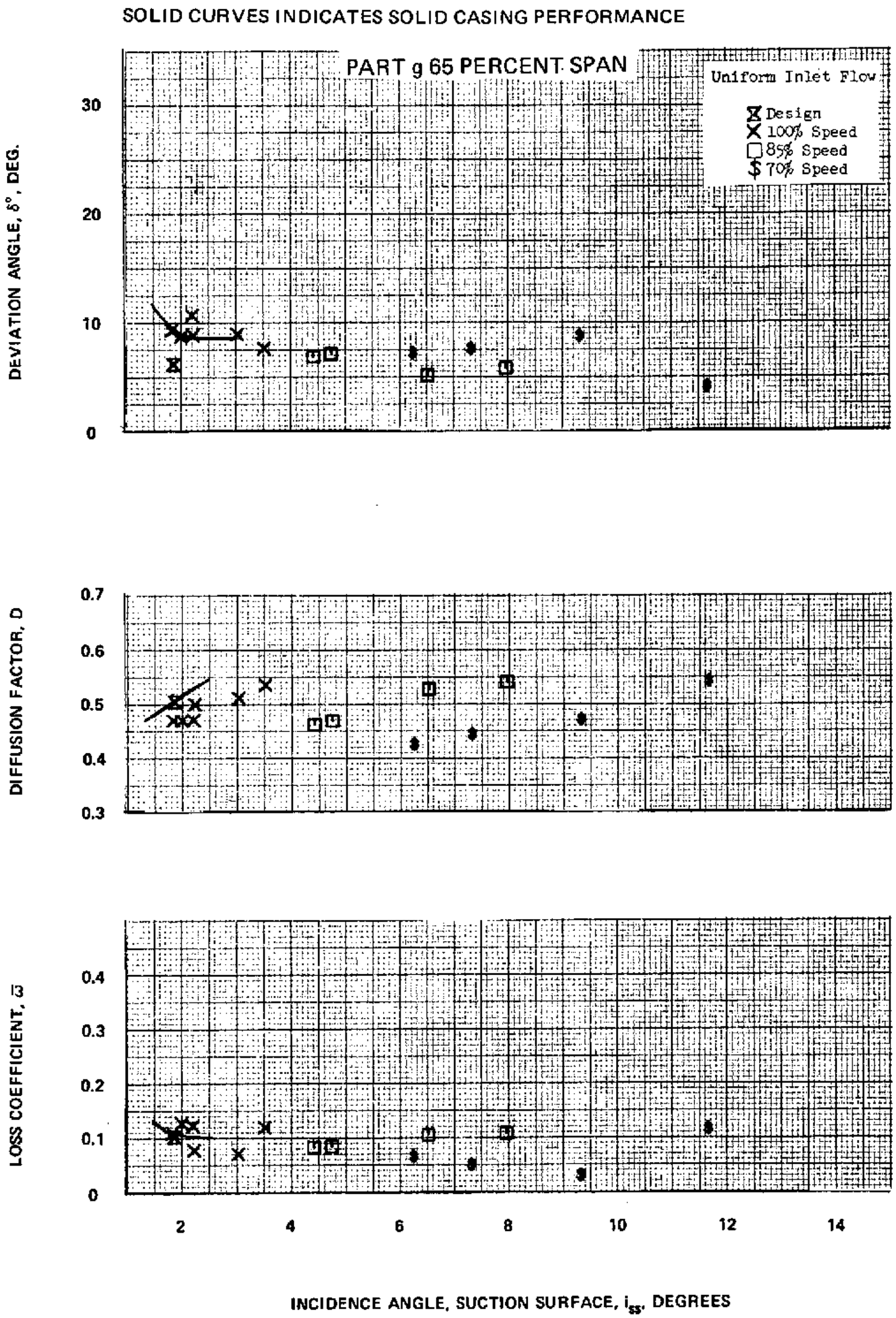


Figure 27 (Cont'd) Rotor 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

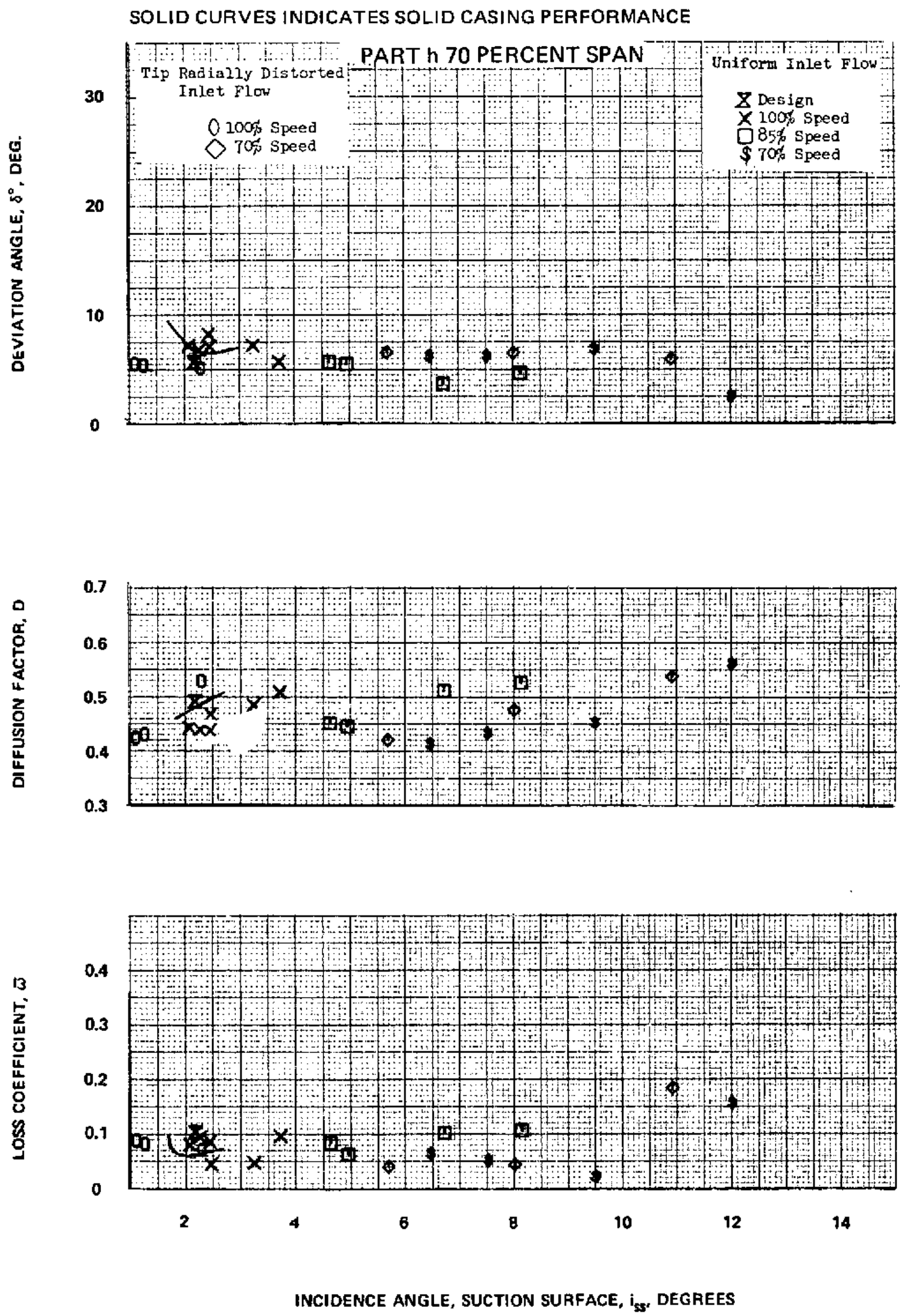


Figure 27 (Cont'd) Rotor 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

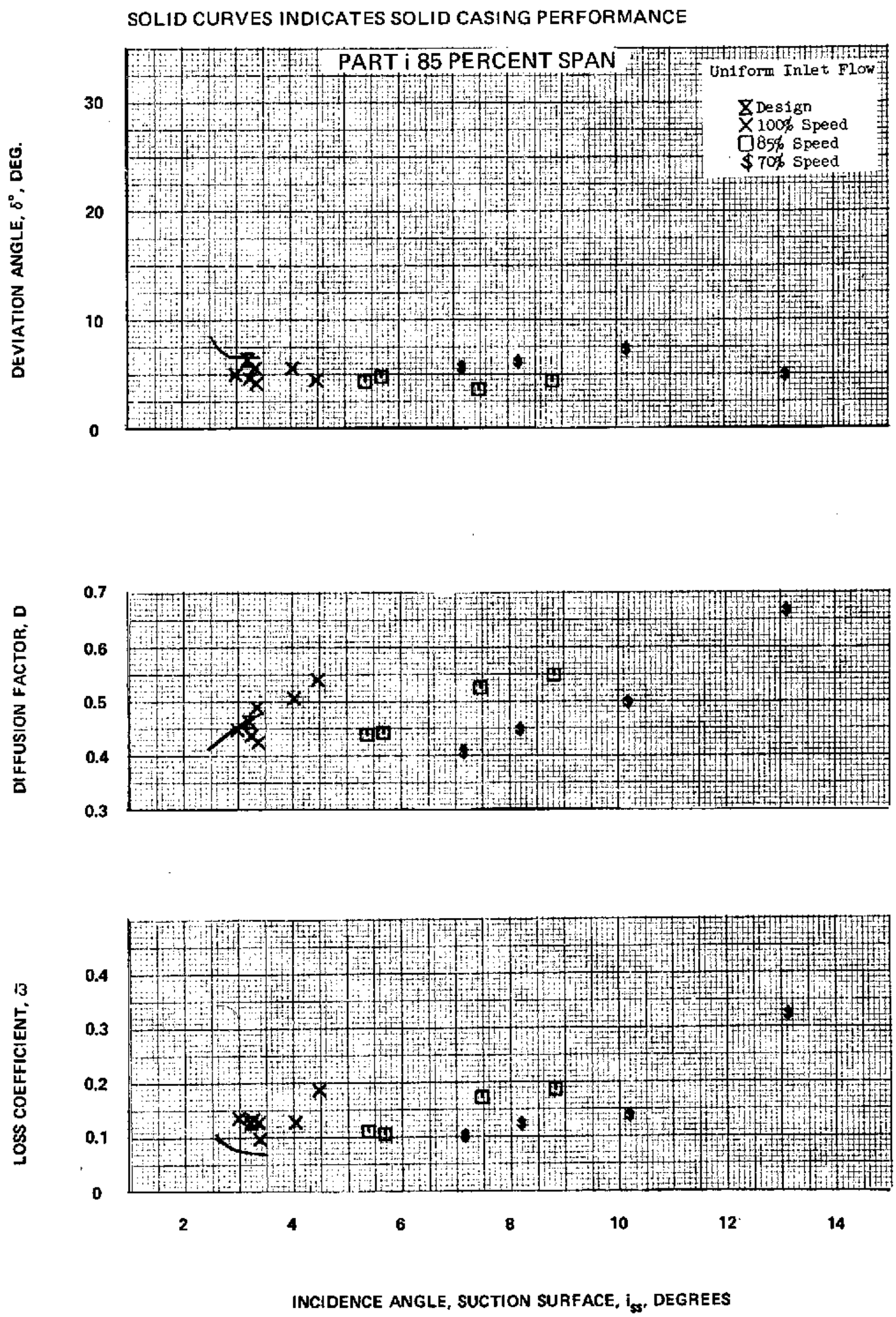


Figure 27 (Cont'd) Rotor 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

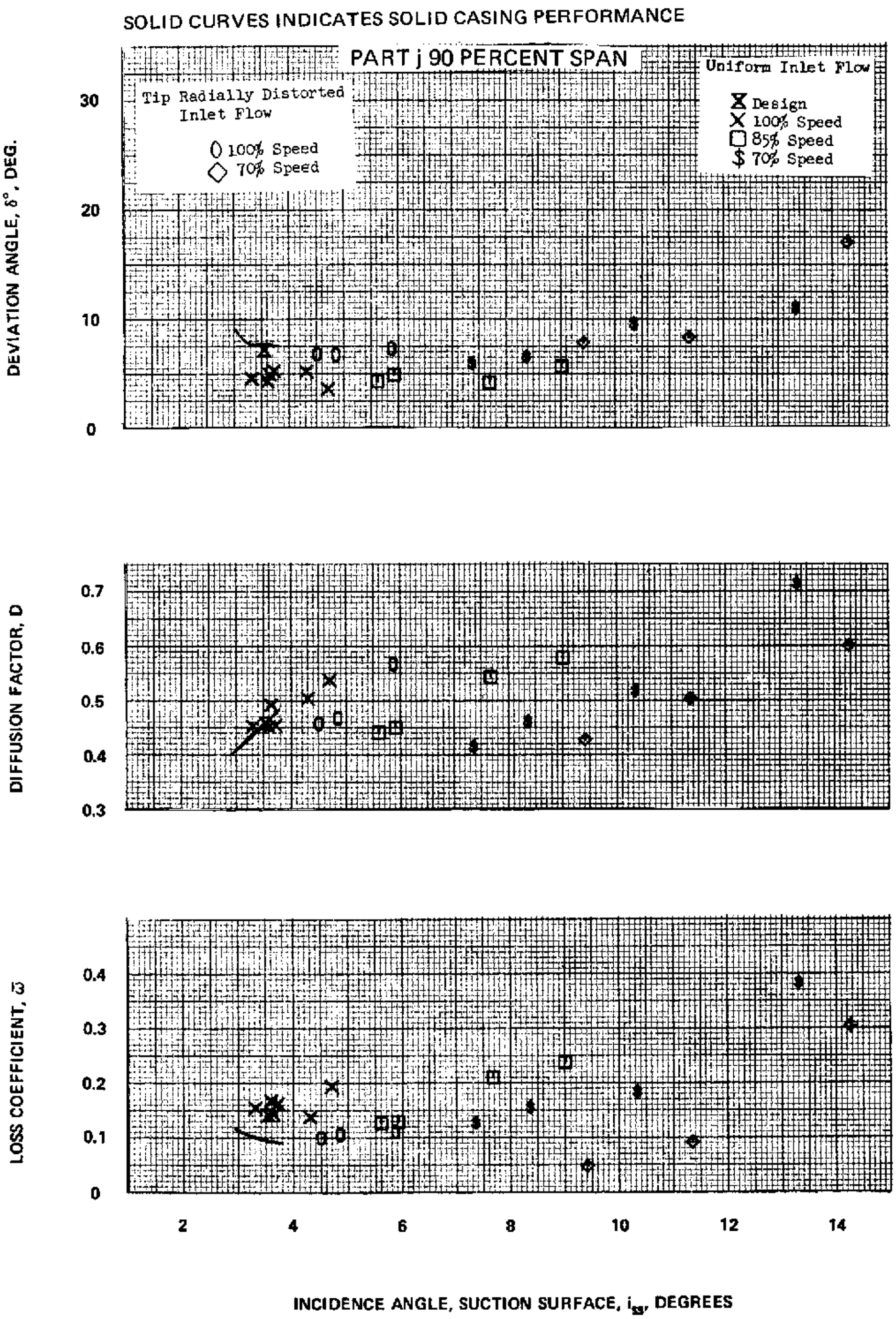


Figure 27 (Cont'd) Rotor 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

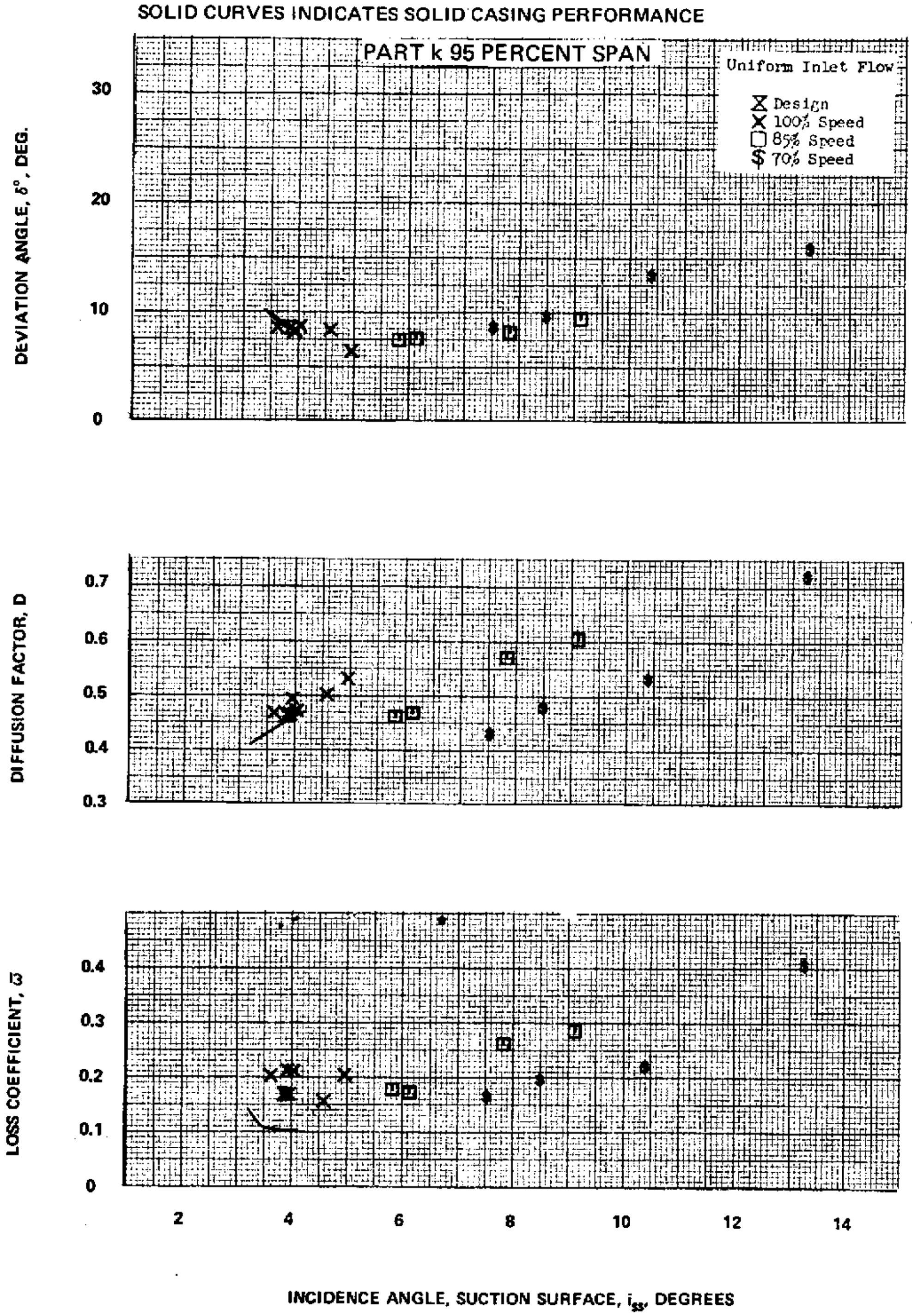


Figure 27 (Cont'd) Rotor 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

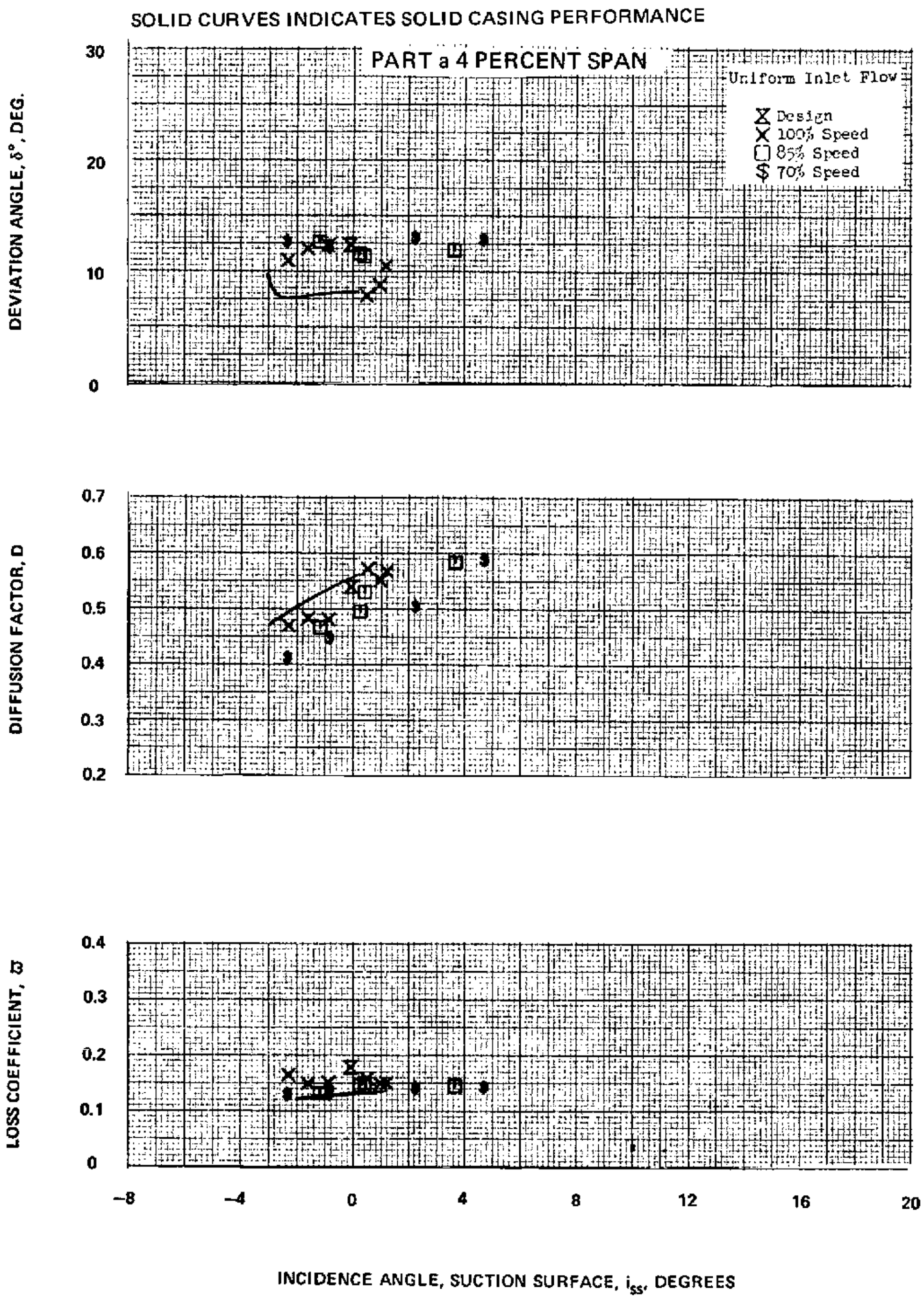


Figure 28 Stator 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

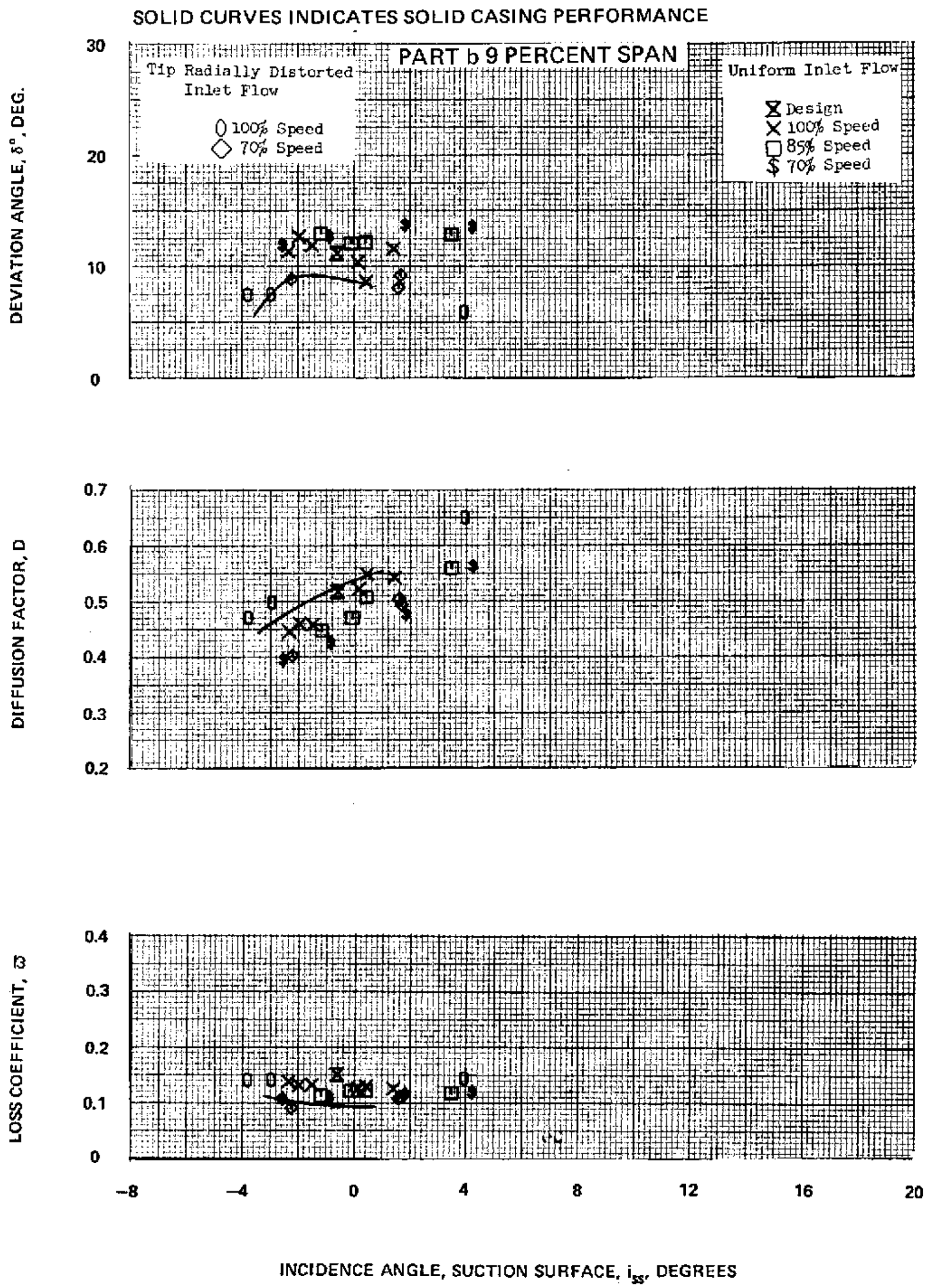


Figure 28 (Cont'd) Stator 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

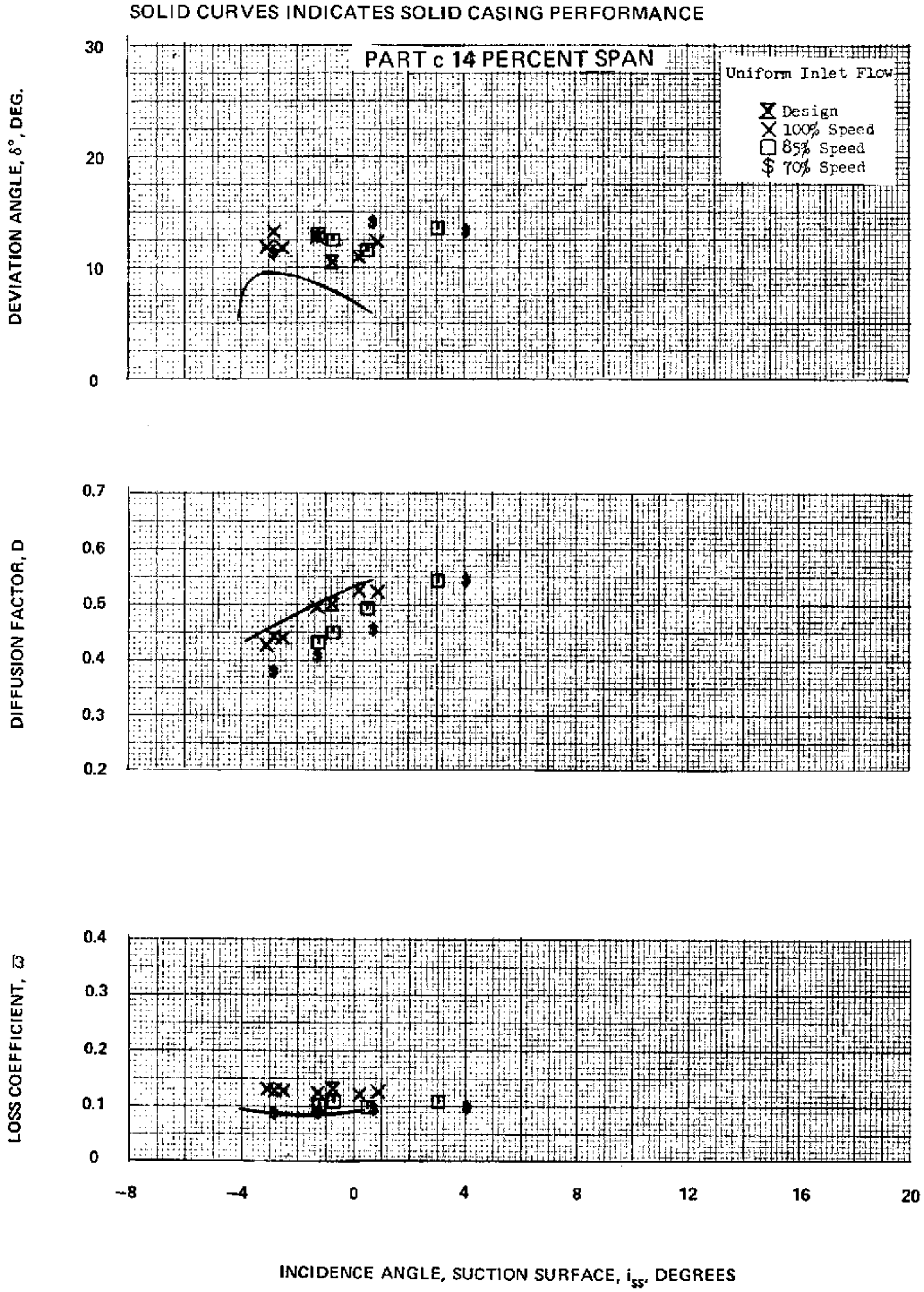


Figure 28 (Cont'd) Stator 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

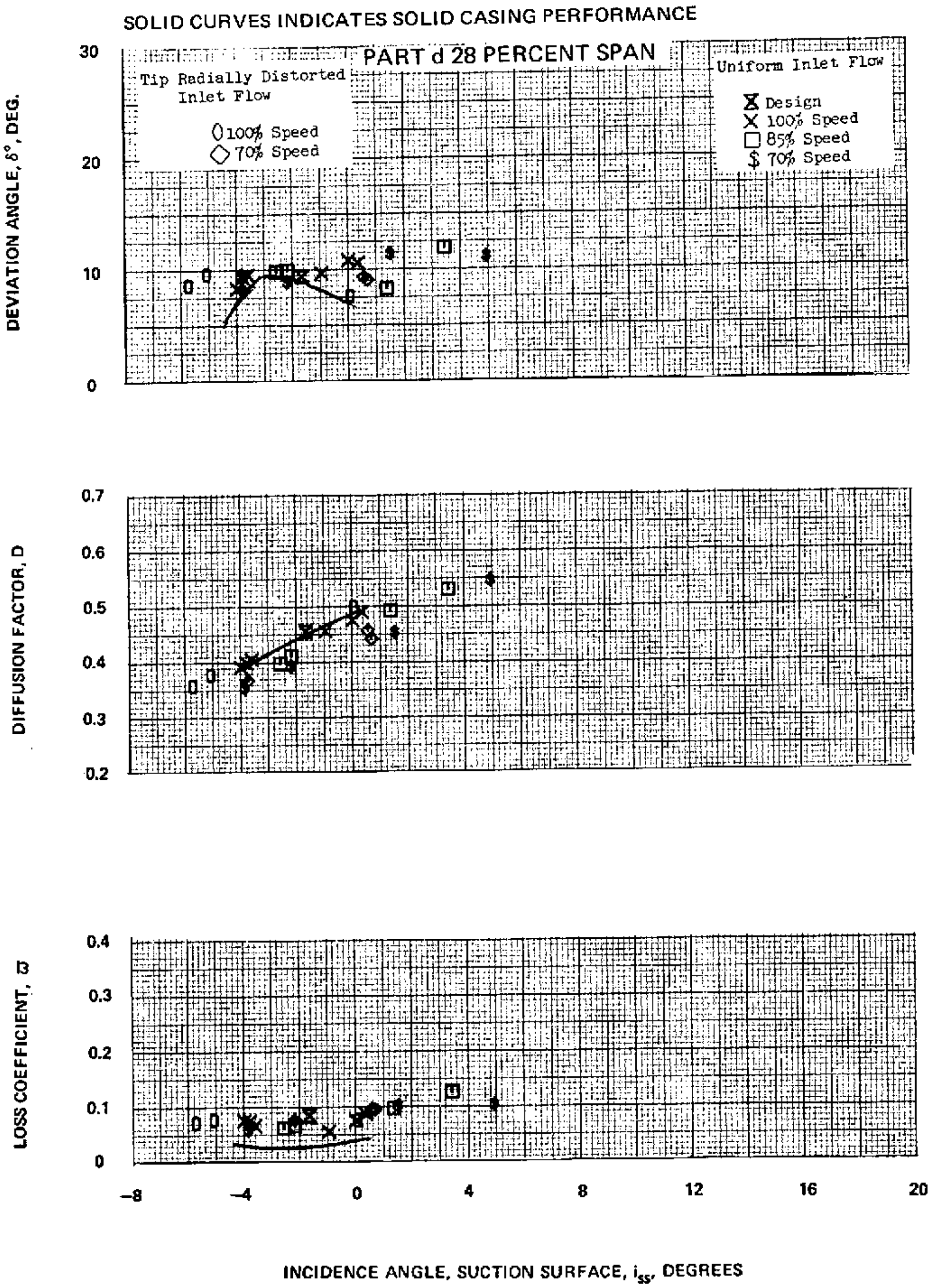


Figure 28 (Cont'd) Stator 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

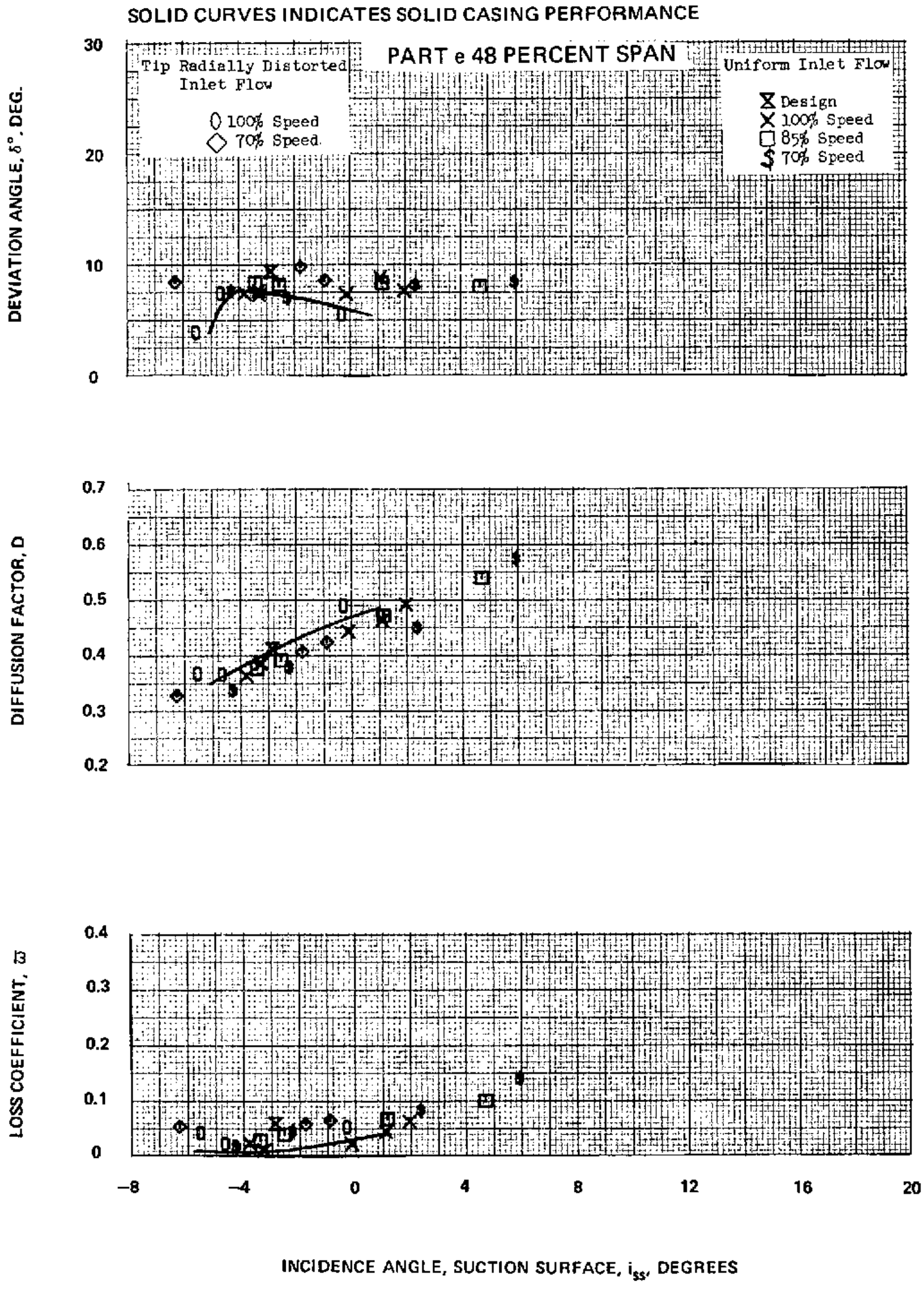


Figure 28 (Cont'd) Stator 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

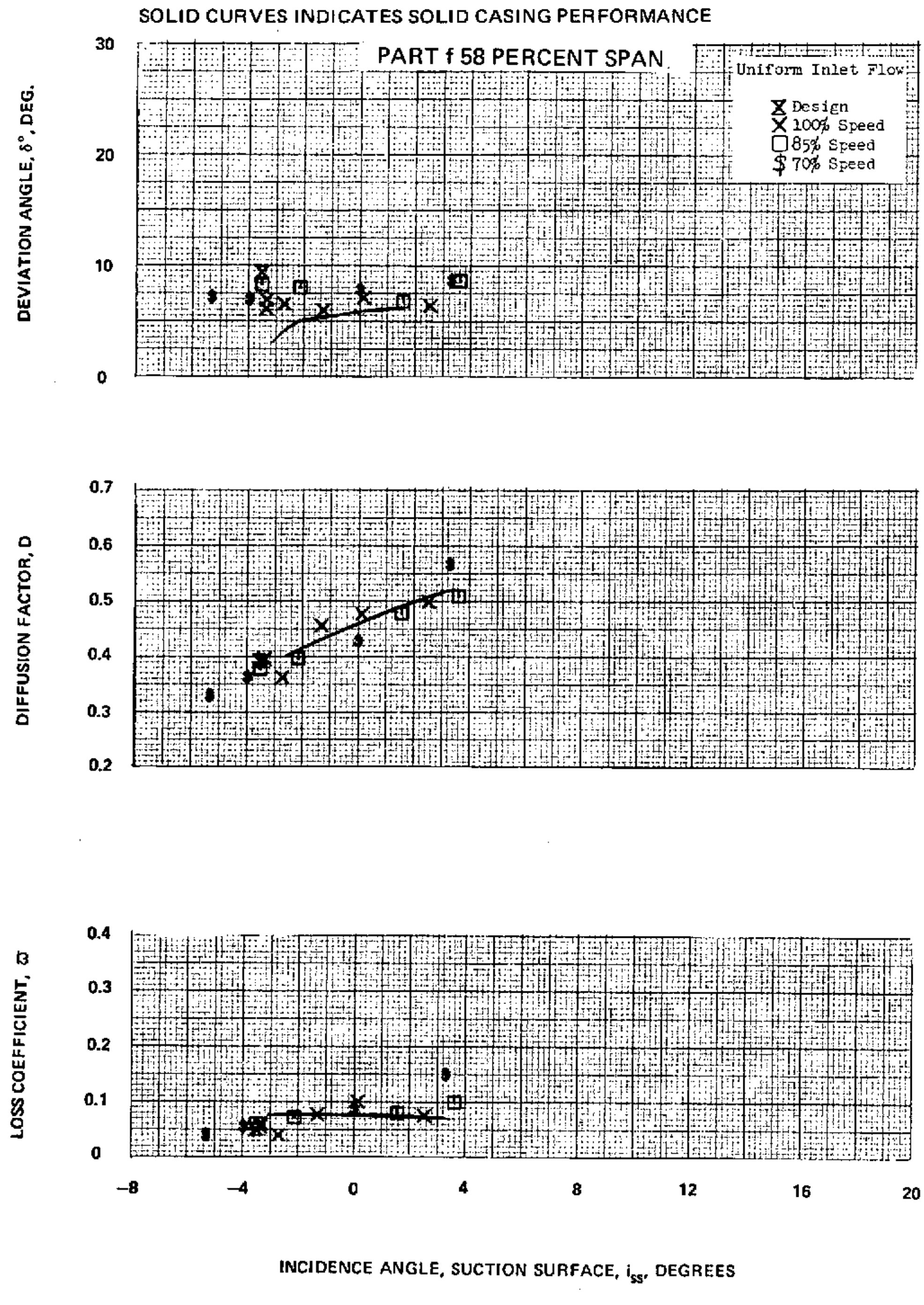


Figure 28 (Cont'd) Stator 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

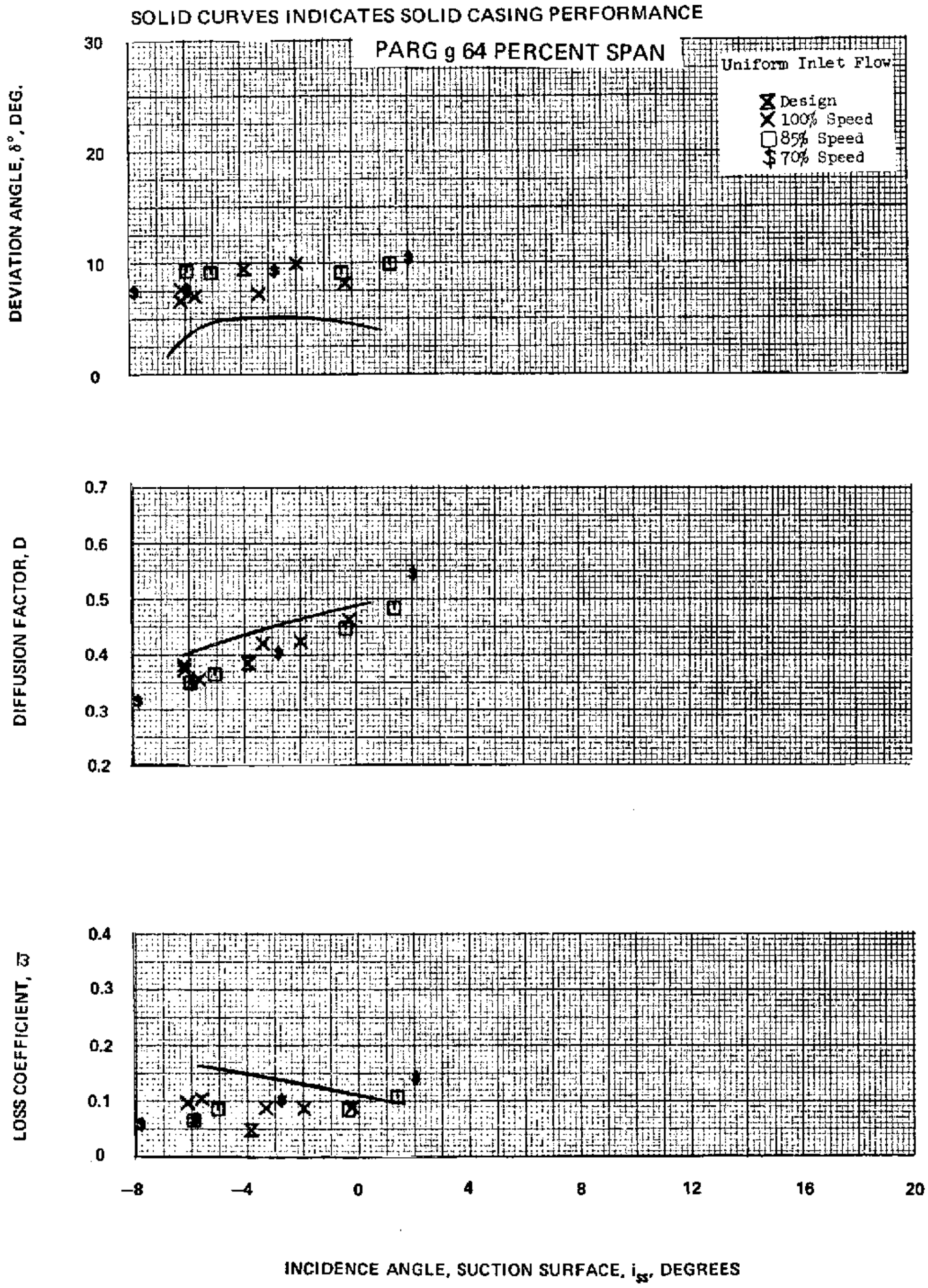


Figure 28 (Cont'd) Stator 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

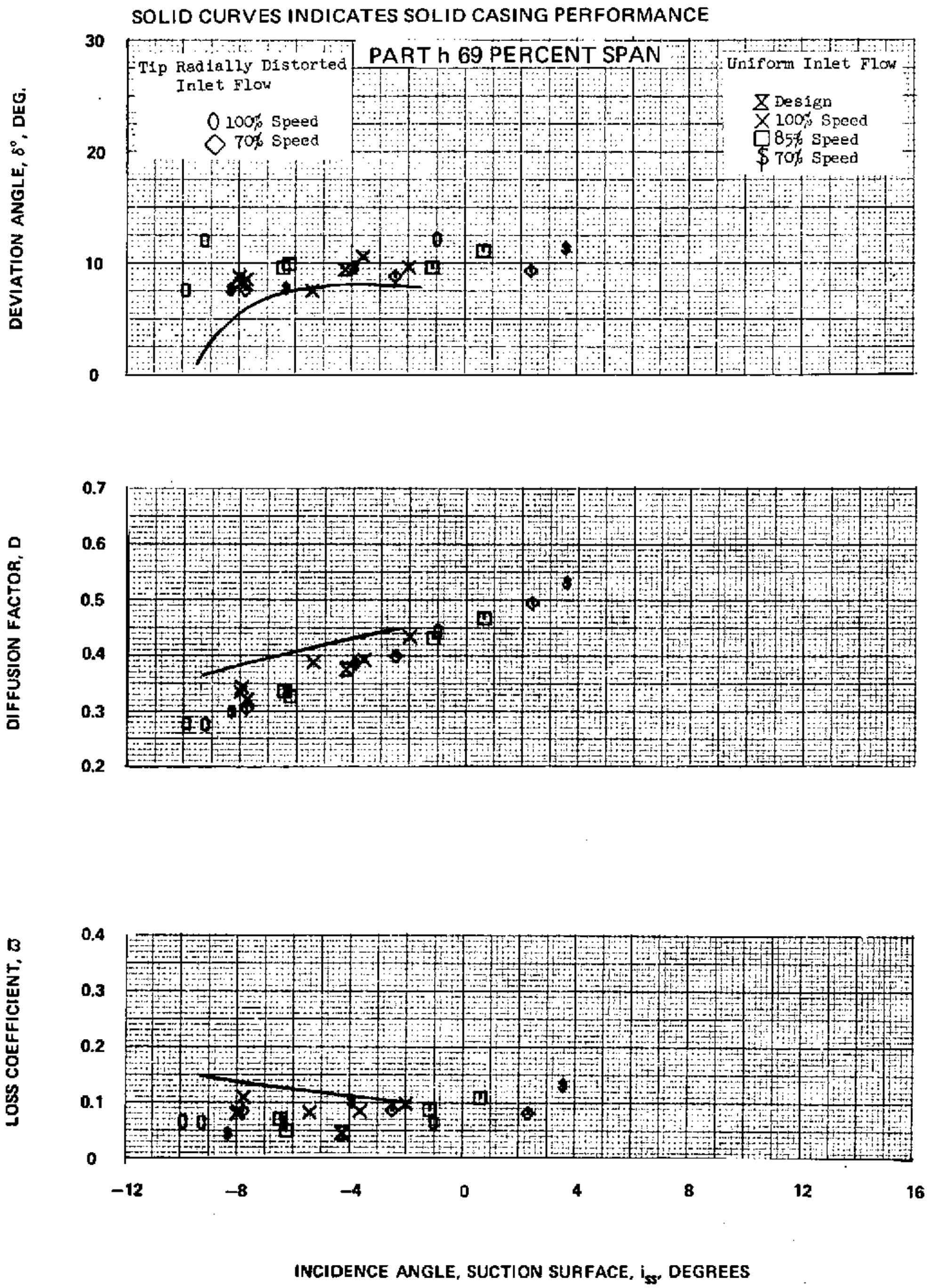


Figure 28 (Cont'd) Stator 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

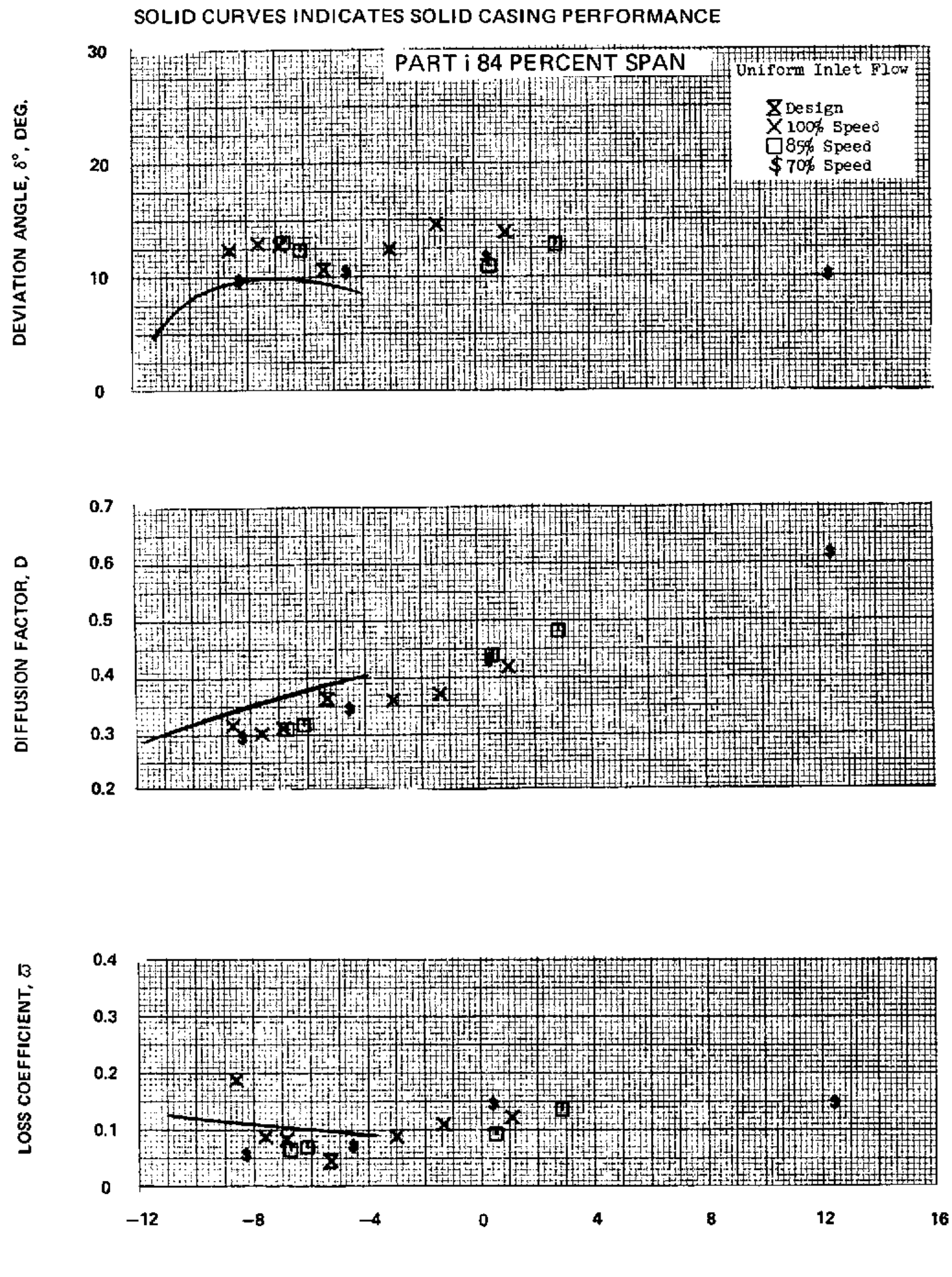


Figure 28 (Cont'd) Stator 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

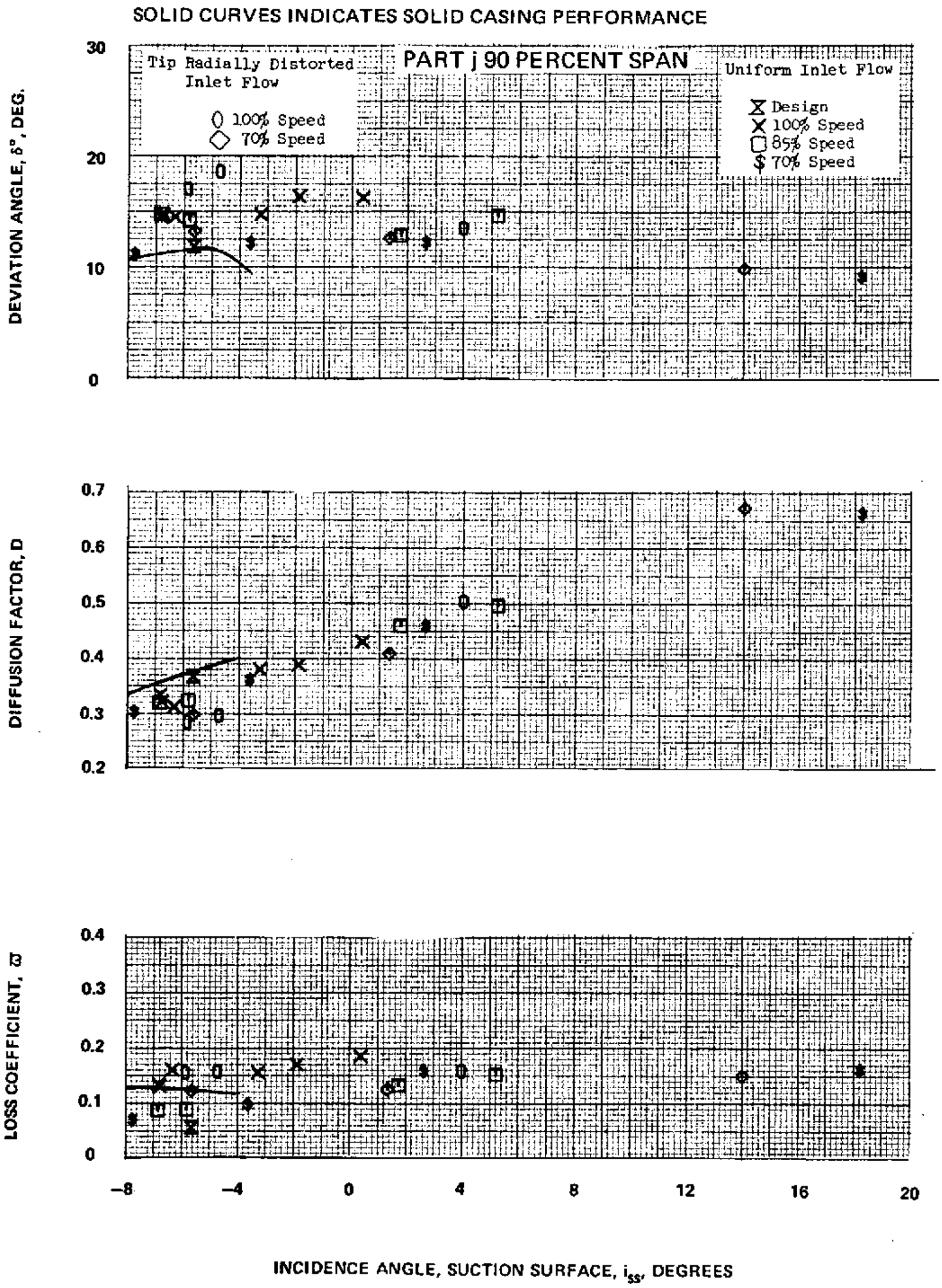


Figure 28 (Cont'd) Stator 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

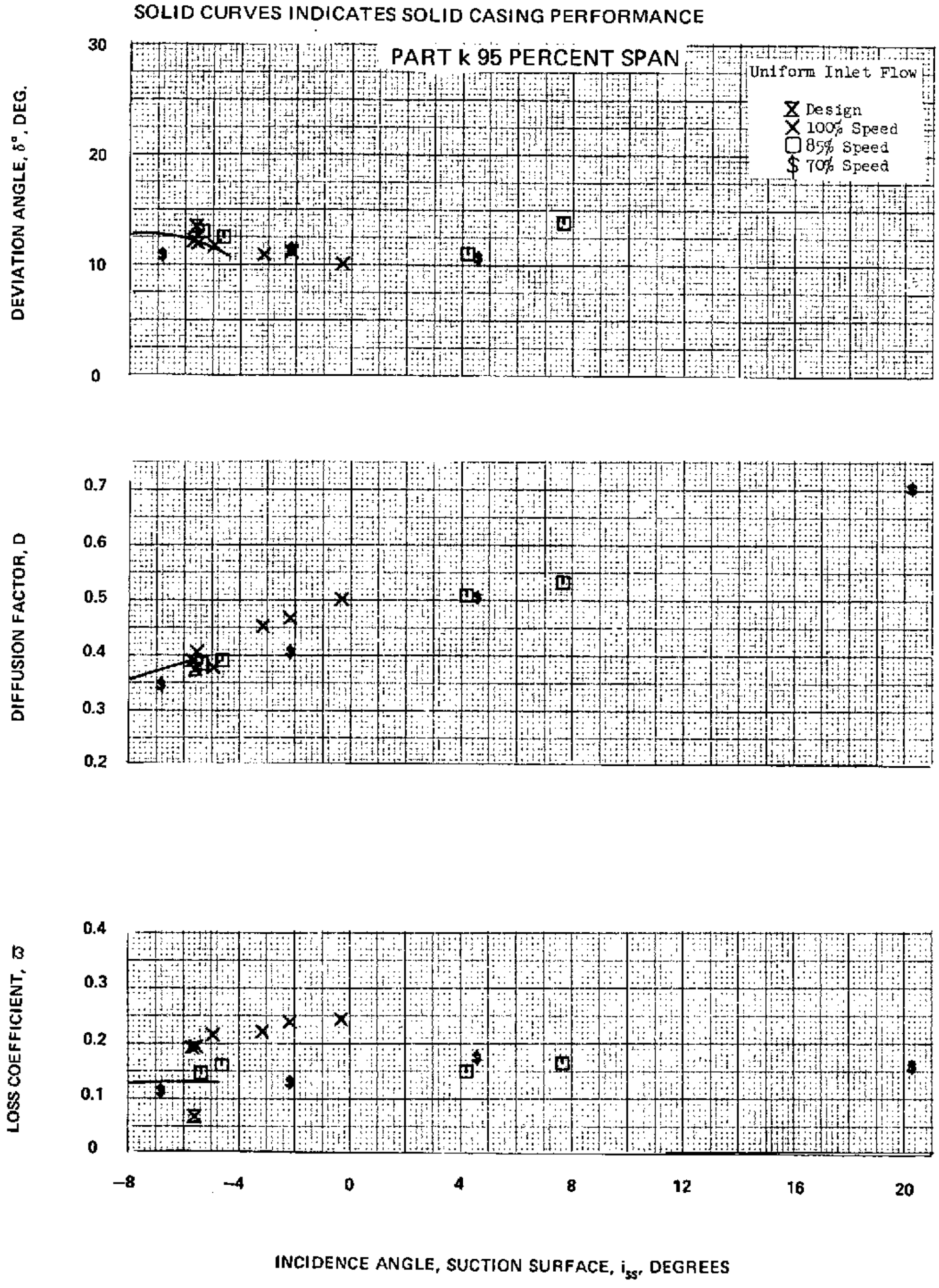


Figure 28 (Cont'd) Stator 1 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

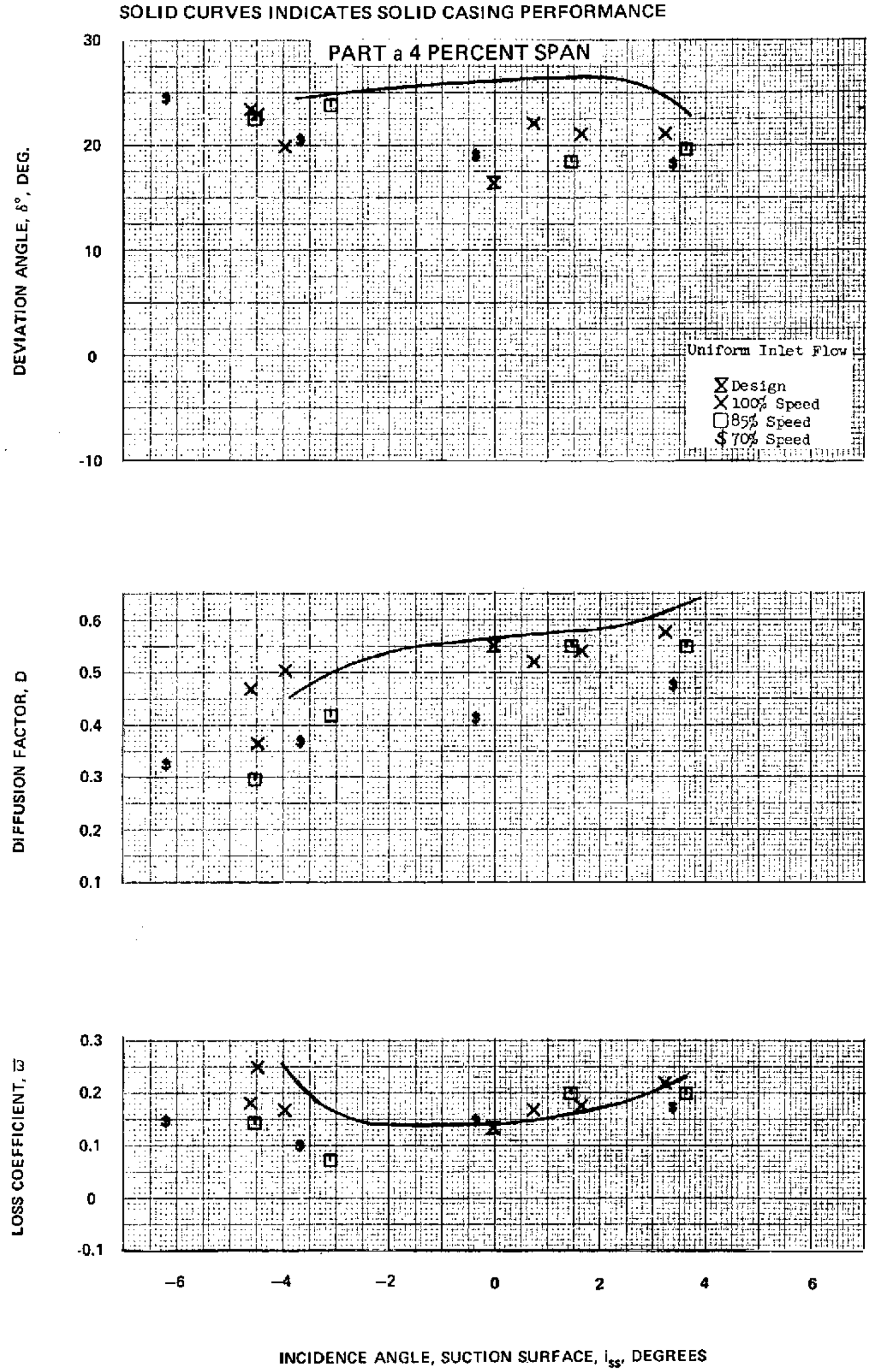


Figure 29 Rotor 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

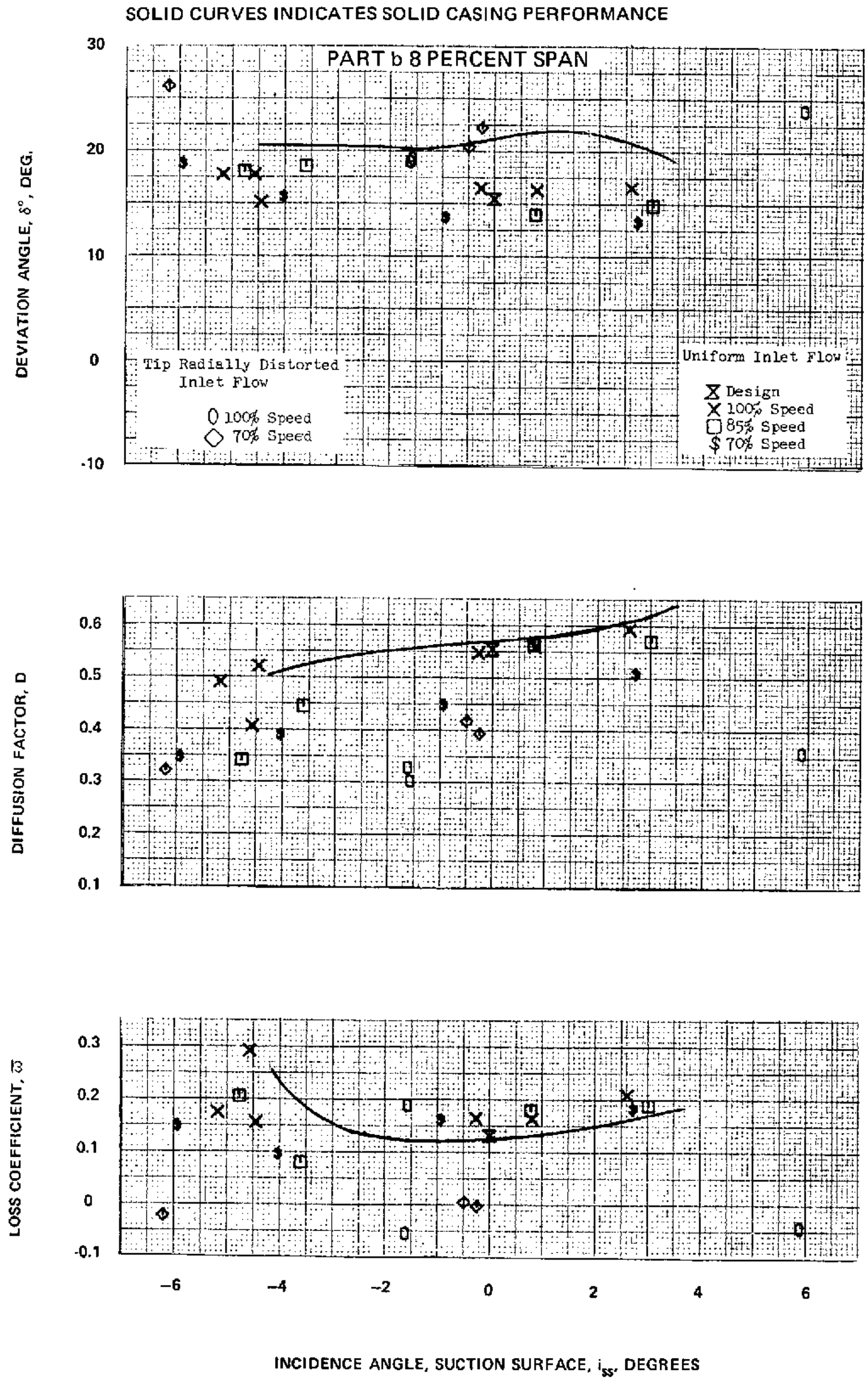


Figure 29 (Cont'd) Rotor 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

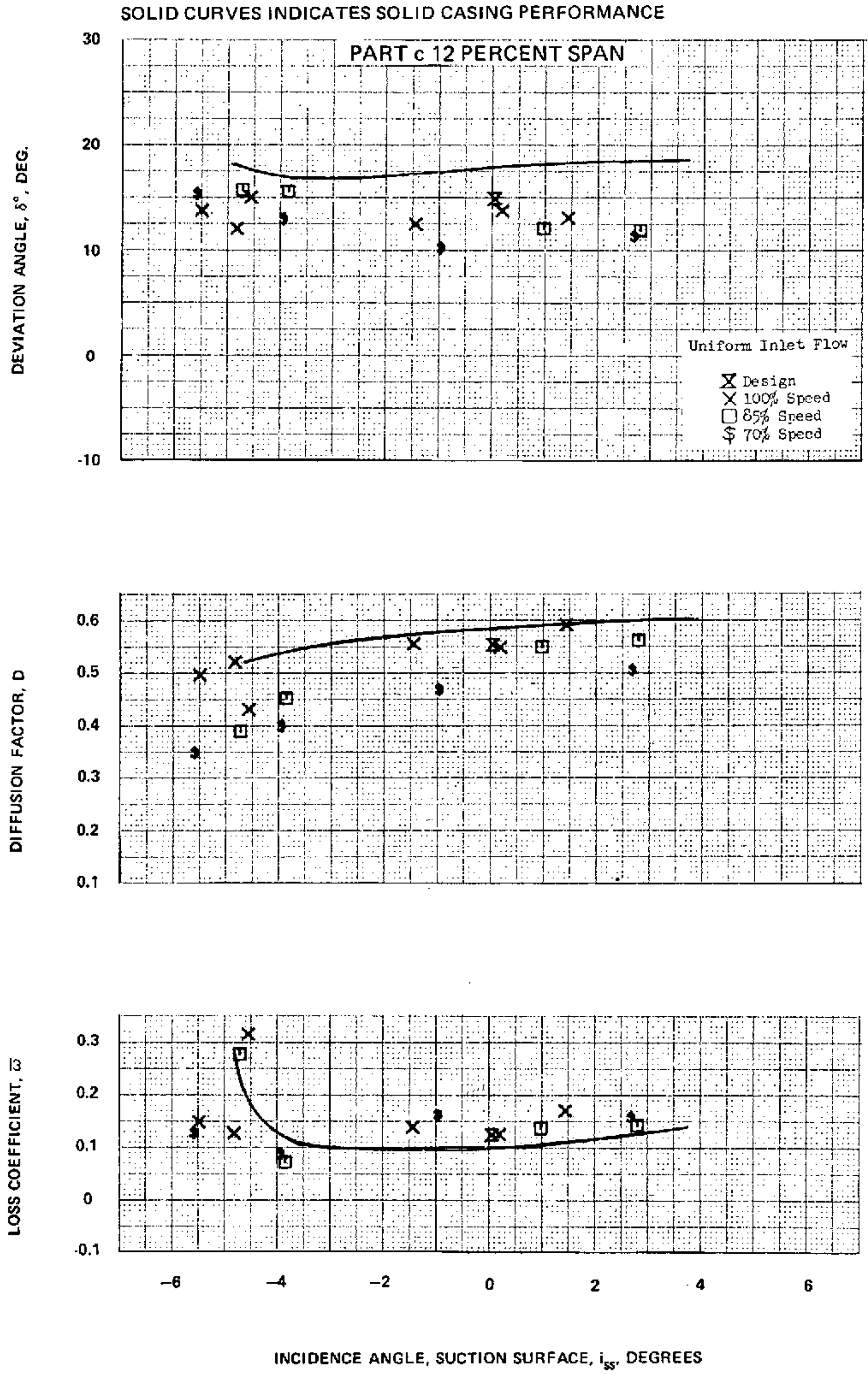


Figure 29 (Cont'd) Rotor 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

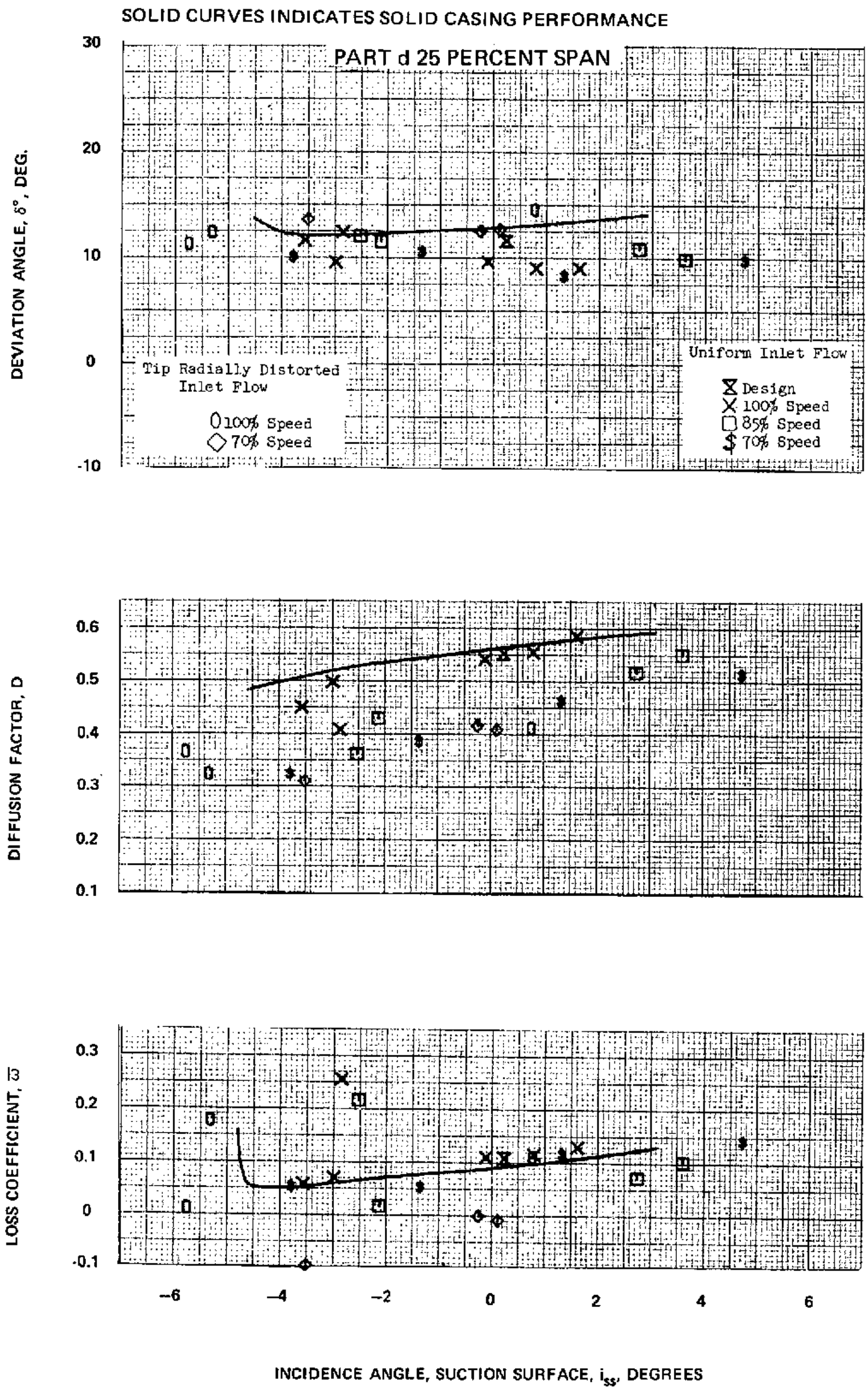


Figure 29 (Cont'd) Rotor 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

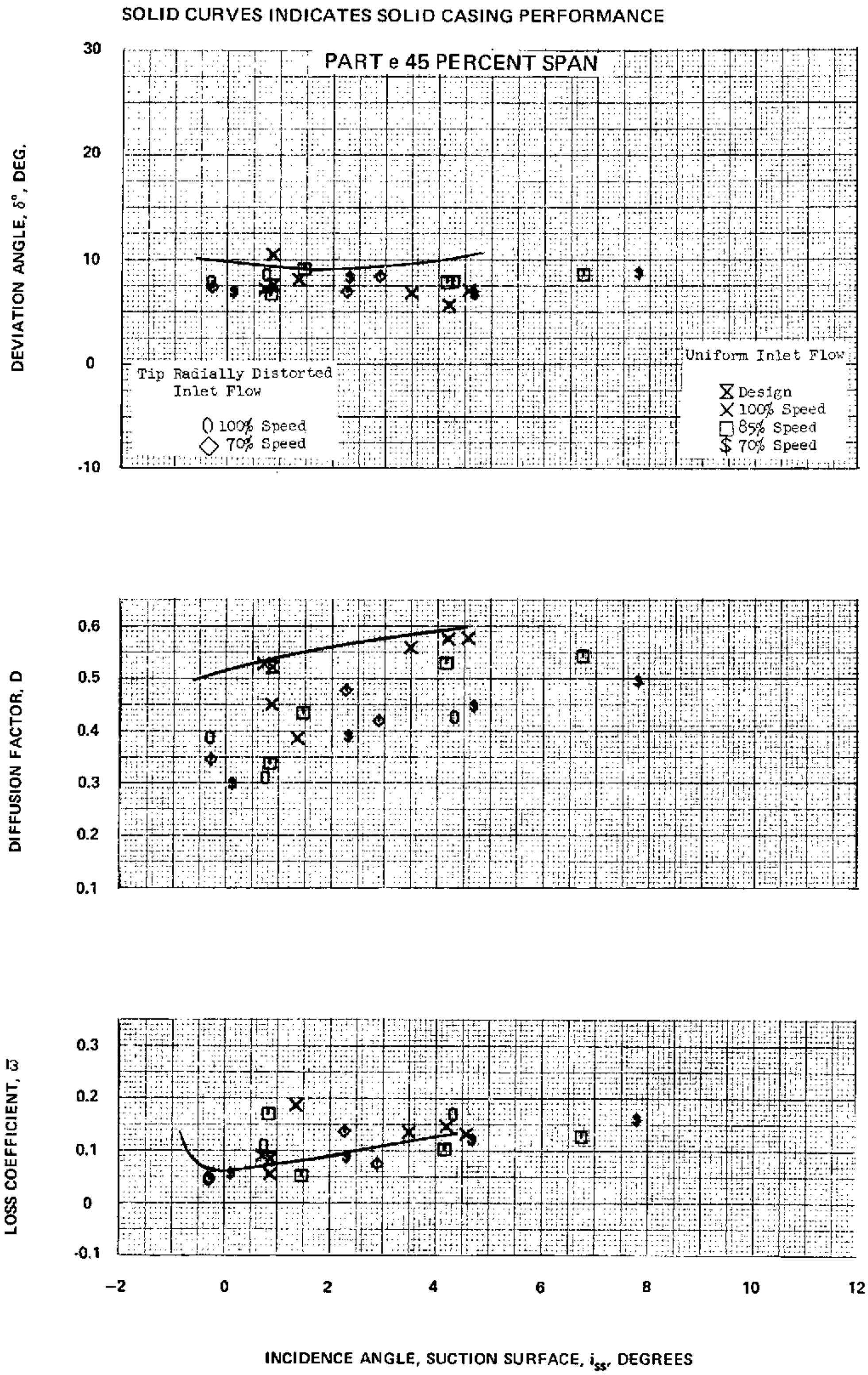


Figure 29 (Cont'd) Rotor 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

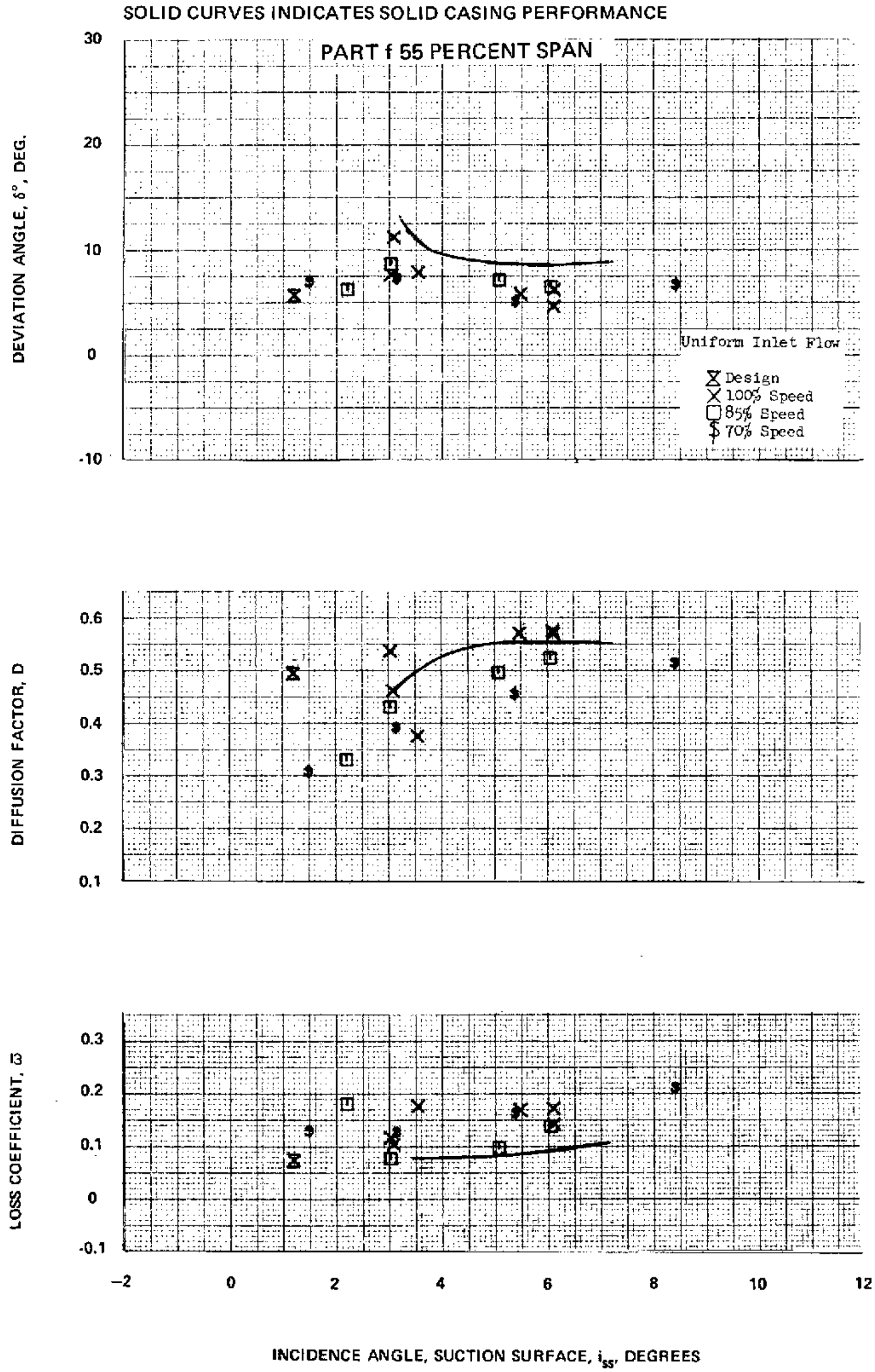


Figure 29 (Cont'd) Rotor 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

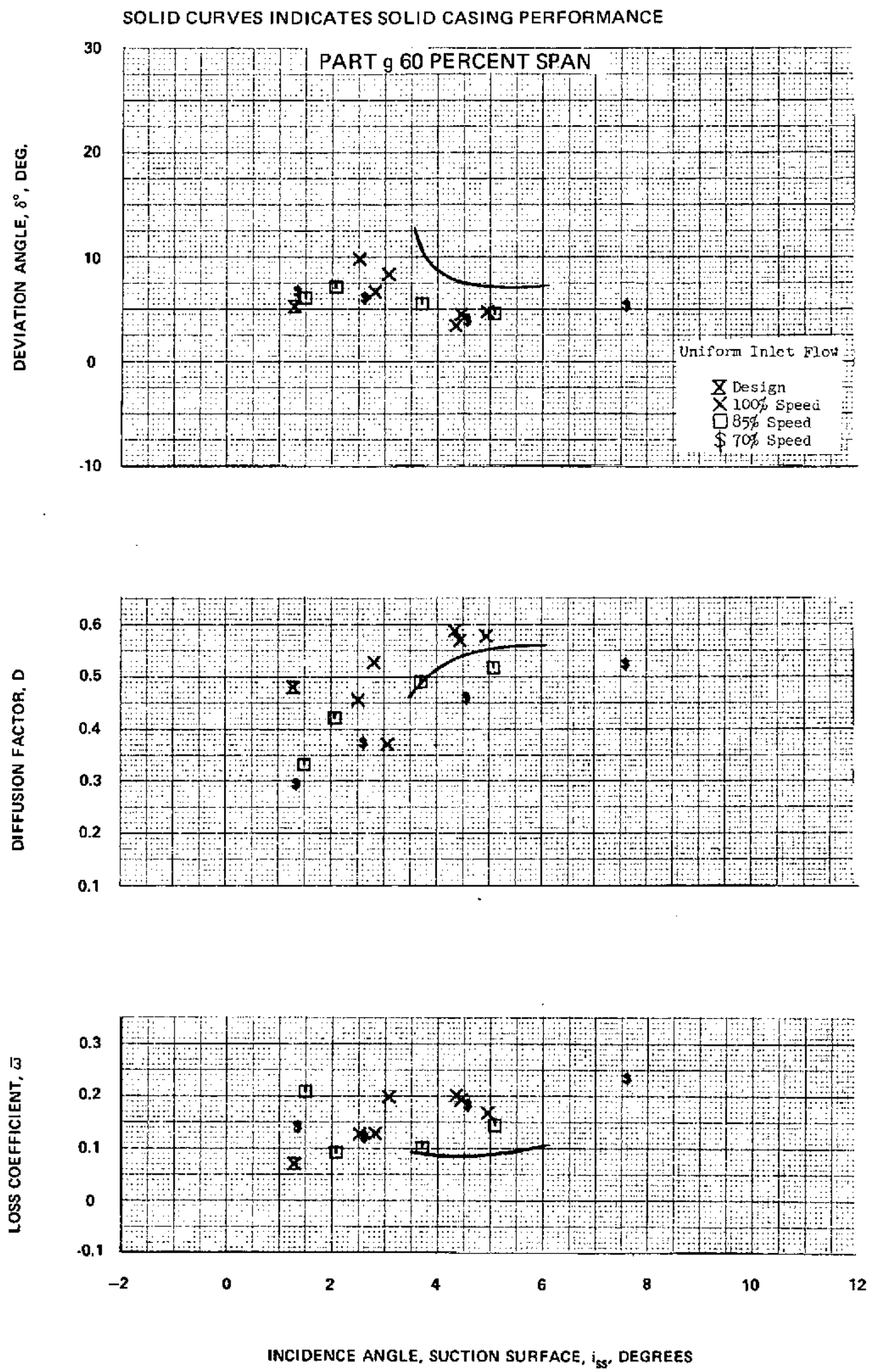


Figure 29 (Cont'd) Rotor 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

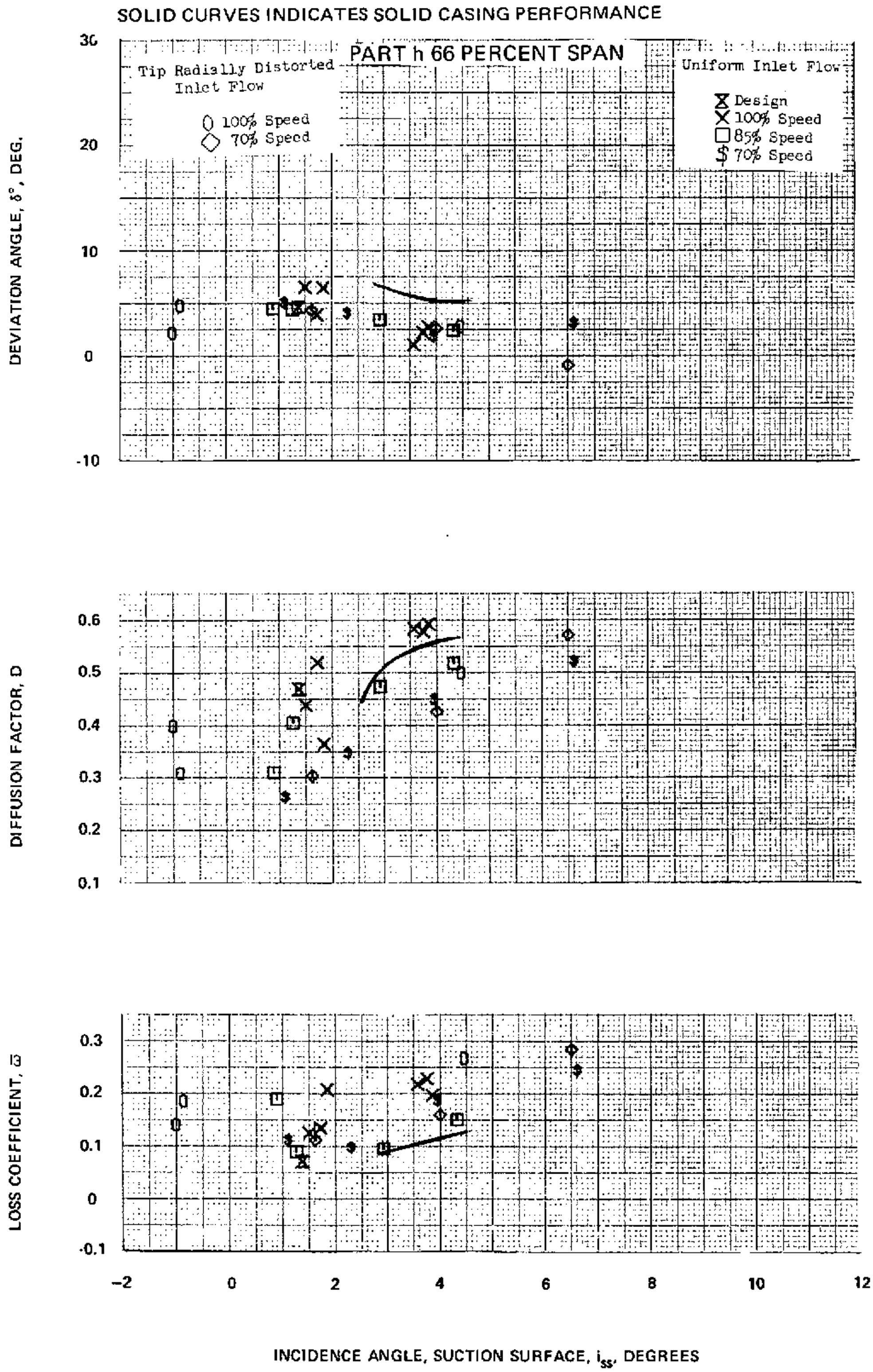


Figure 29 (Cont'd) Rotor 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

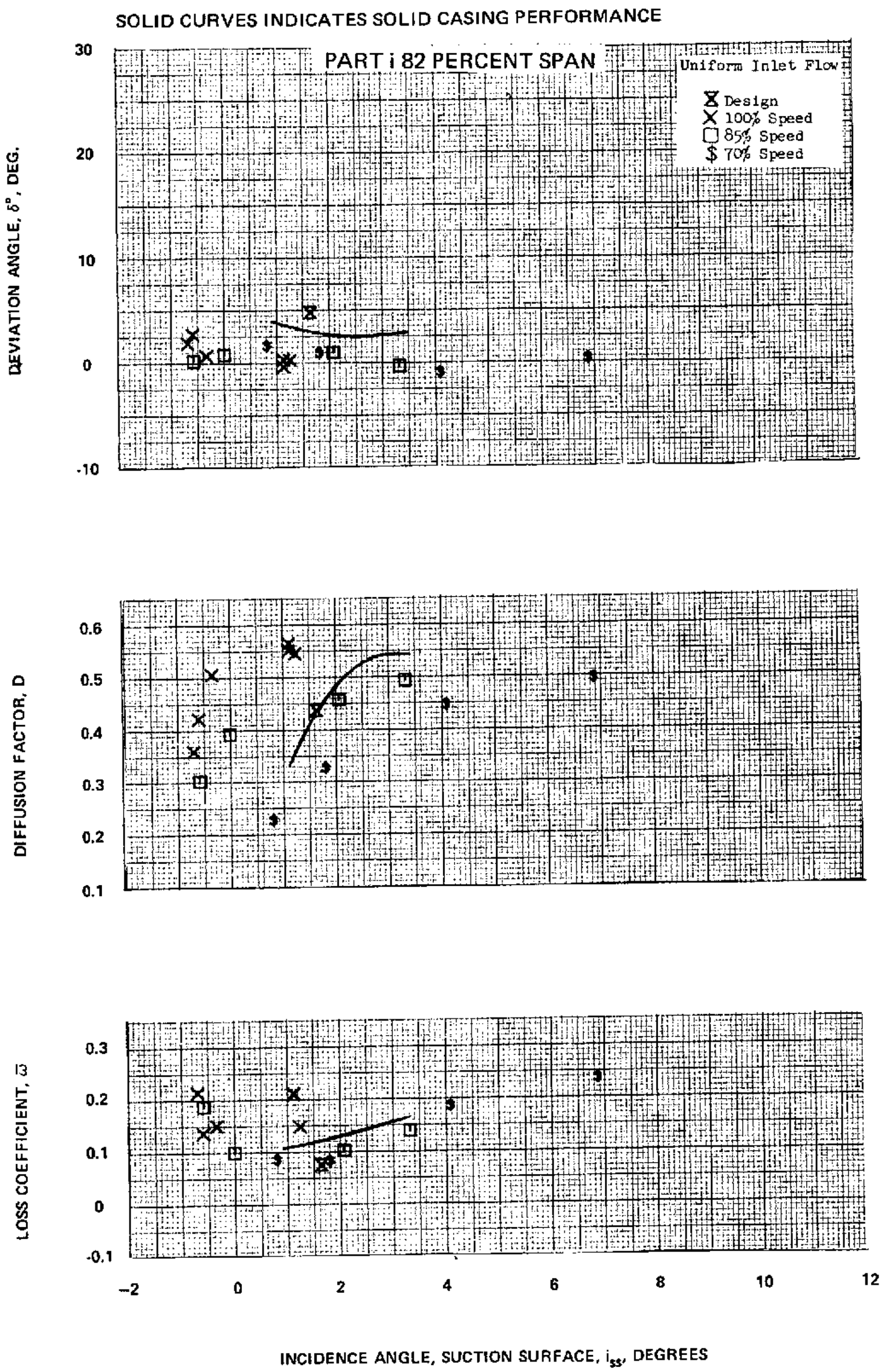


Figure 29 (Cont'd) Rotor 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

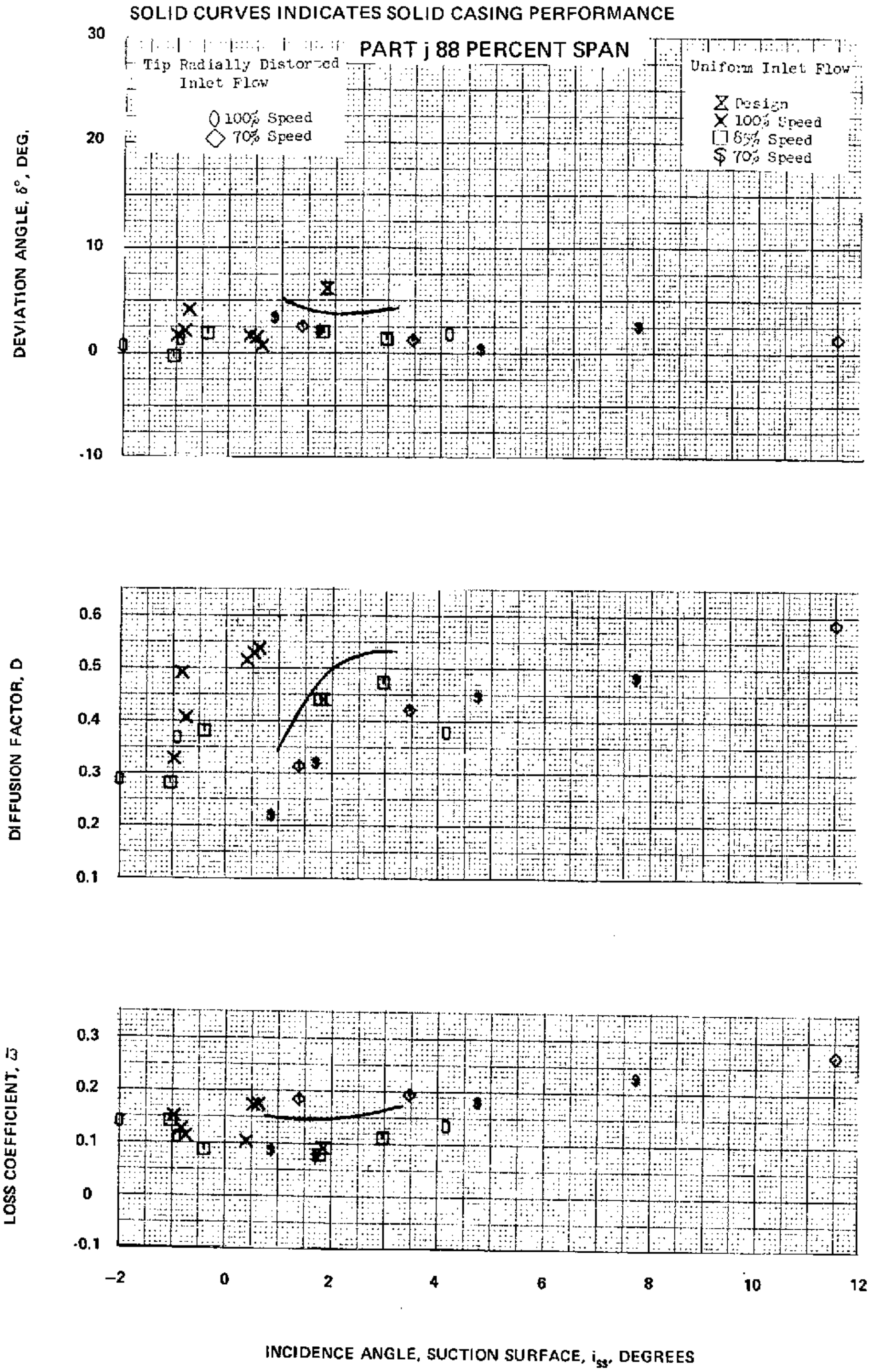


Figure 29 (Cont'd) Rotor 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

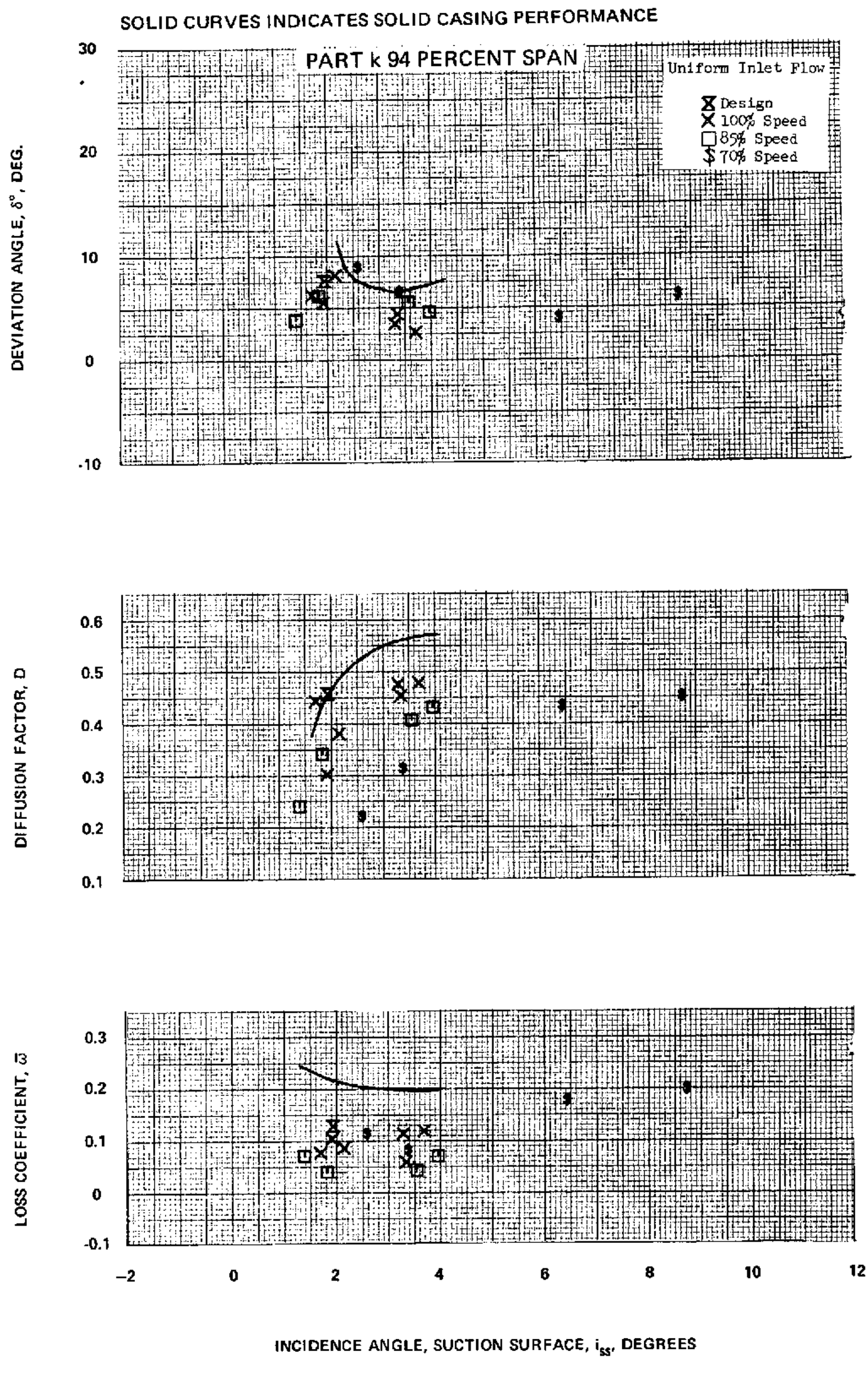


Figure 29 (Cont'd) Rotor 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

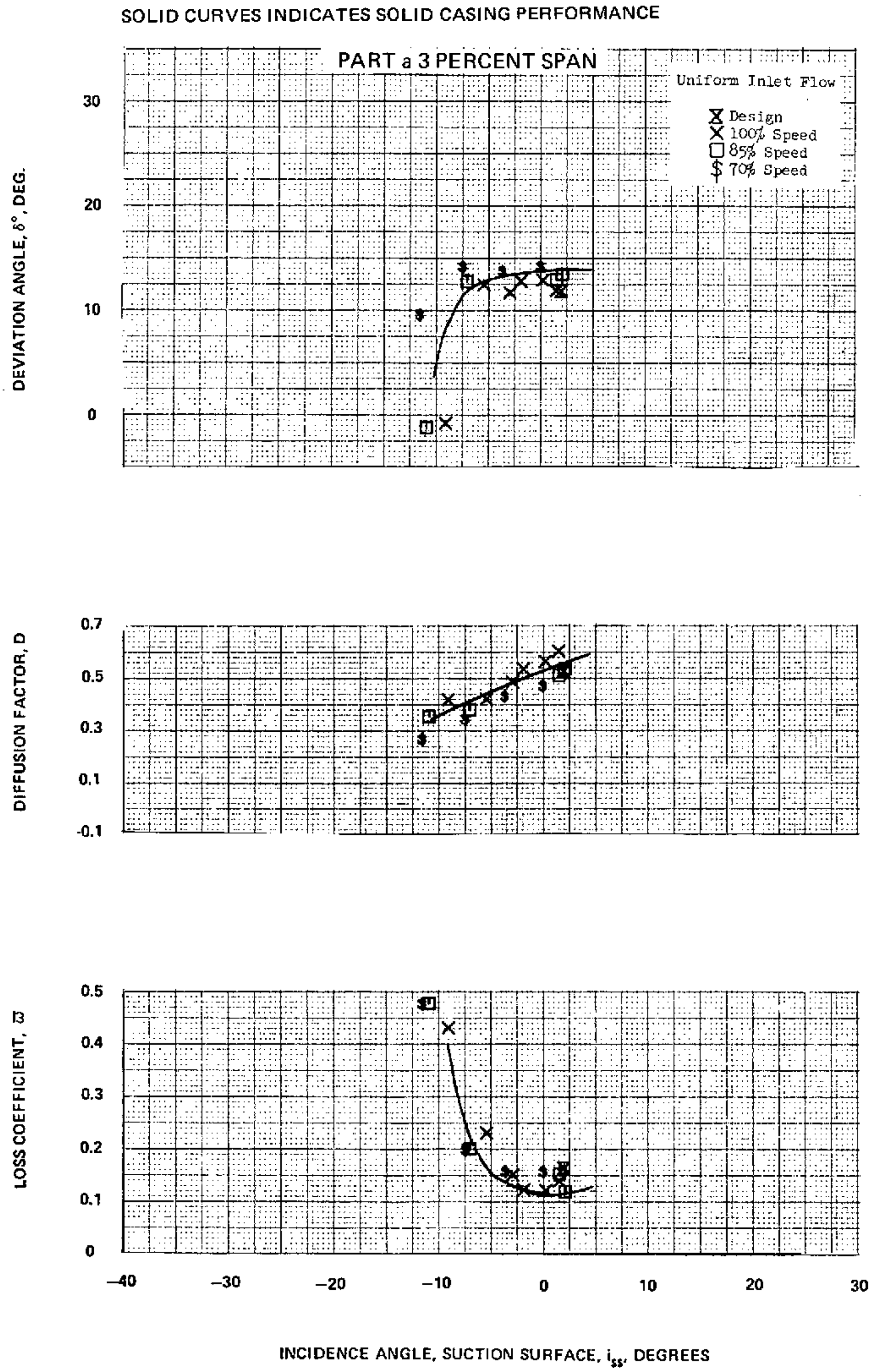


Figure 30 Stator 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

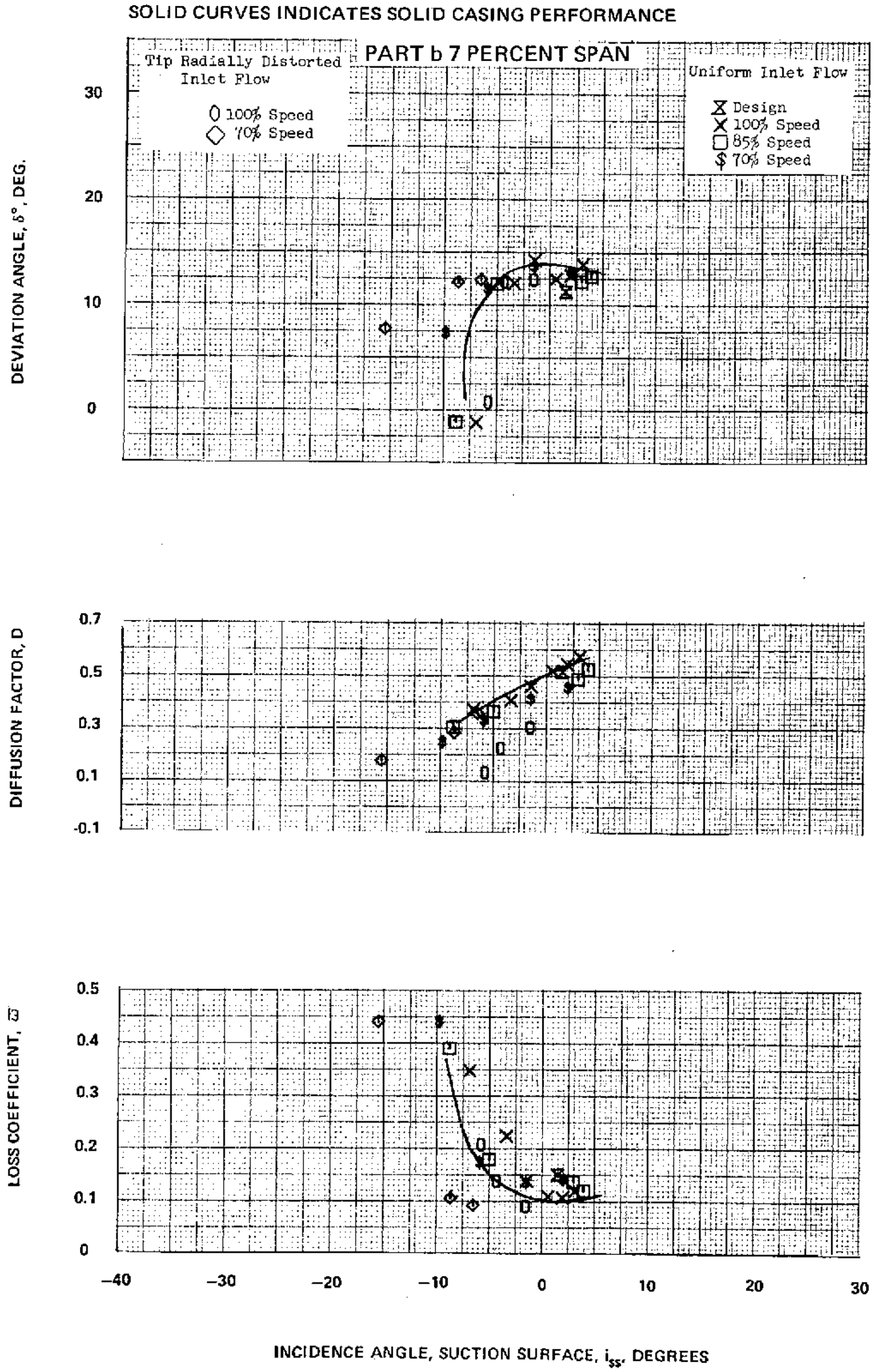


Figure 30 (Cont'd) Stator 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

C-2

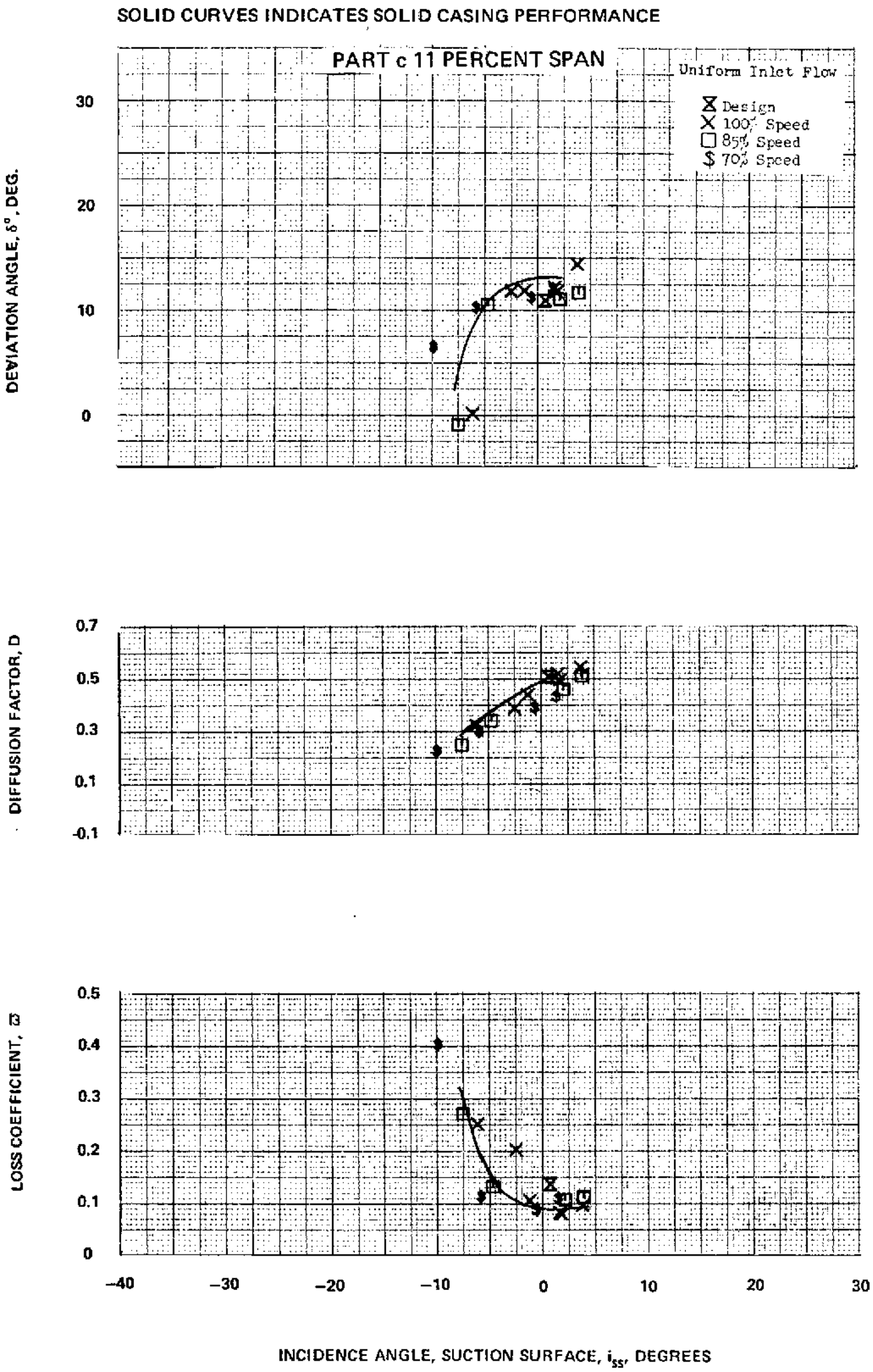


Figure 30 (Cont'd) Stator 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

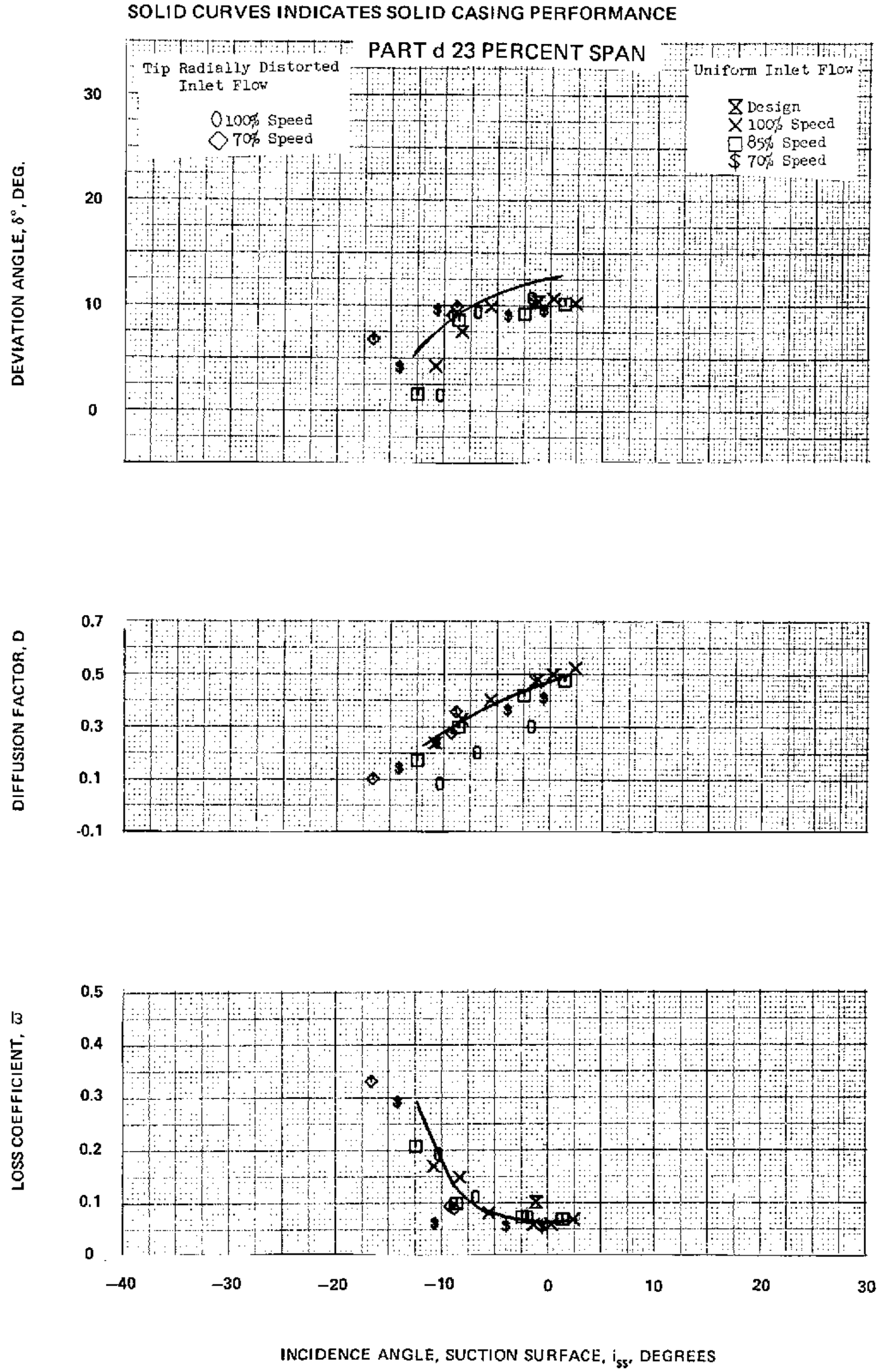


Figure 30 (Cont'd) Stator 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

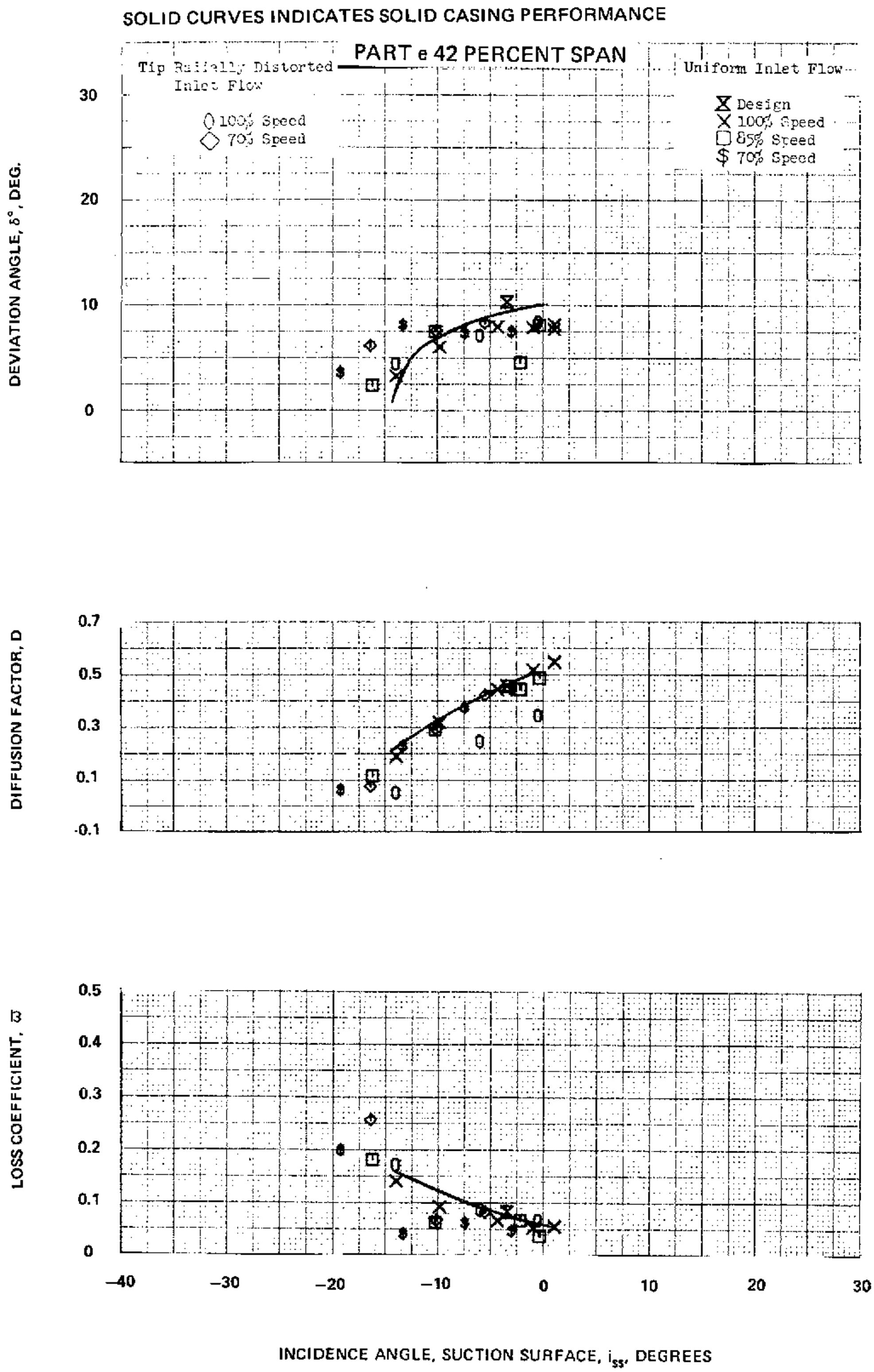


Figure 30 (Cont'd) Stator 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

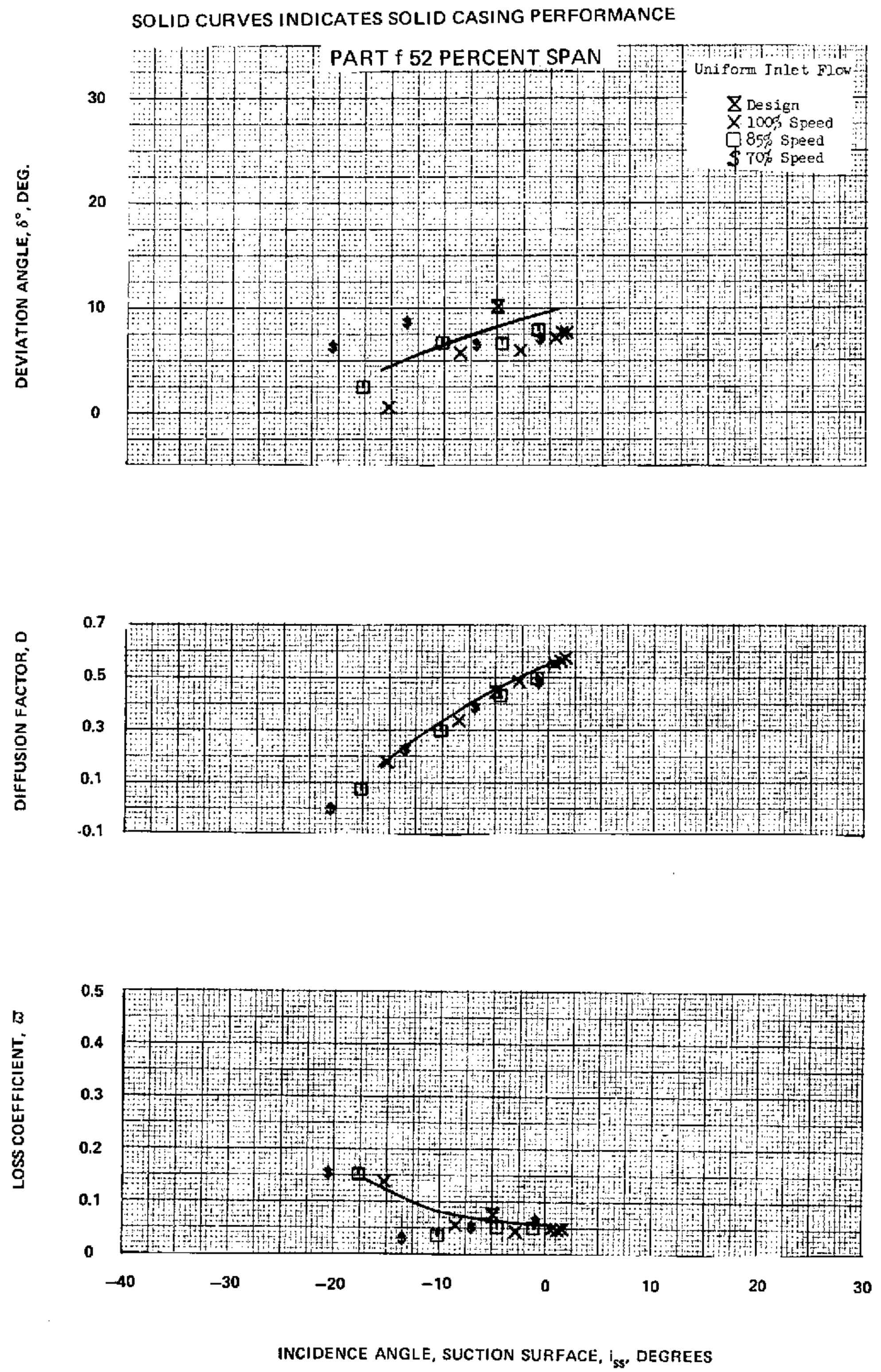


Figure 30 (Cont'd) Stator 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

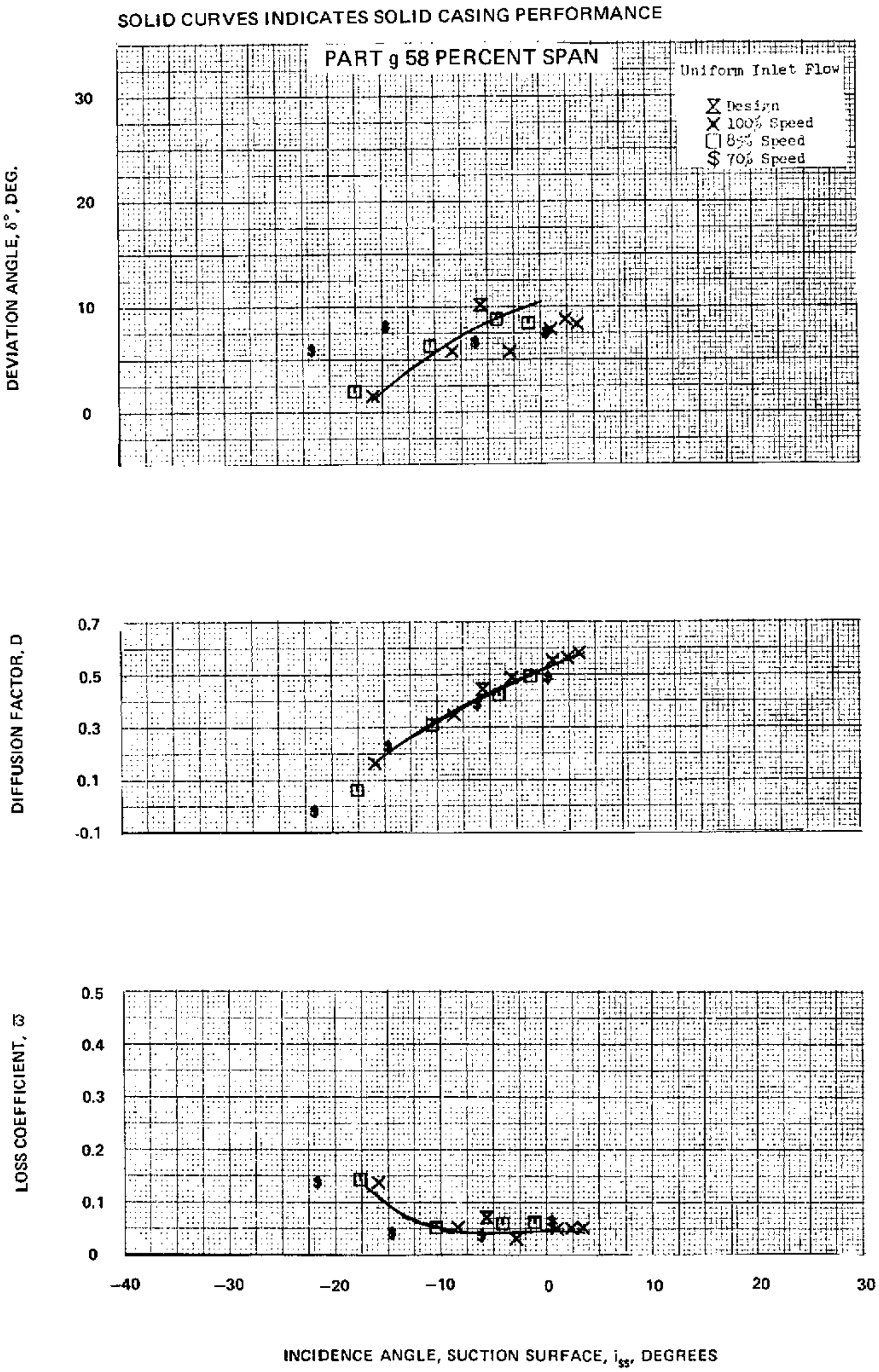


Figure 30 (Cont'd) Stator 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

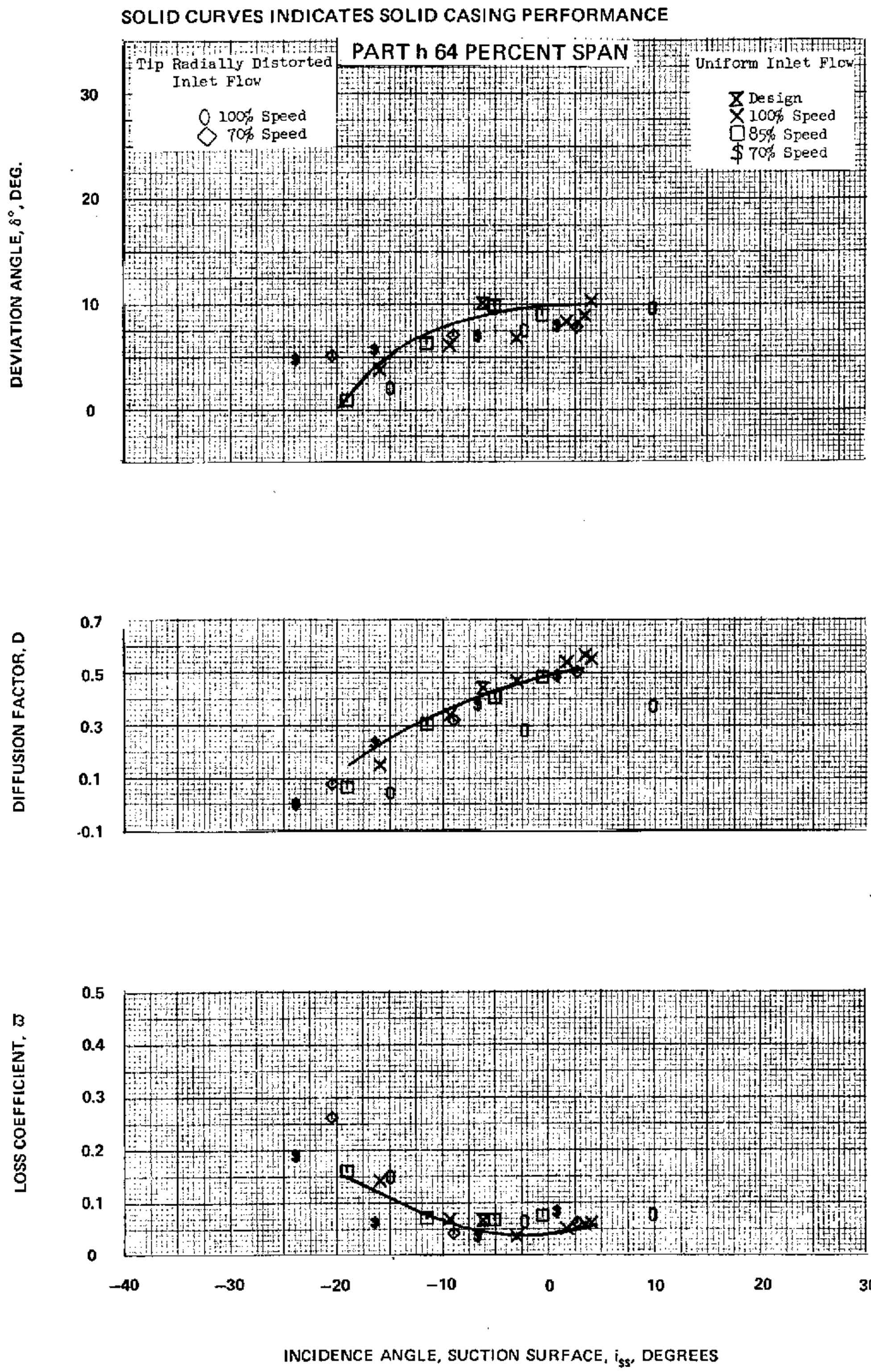


Figure 30 (Cont'd) Stator 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

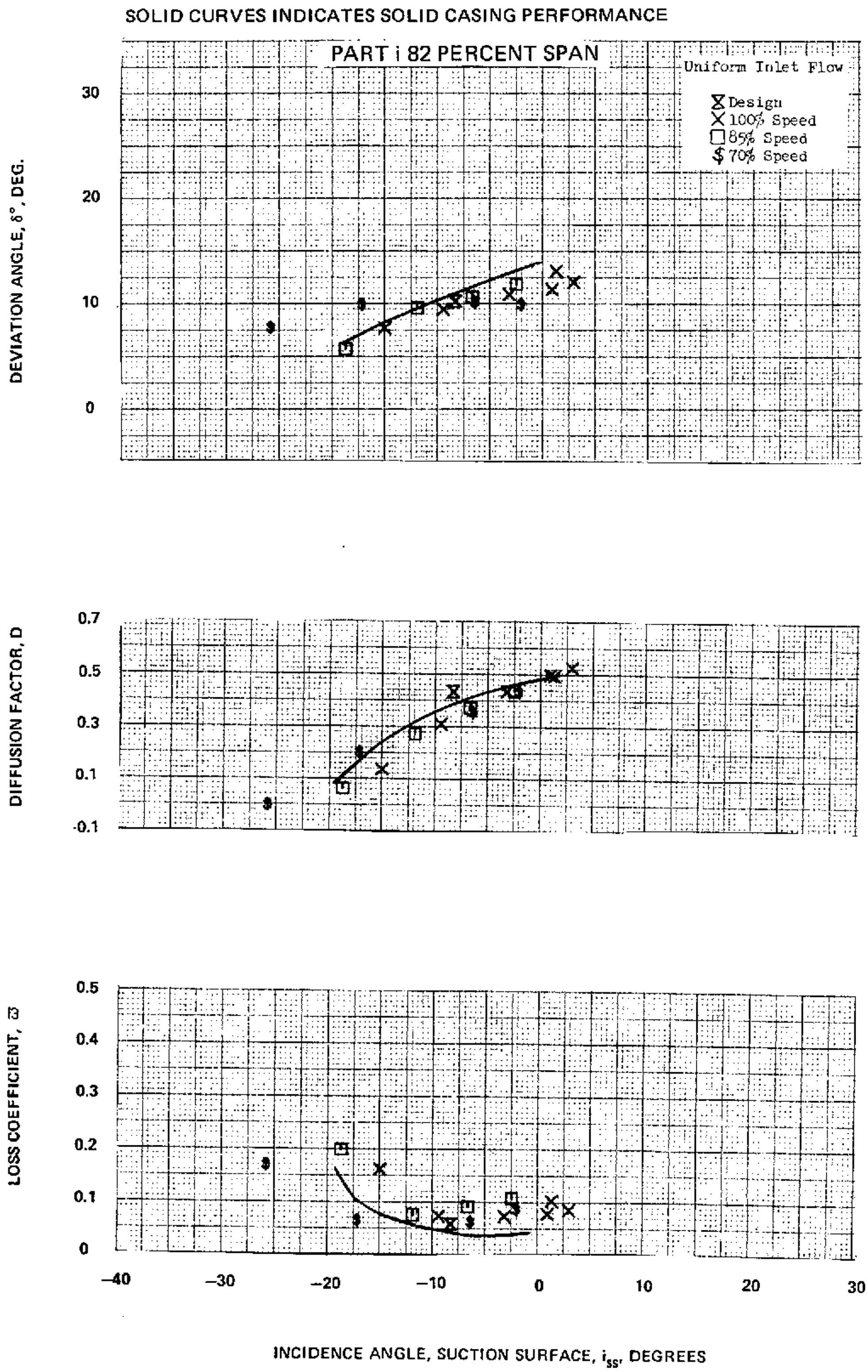


Figure 30 (Cont'd) Stator 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

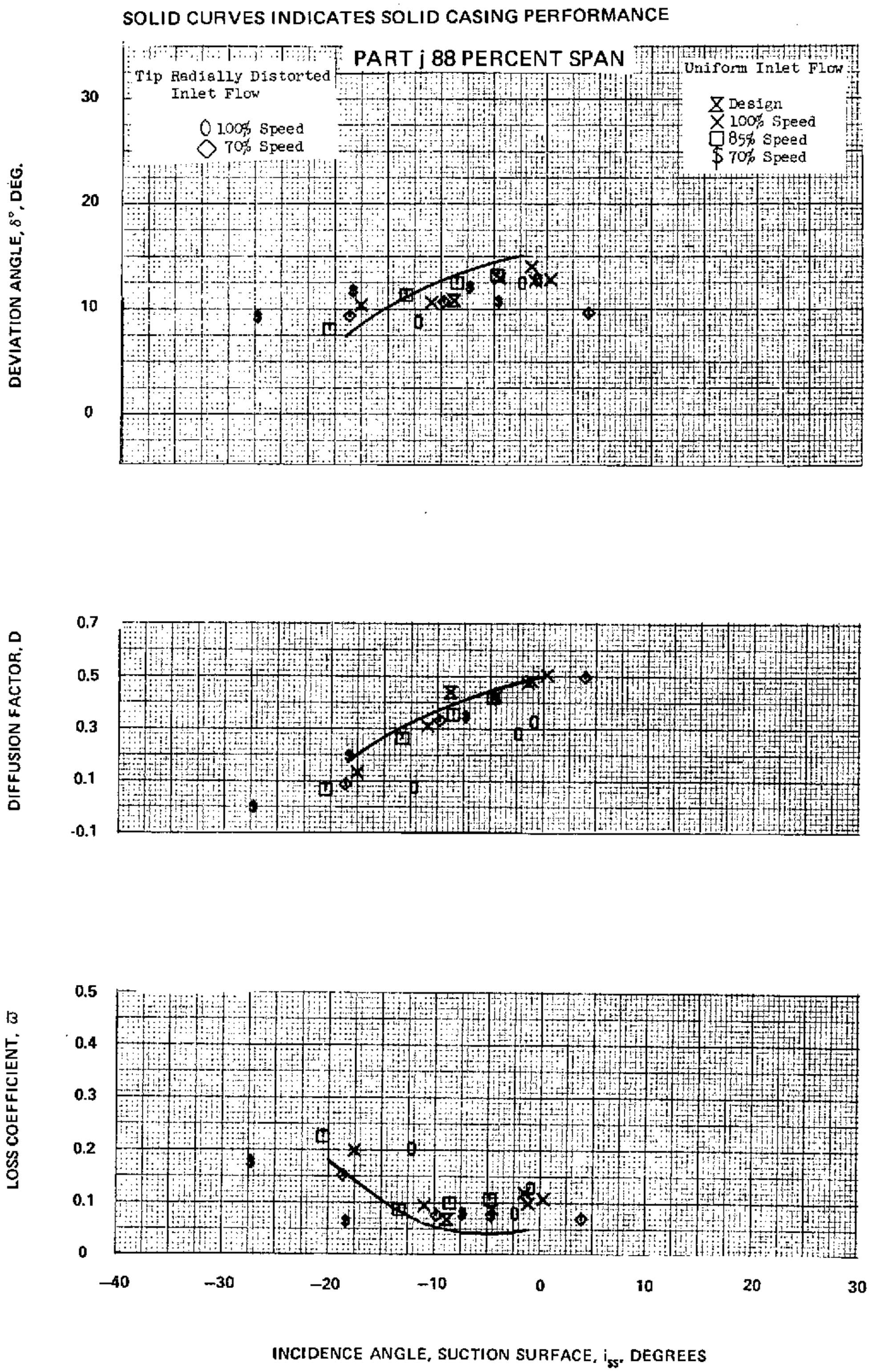


Figure 30 (Cont'd) Stator 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

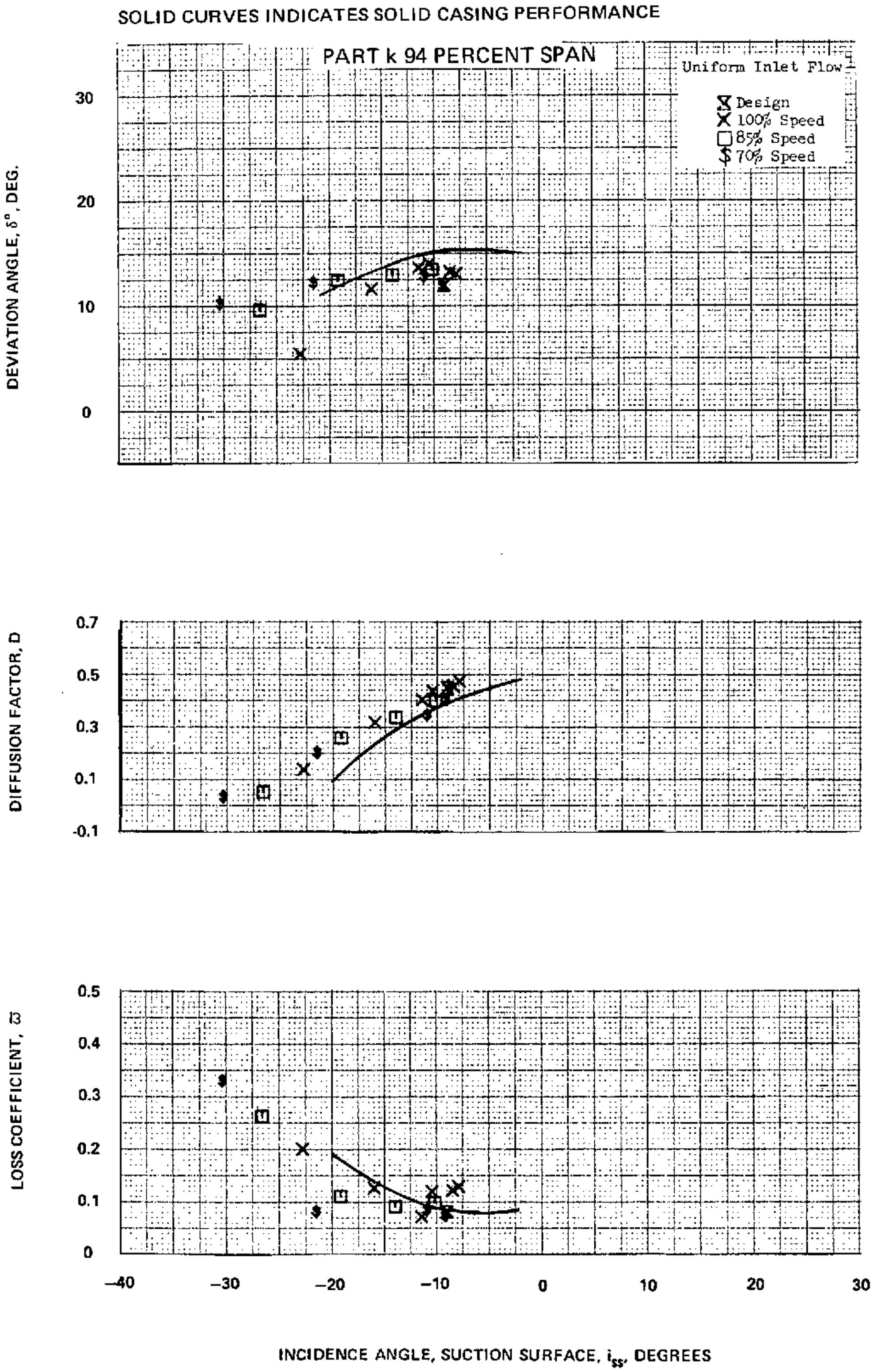


Figure 30 (Cont'd) Stator 2 Blade-Element Performance Data for Uniform and Tip Radially Distorted Inlet Flow With Casing Treatment – Solid Casing Curves Shown for Comparison

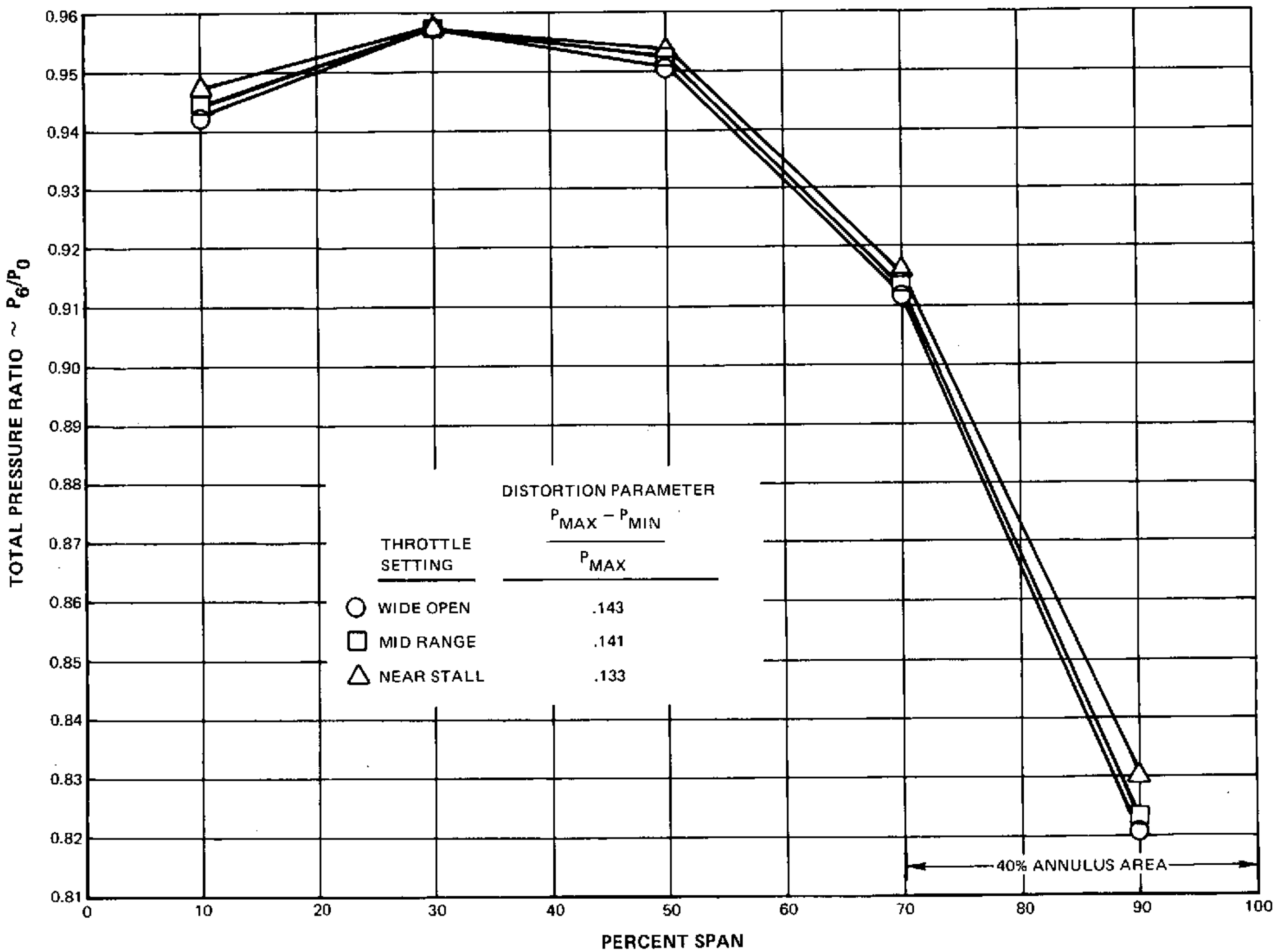


Figure 31 Rotor 1 Inlet Total Pressure Ratio Versus Span for Tip Radially Distorted Inlet Flow at Design Speed With Casing Treatment

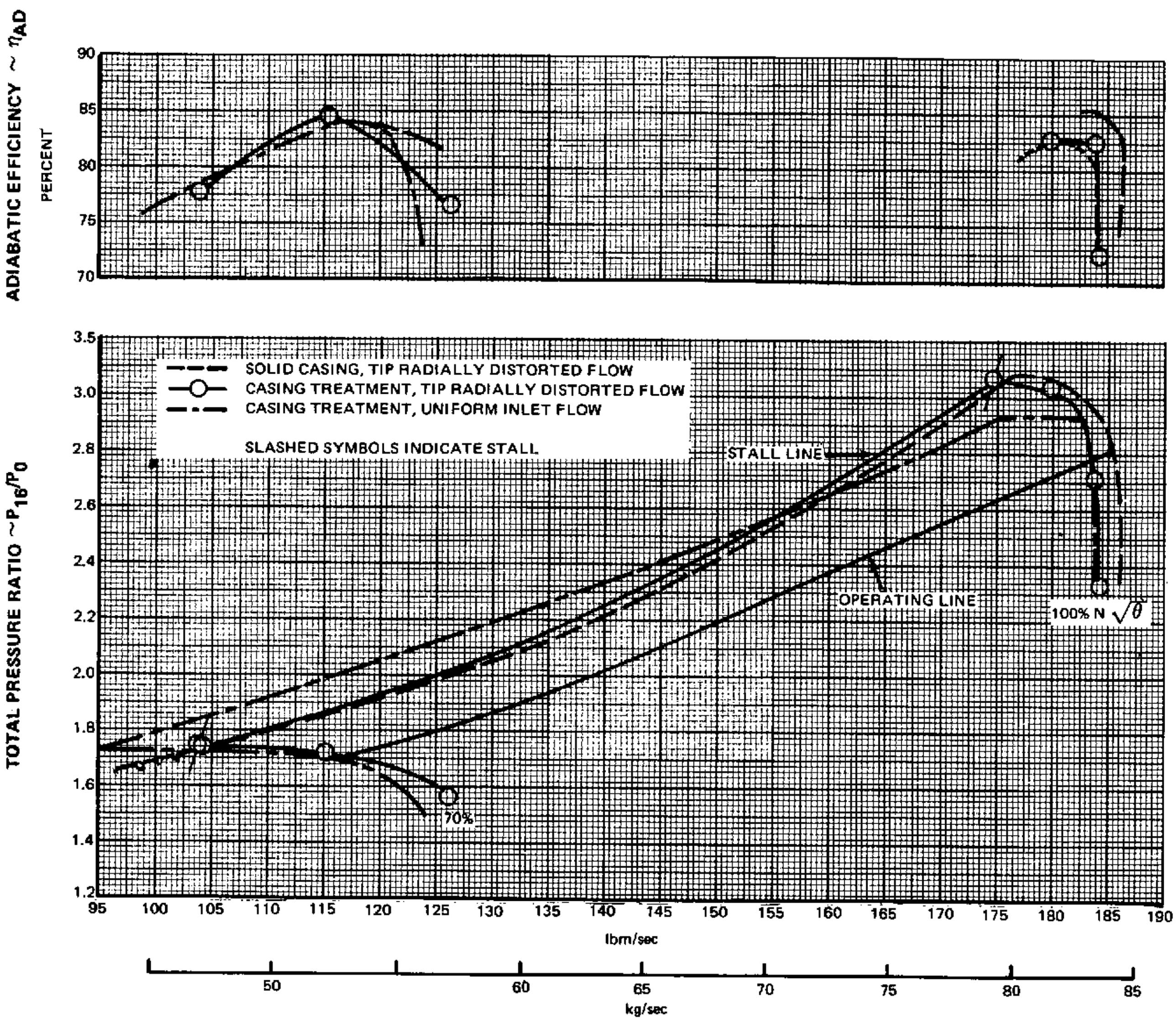


Figure 32 Fan Overall Performance for Tip Radially Distorted Inlet Flow With Casing Treatment – Performance With Uniform Inlet Flow and With Solid Casings Shown for Comparison

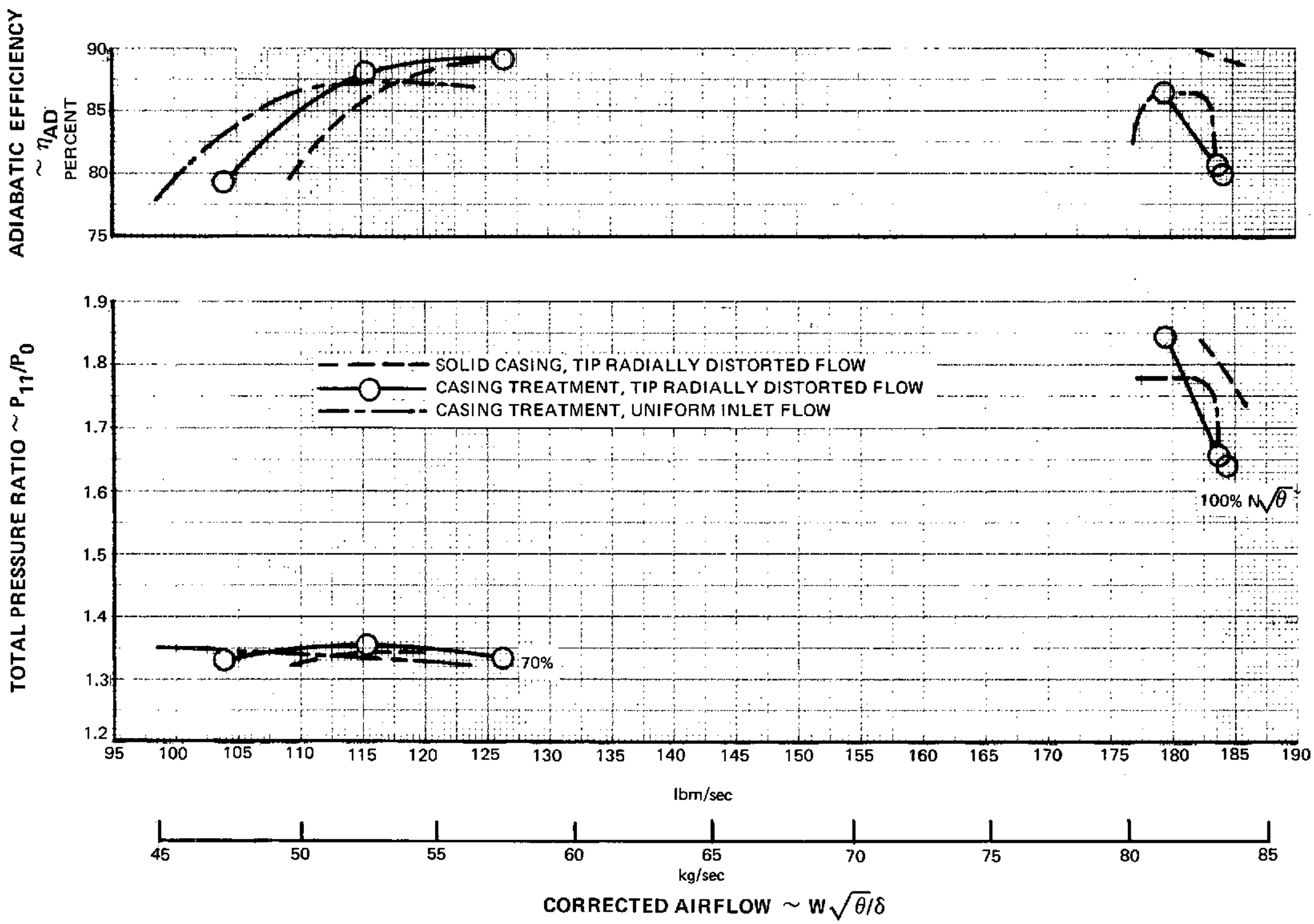


Figure 33 First-Stage Performance for Tip Radially Distorted Inlet Flow With Casing Treatment – Performance With Uniform Inlet Flow and With Solid Casings Shown for Comparison

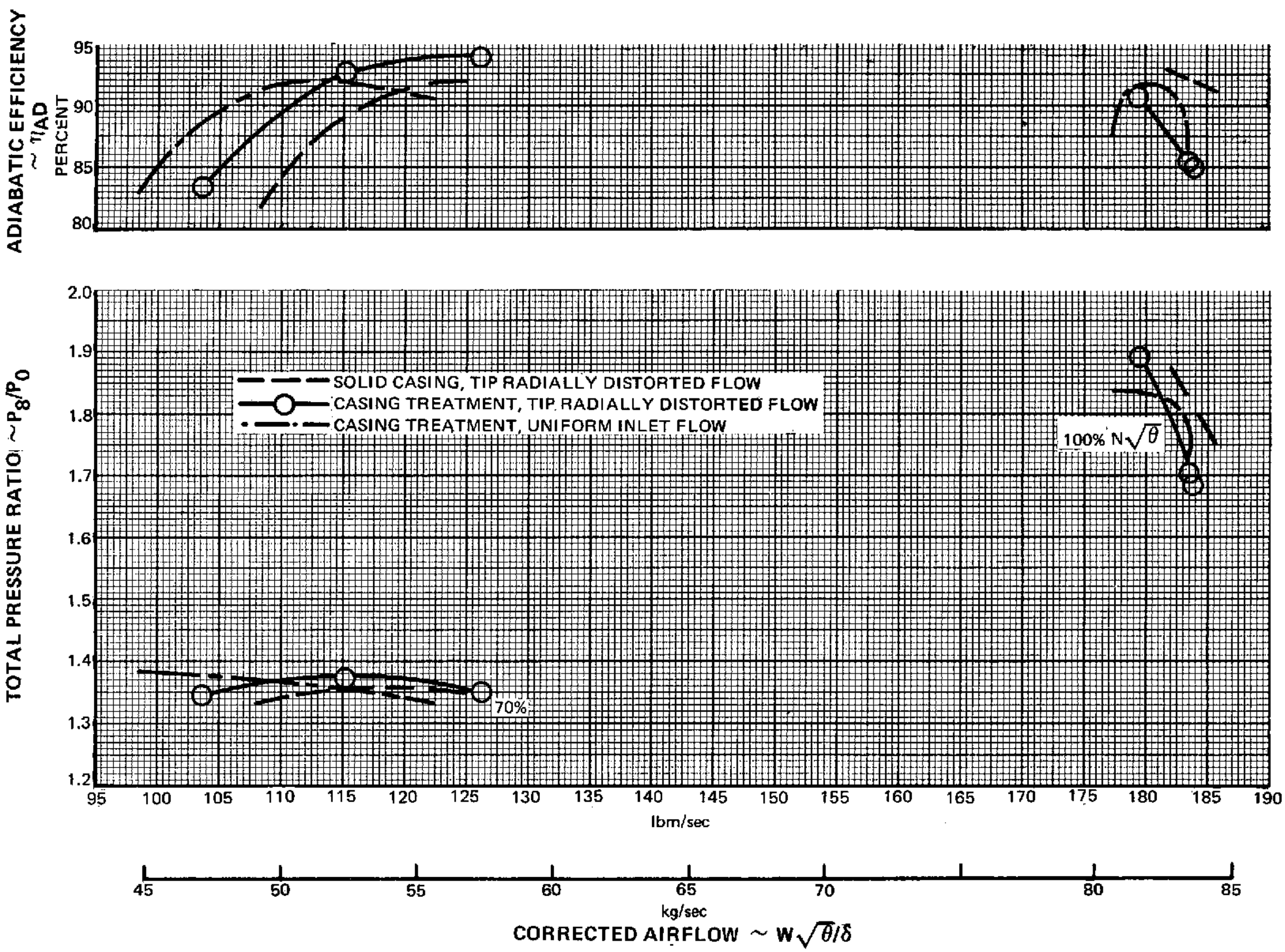


Figure 34 Rotor 1 Performance for Tip Radially Distorted Inlet Flow With Casing Treatment – Performance With Uniform Inlet Flow and With Solid Casings Shown for Comparison

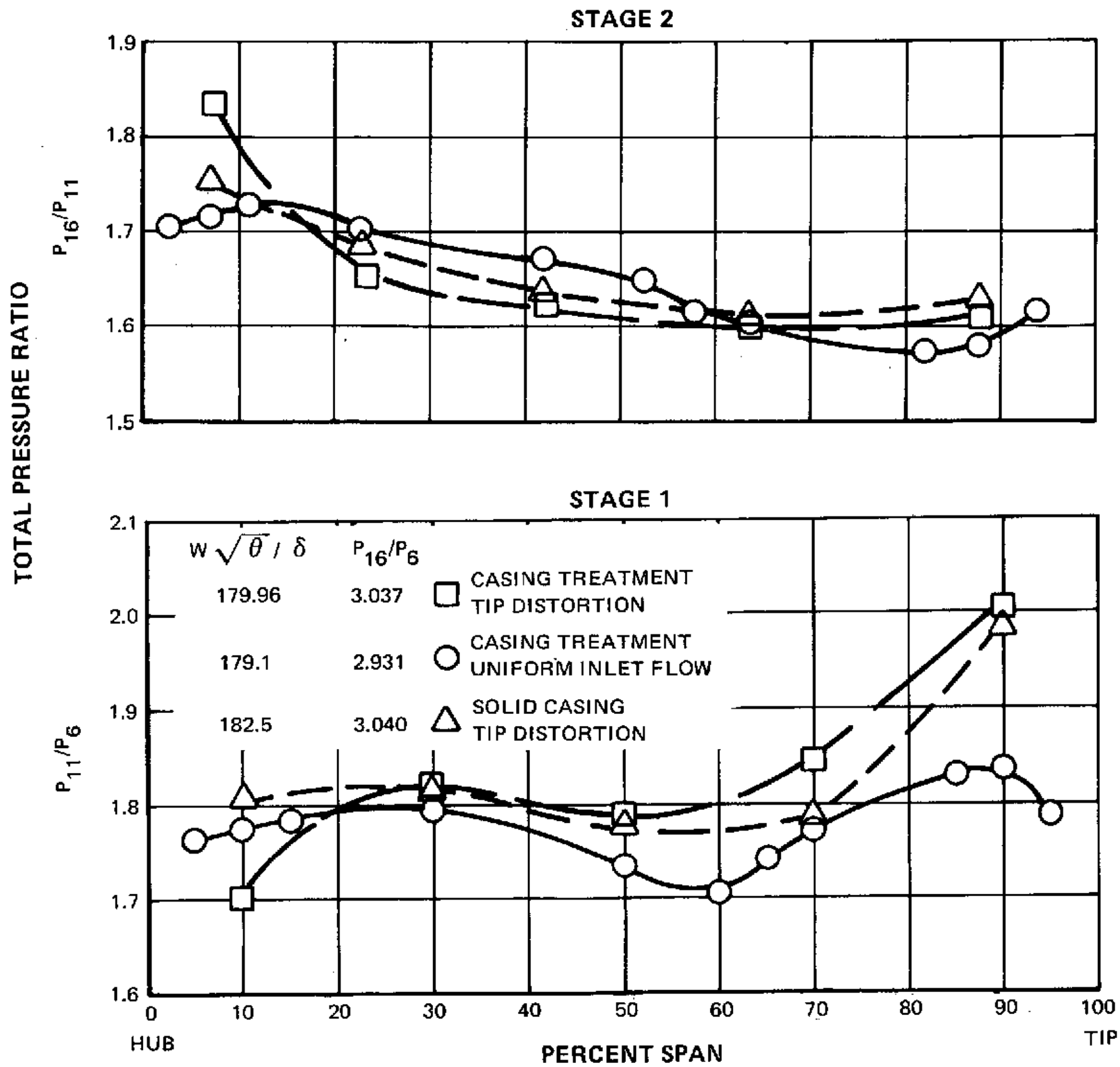


Figure 35 Radial Distribution of Total Pressure Ratio for Near-Stall Conditions for Tip Radially Distorted and Uniform Inlet Flow at Design Speed With Casing Treatment – Data With Solid Casings and Tip Radially Distorted Flow Shown for Comparison

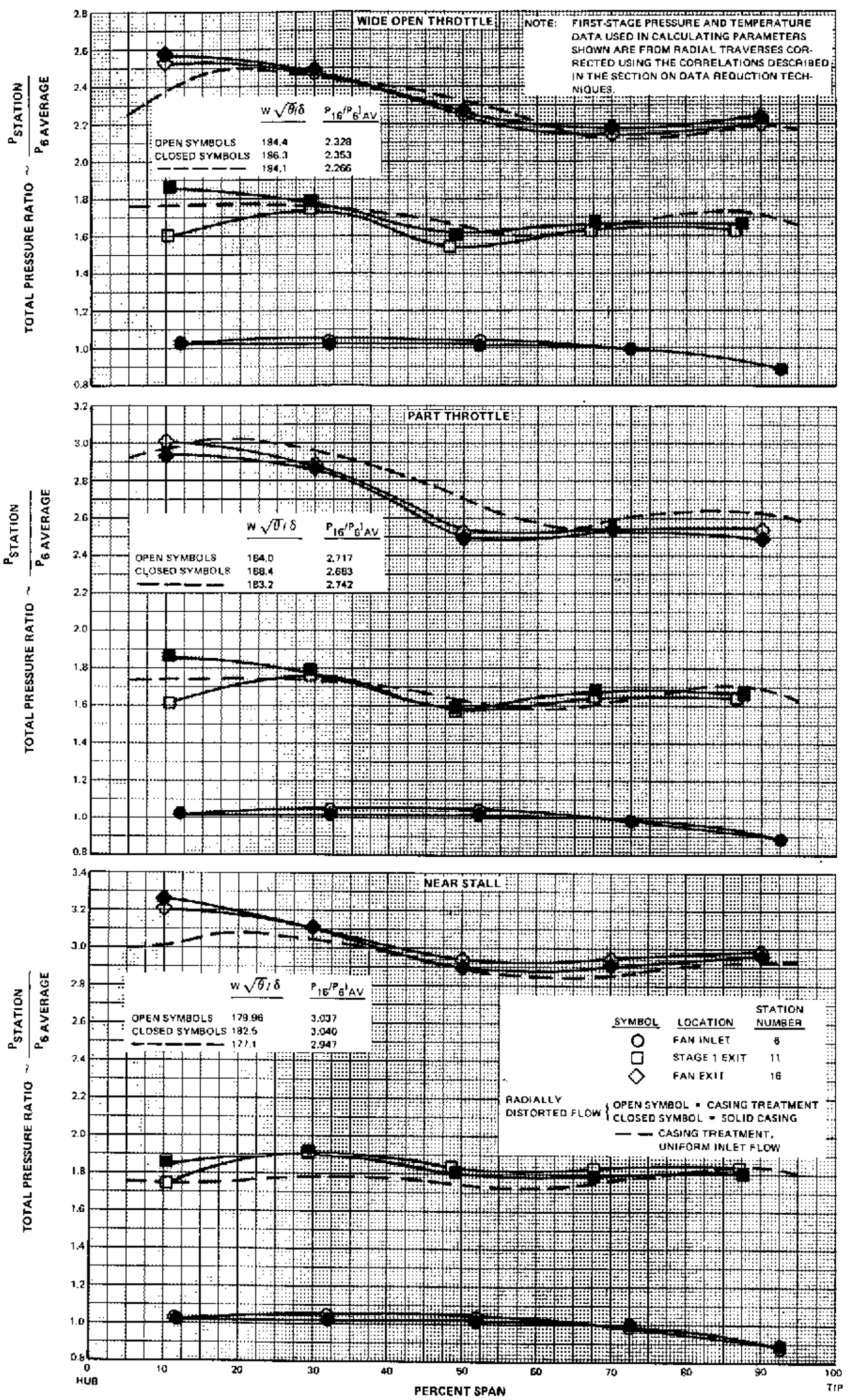


Figure 36 Total Pressure Ratio Versus Span at Fan Inlet, First-Stage Exit, and Fan Exit for Tip Radially Distorted and Uniform Inlet Flow at Design Speed With Casing Treatment – Data With Solid Casing and Tip Radially Distorted Flow Shown for Comparison

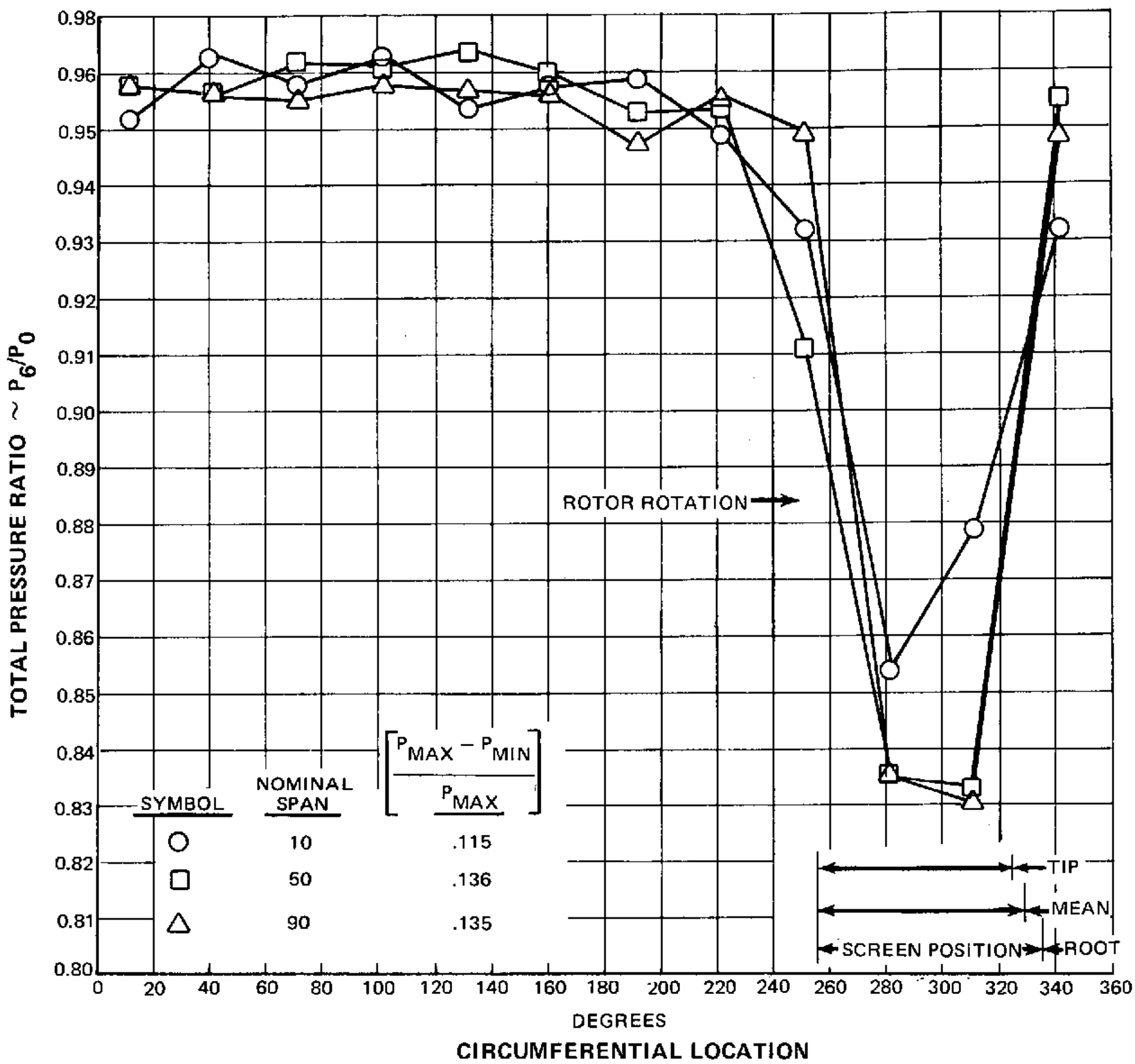


Figure 37 Circumferential Distribution of Total Pressure at Fan Inlet for Circumferentially Distorted Inlet Flow at a Near-Design Data Point With Casing Treatment

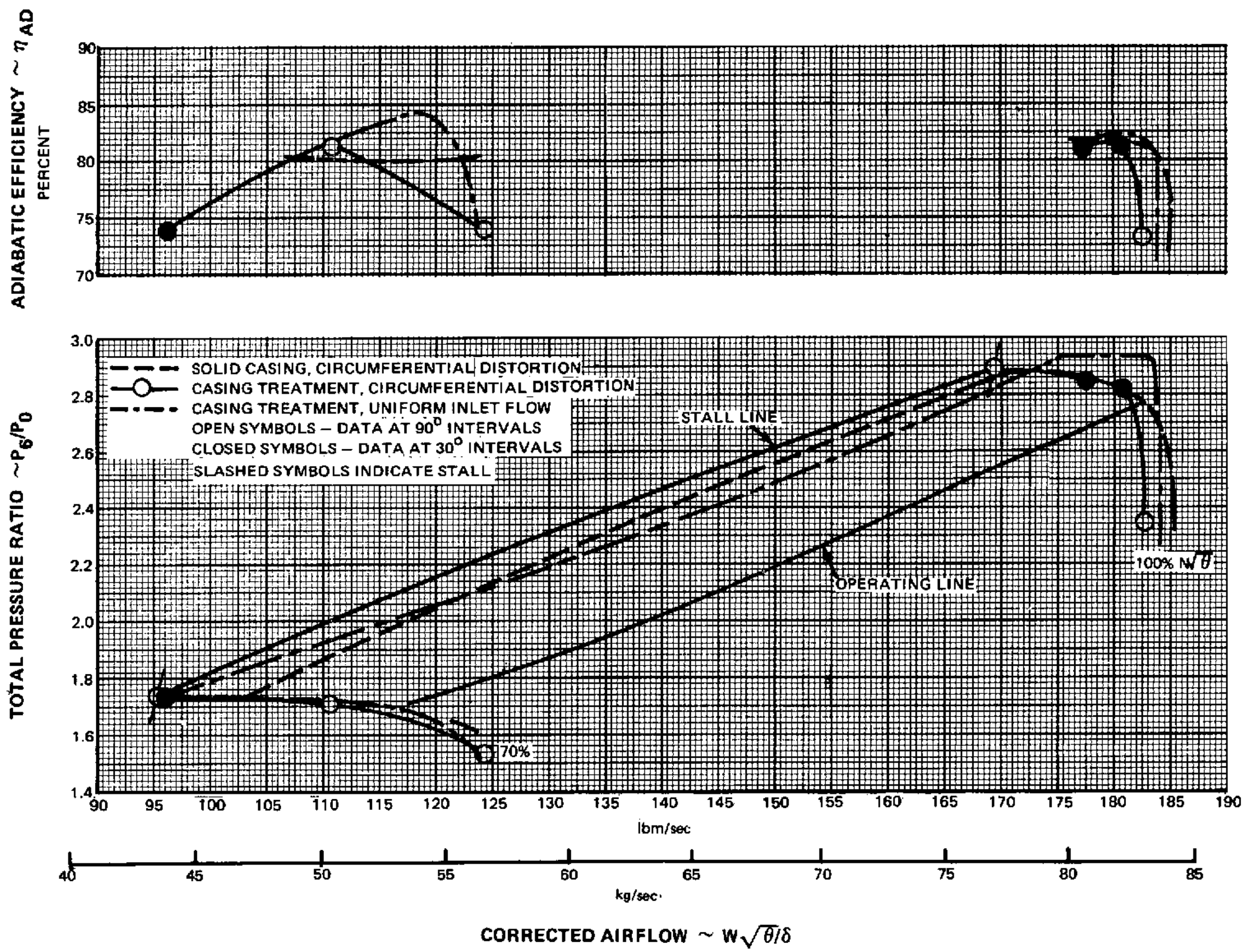


Figure 38 Fan Overall Performance for Circumferentially Distorted Inlet Flow With Casing Treatment – Performance with Uniform Inlet Flow and With Solid Casings Shown for Comparison

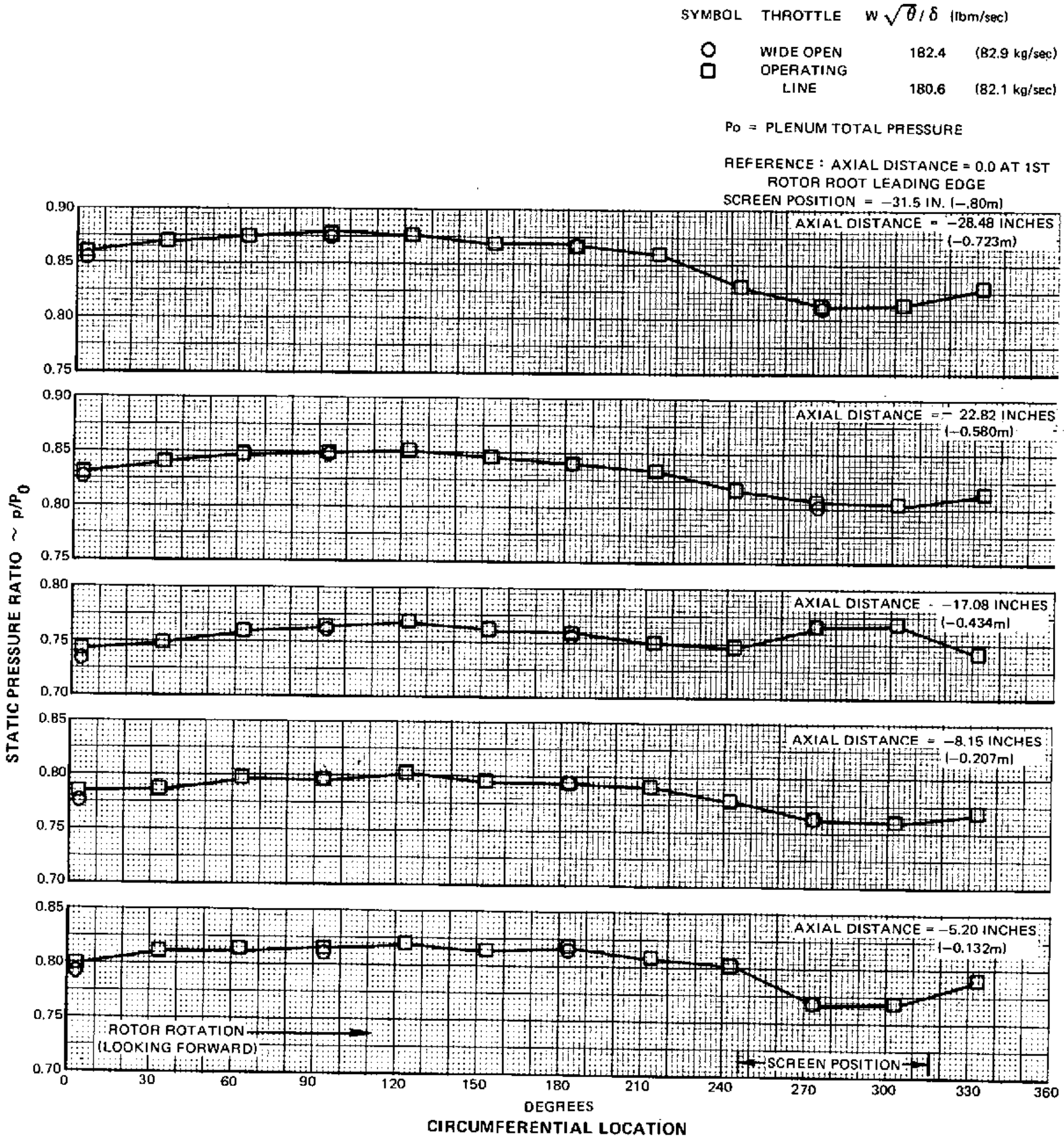


Figure 39 Circumferential Distributions of Rotor 1 Inlet Static Pressure at the Tip for Tests at Design Speed for Circumferentially Distorted Inlet Flow With Casing Treatment

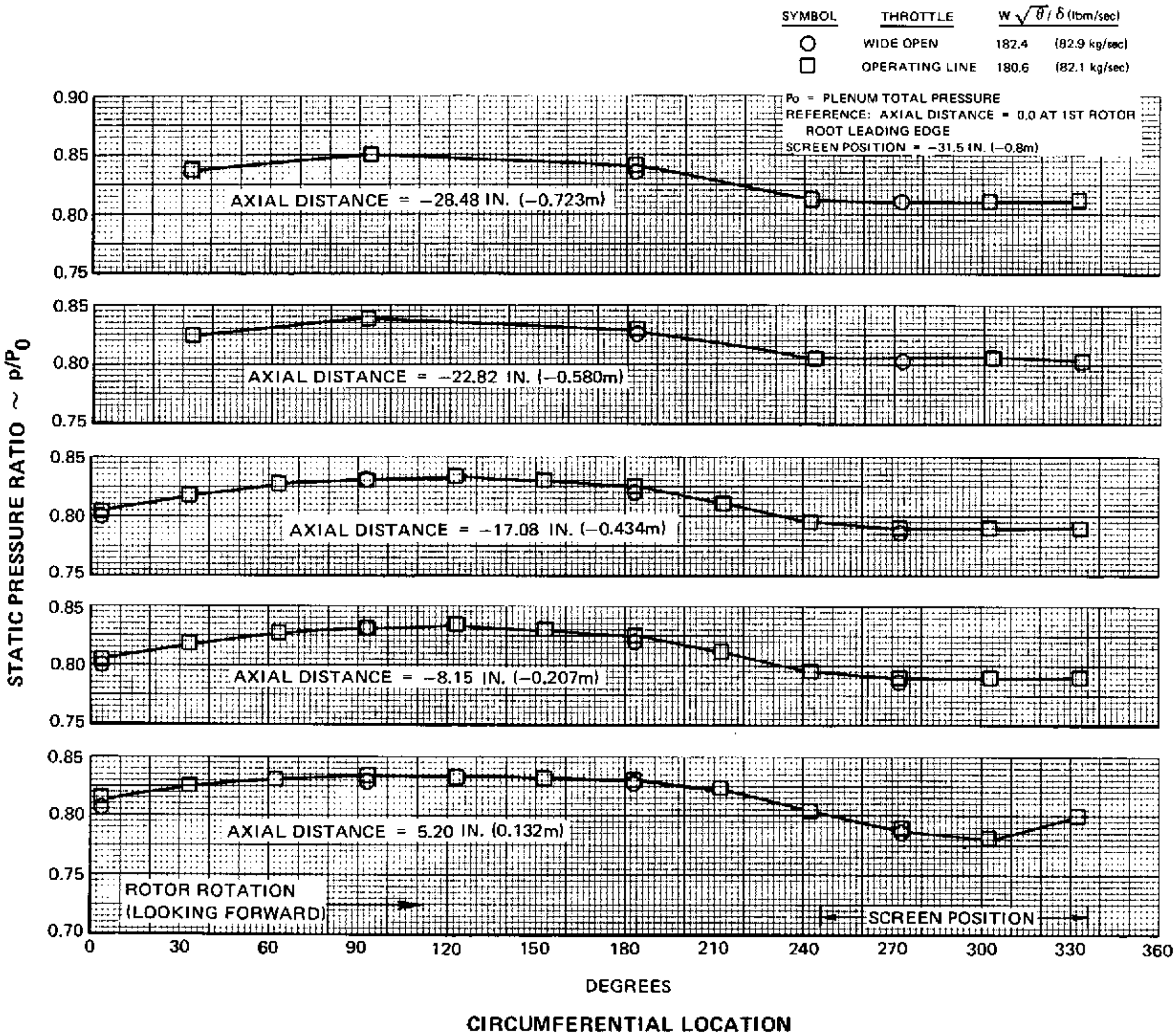


Figure 40 Circumferential Distributions of Rotor 1 Inlet Static Pressure at the Root for Tests at Design Speed for Circumferentially Distorted Inlet Flow With Casing Treatment

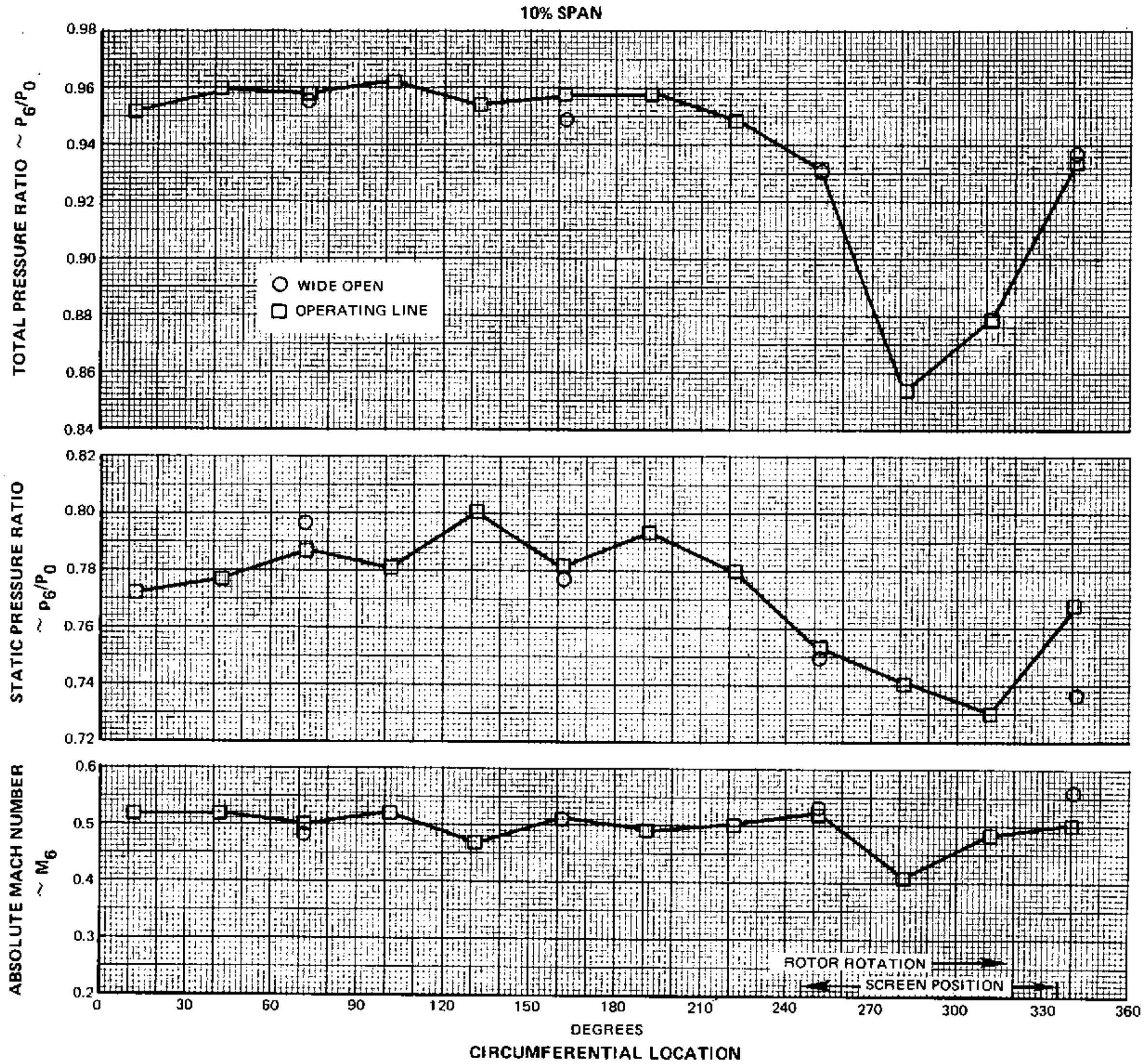


Figure 41 Circumferential Distributions of Fan Inlet Total Pressure, Static Pressure, Absolute Mach Number, Relative Flow Angle, Absolute Flow Angle, and Meridional Velocity for Circumferentially Distorted Inlet Flow at Design Speed With Casing Treatment

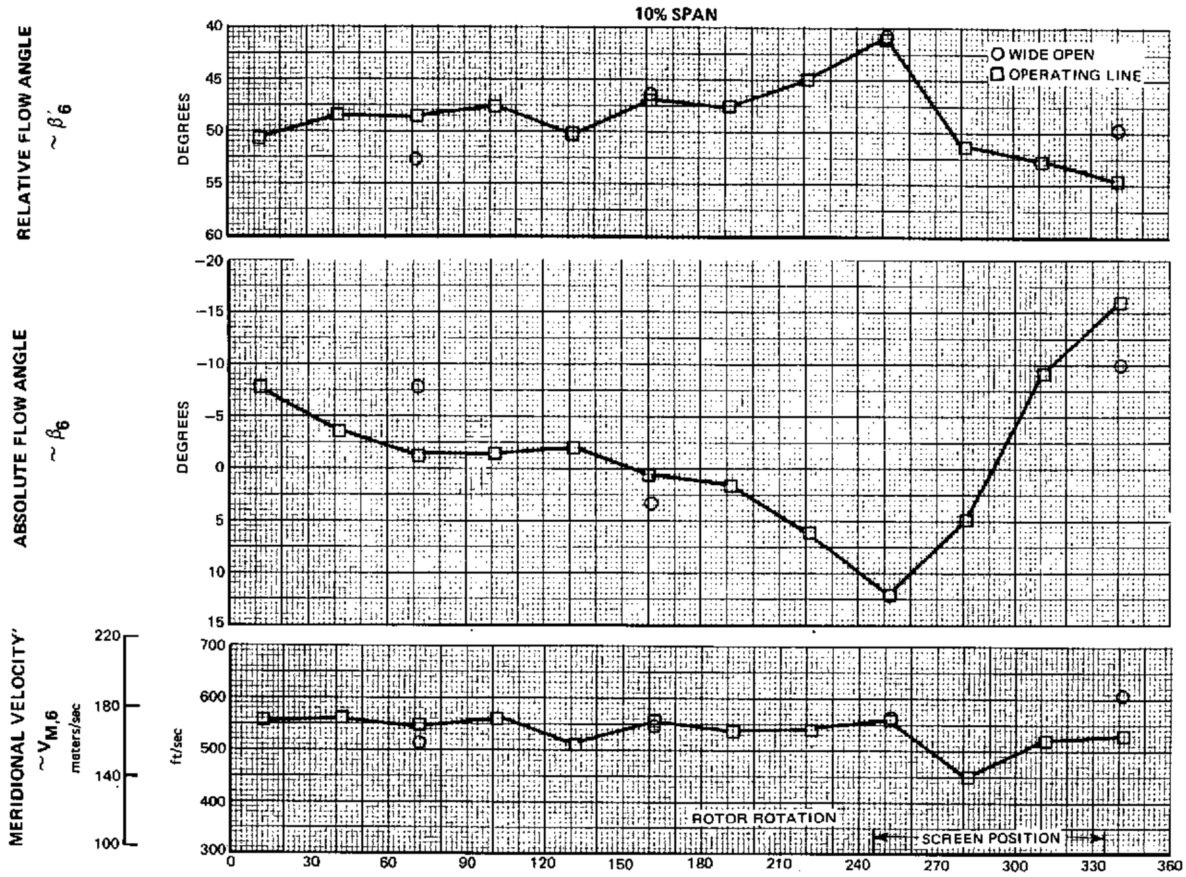


Figure 41 (Cont'd) Circumferential Distributions of Fan Inlet Total Pressure, Static Pressure, Absolute Mach Number, Relative Flow Angle, Absolute Flow Angle, and Meridional Velocity for Circumferentially Distorted Inlet Flow at Design Speed With Casing Treatment

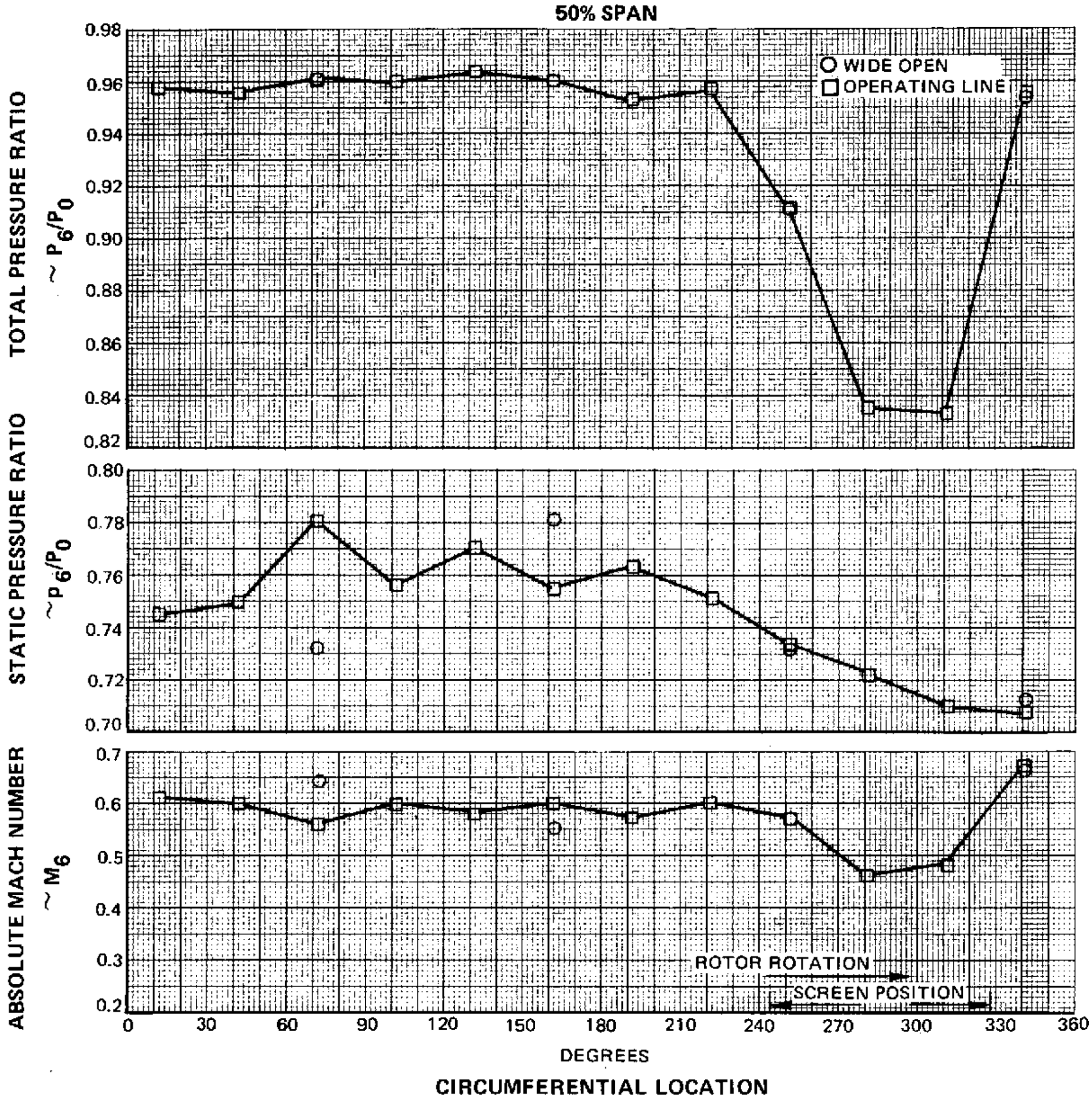


Figure 41 (Cont'd) Circumferential Distributions of Fan Inlet Total Pressure, Static Pressure, Absolute Mach Number, Relative Flow Angle, Absolute Flow Angle, and Meridional Velocity for Circumferentially Distorted Inlet Flow at Design Speed With Casing Treatment

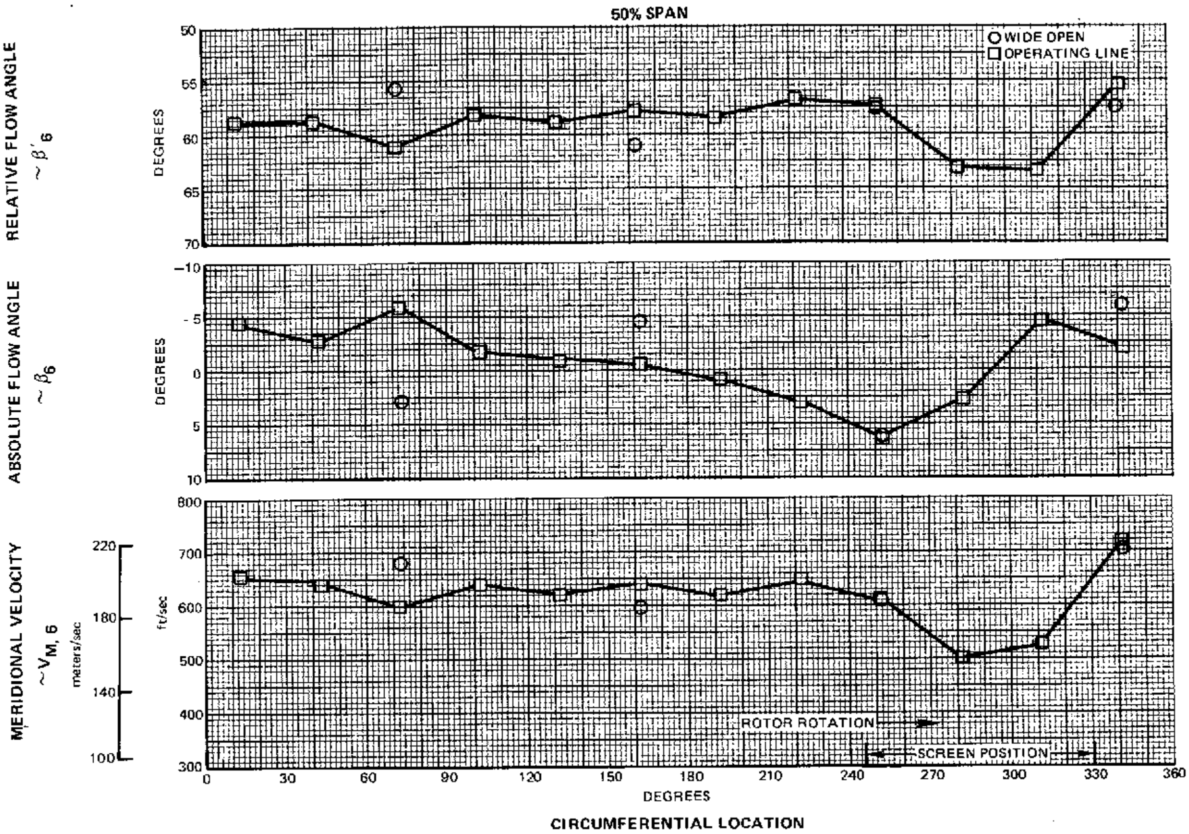


Figure 41 (Cont'd) Circumferential Distributions of Fan Inlet Total Pressure, Static Pressure, Absolute Mach Number, Relative Flow Angle, Absolute Flow Angle, and Meridional Velocity for Circumferentially Distorted Inlet Flow at Design Speed With Casing Treatment

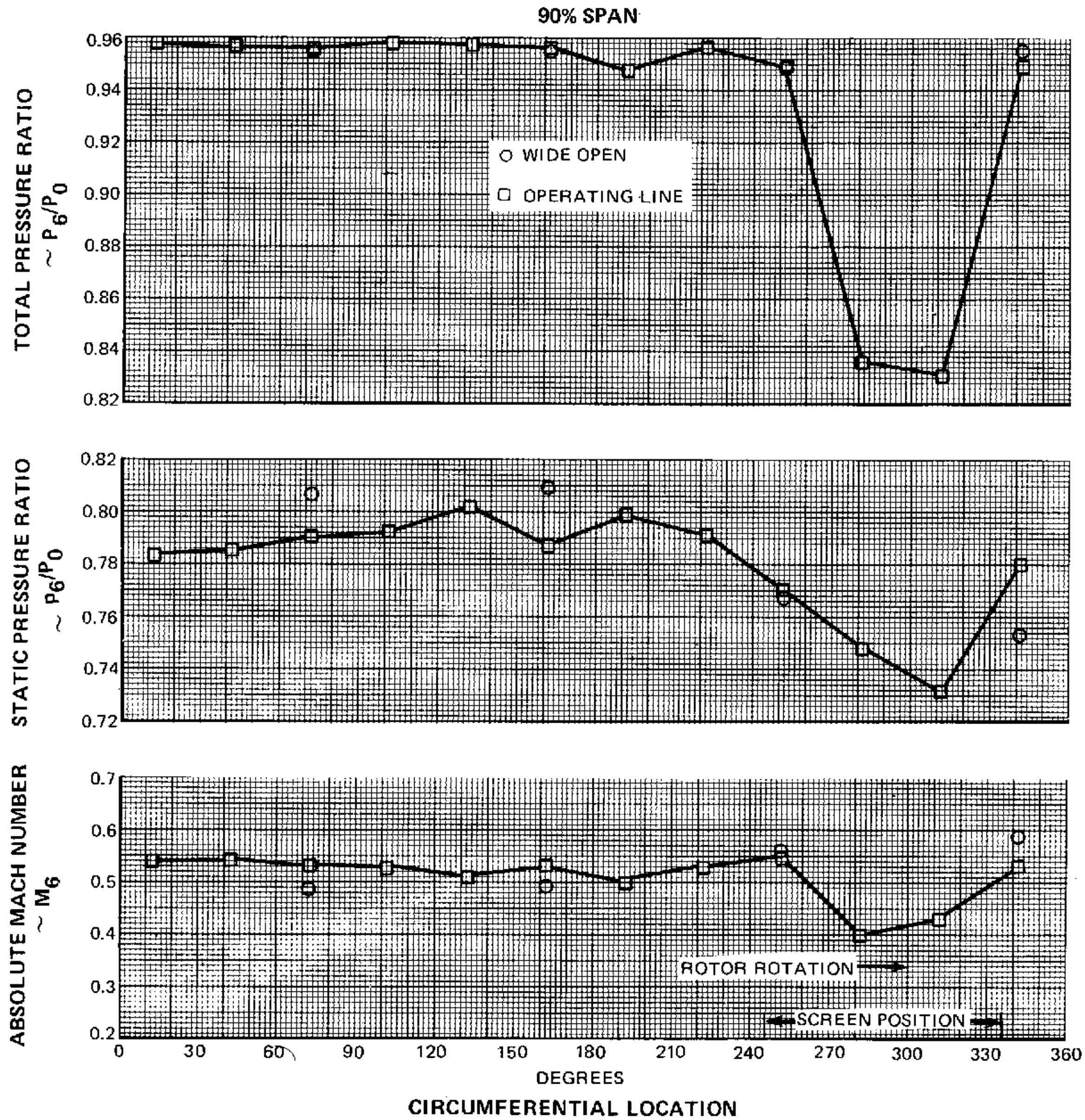


Figure 41 (Cont'd) Circumferential Distributions of Fan Inlet Total Pressure, Static Pressure, Absolute Mach Number, Relative Flow Angle, Absolute Flow Angle, and Meridional Velocity for Circumferentially Distorted Inlet Flow at Design Speed With Casing Treatment

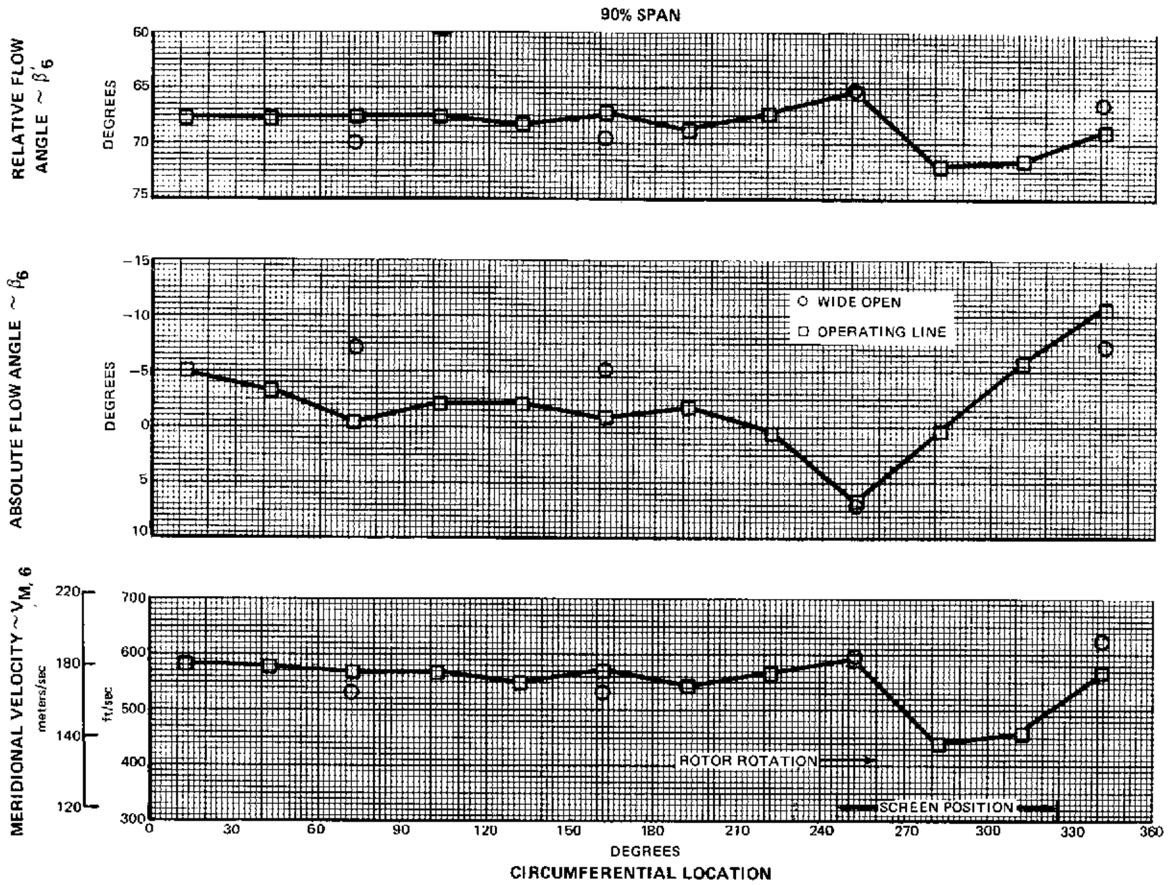


Figure 41 (Cont'd) Circumferential Distributions of Fan Inlet Total Pressure, Static Pressure, Absolute Mach Number, Relative Flow Angle, Absolute Flow Angle, and Meridional Velocity for Circumferentially Distorted Inlet Flow at Design Speed With Casing Treatment

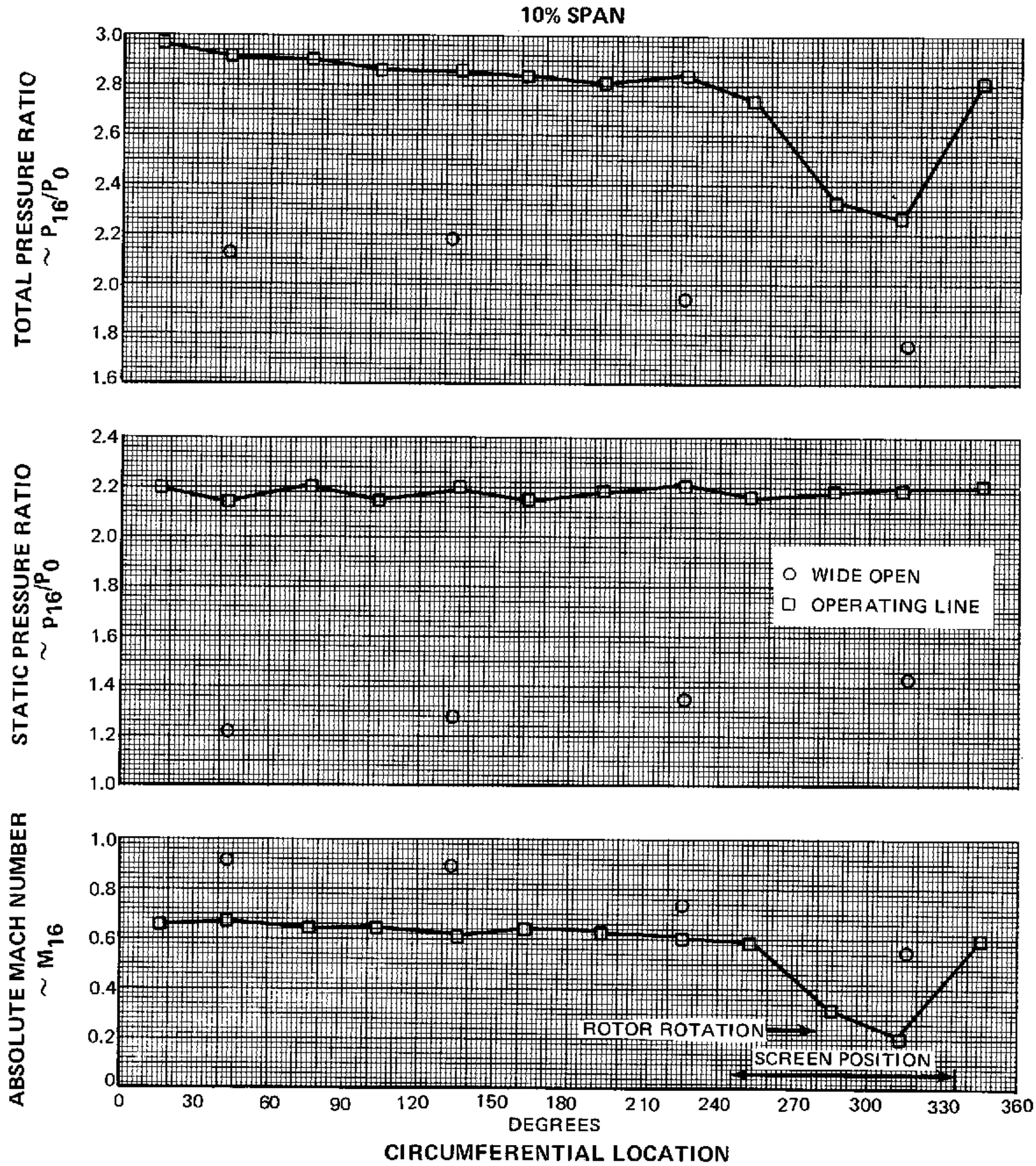


Figure 42 Circumferential Distributions of Fan Exit Total Pressure, Static Pressure, Absolute Mach Number, Relative Flow Angle, Absolute Flow Angle, and Meridional Velocity for Circumferentially Distorted Inlet Flow at Design Speed With Casing Treatment

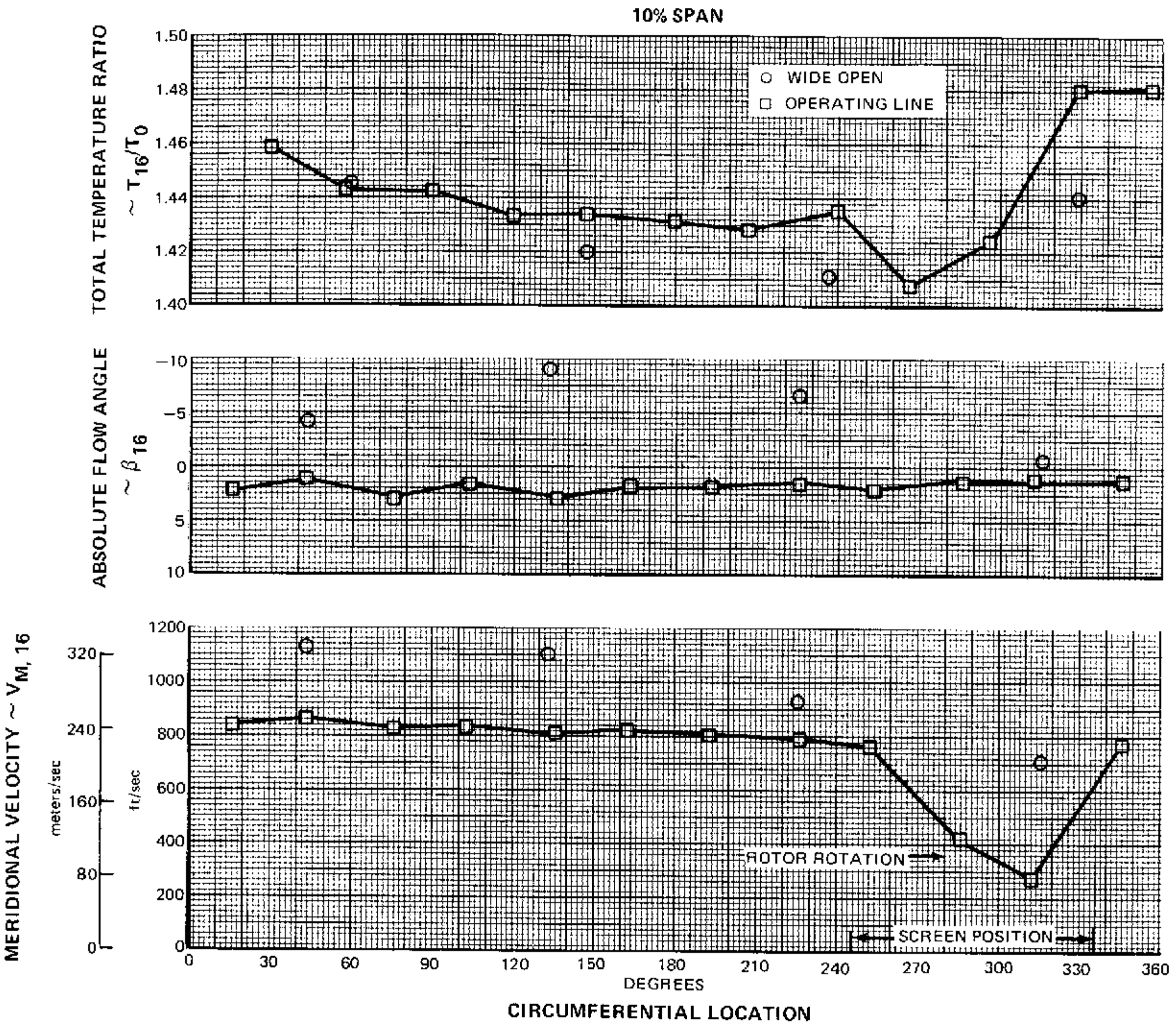


Figure 42 (Cont'd) Circumferential Distributions of Fan Exit Total Pressure, Static Pressure, Absolute Mach Number, Relative Flow Angle, Absolute Flow Angle, and Meridional Velocity for Circumferentially Distorted Inlet Flow at Design Speed With Casing Treatment

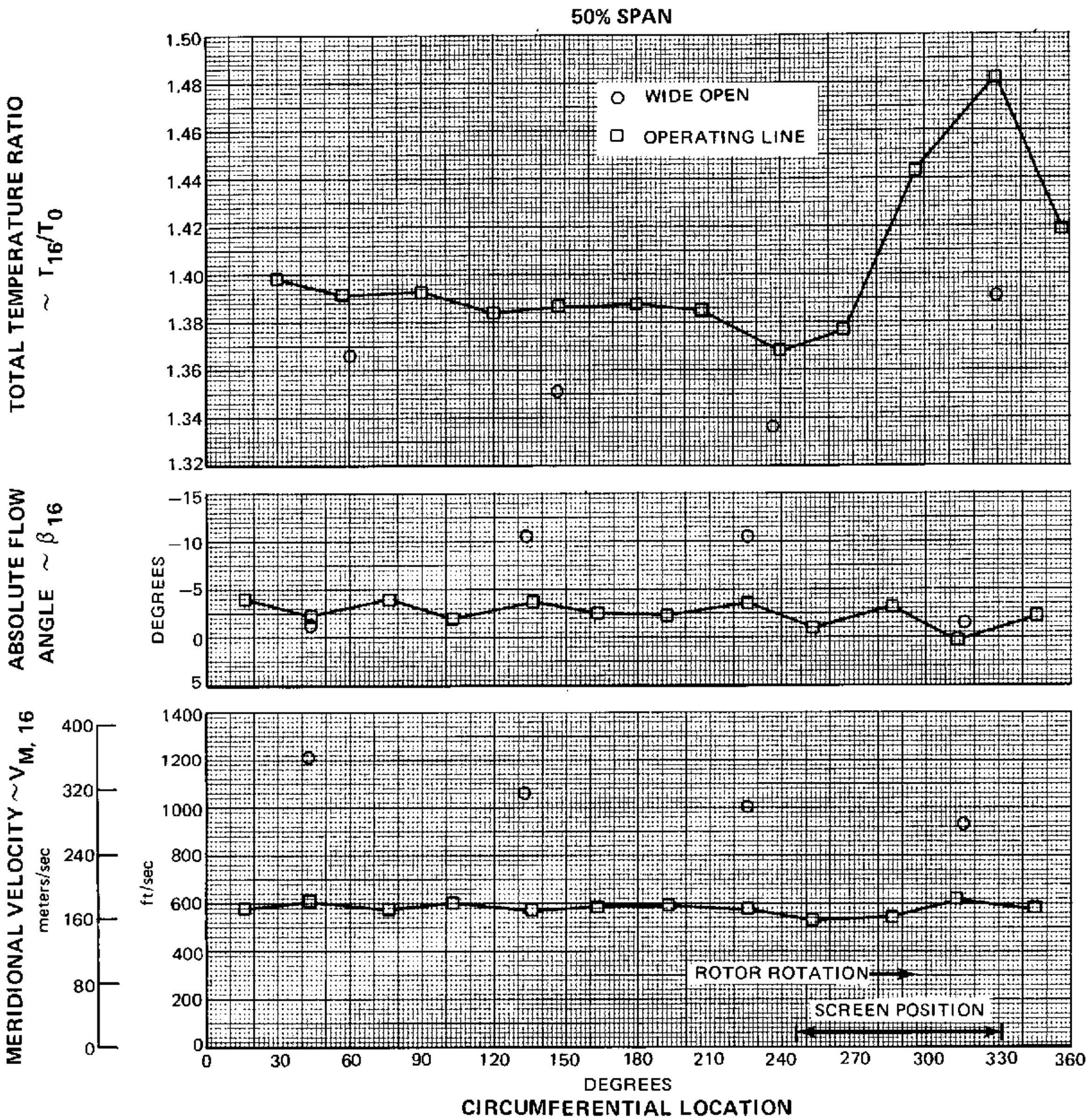


Figure 42 (Cont'd) Circumferential Distributions of Fan Exit Total Pressure, Static Pressure, Absolute Mach Number, Relative Flow Angle, Absolute Flow Angle, and Meridional Velocity for Circumferentially Distorted Inlet Flow At Design Speed With Casing Treatment

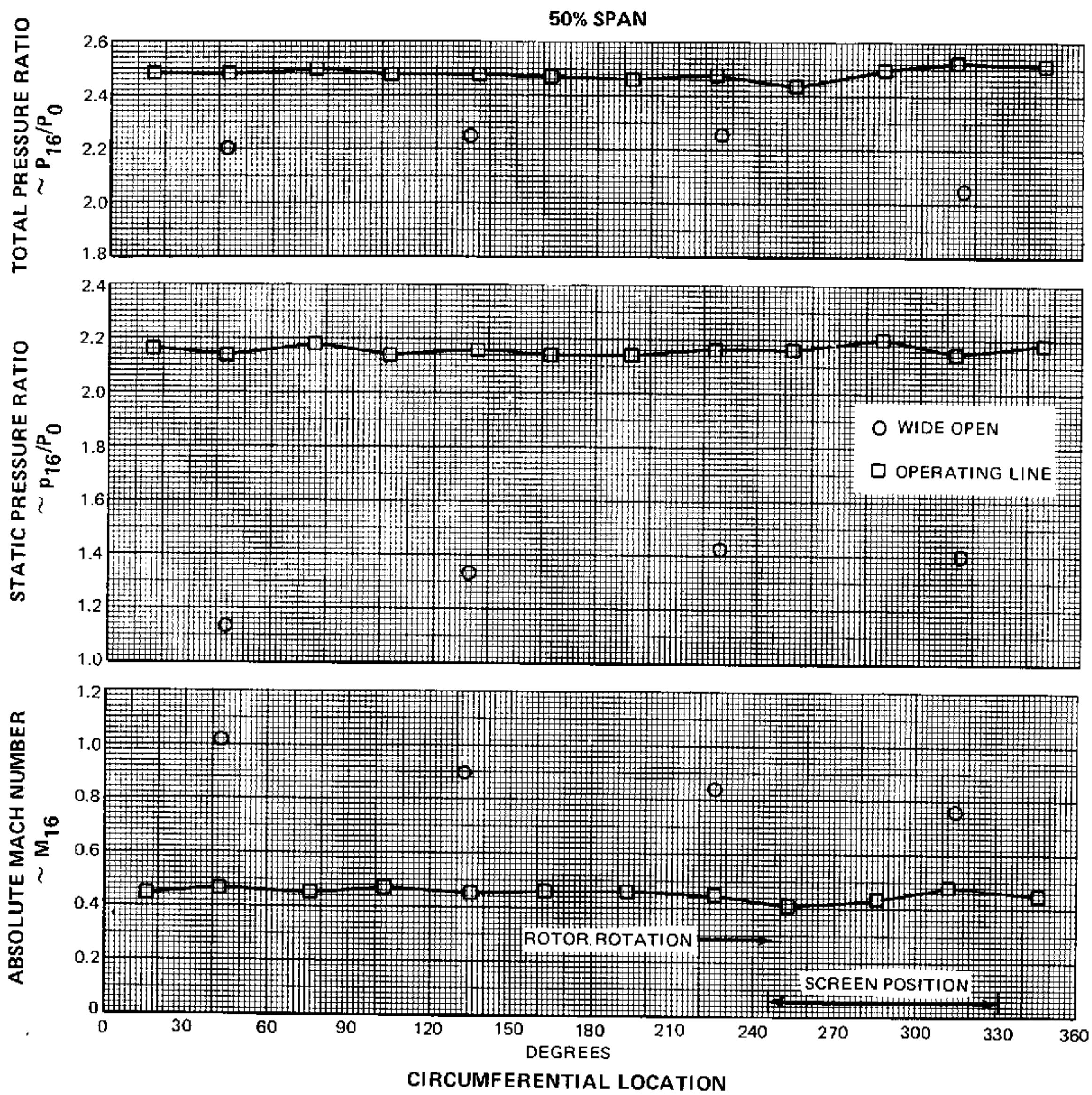


Figure 42 (Cont'd) Circumferential Distributions of Fan Exit Total Pressure, Static Pressure, Absolute Mach Number, Relative Flow Angle, Absolute Flow Angle, and Meridional Velocity for Circumferentially Distorted Inlet Flow at Design Speed With Casing Treatment

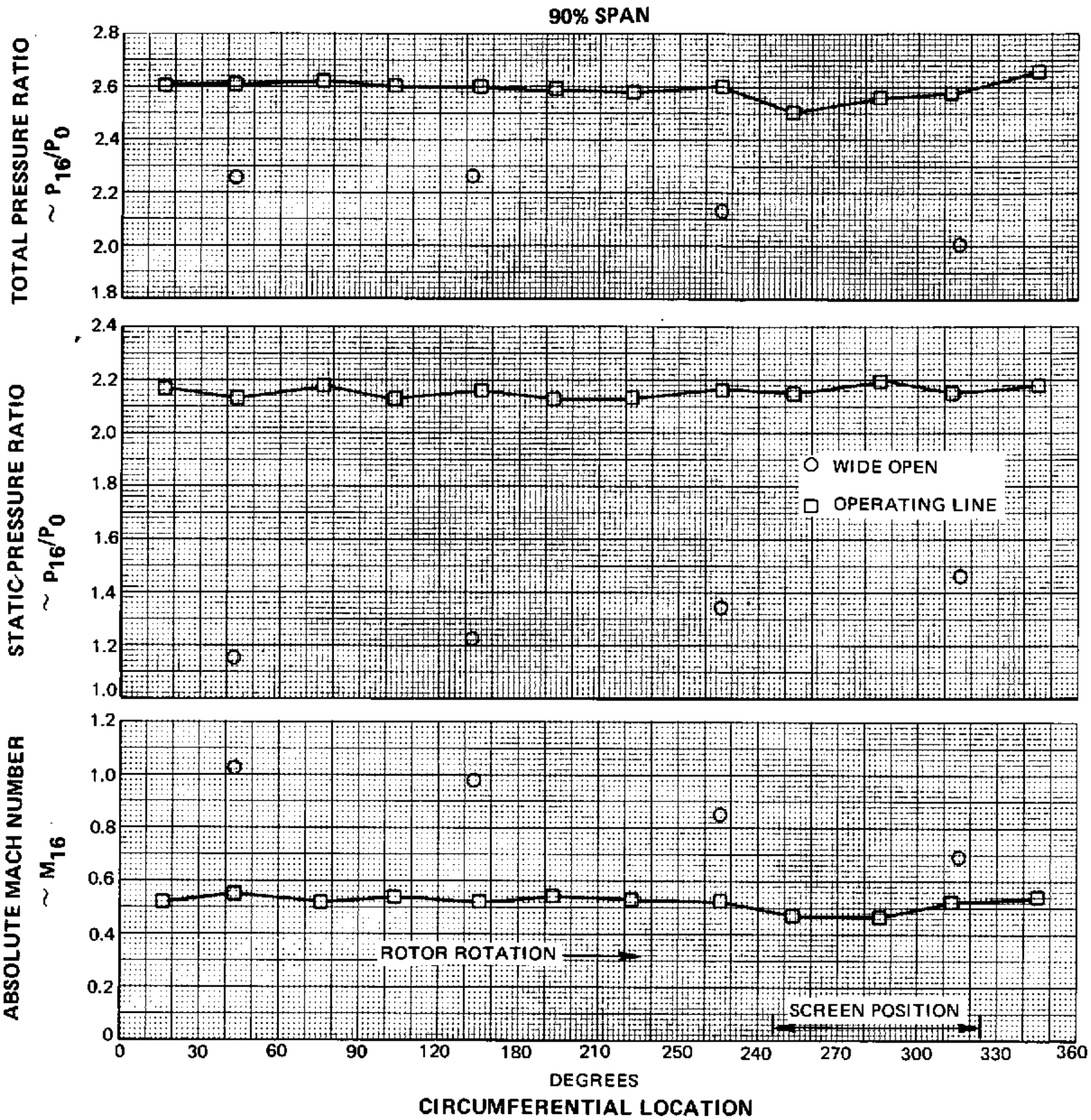


Figure 42 (Cont'd) Circumferential Distributions of Fan Exit Total Pressure, Static Pressure, Absolute Mach Number, Relative Flow Angle, Absolute Flow Angle, and Meridional Velocity for Circumferentially Distorted Inlet Flow at Design Speed With Casing Treatment

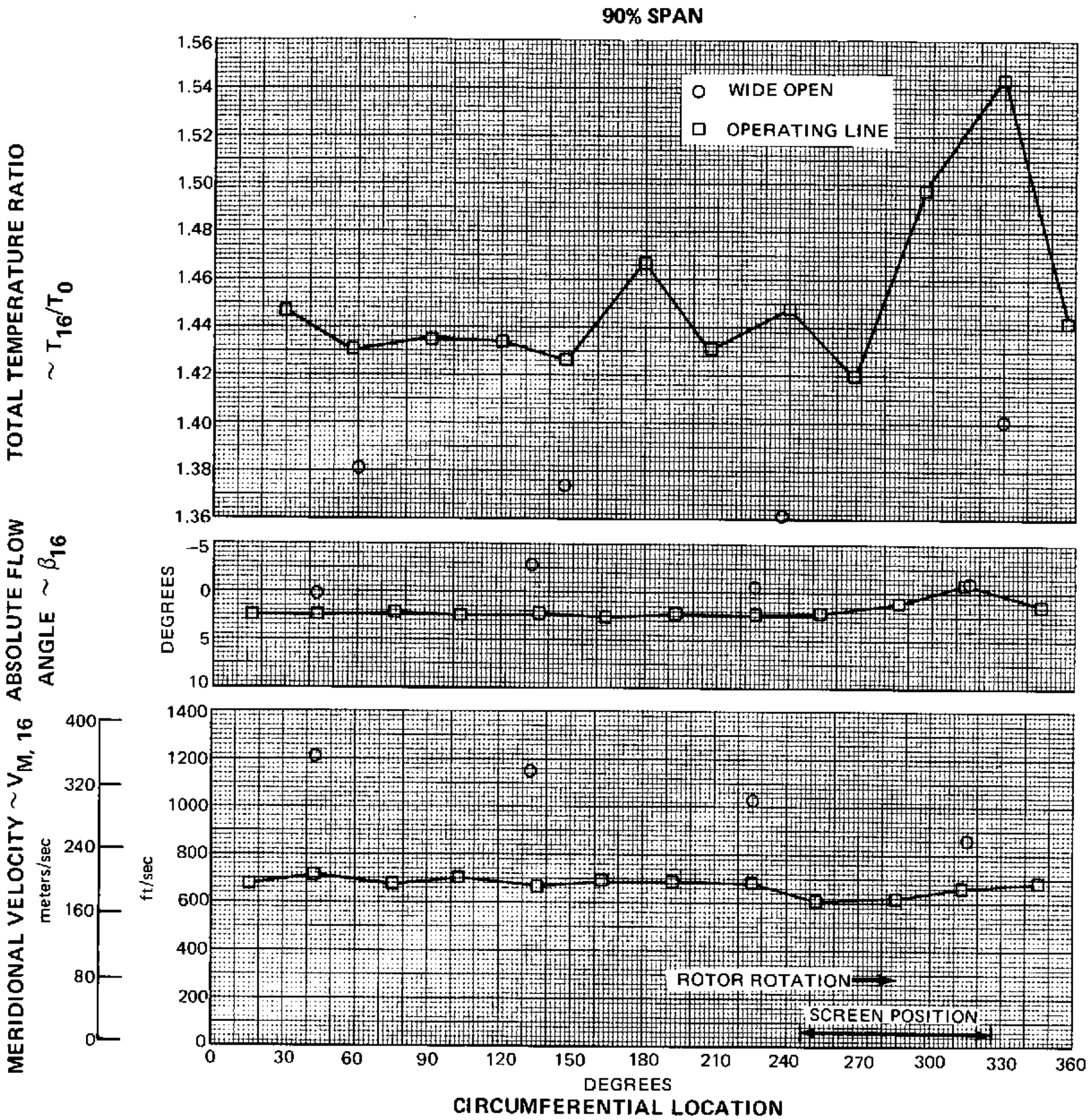


Figure 42 (Cont'd) Circumferential Distributions of Fan Exit Total Pressure, Static Pressure, Absolute Mach Number, Relative Flow Angle, Absolute Flow Angle, and Meridional Velocity for Circumferentially Distorted Inlet Flow at Design Speed With Casing Treatment

APPENDIX A

SYMBOLS AND PERFORMANCE PARAMETERS

SYMBOLS

A	–	area, inches^2 [meters^2]
C_p	–	ratio of specific heats, Btu/lbm-°R [joule/kg-°k]
D	–	diffusion factor
g_c	–	conversion factor, 32.17 lbm-ft/lbf-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 XIII)
i_{ss}	–	incidence angle, angle between inlet air direction and line tangent to blade suction surface at leading edge, degrees (labelled INCS, Table XIII)
J	–	conversion factor, 778 ft-lbf/Btu [1.00m-kg/joule]
N	–	rotor speed, rpm
P	–	total pressure, lbf/ft^2 or n/m^2
p	–	static pressure, lbf/ft^2 or n/m^2
R	–	gas constant for air
r	–	radius measured from rig centerline - inches [meters]
SL	–	streamline number
T	–	total temperature, °R [°K]
t	–	static temperature, °R [°K]
	–	blade maximum thickness, inches [meters]
U	–	rotor speed, ft/sec [meters/sec]
V	–	air velocity, ft/sec [meters/sec]

V_m	–	meridional velocity $(Vr^2 + Vz^2)^{1/2}$, ft/sec [m/sec] labelled VM, Table XIII)
V_θ	–	longitudinal velocity, ft/sec [m/sec]
W	–	mass flow rate, lbm/sec [kg/sec]
z	–	axial distance - inches [meters]
β	–	absolute air angle, $\cot^{-1}$ $(Vm/V\theta)$, degrees (labelled B, Table XIII)
β'	–	relative air angle, $\cot^{-1}$ $(Vm/V\theta')$, degrees (labelled B', Table XIII)
$\Delta\beta$	–	air turning angle, degrees
γ	–	ratio of specific heats for air
δ	–	ratio of total pressure to standard pressure of 2116 lbf/ft^2 [1.0125×10^5 N/M^2]
$\delta°$	–	deviation angle, exit air angle minus tangent to blade mean camber line at trailing edge - degrees (labelled DEV, Table XIII)
ϵ	–	angle between tangent to streamline projected on meridional plane and axial direction - degrees (labelled EPSI, Table XIII)
η	–	efficiency
θ	–	ratio of total temperature to standard temperature of 518.7°R [288.16°K]
ρ	–	mass density - lbm/ft^3 [$kg/meters^3$]
σ	–	solidity, ratio of aerodynamic chord to gap between blades
ϕ	–	flow coefficient
ψ	–	pressure coefficient
ω	–	angular velocity of rotor, radians/sec
$\bar{\omega}$	–	total press loss coefficient

Superscripts

'	–	relative to rotor
*	–	blade metal angle

Subscripts

ad	–	adiabatic
des.	–	design
in	–	inlet
m	–	meridional direction
n	–	selected operating point
p	–	polytropic or profile
r	–	radial direction
	–	ratio (e.g. P_r = total pressure ratio)
ss	–	suction surface
z	–	axial component
θ	–	tangential component
o	–	plenum camber
6	–	instrument plane upstream of rotor 1
7	–	station at rotor 1 leading edge
8	–	station at rotor 1 trailing edge
9	–	station at stator 1 leading edge
10	–	station at stator 1 trailing edge
11	–	instrument plane downstream stator 1

12	–	station at rotor 2 leading edge
13	–	station at rotor 2 trailing edge
14	–	station at stator 2 leading edge
15	–	station at stator 2 trailing edge
16	–	instrument plane downstream stator 2

PERFORMANCE PARAMETERS

a) Relative total temperature

$$T'_7 = t_7 + \left[1 + \frac{\gamma - 1}{2} (M'_7)^2\right] \quad \text{(rotor 1) IN}$$

$$T'_8 = T'_7 + \left[\frac{(\omega r_8)^2 - (\omega r_7)^2}{\frac{2\gamma}{\gamma - 1} R g_c}\right] \quad \text{(rotor 1) OUT}$$

b) Incidence angle based on mean camber line

$i_m = \beta'_7 - \beta'^*_7$ (rotor 1)

$i_m = \beta_9 - \beta^*_9$ (stator 1)

Incidence angle based on suction surface metal angle

$i_{ss} = \beta'_7 - \beta^*_{ss7}$ (rotor 1)

$i_{ss} = \beta_9 - \beta^*_{ss9}$ (stator 1)

c) Deviation angle

$\delta° = \beta'_8 - \beta'^*_8$ (rotor 1)

$\delta° = \beta_{10} - \beta^*_{10}$ (stator 1)

d) Diffusion factor

$$D = 1 - \frac{V'_8}{V'_7} + \frac{r_8 V_{\theta 8} - r_7 V_{\theta 7}}{(r_8 + r_7)\,\sigma\, V'_7} \qquad \text{(rotor 1)}$$

$$D = 1 - \frac{V_{10}}{V_9} + \frac{r_9 V_{\theta 9} - r_{10} V_{\theta 10}}{(r_9 + r_{10})\,\sigma\, V_9} \qquad \text{(stator 1)}$$

e) Loss coefficient

$$\bar{\omega} = \frac{P'_7 \left[\frac{T'_8}{T'_7}\right]^{\frac{\gamma}{\gamma - 1}} - P'_8}{P'_7 - p_7} \qquad \text{(rotor 1)}$$

$$\bar{\omega} = \frac{P_9 - P_{10}}{P_9 - p_9} \qquad \text{(stator 1)}$$

f) Loss parameter

$$\frac{\bar{\omega} \cos \beta'_8}{2\sigma} \qquad \text{(rotor 1)}$$

$$\frac{\bar{\omega} \cos \beta_{10}}{2\sigma} \qquad \text{(stator 1)}$$

g) Polytropic efficiency

$$\eta_p = \frac{\frac{\gamma - 1}{\gamma} \ln \left[\frac{P_8}{P_7}\right]}{\ln \left[\frac{T_8}{T_0}\right]} \qquad \text{(rotor 1)}$$

h) Adiabatic efficiency

$$\eta_{ad} = \frac{\left[\dfrac{P_8}{P_7}\right]^{\frac{\gamma - 1}{\gamma}} - 1}{\left[\dfrac{T_{10}}{T_0}\right] - 1} \qquad \text{(rotor 1)}$$

$$\eta_{ad} = \frac{\left[\dfrac{P_{10}}{P_6}\right]^{\frac{\gamma - 1}{\gamma}} - 1}{\left[\dfrac{T_{10}}{T_0}\right] - 1} \qquad \text{(stage 1)}$$

i) Stall margin

$$SM = \left[\left(\frac{P_{16}/P_6}{W\sqrt{\theta_6}/\delta_6} \right)_{\text{Stall}} \left(\frac{W\sqrt{\theta_6}/\delta_6}{P_{16}/P_6} \right)_{\substack{\text{Reference} \\ \text{Point or} \\ \text{Operating Point}}} - 1 \right] 100$$

j) Flow coefficient $\phi = \dfrac{V_z}{U_{\text{mean flow}}}$

k) Pressure coefficient $\psi = \dfrac{\Delta Hid}{Um^2}$

$$= \frac{\eta_{ad} \, \Delta T_{\text{actual}} \, c_p \, J \, g_c}{U^2_{\text{mean flow}}}$$

l) Total Pressure Recovery $= \dfrac{P_{16}/P_6}{(T_{16}/T_6)^{\frac{\gamma}{\gamma - 11}}}$

APPENDIX B

BLADE SPANS AND DIAMETERS AND COLUMN HEADING IDENTIFICATIONS

This appendix provides the spans and diameters (Table XII) for the blade elements and column heading identifications (Table XIII) for the computer printouts presented in Appendixes C and D.

TABLE XII – SPANS AND DIAMETERS FOR THE BLADE-ELEMENT DATA

SL	Rotor 1 Inlet Diameter (inches)	Rotor 1 Inlet Span (%)	Rotor 1 Exit Diameter (inches)	Rotor 1 Exit Span (%)	Stator 1 Inlet Diameter (inches)	Stator 1 Inlet Span (%)	Stator 1 Exit Diameter (inches)	Stator 1 Exit Span (%)
1	13.47	5.8	15.59	5.0	15.93	4.9	17.38	4.3
2	14.52	11.4	16.35	10.0	16.64	9.9	17.93	8.9
3	15.56	17.0	17.10	15.0	17.36	14.8	18.49	13.6
4	18.52	32.9	19.37	30.0	19.53	29.8	20.26	28.1
5	22.22	52.8	22.38	50.0	22.42	49.8	22.69	48.2
6	24.00	62.4	23.89	60.0	23.87	59.9	23.93	58.4
7	24.88	67.1	24.65	65.0	24.60	64.9	24.55	63.6
8	25.76	71.8	25.40	70.0	25.33	69.9	25.18	68.8
9	28.38	85.9	27.67	85.0	27.50	85.0	27.07	84.4
10	29.26	90.6	28.42	90.0	28.23	90.0	27.70	89.6
11	30.13	95.3	29.18	95.0	28.95	95.0	28.34	94.8

SL	Rotor 2 Inlet Diameter (inches)	Rotor 2 Inlet Span (%)	Rotor 2 Exit Diameter (inches)	Rotor 2 Exit Span (%)	Stator 2 Inlet Diameter (inches)	Stator 2 Inlet Span (%)	Stator 2 Exit Diameter (inches)	Stator 2 Exit Span (%)
1	17.87	4.3	18.74	3.8	18.93	3.8	19.18	3.2
2	18.38	8.8	19.14	7.8	19.30	7.8	19.49	6.8
3	18.90	13.5	19.54	12.0	19.69	11.9	19.82	10.6
4	20.51	28.0	20.84	25.3	20.94	25.3	20.91	23.2
5	22.74	48.0	22.73	44.6	22.75	44.8	22.58	42.2
6	23.88	58.1	23.73	54.9	23.72	55.1	23.49	52.8
7	24.45	63.3	24.25	60.2	24.22	60.5	23.97	58.2
8	25.03	68.4	24.78	65.6	24.72	65.9	24.46	63.9
9	26.78	84.2	26.42	82.4	26.29	82.7	26.00	81.7
10	27.37	89.4	26.98	88.1	26.82	88.4	26.53	87.8
11	27.96	94.7	27.55	94.0	27.36	94.2	27.07	93.9

TABLE XIII – IDENTIFICATION OF OVERALL PERFORMANCE AND BLADE-ELEMENT DATA TABLE COLUMN HEADINGS

ROTOR 1

SL	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'-I	V'-1 FT/SEC	V'-2 FT/SEC
•	ϵ_7	ϵ_8	V_7	V_8	V_{m7}	V_{m8}	$V_{\theta 7}$	$V_{\theta 8}$	β_7	β_8	M_7	M_8	U_7	U_8	M'_7	M'_8	V'_7	V'_8
SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	PO/PO INLET	
•	i_{s7}	i_{m7}	δ^o_8	$\Delta\beta$	$\rho_7 V_{m7}$	$\rho_8 V_{m8}$	D	$\bar{\omega}$	$\frac{\bar{\omega}\cos\beta'_8}{2\sigma}$	$\frac{P_8}{P_7}$	η_p	η_{ad}	β'_7	β'_8	$V'_{\theta 7}$	$V'_{\theta 8}$	$\frac{P_8}{P_o}$	
				TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT		TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %					
				$\frac{T_8}{T_o}$	$\frac{P_8}{P_o}$	η_{ad}	η_p	$\frac{W\sqrt{\theta_7}}{\delta_7 A_7}$		$\frac{T_8}{T_7}$	$\frac{P_8}{P_7}$	η_{ad_8}	η_{p8}					

STATOR 1

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
•	ϵ_9	ϵ_{10}	V_9	V_{10}	V_{m9}	V_{m10}	$V_{\theta 9}$	$V_{\theta 10}$	β_9	β_{10}	M_9	M_{10}	$\frac{P_{10}}{P_o}$	$\frac{T_{10}}{T_o}$	$\frac{P_{10}}{P_7}$	$\frac{T_{10}}{T_7}$
SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1		%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG	
•	i_{s9}	i_{m9}	δ^o_{10}	$\Delta\beta$	$\rho_9 V_{m9}$	$\rho_{10} V_{m10}$	D	$\bar{\omega}$	$\frac{\bar{\omega}\cos\beta_{10}}{2\sigma}$	$\frac{P_{10}}{P_9}$		η_{ad}	η_p	$\eta_{ad\text{-}st}$	$\eta_{p\text{-}st}$	
		NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %		TO2/TO1	PO2/PO1	EFF-AD STAGE %					
		$\frac{N}{\sqrt{\theta_7}}$	$\frac{W\sqrt{\theta_7}}{\delta_7}$	$\frac{T_{10}}{T_o}$	$\frac{P_{10}}{P_o}$	η_{ad}	η_p		$\frac{T_{10}}{T_7}$	$\frac{P_{10}}{P_9}$	$\eta_{ad\text{-}st}$					

ROTOR 2

SL	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'-I	V'-1 FT/SEC	V'-2 FT/SEC
*	ϵ_{12}	ϵ_{13}	V_{12}	V_{13}	V_{m12}	V_{m13}	$V_{\theta 12}$	$V_{\theta 13}$	β_{12}	β_{13}	M_{12}	M_{13}	U_{12}	U_{13}	M'_{12}	M'_{13}	V'_{12}	V'_{13}
SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	PO/PO INLET	
*	$i_{s_{12}}$	i_{m12}	δ^{o}_{13}	$\Delta\beta$	$\rho_{12} V_{m12}$	$\rho_{13} Vm_{13}$	D	$\bar{\omega}$	$\frac{\bar{\omega} \cos \beta'_{13}}{2\sigma}$	$\frac{P_{13}}{P_{12}}$	η_p	η_{ad}	β'_{12}	β'_{13}	$V'_{\theta 12}$	$V'_{\theta 13}$	$\frac{P_{13}}{P_o}$	
				TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT		TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %					
				$\frac{T_{13}}{T_o}$	$\frac{P_{13}}{P_o}$	η_{ad}	η_p	$\frac{W\sqrt{\theta_{12}}}{\delta_{12} A_{12}}$		$\frac{T_{13}}{T_{12}}$	$\frac{P_{13}}{P_{12}}$	$\eta_{ad_{13}}$	η_{p13}					

STATOR 2

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
*	ϵ_{14}	ϵ_{15}	V_{14}	V_{15}	V_{m14}	V_{m15}	$V_{\theta 14}$	$V_{\theta 15}$	β_{14}	β_{15}	M_{14}	M_{15}	$\frac{P_{15}}{P_o}$	$\frac{T_{15}}{T_o}$	$\frac{P_{16}}{P_{12}}$	$\frac{T_{15}}{T_{12}}$
SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1		%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG	
*	$i_{s_{14}}$	i_{m14}	δ_{15}	$\Delta\beta$	$\rho_{14} V_{m14}$	$\rho_{15} V_{m15}$	D	$\bar{\omega}$	$\frac{\bar{\omega} \cos \beta_{15}}{2\sigma}$	$\frac{P_{15}}{P_{14}}$		η_{ad}	η_p	$\eta_{ad\text{-}st}$	$\eta_{p\text{-}st}$	
		NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %		TO2/TO1	PO2/PO1	EFF-AD STAGE %					
		$\frac{N}{\sqrt{\theta_{12}}}$	$\frac{W\sqrt{\theta_{12}}}{\delta_{12}}$	$\frac{T_{16}}{T_o}$	$\frac{P_{16}}{P_o}$	η_{ad}	η_p		$\frac{T_{15}}{T_{12}}$	$\frac{P_{15}}{P_{14}}$	$\eta_{ad\text{-}st}$					

* SEE TABLE XII
SUBSCRIPTS REFER TO CALCULATION STATIONS

APPENDIX C

OVERALL PERFORMANCE AND BLADE-ELEMENT DATA FOR UNIFORM INLET FLOW

This appendix provides test overall performance and blade-element data for uniform inlet flow with casing treatment and design stator settings. The data is presented for 70 percent, 85 percent, and 100 percent of design speed. An overall-performance and stall data summary is given in Table XIV, and the complete overall performance and blade-element data are given in Tables XV, XVII, and XVIII. The column headings for Tables XV, XVI, and XVIII are identified in Table XIII of Appendix B.

TABLE XIV – OVERALL-PERFORMANCE AND STALL DATA SUMMARY WITH UNIFORM INLET FLOW

PERFORMANCE

Reference Table[1]	Percent of Design Speed	Corrected Flow[2] (lbm/sec)	P_{11}/P_0	$\eta_{ad,11}$ (%)	P_{16}/P_0	$\eta_{ad,16}$ (%)
XV(a)	70	123.9	1.315	87.03	1.508	73.24
XV(b)	70	119.0	1.326	86.90	1.665	84.23
XV(c)	70	109.7	1.339	86.41	1.717	81.44
XV(d)	70	98.7	1.350	77.28	1.728	75.46
XVI(a)	85	154.1	1.504	85.48	1.822	70.64
XVI(b)	85	152.7	1.508	85.51	2.105	84.72
XVI(c)	85	143.6	1.540	83.26	2.232	83.22
XVI(d)	85	136.8	1.549	80.95	2.253	80.76
XVII(a)	100	184.1	1.695	83.19	2.266	70.87
XVII(b)	100	183.9	1.685	81.96	2.550	79.83
XVII(c)	100	183.2	1.673	82.63	2.742	82.02
XVII(d)	100	183.2	1.771	86.28	2.931	82.24
XVII(e)	100	179.1	1.777	86.28	2.931	82.32
XVII(f)	100	177.1	1.776	82.29	2.947	80.98

STALL POINT DATA

Percent of Design Speed	Corrected Flow[2] (lbm/sec)	P_{16}/P_0	Stall Margin (%)
70	95.3	1.735	25.9
85	134.5	2.255	15.8
100	175.6	2.935	9.7

Notes: (1) Refers to remaining Appendix C tables.
(2) Corrected flow = $W\sqrt{\theta}/\delta$.

TABLE XV(a) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA (Uniform Inlet Flow, 70 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 9, SPEED CODE 70, POINT NO 1

SL	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'-I	V'-1 FT/SEC	V'-2 FT/SEC
1	16.400	18.124	380.0	761.1	380.0	468.1	0.0	600.1	0.0	52.0	0.3443	0.6800	438.9	508.1	0.5260	0.4262	580.6	477.1
2	13.690	15.592	388.1	730.2	388.1	468.3	0.0	560.2	0.0	50.1	0.3518	0.6507	473.3	532.7	0.5548	0.4180	612.1	469.1
3	11.240	13.253	395.4	704.2	395.4	466.8	0.0	527.2	0.0	48.4	0.3586	0.6261	507.0	557.3	0.5831	0.4159	643.0	467.8
4	5.077	7.162	410.8	642.5	410.8	455.9	0.0	452.8	0.0	44.8	0.3730	0.5683	603.6	631.1	0.6629	0.4329	730.2	489.5
5	-0.468	0.605	416.8	557.9	416.8	409.7	0.0	378.7	0.0	42.7	0.3786	0.4902	724.2	729.4	0.7589	0.4739	835.6	539.3
6	-2.121	-2.090	416.5	536.1	416.5	403.8	0.0	352.7	0.0	41.2	0.3783	0.4704	782.2	778.6	0.8048	0.5149	886.2	586.8
7	-3.114	-3.304	416.0	545.1	416.0	429.2	0.0	336.1	0.0	38.1	0.3778	0.4790	810.9	803.2	0.8276	0.5573	911.4	634.3
8	-4.361	-4.478	415.0	544.5	415.0	433.2	0.0	330.0	0.0	37.3	0.3768	0.4782	839.5	827.8	0.8503	0.5794	936.4	659.8
9	-8.393	-7.949	407.5	550.6	407.5	438.4	0.0	333.0	0.0	37.2	0.3698	0.4817	924.9	901.5	0.9173	0.6282	1010.7	717.9
10	-9.842	-9.153	403.4	558.3	403.4	439.8	0.0	343.9	0.0	38.0	0.3661	0.4875	953.4	926.1	0.9393	0.6370	1035.2	729.6
11	-11.176	-10.377	398.8	547.3	398.8	420.7	0.0	350.0	0.0	39.7	0.3617	0.4764	981.8	950.7	0.9613	0.6383	1059.7	733.3

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	2.47	7.07	16.84	59.97	27.41	36.61	0.4249	-0.0611	-0.0132	1.4007	103.12	103.25	48.85	-11.12	-438.9	92.0	1.4007
2	2.54	6.84	16.25	53.71	27.92	37.01	0.4602	-0.0403	-0.0093	1.3877	102.32	102.46	50.36	-3.35	-473.3	27.5	1.3877
3	2.77	6.88	15.22	48.09	28.38	37.19	0.4822	-0.0223	-0.0053	1.3770	101.42	101.52	51.78	3.68	-507.0	-30.1	1.3770
4	4.10	7.57	11.64	34.28	29.34	36.88	0.5027	0.0236	0.0059	1.3511	97.94	97.89	55.60	21.32	-603.6	-178.3	1.3511
5	5.59	8.23	10.29	19.51	29.70	33.34	0.4939	0.0999	0.0228	1.3030	89.03	88.65	60.07	40.56	-724.2	-350.8	1.3030
6	6.04	8.32	9.20	15.44	29.68	32.99	0.4645	0.1029	0.0224	1.2957	87.64	87.21	61.98	46.54	-782.2	-425.9	1.2957
7	6.27	8.37	7.13	15.41	29.65	35.28	0.4233	0.0628	0.0138	1.3069	92.03	91.76	62.85	47.44	-810.9	-467.1	1.3069
8	6.49	8.44	6.13	14.72	29.59	35.67	0.4117	0.0629	0.0137	1.3098	91.76	91.47	63.71	48.95	-839.5	-497.7	1.3098
9	7.18	8.61	5.54	13.85	29.13	36.06	0.4052	0.0998	0.0216	1.3207	86.41	85.89	66.23	52.34	-924.9	-568.5	1.3207
10	7.39	8.68	5.88	14.19	28.88	36.06	0.4140	0.1253	0.0274	1.3274	83.13	82.48	67.07	52.88	-953.4	-582.2	1.3274
11	7.55	8.70	8.56	12.98	28.59	34.33	0.4281	0.1626	0.0345	1.3194	78.04	77.19	67.88	54.90	-981.8	-600.6	1.3194

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.0936	1.3306	90.92	91.25	28.14	1.0936	1.3306	90.92	91.25

STATOR 1

RUN NO 9, SPEED CODE 70, POINT NO 1

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	18.099	14.832	766.1	564.3	491.8	564.3	587.4	3.3	50.2	0.3	0.6849	0.4940	1.3513	1.0979	1.3513	1.0979
2	15.716	13.031	737.9	556.4	491.7	556.4	550.3	7.4	48.3	0.8	0.6582	0.4873	1.3492	1.0958	1.3492	1.0958
3	13.528	11.316	713.9	552.4	490.0	552.3	519.3	8.4	46.7	0.9	0.6355	0.4839	1.3488	1.0943	1.3488	1.0943
4	7.863	6.468	655.8	530.5	477.8	530.5	449.1	0.9	43.2	0.1	0.5808	0.4645	1.3341	1.0917	1.3341	1.0917
5	1.478	0.211	573.0	486.5	430.6	486.3	378.0	-15.0	41.3	-1.8	0.5042	0.4251	1.2990	1.0887	1.2990	1.0887
6	-1.437	-2.636	552.0	477.1	424.5	476.7	352.8	-18.7	39.7	-2.2	0.4849	0.4167	1.2900	1.0879	1.2900	1.0879
7	-2.605	-3.775	560.1	486.9	447.5	486.6	336.9	-17.6	37.0	-2.1	0.4928	0.4258	1.2957	1.0868	1.2957	1.0868
8	-3.590	-4.719	559.6	496.5	451.1	496.2	331.3	-15.7	36.3	-1.8	0.4921	0.4342	1.3016	1.0880	1.3016	1.0880
9	-6.353	-7.163	566.4	508.4	456.6	508.3	335.2	-8.2	36.4	-0.9	0.4963	0.4433	1.3098	1.0967	1.3098	1.0967
10	-7.239	-7.880	574.2	513.3	458.0	513.2	346.4	-6.2	37.2	-0.7	0.5020	0.4465	1.3127	1.1025	1.3127	1.1025
11	-8.188	-8.558	564.1	491.3	440.2	490.8	352.8	-22.0	38.8	-2.6	0.4917	0.4257	1.2969	1.1068	1.2969	1.1068

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-2.31	-0.20	12.66	49.91	38.35	47.15	0.4122	0.1303	0.0267	0.9649	91.85	92.16	91.85	92.16
2	-2.52	-0.12	11.99	47.56	38.68	46.65	0.3954	0.1084	0.0230	0.9726	93.38	93.62	93.38	93.62
3	-2.81	-0.03	11.25	45.85	38.82	46.43	0.3779	0.0844	0.0186	0.9799	94.72	94.91	94.72	94.91
4	-3.81	-0.09	9.37	43.09	38.40	44.61	0.3528	0.0564	0.0138	0.9884	93.71	93.93	93.71	93.93
5	-4.25	0.80	7.55	43.01	34.81	40.60	0.3355	0.0163	0.0045	0.9974	87.59	88.01	87.59	88.01
6	-5.28	0.33	7.12	41.58	34.47	39.69	0.3294	0.0396	0.0113	0.9940	85.96	86.42	85.96	86.42
7	-7.80	-1.93	7.30	39.08	36.56	40.58	0.3156	0.0581	0.0169	0.9911	88.57	88.94	88.57	88.94
8	-8.26	-2.12	7.62	38.15	36.91	41.38	0.2981	0.0431	0.0128	0.9934	88.96	89.33	88.96	89.33
9	-8.24	-1.36	9.62	37.31	37.30	42.16	0.2940	0.0556	0.0173	0.9914	82.93	83.54	82.93	83.54
10	-7.73	-0.68	11.08	37.90	37.29	42.38	0.3021	0.0683	0.0216	0.9892	78.96	79.72	78.96	79.72
11	-6.80	0.35	10.74	41.41	35.66	40.23	0.3437	0.1117	0.0358	0.9830	72.21	73.18	72.21	73.18

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
7468.	123.90	1.0936	1.3151	87.03	87.49	1.0936	0.9883	87.03

ROTOR 2

RUN NO 9, SPEED CODE 70, POINT NO 1

SL	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
1	11.560	11.126	612.6	855.1	612.6	697.5	3.2	561.0	0.3	38.7	0.5386	0.7721	582.3	610.8	0.7412	0.6032	843.0	699.3
2	10.696	9.910	610.7	888.1	610.7	685.9	7.3	564.1	0.7	39.3	0.5374	0.7653	598.8	623.6	0.7482	0.5933	850.2	688.5
3	9.669	8.750	611.9	874.6	611.9	685.5	8.2	543.3	0.8	38.3	0.5389	0.7537	615.8	636.8	0.7594	0.5961	862.3	691.8
4	5.780	5.423	601.6	810.2	601.6	681.9	0.9	437.5	0.1	32.7	0.5300	0.6979	668.5	679.2	0.7917	0.6232	898.7	723.5
5	-0.564	0.644	556.9	687.7	556.7	614.6	-15.1	308.5	-1.6	26.7	0.4894	0.5902	741.1	740.6	0.8251	0.6447	939.0	751.3
6	-3.456	-1.680	540.2	606.4	539.9	548.2	-18.7	259.3	-2.0	25.3	0.4742	0.5186	778.1	773.3	0.8449	0.6426	962.5	751.5
7	-4.453	-2.613	544.5	584.0	544.2	534.1	-17.6	236.0	-1.9	23.8	0.4784	0.4995	796.8	790.1	0.8605	0.6584	979.5	769.6
8	-5.229	-3.496	549.9	586.4	549.7	546.1	-15.6	213.5	-1.6	21.3	0.4830	0.5025	815.6	807.4	0.8753	0.6914	996.5	806.8
9	-7.723	-6.505	557.2	612.2	557.2	578.8	-8.1	199.5	-0.8	18.9	0.4877	0.5242	872.7	860.8	0.9122	0.7525	1042.3	878.8
10	-8.594	-7.694	558.3	607.7	558.3	577.2	-6.7	190.0	-0.7	18.2	0.4874	0.5192	891.9	879.2	0.9235	0.7680	1057.9	898.9
11	-9.234	-8.847	535.2	549.4	534.7	526.4	-22.3	157.1	-2.4	16.6	0.4653	0.4670	911.2	897.8	0.9355	0.7726	1075.8	908.8

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC	PO/PO INLET
1	-6.17	-1.85	24.46	39.25	50.08	60.08	0.3249	0.1459	0.0332	1.3335	86.51	85.98	43.31	4.07	-579.1	-49.8	1.8019
2	-5.89	-1.44	18.76	39.12	49.97	59.61	0.3462	0.1472	0.0343	1.3410	86.44	85.90	44.06	4.94	-591.5	-59.5	1.8094
3	-5.54	-0.97	15.29	37.05	50.08	60.17	0.3479	0.1270	0.0301	1.3407	87.85	87.36	44.81	7.76	-607.6	-93.6	1.8081
4	-3.75	1.04	9.96	28.48	49.04	61.16	0.3204	0.0519	0.0126	1.3169	94.08	93.87	48.00	19.53	-667.6	-241.7	1.7566
5	0.17	4.75	6.89	18.53	45.17	54.99	0.2979	0.0557	0.0129	1.2451	91.18	90.95	53.64	35.11	-756.2	-432.1	1.6154
6	1.53	5.86	6.93	12.76	43.88	48.45	0.3067	0.1286	0.0278	1.1800	76.59	76.10	55.90	43.13	-796.8	-514.0	1.5240
7	1.39	5.47	6.76	10.25	44.38	47.11	0.2951	0.1411	0.0299	1.1561	72.22	71.69	56.26	46.01	-814.4	-554.1	1.4998
8	1.15	4.56	5.02	5.15	44.87	48.21	0.2637	0.1119	0.0238	1.1510	75.69	75.25	56.53	47.34	-831.2	-593.8	1.4988
9	0.85	3.53	1.61	8.95	45.30	50.64	0.2264	0.0850	0.0196	1.1526	79.58	79.21	57.66	48.70	-880.9	-661.4	1.5101
10	0.91	3.09	3.27	8.16	45.24	50.17	0.2179	0.0852	0.0199	1.1451	78.30	77.93	58.11	49.94	-858.6	-689.1	1.5020
11	2.63	4.32	8.85	5.63	43.09	45.20	0.2183	0.1122	0.0246	1.1165	68.68	68.24	60.14	54.51	-933.5	-740.8	1.4476

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1701	1.6142	86.17	87.05	35.23	1.0699	1.2275	86.12	86.48

STATOR 2

RUN NO 9, SPEED CODE 70, POINT NO 1

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	8.867	1.147	928.3	814.0	744.0	813.3	555.2	-32.5	37.0	-2.3	0.8043	0.6949	1.5020	1.2070	1.1114	1.0992
2	8.023	1.366	919.1	833.6	729.3	831.6	559.2	-57.2	37.7	-3.9	0.7952	0.7132	1.5333	1.2075	1.1358	1.1012
3	7.186	1.473	904.6	853.0	725.6	850.5	540.2	-65.5	36.9	-4.4	0.7825	0.7321	1.5668	1.2058	1.1621	1.1013
4	5.086	1.388	838.5	865.7	715.8	860.6	436.7	-93.9	31.5	-6.2	0.7247	0.7497	1.6125	1.1902	1.2041	1.0897
5	2.692	0.645	718.1	808.0	648.0	802.4	309.6	-95.0	25.5	-6.7	0.6181	0.7016	1.5651	1.1687	1.2026	1.0735
6	1.080	0.080	639.2	747.2	584.0	745.5	259.9	-50.5	24.0	-3.9	0.5482	0.6474	1.5007	1.1583	1.1642	1.0644
7	-0.003	-0.266	615.3	713.2	567.7	711.3	237.2	-52.8	22.6	-4.2	0.5277	0.6170	1.4656	1.1536	1.1317	1.0615
8	-1.061	-0.562	617.1	695.7	578.8	692.7	214.1	-64.6	20.3	-5.3	0.5303	0.6024	1.4490	1.1477	1.1134	1.0550
9	-3.638	-1.093	645.5	714.6	613.6	713.9	200.4	-30.4	18.1	-2.4	0.5544	0.6181	1.4617	1.1541	1.1160	1.0523
10	-4.446	-1.251	645.7	711.0	616.6	710.7	191.6	-19.1	17.3	-1.5	0.5536	0.6136	1.4543	1.1585	1.1085	1.0505
11	-5.445	-1.270	595.6	628.7	574.2	628.5	158.3	-18.8	15.5	-1.7	0.5083	0.5381	1.3702	1.1586	1.0570	1.0468

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-11.44	-9.88	9.53	39.29	62.65	61.46	0.2667	0.4767	0.1076	0.8340	59.51	61.72	30.84	31.83
2	-9.70	-7.68	7.32	41.66	62.06	63.38	0.2487	0.4413	0.1013	0.8486	62.56	64.70	36.51	37.60
3	-9.78	-7.28	6.44	41.27	62.46	65.51	0.2232	0.4016	0.0939	0.8644	66.48	68.49	43.22	44.37
4	-14.07	-10.20	4.09	37.72	63.12	68.32	0.1418	0.2920	0.0721	0.9115	76.91	78.38	60.80	61.78
5	-19.17	-13.86	3.55	32.29	57.15	64.98	0.0588	0.1988	0.0528	0.9524	80.91	82.05	73.58	74.23
6	-20.43	-14.64	6.35	27.83	50.92	60.39	-0.0015	0.1547	0.0427	0.9697	77.67	78.88	68.79	69.41
7	-21.58	-15.59	5.53	26.89	49.38	57.52	-0.0210	0.1373	0.0384	0.9763	75.14	76.42	58.42	59.10
8	-23.78	-17.57	4.79	25.59	50.40	56.14	-0.0007	0.1887	0.0534	0.9673	75.70	76.91	56.62	57.23
9	-25.71	-19.01	7.73	20.53	52.87	57.52	-0.0026	0.1696	0.0497	0.9681	74.33	75.64	60.86	61.41
10	-27.18	-20.31	9.24	18.81	52.70	56.87	-0.0039	0.1745	0.0516	0.9678	71.24	72.67	58.73	59.26
11	-30.28	-23.18	10.23	17.16	48.38	49.35	0.0316	0.3305	0.0986	0.9471	55.33	61.06	34.01	34.46

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
7468.	123.90	1.1701	1.5083	73.24	74.72	1.0699	0.9344	57.06

TABLE XV(b) — OVERALL PERFORMANCE AND BLADE-ELEMENT DATA (Uniform Inlet Flow, 70 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 9, SPEED CODE 70, POINT NO 2

SL	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'-I	V'-1 FT/SEC	V'-2 FT/SEC
1	16.440	18.116	362.9	737.3	362.9	438.5	0.0	592.7	0.0	53.5	0.3284	0.6572	435.8	509.1	0.5160	0.3979	570.1	446.4
2	13.779	15.574	370.5	708.7	370.5	438.3	0.0	556.9	0.0	51.7	0.3354	0.6301	474.2	533.8	0.5449	0.3902	601.8	438.9
3	11.382	13.230	377.6	682.3	377.6	438.4	0.0	522.8	0.0	49.9	0.3420	0.6054	508.0	558.4	0.5734	0.3503	632.9	439.9
4	5.249	7.181	392.4	626.0	392.4	431.5	0.0	453.5	0.0	46.4	0.3558	0.5526	604.8	632.3	0.6537	0.4124	720.9	467.1
5	-0.329	0.773	398.3	548.7	398.3	390.0	0.0	386.0	0.0	44.7	0.3613	0.4814	725.6	730.8	0.7508	0.4567	827.7	520.6
6	-2.201	-1.848	398.4	531.0	398.4	392.5	0.0	357.7	0.0	42.4	0.3613	0.4654	783.7	780.1	0.7974	0.5053	879.1	576.6
7	-3.342	-3.056	397.9	540.6	397.9	414.4	0.0	347.2	0.0	40.0	0.3609	0.4741	812.4	804.7	0.8205	0.5414	904.6	617.3
8	-4.731	-4.256	396.7	544.4	396.7	421.7	0.0	344.3	0.0	39.2	0.3598	0.4772	841.1	829.3	0.8434	0.5633	929.9	642.7
9	-8.924	-7.890	388.9	546.5	388.9	412.1	0.0	359.0	0.0	41.0	0.3525	0.4763	926.7	903.2	0.9110	0.5949	1005.0	682.7
10	-10.282	-9.137	385.0	554.5	385.0	410.2	0.0	373.1	0.0	42.2	0.3489	0.4820	955.2	927.9	0.9333	0.5997	1029.9	690.0
11	-11.447	-10.386	380.6	542.2	380.6	386.3	0.0	380.4	0.0	44.5	0.3448	0.4696	983.7	952.5	0.9556	0.5979	1054.8	690.3

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	PO/PO INLET
1	3.83	8.44	17.16	61.02	26.31	34.73	0.4646	-0.0691	-0.0150	1.3975	103.44	103.63	50.22	-10.80	-439.8	83.6	1.3975
2	3.91	8.21	16.59	54.74	26.80	35.08	0.4990	-0.0494	-0.0114	1.3879	102.77	102.93	51.73	-3.01	-474.2	23.1	1.3879
3	4.12	8.22	16.16	48.49	27.25	35.39	0.5154	-0.0362	-0.0086	1.3779	102.27	102.41	53.12	4.63	-508.0	-35.6	1.3779
4	5.38	8.84	12.79	34.41	28.19	35.40	0.5270	0.0046	0.0011	1.3591	99.56	99.57	56.88	22.47	-604.8	-178.8	1.3591
5	6.71	9.39	11.20	19.75	28.56	32.23	0.5141	0.0811	0.0182	1.3199	91.48	91.18	61.22	41.47	-725.6	-344.8	1.3199
6	7.13	9.41	9.77	15.95	28.56	32.60	0.4736	0.0734	0.0158	1.3160	91.48	91.17	63.07	47.12	-783.7	-422.4	1.3160
7	7.34	9.44	7.53	16.08	28.53	34.58	0.4421	0.0476	0.0104	1.3274	94.23	94.03	63.92	47.84	-812.4	-457.5	1.3274
8	7.55	9.51	6.15	15.76	28.46	35.24	0.4317	0.0502	0.0109	1.3334	93.76	93.54	64.77	49.01	-841.1	-485.0	1.3334
9	8.22	9.65	6.05	14.43	27.97	34.24	0.4468	0.1221	0.0262	1.3402	84.54	83.92	67.27	52.84	-926.7	-544.3	1.3402
10	8.40	9.69	6.47	14.61	27.72	33.95	0.4601	0.1537	0.0331	1.3473	80.86	80.06	68.08	53.47	-955.2	-554.8	1.3473
11	8.52	9.67	9.54	12.57	27.44	31.81	0.4771	0.1940	0.0401	1.3389	75.78	74.79	68.86	55.88	-983.7	-572.0	1.3389

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	T02/T01	P02/P01	EFF-AD ROTOR %	EFF-P ROTOR %
1.0568	1.3449	91.35	91.68	27.03	1.0968	1.3449	91.35	91.68

STATOR 1

RUN NO 9, SPEED CODE 70, POINT NO 2

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	18.090	14.792	740.8	522.5	460.5	522.5	580.2	-1.3	51.7	-0.1	0.6605	0.4560	1.3508	1.0969	1.3508	1.0969
2	15.687	12.961	714.8	517.9	460.2	517.7	546.9	14.0	50.0	1.5	0.6360	0.4522	1.3508	1.0954	1.3508	1.0954
3	13.483	11.232	690.3	514.7	459.8	514.3	514.9	20.9	48.3	2.3	0.6130	0.4496	1.3507	1.0937	1.3507	1.0937
4	7.922	6.459	637.3	456.2	451.5	496.2	449.8	-4.3	44.9	-0.5	0.5633	0.4332	1.3387	1.0920	1.3387	1.0920
5	1.712	0.617	561.8	459.5	408.9	459.1	385.3	-19.6	43.3	-2.4	0.4935	0.4004	1.3107	1.0905	1.3107	1.0905
6	-1.041	-1.685	544.7	455.1	410.6	454.7	358.0	-19.2	41.1	-2.4	0.4779	0.3966	1.3065	1.0896	1.3065	1.0896
7	-2.147	-2.889	554.0	468.4	431.1	468.2	348.0	-15.1	38.9	-1.8	0.4864	0.4085	1.3148	1.0898	1.3148	1.0898
8	-3.095	-3.769	557.9	477.1	438.0	476.9	345.6	-14.0	38.3	-1.7	0.4895	0.4160	1.3207	1.0918	1.3207	1.0918
9	-5.928	-6.326	561.2	481.5	429.6	481.9	361.1	-1.7	40.1	-0.2	0.4897	0.4179	1.3257	1.1040	1.3257	1.1040
10	-6.923	-7.210	569.6	483.7	428.1	483.7	375.7	2.8	41.4	0.3	0.4957	0.4181	1.3273	1.1111	1.3273	1.1111
11	-8.013	-8.150	558.2	462.0	405.6	461.7	383.4	-16.2	43.5	-2.0	0.4841	0.3978	1.3137	1.1163	1.3137	1.1163

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-0.81	1.30	12.19	51.88	36.40	44.44	0.4481	0.1312	0.0268	0.9667	92.67	92.95	92.67	92.95
2	-0.82	1.58	12.76	48.45	36.70	44.17	0.4270	0.1110	0.0236	0.9735	94.13	94.34	94.13	94.34
3	-1.25	1.54	12.71	45.56	36.98	43.99	0.4060	0.0869	0.0192	0.9805	95.84	95.98	95.84	95.98
4	-2.14	1.58	8.78	45.36	36.83	42.42	0.3912	0.0746	0.0182	0.9855	94.50	94.69	94.50	94.69
5	-2.23	2.82	6.87	45.71	33.60	39.00	0.3772	0.0440	0.0120	0.9933	88.85	89.24	88.85	89.24
6	-3.93	1.68	6.94	43.51	33.92	38.59	0.3633	0.0548	0.0157	0.9920	88.69	89.07	88.69	89.07
7	-5.87	0.00	7.54	40.78	35.78	39.79	0.3463	0.0654	0.0191	0.9902	90.63	90.96	90.63	90.96
8	-6.30	-0.16	7.74	39.99	36.39	40.52	0.3368	0.0633	0.0188	0.9904	90.21	90.56	90.21	90.56
9	-4.50	2.38	10.35	40.32	35.47	40.61	0.3440	0.0712	0.0222	0.9892	80.75	81.47	80.75	81.47
10	-3.59	3.46	12.10	41.02	35.21	40.55	0.3600	0.0963	0.0305	0.9851	75.93	76.85	75.93	76.85
11	-2.13	5.02	11.30	45.52	33.18	38.43	0.4038	0.1272	0.0407	0.9812	69.73	70.84	69.73	70.84

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	T02/T01	P02/P01	EFF-AD STAGE %
7482.	119.00	1.0568	1.3263	86.90	87.38	1.0968	0.9862	86.90

ROTOR 2

RUN NO 9, SPEED CODE 70, POINT NO 2

SL	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
1	11.534	11.033	566.2	896.4	566.2	655.9	-1.3	611.0	-0.1	42.8	0.4959	0.7659	583.4	611.9	0.7129	0.5633	813.9	655.9
2	10.637	9.724	566.5	879.1	566.3	638.1	13.7	604.6	1.4	43.3	0.4966	0.7544	599.9	624.7	0.7145	0.5479	815.1	638.4
3	9.594	8.486	567.5	854.5	567.1	628.4	20.4	579.1	2.1	42.6	0.4979	0.7330	616.9	638.1	0.7222	0.5414	823.1	631.2
4	5.710	4.983	557.3	767.7	557.3	618.2	-4.3	455.1	-0.4	36.3	0.4889	0.6565	669.7	680.5	0.7673	0.5627	874.6	658.0
5	-0.143	0.349	517.7	637.3	517.4	535.3	-19.6	345.9	-2.2	32.9	0.4531	0.5414	742.5	742.0	0.8061	0.5657	921.1	665.9
6	-2.593	-1.679	507.8	579.2	507.4	488.9	-19.0	310.6	-2.1	32.4	0.4442	0.4908	779.6	774.8	0.8277	0.5713	946.2	674.1
7	-3.441	-2.517	517.4	571.6	517.2	489.9	-15.1	294.5	-1.7	31.0	0.4529	0.4847	798.3	791.6	0.8438	0.5918	963.9	698.0
8	-4.206	-3.326	524.6	576.8	524.4	505.0	-14.0	278.7	-1.5	28.8	0.4590	0.4895	817.1	808.9	0.8599	0.6213	982.8	732.2
9	-6.741	-6.075	531.9	593.3	531.9	524.5	-1.8	277.3	-0.2	27.7	0.4630	0.5013	874.4	862.5	0.8922	0.6640	1025.0	785.9
10	-7.646	-7.171	534.3	596.0	534.3	528.7	3.0	275.1	0.3	27.4	0.4637	0.5022	893.6	880.8	0.9013	0.6775	1038.6	804.0
11	-6.528	-8.398	514.3	562.6	514.1	506.6	-16.3	244.7	-1.8	25.7	0.4445	0.4719	912.9	899.5	0.9178	0.6945	1061.9	828.0

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC	PO/PO INLET
1	-3.64	0.68	20.48	45.76	47.29	58.86	0.3696	0.0994	0.0227	1.3988	92.17	91.81	45.84	0.08	-584.7	-0.9	1.8894
2	-3.99	0.46	15.62	44.16	47.35	57.84	0.3895	0.0948	0.0221	1.3943	92.41	92.06	45.96	1.80	-586.2	-20.1	1.8834
3	-3.90	0.68	12.88	41.11	47.46	57.53	0.3989	0.0871	0.0208	1.3822	92.66	92.33	46.45	5.35	-596.5	-59.0	1.8670
4	-1.31	3.48	10.46	30.42	46.48	57.73	0.3836	0.0513	0.0124	1.3385	94.65	94.45	50.44	20.02	-674.0	-225.4	1.7912
5	2.36	6.93	8.28	19.33	43.00	50.08	0.3896	0.0876	0.0200	1.2686	88.26	87.90	55.83	36.50	-762.1	-396.1	1.6619
6	3.19	7.53	7.29	14.07	42.25	45.61	0.3918	0.1268	0.0273	1.2292	81.30	80.78	57.57	43.50	-798.6	-464.2	1.6075
7	2.66	6.74	6.12	12.16	43.16	45.80	0.3743	0.1219	0.0261	1.2183	80.89	80.38	57.54	45.38	-813.4	-497.1	1.6024
8	2.34	6.15	4.01	11.39	43.75	47.31	0.3480	0.0986	0.0213	1.2179	83.58	83.15	57.72	46.33	-831.2	-530.2	1.6084
9	1.85	4.53	0.90	10.66	43.97	48.82	0.3272	0.0822	0.0192	1.2256	85.68	85.30	58.66	48.00	-876.2	-585.2	1.6243
10	1.74	3.92	2.06	10.20	43.94	48.98	0.3189	0.0738	0.0177	1.2245	86.74	86.39	58.94	48.74	-890.6	-605.7	1.6266
11	3.43	5.13	6.49	8.80	41.99	46.53	0.3118	0.0800	0.0185	1.2141	84.91	84.52	60.95	52.15	-929.2	-654.9	1.5955

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1860	1.6951	87.44	88.32	33.60	1.0814	1.2780	89.07	89.42

STATOR 2

RUN NO 9, SPEED CODE 70, POINT NO 2

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/TO1
1	8.686	0.852	925.5	738.0	700.5	737.4	604.9	30.1	41.1	2.3	0.7980	0.6220	1.7614	1.2171	1.3040	1.1095
2	7.652	0.767	906.8	745.1	680.4	745.1	599.5	3.9	41.6	0.3	0.7810	0.6292	1.7765	1.2146	1.3152	1.1086
3	6.592	0.546	881.4	761.3	667.8	761.3	575.3	-8.6	40.9	-0.7	0.7586	0.6455	1.8052	1.2092	1.3364	1.1055
4	3.933	-0.310	792.8	720.3	650.1	720.3	453.7	-9.7	35.0	-0.8	0.6798	0.6126	1.7661	1.1931	1.3188	1.0925
5	1.159	-0.976	661.5	614.4	563.9	613.9	345.8	-23.7	31.5	-2.2	0.5632	0.5207	1.6533	1.1779	1.2615	1.0801
6	-0.526	-1.230	603.2	558.8	517.0	558.6	310.8	-14.9	31.0	-1.5	0.5122	0.4727	1.6005	1.1716	1.2245	1.0753
7	-1.441	-1.310	595.5	549.0	517.4	548.6	294.8	-19.7	29.6	-2.1	0.5059	0.4646	1.5915	1.1687	1.2103	1.0723
8	-2.256	-1.333	600.4	551.2	531.5	549.6	279.3	-42.0	27.7	-4.4	0.5105	0.4668	1.5920	1.1677	1.2055	1.0696
9	-4.321	-1.329	620.7	578.3	554.6	578.3	278.6	-2.9	26.7	-0.3	0.5256	0.4880	1.6064	1.1807	1.2120	1.0700
10	-5.024	-1.339	626.6	585.0	562.2	584.9	276.7	9.6	26.2	0.9	0.5294	0.4925	1.6081	1.1872	1.2109	1.0688
11	-5.830	-1.262	599.9	551.5	546.9	551.5	246.4	2.3	24.3	0.2	0.5047	0.4622	1.5742	1.1915	1.1981	1.0673

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-7.37	-5.81	14.15	38.75	61.64	67.73	0.3431	0.1979	0.0447	0.9320	80.80	82.24	71.81	72.83
2	-5.81	-3.79	11.55	41.31	60.55	68.88	0.3317	0.1732	0.0399	0.9421	83.09	84.38	74.87	75.80
3	-5.73	-3.22	10.19	41.57	60.10	71.14	0.2976	0.1116	0.0262	0.9642	87.79	88.74	81.73	82.44
4	-10.58	-6.71	9.55	35.75	59.86	68.03	0.2419	0.0608	0.0151	0.9837	91.30	91.95	88.78	89.18
5	-13.21	-7.90	8.09	33.71	52.18	57.73	0.2271	0.0403	0.0108	0.9920	86.78	87.66	85.46	85.89
6	-13.42	-7.63	8.69	32.51	47.75	52.31	0.2254	0.0303	0.0084	0.9950	83.76	84.78	78.95	79.51
7	-14.58	-8.59	8.11	31.70	47.88	51.40	0.2268	0.0412	0.0115	0.9934	84.15	85.13	77.40	77.97
8	-16.34	-10.14	5.74	32.07	49.30	51.50	0.2342	0.0623	0.0176	0.9899	84.71	85.66	78.70	79.22
9	-17.10	-10.41	9.88	26.98	51.00	53.56	0.2020	0.0645	0.0189	0.9889	80.21	81.46	80.50	80.99
10	-18.21	-11.33	11.71	25.31	51.39	53.82	0.1924	0.0631	0.0187	0.9891	77.61	79.03	81.52	81.98
11	-21.41	-14.31	12.17	24.09	49.47	50.18	0.2023	0.0822	0.0246	0.9869	72.25	73.94	78.58	79.09

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
7482.	119.00	1.1860	1.6648	84.23	85.30	1.0814	0.9822	82.33

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE XV(c) — OVERALL PERFORMANCE AND BLADE-ELEMENT DATA (Uniform Inlet Flow, 70 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 9, SPEED CODE 70, POINT NO 3

SL	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'-I	V'-1 FT/SEC	V'-2 FT/SEC
1	16.577	18.063	330.1	711.9	330.1	392.6	0.0	593.8	0.0	56.5	0.2982	0.6326	440.8	510.3	0.4975	0.3567	550.7	401.4
2	14.007	15.491	337.7	683.5	337.7	398.1	0.0	555.7	0.0	54.3	0.3052	0.6060	475.3	535.0	0.5269	0.3534	583.1	398.6
3	11.603	13.162	345.0	657.5	345.0	406.0	0.0	517.1	0.0	51.8	0.3119	0.5820	509.2	559.7	0.5561	0.3614	615.0	408.2
4	5.123	7.238	359.7	604.7	359.7	388.5	0.0	463.4	0.0	50.0	0.3255	0.5323	606.2	633.8	0.6379	0.3734	704.9	424.2
5	-0.307	0.942	364.6	537.9	364.6	350.6	0.0	407.9	0.0	49.3	0.3300	0.4703	727.3	732.5	0.7364	0.4177	813.6	477.8
6	-2.202	-1.637	364.5	519.8	364.5	359.2	0.0	375.7	0.0	46.3	0.3299	0.4541	785.6	781.9	0.7838	0.4738	866.0	542.3
7	-3.494	-2.852	364.0	529.8	364.0	387.3	0.0	361.6	0.0	43.0	0.3295	0.4634	814.3	806.6	0.8073	0.5160	892.0	590.0
8	-5.173	-4.108	362.7	538.4	362.7	402.9	0.0	357.1	0.0	41.6	0.3283	0.4708	843.0	831.3	0.8306	0.5442	917.8	622.3
9	-10.115	-8.017	353.4	540.1	353.4	375.2	0.0	388.6	0.0	46.0	0.3196	0.4685	928.9	905.4	0.8989	0.5539	993.8	638.6
10	-11.380	-9.300	349.1	531.3	349.1	350.9	0.0	399.0	0.0	48.6	0.3157	0.4592	957.5	930.1	0.9216	0.5502	1019.1	636.6
11	-12.103	-10.511	345.0	516.0	345.0	322.2	0.0	403.1	0.0	51.3	0.3120	0.4446	986.0	954.7	0.9445	0.5504	1044.6	638.9

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	6.55	11.16	15.95	64.94	24.16	31.59	0.5274	-0.0746	-0.0161	1.3995	103.46	103.66	52.94	-12.00	-440.8	83.5	1.3995
2	6.55	10.85	16.64	57.33	24.66	32.39	0.5510	-0.0694	-0.0160	1.3920	103.68	103.88	54.37	-2.96	-475.3	20.7	1.3920
3	6.65	10.75	17.50	49.68	25.14	33.36	0.5503	-0.0744	-0.0177	1.3837	104.47	104.71	55.65	5.97	-509.2	-42.6	1.3837
4	7.67	11.14	13.96	35.53	26.10	32.39	0.5807	0.0031	0.0007	1.3693	99.69	99.71	59.17	23.64	-606.2	-170.4	1.3693
5	8.85	11.53	12.52	20.58	26.42	29.50	0.5660	0.0815	0.0180	1.3437	92.17	91.86	63.37	42.75	-727.3	-324.6	1.3437
6	9.19	11.47	11.18	16.60	26.41	30.45	0.5115	0.0626	0.0131	1.3420	93.30	93.04	65.12	48.52	-785.5	-406.2	1.3420
7	9.35	11.46	8.66	16.96	26.38	33.03	0.4701	0.0274	0.0058	1.3546	96.92	96.81	65.93	48.97	-814.3	-445.0	1.3546
8	9.54	11.49	6.80	17.10	26.30	34.44	0.4515	0.0200	0.0043	1.3645	97.66	97.58	66.76	49.66	-843.0	-474.2	1.3645
9	10.22	11.65	7.21	15.27	25.69	31.71	0.4970	0.1367	0.0285	1.3697	84.08	83.39	69.27	54.00	-928.8	-516.8	1.3697
10	10.38	11.67	9.51	13.55	25.41	29.50	0.5171	0.1814	0.0362	1.3642	78.90	77.99	70.06	56.51	-957.5	-531.1	1.3642
11	10.43	11.58	13.30	11.12	25.14	26.97	0.5299	0.2178	0.0406	1.3547	74.47	73.39	70.76	59.64	-986.0	-551.7	1.3547

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1008	1.3643	92.11	92.42	24.92	1.1008	1.3643	92.11	92.42

STATOR 1

RUN NO 9, SPEED CODE 70, POINT NO 3

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	18.029	14.809	712.4	464.8	411.9	464.7	581.2	5.8	54.8	0.7	0.6331	0.4038	1.3523	1.0973	1.3523	1.0973
2	15.606	13.027	686.7	465.3	416.8	464.9	545.7	20.9	52.7	2.6	0.6090	0.4047	1.3555	1.0954	1.3555	1.0954
3	13.481	11.384	662.6	464.0	423.8	463.1	509.3	29.5	50.3	3.6	0.5869	0.4040	1.3568	1.0929	1.3568	1.0929
4	8.231	6.826	613.1	442.7	405.7	442.4	459.7	15.6	48.6	2.0	0.5401	0.3846	1.3449	1.0943	1.3449	1.0943
5	1.887	0.977	548.4	415.4	367.3	415.3	407.2	-8.8	47.9	-1.2	0.4798	0.3599	1.3275	1.0959	1.3275	1.0959
6	-0.887	-1.563	531.0	414.8	375.0	414.6	376.0	-11.3	45.1	-1.6	0.4644	0.3597	1.3266	1.0943	1.3266	1.0943
7	-1.923	-2.540	541.0	429.9	401.7	429.9	362.3	-1.3	42.1	-0.2	0.4736	0.3733	1.3354	1.0936	1.3354	1.0936
8	-2.736	-3.329	545.3	444.0	416.4	444.0	358.2	1.4	40.7	0.2	0.4808	0.3856	1.3443	1.0952	1.3443	1.0952
9	-5.272	-5.642	552.0	435.5	350.1	435.4	390.6	8.2	45.1	1.1	0.4793	0.3750	1.3412	1.1122	1.3412	1.1122
10	-6.385	-6.608	543.9	422.6	366.9	422.6	401.5	3.0	47.6	0.4	0.4706	0.3625	1.3348	1.1186	1.3348	1.1186
11	-7.725	-7.784	529.1	401.0	339.0	400.5	406.2	-19.6	50.2	-2.8	0.4563	0.3428	1.3238	1.1235	1.3238	1.1235

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	2.29	4.40	13.04	54.13	33.13	40.42	0.5054	0.1422	0.0291	0.9664	92.65	92.93	92.65	92.93
2	1.87	4.27	13.78	50.16	33.86	40.59	0.4776	0.1170	0.0248	0.9740	95.29	95.46	95.29	95.46
3	0.75	3.54	14.01	46.65	34.74	40.57	0.4534	0.0930	0.0205	0.9807	98.15	98.20	98.15	98.20
4	1.56	5.28	11.28	46.55	33.69	38.66	0.4517	0.0989	0.0241	0.9822	93.76	93.99	93.76	93.99
5	2.42	7.47	8.10	49.13	30.77	26.09	0.4485	0.0821	0.0224	0.9880	87.98	88.42	87.98	88.42
6	0.05	5.67	7.80	46.63	31.65	36.06	0.4279	0.0869	0.0249	0.9880	89.28	89.67	89.28	89.67
7	-2.74	3.14	9.22	42.23	34.10	37.48	0.4019	0.1009	0.0295	0.9856	92.05	92.34	92.05	92.34
8	-3.88	2.27	9.61	40.54	35.43	38.73	0.3848	0.1010	0.0300	0.9852	92.83	93.09	92.83	93.09
9	0.46	7.34	11.63	43.19	32.81	37.46	0.4284	0.1447	0.0451	0.9789	78.05	78.91	78.05	78.91
10	2.69	9.74	12.18	47.23	30.69	36.14	0.4579	0.1573	0.0498	0.9778	72.60	73.66	72.60	73.66
11	4.62	11.77	10.51	53.05	28.23	34.05	0.5028	0.1725	0.0552	0.9770	67.59	68.81	67.59	68.81

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
7500.	109.70	1.1008	1.3394	86.41	86.93	1.1008	0.9817	86.41

ROTOR 2

RUN NO 9, SPEED CODE 70, POINT NO 3

SL	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
1	11.546	10.582	495.6	863.5	499.5	593.0	5.6	627.7	0.6	46.5	0.4352	0.7376	584.8	613.4	0.6663	0.5067	764.9	593.1
2	10.670	9.651	503.8	847.6	503.4	569.6	20.3	627.6	2.3	47.7	0.4394	0.7234	601.3	626.2	0.6705	0.4862	768.8	569.6
3	9.683	8.419	505.7	827.8	504.9	555.4	29.0	613.8	3.3	47.8	0.4416	0.7062	618.4	639.6	0.6778	0.4743	776.1	556.0
4	5.935	4.946	492.9	743.5	492.6	542.9	15.4	508.0	1.8	43.1	0.4297	0.6313	671.3	682.1	0.7152	0.4841	820.3	570.1
5	0.137	0.401	466.8	636.0	466.7	496.6	-8.8	397.3	-1.1	38.7	0.4059	0.5365	744.3	743.8	0.7704	0.5108	886.0	605.5
6	-2.491	-1.781	461.2	592.1	461.1	460.6	-11.0	372.1	-1.4	38.9	0.4012	0.4984	761.4	776.6	0.7975	0.5159	916.8	613.0
7	-3.410	-2.662	471.9	582.5	471.9	449.0	-1.2	371.2	-0.1	39.5	0.4110	0.4901	800.2	793.5	0.8099	0.5186	930.0	616.4
8	-4.062	-3.400	483.2	545.4	483.2	455.9	1.4	367.2	0.2	38.8	0.4208	0.4922	819.1	810.8	0.8271	0.5349	949.7	636.2
9	-6.042	-5.680	480.0	599.6	479.9	466.5	8.3	376.6	1.0	38.8	0.4146	0.4997	876.5	864.5	0.8569	0.5627	991.9	675.1
10	-6.911	-6.647	471.5	602.2	471.4	469.5	4.1	377.1	0.5	38.6	0.4058	0.5001	895.7	882.9	0.8682	0.5731	1008.6	690.2
11	-8.024	-7.975	453.5	583.5	453.1	468.6	-19.4	347.7	-2.4	36.4	0.3890	0.4823	915.1	901.7	0.8908	0.5998	1038.6	725.6

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	-0.33	3.98	19.03	50.52	42.90	54.16	0.4144	0.1473	0.0336	1.3943	89.73	89.26	49.15	-1.37	-579.2	14.3	1.8856
2	-0.89	3.56	13.68	49.21	43.33	52.52	0.4475	0.1605	0.0375	1.3881	88.63	88.11	49.07	-0.14	-581.0	1.4	1.8819
3	-0.92	3.65	10.17	46.75	43.56	51.72	0.4677	0.1612	0.0386	1.3811	88.23	87.70	49.43	2.64	-589.4	-25.7	1.8737
4	1.37	6.16	8.21	35.35	42.29	51.51	0.4603	0.1158	0.0284	1.3441	89.73	89.32	53.12	17.77	-655.9	-174.1	1.8074
5	4.74	9.32	6.68	23.31	39.87	47.49	0.4471	0.1208	0.0281	1.2928	86.39	85.91	58.21	34.90	-753.1	-346.4	1.7160
6	5.43	9.77	5.06	18.53	39.50	44.05	0.4553	0.1622	0.0362	1.2643	80.27	79.64	59.80	41.27	-792.4	-404.5	1.6787
7	4.62	8.70	3.96	16.28	40.56	42.96	0.4595	0.1830	0.0407	1.2514	77.04	76.33	59.49	43.21	-801.4	-422.3	1.6722
8	4.00	7.81	1.83	15.23	41.58	43.65	0.4503	0.1874	0.0421	1.2477	75.82	75.08	59.38	44.15	-817.6	-443.6	1.6773
9	4.14	6.82	-0.96	14.82	40.68	44.17	0.4469	0.1856	0.0449	1.2640	76.06	75.29	60.95	46.13	-868.1	-487.9	1.6964
10	4.80	6.98	0.28	15.05	39.69	44.25	0.4453	0.1797	0.0446	1.2726	76.87	76.09	62.00	46.96	-891.7	-505.8	1.7015
11	6.50	8.19	3.96	14.39	37.90	43.88	0.4320	0.1759	0.0431	1.2733	76.57	75.78	64.01	49.62	-934.5	-554.0	1.6865

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.2049	1.7436	83.93	85.12	30.73	1.0946	1.3018	82.58	83.20

STATOR 2

RUN NO 9, SPEED CODE 70, POINT NO 3

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	8.689	0.847	884.5	639.2	629.5	638.9	621.3	21.4	44.9	1.9	0.7576	0.5331	1.7920	1.2196	1.3254	1.1114
2	7.631	0.743	867.5	646.8	604.7	646.2	622.1	27.2	46.0	2.4	0.7423	0.5403	1.8048	1.2177	1.3318	1.1114
3	6.495	0.465	847.2	662.7	588.4	662.7	609.5	3.5	46.2	0.3	0.7243	0.5553	1.8279	1.2138	1.3467	1.1104
4	3.627	-0.508	762.0	616.6	569.6	616.4	506.1	-14.1	41.7	-1.3	0.6482	0.5171	1.7847	1.2024	1.3269	1.0988
5	0.920	-0.953	653.7	525.8	519.4	525.1	397.0	-27.2	37.4	-3.0	0.5524	0.4396	1.6989	1.1929	1.2797	1.0886
6	-0.337	-0.903	610.3	486.3	483.6	485.3	372.3	-30.9	37.5	-3.6	0.5145	0.4060	1.6660	1.1895	1.2561	1.0870
7	-1.120	-0.882	601.0	480.9	472.3	480.0	371.6	-30.1	38.2	-3.6	0.5064	0.4016	1.6616	1.1882	1.2452	1.0866
8	-1.970	-0.903	604.3	488.3	479.3	487.6	368.0	-26.4	37.5	-3.1	0.5089	0.4078	1.6667	1.1891	1.2399	1.0866
9	-4.399	-1.094	622.3	514.0	493.9	514.0	378.5	-0.9	37.5	-0.1	0.5196	0.4257	1.6784	1.2125	1.2504	1.0917
10	-5.217	-1.181	627.6	520.2	500.0	520.0	379.2	12.0	37.2	1.3	0.5222	0.4293	1.6752	1.2220	1.2558	1.0935
11	-6.005	-1.177	614.1	505.5	504.5	505.5	350.1	7.7	34.9	0.9	0.5089	0.4155	1.6632	1.2291	1.2558	1.0941

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-3.55	-1.99	13.73	42.58	56.73	62.52	0.4302	0.1569	0.0354	0.9502	82.52	83.87	75.11	76.06
2	-1.38	0.64	13.66	43.63	55.06	63.56	0.4131	0.1348	0.0310	0.9584	84.34	85.56	76.43	77.35
3	-0.46	2.04	11.15	45.88	54.15	65.71	0.3887	0.0857	0.0201	0.9745	87.91	88.87	80.22	81.01
4	-3.88	-0.02	9.01	42.99	53.51	61.41	0.3628	0.0554	0.0138	0.9863	88.84	89.69	85.01	85.57
5	-7.34	-2.03	7.34	40.33	49.27	52.01	0.3732	0.0610	0.0163	0.9885	84.67	85.75	82.29	82.87
6	-6.85	-1.06	6.58	41.19	45.89	47.94	0.3882	0.0522	0.0144	0.9913	82.83	84.00	77.29	77.98
7	-6.07	-0.08	6.59	41.74	44.85	47.41	0.3874	0.0360	0.0101	0.9942	82.90	84.06	74.58	75.32
8	-6.56	-0.36	7.01	40.58	45.53	48.16	0.3766	0.0353	0.0100	0.9943	83.04	84.19	73.07	73.84
9	-6.31	0.39	10.07	37.59	46.32	49.78	0.3532	0.0620	0.0182	0.9896	75.00	76.72	71.78	72.63
10	-7.22	-0.35	12.09	35.92	46.62	49.92	0.3456	0.0777	0.0230	0.9868	71.84	73.78	71.77	72.64
11	-10.87	-3.78	12.80	33.99	46.66	48.05	0.3439	0.0847	0.0253	0.9863	68.21	70.37	71.31	72.19

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
7500.	109.70	1.2049	1.7170	81.44	82.77	1.0946	0.9848	77.61

TABLE XV(d) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA (Uniform Inlet Flow, 70 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 9, SPEED CODE 70, POINT NO 4

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	16.421	17.588	305.5	715.9	305.5	369.2	0.0	613.4	0.0	58.9	0.2757	0.6359	440.1	509.4	0.4834	0.3404	535.7	383.5
2	13.671	15.383	311.8	688.2	311.8	377.6	0.0	575.4	0.0	56.7	0.2814	0.6096	474.5	534.1	0.5125	0.3364	567.8	379.8
3	11.102	13.035	317.8	663.2	317.8	378.8	0.0	544.3	0.0	55.1	0.2869	0.5861	508.3	558.7	0.5412	0.3350	599.5	379.1
4	4.367	7.078	329.8	610.5	329.8	364.4	0.0	489.9	0.0	53.3	0.2979	0.5363	605.2	632.7	0.6226	0.3438	689.2	391.4
5	-2.032	0.760	331.9	570.4	331.9	346.7	0.0	452.9	0.0	52.6	0.2998	0.4976	726.1	731.3	0.7213	0.3879	798.3	444.7
6	-4.930	-1.990	328.8	566.4	328.8	370.4	0.0	428.4	0.0	49.2	0.2970	0.4937	784.2	780.6	0.7681	0.4455	850.4	511.1
7	-6.695	-3.385	325.8	576.4	325.8	389.2	0.0	425.2	0.0	47.6	0.2943	0.5023	812.9	805.2	0.7910	0.4740	875.8	543.9
8	-8.646	-4.850	321.5	565.6	321.5	384.7	0.0	441.5	0.0	49.0	0.2903	0.5088	841.6	829.5	0.8135	0.4750	901.0	546.7
9	-13.864	-9.190	303.4	596.3	303.4	316.3	0.0	505.5	0.0	58.0	0.2737	0.5116	927.3	903.8	0.8802	0.4365	975.7	508.7
10	-14.757	-10.271	297.1	582.9	297.1	252.8	0.0	525.2	0.0	64.3	0.2679	0.4974	955.8	928.5	0.9027	0.4061	1000.9	476.0
11	-14.270	-11.086	292.4	573.0	292.4	225.4	0.0	526.8	0.0	66.8	0.2636	0.4875	984.4	953.1	0.9259	0.4102	1026.9	482.2

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC	PO/PO INLET
1	8.60	13.20	12.24	70.69	22.50	29.54	0.5561	-0.0042	-0.0009	1.3981	100.19	100.22	54.98	-15.71	-440.1	103.9	1.3981
2	8.60	12.90	13.38	62.64	22.93	30.59	0.5804	-0.0110	-0.0025	1.3924	100.54	100.59	56.42	-6.23	-474.5	41.3	1.3924
3	8.71	12.82	13.70	55.55	23.33	30.97	0.5986	-0.0015	-0.0004	1.3857	100.06	100.05	57.72	2.17	-508.3	-14.4	1.3857
4	9.74	13.21	11.69	39.88	24.13	30.27	0.6293	0.0596	0.0148	1.3739	95.72	95.55	61.25	21.37	-605.2	-142.9	1.3739
5	10.93	13.61	8.48	26.69	24.27	29.07	0.6183	0.1303	0.0305	1.3688	88.78	88.30	65.44	38.75	-726.1	-278.4	1.3688
6	11.39	13.67	6.23	23.76	24.07	31.20	0.5628	0.1154	0.0265	1.3740	89.03	88.56	67.33	43.57	-784.2	-352.2	1.3740
7	11.69	13.79	4.03	23.94	23.87	32.80	0.5417	0.1129	0.0262	1.3833	88.91	88.42	68.27	44.34	-812.9	-380.0	1.3833
8	12.05	14.00	2.45	23.56	23.58	32.23	0.5605	0.1553	0.0363	1.3892	84.77	84.08	69.26	45.31	-841.6	-388.4	1.3892
9	13.16	14.58	4.82	20.58	22.36	25.87	0.6657	0.3228	0.0711	1.3931	69.24	67.80	72.20	51.62	-927.3	-398.4	1.3931
10	13.36	14.65	10.96	15.08	21.92	20.52	0.7134	0.3814	0.0732	1.3858	64.21	62.56	73.04	51.96	-955.8	-403.3	1.3858
11	13.30	14.46	15.77	11.53	21.60	18.27	0.7188	0.4065	0.0698	1.3823	61.89	60.15	73.64	62.11	-984.4	-426.3	1.3823

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1160	1.3819	83.53	84.24	22.42	1.1160	1.3819	83.53	84.24

STATOR 1

RUN NO 9, SPEED CODE 70, POINT NO 4

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/TO1
1	18.075	14.926	714.8	410.8	388.0	410.8	600.4	4.0	57.3	0.5	0.6345	0.3552	1.3506	1.1004	1.3506	1.1004
2	15.768	13.245	689.7	413.5	395.4	413.2	565.2	17.4	55.1	2.4	0.6110	0.3579	1.3549	1.0987	1.3549	1.0987
3	13.731	11.665	666.5	415.2	395.9	414.7	536.2	20.7	53.6	2.8	0.5893	0.3595	1.3575	1.0977	1.3579	1.0977
4	8.619	7.242	617.0	395.0	380.2	394.8	485.9	12.2	52.0	1.8	0.5423	0.3414	1.3489	1.0993	1.3489	1.0993
5	3.135	2.063	578.0	372.7	360.1	372.6	452.2	-6.4	51.5	-1.0	0.5046	0.3206	1.3382	1.1063	1.3382	1.1063
6	1.134	0.071	573.7	371.2	381.1	371.2	428.7	-4.6	48.4	-0.7	0.5003	0.3193	1.3389	1.1069	1.3389	1.1069
7	0.446	-0.645	583.2	384.2	398.5	384.1	425.8	6.4	46.9	1.0	0.5085	0.3304	1.3470	1.1083	1.3470	1.1083
8	-0.220	-1.255	592.3	398.3	394.3	398.1	442.0	13.4	48.3	1.9	0.5150	0.3422	1.3567	1.1123	1.3567	1.1123
9	-2.924	-3.629	603.6	386.2	327.4	386.2	507.1	-3.5	57.1	-0.5	0.5183	0.3276	1.3590	1.1393	1.3590	1.1393
10	-4.749	-4.998	591.1	370.6	265.9	370.1	527.9	-17.6	63.2	-2.7	0.5048	0.3125	1.3539	1.1504	1.3539	1.1504
11	-6.910	-6.861	581.3	355.0	236.8	353.7	530.9	-30.7	66.0	-5.0	0.4949	0.2977	1.3487	1.1609	1.3487	1.1609

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	4.74	6.85	12.88	56.75	31.06	36.23	0.5891	0.1431	0.0293	0.9659	89.41	89.82	89.41	89.82
2	4.29	6.69	13.62	52.74	32.00	36.58	0.5634	0.1213	0.0257	0.9728	91.87	92.18	91.87	92.18
3	4.10	6.89	13.23	50.78	32.31	36.80	0.5431	0.0966	0.0213	0.9797	93.59	93.83	93.59	93.83
4	4.98	8.70	11.03	50.22	31.49	34.97	0.5450	0.1011	0.0247	0.9816	90.02	90.41	90.02	90.41
5	9.97	11.02	8.32	52.47	30.08	32.76	0.5723	0.1389	0.0380	0.9777	81.73	82.43	81.73	82.43
6	3.35	8.96	8.65	49.08	32.00	32.65	0.5667	0.1493	0.0427	0.9767	81.39	82.11	81.39	82.11
7	2.09	7.97	10.34	45.94	33.48	33.83	0.5444	0.1415	0.0413	0.9775	82.11	82.82	82.11	82.82
8	3.65	9.79	11.36	46.32	32.94	35.04	0.5303	0.1302	0.0386	0.9787	81.28	82.04	81.28	82.04
9	12.49	19.37	10.02	57.63	26.69	33.41	0.6142	0.1472	0.0459	0.9752	65.84	67.26	65.84	67.26
10	18.31	25.36	9.05	65.97	21.51	31.74	0.6632	0.1603	0.0507	0.9735	60.22	61.85	60.22	61.85
11	20.37	27.52	8.34	70.97	19.13	30.07	0.7036	0.1562	0.0499	0.9757	55.46	57.26	55.46	57.26

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
7487.	98.70	1.1160	1.3502	77.28	78.19	1.1160	0.9771	77.28

ROTOR 2

RUN NO 9, SPEED CODE 70, POINT NO 4

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	11.598	10.913	437.6	823.0	437.6	526.6	3.7	632.5	0.5	50.1	0.3790	0.6984	583.8	612.4	0.6293	0.4472	726.7	527.0
2	10.758	9.526	444.1	808.8	443.8	506.9	16.8	630.2	2.2	51.1	0.3851	0.6858	600.3	625.2	0.6356	0.4299	733.1	507.0
3	9.769	8.234	449.1	792.7	448.6	512.4	20.6	604.8	2.6	49.6	0.3897	0.6721	617.4	638.5	0.6479	0.4354	746.6	513.6
4	5.780	4.534	435.4	705.0	435.3	486.0	12.0	510.8	1.6	46.4	0.3773	0.5946	670.2	681.0	0.6836	0.4343	789.1	514.9
5	0.069	-0.084	410.1	602.8	410.0	440.3	-6.4	411.7	-0.9	43.1	0.3536	0.5042	743.0	742.5	0.7365	0.4606	854.3	550.7
6	-2.443	-2.291	402.8	568.4	402.8	402.2	-5.0	401.6	-0.7	44.9	0.3470	0.4737	780.1	775.3	0.7603	0.4576	882.4	549.0
7	-3.266	-3.131	412.0	563.9	412.0	389.7	5.8	407.5	0.8	46.3	0.3550	0.4693	798.8	792.2	0.7699	0.4557	893.6	547.6
8	-3.734	-3.774	426.0	568.0	425.8	391.9	13.7	411.2	1.8	46.3	0.3668	0.4719	817.7	809.5	0.7832	0.4641	909.8	558.7
9	-5.383	-5.643	430.1	582.2	430.1	424.0	-1.8	399.0	-0.2	43.1	0.3659	0.4778	875.0	863.1	0.8309	0.5158	976.6	628.5
10	-6.429	-6.609	422.5	574.5	422.2	430.5	-16.2	380.3	-2.2	41.3	0.3575	0.4688	894.2	881.4	0.8492	0.5391	1003.6	660.7
11	-7.808	-7.985	413.0	559.2	411.9	435.6	-30.8	344.3	-4.3	38.2	0.3475	0.4506	913.5	900.1	0.8668	0.5732	1030.3	706.2

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	PO/PO INLET
1	3.42	7.73	18.22	55.08	38.27	49.10	0.4767	0.1722	0.0392	1.3936	89.11	88.61	52.90	-2.18	-580.1	20.1	1.8826
2	2.77	7.22	13.25	53.30	38.90	47.69	0.5083	0.1817	0.0425	1.3883	88.25	87.71	52.73	-0.57	-583.5	5.1	1.8815
3	2.73	7.31	11.27	49.34	39.38	48.70	0.5047	0.1573	0.0376	1.3841	89.29	88.81	53.08	3.74	-596.8	-33.6	1.8792
4	4.79	9.59	9.72	37.27	38.08	46.82	0.5115	0.1412	0.0343	1.3402	88.29	87.82	56.54	19.28	-658.1	-170.2	1.8071
5	7.85	12.42	8.70	24.40	35.66	42.44	0.4953	0.1604	0.0364	1.2862	83.29	82.71	61.32	36.92	-749.4	-330.8	1.7210
6	8.47	12.80	6.67	19.95	35.10	38.67	0.5146	0.2110	0.0459	1.2640	76.93	76.18	62.84	42.88	-785.1	-373.7	1.6940
7	7.66	11.74	5.34	17.93	35.97	37.43	0.5244	0.2346	0.0509	1.2555	73.98	73.16	62.53	44.60	-793.0	-384.6	1.6924
8	6.67	10.48	3.09	16.64	37.18	37.58	0.5228	0.2453	0.0539	1.2524	72.37	71.50	62.05	45.41	-804.0	-398.2	1.6991
9	6.93	5.61	0.33	16.31	36.78	40.02	0.4956	0.2366	0.0559	1.2646	72.24	71.33	63.74	47.43	-876.8	-464.0	1.7201
10	7.78	9.96	2.48	15.82	35.73	40.31	0.4809	0.2267	0.0538	1.2659	72.53	71.62	64.98	49.16	-910.4	-501.1	1.7158
11	8.80	10.49	6.10	14.55	34.48	40.46	0.4495	0.1981	0.0463	1.2613	74.30	73.46	66.31	51.76	-944.4	-555.9	1.7016

TO/TO INLET	PO/PC INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.2240	1.7551	77.75	79.41	27.62	1.0968	1.2998	80.15	80.85

STATOR 2

RUN NO 9, SPEED CODE 70, POINT NO 4

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	8.642	0.809	838.9	580.7	558.3	580.2	626.1	24.1	48.6	2.4	0.7132	0.4811	1.7977	1.2236	1.3311	1.1120
2	7.539	0.657	823.9	587.1	537.1	586.8	624.8	19.0	49.5	1.9	0.6998	0.4871	1.8076	1.2219	1.3343	1.1120
3	6.441	0.371	807.4	600.2	539.5	600.1	600.6	12.0	48.2	1.1	0.6856	0.4992	1.8247	1.2182	1.3437	1.1098
4	3.921	-0.478	719.3	555.5	508.3	555.4	508.9	-8.0	45.1	-0.8	0.6075	0.4623	1.7874	1.2087	1.3253	1.0994
5	1.114	-1.119	616.3	461.3	459.0	460.7	411.2	-22.9	41.8	-2.8	0.5161	0.3819	1.7092	1.2058	1.2773	1.0899
6	-0.159	-1.061	582.2	418.6	421.5	418.0	401.7	-22.5	43.6	-3.1	0.4858	0.3454	1.6782	1.2072	1.2530	1.0906
7	-0.997	-1.038	578.1	415.6	409.5	415.2	408.1	-19.2	44.9	-2.6	0.4816	0.3426	1.6758	1.2096	1.2444	1.0915
8	-1.952	-1.072	582.8	420.2	412.1	419.9	412.1	-15.5	45.0	-2.1	0.4847	0.3458	1.6779	1.2141	1.2371	1.0926
9	-4.621	-1.297	600.9	460.3	447.5	460.3	401.0	-2.1	41.9	-0.3	0.4938	0.3745	1.6974	1.2466	1.2479	1.0970
10	-5.380	-1.350	596.2	464.5	457.3	464.5	382.5	-0.6	40.0	-0.1	0.4873	0.3762	1.6965	1.2590	1.2519	1.0969
11	-6.073	-1.268	582.1	450.7	467.6	450.7	346.7	-0.7	36.7	-0.1	0.4734	0.3633	1.6832	1.2686	1.2479	1.0929

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	0.10	1.66	14.19	46.18	51.56	58.21	0.4693	0.1566	0.0354	0.9549	81.49	82.93	75.89	76.82
2	2.11	4.13	13.10	47.68	50.08	59.12	0.4570	0.1408	0.0324	0.9606	82.97	84.30	76.51	77.42
3	1.59	4.09	11.99	47.08	50.85	60.86	0.4297	0.1077	0.0253	0.9708	85.84	86.97	80.05	80.84
4	-0.46	3.41	9.50	45.92	48.63	56.56	0.4087	0.0539	0.0134	0.9878	86.39	87.44	84.12	84.72
5	-2.87	2.44	7.46	44.68	44.00	46.47	0.4423	0.0460	0.0123	0.9924	80.36	81.75	80.37	81.01
6	-0.81	4.98	7.14	46.67	40.29	41.89	0.4833	0.0652	0.0180	0.9902	76.86	78.46	73.33	74.14
7	0.63	6.63	7.52	47.50	39.10	41.51	0.4879	0.0637	0.0178	0.9907	75.78	77.45	70.30	71.17
8	0.92	7.13	7.99	47.09	39.29	41.83	0.4877	0.0812	0.0230	0.9880	74.39	76.16	67.56	68.49
9	-1.90	4.80	9.90	42.16	41.93	44.72	0.4320	0.0863	0.0253	0.9868	66.09	68.48	67.15	68.14
10	-4.48	2.40	10.71	40.05	42.46	44.64	0.4113	0.0738	0.0218	0.9890	62.86	65.47	68.17	69.15
11	-9.08	-1.98	11.85	36.74	43.00	42.85	0.4038	0.0742	0.0221	0.9895	59.64	62.43	70.06	70.96

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
7487.	98.70	1.2240	1.7283	75.46	77.24	1.0968	0.9840	75.29

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE XVI(a) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA (Uniform Inlet Flow, 85 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 9, SPEED CODE 85, POINT NO 21

SL	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
1	16.641	18.437	467.8	924.0	467.8	554.4	0.0	739.2	0.0	53.2	0.4454	0.8237	534.3	618.5	0.6605	0.5058	723.5	567.4
2	14.129	16.166	497.7	889.0	497.7	554.4	0.0	695.0	0.0	51.5	0.4548	0.7893	576.1	648.4	0.6956	0.4939	761.3	556.3
3	11.838	14.035	507.2	861.9	507.2	553.9	0.0	660.3	0.0	50.0	0.4639	0.7627	617.1	678.3	0.7305	0.4904	798.8	554.2
4	5.978	8.256	530.1	784.1	530.1	544.0	0.0	564.7	0.0	46.1	0.4857	0.6885	734.7	768.2	0.8302	0.5100	906.0	580.8
5	0.114	1.811	544.9	684.4	544.9	495.5	0.0	472.1	0.0	43.6	0.4999	0.5956	881.9	887.8	0.9509	0.5629	1036.3	646.8
6	-1.962	-1.021	547.1	655.6	547.1	479.8	0.0	446.8	0.0	43.0	0.5021	0.5685	952.1	947.7	1.0078	0.6015	1098.1	693.6
7	-3.027	-2.378	547.3	666.4	547.3	509.8	0.0	429.0	0.0	40.1	0.5023	0.5788	987.0	977.6	1.0357	0.6505	1128.6	748.9
8	-4.259	-3.689	546.7	668.4	546.7	515.7	0.0	425.1	0.0	39.5	0.5017	0.5799	1021.8	1007.5	1.0635	0.6749	1158.8	777.9
9	-8.286	-7.529	538.7	685.2	538.7	536.3	0.0	432.9	0.0	38.9	0.4940	0.5951	1125.8	1097.3	1.1445	0.7372	1248.0	853.9
10	-9.775	-8.856	533.6	704.9	533.6	547.2	0.0	444.3	0.0	39.0	0.4891	0.6073	1160.4	1127.2	1.1707	0.7539	1277.2	875.1
11	-11.163	-10.220	527.4	685.6	527.4	513.7	0.0	454.1	0.0	41.4	0.4832	0.5873	1195.1	1157.2	1.1967	0.7459	1306.3	870.7

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHCVM-1	RHCVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC	PO/PO INLET
1	0.99	5.60	15.65	55.66	33.85	43.27	0.4583	0.0157	0.0034	1.6088	99.20	99.16	47.37	-12.31	-534.3	120.7	1.6088
2	1.12	5.42	14.80	53.74	34.39	44.02	0.4935	0.0245	0.0056	1.5941	98.61	96.53	48.94	-4.80	-576.1	46.5	1.5941
3	1.36	5.47	13.39	48.50	34.91	44.61	0.5155	0.0298	0.0071	1.5865	98.14	98.04	50.37	1.86	-617.1	-18.0	1.5865
4	2.57	6.04	10.84	33.55	36.12	45.15	0.5311	0.0472	0.0118	1.5513	96.21	95.99	54.07	20.52	-734.7	-203.5	1.5513
5	3.75	6.43	9.73	18.27	36.88	41.83	0.5151	0.0999	0.0230	1.4865	89.72	89.16	58.27	40.00	-881.5	-415.8	1.4865
6	4.19	6.47	8.89	13.89	37.00	40.72	0.4978	0.1171	0.0256	1.4743	87.02	86.32	60.12	46.23	-952.1	-500.9	1.4743
7	4.42	6.52	6.78	13.91	37.01	43.65	0.4596	0.0799	0.0177	1.4939	90.79	90.28	61.00	47.09	-987.0	-548.6	1.4939
8	4.64	6.60	5.61	13.40	36.98	44.28	0.4500	0.0825	0.0182	1.5026	90.31	89.76	61.86	48.47	-1021.8	-582.4	1.5026
9	5.38	6.81	4.24	13.39	36.57	46.19	0.4374	0.1094	0.0244	1.5401	86.93	86.13	64.43	51.04	-1125.8	-664.4	1.5401
10	5.62	6.92	4.22	14.09	36.31	47.09	0.4392	0.1249	0.0283	1.5602	85.24	84.31	65.31	51.22	-1160.4	-682.9	1.5602
11	5.84	6.99	7.40	12.43	35.96	43.84	0.4598	0.1752	0.0382	1.5409	79.24	77.97	66.17	53.74	-1195.1	-703.1	1.5409

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1446	1.5328	89.75	90.33	35.00	1.1446	1.5328	89.75	90.33

STATOR 1

RUN NO 9, SPEED CODE 85, POINT NO 21

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/TO1
1	18.309	14.990	929.0	636.4	582.6	636.3	723.7	3.5	51.4	0.3	0.8288	0.5481	1.5319	1.1467	1.5319	1.1467
2	16.091	13.290	897.5	630.1	582.6	629.8	682.7	19.7	49.7	1.8	0.7978	0.5429	1.5316	1.1446	1.5316	1.1446
3	14.028	11.668	873.0	629.2	582.1	628.5	650.5	28.1	48.3	2.5	0.7737	0.5422	1.5343	1.1437	1.5343	1.1437
4	8.554	7.207	800.0	614.5	571.1	614.5	560.2	4.2	44.5	0.4	0.7039	0.5300	1.5236	1.1391	1.5236	1.1391
5	2.351	1.711	702.9	569.1	521.6	569.0	471.3	-10.2	42.1	-1.0	0.6129	0.4899	1.4768	1.1346	1.4768	1.1346
6	-0.501	-0.875	674.6	552.1	505.1	552.0	447.2	-11.0	41.5	-1.1	0.5861	0.4744	1.4582	1.1357	1.4582	1.1357
7	-1.800	-1.992	685.0	572.4	533.4	572.4	429.9	-1.9	38.9	-0.2	0.5961	0.4929	1.4742	1.1349	1.4742	1.1349
8	-2.974	-2.582	687.2	589.5	538.9	589.5	426.4	4.9	38.4	0.5	0.5974	0.5076	1.4883	1.1379	1.4883	1.1379
9	-6.174	-5.908	710.0	620.9	560.8	620.4	435.5	26.2	37.9	2.4	0.6144	0.5324	1.5192	1.1530	1.5192	1.1530
10	-7.143	-6.901	726.7	628.4	572.8	627.5	447.3	32.1	38.1	2.9	0.6275	0.5372	1.5282	1.1612	1.5282	1.1612
11	-8.139	-7.982	709.7	587.6	542.4	587.5	457.6	-4.7	40.3	-0.5	0.6095	0.4988	1.4915	1.1686	1.4915	1.1686

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHCVM-1	RHCVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-1.17	0.94	12.64	51.07	45.30	56.19	0.4664	0.1315	0.0269	0.9523	88.34	89.00	88.34	89.00
2	-1.16	1.24	13.01	47.90	45.99	55.85	0.4481	0.1142	0.0242	0.9609	89.58	90.16	89.58	90.16
3	-1.24	1.54	12.94	45.74	46.54	55.90	0.4302	0.0999	0.0220	0.9674	90.52	91.05	90.52	91.05
4	-2.54	1.18	9.66	44.07	46.96	54.83	0.3962	0.0598	0.0146	0.9831	91.91	92.36	91.91	92.36
5	-3.42	1.63	8.28	43.12	43.60	50.37	0.3749	0.0270	0.0074	0.9941	87.55	88.19	87.55	88.19
6	-3.50	2.12	8.22	42.66	42.45	48.55	0.3768	0.0603	0.0172	0.9874	83.84	84.66	83.84	84.66
7	-5.92	-0.04	9.20	39.07	45.23	50.50	0.3491	0.0646	0.0188	0.9862	86.93	87.60	86.93	87.60
8	-6.22	-0.08	9.90	37.91	45.82	52.00	0.3260	0.0478	0.0142	0.9897	87.25	87.93	87.25	87.93
9	-6.71	0.17	12.97	35.45	47.78	54.46	0.3088	0.0642	0.0200	0.9855	82.94	83.90	82.94	83.90
10	-6.85	0.20	14.71	35.15	48.72	54.88	0.3177	0.0855	0.0270	0.9802	79.93	81.06	79.93	81.06
11	-5.35	1.80	12.86	40.73	45.72	50.79	0.3826	0.1439	0.0461	0.9681	71.76	73.28	71.76	73.28

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
9090.	154.10	1.1446	1.5036	85.48	86.27	1.1446	0.9810	85.48

ROTOR 2

RUN NO 9, SPEED CODE 85, POINT NO 21

SL	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'-I	V'-1 FT/SEC	V'-2 FT/SEC
1	11.437	11.154	704.4	1122.3	704.4	867.0	3.3	712.5	0.3	39.3	0.6108	0.9529	708.8	743.4	0.8645	0.7367	997.0	867.6
2	10.521	9.952	703.5	1075.5	703.3	817.6	19.1	698.8	1.6	40.4	0.6106	0.9089	728.8	759.0	0.8672	0.6928	999.2	819.8
3	9.546	8.837	705.8	1013.1	705.3	763.6	27.7	665.8	2.2	41.0	0.6130	0.8511	749.5	775.2	0.8764	0.6480	1009.2	771.4
4	6.369	5.711	658.7	926.8	658.6	762.3	4.3	527.1	0.4	34.7	0.6076	0.7778	813.6	826.7	0.9298	0.6874	1069.2	819.1
5	1.277	1.362	654.7	816.9	654.7	707.4	-10.2	408.5	-0.9	30.0	0.5681	0.6830	902.0	901.5	0.9742	0.7210	1122.8	862.3
6	-1.385	-0.869	631.4	735.6	631.3	646.7	-11.3	350.5	-1.0	28.4	0.5463	0.6124	947.1	941.2	0.9929	0.7292	1147.6	875.9
7	-2.547	-1.890	644.9	702.4	644.9	617.5	-2.1	334.6	-0.2	28.4	0.5589	0.5845	969.8	961.7	1.0109	0.7324	1166.4	880.1
8	-3.471	-2.825	657.5	701.3	657.5	626.2	4.7	315.8	0.4	26.7	0.5698	0.5843	992.7	982.7	1.0284	0.7621	1186.8	914.8
9	-5.824	-5.577	689.0	737.3	666.5	658.4	26.1	331.9	2.2	26.6	0.5548	0.6114	1062.3	1047.8	1.0740	0.8066	1244.1	972.7
10	-6.706	-6.615	701.0	774.7	700.2	699.1	33.7	333.8	2.7	25.4	0.6036	0.6429	1085.6	1070.1	1.0881	0.8426	1263.6	1015.3
11	-7.905	-7.557	666.9	753.7	666.8	705.4	-4.4	265.6	-0.4	20.5	0.5702	0.6244	1109.1	1092.8	1.1098	0.9005	1297.9	1087.1

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	V0'-1 FT/SEC	V0'-2 FT/SEC	PO/PO INLET
1	-4.52	-0.21	22.43	42.92	60.11	77.97	0.2958	0.1425	0.0325	1.5326	88.54	87.84	44.96	2.03	-705.5	-30.9	2.3479
2	-4.73	-0.28	18.02	41.02	60.12	73.89	0.3416	0.2035	0.0474	1.4819	82.95	82.00	45.22	4.20	-709.8	-60.2	2.2696
3	-4.69	-0.11	15.66	37.53	60.36	69.12	0.3891	0.2761	0.0655	1.4094	75.22	74.01	45.66	8.13	-721.8	-109.3	2.1623
4	-2.50	2.30	11.51	27.78	59.81	71.10	0.3592	0.2151	0.0515	1.3595	76.39	75.36	49.25	21.47	-809.3	-299.7	2.0735
5	0.87	5.45	6.66	19.46	55.75	67.10	0.3367	0.1694	0.0394	1.3167	77.41	76.54	54.34	34.88	-912.2	-493.0	1.9467
6	2.23	6.57	6.17	14.23	53.60	61.04	0.3295	0.1798	0.0394	1.2641	72.66	71.76	56.60	42.38	-958.4	-590.7	1.8415
7	1.53	5.60	6.13	11.01	55.04	58.27	0.3325	0.2084	0.0446	1.2238	65.70	64.74	56.40	45.39	-971.9	-627.1	1.8026
8	0.92	4.73	4.41	9.58	56.19	59.25	0.3100	0.1894	0.0407	1.2127	66.38	65.48	56.30	46.73	-988.0	-666.9	1.8031
9	-0.55	2.13	0.15	5.02	58.47	62.04	0.3017	0.1859	0.0441	1.2204	66.24	65.30	56.26	47.24	-1036.2	-716.0	1.8513
10	-1.01	1.17	-0.37	5.89	59.16	66.22	0.2795	0.1405	0.0352	1.2467	74.11	73.32	56.19	46.31	-1051.9	-736.3	1.9067
11	1.42	3.12	3.73	9.55	55.62	66.84	0.2371	0.0687	0.0169	1.2606	86.02	85.57	58.94	49.39	-1113.4	-827.2	1.8855

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.2643	1.9633	80.29	82.04	39.21	1.1046	1.3057	75.43	76.32

STATOR 2

RUN NO 9, SPEED CODE 85, POINT NO 21

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	9.017	1.078	1163.6	964.5	925.4	939.5	705.4	-218.2	37.6	-13.1	0.9948	0.8000	1.8241	1.3158	1.1907	1.1473
2	8.256	1.217	1116.2	997.4	874.9	974.0	693.1	-214.9	38.7	-12.4	0.9491	0.8323	1.8972	1.3122	1.2388	1.1457
3	7.371	1.211	1053.3	1020.4	819.0	998.8	662.3	-209.0	39.2	-11.8	0.8899	0.8566	1.9578	1.3060	1.2774	1.1414
4	4.674	0.818	963.9	979.5	808.0	968.0	525.7	-149.7	33.1	-8.8	0.8129	0.8261	1.9283	1.2822	1.2611	1.1244
5	1.821	0.213	856.2	920.5	752.4	911.6	408.8	-127.6	28.5	-8.0	0.7192	0.7785	1.8630	1.2580	1.2536	1.1085
6	0.382	-0.174	775.3	869.4	655.8	861.6	351.0	-116.2	26.7	-7.7	0.6517	0.7339	1.7922	1.2478	1.2275	1.0987
7	-0.474	-0.393	747.7	842.5	668.3	833.9	335.3	-120.3	26.6	-8.2	0.6245	0.7108	1.7563	1.2413	1.1981	1.0935
8	-1.541	-0.593	747.3	827.0	676.9	816.4	316.5	-132.4	25.0	-9.2	0.6254	0.6980	1.7361	1.2365	1.1714	1.0881
9	-4.660	-0.986	788.1	855.5	713.9	852.9	333.9	-67.2	25.1	-4.5	0.6570	0.7189	1.7574	1.2539	1.1592	1.0891
10	-5.548	-1.069	828.7	884.4	757.6	883.4	336.0	-42.0	24.0	-2.7	0.6918	0.7433	1.7887	1.2619	1.1698	1.0884
11	-6.214	-1.090	816.1	866.5	771.3	866.2	266.6	-35.4	19.1	-2.3	0.6806	0.7272	1.7531	1.2610	1.1724	1.0796

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-10.84	-9.28	-1.24	50.66	80.46	73.70	0.3531	0.4775	0.1051	0.7746	59.21	62.43	34.58	36.14
2	-8.77	-6.75	-1.18	51.09	76.70	77.82	0.3050	0.3900	0.0877	0.8234	64.18	67.19	43.13	44.77
3	-7.47	-4.96	-0.97	50.99	72.06	81.30	0.2460	0.2688	0.0617	0.8864	69.04	71.76	51.07	52.70
4	-12.42	-8.55	1.52	41.93	73.54	80.84	0.1722	0.2067	0.0507	0.9257	73.04	75.38	55.00	56.42
5	-16.20	-10.89	2.34	36.47	69.80	77.54	0.1131	0.1814	0.0481	0.9454	75.29	77.32	61.32	62.51
6	-17.66	-11.87	2.55	34.41	64.21	73.26	0.0744	0.1536	0.0421	0.9601	73.09	75.17	60.90	61.99
7	-17.62	-11.63	1.97	34.80	61.63	70.92	0.0615	0.1433	0.0398	0.9659	72.27	74.34	56.39	57.46
8	-19.02	-12.81	0.91	34.23	62.58	69.47	0.0661	0.1601	0.0449	0.9629	72.09	74.14	52.33	53.35
9	-18.71	-12.01	5.67	29.59	65.50	71.47	0.0613	0.1987	0.0581	0.9502	68.77	71.10	48.21	49.25
10	-20.48	-13.60	8.06	26.69	69.66	73.69	0.0660	0.2241	0.0662	0.9388	68.92	71.31	51.66	52.69
11	-26.60	-19.50	9.60	21.47	70.64	71.62	0.0491	0.2629	0.0784	0.9299	66.55	69.04	58.20	59.11

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
9090.	154.10	1.2643	1.8222	70.64	72.97	1.1046	0.9281	53.77

ORIGINAL PAGE IS OF POOR QUALITY

TABLE XVI(b) — OVERALL PERFORMANCE AND BLADE-ELEMENT DATA
(Uniform Inlet Flow, 85 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 9, SPEED CODE 85, POINT NO 12

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	16.661	18.193	487.3	928.2	487.3	537.4	0.0	756.8	0.0	54.6	0.4449	0.8265	533.8	618.0	0.6599	0.4942	722.8	555.0
2	14.183	15.714	496.5	891.1	496.5	541.4	0.0	707.8	0.0	52.6	0.4537	0.7904	575.6	647.9	0.6946	0.4831	760.2	544.7
3	11.686	13.426	505.4	863.2	505.4	547.8	0.0	667.1	0.0	50.6	0.4621	0.7635	616.7	677.8	0.7290	0.4847	797.3	547.9
4	5.954	7.466	526.1	781.6	526.1	538.0	0.0	567.0	0.0	46.5	0.4819	0.6860	734.2	767.6	0.8274	0.5039	903.2	574.2
5	0.326	1.049	537.4	684.4	537.4	488.5	0.0	479.3	0.0	44.4	0.4928	0.5950	880.8	887.1	0.9461	0.5533	1031.8	636.4
6	-1.282	-1.612	538.9	647.3	538.9	462.8	0.0	452.6	0.0	44.4	0.4942	0.5604	951.3	946.9	1.0027	0.5863	1093.4	677.2
7	-2.226	-2.813	539.1	661.8	539.1	499.6	0.0	434.1	0.0	41.0	0.4944	0.5742	986.2	976.8	1.0307	0.6400	1123.9	737.7
8	-3.554	-3.989	538.7	670.9	538.7	519.7	0.0	424.2	0.0	39.2	0.4940	0.5823	1021.0	1006.8	1.0586	0.6776	1154.4	780.7
9	-8.016	-7.579	530.7	682.2	530.7	526.4	0.0	434.0	0.0	39.5	0.4863	0.5886	1124.9	1096.4	1.1398	0.7300	1243.8	846.2
10	-9.596	-8.859	525.5	695.4	525.5	531.6	0.0	448.3	0.0	40.1	0.4813	0.5981	1159.5	1126.4	1.1660	0.7410	1273.0	861.6
11	-11.059	-10.204	519.1	683.9	519.1	506.8	0.0	459.3	0.0	42.1	0.4752	0.5853	1194.1	1156.2	1.1920	0.7375	1302.1	861.7

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	PO/PO INLET
1	1.00	5.60	13.46	61.88	33.82	41.97	0.4804	0.0344	0.0073	1.6182	98.29	98.19	47.38	-14.49	-533.8	138.8	1.6182
2	1.17	5.47	13.30	55.29	34.33	43.08	0.5116	0.0346	0.0079	1.6024	98.09	97.97	48.99	-6.30	-575.6	59.8	1.6024
3	1.44	5.55	12.65	49.33	34.81	44.30	0.5239	0.0249	0.0060	1.5954	98.47	98.39	50.45	1.12	-616.7	-10.7	1.5954
4	2.75	6.22	10.74	33.83	35.92	44.86	0.5373	0.0425	0.0106	1.5563	96.63	96.43	54.25	20.42	-734.2	-200.6	1.5563
5	4.08	6.77	9.58	18.75	36.50	41.40	0.5242	0.1025	0.0236	1.4945	89.72	89.15	58.60	39.85	-880.8	-407.9	1.4945
6	4.54	6.82	9.56	13.58	36.58	39.42	0.5104	0.1272	0.0275	1.4755	86.23	85.48	60.47	46.90	-951.3	-494.4	1.4755
7	4.75	6.85	7.06	13.95	36.59	43.01	0.4669	0.0816	0.0179	1.5006	90.87	90.36	61.33	47.38	-986.2	-542.8	1.5006
8	4.96	6.91	5.41	13.91	36.57	45.05	0.4434	0.0616	0.0136	1.5185	92.90	92.49	62.17	48.26	-1021.0	-582.5	1.5185
9	5.68	7.11	4.68	13.25	36.15	45.71	0.4413	0.1037	0.0229	1.5475	87.77	87.01	64.73	51.48	-1124.9	-662.5	1.5475
10	5.93	7.22	4.83	13.78	35.88	46.06	0.4487	0.1276	0.0285	1.5648	85.14	84.20	65.61	51.83	-1159.5	-678.0	1.5648
11	6.15	7.30	7.53	12.61	35.55	43.62	0.4662	0.1711	0.0372	1.5546	80.07	78.82	66.48	53.87	-1194.1	-696.9	1.5546

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	T02/T01	P02/P01	EFF-AD ROTOR %	EFF-P ROTOR %
1.1457	1.5412	90.27	90.83	34.68	1.1457	1.5412	90.27	90.83

STATOR 1

RUN NO 9, SPEED CODE 85, POINT NO 12

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	T02/ T01
1	18.013	14.709	932.0	616.4	565.4	616.3	740.8	-8.6	52.8	-0.8	0.8303	0.5291	1.5320	1.1500	1.5320	1.1500
2	15.561	12.803	898.6	614.4	569.4	614.3	695.2	9.9	50.8	0.9	0.7979	0.5280	1.5348	1.1470	1.5348	1.1470
3	13.355	11.023	873.4	616.3	575.4	615.9	657.1	21.6	48.8	2.0	0.7736	0.5302	1.5396	1.1450	1.5396	1.1450
4	7.783	6.153	796.8	601.8	564.4	601.8	562.4	5.9	44.9	0.6	0.7006	0.5184	1.5267	1.1395	1.5267	1.1395
5	1.602	0.247	701.8	560.0	513.4	559.9	478.5	-12.0	43.0	-1.2	0.6113	0.4813	1.4805	1.1365	1.4805	1.1365
6	-1.319	-2.389	665.4	535.5	487.4	535.4	453.0	-13.1	42.9	-1.4	0.5771	0.4592	1.4559	1.1374	1.4559	1.1374
7	-2.534	-3.451	680.4	561.7	523.4	561.7	434.8	-3.1	39.7	-0.3	0.5915	0.4830	1.4769	1.1359	1.4769	1.1359
8	-3.522	-4.307	689.3	585.0	542.3	585.0	425.6	1.9	38.2	0.2	0.5995	0.5037	1.4972	1.1372	1.4972	1.1372
9	-6.282	-6.645	702.8	613.0	550.7	612.8	436.6	18.4	38.5	1.7	0.6076	0.5253	1.5247	1.1531	1.5247	1.1531
10	-7.200	-7.406	716.7	621.7	556.7	621.2	451.4	25.8	39.1	2.4	0.6179	0.5309	1.5334	1.1625	1.5334	1.1625
11	-8.175	-8.236	707.1	585.4	534.6	585.3	462.9	-9.8	41.0	-1.0	0.6066	0.4965	1.5002	1.1704	1.5002	1.1704

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	0.26	2.37	11.54	53.60	44.04	54.79	0.4955	0.1457	0.0298	0.9471	86.40	87.17	86.40	87.17
2	-0.08	2.32	12.14	49.85	45.07	54.88	0.4710	0.1225	0.0260	0.9581	88.56	89.20	88.56	89.20
3	-0.71	2.08	12.38	46.82	46.21	55.24	0.4481	0.1056	0.0233	0.9656	90.50	91.04	90.50	91.04
4	-2.15	1.57	9.83	44.30	46.63	54.09	0.4099	0.0638	0.0156	0.9822	92.09	92.52	92.09	92.52
5	-2.54	2.51	8.08	44.19	43.11	49.80	0.3901	0.0386	0.0105	0.9915	86.90	87.58	86.90	87.58
6	-2.11	3.50	7.96	44.31	41.14	47.26	0.3960	0.0715	0.0205	0.9855	82.44	83.32	82.44	83.32
7	-5.06	0.82	9.07	40.07	44.66	49.83	0.3639	0.0848	0.0248	0.9820	86.71	87.40	86.71	87.40
8	-6.43	-0.29	9.61	37.99	46.57	52.04	0.3351	0.0698	0.0207	0.9849	89.09	89.67	89.09	89.67
9	-6.12	0.76	12.27	36.77	47.32	54.17	0.3159	0.0688	0.0215	0.9848	83.66	84.58	83.66	84.58
10	-5.80	1.25	14.16	36.75	47.70	54.63	0.3226	0.0873	0.0276	0.9802	79.95	81.10	79.95	81.10
11	-4.61	2.54	12.35	41.98	45.47	50.87	0.3882	0.1587	0.0508	0.9651	72.09	73.61	72.09	73.61

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	T02/T01	P02/P01	EFF-AD STAGE %
9083.	152.70	1.1457	1.5084	85.51	86.31	1.1457	0.9787	85.51

ROTOR 2

RUN NO 9, SPEED CODE 85, POINT NO 12

SL	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'-I	V'-1 FT/SEC	V'-2 FT/SEC
1	11.450	11.066	680.2	1016.7	680.2	737.9	-8.3	699.4	-0.7	43.3	0.5874	0.8487	708.2	742.8	0.8532	0.6171	987.9	739.2
2	10.502	9.783	683.6	558.9	683.6	713.1	9.9	699.4	0.8	44.3	0.5914	0.8331	728.3	758.4	0.8579	0.5968	991.6	715.5
3	9.448	8.568	690.1	974.7	689.8	702.8	20.9	675.4	1.7	43.8	0.5980	0.8127	748.9	774.6	0.8690	0.5918	1002.9	709.7
4	5.601	5.092	686.3	895.6	686.3	701.3	5.7	557.0	0.5	38.5	0.5960	0.7463	813.0	826.1	0.9201	0.6259	1059.6	751.1
5	-0.363	0.370	640.7	748.0	640.6	604.6	-12.0	440.4	-1.1	36.1	0.5546	0.6178	901.3	900.7	0.9657	0.6276	1115.6	759.9
6	-2.967	-1.816	612.5	675.3	612.3	546.4	-12.4	396.7	-1.2	36.0	0.5286	0.5555	946.4	940.5	0.9818	0.6341	1137.6	770.9
7	-3.923	-2.761	631.8	668.7	631.8	544.4	-2.8	388.3	-0.3	35.5	0.5466	0.5505	969.1	961.0	1.0028	0.6506	1159.2	790.2
8	-4.654	-3.606	650.5	682.2	650.5	565.0	2.2	382.4	0.2	34.0	0.5634	0.5622	991.9	981.9	1.0258	0.6789	1184.4	823.8
9	-6.700	-6.113	679.3	709.5	679.1	592.6	18.7	390.3	1.6	33.3	0.5858	0.5813	1061.4	1047.0	1.0730	0.7246	1244.4	884.5
10	-7.358	-6.991	689.4	715.1	688.9	602.0	26.2	386.0	2.2	32.5	0.5925	0.5845	1084.8	1069.2	1.0855	0.7442	1263.0	910.6
11	-8.222	-8.154	658.6	683.9	658.5	603.4	-9.8	321.8	-0.8	27.9	0.5622	0.5571	1108.2	1092.0	1.1C77	0.7970	1297.5	978.4

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	PO/PO INLET
1	-3.08	1.24	23.76	43.04	58.64	73.67	0.4188	0.0710	0.0162	1.5722	94.44	94.08	46.40	3.36	-716.5	-43.5	2.4087
2	-3.57	0.88	18.53	41.67	59.07	72.07	0.4442	0.0786	0.0183	1.5659	93.76	93.36	46.38	4.71	-718.4	-59.0	2.4039
3	-3.82	0.76	15.54	38.52	59.68	71.96	0.4516	C.0710	0.0168	1.5508	94.11	93.74	46.54	8.01	-728.0	-99.2	2.3878
4	-2.10	2.69	11.42	28.67	59.22	74.15	0.4261	0.0150	0.0036	1.5173	98.57	98.48	49.65	20.98	-807.3	-269.0	2.3151
5	1.49	6.06	9.06	17.67	54.93	64.11	0.4337	0.0515	0.0116	1.4309	93.76	93.46	54.96	37.28	-913.4	-460.3	2.1138
6	3.07	7.41	8.63	12.60	52.37	57.67	0.4301	0.0756	0.0159	1.3829	90.00	89.55	57.44	44.84	-958.8	-543.7	2.0196
7	2.10	6.18	7.16	10.55	54.38	57.62	0.4219	0.0916	0.0192	1.3610	87.30	86.76	56.97	46.42	-971.9	-572.7	2.0146
8	1.29	5.10	4.32	10.02	56.17	59.99	0.4049	0.0890	0.0191	1.3578	87.23	86.68	56.67	46.64	-989.7	-599.6	2.0343
9	0.03	2.71	0.72	9.03	58.17	62.48	0.3920	0.0985	0.0231	1.3608	85.40	84.76	56.84	47.81	-1042.7	-656.7	2.0739
10	-0.37	1.81	1.79	8.36	58.65	63.33	0.3799	0.0858	0.0207	1.3581	86.85	86.28	56.83	48.46	-1058.6	-683.2	2.0841
11	1.86	3.56	6.12	7.60	55.38	63.22	0.3398	0.0376	0.0088	1.3623	93.78	93.51	59.38	51.78	-1118.0	-770.2	2.0467

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WCI/AI LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.2793	2.1633	88.16	89.35	38.75	1.1165	1.4341	92.75	93.10

STATOR 2

RUN NO 9, SPEED CODE 85, POINT NO 12

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	8.720	0.851	1051.6	806.1	791.6	806.0	692.2	13.2	41.4	0.9	0.8823	0.6556	2.2170	1.3181	1.4473	1.1460
2	7.705	0.773	1032.0	814.5	764.4	814.4	693.4	10.1	42.4	0.7	0.8648	0.6638	2.2393	1.3153	1.4596	1.1463
3	6.653	0.575	1006.8	830.9	750.6	830.9	671.0	-5.7	42.0	-0.4	0.8431	0.6802	2.2776	1.3092	1.4798	1.1432
4	4.076	-0.180	924.8	798.5	739.6	798.2	555.2	-24.2	37.0	-1.7	0.7734	0.6575	2.2469	1.2867	1.4707	1.1290
5	1.427	-0.810	776.9	685.8	640.0	685.0	440.4	-33.8	34.5	-2.8	0.6435	0.5628	2.0922	1.2680	1.4135	1.1156
6	-0.260	-1.047	704.5	615.5	582.1	614.4	397.0	-37.3	34.3	-3.5	0.5811	0.5036	2.0064	1.2606	1.3768	1.1084
7	-1.231	-1.122	697.8	602.0	579.5	600.6	388.8	-41.1	33.8	-3.9	0.5761	0.4928	1.9914	1.2563	1.3474	1.1059
8	-2.161	-1.153	711.0	614.2	598.9	612.8	383.3	-41.2	32.6	-3.8	0.5875	0.5033	2.0035	1.2566	1.3380	1.1050
9	-4.606	-1.295	742.3	658.5	630.0	658.5	392.5	-6.9	32.0	-0.6	0.6100	0.5370	2.0398	1.2774	1.3383	1.1082
10	-5.420	-1.353	751.0	668.6	642.8	668.5	388.4	6.3	31.2	0.5	0.6159	0.5440	2.0447	1.2845	1.3320	1.1053
11	-6.148	-1.277	726.5	634.0	650.4	634.0	323.6	4.5	26.5	0.4	0.5941	0.5142	1.9969	1.2852	1.3306	1.0981

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-7.01	-5.45	12.75	40.51	77.06	84.35	0.3792	0.2001	0.0452	0.9203	80.10	82.17	75.98	77.19
2	-4.98	-2.96	11.96	41.73	75.46	85.85	0.3649	0.1785	0.0411	0.9307	81.97	83.86	77.63	78.78
3	-4.67	-2.17	10.45	42.37	75.19	88.60	0.3379	0.1299	0.0305	0.9512	85.55	87.10	82.39	83.33
4	-8.59	-4.73	8.58	38.70	76.79	86.63	0.2975	0.0979	0.0243	0.9677	90.60	91.59	90.00	90.53
5	-10.19	-4.89	7.48	37.34	66.90	74.10	0.2894	0.0625	0.0167	0.9844	87.45	88.66	89.54	90.02
6	-10.14	-4.35	6.75	37.73	60.60	66.08	0.2992	0.0360	0.0099	0.9926	84.35	85.78	87.96	88.47
7	-10.41	-4.41	6.26	37.73	60.52	64.66	0.3091	0.0516	0.0144	0.9897	84.74	86.13	83.71	84.37
8	-11.46	-5.25	6.27	36.43	62.72	66.04	0.3053	0.0702	0.0199	0.9854	85.46	86.79	82.37	83.06
9	-11.84	-5.15	9.56	32.56	65.38	69.90	0.2715	0.0745	0.0219	0.9835	81.30	83.05	79.97	80.76
10	-13.25	-6.37	11.31	30.67	66.45	70.48	0.2614	0.0847	0.0251	0.9809	79.55	81.47	80.71	81.46
11	-19.20	-12.10	12.34	26.13	66.78	66.22	0.2575	0.1110	0.0331	0.9765	76.46	78.60	86.32	86.85

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
9083.	152.70	1.2793	2.1054	84.72	86.21	1.1165	0.9732	85.44

ORIGINAL PAGE IS OF POOR QUALITY

TABLE XVI(c) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA
(Uniform Inlet Flow, 85 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 9, SPEED CODE 85, POINT NO 33

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	16.500	18.354	449.9	875.3	449.9	507.8	0.0	712.9	0.0	54.6	0.4096	0.7770	533.2	617.2	0.6351	0.4587	697.7	516.8
2	13.861	16.029	459.5	841.4	459.5	508.7	0.0	678.2	0.0	52.8	0.4186	0.7442	574.9	647.1	0.6705	0.4504	736.0	509.2
3	11.473	13.866	468.3	809.6	468.3	503.4	0.0	634.1	0.0	51.6	0.4269	0.7137	615.9	677.0	0.7053	0.4453	773.7	505.2
4	5.616	8.108	487.9	750.3	487.9	483.8	0.0	573.5	0.0	49.9	0.4455	0.6556	733.3	766.6	0.8042	0.4552	880.8	520.9
5	-0.053	1.716	499.0	684.9	499.0	458.3	0.0	509.1	0.0	48.0	0.4560	0.5933	879.7	886.0	0.9243	0.5140	1011.4	593.4
6	-2.217	-1.027	500.1	670.6	500.1	449.7	0.0	497.5	0.0	47.9	0.4571	0.5783	950.2	945.8	0.9814	0.5476	1073.7	634.9
7	-3.389	-2.329	499.9	685.1	499.9	479.7	0.0	489.2	0.0	45.6	0.4569	0.5911	985.0	975.6	1.0095	0.5894	1104.5	683.1
8	-4.787	-3.650	498.8	692.7	498.8	493.9	0.0	485.8	0.0	44.5	0.4558	0.5971	1019.7	1005.5	1.0374	0.6180	1135.2	717.0
9	-9.132	-7.602	489.0	703.2	489.0	486.2	0.0	508.0	0.0	46.2	0.4465	0.6008	1123.5	1095.1	1.1186	0.6512	1225.3	762.2
10	-10.542	-8.951	483.6	713.7	483.6	478.8	0.0	529.2	0.0	47.8	0.4414	0.6069	1158.1	1125.0	1.1455	0.6500	1255.0	764.3
11	-11.654	-10.293	477.8	695.8	477.8	436.2	0.0	542.1	0.0	51.1	0.4359	0.5881	1192.6	1154.8	1.1721	0.6357	1284.8	752.1

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	3.21	7.81	17.27	60.28	31.68	41.23	0.5021	-0.0642	-0.0139	1.6112	103.14	103.37	49.59	-10.69	-533.2	95.7	1.6112
2	3.28	7.58	17.00	53.70	32.24	41.95	0.5321	-0.0493	-0.0113	1.5976	102.69	102.90	51.10	-2.60	-574.9	23.1	1.5976
3	3.50	7.60	16.40	47.63	32.75	42.00	0.5549	-0.0257	-0.0061	1.5822	101.55	101.67	52.50	4.87	-615.9	-42.9	1.5822
4	4.72	8.19	12.09	34.46	33.85	41.30	0.5882	0.0391	0.0097	1.5657	97.04	96.86	56.23	21.77	-733.3	-193.2	1.5657
5	5.91	8.59	9.17	20.98	34.46	39.75	0.5666	0.0961	0.0223	1.5393	91.15	90.62	60.43	39.44	-879.7	-377.0	1.5393
6	6.32	8.60	7.57	17.34	34.53	39.17	0.5559	0.1249	0.0280	1.5414	87.87	87.13	62.25	44.91	-950.2	-448.3	1.5414
7	6.53	8.63	5.08	17.71	34.51	42.06	0.5252	0.1023	0.0233	1.5655	89.83	89.19	63.11	45.40	-985.0	-486.4	1.5655
8	6.74	8.70	3.60	17.51	34.45	43.45	0.5103	0.1001	0.0229	1.5808	89.85	89.19	65.96	46.45	-1019.7	-519.7	1.5808
9	7.48	8.91	3.53	16.21	33.91	42.55	0.5243	0.1715	0.0388	1.6056	82.34	81.15	66.53	50.32	-1123.5	-587.0	1.6056
10	7.70	8.99	4.14	16.24	33.61	41.69	0.5424	0.2088	0.0474	1.6200	78.83	77.38	67.38	51.14	-1158.1	-595.7	1.6200
11	7.85	9.00	8.11	13.73	33.29	37.68	0.5685	0.2595	0.0556	1.6032	73.63	71.86	68.19	54.46	-1192.6	-612.7	1.6032

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1576	1.5780	88.30	89.00	32.62	1.1576	1.5780	88.30	89.00

STATOR 1

RUN NO 9, SPEED CODE 85, POINT NO 33

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	18.347	15.111	876.7	550.7	550.6	550.6	697.9	-9.9	53.0	-1.0	0.7784	0.4719	1.5315	1.1413	1.5315	1.1413
2	16.195	13.544	845.9	550.0	531.1	549.9	658.4	9.5	51.3	1.0	0.7486	0.4717	1.5369	1.1393	1.5369	1.1393
3	14.200	12.023	816.4	546.5	525.7	546.4	624.6	10.3	50.0	1.1	0.7202	0.4689	1.5385	1.1377	1.5385	1.1377
4	8.929	7.628	761.2	526.9	505.9	526.8	568.8	-10.3	48.4	-1.1	0.6660	0.4507	1.5281	1.1410	1.5261	1.1410
5	2.914	2.194	698.6	511.4	479.5	511.3	508.1	-9.8	46.7	-1.1	0.6060	0.4363	1.5172	1.1444	1.5172	1.1444
6	0.161	-0.304	685.1	505.9	470.7	505.3	497.9	-23.1	46.6	-2.6	0.5917	0.4302	1.5132	1.1507	1.5132	1.1507
7	-1.091	-1.401	699.8	531.2	499.5	531.2	490.0	-3.4	44.5	-0.4	0.6047	0.4522	1.5346	1.1528	1.5346	1.1528
8	-2.192	-2.405	707.9	546.8	513.8	546.8	487.0	2.1	43.5	0.2	0.6112	0.4653	1.5493	1.1560	1.5493	1.1560
9	-5.350	-5.495	720.6	563.6	508.6	563.6	510.5	2.8	45.1	0.3	0.6168	0.4758	1.5702	1.1771	1.5702	1.1771
10	-6.449	-6.589	732.4	564.1	503.0	564.0	532.4	9.6	46.7	1.0	0.6242	0.4735	1.5722	1.1900	1.5722	1.1900
11	-7.713	-7.810	715.9	537.5	462.6	537.1	546.3	-22.5	49.8	-2.4	0.6063	0.4482	1.5515	1.2008	1.5515	1.2006

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	0.42	2.53	11.31	54.00	43.04	50.67	0.5306	0.1502	0.0307	0.9503	91.67	92.14	91.67	92.14
2	0.43	2.84	12.21	50.29	43.67	50.87	0.5074	0.1235	0.0262	0.9615	93.80	94.14	93.60	94.14
3	0.52	3.30	11.47	48.97	43.68	50.74	0.4919	0.0952	0.0210	0.9721	95.09	95.36	95.09	95.36
4	1.39	5.11	8.15	49.51	42.92	48.84	0.4912	0.0945	0.0231	0.9756	91.34	91.82	91.34	91.82
5	1.15	6.20	8.22	47.75	41.31	47.21	0.4697	0.0655	0.0179	0.9856	67.62	88.30	87.62	88.30
6	1.58	7.20	6.74	49.22	40.69	46.40	0.4780	0.0793	0.0227	0.9833	83.35	84.27	83.35	84.27
7	-0.35	5.53	9.02	44.82	43.47	48.92	0.4458	0.0837	0.0244	0.9817	85.17	86.02	85.17	86.02
8	-1.13	5.01	9.65	43.25	44.85	50.40	0.4304	0.0859	0.0255	0.9809	85.41	86.26	85.41	86.26
9	0.53	7.41	10.83	44.86	44.11	51.47	0.4367	0.0916	0.0286	0.9793	77.69	79.04	77.69	79.04
10	1.75	8.80	12.76	45.71	43.38	51.06	0.4582	0.1314	0.0416	0.9695	72.61	74.27	72.61	74.27
11	4.21	11.36	10.90	52.25	39.56	48.09	0.5066	0.1475	0.0472	0.9675	66.55	68.51	66.55	68.51

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
9072.	143.60	1.1576	1.5398	83.26	84.22	1.1576	0.9758	83.26

ROTOR 2

RUN NO 9, SPEED CODE 85, POINT NO 35

SL	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
1	11.733	11.094	580.9	967.2	580.8	594.9	-10.0	762.6	-1.0	51.9	0.4991	0.7997	707.4	741.9	0.7930	0.4922	923.0	595.3
2	11.060	9.852	586.8	955.0	586.8	582.9	9.2	756.4	0.9	52.3	0.5049	0.7696	727.4	757.4	0.7979	0.4820	947.4	582.9
3	10.211	8.678	590.4	940.1	590.3	596.6	10.9	726.6	1.1	50.5	0.5085	0.7780	748.0	773.6	0.8133	0.4952	944.3	598.4
4	6.612	5.162	587.3	854.5	587.2	608.7	-10.1	599.7	-1.0	44.6	0.5049	0.7036	812.0	825.0	0.8666	0.5344	1010.3	649.1
5	1.152	0.811	576.0	739.0	575.9	530.4	-9.4	514.5	-0.9	44.1	0.4940	0.6027	900.2	899.6	0.9233	0.5346	1076.6	655.5
6	-1.217	-1.163	570.5	686.0	570.0	514.1	-22.8	454.1	-2.3	41.4	0.4876	0.5570	945.2	939.3	0.9602	0.5740	1123.4	706.9
7	-2.262	-2.078	592.1	681.6	592.1	509.4	-4.3	452.9	-0.4	41.6	0.5066	0.5533	967.9	959.8	0.9758	0.5635	1136.3	718.6
8	-3.174	-2.939	607.9	685.6	607.9	521.6	1.9	444.9	0.2	40.4	0.5200	0.5564	950.7	980.7	0.9949	0.6069	1160.7	747.8
9	-5.820	-5.646	634.4	698.3	634.4	545.5	2.6	435.8	0.2	38.5	0.5389	0.5615	1060.1	1045.7	1.0475	0.6560	1233.2	816.3
10	-6.746	-6.673	640.6	705.6	640.5	560.0	11.2	429.4	1.0	37.3	0.5414	0.5655	1083.4	1067.9	1.0554	0.6806	1249.0	849.3
11	-7.936	-8.018	620.3	684.7	619.9	571.2	-22.5	377.5	-2.1	33.3	0.5206	0.5461	1106.8	1090.6	1.0812	0.7267	1288.2	913.7

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	1.47	5.78	18.42	52.92	52.78	61.38	0.5504	0.1987	0.0453	1.5772	87.00	86.15	50.94	-1.98	-717.3	20.6	2.4151
2	0.81	5.26	13.92	50.66	53.45	61.07	0.5632	0.1783	0.0417	1.5800	88.15	87.37	50.76	0.10	-718.2	-1.0	2.4277
3	1.01	5.59	12.02	46.87	53.82	63.56	0.5487	0.1360	0.0325	1.5835	90.57	89.95	51.37	4.49	-737.1	-47.0	2.4371
4	2.78	7.57	10.75	34.22	53.11	66.76	0.5134	0.0708	0.0171	1.5468	94.06	93.69	54.53	20.31	-822.1	-225.3	2.3642
5	4.20	8.77	7.76	21.68	51.84	58.95	0.5289	0.1022	0.0235	1.4781	89.83	89.27	57.67	35.98	-909.6	-385.1	2.2427
6	5.11	9.45	7.10	16.17	51.04	57.20	0.4955	0.0958	0.0207	1.4458	89.37	88.81	59.48	43.31	-968.0	-485.2	2.1880
7	3.74	7.82	5.55	13.81	53.16	56.87	0.4905	0.1016	0.0220	1.4302	88.27	87.67	56.61	44.81	-972.1	-506.9	2.1908
8	2.97	6.78	3.37	12.66	54.60	58.45	0.4738	0.0947	0.0207	1.4253	88.66	88.08	56.36	45.69	-986.8	-535.8	2.2048
9	2.10	4.78	0.94	10.88	56.21	60.74	0.4563	0.1021	0.0238	1.4272	87.09	86.43	58.91	48.03	-1057.5	-609.9	2.2394
10	1.80	3.98	1.90	10.42	56.18	62.16	0.4398	0.0769	0.0185	1.4340	90.03	89.52	59.00	48.58	-1072.2	-638.5	2.2552
11	3.59	5.28	5.49	9.95	53.68	63.04	0.4043	0.0410	0.0097	1.4365	94.36	94.07	61.10	51.15	-1129.3	-713.1	2.2321

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.3092	2.2803	85.69	87.23	35.88	1.1309	1.4809	90.27	90.78

STATOR 2

RUN NO 9, SPEED CODE 85, POINT NO 35

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	8.473	0.763	988.6	651.7	638.3	651.6	755.0	12.8	50.0	1.1	0.8197	0.5211	2.2831	1.3248	1.4911	1.1607
2	7.242	0.593	975.6	668.2	624.1	668.1	749.8	11.2	50.4	1.0	0.8089	0.5358	2.3106	1.3212	1.5044	1.1593
3	6.066	0.336	960.1	690.7	633.9	690.7	721.1	2.0	48.8	0.2	0.7966	0.5562	2.3482	1.3153	1.5260	1.1558
4	3.466	-0.388	873.8	662.5	637.9	662.4	597.2	-13.2	43.2	-1.1	0.7211	0.5350	2.3179	1.3023	1.5161	1.1417
5	0.627	-1.059	759.1	578.3	558.6	575.4	514.0	-58.0	42.6	-5.7	0.6203	0.4652	2.2130	1.2951	1.4561	1.1320
6	-0.859	-1.223	707.3	539.4	542.1	538.4	454.3	-33.4	39.9	-3.5	0.5754	0.4330	2.1683	1.2938	1.4325	1.1250
7	-1.645	-1.258	703.5	537.0	537.7	536.8	453.6	-12.9	40.1	-1.4	0.5722	0.4310	2.1641	1.2935	1.4150	1.1225
8	-2.459	-1.273	708.1	548.8	550.1	546.8	445.9	-2.6	39.0	-0.3	0.5759	0.4407	2.1741	1.2945	1.4066	1.1206
9	-4.771	-1.308	726.1	585.0	578.9	584.9	438.2	4.4	37.2	0.4	0.5853	0.4661	2.1973	1.3201	1.4004	1.1232
10	-5.540	-1.300	737.0	601.7	597.1	601.4	431.9	17.8	36.0	1.7	0.5922	0.4780	2.2090	1.3309	1.4046	1.1205
11	-6.206	-1.221	722.3	591.0	614.5	590.9	379.6	9.7	31.8	0.9	0.5780	0.4678	2.1898	1.3382	1.4100	1.1151

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	1.59	3.15	12.94	48.92	64.92	75.24	0.5099	0.1528	0.0345	0.9454	81.69	83.66	74.91	76.27
2	3.00	5.02	12.21	49.46	64.50	77.71	0.4890	0.1360	0.0313	0.9523	83.95	85.70	77.36	78.61
3	2.18	4.69	11.01	48.67	66.66	81.15	0.4571	0.1051	0.0246	0.9640	87.41	88.80	82.05	83.07
4	-2.40	1.47	9.18	44.30	69.18	78.44	0.4189	0.0727	0.0180	0.9786	89.60	90.74	88.75	89.38
5	-2.11	3.19	4.55	48.35	61.47	67.62	0.4437	0.0661	0.0176	0.9848	86.16	87.59	85.84	86.56
6	-4.47	1.32	6.68	43.47	59.72	62.93	0.4325	0.0521	0.0144	0.9894	84.06	85.68	86.15	86.83
7	-4.11	1.88	6.79	41.50	59.44	62.70	0.4229	0.0596	0.0167	0.9881	83.91	85.54	84.75	85.47
8	-5.05	1.16	9.84	39.27	61.02	64.08	0.4054	0.0662	0.0188	0.9867	84.18	85.78	84.53	85.24
9	-6.64	0.06	10.60	36.73	63.63	66.94	0.3704	0.0908	0.0266	0.9812	78.62	80.82	81.61	82.46
10	-8.50	-1.63	12.46	34.27	65.33	68.26	0.3510	0.0981	0.0290	0.9793	76.60	79.02	84.19	84.92
11	-13.92	-6.82	12.87	30.87	66.67	66.43	0.3347	0.0913	0.0273	0.9815	74.02	76.67	89.15	89.66

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
9072.	143.60	1.3092	2.2323	83.22	84.98	1.1309	0.9790	85.12

ORIGINAL PAGE IS OF POOR QUALITY

TABLE XVI(d) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA (Uniform Inlet Flow, 85 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 9, SPEED CODE 85, POINT NO 4

SL	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
1	16.619	18.338	423.4	874.3	423.4	466.2	0.0	739.6	0.0	57.8	0.3847	0.7736	536.6	621.2	0.6210	0.4256	683.5	481.0
2	14.096	16.006	432.2	837.6	432.2	470.0	0.0	693.2	0.0	55.9	0.3929	0.7384	578.6	651.3	0.6566	0.4160	722.2	471.9
3	11.775	13.850	440.6	809.0	440.6	475.1	0.0	654.7	0.0	54.0	0.4009	0.7112	619.9	681.3	0.6919	0.4183	760.5	475.9
4	5.806	8.117	460.0	757.9	460.0	468.1	0.0	595.5	0.0	51.8	0.4190	0.6605	738.0	771.6	0.7922	0.4361	869.6	500.1
5	0.179	1.782	470.6	635.2	470.6	419.5	0.0	529.0	0.0	51.6	0.4291	0.5824	885.4	891.8	0.9142	0.4784	1002.7	554.6
6	-1.967	-0.919	472.0	672.4	472.0	433.5	0.0	514.3	0.0	49.9	0.4305	0.5786	956.3	951.9	0.9725	0.5298	1066.5	616.0
7	-3.259	-2.241	471.9	683.1	471.9	463.8	0.0	501.6	0.0	47.2	0.4303	0.5879	991.3	981.9	1.0012	0.5747	1097.9	667.7
8	-4.762	-3.580	470.9	685.9	470.9	473.8	0.0	495.9	0.0	46.3	0.4294	0.5896	1026.3	1012.0	1.0296	0.6023	1129.2	700.6
9	-9.358	-7.626	460.8	702.3	460.8	463.9	0.0	527.2	0.0	48.6	0.4199	0.5978	1130.8	1102.2	1.1125	0.6289	1221.1	738.8
10	10.764	-8.988	455.5	707.8	455.5	441.2	0.0	553.4	0.0	51.4	0.4149	0.5989	1165.6	1132.2	1.1397	0.6158	1251.4	727.8
11	-11.764	-10.318	450.0	698.1	450.0	403.3	0.0	569.8	0.0	54.6	0.4096	0.5871	1200.4	1162.3	1.1670	0.6028	1281.9	716.7

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	5.12	9.73	13.69	65.77	30.10	37.61	0.5526	0.0358	0.0076	1.6060	98.37	98.28	51.50	-14.27	-536.6	118.4	1.6060
2	5.19	9.49	14.50	58.11	30.63	38.60	0.5815	0.0341	0.0078	1.5928	98.25	98.15	53.01	-5.10	-578.6	41.9	1.5928
3	5.37	9.48	14.74	51.17	31.14	39.61	0.5913	0.0272	0.0065	1.5859	98.45	98.36	54.38	3.21	-619.9	-26.6	1.5859
4	6.44	9.91	10.93	37.33	32.27	40.18	0.6130	0.0568	0.0142	1.5876	95.98	95.73	57.95	20.61	-738.0	-176.0	1.5876
5	7.46	10.17	10.58	21.15	32.88	36.62	0.6070	0.1308	0.0297	1.5485	88.60	87.89	62.00	40.85	-885.4	-362.8	1.5485
6	7.80	10.08	7.92	18.47	32.96	38.17	0.5749	0.1314	0.0293	1.5667	87.88	87.11	63.74	45.26	-956.3	-437.6	1.5667
7	7.97	10.08	5.69	18.56	32.95	41.15	0.5396	0.1047	0.0236	1.5881	90.02	89.37	64.56	46.00	-991.3	-480.3	1.5881
8	8.16	10.11	4.58	17.94	32.89	42.18	0.5250	0.1044	0.0235	1.5988	89.77	89.05	65.38	47.44	-1026.3	-516.1	1.5988
9	8.84	10.26	4.26	16.83	32.32	41.02	0.5475	0.1852	0.0413	1.6303	81.69	80.41	67.89	51.06	-1130.8	-574.9	1.6303
10	9.03	10.32	5.62	16.10	32.01	38.72	0.5772	0.2361	0.0519	1.6389	77.05	75.43	68.71	52.62	-1165.6	-578.8	1.6389
11	9.14	10.30	9.32	13.81	31.68	35.14	0.6030	0.2827	0.0588	1.6322	72.60	70.68	69.48	55.66	-1200.4	-592.5	1.6322

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1644	1.5951	86.79	87.61	31.07	1.1644	1.5951	86.75	87.61

STATOR 1

RUN NO 9, SPEED CODE 85, POINT NO 4

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/TO1
1	18.244	15.027	873.0	505.3	487.7	505.3	724.1	-3.8	56.2	-0.4	0.7723	0.4303	1.5302	1.1475	1.5302	1.1475
2	16.012	13.396	839.5	505.6	490.9	505.4	681.0	14.9	54.4	1.7	0.7403	0.4311	1.5351	1.1450	1.5351	1.1450
3	14.003	11.845	813.3	504.4	495.4	503.6	645.0	27.1	52.6	3.1	0.7154	0.4304	1.5376	1.1432	1.5376	1.1432
4	8.908	7.547	766.3	498.1	488.1	497.6	590.7	22.1	50.5	2.5	0.6688	0.4240	1.5375	1.1473	1.5375	1.1473
5	2.980	2.163	687.1	464.1	439.7	464.0	528.0	-11.1	50.2	-1.4	0.5934	0.3935	1.5152	1.1510	1.5152	1.1510
6	0.238	-0.295	685.5	485.4	452.8	485.4	514.7	-6.3	48.7	-0.7	0.5904	0.4111	1.5320	1.1567	1.5320	1.1567
7	-0.960	-1.371	696.4	505.1	482.2	505.1	502.5	3.6	46.2	0.4	0.6002	0.4281	1.5486	1.1578	1.5486	1.1578
8	-2.010	-2.360	699.7	516.5	492.5	516.3	497.0	15.4	45.3	1.7	0.6024	0.4378	1.5596	1.1601	1.5596	1.1601
9	-5.028	-5.404	718.4	531.5	485.6	531.1	529.5	20.2	47.5	2.2	0.6127	0.4462	1.5789	1.1837	1.5789	1.1837
10	-6.166	-6.517	725.3	535.4	465.0	534.7	556.6	26.2	50.2	2.8	0.6149	0.4467	1.5841	1.1988	1.5841	1.1988
11	-7.561	-7.779	716.6	521.5	428.8	521.5	574.2	3.6	53.3	0.4	0.6039	0.4321	1.5746	1.2124	1.5746	1.2124

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	3.68	5.79	11.91	56.65	39.38	47.05	0.5847	0.1449	0.0296	0.9527	87.62	88.32	87.62	88.32
2	3.51	5.91	12.90	52.68	40.26	47.30	0.5601	0.1189	0.0252	0.9637	89.86	90.43	89.86	90.43
3	3.05	5.83	13.46	49.51	41.20	47.30	0.5421	0.1052	0.0232	0.9696	91.37	91.66	91.37	91.86
4	3.47	7.19	11.80	47.94	41.69	46.69	0.5287	0.1233	0.0301	0.9679	88.75	89.39	88.75	89.39
5	4.71	9.76	7.94	51.58	38.14	43.28	0.5379	0.0987	0.0270	0.9790	83.50	84.41	83.50	84.41
6	3.64	9.25	8.62	49.40	39.61	45.24	0.5086	0.0992	0.0284	0.9792	82.70	83.68	82.70	83.68
7	1.38	7.26	9.80	45.77	42.49	47.21	0.4830	0.1067	0.0312	0.9770	84.31	85.23	84.31	85.23
8	0.67	6.81	11.14	43.56	43.53	48.31	0.4654	0.1074	0.0319	0.9767	84.53	85.45	84.53	85.45
9	2.88	9.76	12.73	49.32	42.59	49.14	0.4793	0.1351	0.0421	0.9698	75.86	77.33	75.86	77.33
10	5.23	12.27	14.58	47.36	40.45	49.00	0.4946	0.1510	0.0478	0.9658	70.60	72.41	70.60	72.41
11	7.71	14.86	13.71	52.93	37.02	47.26	0.5309	0.1622	0.0520	0.9645	65.16	67.28	65.16	67.28

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
9130.	136.80	1.1644	1.5487	80.95	82.07	1.1644	0.9709	80.95

ROTOR 2

RUN NO 9, SPEED CODE 85, POINT NO 4

SL	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
1	11.657	11.055	535.4	951.8	535.4	579.8	-3.9	754.9	-0.4	52.3	0.4570	0.7841	711.9	746.7	0.7630	0.4777	893.9	579.9
2	10.697	9.771	540.9	935.7	540.7	562.6	14.2	752.7	1.5	53.1	0.4624	0.7740	732.1	762.3	0.7683	0.4635	898.7	562.7
3	9.979	8.549	544.8	930.1	544.2	569.2	26.6	735.5	2.8	52.2	0.4663	0.7669	752.8	778.6	0.7767	0.4707	907.5	570.9
4	6.395	5.028	550.0	846.6	549.6	561.9	22.0	633.3	2.3	48.4	0.4700	0.6942	817.2	830.4	0.8261	0.4882	966.6	595.4
5	1.079	0.725	523.9	731.2	523.7	508.5	-10.7	525.4	-1.2	45.9	0.4460	0.5932	906.0	905.4	0.8990	0.5150	1055.8	634.8
6	-1.394	-1.321	542.2	695.6	542.2	493.2	-6.4	490.5	-0.7	44.8	0.4611	0.5623	951.3	945.4	0.9359	0.5424	1100.5	670.9
7	-2.436	-2.254	559.7	695.8	559.6	495.0	3.2	489.0	0.3	44.6	0.4764	0.5622	974.1	966.0	0.9539	0.5554	1120.6	687.4
8	-3.324	-3.103	571.6	701.2	571.4	495.6	15.0	496.1	1.5	45.0	0.4866	0.5660	997.1	987.1	0.9672	0.5631	1136.3	697.7
9	-5.885	-5.720	597.6	719.3	597.2	527.0	20.4	489.6	1.9	42.7	0.5045	0.5791	1067.0	1052.4	1.0173	0.6165	1205.0	771.1
10	-6.854	-6.768	606.7	718.2	606.1	539.2	26.2	474.5	2.5	41.2	0.5092	0.5718	1090.4	1074.8	1.0279	0.6424	1224.7	806.9
11	-8.026	-8.101	599.0	701.1	599.0	557.8	4.1	424.7	0.4	37.1	0.4994	0.5557	1114.0	1097.7	1.0515	0.6928	1261.3	874.1

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC	PO/PO INLET
1	3.66	7.98	19.60	53.94	45.29	60.01	0.5494	0.1981	0.0452	1.5706	87.60	86.80	53.14	-0.80	-715.8	8.2	2.4033
2	3.05	7.50	14.80	52.02	49.93	59.05	0.5699	0.1875	0.0438	1.5727	88.11	87.33	53.00	0.58	-717.8	9.7	2.4141
3	2.84	7.41	11.85	48.87	50.33	60.74	0.5609	0.1421	0.0339	1.5817	90.73	90.12	53.19	4.32	-726.2	-43.1	2.4323
4	3.65	8.45	9.76	36.08	50.56	61.54	0.5479	0.1007	0.0244	1.5355	92.14	91.65	55.41	19.32	-795.2	-197.1	2.3612
5	6.79	11.37	8.55	23.49	47.84	56.31	0.5425	0.1264	0.0287	1.4797	88.09	87.43	60.26	36.78	-916.7	-380.0	2.2426
6	6.09	10.43	6.45	17.81	49.48	54.81	0.5236	0.1366	0.0298	1.4456	85.79	85.04	60.46	42.66	-957.7	-454.9	2.2138
7	5.13	9.21	4.63	16.11	51.21	55.21	0.5178	0.1439	0.0316	1.4374	84.58	83.78	60.00	43.89	-970.9	-477.0	2.2235
8	4.37	8.18	2.34	15.09	52.32	55.40	0.5177	0.1503	0.0335	1.4374	83.71	82.87	59.75	44.66	-982.1	-491.0	2.2398
9	3.36	6.04	-0.36	13.43	53.82	58.63	0.4933	0.1381	0.0330	1.4498	84.27	83.44	60.17	46.73	-1046.6	-562.9	2.2874
10	3.00	5.18	1.23	12.29	53.99	59.76	0.4719	0.1113	0.0271	1.4482	86.81	86.11	60.20	47.51	-1064.2	-600.4	2.2926
11	4.00	5.70	4.54	11.32	52.69	61.55	0.4297	0.0679	0.0164	1.4441	91.32	90.86	61.51	50.19	-1109.5	-672.9	2.2755

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.3226	2.2988	83.01	84.85	34.09	1.1359	1.4843	87.50	88.17

STATOR 2

RUN NO 9, SPEED CODE 85, POINT NO 4

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	8.557	0.777	970.7	616.4	619.4	616.2	747.3	17.8	50.6	1.7	0.8016	0.4908	2.3047	1.3288	1.5063	1.1579
2	7.410	0.637	957.7	621.0	600.3	620.8	746.2	15.7	51.4	1.5	0.7906	0.4951	2.3149	1.3258	1.5088	1.1575
3	6.294	0.426	947.4	636.7	603.8	636.6	730.1	8.7	50.6	0.8	0.7830	0.5093	2.3402	1.3207	1.5223	1.1551
4	3.616	-0.286	863.7	614.7	550.2	614.7	630.7	-1.8	47.0	-0.2	0.7096	0.4929	2.3208	1.3102	1.5092	1.1423
5	0.590	-1.061	749.2	534.3	534.7	533.9	524.9	-20.8	44.4	-2.2	0.6089	0.4266	2.2284	1.3062	1.4695	1.1350
6	-0.821	-1.166	714.7	501.3	519.6	500.9	490.8	-19.9	43.3	-2.3	0.5788	0.3993	2.1928	1.3068	1.4329	1.1303
7	-1.563	-1.163	715.5	503.8	521.6	503.6	489.8	-15.3	43.2	-1.7	0.5792	0.4012	2.1936	1.3078	1.4201	1.1298
8	-2.357	-1.165	721.7	516.5	522.9	516.4	497.5	-10.3	43.5	-1.1	0.5836	0.4111	2.2038	1.3114	1.4153	1.1310
9	-4.783	-1.287	745.0	560.8	555.3	560.5	492.1	16.0	41.4	1.6	0.5969	0.4427	2.2351	1.3397	1.4167	1.1334
10	-5.545	-1.300	747.2	572.8	575.1	572.3	477.1	24.6	39.8	2.5	0.5964	0.4508	2.2415	1.3504	1.4158	1.1287
11	-6.199	-1.225	736.0	566.3	599.3	566.2	427.2	14.4	35.6	1.5	0.5852	0.4442	2.2283	1.3577	1.4145	1.1208

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	2.16	3.72	13.47	48.95	63.32	72.66	0.5342	0.1184	0.0267	0.9591	81.73	83.71	78.28	79.49
2	3.97	5.98	12.70	49.94	62.28	73.54	0.5267	0.1193	0.0275	0.9596	82.97	84.83	78.80	79.98
3	3.92	6.42	11.63	45.78	63.72	76.01	0.5068	0.1102	0.0258	0.9632	85.53	87.13	81.90	82.92
4	1.40	5.26	10.15	47.12	64.02	73.95	0.4742	0.0674	0.0167	0.9805	87.47	88.84	87.35	88.05
5	-0.26	5.04	8.07	46.68	58.70	63.69	0.4857	0.0356	0.0095	0.9921	83.82	85.51	85.72	86.47
6	-1.07	4.72	7.95	45.55	57.23	59.42	0.4991	0.0509	0.0141	0.9896	81.78	83.65	82.68	83.53
7	-1.07	4.93	8.42	44.90	57.65	59.67	0.4937	0.0620	0.0174	0.9874	81.56	83.45	80.88	81.79
8	-0.50	5.70	8.97	44.69	57.90	61.07	0.4836	0.0740	0.0210	0.9848	81.14	83.09	79.29	80.26
9	-2.41	4.29	11.80	39.76	61.47	64.96	0.4356	0.1066	0.0313	0.9772	75.86	78.39	78.00	79.04
10	-4.70	2.17	13.23	37.30	62.88	65.76	0.4137	0.1045	0.0309	0.9777	73.81	76.56	80.70	81.62
11	-10.14	-3.05	13.39	34.13	65.08	64.50	0.3982	0.0986	0.0294	0.9796	71.70	74.65	85.71	86.39

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
9130.	136.80	1.3226	2.2529	80.76	82.80	1.1359	0.9800	82.80

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OF POOR QUALITY

TABLE XVII(a) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA
(Uniform Inlet Flow, 100 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 8, SPEED CODE 10, POINT NO 1

SL	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
1	18.744	18.382	622.5	1099.0	622.5	652.1	0.0	884.6	0.0	53.6	0.5755	0.9764	627.7	726.7	0.8173	0.5973	884.0	670.9
2	14.278	16.065	637.4	1058.6	637.4	662.2	0.0	825.9	0.0	51.3	0.5903	0.9380	676.9	761.9	0.8610	0.5895	929.7	665.3
3	11.928	13.910	652.3	1029.8	652.3	677.7	0.0	775.4	0.0	48.9	0.6051	0.9098	725.1	797.0	0.9047	0.5991	975.3	678.1
4	5.565	8.130	688.3	934.8	688.3	662.0	0.0	660.0	0.0	44.9	0.6411	0.8170	863.3	902.5	1.0284	0.6161	1104.1	705.0
5	-0.539	1.631	708.9	783.3	708.9	563.7	0.0	543.9	0.0	44.0	0.6621	0.6741	1035.7	1043.1	1.1721	0.6480	1255.1	753.0
6	-2.037	-1.262	712.2	723.2	712.2	525.1	0.0	497.3	0.0	43.4	0.6654	0.6194	1118.6	1113.4	1.2389	0.6934	1326.1	809.6
7	-2.821	-2.587	713.2	745.4	713.2	570.6	0.0	479.6	0.0	40.1	0.6664	0.6402	1159.6	1148.6	1.2720	0.7552	1361.3	879.3
8	-4.005	-3.865	713.0	761.6	713.0	601.3	0.0	467.8	0.0	37.9	0.6662	0.6552	1200.5	1183.8	1.3046	0.8042	1396.3	935.0
9	-8.268	-7.570	702.1	798.2	702.1	621.3	0.0	501.2	0.0	38.8	0.6551	0.6802	1322.7	1289.2	1.3972	0.8551	1497.5	1003.5
10	-9.845	-8.863	694.7	823.1	694.7	637.7	0.0	520.4	0.0	39.1	0.6476	0.6991	1363.4	1324.4	1.4265	0.8716	1530.2	1026.3
11	-11.262	-10.212	685.8	785.6	685.8	588.3	0.0	520.5	0.0	41.4	0.6386	0.6626	1404.1	1359.5	1.4551	0.8643	1562.6	1024.7

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC	PO/PO INLET
1	-1.36	3.25	14.32	58.66	40.55	50.65	0.4782	0.0464	0.0099	1.8987	97.63	97.42	45.03	-13.64	-627.7	157.9	1.8987
2	-1.32	2.96	14.08	52.03	41.19	52.86	0.5022	0.0329	0.0075	1.8615	98.14	97.98	46.50	-5.53	-676.9	64.0	1.8815
3	-1.19	2.91	13.36	45.99	41.80	55.41	0.5060	0.0067	0.0016	1.8792	99.58	99.56	47.82	1.83	-725.1	-21.6	1.8792
4	-0.21	3.26	10.44	31.17	43.20	56.31	0.5274	0.0351	0.0086	1.8133	97.13	96.89	51.29	20.12	-863.3	-242.5	1.8133
5	1.06	3.76	11.26	14.07	43.94	48.59	0.5333	0.1342	0.0302	1.6566	86.16	85.17	55.60	41.53	-1035.7	-499.2	1.6566
6	1.59	3.87	12.22	7.56	44.06	45.58	0.5090	0.1511	0.0310	1.6083	82.97	81.82	57.53	49.57	-1118.6	-616.2	1.6083
7	1.83	3.93	9.23	8.87	44.09	50.19	0.4680	0.1072	0.0226	1.6483	87.68	86.80	58.41	49.54	-1159.6	-669.0	1.6483
8	2.08	4.03	7.12	9.32	44.08	53.43	0.4407	0.0793	0.0169	1.6813	90.72	90.04	59.29	49.98	-1200.5	-716.0	1.6813
9	2.39	4.42	4.90	10.34	43.70	55.18	0.4471	0.1344	0.0295	1.7493	84.76	83.53	62.04	51.70	-1322.7	-788.1	1.7493
10	3.32	4.61	4.51	11.50	43.44	56.55	0.4509	0.1531	0.0345	1.7877	83.03	81.61	63.00	51.51	-1363.4	-804.0	1.7877
11	3.63	4.78	8.51	9.10	43.11	51.68	0.4654	0.2011	0.0427	1.7392	77.22	75.41	63.96	54.86	-1404.1	-839.0	1.7392

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1955	1.7476	88.41	89.26	41.81	1.1955	1.7476	88.41	89.26

STATOR 1

RUN NO 8, SPEED CODE 10, POINT NO 1

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	18.124	14.885	1106.6	742.7	688.9	742.7	866.0	-0.7	51.7	-0.1	0.9865	0.6294	1.7651	1.2060	1.7651	1.2060
2	15.782	13.136	1070.9	741.6	699.0	741.5	811.3	9.3	49.4	0.7	0.9508	0.6296	1.7710	1.2015	1.7710	1.2015
3	13.702	11.521	1045.4	744.0	713.7	743.8	763.8	17.1	47.0	1.3	0.9259	0.6329	1.7784	1.1979	1.7784	1.1979
4	8.436	7.188	956.1	729.0	696.7	729.0	654.8	-0.9	43.2	-0.1	0.8381	0.6211	1.7583	1.1907	1.7583	1.1907
5	2.144	1.646	807.8	647.4	598.0	647.0	543.0	-23.8	42.2	-2.1	0.6971	0.5495	1.6462	1.1815	1.6462	1.1815
6	-1.037	-1.185	748.7	607.2	559.3	606.2	497.7	-34.9	41.7	-3.3	0.6430	0.5144	1.5958	1.1774	1.5958	1.1774
7	-2.376	-2.383	769.9	628.7	601.5	628.0	480.6	-31.2	38.6	-2.8	0.6631	0.5338	1.6143	1.1769	1.6143	1.1769
8	-3.450	-3.363	786.0	663.2	630.6	663.0	469.2	-14.2	36.7	-1.2	0.6780	0.5643	1.6483	1.1790	1.6463	1.1790
9	-6.329	-6.066	824.8	721.9	652.8	721.4	504.2	26.9	37.8	2.1	0.7050	0.6097	1.7122	1.2088	1.7122	1.2088
10	-7.226	-6.962	850.7	722.6	670.3	721.9	523.9	33.4	38.1	1.7	0.7250	0.6069	1.7141	1.2216	1.7141	1.2216
11	-8.161	-7.983	816.5	662.0	625.7	661.8	524.6	-17.5	40.1	-1.5	0.6911	0.5514	1.6471	1.2270	1.6471	1.2270

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-0.87	1.24	12.27	51.74	53.16	68.70	0.4810	0.1511	0.0309	0.9301	85.52	86.61	85.52	86.61
2	-1.48	0.93	11.94	48.65	55.22	69.07	0.4590	0.1334	0.0283	0.9413	87.99	88.90	87.99	88.90
3	-2.51	0.27	11.70	45.70	57.63	69.65	0.4386	0.1248	0.0275	0.9472	90.26	91.00	90.26	91.00
4	-3.77	-0.05	9.20	43.30	58.37	68.35	0.3977	0.0730	0.0178	0.9730	91.66	92.28	91.66	92.28
5	-3.28	1.77	7.20	44.33	50.81	59.51	0.3834	0.0108	0.0030	0.9973	84.23	85.27	84.23	85.27
6	-3.36	2.26	6.06	44.96	47.89	55.23	0.3961	0.0544	0.0155	0.9865	80.49	81.71	80.49	81.71
7	-6.15	-0.28	6.94	41.49	52.19	57.33	0.3803	0.0963	0.0281	0.9752	82.83	83.93	82.83	83.93
8	-7.91	-1.77	8.20	37.92	55.27	60.74	0.3424	0.0826	0.0245	0.9780	85.72	86.67	85.72	86.67
9	-6.85	0.03	12.69	35.63	57.07	65.32	0.3106	0.0831	0.0259	0.9763	79.52	80.99	79.52	80.99
10	-6.82	0.23	14.43	35.46	58.46	64.82	0.3328	0.1325	0.0419	0.9613	75.06	76.85	75.06	76.85
11	-5.53	1.62	11.80	41.62	53.99	58.61	0.4032	0.1923	0.0616	0.9476	67.46	69.62	67.46	69.62

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10680.	184.10	1.1955	1.6950	83.19	84.37	1.1955	0.9699	83.19

ROTOR 2

RUN NO 8, SPEED CODE 10, POINT NO 1

SL	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'-I	V'-1 FT/SEC	V'-2 FT/SEC
1	11.490	11.263	830.6	1255.1	830.6	939.7	-0.8	831.9	-0.1	41.4	0.7110	1.0329	832.8	873.5	1.0072	0.7742	1176.8	940.6
2	10.644	10.163	834.2	1224.1	834.2	899.8	9.0	829.9	0.6	42.6	0.7158	1.0034	856.3	891.7	1.0203	0.7393	1189.1	902.0
3	9.749	9.132	840.1	1178.5	839.9	867.7	16.8	797.5	1.1	42.6	0.7225	0.9632	880.6	910.7	1.0362	0.7151	1204.8	875.0
4	6.763	6.188	835.8	1059.1	835.8	851.1	-0.6	630.3	-0.0	36.6	0.7208	0.8640	955.9	971.3	1.0955	0.7480	1270.2	916.8
5	1.770	2.000	763.2	916.3	762.8	772.8	-23.4	492.3	-1.8	32.5	0.6554	0.7431	1059.8	1059.1	1.1377	0.7772	1324.8	958.4
6	-1.180	-0.417	718.6	822.3	717.8	704.4	-34.9	424.3	-2.8	31.0	0.6153	0.6641	1112.7	1105.8	1.1590	0.7916	1353.7	980.2
7	-2.561	-1.607	731.7	777.7	731.1	670.8	-31.6	393.5	-2.5	30.3	0.6275	0.6275	1139.4	1129.9	1.1839	0.8037	1380.5	996.2
8	-3.594	-2.676	758.2	775.1	758.1	670.2	-14.5	389.5	-1.1	30.1	0.6515	0.6260	1166.3	1154.6	1.2058	0.8215	1403.2	1017.1
9	-3.710	-5.401	815.4	816.5	815.0	703.2	26.7	418.7	1.9	30.6	0.6959	0.6552	1248.1	1231.1	1.2531	0.8600	1468.3	1074.4
10	-6.487	-6.376	823.6	854.9	822.8	750.0	35.7	410.3	2.5	28.5	0.6995	0.6850	1275.5	1257.3	1.2638	0.9065	1488.0	1131.3
11	-7.710	-7.791	774.0	828.0	773.8	752.1	-16.8	346.2	-1.2	24.6	0.6520	0.6603	1303.1	1284.0	1.2888	0.9587	1530.0	1202.1

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC	PO/PO INLET
1	-4.46	-0.15	22.92	42.49	73.08	89.48	0.3658	0.2486	0.0566	1.6457	80.35	78.91	45.02	2.52	-833.6	-41.5	2.9048
2	-4.54	-0.09	17.74	41.50	73.67	86.63	0.4058	0.2906	0.0677	1.6151	76.50	74.88	45.42	3.92	-847.3	-61.8	2.8596
3	-4.53	0.04	14.95	38.40	74.38	84.58	0.4302	0.3148	0.0748	1.5641	73.16	71.44	45.82	7.42	-863.8	-113.2	2.7812
4	-2.62	1.97	12.30	27.07	73.74	86.56	0.4047	0.2542	0.0607	1.4820	73.60	72.11	48.93	21.87	-956.5	-341.0	2.6128
5	1.37	5.96	8.05	18.58	66.19	80.71	0.3852	0.1859	0.0425	1.4557	77.68	76.48	54.86	36.27	-1083.2	-566.8	2.4080
6	3.58	7.92	7.81	13.93	61.97	73.59	0.3749	0.1753	0.0374	1.4191	76.95	75.80	57.95	44.02	-1147.7	-681.6	2.2620
7	3.11	7.19	8.36	10.38	63.41	70.06	0.3715	0.1982	0.0407	1.3639	71.68	70.43	57.99	47.61	-1171.0	-736.4	2.1971
8	1.87	5.68	6.39	8.54	66.10	70.23	0.3644	0.2075	0.0429	1.3351	68.69	67.41	57.25	48.70	-1180.9	-765.1	2.1974
9	-0.66	2.02	1.86	7.15	70.07	72.97	0.3594	0.2136	0.0490	1.3279	66.60	65.25	56.15	48.95	-1221.3	-812.3	2.2691
10	-0.94	1.24	1.61	7.98	70.01	78.39	0.3270	0.1499	0.0362	1.3597	75.75	74.68	56.26	48.28	-1239.9	-846.9	2.3407
11	1.95	3.64	5.44	8.36	64.82	78.31	0.2994	0.1012	0.0240	1.3913	83.14	82.34	59.46	51.10	-1319.9	-937.7	2.3042

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.3703	2.4347	77.93	80.47	42.47	1.1462	1.4364	74.10	75.38

STATOR 2

RUN NO 8, SPEED CODE 10, POINT NO 1

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	9.022	1.066	1304.8	997.8	1012.3	973.6	823.3	-218.5	39.4	-12.6	1.0831	0.7908	2.2514	1.4382	1.2759	1.1921
2	8.248	1.181	1272.4	1046.0	970.5	1021.3	823.0	-225.8	40.6	-12.5	1.0514	0.8346	2.3688	1.4371	1.3396	1.1943
3	7.334	1.128	1226.5	1082.8	935.1	1063.6	793.7	-202.6	40.5	-10.8	1.0098	0.8705	2.4737	1.4306	1.3935	1.1925
4	4.681	0.588	1104.3	1042.7	907.6	1036.8	629.1	-111.4	34.8	-6.1	0.9066	0.8467	2.4479	1.3925	1.3838	1.1676
5	1.831	-0.135	962.3	963.8	826.4	956.5	493.0	-118.8	30.8	-7.1	0.7847	0.7850	2.3217	1.3596	1.3891	1.1490
6	0.450	-0.461	872.2	893.5	761.3	880.9	425.6	-149.3	29.2	-9.6	0.7081	0.7262	2.2007	1.3437	1.3755	1.1404
7	-0.365	-0.610	828.3	852.3	728.7	842.6	393.9	-128.3	28.4	-8.6	0.6718	0.6922	2.1351	1.3340	1.3323	1.1334
8	-1.411	-0.727	825.9	839.4	728.1	834.3	390.0	-92.4	28.1	-6.3	0.6706	0.6823	2.1158	1.3264	1.2941	1.1282
9	-4.666	-1.037	873.5	888.4	765.2	887.6	421.2	-39.0	28.9	-2.5	0.7033	0.7170	2.1649	1.3596	1.2679	1.1284
10	-5.589	-1.105	912.7	916.8	814.0	916.8	412.7	-6.9	27.0	-0.4	0.7361	0.7398	2.1999	1.3682	1.2780	1.1223
11	-6.253	-1.102	895.1	907.6	824.7	901.7	348.0	-103.9	23.0	-6.6	0.7191	0.7302	2.1690	1.3730	1.3104	1.1194

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-9.03	-7.47	-0.81	52.05	92.32	86.80	0.4170	0.4307	0.0950	0.7741	59.31	63.56	37.25	39.33
2	-6.86	-4.84	-1.21	53.02	89.77	92.84	0.3724	0.3473	0.0781	0.8226	63.64	67.65	44.44	46.63
3	-6.10	-3.60	0.06	51.32	87.78	98.79	0.3197	0.2489	0.0573	0.8779	68.33	72.00	51.32	53.51
4	-10.76	-6.88	4.19	40.95	89.42	99.69	0.2373	0.1690	0.0417	0.9285	74.04	77.03	57.72	59.59
5	-13.90	-8.59	3.22	37.88	84.00	93.39	0.1864	0.1401	0.0372	0.9519	75.43	78.11	65.73	67.26
6	-15.22	-9.43	0.61	38.78	77.46	85.83	0.1786	0.1388	0.0378	0.9592	73.32	76.05	67.59	68.99
7	-15.87	-9.88	1.92	37.00	74.11	82.02	0.1631	0.1372	0.0380	0.9633	72.26	75.00	63.64	65.06
8	-15.91	-9.70	3.79	34.46	74.28	81.33	0.1500	0.1413	0.0399	0.9632	72.53	75.22	59.30	60.73
9	-14.96	-8.24	7.65	31.38	77.06	84.61	0.1360	0.1611	0.0473	0.9548	68.44	71.61	54.36	55.85
10	-17.51	-10.63	10.34	27.38	82.37	86.93	0.1311	0.1978	0.0585	0.9403	68.41	71.64	59.05	60.43
11	-22.77	-15.67	5.37	29.52	82.72	84.53	0.1368	0.2006	0.0595	0.9416	66.18	69.58	66.84	68.07

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10680.	184.10	1.3703	2.2657	70.87	73.96	1.1462	0.9306	58.77

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OF POOR QUALITY

TABLE XVII(b) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA
(Uniform Inlet Flow, 100 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 8, SPEED CODE 10, POINT NO 2

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	16.704	18.206	634.0	1099.7	634.0	662.7	0.0	877.7	0.0	53.0	0.5869	0.9800	627.5	726.5	0.8258	0.6057	892.0	679.7
2	14.214	15.848	648.2	1060.2	648.2	668.7	0.0	822.7	0.0	50.9	0.6010	0.9401	676.7	761.7	0.8689	0.5954	937.1	671.5
3	11.847	13.610	662.3	1032.2	662.3	682.0	0.0	774.8	0.0	48.6	0.6150	0.9124	724.9	796.8	0.9118	0.6032	981.9	682.4
4	5.508	7.648	693.8	936.8	693.8	659.7	0.0	665.1	0.0	45.2	0.6467	0.8183	863.0	902.3	1.0322	0.6124	1107.3	701.0
5	-0.263	1.018	707.7	788.7	707.7	567.2	0.0	548.0	0.0	44.0	0.6608	0.6787	1035.4	1042.9	1.1710	0.6478	1254.1	752.8
6	-1.550	-1.843	708.2	731.0	708.2	530.1	0.0	503.4	0.0	43.5	0.6613	0.6261	1118.3	1113.2	1.2361	0.6920	1323.7	808.0
7	-2.313	-3.088	708.1	753.7	708.1	576.4	0.0	486.6	0.0	40.1	0.6611	0.6473	1159.3	1148.3	1.2684	0.7543	1358.4	878.3
8	-3.541	-4.262	707.0	768.0	707.0	606.7	0.0	470.9	0.0	37.8	0.6601	0.6607	1200.2	1183.5	1.3005	0.8051	1392.9	935.8
9	-8.060	-7.758	693.8	804.6	693.8	633.7	0.0	495.8	0.0	38.0	0.6467	0.6869	1322.3	1288.9	1.3920	0.8666	1493.3	1015.2
10	-9.726	-8.993	685.8	827.9	685.8	641.6	0.0	523.2	0.0	39.1	0.6386	0.7032	1363.0	1324.1	1.4209	0.8716	1525.8	1026.2
11	-11.192	-10.280	676.3	792.0	676.3	595.6	0.0	522.0	0.0	41.1	0.6291	0.6683	1403.7	1359.2	1.4494	0.8670	1556.1	1027.4

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC	PO/PO INLET
1	-1.90	2.71	15.09	57.35	41.05	51.26	0.4715	0.0439	0.0094	1.8907	97.71	97.50	44.49	-12.87	-627.5	151.2	1.8907
2	-1.82	2.48	14.39	51.22	41.64	53.06	0.4990	0.0393	0.0090	1.8722	97.74	97.54	46.00	-5.22	-676.7	61.1	1.8722
3	-1.64	2.47	13.38	45.52	42.21	55.36	0.5050	0.0187	0.0045	1.8690	98.81	98.72	47.37	1.84	-724.9	-22.0	1.8690
4	-0.45	3.02	10.08	31.30	43.40	55.47	0.5336	0.0622	0.0156	1.7964	94.95	94.54	51.06	19.76	-863.0	-237.2	1.7964
5	1.12	3.80	10.82	14.54	43.90	48.33	0.5336	0.1534	0.0347	1.6438	84.28	83.17	55.64	41.10	-1035.4	-494.9	1.6436
6	1.72	4.00	11.67	8.65	43.92	45.49	0.5098	0.1705	0.0354	1.5986	81.03	79.76	57.66	49.01	-1118.3	-609.8	1.5986
7	2.00	4.10	8.68	9.58	43.91	50.15	0.4681	0.1248	0.0266	1.6404	85.86	84.86	58.58	49.00	-1159.3	-662.7	1.6404
8	2.27	4.22	6.74	9.89	43.88	53.37	0.4386	0.0935	0.0201	1.6716	89.18	88.39	59.49	49.60	-1200.2	-712.5	1.6716
9	3.25	4.68	4.54	10.96	43.41	55.91	0.4361	0.1324	0.0293	1.7417	84.94	83.74	62.30	51.34	-1322.3	-793.1	1.7417
10	3.61	4.90	4.23	12.05	43.11	56.31	0.4499	0.1660	0.0376	1.7756	81.67	80.16	63.29	51.23	-1363.0	-800.9	1.7756
11	3.93	5.08	8.13	9.79	42.75	51.80	0.4624	0.2104	0.0451	1.7291	76.23	74.36	64.26	54.47	-1403.7	-837.2	1.7291

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1960	1.7369	87.09	88.04	41.77	1.1960	1.7369	87.09	88.04

STATOR 1

RUN NO 8, SPEED CODE 10, POINT NO 2

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	18.048	14.790	1108.8	741.3	701.0	741.3	859.2	-4.2	51.0	-0.3	0.9897	0.6286	1.7584	1.2043	1.7584	1.2043
2	15.644	12.947	1074.1	739.0	707.6	738.8	808.1	19.4	48.9	1.5	0.9546	0.6275	1.7625	1.2007	1.7625	1.2007
3	13.519	11.224	1049.5	739.8	720.4	738.9	763.2	36.1	46.7	2.8	0.9303	0.6230	1.7676	1.1978	1.7676	1.1978
4	8.118	6.470	959.6	726.1	696.8	726.1	659.7	2.1	43.4	0.2	0.8410	0.6180	1.7475	1.1922	1.7475	1.1922
5	1.565	0.343	813.7	645.8	602.4	649.5	547.0	-19.8	42.2	-1.7	0.7024	0.5513	1.6348	1.1829	1.6348	1.1829
6	-1.649	-2.633	757.6	613.5	565.9	612.9	503.7	-26.5	41.7	-2.5	0.6507	0.5195	1.5850	1.1795	1.5850	1.1795
7	-2.926	-3.792	779.2	638.7	608.6	638.4	486.5	-20.0	38.7	-1.8	0.6711	0.5423	1.6064	1.1788	1.6064	1.1788
8	-3.910	-4.678	792.6	673.2	636.5	673.1	472.3	-7.6	36.6	-0.7	0.6838	0.5732	1.6407	1.1796	1.6407	1.1796
9	-6.496	-6.937	830.6	731.5	663.9	730.9	499.0	29.4	37.0	2.3	0.7112	0.6189	1.7016	1.2067	1.7016	1.2067
10	-7.313	-7.602	854.5	735.6	672.8	734.6	526.8	37.5	38.2	2.9	0.7281	0.6183	1.7040	1.2227	1.7040	1.2227
11	-8.209	-8.335	821.5	677.6	631.0	677.5	526.1	-15.3	39.9	-1.3	0.6956	0.5651	1.6375	1.2275	1.6375	1.2275

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-1.59	0.52	12.01	51.28	53.80	68.44	0.4830	0.1495	0.0306	0.9306	85.58	86.66	85.58	86.66
2	-1.95	0.45	12.72	47.40	55.49	68.61	0.4605	0.1323	0.0281	0.9415	87.51	88.45	87.51	88.45
3	-2.82	-0.04	13.17	43.92	57.65	68.93	0.4408	0.1252	0.0276	0.9466	89.28	90.09	89.28	90.09
4	-3.58	0.19	9.43	43.26	57.63	67.70	0.4039	0.0641	0.0156	0.9761	89.89	90.64	89.89	90.64
5	-3.29	1.76	7.57	43.95	50.56	59.21	0.3854	0.0089	0.0024	0.9978	82.35	83.50	82.35	83.50
6	-3.34	2.28	6.88	44.16	47.89	55.22	0.3942	0.0601	0.0172	0.9848	78.31	79.64	78.31	79.64
7	-6.13	-0.25	7.59	40.47	52.24	57.66	0.3724	0.0968	0.0282	0.9746	81.06	82.25	81.06	82.25
8	-7.97	-1.83	8.78	37.28	55.23	61.06	0.3334	0.0791	0.0235	0.9787	84.57	85.59	84.57	85.59
9	-7.53	-0.71	12.86	34.71	57.68	65.53	0.3007	0.0869	0.0271	0.9750	79.31	80.77	79.31	80.77
10	-6.77	0.28	14.71	35.23	58.09	65.10	0.3204	0.1291	0.0408	0.9620	73.81	75.66	73.81	75.66
11	-5.68	1.47	12.02	41.24	53.95	59.19	0.3877	0.1907	0.0611	0.9474	66.44	68.65	66.44	68.65

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10677.	183.90	1.1960	1.6852	81.96	83.22	1.1960	0.9702	81.96

ROTOR 2

RUN NO 8, SPEED CODE 10, POINT NO 2

SL	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
1	11.516	11.214	837.4	1168.2	837.4	821.8	-4.0	830.2	-0.3	45.2	0.7179	0.9486	632.6	873.2	1.0147	0.6683	1183.7	823.0
2	10.681	10.057	841.9	1157.1	841.7	799.4	19.0	836.6	1.3	46.2	0.7233	0.9391	856.1	891.5	1.0199	0.6503	1187.1	801.2
3	9.752	8.939	849.2	1142.2	848.5	789.9	35.4	825.0	2.4	46.2	0.7313	0.9275	880.4	910.5	1.0312	0.6451	1197.5	794.5
4	6.163	5.599	853.7	1048.4	853.7	817.5	2.1	656.3	0.1	38.8	0.7375	0.8512	955.7	971.1	1.1057	0.7113	1279.9	876.0
5	0.017	0.750	773.9	855.1	773.7	686.7	-19.9	509.6	-1.5	36.6	0.6651	0.6872	1059.5	1058.8	1.1412	0.7066	1328.1	879.3
6	-3.065	-1.623	726.4	751.0	726.0	592.0	-26.2	462.1	-2.1	38.0	0.6219	0.5994	1112.5	1105.6	1.1561	0.6979	1350.4	874.4
7	-4.239	-2.652	740.7	740.4	740.4	584.7	-19.1	454.2	-1.5	37.8	0.6353	0.5910	1139.1	1129.6	1.1791	0.7130	1374.7	893.3
8	-5.044	-3.583	764.2	762.3	764.1	612.8	-6.8	453.5	-0.5	36.4	0.6567	0.6094	1166.0	1154.3	1.2029	0.7443	1399.8	930.9
9	-6.923	-6.185	811.9	794.7	811.3	642.9	30.1	467.2	2.1	35.9	0.6930	0.6304	1247.7	1230.7	1.2489	0.7917	1463.2	998.1
10	-7.424	-7.009	816.8	794.9	815.9	649.4	37.9	458.3	2.6	35.1	0.6927	0.6280	1275.2	1256.9	1.2570	0.8132	1482.1	1029.3
11	-8.182	-8.116	766.6	759.2	766.5	647.7	-15.2	396.0	-1.1	31.3	0.6451	0.5963	1302.7	1283.6	1.2829	0.8630	1524.6	1098.8

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	V0'-1 FT/SEC	V0'-2 FT/SEC	PO/PO INLET
1	-4.59	-0.27	23.38	41.91	73.16	86.74	0.4693	0.1803	0.0411	1.7061	85.88	84.78	44.89	2.98	-836.6	-43.0	3.0000
2	-5.14	-0.69	17.73	40.90	73.67	85.91	0.4896	0.1729	0.0403	1.7169	86.43	85.37	44.82	3.92	-837.1	-54.9	3.0256
3	-5.46	-0.88	13.69	38.73	74.27	86.65	0.4956	0.1478	0.0352	1.7237	88.19	87.25	44.90	6.16	-845.0	-85.5	3.0465
4	-3.54	1.25	11.51	27.14	73.92	94.19	0.4469	0.0562	0.0135	1.6871	94.63	94.21	48.21	21.07	-953.6	-314.7	2.9501
5	0.90	5.47	10.43	15.71	66.09	79.75	0.4499	0.0547	0.0121	1.5940	93.71	93.29	54.37	38.66	-1079.4	-549.2	2.5971
6	3.12	7.45	11.16	10.12	61.97	68.04	0.4609	0.1027	0.0206	1.5205	87.30	86.54	57.49	47.37	-1138.7	-643.5	2.4169
7	2.55	6.63	9.82	8.34	63.65	67.24	0.4560	0.1270	0.0254	1.4883	83.75	82.82	57.42	49.08	-1158.3	-675.4	2.4024
8	1.53	5.34	6.46	8.13	66.12	70.75	0.4382	0.1247	0.0257	1.4835	83.60	82.67	56.91	48.78	-1172.8	-700.8	2.4388
9	-0.56	2.12	2.69	6.47	69.55	73.38	0.4212	0.1358	0.0306	1.4640	81.21	80.18	56.25	49.78	-1217.6	-763.5	2.4907
10	-0.72	1.46	4.05	5.75	69.12	73.73	0.4048	0.1124	0.0258	1.4575	83.79	82.91	56.48	50.73	-1237.3	-798.6	2.4926
11	2.18	3.87	8.08	5.95	64.03	72.89	0.3786	0.0838	0.0187	1.4850	87.77	87.07	59.69	53.74	-1317.9	-887.6	2.4373

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.3829	2.6612	83.98	86.00	42.68	1.1562	1.5792	88.71	89.41

STATOR 2

RUN NO 8, SPEED CODE 10, POINT NO 2

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	8.689	0.827	1209.6	884.7	887.6	884.7	821.7	9.7	43.1	0.6	0.9886	0.6925	2.6768	1.4371	1.5226	1.1929
2	7.649	0.741	1196.3	856.9	862.4	896.8	829.1	12.6	44.1	0.8	0.9768	0.7035	2.7120	1.4350	1.5398	1.1943
3	6.589	0.560	1179.9	919.2	848.6	919.1	819.7	14.0	44.2	0.9	0.9635	0.7243	2.7716	1.4296	1.5687	1.1929
4	4.178	-0.101	1082.7	908.5	862.5	907.4	654.7	-45.3	37.3	-2.9	0.8831	0.7240	2.7875	1.3978	1.5897	1.1718
5	1.994	-0.674	890.2	773.9	729.7	771.7	509.9	-58.1	34.9	-4.3	0.7181	0.6162	2.5562	1.3639	1.5591	1.1527
6	0.531	-0.885	786.8	670.2	636.6	668.1	462.4	-52.0	36.0	-4.4	0.6302	0.5309	2.3993	1.3525	1.5142	1.1466
7	-0.466	-0.952	774.4	643.9	626.9	642.0	454.6	-49.1	35.9	-4.4	0.6201	0.5096	2.3646	1.3495	1.4718	1.1467
8	-1.513	-0.991	795.6	667.3	653.2	665.7	454.3	-46.2	34.8	-4.0	0.6382	0.5292	2.3960	1.3490	1.4606	1.1437
9	-4.346	-1.250	831.1	715.6	685.8	715.6	469.5	-9.3	34.4	-0.7	0.6617	0.5636	2.4448	1.3781	1.4371	1.1427
10	-5.288	-1.326	834.3	713.9	695.7	713.9	460.5	-2.0	33.6	-0.2	0.6617	0.5598	2.4315	1.3889	1.4243	1.1362
11	-6.120	-1.264	806.2	672.2	700.7	672.2	398.7	-4.7	29.7	-0.4	0.6360	0.5240	2.3630	1.3950	1.4417	1.1364

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-5.38	-3.82	12.44	42.44	90.67	100.22	0.4197	0.2303	0.0520	0.8925	74.01	77.28	65.67	67.62
2	-3.33	-1.31	12.05	43.29	89.88	102.36	0.4071	0.2229	0.0513	0.8979	75.51	78.63	67.06	68.98
3	-2.46	0.04	11.72	43.31	90.44	106.17	0.3843	0.2003	0.0470	0.9096	78.39	81.20	70.68	72.46
4	-8.28	-4.41	7.46	40.14	97.03	107.85	0.3285	0.1481	0.0367	0.9404	85.24	87.18	81.93	83.07
5	-9.77	-4.46	6.00	39.24	83.24	92.04	0.3155	0.0914	0.0244	0.9723	84.21	86.12	88.06	88.78
6	-8.44	-2.65	5.77	40.40	71.95	79.02	0.3370	0.0562	0.0155	0.9865	80.36	82.58	85.32	86.15
7	-8.32	-2.33	5.79	40.28	70.89	75.79	0.3472	0.0519	0.0145	0.9883	79.54	81.82	80.23	81.27
8	-9.27	-3.06	6.14	38.75	74.17	78.89	0.3385	0.0679	0.0192	0.9838	81.03	83.18	79.14	80.22
9	-9.38	-2.68	9.42	35.16	76.83	83.23	0.3089	0.0724	0.0213	0.9816	76.72	79.41	76.03	77.22
10	-10.90	-4.02	10.61	33.72	77.39	82.10	0.3679	0.0931	0.0276	0.9764	74.07	77.04	77.56	78.65
11	-16.00	-8.91	11.53	30.13	77.07	76.17	0.3155	0.1264	0.0377	0.9699	70.26	73.56	80.19	81.18

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10677.	183.90	1.3829	2.5505	79.83	82.26	1.1562	0.9584	79.96

TABLE XVII(c) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA
(Uniform Inlet Flow, 100 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 9, SPEED CODE 10, POINT NO 23

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	16.637	18.257	631.1	1068.3	631.1	654.4	0.0	844.4	0.0	52.2	0.5841	0.9505	627.4	726.3	0.8236	0.5917	889.9	665.0
2	14.109	15.635	645.3	1028.0	645.3	653.7	0.0	793.5	0.0	50.5	0.5981	0.9100	676.5	761.4	0.8665	0.5793	934.9	654.4
3	11.745	13.587	658.8	1001.1	658.8	664.6	0.0	748.5	0.0	48.4	0.6116	0.8835	724.7	796.6	0.9092	0.5882	979.4	666.6
4	5.441	7.619	689.1	910.7	689.1	645.9	0.0	642.1	0.0	44.8	0.6420	0.7952	862.8	902.0	1.0287	0.6079	1104.2	696.2
5	-0.480	1.039	701.7	778.8	701.7	565.9	0.0	535.1	0.0	43.4	0.6547	0.6709	1035.1	1042.6	1.1668	0.6547	1250.5	760.0
6	-1.668	-1.803	701.8	704.8	701.8	505.2	0.0	491.5	0.0	44.2	0.6548	0.6032	1118.0	1112.6	1.2316	0.6853	1320.0	800.8
7	-2.219	-3.015	702.0	723.9	702.0	549.1	0.0	471.6	0.0	40.7	0.6550	0.6212	1158.9	1148.0	1.2643	0.7476	1355.0	871.2
8	-3.321	-4.154	701.7	744.1	701.7	585.9	0.0	458.8	0.0	38.1	0.6547	0.6398	1199.6	1183.1	1.2969	0.8010	1390.0	931.0
9	-8.101	-7.684	690.3	812.8	690.3	649.6	0.0	488.5	0.0	36.9	0.6432	0.6955	1322.0	1288.5	1.3896	0.8818	1491.3	1030.5
10	-9.651	-8.969	682.1	810.5	682.1	623.5	0.0	517.9	0.0	39.6	0.6349	0.6877	1362.7	1323.7	1.4164	0.8645	1523.6	1018.8
11	-11.243	-10.272	672.6	784.0	672.6	582.1	0.0	525.2	0.0	42.0	0.6253	0.6606	1403.3	1358.8	1.4469	0.8567	1556.2	1016.8

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC	PO/PO INLET
1	-1.79	2.82	17.72	54.83	40.92	51.94	0.4781	-0.0091	-0.0020	1.8816	100.48	100.54	44.60	-10.24	-627.4	118.1	1.8816
2	-1.71	2.59	16.80	48.92	41.52	53.01	0.5088	0.0041	0.0009	1.8573	99.77	99.76	46.11	-2.81	-676.5	32.1	1.8573
3	-1.51	2.60	15.66	43.37	42.07	55.01	0.5134	-0.0089	-0.0021	1.8525	100.57	100.64	47.50	4.13	-724.7	-48.1	1.8525
4	-0.27	3.20	12.22	29.33	43.23	55.15	0.5313	0.0362	0.0090	1.7843	96.97	96.73	51.24	21.90	-862.8	-259.9	1.7843
5	1.34	4.02	11.60	13.98	43.69	48.85	0.5233	0.1251	0.0280	1.6518	86.99	86.06	55.86	41.88	-1035.1	-507.4	1.6516
6	1.95	4.23	13.55	6.99	43.69	43.71	0.5113	0.1645	0.0328	1.5852	81.37	80.15	57.89	50.89	-1118.0	-621.4	1.5852
7	2.21	4.31	10.63	7.85	43.70	48.16	0.4685	0.1197	0.0245	1.6212	86.15	85.20	58.79	50.94	-1158.9	-676.4	1.6212
8	2.45	4.40	8.18	8.62	43.69	52.00	0.4371	0.0844	0.0176	1.6594	90.07	89.36	59.66	51.04	-1199.8	-724.3	1.6594
9	3.37	4.79	4.09	11.53	43.28	58.26	0.4235	0.0958	0.0214	1.7756	89.11	88.22	62.42	50.88	-1322.0	-800.0	1.7756
10	3.73	5.02	5.20	11.21	42.97	55.24	0.4529	0.1608	0.0357	1.7716	82.13	80.66	63.41	52.20	-1362.7	-805.8	1.7716
11	4.05	5.20	6.63	9.41	42.61	51.05	0.4694	0.2096	0.0444	1.7371	76.47	74.61	64.38	54.98	-1403.3	-833.6	1.7371

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1916	1.7358	89.01	89.81	41.61	1.1916	1.7358	89.01	89.81

STATOR 1

RUN NO 9, SPEED CODE 10, POINT NO 23

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	18.116	14.827	1078.0	736.9	692.0	736.7	826.6	-18.2	50.2	-1.4	0.9608	0.6267	1.7420	1.1966	1.7420	1.1966
2	15.751	12.998	1042.3	735.3	692.0	735.3	779.4	1.8	48.5	0.1	0.9247	0.6261	1.7472	1.1936	1.7472	1.1936
3	13.617	11.274	1018.4	737.7	702.6	737.5	737.3	17.7	46.4	1.4	0.9012	0.6291	1.7546	1.1911	1.7546	1.1911
4	8.184	6.526	933.2	722.6	682.0	722.4	636.9	-13.4	43.0	-1.1	0.8174	0.6167	1.7332	1.1856	1.7332	1.1856
5	1.736	0.528	802.6	657.7	599.1	657.3	534.2	-22.9	41.7	-2.0	0.6933	0.5594	1.6338	1.1786	1.6338	1.1786
6	-1.653	-2.400	730.5	618.0	540.2	617.2	491.8	-30.7	42.3	-2.8	0.6269	0.5246	1.5802	1.1750	1.5802	1.1750
7	-3.086	-3.614	748.5	632.1	580.6	631.5	472.4	-26.7	39.2	-2.4	0.6441	0.5376	1.5903	1.1737	1.5903	1.1737
8	-4.132	-4.540	768.1	665.6	614.9	665.5	460.2	-10.2	36.9	-0.9	0.6622	0.5674	1.6219	1.1753	1.6219	1.1753
9	-6.409	-6.767	837.6	723.0	678.2	722.6	491.6	22.1	36.0	1.8	0.7189	0.6120	1.6793	1.2036	1.6793	1.2036
10	-7.149	-7.444	837.5	732.2	655.3	731.4	521.4	34.5	38.6	2.7	0.7129	0.6158	1.6890	1.2204	1.6890	1.2204
11	-8.124	-8.238	813.7	685.7	618.1	685.4	529.3	-20.8	40.7	-1.7	0.6879	0.5720	1.6364	1.2288	1.6364	1.2288

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-2.30	-0.19	10.93	51.65	54.47	67.89	0.4694	0.1649	0.0337	0.9263	87.34	88.27	87.34	88.27
2	-2.33	0.07	11.37	48.37	55.47	68.15	0.4462	0.1395	0.0296	0.9409	89.20	90.00	89.20	90.00
3	-3.08	-0.30	11.75	45.08	57.34	68.69	0.4250	0.1277	0.0282	0.9478	91.15	91.81	91.15	91.81
4	-3.97	-0.25	8.21	44.09	57.33	67.24	0.3899	0.0734	0.0179	0.9738	91.62	92.23	91.62	92.23
5	-3.80	1.24	7.32	43.69	50.98	59.84	0.3625	0.0226	0.0062	0.9938	84.23	85.25	84.23	65.25
6	-2.70	2.92	6.51	45.17	46.14	55.52	0.3621	0.0395	0.0113	0.9905	79.80	81.03	79.80	81.03
7	-5.63	0.25	6.96	41.60	50.29	56.85	0.3545	0.1034	0.0302	0.9745	81.57	82.71	81.57	82.71
8	-7.73	-1.58	8.55	37.75	53.89	60.09	0.3208	0.1084	0.0322	0.9720	84.50	85.50	84.50	85.50
9	-8.59	-1.71	12.31	34.27	59.92	64.36	0.3149	0.1869	0.0583	0.9456	78.39	79.89	78.39	79.89
10	-6.33	0.72	14.49	35.90	57.14	64.46	0.3109	0.1591	0.0503	0.9545	73.25	75.11	73.25	75.11
11	-4.93	2.22	11.57	42.44	53.30	59.57	0.3756	0.2133	0.0683	0.9422	65.97	68.20	65.97	68.20

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10674.	183.20	1.1916	1.6731	82.63	83.82	1.1916	0.9639	82.63

ROTOR 2

RUN NO 9, SPEED CODE 10, POINT NO 23

SL	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VB-1 FT/SEC	VB-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
1	11.532	11.185	831.9	1189.1	831.7	798.5	-17.7	881.1	-1.2	47.7	0.7152	0.9648	832.3	873.0	1.0224	0.6479	1189.3	798.5
2	10.700	10.001	837.5	1172.7	837.5	782.0	1.8	873.9	0.1	48.1	0.7215	0.9509	855.8	891.2	1.0305	0.6343	1196.2	782.2
3	9.757	8.861	846.8	1152.3	846.6	778.5	17.3	849.6	1.2	47.4	0.7312	0.9350	880.1	910.2	1.0438	0.6336	1208.8	780.6
4	6.155	5.492	849.6	1054.0	849.5	788.9	-13.2	698.9	-0.9	41.6	0.7358	0.8526	955.4	970.8	1.1158	0.6750	1286.4	834.4
5	0.266	0.611	780.2	884.2	779.9	655.6	-22.9	593.3	-1.7	42.1	0.6722	0.7057	1059.2	1058.5	1.1493	0.6417	1333.9	803.9
6	-2.597	-1.447	730.4	797.6	729.8	578.0	-30.7	549.6	-2.4	43.5	0.6269	0.6326	1112.1	1105.2	1.1638	0.6355	1356.0	801.8
7	-3.793	-2.496	736.1	784.7	735.6	571.2	-25.9	538.1	-2.0	43.2	0.6325	0.6222	1138.8	1129.3	1.1837	0.6519	1377.6	822.1
8	-4.698	-3.455	759.0	798.9	758.9	585.7	-9.6	543.3	-0.7	42.6	0.6532	0.6336	1165.7	1154.0	1.2040	0.6711	1399.0	846.1
9	-6.577	-5.978	807.9	825.3	807.6	610.3	22.6	555.6	1.6	42.2	0.6903	0.6481	1247.4	1230.4	1.2535	0.7145	1467.0	909.8
10	-7.105	-6.778	820.3	826.1	819.5	617.0	35.1	549.4	2.4	41.5	0.6967	0.6462	1274.8	1256.6	1.2622	0.7341	1486.1	938.5
11	-7.979	-7.945	783.2	791.2	782.9	639.8	-20.7	465.5	-1.5	35.9	0.6599	0.6161	1302.4	1283.3	1.2953	0.8085	1537.4	1038.3

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VB'-1 FT/SEC	VB'-2 FT/SEC	PO/PO INLET
1	-3.94	0.38	19.82	46.13	72.58	86.30	0.5048	0.1666	0.0380	1.7992	87.78	86.73	45.54	-0.58	-850.1	8.1	3.1342
2	-4.42	0.03	15.09	44.27	73.19	86.17	0.5199	0.1546	0.0361	1.8029	88.51	87.52	45.54	1.27	-854.1	-17.3	3.1494
3	-4.79	-0.22	11.98	41.11	73.99	87.69	0.5206	0.1260	0.0301	1.8006	90.34	89.51	45.56	4.45	-862.8	-60.7	3.1590
4	-2.96	1.83	9.46	29.77	73.45	93.08	0.4947	0.0679	0.0165	1.7579	93.90	93.39	48.79	19.02	-966.6	-271.8	3.0482
5	0.75	5.33	7.14	18.85	66.54	76.20	0.5273	0.0894	0.0207	1.6856	91.00	90.32	54.22	35.37	-1082.1	-465.3	2.7470
6	3.07	7.40	7.63	13.59	62.13	68.70	0.5362	0.1156	0.0247	1.6445	87.85	86.97	57.44	43.84	-1142.9	-555.7	2.5998
7	2.85	6.92	6.69	11.77	62.95	68.09	0.5280	0.1282	0.0272	1.6214	86.09	85.11	57.72	45.95	-1164.7	-591.3	2.5864
8	1.75	5.56	3.82	11.00	65.28	70.09	0.5189	0.1351	0.0293	1.6129	85.04	84.01	57.13	46.13	-1175.3	-610.6	2.6192
9	-0.31	2.37	0.64	8.76	68.63	72.48	0.5056	0.1493	0.0351	1.5991	82.77	81.60	56.50	47.74	-1224.7	-674.8	2.6832
10	-0.80	1.38	2.05	7.67	68.80	73.07	0.4900	0.1253	0.0300	1.5901	85.01	84.00	56.40	48.73	-1239.7	-707.2	2.6930
11	1.73	3.43	6.15	7.44	64.72	75.47	0.4404	0.0742	0.0173	1.6094	90.68	90.03	59.24	51.81	-1323.1	-817.7	2.6413

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.4057	2.8160	84.52	86.57	42.74	1.1797	1.6031	88.67	89.47

STATOR 2

RUN NO 9, SPEED CODE 10, POINT NO 23

SL	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VB-1 FT/SEC	VB-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	8.596	0.729	1226.8	828.5	862.7	828.5	872.3	-2.1	45.6	-0.1	1.0013	0.6424	2.9104	1.4472	1.6711	1.2091
2	7.483	0.542	1208.7	841.3	842.8	840.1	866.3	43.5	46.0	3.0	0.9856	0.6541	2.9468	1.4432	1.6878	1.2086
3	6.384	0.258	1186.8	865.9	834.6	865.8	843.8	14.1	45.5	0.9	0.9681	0.6773	3.0123	1.4343	1.7175	1.2038
4	3.853	-0.606	1085.0	827.0	831.8	827.0	696.7	-7.2	40.0	-0.5	0.8813	0.6510	2.9568	1.4072	1.7033	1.1866
5	1.500	-1.111	913.8	681.8	695.3	681.2	593.0	-28.2	40.4	-2.4	0.7318	0.5336	2.7065	1.3675	1.6548	1.1771
6	0.057	-1.169	827.3	592.0	617.8	590.4	550.2	-43.6	41.6	-4.2	0.6580	0.4613	2.5777	1.3806	1.6313	1.1750
7	-0.824	-1.137	813.5	578.6	609.7	576.8	538.5	-44.9	41.4	-4.4	0.6469	0.4511	2.5612	1.3766	1.6109	1.1729
8	-1.764	-1.109	827.6	604.8	623.3	603.8	544.5	-34.8	41.1	-3.3	0.6583	0.4721	2.5932	1.3784	1.5996	1.1731
9	-4.607	-1.304	857.4	648.7	650.7	648.6	558.4	7.4	40.7	0.7	0.6755	0.5016	2.6319	1.4122	1.5684	1.1746
10	-5.544	-1.358	861.5	655.2	660.8	654.8	552.7	24.1	40.0	2.1	0.6762	0.5048	2.6311	1.4234	1.5540	1.1670
11	-6.294	-1.275	832.9	632.4	689.0	632.1	468.0	18.1	34.3	1.6	0.6512	0.4860	2.5919	1.4257	1.5823	1.1602

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-2.86	-1.30	11.67	45.73	90.46	104.49	0.4851	0.1503	0.0340	0.9289	79.45	82.25	75.00	76.72
2	-1.42	0.60	14.21	43.04	90.27	106.83	0.4608	0.1377	0.0317	0.9362	81.27	83.84	76.77	78.41
3	-1.17	1.33	11.78	44.54	91.54	111.64	0.4361	0.1036	0.0243	0.9530	84.90	87.02	81.40	82.76
4	-5.55	-1.68	9.82	40.51	96.07	108.41	0.4013	0.0802	0.0199	0.9681	88.82	90.37	87.49	88.39
5	-4.26	1.04	7.93	42.82	81.64	88.40	0.4418	0.0654	0.0175	0.9800	84.59	86.56	86.64	87.73
6	-2.75	3.04	6.00	45.86	72.35	75.95	0.4869	0.0444	0.0122	0.9886	81.36	83.63	85.24	86.22
7	-2.82	3.18	5.72	45.86	71.62	74.27	0.4885	0.0305	0.0085	0.9926	81.57	83.80	83.89	84.93
8	-2.95	3.26	6.81	44.40	73.50	77.89	0.4673	0.0349	0.0099	0.9912	82.42	84.58	82.49	83.60
9	-3.13	3.57	10.82	40.02	75.99	81.76	0.4331	0.0728	0.0214	0.9808	76.97	79.82	78.04	79.38
10	-4.47	2.41	12.88	37.89	76.83	81.73	0.4212	0.0864	0.0255	0.9773	74.89	78.00	79.78	81.00
11	-11.43	-4.34	13.57	32.66	79.61	78.30	0.4010	0.0716	0.0214	0.9823	73.16	76.44	66.75	87.58

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10674.	183.20	1.4057	2.7418	82.02	84.34	1.1797	0.9737	83.80

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OF POOR QUALITY

TABLE XVII(d) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA (Uniform Inlet Flow, 100 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 8, SPEED CODE 10, POINT NO 3

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	16.853	18.251	626.6	1059.6	626.6	601.6	0.0	872.2	0.0	55.4	0.5796	0.9378	631.2	730.8	0.8227	0.5470	889.4	618.0
2	14.487	15.841	640.2	1018.1	640.2	614.7	0.0	811.6	0.0	52.9	0.5931	0.8972	680.7	766.1	0.8656	0.5432	934.4	616.3
3	12.183	13.626	653.7	995.6	653.7	640.2	0.0	762.4	0.0	50.0	0.6065	0.8758	729.2	801.5	0.9086	0.5642	979.3	641.4
4	6.069	7.818	684.4	903.7	684.4	607.4	0.0	669.2	0.0	47.8	0.6373	0.7849	868.1	907.6	1.0293	0.5668	1105.5	652.6
5	0.722	1.388	701.5	786.2	701.5	535.4	0.0	575.7	0.0	47.1	0.6545	0.6731	1041.5	1049.0	1.1716	0.6118	1255.7	714.6
6	-0.890	-1.359	704.8	744.9	704.8	523.9	0.0	529.6	0.0	45.3	0.6578	0.6359	1124.9	1119.7	1.2390	0.6736	1327.5	789.[illegible]
7	-1.902	-2.614	705.7	756.7	705.7	554.9	0.0	514.5	0.0	42.8	0.6587	0.6467	1166.1	1155.1	1.2723	0.7242	1363.0	847.5
8	-3.279	-3.828	705.4	766.7	705.4	584.0	0.0	496.9	0.0	40.4	0.6585	0.6562	1207.3	1190.4	1.3052	0.7760	1398.3	906.7
9	-7.786	-7.460	694.7	795.2	694.7	583.2	0.0	540.6	0.0	42.8	0.6476	0.6721	1330.1	1296.5	1.3989	0.8069	1500.6	954.7
10	-9.381	-8.736	687.7	823.5	687.7	604.0	0.0	559.7	0.0	42.7	0.6405	0.6939	1371.1	1331.9	1.4287	0.8260	1533.9	980.3
11	-10.951	-10.122	678.9	800.5	678.9	577.5	0.0	554.4	0.0	43.7	0.6317	0.6716	1412.0	1367.2	1.4578	0.8364	1566.7	997.0

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VB'-1 FT/SEC	VB'-2 FT/SEC	PO/PO INLET
1	-1.37	3.24	14.71	58.26	40.73	48.49	0.5371	0.0233	0.0050	1.9038	98.80	98.69	45.01	-13.25	-651.2	141.5	1.9038
2	-1.26	3.04	15.38	50.79	41.31	50.88	0.5525	0.0074	0.0017	1.8859	99.58	99.55	46.56	-4.23	-680.7	45.4	1.8859
3	-1.07	3.04	15.02	44.45	41.86	54.33	0.5410	-0.0331	-0.0079	1.8965	102.07	102.27	47.94	3.49	-729.2	-39.0	1.8965
4	0.13	3.60	11.74	30.21	43.06	53.38	0.5762	0.0323	0.0080	1.8363	97.47	97.26	51.63	21.43	-868.1	-238.5	1.8363
5	1.51	4.20	11.20	14.56	43.68	48.12	0.5696	0.1101	0.0248	1.7429	89.56	88.73	56.03	41.48	-1041.5	-473.3	1.7429
6	2.00	4.28	11.06	9.53	43.80	47.78	0.5302	0.1040	0.0218	1.7243	89.32	88.49	57.93	48.40	-1124.9	-590.1	1.7243
7	2.23	4.33	8.79	9.71	43.83	51.21	0.4984	0.0748	0.0159	1.7566	92.16	91.54	58.81	49.10	-1166.1	-640.5	1.7566
8	2.47	4.42	7.04	9.78	43.82	54.53	0.4671	0.0434	0.0093	1.7863	95.33	94.95	59.68	49.90	-1207.3	-693.6	1.7863
9	3.35	4.77	5.50	10.10	43.44	54.34	0.4891	0.1263	0.0274	1.8524	86.79	85.62	62.40	52.30	-1330.1	-755.9	1.8524
10	3.65	4.95	4.88	11.45	43.18	56.33	0.4906	0.1411	0.0315	1.9015	85.56	84.22	63.34	51.88	-1371.1	-772.1	1.9015
11	3.96	5.11	8.15	9.80	42.85	53.72	0.4919	0.1664	0.0356	1.8767	82.56	80.97	64.29	54.49	-1412.0	-812.8	1.8767

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.2054	1.8251	91.24	91.94	41.61	1.2054	1.8251	91.24	91.94

STATOR 1

RUN NO 8, SPEED CODE 10, POINT NO 3

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	17.999	14.740	1064.0	652.7	635.0	651.4	853.8	-41.6	53.5	-3.6	0.9425	0.5487	1.7794	1.2043	1.7794	1.2043
2	15.588	12.873	1027.1	654.5	647.6	654.4	797.1	-9.4	51.0	-0.8	0.9064	0.5515	1.7882	1.1992	1.7882	1.1992
3	13.509	11.164	1007.6	663.7	671.7	663.2	751.1	26.1	48.2	2.2	0.8880	0.5605	1.8033	1.1960	1.8033	1.1960
4	8.193	6.463	921.4	660.1	639.1	660.0	663.7	3.4	46.1	0.3	0.8022	0.5575	1.8008	1.1948	1.8008	1.1948
5	1.605	0.573	807.0	610.2	566.6	609.8	574.7	-22.1	45.4	-2.1	0.6927	0.5134	1.7313	1.1934	1.7313	1.1934
6	-1.390	-2.098	766.7	578.3	554.1	577.3	530.0	-34.7	43.7	-3.4	0.6561	0.4860	1.6925	1.1901	1.6925	1.1901
7	-2.602	-3.164	779.0	611.5	584.0	611.0	515.6	-23.7	41.5	-2.2	0.6674	0.5152	1.7231	1.1908	1.7231	1.1908
8	-3.597	-4.004	788.9	638.2	611.6	637.9	498.3	-21.1	39.2	-1.9	0.6769	0.5393	1.7514	1.1896	1.7514	1.1896
9	-6.443	-6.318	820.2	692.1	613.9	691.8	543.9	21.8	41.6	1.8	0.6952	0.5784	1.8099	1.2261	1.8099	1.2261
10	-7.388	-7.105	849.4	696.8	635.5	695.9	563.6	35.3	41.7	2.9	0.7179	0.5791	1.8171	1.2399	1.8171	1.2399
11	-8.284	-8.036	829.4	645.2	612.9	644.6	558.8	-28.2	42.5	-2.5	0.6981	0.5330	1.7620	1.2431	1.7620	1.2431

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	0.97	3.08	8.71	57.14	51.00	63.59	0.5512	0.1495	0.0305	0.9350	87.55	88.50	87.55	88.50
2	0.15	2.55	10.41	51.81	53.23	64.38	0.5227	0.1265	0.0269	0.9478	90.60	91.32	90.60	91.32
3	-1.29	1.50	12.63	46.00	56.47	65.66	0.4938	0.1217	0.0268	0.9513	93.56	94.06	93.56	94.06
4	-0.93	2.79	9.56	45.79	55.48	65.42	0.4539	0.0528	0.0129	0.9817	93.87	94.34	93.87	94.34
5	-0.12	4.92	7.24	47.45	50.31	59.49	0.4422	0.0213	0.0058	0.9943	87.72	88.61	87.72	88.61
6	-1.29	4.33	5.92	47.17	49.93	55.94	0.4554	0.0768	0.0219	0.9808	85.31	86.33	85.31	86.33
7	-3.33	2.54	7.16	43.69	53.24	59.42	0.4192	0.0867	0.0253	0.9775	88.12	88.97	88.12	88.97
8	-5.39	0.76	7.53	41.12	56.41	62.35	0.3876	0.0809	0.0240	0.9786	91.53	92.15	91.53	92.15
9	-2.98	3.90	12.36	39.83	56.38	66.42	0.3587	0.0878	0.0274	0.9757	81.63	83.07	81.63	83.07
10	-3.25	3.80	14.49	38.77	58.36	66.29	0.3793	0.1543	0.0488	0.9552	77.48	79.26	77.48	79.26
11	-3.14	4.01	10.80	45.00	56.09	60.85	0.4503	0.2191	0.0701	0.9392	72.17	74.26	72.17	74.26

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10740.	183.20	1.2054	1.7708	86.28	87.32	1.2054	0.9702	86.28

ROTOR 2

RUN NO 8, SPEED CODE 10, POINT NO 3

SL	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
1	11.442	11.067	729.1	1141.1	728.0	754.2	-40.3	856.3	-3.2	48.5	0.6175	0.9164	837.5	878.4	0.9658	0.6059	1140.4	754.5
2	10.502	9.784	736.1	1126.3	736.1	723.3	-8.7	863.4	-0.7	49.9	0.6253	0.9050	861.1	896.8	0.9679	0.5818	1139.5	724.1
3	9.484	8.580	749.4	1110.0	748.9	707.6	25.5	855.3	1.9	50.3	0.6384	0.8932	885.6	915.9	0.9715	0.5714	1140.5	710.2
4	5.882	5.189	758.4	1019.3	758.4	710.8	3.2	730.6	0.2	45.8	0.6470	0.8157	961.3	976.8	1.0425	0.6019	1221.9	752.2
5	0.221	0.625	707.0	884.8	706.6	620.7	-22.2	630.5	-1.8	45.4	0.6003	0.6985	1065.8	1065.1	1.1015	0.5982	1297.3	757.7
6	-2.562	-1.679	669.7	826.9	668.9	566.5	-34.3	602.3	-2.9	46.7	0.5674	0.6487	1119.0	1112.1	1.1295	0.5978	1333.2	762.1
7	-3.699	-2.737	692.9	820.4	692.5	559.2	-23.7	600.2	-2.0	47.0	0.5882	0.6428	1145.9	1136.3	1.1538	0.6071	1359.2	774.7
8	-4.488	-3.623	712.4	827.9	712.1	558.6	-21.2	611.0	-1.7	47.5	0.6062	0.6475	1172.9	1161.1	1.1831	0.6132	1390.3	784.0
9	-5.834	-5.622	767.9	838.8	767.5	577.7	21.9	608.1	1.6	46.3	0.6467	0.6489	1255.1	1238.0	1.2234	0.6612	1452.6	654.7
10	-6.279	-6.269	781.2	842.6	780.3	594.8	37.2	596.8	2.7	44.9	0.6549	0.6504	1282.7	1264.3	1.2322	0.6902	1469.7	694.1
11	-7.440	-7.499	742.1	843.7	741.5	656.3	-28.0	530.2	-2.1	38.7	0.6186	0.6502	1310.4	1291.2	1.2755	0.7743	1530.1	1004.9

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	0.76	5.08	22.07	48.57	68.45	86.35	0.5213	0.1671	0.0381	1.8045	88.61	87.63	50.24	1.67	-877.8	-22.0	3.2114
2	-0.23	4.22	16.45	47.09	69.54	84.41	0.5466	0.1628	0.0380	1.8051	88.83	87.86	49.72	2.63	-869.9	-33.4	3.2293
3	-1.41	3.17	12.41	44.66	71.00	84.34	0.5547	0.1379	0.0329	1.8006	90.31	89.48	48.95	4.88	-860.1	-60.6	3.2476
4	-0.08	4.71	9.54	32.57	71.48	87.93	0.5384	0.1085	0.0264	1.7466	91.06	90.33	51.67	19.10	-958.1	-246.2	3.1445
5	3.53	6.10	6.77	22.00	65.85	77.74	0.5586	0.1349	0.0313	1.6932	87.55	86.60	57.00	35.00	-1088.0	-434.6	2.9270
6	5.51	9.85	5.75	17.93	62.28	70.90	0.5704	0.1685	0.0372	1.6709	83.94	82.74	59.88	41.96	-1153.3	-509.7	2.8358
7	4.49	8.57	4.50	15.61	64.88	70.17	0.5701	0.1936	0.0426	1.6422	80.94	79.58	59.36	43.75	-1169.5	-536.1	2.8356
8	3.73	7.60	2.18	14.67	67.18	70.16	0.5780	0.2283	0.0510	1.6319	77.36	75.77	59.17	44.50	-1194.1	-550.1	2.8606
9	1.16	3.84	0.22	10.66	70.89	72.27	0.5511	0.2089	0.0495	1.6138	77.97	76.44	57.97	47.32	-1233.2	-629.9	2.9156
10	0.56	2.74	1.42	9.66	71.23	74.66	0.5272	0.1715	0.0416	1.6179	81.36	80.05	57.76	48.10	-1245.5	-667.5	2.9416
11	3.33	5.03	3.38	11.81	66.86	82.73	0.4740	0.1116	0.0277	1.6740	87.60	86.67	60.84	49.03	-1338.4	-760.9	2.9657

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	T02/T01	P02/P01	EFF-AD ROTOR %	EFF-P ROTOR %
1.4355	3.0008	84.32	86.51	40.62	1.1909	1.6945	84.55	85.65

STATOR 2

RUN NO 8, SPEED CODE 10, POINT NO 3

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	T02/ T01
1	8.691	0.820	1170.9	733.6	807.9	733.5	847.6	12.5	46.7	1.0	0.9445	0.5624	3.0384	1.4550	1.7079	1.2080
2	7.647	0.704	1154.5	748.5	775.1	748.4	855.6	15.7	48.1	1.2	0.9314	0.5757	3.0757	1.4496	1.7216	1.2082
3	6.539	0.442	1137.1	776.3	756.2	776.2	849.2	11.4	48.5	0.8	0.9185	0.6007	3.1418	1.4400	1.7435	1.2038
4	3.761	-0.485	1044.5	735.9	749.1	735.9	727.8	-2.4	44.2	-0.2	0.8386	0.5711	3.0830	1.4222	1.7109	1.1903
5	1.133	-0.979	908.9	618.9	655.3	618.4	629.9	-26.6	43.9	-2.5	0.7194	0.4771	2.8908	1.4153	1.6688	1.1859
6	-0.234	-0.982	851.6	554.1	601.8	553.3	602.6	-29.4	45.0	-3.0	0.6698	0.4252	2.6003	1.4158	1.6555	1.1897
7	-1.037	-0.938	845.6	551.5	594.8	551.0	601.0	-22.5	45.3	-2.3	0.6643	0.4231	2.7963	1.4160	1.6245	1.1692
8	-1.977	-0.944	853.7	572.2	594.8	571.9	612.4	-17.4	45.8	-1.7	0.6694	0.4384	2.8202	1.4228	1.6128	1.1959
9	-5.097	-1.243	869.0	614.8	617.4	614.7	611.5	12.1	44.8	1.1	0.6742	0.4668	2.8568	1.4563	1.5809	1.1900
10	-6.079	-1.311	875.5	629.4	637.2	629.0	600.3	20.8	43.4	1.9	0.6780	0.4772	2.8682	1.4632	1.5767	1.1819
11	-6.670	-1.244	882.1	638.0	703.0	637.9	532.7	13.8	37.3	1.2	0.6823	0.4831	2.8709	1.4684	1.6247	1.1814

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-1.80	-0.24	12.79	45.67	90.46	100.48	0.5339	0.1222	0.0276	0.9465	81.75	84.33	78.84	80.36
2	0.63	2.65	12.45	46.86	88.57	103.42	0.5188	0.1082	0.0249	0.9535	83.81	86.12	80.03	81.49
3	1.84	4.34	11.69	47.64	88.37	108.80	0.4918	0.0774	0.0181	0.9673	87.55	89.36	83.82	85.03
4	-1.32	2.54	10.13	44.42	91.17	104.15	0.4715	0.0578	0.0144	0.9786	89.50	91.00	86.54	87.52
5	-0.86	4.45	7.84	46.32	81.00	86.39	0.5159	0.0519	0.0139	0.9847	84.96	87.00	84.18	85.27
6	0.60	6.39	7.19	48.03	74.36	76.58	0.5556	0.0492	0.0136	0.9872	81.94	84.31	81.10	82.39
7	1.03	7.02	7.83	47.59	73.67	76.21	0.5540	0.0501	0.0140	0.9872	81.76	84.16	78.06	79.49
8	1.76	7.96	8.37	47.54	73.72	78.88	0.5385	0.0493	0.0140	0.9872	81.21	83.70	74.18	75.84
9	0.98	7.68	11.30	43.65	76.05	82.88	0.4960	0.0775	0.0227	0.9797	76.30	79.46	72.97	74.65
10	-1.06	5.82	12.67	41.50	78.66	84.36	0.4783	0.0971	0.0287	0.9743	75.48	78.76	75.76	77.26
11	-8.45	-1.35	13.17	36.05	86.91	85.09	0.4526	0.1215	0.0362	0.9675	74.72	78.11	81.27	82.50

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	T02/T01	P02/P01	EFF-AD STAGE %
10740.	183.20	1.4355	2.9314	82.24	84.67	1.1909	0.9769	80.53

TABLE XVII(e) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA
(Uniform Inlet Flow, 100 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 8, SPEED CODE 10, POINT NO 4

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	16.784	18.305	605.0	1036.0	605.0	587.3	0.0	853.5	0.0	55.5	0.5584	0.9159	627.4	726.4	0.8044	0.5312	871.6	600.9
2	14.423	15.922	617.6	996.4	617.6	585.2	0.0	806.5	0.0	54.0	0.5707	0.8762	676.6	761.6	0.8465	0.5161	916.1	586.9
3	12.228	13.708	629.8	973.9	629.8	597.6	0.0	769.0	0.0	52.1	0.5828	0.8537	724.8	796.7	0.8885	0.5244	960.2	596.2
4	6.442	7.887	658.6	888.1	658.6	586.6	0.0	666.8	0.0	48.7	0.6113	0.7704	862.9	902.2	1.0077	0.5485	1085.5	632.0
5	1.038	1.484	675.3	775.3	675.3	516.3	0.0	578.4	0.0	48.2	0.6281	0.6631	1035.3	1042.7	1.1497	0.5939	1236.1	694.4
6	-0.625	-1.248	678.5	743.6	678.5	510.0	0.0	541.1	0.0	46.7	0.6314	0.6338	1118.2	1113.0	1.2170	0.6531	1308.0	766.2
7	-1.689	-2.506	679.4	751.6	679.4	539.1	0.0	523.8	0.0	44.2	0.6322	0.6413	1159.1	1148.1	1.2502	0.7036	1343.5	824.9
8	-3.065	-3.720	679.3	761.0	679.3	564.0	0.0	511.0	0.0	42.2	0.6321	0.6497	1200.0	1183.3	1.2831	0.7492	1378.9	877.6
9	-7.598	-7.367	669.9	792.9	669.9	565.7	0.0	555.6	0.0	44.4	0.6227	0.6686	1322.2	1288.7	1.3777	0.7807	1482.2	926.0
10	-9.220	-8.662	663.7	815.9	663.7	584.9	0.0	568.9	0.0	44.1	0.6164	0.6861	1362.9	1323.9	1.4080	0.8031	1515.9	955.0
11	-10.849	-10.076	655.5	795.5	655.5	564.5	0.0	560.5	0.0	44.7	0.6083	0.6666	1403.5	1359.0	1.4375	0.8195	1549.0	977.9

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	-0.55	4.06	15.73	58.06	39.77	47.88	0.5424	0.0066	0.0014	1.8837	99.66	99.64	45.84	-12.23	-627.4	127.1	1.8837
2	-0.41	3.89	15.22	51.80	40.33	48.83	0.5743	0.0164	0.0038	1.8667	99.08	99.01	47.41	-4.39	-676.6	44.9	1.8667
3	-0.17	3.93	14.18	46.18	40.87	50.99	0.5782	-0.0015	-0.0004	1.8759	100.09	100.11	48.83	2.65	-724.8	-27.7	1.8759
4	1.05	4.52	12.17	30.70	42.06	52.19	0.5860	0.0207	0.0051	1.8375	98.43	98.30	52.55	21.85	-862.9	-235.3	1.8375
5	2.36	5.04	11.69	14.91	42.71	47.05	0.5789	0.0991	0.0221	1.7557	90.86	90.12	56.88	41.96	-1035.3	-464.3	1.7557
6	2.81	5.09	10.94	10.47	42.84	47.13	0.5430	0.0972	0.0205	1.7496	90.41	89.64	58.75	48.28	-1118.2	-571.9	1.7496
7	3.03	5.13	8.88	10.42	42.87	50.41	0.5098	0.0681	0.0144	1.7778	93.12	92.56	59.61	49.19	-1159.1	-624.4	1.7778
8	3.25	5.20	7.14	10.47	42.86	53.28	0.4837	0.0461	0.0099	1.8064	95.22	94.82	60.47	50.00	-1200.0	-672.3	1.8064
9	4.04	5.47	5.49	10.81	42.51	53.44	0.5054	0.1264	0.0274	1.8814	87.27	86.11	63.09	52.28	-1322.2	-733.1	1.8814
10	4.32	5.61	5.15	11.85	42.26	55.39	0.5031	0.1363	0.0303	1.9254	86.42	85.13	64.00	52.15	-1362.9	-755.0	1.9254
11	4.59	5.75	8.28	10.30	41.93	53.46	0.4997	0.1540	0.0329	1.9063	84.24	82.77	64.93	54.63	-1403.5	-798.5	1.9063

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.2066	1.8373	91.77	92.43	40.68	1.2066	1.8373	91.77	92.43

STATOR 1

RUN NO 8, SPEED CODE 10, POINT NO 4

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	18.123	14.774	1038.4	616.1	616.7	615.8	835.5	-20.5	53.7	-1.9	0.9184	0.5175	1.7642	1.1988	1.7642	1.1988
2	15.755	12.907	1003.0	618.8	615.3	618.8	792.2	4.2	52.3	0.4	0.8829	0.5203	1.7731	1.1970	1.7731	1.1970
3	13.602	11.155	983.7	627.6	627.5	627.3	757.5	20.4	50.4	1.8	0.8635	0.5282	1.7866	1.1965	1.7866	1.1965
4	8.141	6.378	903.7	629.3	615.7	629.1	661.4	15.7	47.0	1.4	0.7855	0.5305	1.7916	1.1930	1.7916	1.1930
5	1.731	0.550	794.3	584.9	545.5	584.9	577.4	-5.9	46.6	-0.6	0.6806	0.4911	1.7348	1.1935	1.7348	1.1935
6	-1.220	-2.082	765.8	560.0	538.5	559.6	541.6	-22.3	45.2	-2.3	0.6525	0.4693	1.7059	1.1932	1.7059	1.1932
7	-2.455	-3.118	772.3	598.4	566.6	598.4	524.8	5.0	42.8	0.5	0.6605	0.5031	1.7425	1.1929	1.7425	1.1929
8	-3.496	-3.962	781.9	624.6	590.5	624.4	512.6	12.7	41.0	1.2	0.6691	0.5261	1.7695	1.1941	1.7695	1.1941
9	-5.456	-6.272	816.7	677.8	595.3	676.2	559.1	46.8	43.3	4.0	0.6904	0.5645	1.8275	1.2308	1.8275	1.2308
10	-7.418	-7.061	840.7	682.2	615.4	680.1	572.8	54.1	43.1	4.6	0.7090	0.5656	1.8352	1.2424	1.8352	1.2424
11	-8.308	-8.011	823.2	630.8	598.8	630.5	564.9	-25.2	43.5	-2.3	0.6920	0.5201	1.7820	1.2445	1.7820	1.2443

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	1.20	3.31	10.44	55.64	50.18	60.83	0.5681	0.1506	0.0308	0.9367	88.50	89.36	88.50	89.36
2	1.43	3.83	11.62	51.88	51.08	61.44	0.5433	0.1264	0.0268	0.9498	90.18	90.93	90.18	90.93
3	0.89	3.68	12.24	48.57	53.14	62.53	0.5213	0.1233	0.0272	0.9525	91.70	92.34	91.70	92.34
4	0.04	3.75	10.70	45.61	54.21	63.00	0.4737	0.0726	0.0177	0.9757	93.87	94.34	93.87	94.34
5	1.10	6.15	8.73	47.19	49.16	57.79	0.4618	0.0431	0.0118	0.9886	88.05	88.92	88.05	88.92
6	0.13	5.76	7.06	47.45	49.22	54.93	0.4767	0.1001	0.0286	0.9752	85.28	86.33	85.28	86.33
7	-1.97	3.90	9.87	42.35	52.40	59.07	0.4229	0.0862	0.0252	0.9781	89.09	89.89	89.09	89.89
8	-3.60	2.54	10.59	39.84	55.14	61.84	0.3922	0.0834	0.0248	0.9783	91.18	91.85	91.18	91.85
9	-1.32	5.56	14.52	39.33	55.47	65.79	0.3694	0.1091	0.0340	0.9702	81.37	82.86	81.37	82.86
10	-1.87	5.18	16.33	38.51	57.44	65.78	0.3876	0.1687	0.0532	0.9519	78.06	79.83	78.06	79.83
11	-2.16	4.99	11.02	45.77	55.82	60.51	0.4649	0.2368	0.0758	0.9353	73.38	75.42	73.38	75.42

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10676.	179.10	1.2066	1.7766	86.28	87.33	1.2066	0.9670	86.28

ROTOR 2

RUN NO 8, SPEED CODE 10, POINT NO 4

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	11.471	11.037	684.9	1117.6	684.6	707.6	-19.8	865.1	-1.7	50.6	0.5789	0.8980	832.4	873.1	0.9239	0.5680	1093.2	707.6
2	10.543	9.728	693.7	1103.3	693.7	688.9	4.3	861.8	0.4	51.3	0.5873	0.8861	856.0	891.4	0.9299	0.5538	1096.4	689.5
3	9.485	8.487	707.6	1088.6	707.3	698.6	19.8	834.9	1.6	50.0	0.6000	0.8752	880.2	910.4	0.9445	0.5649	1113.8	702.7
4	5.620	4.955	719.9	1008.1	719.7	682.1	15.5	742.4	1.2	47.4	0.6122	0.8066	955.6	970.9	1.0068	0.5755	1183.9	719.3
5	-0.007	0.446	673.5	889.9	673.5	602.2	-6.3	655.2	-0.5	47.4	0.5700	0.7024	1059.4	1058.7	1.0068	0.5721	1260.6	724.9
6	-2.783	-1.893	642.3	837.0	641.9	563.0	-22.8	619.3	-2.0	47.7	0.5421	0.6567	1112.3	1105.4	1.1004	0.5836	1304.0	743.8
7	-3.849	-2.926	673.5	830.7	673.4	539.1	6.5	632.0	0.6	49.5	0.5701	0.6514	1139.0	1129.5	1.1154	0.5753	1317.6	733.6
8	-4.545	-3.740	692.5	839.9	692.4	548.4	12.9	636.1	1.1	49.2	0.5870	0.6578	1165.9	1154.1	1.1399	0.5908	1344.9	754.4
9	-3.738	-5.612	748.4	845.7	746.9	560.1	47.1	633.7	3.6	48.4	0.6277	0.6539	1247.6	1230.6	1.1859	0.6329	1413.9	816.5
10	-6.127	-6.198	762.3	851.3	760.2	585.6	56.6	617.9	4.2	46.3	0.6371	0.6572	1275.0	1256.8	1.2002	0.6690	1436.2	866.6
11	-7.364	-7.430	723.7	852.3	723.2	657.8	-24.9	541.9	-2.0	39.3	0.6019	0.6569	1302.5	1283.4	1.2572	0.7641	1511.7	991.3

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	1.66	5.97	21.05	50.49	65.51	81.48	0.5414	0.1745	0.0398	1.7924	88.67	87.71	51.14	0.65	-852.3	-8.0	3.1626
2	0.84	5.29	16.27	48.35	66.52	80.70	0.5584	0.1617	0.0377	1.7924	89.33	88.42	50.60	2.45	-851.6	-29.6	3.1790
3	0.22	4.80	13.68	44.42	67.88	83.45	0.5476	0.1245	0.0296	1.7900	91.43	90.70	50.57	6.15	-860.4	-75.5	3.1985
4	0.03	5.62	8.95	34.06	68.98	84.41	0.5520	0.1138	0.0278	1.7413	90.56	90.22	52.58	18.52	-940.1	-228.5	3.1179
5	4.24	8.81	5.60	23.88	63.94	75.38	0.5745	0.1459	0.0344	1.6948	87.09	86.10	57.71	33.82	-1065.6	-403.5	2.9361
6	6.14	10.48	4.58	19.72	60.82	70.48	0.5749	0.1712	0.0385	1.6691	84.12	82.94	60.51	40.79	-1135.1	-486.1	2.8552
7	4.39	8.47	3.41	16.59	64.34	67.78	0.5877	0.2013	0.0451	1.6346	80.80	79.43	59.26	42.67	-1132.5	-497.5	2.8574
8	3.61	7.42	1.00	15.68	66.45	69.14	0.5838	0.2175	0.0496	1.6306	78.98	77.49	58.99	43.32	-1152.9	-518.0	2.8883
9	1.16	3.84	-0.42	11.31	70.16	70.20	0.5639	0.2109	0.0505	1.6098	78.35	76.86	57.57	46.67	-1200.5	-596.9	2.9360
10	0.00	2.83	0.61	10.56	70.70	73.76	0.5359	0.1732	0.0427	1.6183	81.69	80.41	57.86	47.29	-1218.5	-638.8	2.9669
11	3.73	5.43	2.57	13.02	66.52	83.31	0.4766	0.1168	0.0294	1.6716	87.26	86.31	61.25	48.23	-1327.4	-741.5	2.9958

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.4350	3.0026	84.46	86.64	39.60	1.1893	1.6901	84.82	85.89

STATOR 2

RUN NO 8, SPEED CODE 10, POINT NO 4

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	8.622	0.839	1144.3	689.5	758.9	689.3	856.4	12.8	48.7	1.1	0.9229	0.5286	3.0003	1.4451	1.7006	1.2054
2	7.535	0.744	1128.6	705.8	737.5	705.6	854.4	18.5	49.4	1.5	0.9098	0.5425	3.0359	1.4417	1.7135	1.2042
3	6.474	0.538	1113.0	731.2	742.7	731.0	828.9	16.4	48.3	1.3	0.8977	0.5646	3.0908	1.4349	1.7316	1.1992
4	3.988	-0.185	1030.8	703.8	718.2	703.8	739.4	4.0	45.9	0.3	0.8271	0.5454	3.0600	1.4189	1.7071	1.1894
5	1.184	-0.814	912.1	595.8	635.2	599.3	654.6	-22.6	45.8	-2.2	0.7216	0.4614	2.8977	1.4173	1.6699	1.1875
6	-0.187	-0.837	860.1	542.6	596.7	542.1	619.5	-23.7	46.0	-2.5	0.6764	0.4157	2.8207	1.4184	1.6532	1.1887
7	-1.009	-0.817	854.5	540.0	574.1	539.7	632.9	-17.4	47.7	-1.8	0.6717	0.4137	2.8172	1.4175	1.6186	1.1883
8	-2.037	-0.664	664.4	559.4	583.4	559.2	637.8	-11.5	47.5	-1.2	0.6786	0.4283	2.8356	1.4226	1.6069	1.1915
9	-3.220	-1.249	874.5	599.0	598.9	598.7	637.3	19.3	46.8	1.8	0.6761	0.4538	2.8708	1.4595	1.5735	1.1860
10	-6.228	-1.335	882.9	618.1	627.3	617.7	621.3	21.8	44.8	2.0	0.6837	0.4679	2.6885	1.4653	1.5738	1.1811
11	-6.769	-1.266	889.2	627.9	703.4	627.8	544.0	11.6	37.9	1.1	0.6879	0.4748	2.8928	1.4702	1.6187	1.1817

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	0.27	1.83	12.88	47.66	85.70	95.53	0.5634	0.1204	0.0272	0.9490	82.48	84.93	79.20	80.69
2	1.99	4.01	12.76	47.91	84.82	98.48	0.5450	0.1059	0.0244	0.9559	84.16	86.40	80.85	82.23
3	1.07	4.17	12.13	47.03	87.19	103.16	0.5158	0.0808	0.0189	0.9670	87.09	86.94	84.65	85.79
4	0.34	4.21	10.64	45.58	87.61	100.45	0.4976	0.0582	0.0144	0.9788	89.50	90.99	86.55	87.53
5	1.14	6.45	8.14	48.01	78.54	84.43	0.5449	0.0541	0.0145	0.9840	84.79	86.85	83.56	84.70
6	1.64	7.43	7.72	48.54	73.79	75.73	0.5772	0.0495	0.0137	0.9869	82.09	84.46	81.27	82.55
7	3.52	9.51	8.32	49.60	71.29	75.41	0.5810	0.0517	0.0145	0.9865	82.14	84.51	77.77	79.21
8	3.47	9.67	8.93	48.69	72.63	78.01	0.5654	0.0568	0.0161	0.9650	81.88	84.29	75.27	76.85
9	3.04	9.74	12.01	45.00	73.95	81.41	0.5235	0.0846	0.0248	0.9776	76.18	79.37	72.96	74.62
10	0.38	7.26	12.79	42.83	77.76	83.66	0.5023	0.1055	0.0312	0.9717	75.71	78.98	75.75	77.24
11	-7.87	-0.78	12.99	36.80	87.40	84.60	0.4725	0.1289	0.0385	0.9650	75.04	78.41	80.47	81.74

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10676.	179.10	1.4350	2.9313	82.32	84.74	1.1893	0.9763	80.65

TABLE XVII(f) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA
(Uniform Inlet Flow, 100 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 9, SPEED CODE 10, POINT NO 14

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	16.688	18.441	589.2	1034.0	589.2	597.5	0.0	843.9	0.0	54.8	0.5429	0.9147	628.9	728.0	0.7941	0.5364	661.8	608.6
2	14.208	16.180	602.1	993.2	602.1	599.0	0.0	792.3	0.0	52.9	0.5555	0.8743	678.1	763.3	0.8367	0.5275	906.9	599.7
3	11.919	14.062	614.5	969.0	614.5	605.4	0.0	756.5	0.0	51.4	0.5677	0.8499	726.5	798.5	0.8790	0.5323	951.5	606.9
4	5.979	8.409	644.1	895.5	644.1	588.4	0.0	675.0	0.0	48.9	0.5970	0.7765	864.9	904.2	0.9994	0.5476	1078.4	631.5
5	0.213	2.062	663.2	799.7	663.2	524.1	0.0	604.0	0.0	49.1	0.6160	0.6831	1037.6	1045.1	1.1438	0.5651	1231.5	685.0
6	-1.643	-0.719	667.0	758.2	667.0	495.4	0.0	574.0	0.0	49.2	0.6198	0.6438	1120.7	1115.6	1.2119	0.6232	1304.2	734.0
7	-2.639	-2.079	666.1	773.0	668.1	538.1	0.0	555.0	0.0	45.9	0.6209	0.6576	1161.8	1150.8	1.2454	0.6830	1340.2	802.8
8	-3.929	-3.418	668.1	786.1	668.1	567.5	0.0	544.0	0.0	43.8	0.6209	0.6691	1202.8	1186.0	1.2766	0.7293	1375.9	856.9
9	-7.985	-7.350	659.6	816.6	659.6	556.8	0.0	597.3	0.0	46.9	0.6124	0.6850	1325.2	1251.7	1.3743	0.7466	1480.3	890.0
10	-9.402	-8.703	653.7	848.1	653.7	583.7	0.0	615.3	0.0	46.4	0.6065	0.7096	1366.0	1326.9	1.4050	0.7701	1514.3	920.4
11	-10.899	-10.128	645.9	835.1	645.9	573.6	0.0	607.0	0.0	46.5	0.5987	0.6967	1406.7	1362.1	1.4349	0.7911	1547.9	948.3

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	0.26	4.87	16.96	57.64	39.05	48.67	0.5257	0.0006	0.0001	1.8776	99.97	99.97	46.64	-11.00	-628.9	115.9	1.8776
2	0.35	4.65	16.83	50.94	39.64	49.91	0.5525	0.0067	0.0015	1.8566	99.63	99.61	48.17	-2.77	-678.1	29.0	1.8566
3	0.56	4.66	15.50	45.59	40.20	51.44	0.5625	0.0013	0.0003	1.8588	99.92	99.92	49.56	3.97	-726.5	-42.0	1.8588
4	1.70	5.17	11.62	31.90	41.47	51.67	0.5864	0.0436	0.0108	1.8327	96.72	96.44	53.20	21.31	-864.9	-229.2	1.8327
5	2.89	5.57	9.82	17.31	42.24	47.16	0.5925	0.1308	0.0300	1.7686	88.28	87.32	57.41	40.09	-1037.6	-441.1	1.7686
6	3.31	5.59	10.20	11.70	42.39	44.96	0.5760	0.1555	0.0332	1.7454	85.12	83.93	59.25	47.54	-1120.7	-541.6	1.7454
7	3.52	5.62	7.59	12.20	42.44	49.48	0.5341	0.1168	0.0254	1.7828	88.56	87.61	60.10	47.90	-1161.8	-595.8	1.7826
8	3.73	5.68	5.65	12.44	42.44	52.70	0.5071	0.0947	0.0208	1.8162	90.56	89.75	60.95	48.51	-1202.8	-642.0	1.8162
9	4.48	5.90	4.41	12.31	42.10	51.53	0.5395	0.1854	0.0412	1.8889	82.10	80.45	63.52	51.21	-1325.2	-694.3	1.8889
10	4.72	6.01	3.55	13.85	41.86	54.20	0.5368	0.1923	0.0442	1.9473	81.77	80.01	64.40	50.55	-1366.0	-711.6	1.9473
11	4.97	6.12	6.32	12.64	41.54	53.36	0.5295	0.2022	0.0452	1.9399	80.40	78.52	65.30	52.67	-1406.7	-755.1	1.9399

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.2164	1.8430	88.10	89.07	40.22	1.2164	1.8430	88.10	89.07

STATOR 1

RUN NO 9, SPEED CODE 10, POINT NO 14

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	18.335	15.043	1036.6	616.0	626.1	614.0	826.2	-49.6	53.1	-4.6	0.9173	0.5178	1.7527	1.1971	1.7527	1.1971
2	16.160	13.410	999.6	615.8	627.4	615.1	778.2	-27.8	51.3	-2.6	0.8808	0.5183	1.7603	1.1940	1.7603	1.1940
3	14.152	11.859	978.2	624.2	633.7	624.2	745.2	5.2	49.7	0.5	0.8592	0.5258	1.7746	1.1938	1.7746	1.1938
4	8.895	7.535	910.3	625.0	616.8	622.9	669.4	13.1	47.4	1.2	0.7910	0.5243	1.7807	1.1957	1.7607	1.1957
5	2.750	2.098	818.2	585.5	553.1	585.2	602.9	-17.7	47.5	-1.7	0.7004	0.4897	1.7380	1.2025	1.7380	1.2025
6	-0.247	-0.519	778.2	562.7	525.1	561.9	574.4	-29.6	47.6	-3.0	0.6622	0.4692	1.7131	1.2054	1.7131	1.2054
7	-1.632	-1.637	792.6	593.3	564.7	593.2	556.1	-13.5	44.6	-1.3	0.6757	0.4961	1.7424	1.2048	1.7424	1.2048
8	-2.822	-2.619	806.0	618.8	593.2	618.8	545.6	2.5	42.6	0.2	0.6876	0.5180	1.7692	1.2070	1.7692	1.2070
9	-6.185	-5.652	840.2	668.1	587.4	667.0	600.8	38.0	45.7	3.3	0.7068	0.5519	1.8250	1.2480	1.8250	1.2480
10	-7.277	-6.724	872.6	680.7	614.6	678.6	619.5	52.4	45.3	4.4	0.7323	0.5595	1.8421	1.2624	1.8421	1.2624
11	-8.259	-7.884	862.2	641.1	607.5	640.0	611.7	-37.5	45.3	-3.4	0.7215	0.5245	1.8026	1.2651	1.8026	1.2651

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	0.51	2.62	7.75	57.64	50.89	60.33	0.5722	0.1587	0.0323	0.9333	88.15	89.03	88.15	89.03
2	0.45	2.85	8.66	53.86	52.01	60.85	0.5494	0.1306	0.0277	0.9482	90.33	91.05	90.33	91.05
3	0.22	3.00	10.87	49.27	53.48	62.02	0.5236	0.1184	0.0261	0.9547	91.84	92.46	91.84	92.46
4	0.38	4.10	10.48	46.18	53.84	62.05	0.4884	0.0844	0.0206	0.9714	91.49	92.14	91.49	92.14
5	1.96	7.01	7.58	49.19	49.24	57.53	0.4904	0.0620	0.0169	0.9827	84.43	85.58	84.43	85.58
6	2.55	8.16	6.34	50.59	47.13	54.83	0.4989	0.0747	0.0214	0.9809	80.89	82.26	80.89	82.26
7	-0.23	5.64	8.08	45.87	51.35	58.17	0.4619	0.0885	0.0258	0.9766	83.87	85.06	83.87	85.06
8	-1.97	4.17	9.66	42.39	54.46	60.86	0.4332	0.0968	0.0287	0.9737	85.46	86.56	85.46	86.56
9	1.11	7.99	13.81	42.46	53.61	64.34	0.4168	0.1212	0.0378	0.9656	75.51	77.46	75.51	77.46
10	0.40	7.45	16.20	40.91	56.22	65.06	0.4294	0.1838	0.0580	0.9448	72.56	74.78	72.56	74.78
11	-0.30	6.85	9.95	48.70	55.62	60.90	0.4996	0.2414	0.0772	0.9294	69.06	71.47	69.06	71.47

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10700.	177.10	1.2164	1.7757	82.29	83.64	1.2164	0.9634	82.29

ROTOR 2

RUN NO 9, SPEED CODE 10, POINT NO 14

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	11.581	11.097	671.5	1102.4	669.8	681.3	-48.4	866.7	-4.1	51.7	0.5672	0.8814	834.4	875.1	0.9361	0.5447	1106.1	661.3
2	10.769	9.841	677.4	1088.8	676.8	665.3	-27.7	861.9	-2.3	52.2	0.5733	0.8705	857.9	893.4	0.9434	0.5325	1114.6	666.1
3	9.832	8.655	690.7	1075.2	690.7	659.8	4.6	848.9	0.4	52.1	0.5855	0.8606	882.3	912.5	0.9467	0.5306	1116.9	662.9
4	6.563	5.362	703.1	996.1	702.9	647.8	13.3	756.6	1.1	49.4	0.5961	0.7933	957.7	973.2	0.9983	0.5446	1177.4	683.[illegible]
5	1.545	1.117	672.4	873.8	672.2	592.1	-17.2	642.6	-1.5	47.3	0.5608	0.6863	1061.8	1061.1	1.0715	0.5695	1271.3	725.0
6	-1.078	-1.070	647.2	818.2	646.5	555.1	-30.0	601.1	-2.7	47.2	0.5435	0.6383	1114.9	1107.9	1.1041	0.5864	1314.8	751.7
7	-2.266	-2.088	670.2	813.9	670.0	540.6	-14.2	608.4	-1.2	48.3	0.5641	0.6342	1141.6	1132.1	1.1246	0.5865	1336.0	752.7
8	-3.177	-2.945	691.8	820.0	691.8	527.6	1.9	627.7	0.2	49.9	0.5830	0.6374	1168.5	1156.8	1.1431	0.5808	1356.3	747.2
9	-5.313	-5.293	751.5	836.1	750.6	571.5	37.9	610.3	2.9	46.7	0.6260	0.6434	1250.4	1233.4	1.1878	0.6506	1426.0	645.5
10	-6.182	-6.248	772.0	836.9	770.1	593.8	54.3	589.7	4.0	44.6	0.6404	0.6429	1277.9	1259.6	1.1993	0.6877	1445.8	695.2
11	-7.518	-7.657	743.7	824.8	742.7	658.4	-37.2	496.9	-2.9	36.9	0.6143	0.6324	1305.5	1286.4	1.2675	0.7862	1534.5	1020.0

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	3.26	7.58	21.10	52.04	64.16	78.59	0.5774	0.2186	0.0498	1.7937	85.89	84.68	52.74	0.70	-882.8	-6.4	3.1436
2	2.64	7.09	16.52	49.89	65.07	78.11	0.5925	0.2073	0.0484	1.7973	86.43	85.27	52.59	2.70	-885.6	-31.5	3.1628
3	1.47	6.04	13.02	46.33	66.52	79.02	0.5906	0.1694	0.0404	1.7959	88.63	87.65	51.82	5.49	-877.7	-63.5	3.1857
4	1.65	6.45	8.92	34.92	67.44	80.61	0.5826	0.1280	0.0312	1.7520	90.19	89.38	53.41	18.48	-944.5	-216.5	3.1218
5	4.62	9.19	7.03	22.83	63.62	74.99	0.5759	0.1314	0.0304	1.6994	88.37	87.48	58.09	35.26	-1079.0	-418.5	2.9570
6	6.15	10.49	6.16	18.15	60.85	70.40	0.5694	0.1409	0.0309	1.6816	86.89	85.90	60.52	42.37	-1144.8	-506.9	2.8817
7	4.99	9.07	4.78	15.82	63.46	68.85	0.5778	0.1672	0.0366	1.6626	84.10	82.93	59.86	44.04	-1155.8	-523.7	2.8903
8	3.89	7.70	2.69	14.27	65.75	67.31	0.5926	0.1965	0.0435	1.6532	81.21	79.65	59.27	45.01	-1166.7	-529.1	2.9173
9	1.28	3.96	0.21	10.79	69.51	73.08	0.5449	0.1469	0.0348	1.6477	84.79	83.68	58.09	47.30	-1212.5	-623.1	2.9985
10	0.43	2.61	1.57	9.38	70.59	76.29	0.5134	0.1023	0.0247	1.6443	88.90	88.09	57.63	48.25	-1223.6	-669.9	3.0222
11	3.38	5.07	4.34	10.89	67.49	84.90	0.4516	0.0565	0.0137	1.6694	93.49	92.99	60.89	50.00	-1342.8	-789.5	3.0214

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.4447	3.0215	83.17	85.53	39.34	1.1877	1.7016	86.72	87.67

STATOR 2

RUN NO 9, SPEED CODE 10, POINT NO 14

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	8.680	0.882	1124.3	640.0	726.6	640.0	858.0	0.9	50.0	0.1	0.9016	0.4875	2.9636	1.4522	1.6912	1.2129
2	7.650	0.836	1109.6	663.2	708.1	662.6	854.4	29.8	50.6	2.6	0.8897	0.5068	3.0073	1.4486	1.7107	1.2126
3	6.605	0.686	1095.3	691.0	699.7	689.7	842.7	41.9	50.5	3.5	0.8790	0.5305	3.0617	1.4419	1.7297	1.2079
4	3.778	-0.022	1015.7	677.9	681.1	677.9	753.5	-1.5	48.0	-0.1	0.8110	0.5227	3.0562	1.4271	1.7147	1.1938
5	0.803	-0.736	894.9	590.0	623.4	589.4	642.0	-27.0	45.8	-2.6	0.7045	0.4523	2.9221	1.4252	1.6760	1.1859
6	-0.537	-0.857	841.3	542.8	588.3	542.2	601.4	-23.6	45.6	-2.5	0.6579	0.4144	2.8565	1.4278	1.6635	1.1851
7	-1.294	-0.890	837.9	539.5	575.1	539.3	609.4	-13.2	46.6	-1.4	0.6545	0.4115	2.8503	1.4298	1.6465	1.1865
8	-2.246	-0.951	845.1	555.6	563.7	555.6	629.6	2.0	48.1	0.2	0.6585	0.4232	2.8673	1.4365	1.6296	1.1909
9	-5.314	-1.282	866.0	611.9	611.4	611.2	613.3	30.8	45.2	2.9	0.6683	0.4623	2.9204	1.4699	1.6043	1.1816
10	-6.141	-1.311	869.9	626.2	636.7	625.2	592.7	35.5	43.1	3.2	0.6704	0.4727	2.9317	1.4750	1.5939	1.1710
11	-6.647	-1.228	864.1	629.7	706.2	629.3	498.0	22.2	35.3	2.0	0.6651	0.4751	2.9281	1.4772	1.6205	1.1679

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-INLET	%EFF-P TOT-INLET	%EFF-A TOT-STG	%EFF-P TOT-STG
1	1.56	3.12	11.89	49.94	82.51	88.92	0.6027	0.1390	0.0314	0.9429	80.12	82.86	75.50	77.23
2	3.15	5.17	13.83	48.00	81.91	92.79	0.5730	0.1185	0.0273	0.9522	82.03	84.54	77.41	79.04
3	3.83	6.33	14.32	47.00	82.63	97.66	0.5412	0.0937	0.0219	0.9628	84.87	87.02	80.94	82.34
4	2.39	6.26	10.19	48.08	83.71	97.18	0.5219	0.0672	0.0167	0.9761	87.67	89.43	85.32	86.39
5	1.11	6.42	7.68	48.45	78.06	83.58	0.5466	0.0550	0.0147	0.9843	83.96	86.15	84.89	85.95
6	1.20	6.99	7.73	48.08	73.75	76.23	0.5657	0.0473	0.0131	0.9879	81.39	83.88	83.94	85.05
7	2.39	8.38	8.77	48.02	72.36	75.65	0.5637	0.0507	0.0142	0.9873	80.83	83.39	81.49	82.74
8	4.09	10.29	10.31	47.93	71.02	77.66	0.5512	0.0600	0.0170	0.9849	80.11	82.78	77.88	79.34
9	1.36	8.05	13.05	42.28	77.03	83.63	0.4919	0.1020	0.0299	0.9736	75.87	79.15	78.95	80.30
10	-1.40	5.48	14.02	39.81	80.47	85.18	0.4709	0.1172	0.0346	0.9695	75.36	78.72	82.58	83.68
11	-10.41	-3.31	13.95	33.31	89.30	85.42	0.4356	0.1196	0.0357	0.9693	74.92	78.33	87.26	88.10

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10700.	177.10	1.4447	2.9466	80.98	83.59	1.1877	0.9752	82.33

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APPENDIX D

OVERALL PERFORMANCE AND BLADE-ELEMENT DATA FOR TIP RADIALLY DISTORTED INLET FLOW

This appendix provides test overall performance and blade-element data for tip radially distorted inlet flow with casing treatment and design stator-settings. The data is present for 70 percent and 100 percent of design speed. An overall-performance and stall data summary is given in Table XVIII, and the complete overall performance and blade-element data are given in Tables XIX and XX. The column headings for Tables XIX and XX are identified in Table XIII of Appendix B.

TABLE XVIII – OVERALL PERFORMANCE AND STALL DATA SUMMARY WITH TIP-RADIAL INLET FLOW DISTORTION

PERFORMANCE

Reference Table[1]	Percent of Design Speed	Corrected Flow[2] lbm/sec	P_{11}/P_0	$\eta_{ad,11}$ (%)	P_{16}/P_0	$\eta_{ad,16}$ (%)
XIX (a)	70	126.4	1.332	89.13	1.563	76.85
XIX (b)	70	115.4	1.353	87.99	1.722	84.76
XIX (c)	70	103.9	1.326	79.19	1.734	77.98
XX(a)	100	184.4	1.638	79.87	2.328	72.62
XX(b)	100	184.0	1.657	80.45	2.717	82.71
XX(c)	100	180.0	1.842	86.36	3.037	82.91

STALL POINT DATA

Percent of Design Speed	Corrected Flow[2] (lbm/sec)	P_6/P_0	Stall Margin %
70	174.7	3.072	15.6
100	103.8	1.735	15.3

Notes: (1) Refers to remaining Appendix D tables.
(2) Corrected flow = $W\sqrt{\theta}/\delta$

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TABLE XIX(a) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA

(Tip Radially Distorted Inlet Flow, 70 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 11, SPEED CODE 70, POINT NO 11

SL	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
1	14.003	15.963	405.6	766.0	405.6	489.4	0.0	589.3	0.0	50.3	0.3681	0.6835	478.1	538.1	0.5689	0.4390	626.9	492.0
2	6.646	8.029	443.7	649.9	443.7	461.1	0.0	458.0	0.0	44.8	0.4037	0.5747	609.7	637.4	0.6861	0.4375	754.1	494.8
3	2.926	2.092	456.5	568.8	456.5	432.7	0.0	369.1	0.0	40.5	0.4158	0.5006	731.5	736.7	0.7855	0.4998	862.2	567.8
4	-0.452	-2.709	432.6	545.3	432.6	430.0	0.0	335.3	0.0	37.9	0.3933	0.4783	847.9	836.1	0.8654	0.5790	951.9	660.0
5	-6.910	-7.996	364.6	539.9	364.6	409.7	0.0	351.7	0.0	40.5	0.3300	0.4699	963.0	935.4	0.9320	0.6207	1029.6	713.1

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	1.62	5.91	13.63	55.41	29.48	38.69	0.4467	0.0084	0.0019	1.4015	99.50	99.50	49.44	-5.98	-478.1	51.2	1.4243
2	2.37	5.84	11.56	32.61	31.95	37.51	0.5100	0.0807	0.0200	1.3387	93.02	92.76	53.87	21.26	-609.7	-179.4	1.3657
3	3.54	6.22	10.08	17.70	32.59	35.72	0.4690	0.0808	0.0185	1.3046	90.79	90.47	58.06	40.35	-731.5	-367.6	1.3266
4	5.70	7.65	6.46	13.60	30.50	35.83	0.4191	0.0388	0.0064	1.3317	95.02	94.84	62.92	49.31	-847.9	-500.8	1.3285
5	9.44	10.73	7.81	14.32	25.39	34.10	0.4266	0.0461	0.0096	1.3925	94.24	94.00	69.12	54.81	-963.0	-583.7	1.3406

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.0957	1.3523	94.13	94.35	28.70	1.0957	1.3525	94.17	94.39

STATOR 1

RUN NO 11, SPEED CODE 70, POINT NO 11

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/TO1
1	15.911	12.766	773.0	583.9	512.3	583.4	578.9	-23.9	48.6	-2.3	0.6903	0.5111	1.3880	1.1017	1.3657	1.1017
2	6.207	5.675	662.6	530.0	482.2	529.8	454.4	-12.1	43.3	-1.3	0.5866	0.4636	1.3460	1.0934	1.3195	1.0934
3	2.425	-0.721	582.8	494.5	451.5	494.4	368.5	-8.3	39.2	-1.0	0.5136	0.4326	1.3151	1.0873	1.2938	1.0873
4	-2.122	-5.405	560.2	494.6	448.3	494.4	336.0	-15.8	36.9	-1.8	0.4921	0.4322	1.3115	1.0899	1.3146	1.0899
5	-6.734	-8.166	559.7	503.0	433.5	502.8	354.1	12.1	39.3	1.4	0.4880	0.4365	1.3162	1.1056	1.3670	1.1056

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-2.22	0.19	6.90	50.95	40.33	49.49	0.4031	0.0918	0.0195	0.9750	91.59	91.92
2	-3.72	0.00	7.97	44.59	38.97	44.89	0.3655	0.0640	0.0156	0.9868	88.25	88.67
3	-6.29	-1.24	8.35	40.17	37.04	41.72	0.3263	0.0528	0.0144	0.9914	87.55	87.95
4	-7.75	-1.60	7.59	38.70	37.12	41.51	0.3041	0.0832	0.0247	0.9873	90.47	90.81
5	-5.62	1.43	13.17	37.93	35.78	41.69	0.2967	0.1211	0.0383	0.9818	88.51	88.96

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
7543.	126.36	1.0957	1.3315	89.09	89.49	1.0957	0.9846	89.13

ROTOR 2

RUN NO 11, SPEED CODE 70, POINT NO 11

SL	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
1	10.396	9.886	654.7	859.2	654.3	717.7	-23.3	472.4	-2.0	33.3	0.5769	0.7396	604.8	629.8	0.7993	0.6324	907.0	734.7
2	4.758	5.052	612.4	789.4	612.3	683.7	-11.8	394.7	-1.1	30.0	0.5396	0.6798	675.2	686.0	0.8108	0.6399	920.2	743.2
3	-1.662	0.157	566.3	671.1	566.2	583.8	-8.5	331.1	-0.9	29.6	0.4983	0.5741	746.5	748.0	0.8319	0.6137	945.4	717.4
4	-6.477	-4.069	545.7	590.7	545.5	536.2	-15.0	247.8	-1.6	24.8	0.4786	0.5037	823.8	815.5	0.8776	0.6658	1000.6	780.9
5	-6.778	-7.917	541.6	596.4	541.4	529.7	12.3	274.1	1.3	27.3	0.4714	0.5041	900.9	888.0	0.9058	0.6854	1040.5	810.8

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	-6.17	-1.72	26.15	31.45	53.65	66.83	0.3203	-0.0235	-0.0054	1.3666	102.61	102.75	43.78	12.33	-628.1	-157.4	1.8966
2	-3.46	1.31	13.51	25.19	50.01	64.64	0.3071	-0.0973	-0.0231	1.3618	112.21	112.78	48.27	23.08	-687.0	-291.4	1.8292
3	-0.25	4.33	7.31	17.69	46.36	54.14	0.3447	0.0450	0.0104	1.2673	92.90	92.73	53.22	35.54	-757.1	-416.9	1.6649
4	1.65	5.46	4.27	10.44	44.66	48.45	0.3031	0.1114	0.0240	1.1822	78.52	78.05	57.03	46.59	-838.8	-567.6	1.5510
5	1.42	3.60	2.44	9.50	44.21	46.33	0.3120	0.1831	0.0435	1.1607	65.20	64.49	58.62	49.12	-888.6	-613.9	1.5277

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1771	1.6791	90.10	90.77	35.53	1.0742	1.2611	92.18	92.40

STATOR 2

RUN NO 11, SPEED CODE 70, POINT NO 11

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/TO1
1	8.243	1.362	892.0	857.3	759.1	855.6	468.5	-53.1	31.9	-3.5	0.7710	0.7375	1.6230	1.2021	1.1668	1.0908
2	5.914	1.915	816.6	859.5	715.5	857.8	393.6	-53.6	28.9	-3.6	0.7054	0.7451	1.6695	1.1861	1.2346	1.0835
3	3.656	1.389	699.8	782.8	616.1	780.7	331.8	-56.9	28.3	-4.2	0.6004	0.6769	1.6042	1.1714	1.2169	1.0773
4	0.207	0.384	618.8	661.4	566.7	659.0	248.5	-57.2	23.6	-5.0	0.5289	0.5678	1.4876	1.1589	1.1344	1.0639
5	-4.123	-0.465	632.1	663.6	568.8	663.6	275.7	-17.0	25.9	-1.5	0.5360	0.5646	1.4870	1.1795	1.1258	1.0669

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-15.50	-13.48	7.70	35.47	69.19	68.24	0.1772	0.4404	0.1012	0.8557	50.09	51.15
2	-16.62	-12.75	6.74	32.52	66.81	70.96	0.1008	0.3311	0.0821	0.9039	74.22	74.94
3	-16.38	-11.07	6.13	32.50	56.45	65.66	0.0717	0.2561	0.0683	0.9405	75.15	75.80
4	-20.41	-14.21	5.15	28.59	50.60	55.33	0.0776	0.2616	0.0740	0.9541	57.35	58.06
5	-18.59	-11.71	9.31	27.34	48.97	54.81	0.0848	0.1504	0.0445	0.9734	52.98	53.74

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
7543.	126.36	1.1771	1.5631	76.85	78.23	1.0742	0.9309	63.09

TABLE XIX(b) — OVERALL PERFORMANCE AND BLADE-ELEMENT DATA (Tip Radially Distorted Inlet Flow, 70 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 11, SPEED CODE 70, POINT NO 3

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	14.512	15.913	369.6	714.4	369.6	419.7	0.0	578.1	0.0	54.0	0.3347	0.6345	473.7	533.2	0.5440	0.3749	600.8	422.1
2	7.376	6.093	403.0	634.4	403.0	416.6	0.0	478.5	0.0	49.0	0.3657	0.5592	604.1	631.6	0.6589	0.3913	726.2	443.9
3	3.217	2.434	413.5	564.6	413.5	393.8	0.0	404.6	0.0	45.8	0.3755	0.4950	724.8	730.0	0.7577	0.4479	834.4	510.9
4	-0.716	-2.297	386.5	540.6	386.5	393.6	0.0	370.5	0.0	43.2	0.3503	0.4721	840.1	828.4	0.8382	0.5274	924.7	603.9
5	-7.155	-7.831	325.2	540.0	325.2	363.6	0.0	399.3	0.0	47.5	0.2937	0.4671	954.1	926.8	0.9104	0.5542	1008.0	640.7

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	V0'-1 FT/SEC	V0'-2 FT/SEC	PO/PO INLET
1	4.03	6.33	13.49	57.96	27.13	33.66	0.5325	0.0458	0.0105	1.3799	97.52	97.43	51.85	-6.12	-473.7	45.0	1.3997
2	4.75	8.22	10.50	30.06	29.34	34.52	0.5671	0.0645	0.0161	1.3605	95.01	94.81	56.25	20.19	-604.1	-153.2	1.3836
3	5.81	8.49	9.31	20.74	29.90	33.15	0.5313	0.0799	0.0185	1.3390	92.09	91.79	60.32	39.58	-724.8	-325.4	1.3582
4	8.03	9.98	6.42	15.97	27.66	33.49	0.4750	0.0425	0.0092	1.3675	95.25	95.06	65.25	49.27	-840.1	-457.9	1.3628
5	11.36	12.67	8.28	15.77	23.06	30.85	0.5033	0.0897	0.0185	1.4254	90.23	89.75	71.06	55.28	-954.1	-527.5	1.3812

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1025	1.3755	93.06	93.34	26.21	1.1025	1.3757	93.09	93.37

STATOR 1

RUN NO 11, SPEED CODE 70, POINT NO 3

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	15.935	12.660	717.5	476.6	438.6	475.9	567.9	-26.1	52.5	-3.1	0.6375	0.4141	1.3631	1.0990	1.3438	1.0990
2	8.528	5.667	643.1	464.5	433.9	464.5	474.6	-0.6	47.6	-0.1	0.5673	0.4036	1.3583	1.0970	1.3356	1.0970
3	2.962	-0.247	575.1	443.8	409.4	443.7	403.9	-6.3	44.6	-0.8	0.5046	0.3855	1.3444	1.0948	1.3249	1.0948
4	-1.450	-4.473	552.5	442.8	409.7	442.7	370.8	-4.6	42.1	-0.6	0.4831	0.3841	1.3447	1.0973	1.3476	1.0973
5	-6.427	-7.650	556.7	456.3	385.0	456.3	402.0	6.0	46.3	0.6	0.4822	0.3923	1.3560	1.1188	1.3966	1.1188

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-STG	%EFF-P TOT-STG
1	1.61	4.01	8.11	55.57	35.14	41.49	0.5056	0.1092	0.0232	0.9739	89.08	89.49
2	0.58	4.30	9.20	47.66	35.80	40.59	0.4554	0.0935	0.0228	0.9816	86.88	89.29
3	-0.89	4.16	6.50	45.42	34.30	38.73	0.4227	0.0633	0.0173	0.9899	88.36	88.78
4	-2.46	3.68	8.83	42.74	34.68	38.58	0.3986	0.0645	0.0251	0.9875	91.57	91.89
5	1.36	8.41	12.54	45.54	32.44	39.20	0.4082	0.1258	0.0392	0.9818	84.70	85.38

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
7474.	115.37	1.1025	1.3526	87.96	88.43	1.1025	0.9834	87.99

ROTOR 2

RUN NO 11, SPEED CODE 70, POINT NO 3

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	10.227	9.490	528.4	819.4	527.8	623.6	-25.4	531.5	-2.8	40.3	0.4609	0.6992	599.3	624.0	0.7134	0.5380	817.8	630.5
2	4.397	4.276	524.2	727.7	524.2	575.9	-0.5	446.9	-0.1	37.6	0.4576	0.6192	669.0	679.7	0.7422	0.5292	850.3	621.9
3	-1.655	-0.433	497.2	624.0	497.2	505.4	-6.3	365.9	-0.7	35.9	0.4335	0.5280	741.7	741.2	0.7831	0.5327	898.1	629.5
4	-5.667	-4.215	485.4	578.9	485.4	465.8	-4.4	343.7	-0.5	36.4	0.4223	0.4868	816.2	808.0	0.8294	0.5530	953.4	657.7
5	-6.412	-7.621	496.4	592.9	496.4	478.6	6.1	350.0	0.7	30.1	0.4280	0.4933	692.6	879.8	0.8760	0.5940	1016.0	713.9

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	V0'-1 FT/SEC	V0'-2 FT/SEC	PO/PO INLET
1	-0.21	4.24	22.22	41.34	45.12	59.73	0.3923	-0.0046	-0.0011	1.4038	100.38	100.42	49.74	8.40	-624.7	-92.5	1.9134
2	0.15	4.95	12.60	29.75	44.79	56.18	0.4060	-0.0108	-0.0026	1.3506	101.14	101.21	51.90	22.16	-669.5	-232.9	1.8326
3	2.93	7.51	8.37	19.81	42.57	49.04	0.4188	0.0744	0.0169	1.2801	90.49	90.19	56.40	36.59	-748.0	-375.2	1.7205
4	4.04	7.85	2.55	14.55	41.66	44.55	0.4261	0.1594	0.0354	1.2409	78.14	77.49	59.42	44.87	-820.6	-464.3	1.6695
5	5.50	5.68	1.13	12.90	42.05	44.80	0.4195	0.1927	0.0470	1.2359	72.66	71.66	60.71	47.81	-886.5	-529.8	1.6759

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1981	1.7504	87.50	88.43	32.03	1.0867	1.2941	88.02	88.43

STATOR 2

RUN NO 11, SPEED CODE 70, POINT NO 3

SL	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	PO/PO INLET	TO/TO INLET	PO/PI STAGE	TO2/ TO1
1	7.757	0.655	845.4	724.7	661.2	724.6	526.9	11.3	38.8	0.9	0.7236	0.6119	1.8543	1.2100	1.3603	1.1011
2	4.503	0.005	749.6	662.1	604.3	661.9	443.5	-14.8	36.4	-1.3	0.6392	0.5593	1.7967	1.1949	1.3234	1.0893
3	1.773	-0.442	643.7	566.2	529.7	565.5	365.7	-27.3	34.6	-2.8	0.5456	0.4767	1.7060	1.1837	1.2691	1.0812
4	-1.467	-0.762	598.1	513.1	489.0	512.4	344.4	-27.2	35.1	-3.0	0.5038	0.4294	1.6588	1.1882	1.2333	1.0821
5	-4.750	-1.004	618.8	520.2	508.8	520.2	352.2	-1.0	34.7	-0.1	0.5159	0.4305	1.6552	1.2156	1.2206	1.0865

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-8.64	-6.62	12.15	37.88	62.33	70.89	0.2836	0.1048	0.0241	0.9691	90.75	91.12
2	-9.20	-5.33	9.04	37.64	58.29	65.39	0.2753	0.0932	0.0231	0.9773	93.14	93.38
3	-10.09	-4.79	7.54	37.38	50.96	55.76	0.2919	0.0658	0.0176	0.9877	66.61	67.02
4	-8.93	-2.73	7.07	38.16	46.40	49.97	0.3196	0.0411	0.0117	0.9935	75.04	75.74
5	-9.73	-2.85	10.67	34.84	47.11	49.46	0.3286	0.0743	0.0220	0.9877	67.61	68.48

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
7474.	115.37	1.1981	1.7221	84.76	85.86	1.0867	0.9838	82.27

TABLE XIX(c) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA
(Tip Radially Distorted Inlet Flow, 70 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 11, SPEED CODE 70, POINT NO 4

SL	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
1	13.913	15.652	343.4	710.3	343.4	415.6	0.0	576.0	0.0	54.2	0.3104	0.6306	474.8	534.4	0.5297	0.3708	585.9	417.7
2	5.778	7.455	368.0	647.3	368.0	424.4	0.0	488.7	0.0	49.0	0.3332	0.5707	605.5	633.1	0.6415	0.3953	708.6	448.3
3	-0.384	1.477	372.9	594.9	372.9	424.0	0.0	417.4	0.0	44.5	0.3377	0.5222	726.5	731.7	0.7395	0.4632	816.6	527.8
4	-6.585	-3.573	338.9	551.1	338.9	370.1	0.0	408.4	0.0	47.8	0.3063	0.4794	842.1	830.3	0.8204	0.4882	907.7	561.3
5	-11.426	-6.775	276.0	495.6	276.0	242.6	0.0	429.8	0.0	60.5	0.2487	0.4236	956.4	929.0	0.8968	0.4764	995.4	555.1

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	6.05	10.35	13.89	59.58	25.34	33.12	0.5292	0.0870	0.0199	1.3699	95.44	95.26	53.87	-5.71	-474.8	41.6	1.3868
2	7.09	10.56	9.08	39.63	27.00	34.85	0.5593	0.0851	0.0215	1.3639	93.64	93.38	58.59	18.76	-605.5	-144.3	1.3823
3	8.30	10.98	6.28	26.27	27.23	35.11	0.5143	0.0934	0.0225	1.3464	90.88	90.52	62.82	36.55	-726.5	-314.3	1.3582
4	10.95	12.90	5.88	19.43	24.59	30.19	0.5369	0.1825	0.0400	1.3361	80.25	79.46	68.16	48.74	-842.1	-422.0	1.3237
5	14.30	15.59	17.01	9.97	19.92	19.43	0.5995	0.3033	0.0481	1.3280	67.21	65.90	73.98	64.01	-956.4	-499.2	1.2905

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	T02/T01	P02/P01	EFF-AD ROTOR %	EFF-P ROTOR %
1.1062	1.3481	83.97	84.60	23.60	1.1062	1.3482	83.99	84.63

STATOR 1

RUN NO 11, SPEED CODE 70, POINT NO 4

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	T02/T01
1	15.826	12.848	713.9	480.2	435.4	479.9	565.8	-16.8	52.5	-2.0	0.6341	0.4173	1.3503	1.0988	1.3338	1.0988
2	8.565	6.430	655.5	484.0	441.3	484.0	484.8	-2.8	47.7	-0.3	0.5784	0.4207	1.3561	1.0993	1.3381	1.0993
3	3.819	1.980	602.9	471.0	435.8	471.0	416.6	3.3	43.7	0.4	0.5296	0.4093	1.3451	1.0980	1.3332	1.0980
4	0.321	-0.305	559.0	412.4	381.9	412.0	408.3	-18.0	46.9	-2.5	0.4867	0.3553	1.3099	1.1080	1.3209	1.1080
5	-5.328	-4.816	504.3	312.6	259.1	296.4	432.6	-99.3	59.1	-18.5	0.4331	0.2655	1.2676	1.1281	1.3040	1.1281

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOT-STG	%EFF-P TOT-STG
1	1.69	4.10	9.24	54.53	34.63	41.39	0.4946	0.1110	0.0236	0.9737	86.85	87.35
2	0.71	4.42	8.95	48.03	36.08	41.85	0.4399	0.0925	0.0226	0.9812	87.41	87.88
3	-1.77	3.28	9.71	43.34	35.97	40.64	0.4053	0.0566	0.0155	0.9901	87.41	87.88
4	2.30	8.44	6.92	49.41	31.08	34.99	0.4901	0.0788	0.0234	0.9882	76.83	77.69
5	14.14	21.19	-6.74	77.59	20.68	24.59	0.7163	0.1483	0.0445	0.9820	61.55	62.93

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	T02/T01	P02/P01	EFF-AD STAGE %
7491.	103.91	1.1062	1.3261	79.16	79.95	1.1062	0.9837	79.19

ROTOR 2

RUN NO 11, SPEED CODE 70, POINT NO 4

SL	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
1	10.387	9.646	526.4	822.0	526.2	606.1	-16.4	555.4	-1.8	42.4	0.4592	0.7006	600.7	625.5	0.7073	0.5200	810.9	610.1
2	5.047	4.801	534.8	730.3	534.7	576.7	-2.6	448.1	-0.3	37.8	0.4666	0.6205	670.5	681.3	0.7502	0.5285	859.7	622.0
3	0.292	0.870	503.7	627.2	503.7	476.5	3.2	407.8	0.4	40.6	0.4387	0.5283	743.4	742.9	0.7798	0.4907	895.3	582.5
4	-0.803	-1.212	438.8	580.4	438.5	379.8	-15.5	438.9	-2.0	49.0	0.3788	0.4811	818.1	809.9	0.8132	0.4401	941.9	530.9
5	-4.619	-4.412	366.4	553.1	352.7	410.6	-99.3	370.6	-15.6	41.8	0.3120	0.4504	694.7	881.9	0.8962	0.5339	1054.8	655.7

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	PO/PO INLET
1	-0.46	3.99	20.39	42.92	44.59	57.73	0.4164	0.0032	0.0008	1.4144	99.74	99.74	49.49	6.57	-617.1	-70.1	1.9099
2	-0.22	4.57	12.44	29.52	45.35	56.04	0.4129	-0.0022	-0.0005	1.3513	100.25	100.28	51.53	22.01	-673.2	-233.2	1.8326
3	2.30	6.87	6.90	20.65	42.93	45.90	0.4767	0.1362	0.0316	1.2821	84.24	83.72	55.77	35.12	-740.2	-335.1	1.7242
4	6.78	10.59	1.90	17.94	37.01	35.80	0.5814	0.2793	0.0627	1.2825	70.81	69.79	62.16	44.22	-833.6	-371.0	1.6872
5	13.09	15.27	4.28	19.33	28.90	38.13	0.5336	0.2442	0.0559	1.3301	73.30	72.23	70.29	50.96	-994.8	-511.3	1.6893

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	T02/T01	P02/P01	EFF-AD ROTOR %	EFF-P ROTOR %
1.2182	1.7628	80.52	81.98	29.47	1.1013	1.3293	83.48	84.10

STATOR 2

RUN NO 11, SPEED CODE 70, POINT NO 4

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	T02/T01
1	7.791	0.746	844.1	666.7	639.8	666.5	550.6	13.0	40.9	1.1	0.7213	0.5590	1.8585	1.2133	1.3764	1.1042
2	4.903	0.483	748.4	601.8	600.3	601.8	447.0	-5.3	36.8	-0.5	0.6370	0.5047	1.8025	1.1996	1.3293	1.0911
3	2.662	0.632	643.6	497.4	498.4	497.1	407.3	-17.6	39.3	-2.0	0.5430	0.4148	1.7151	1.1941	1.2728	1.0876
4	-1.427	0.382	597.1	441.3	404.0	441.0	439.7	-17.7	47.4	-2.3	0.4956	0.3631	1.6713	1.2176	1.2657	1.1031
5	-5.640	-0.781	576.4	459.6	439.6	459.5	372.8	-9.3	40.4	-1.2	0.4702	0.3721	1.6705	1.2590	1.3147	1.1169

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-6.48	-4.46	12.37	39.82	60.13	67.10	0.3576	0.0915	0.0211	0.9731	91.53	91.89
2	-8.79	-4.92	9.81	37.28	57.79	61.06	0.3565	0.0879	0.0218	0.9785	92.78	93.04
3	-5.45	-0.14	8.28	41.28	47.70	50.15	0.4200	0.0818	0.0219	0.9844	81.33	81.92
4	3.33	9.54	7.81	49.68	37.83	43.37	0.4813	0.0639	0.0181	0.9900	67.41	68.45
5	-4.08	2.80	9.62	41.54	40.47	43.55	0.4001	0.0789	0.0233	0.9889	69.35	70.48

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	T02/T01	P02/P01	EFF-AD STAGE %
7491.	103.91	1.2182	1.7338	77.98	79.59	1.1013	0.9836	78.43

TABLE XX(a) — OVERALL PERFORMANCE AND BLADE-ELEMENT DATA
(Tip Radially Distorted Inlet Flow, 100 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 11, SPEED CODE 10, POINT NO 21

SL	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	β-1 DEGREE	β-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-I	V'-1 FT/SEC	V'-2 FT/SEC
1	14.661	16.187	645.4	991.4	645.4	651.8	0.0	746.9	0.0	48.9	0.5982	0.8772	676.6	761.6	0.8667	.5769	935.1	652.0
2	7.556	8.762	715.1	962.4	715.1	705.5	0.0	654.7	0.0	42.9	0.6684	0.8451	862.9	902.2	1.0474	.6565	1120.8	747.6
3	4.138	3.006	744.3	769.0	744.3	574.6	0.0	511.1	0.0	41.7	0.6982	0.6640	1035.3	1042.8	1.1961	.6760	1275.1	782.8
4	0.546	-2.066	738.3	785.4	738.3	637.8	0.0	465.2	0.0	36.1	0.6920	0.6815	1200.1	1183.3	1.3207	.8292	1409.0	960.5
5	-6.645	-7.793	653.2	783.4	653.2	591.3	0.0	513.9	0.0	40.8	0.6060	0.6631	1362.9	1323.9	1.4021	.6489	1511.4	1002.9

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	β'-1 DEGREE	β'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	PO/PO INLET
1	-1.64	2.66	20.89	44.89	42.81	50.21	0.4960	0.2250	0.0518	1.6525	85.56	84.52	46.18	1.29	-676.6	-14.6	1.7036
2	-1.18	2.29	9.69	30.95	46.20	58.12	0.4902	0.1420	0.0357	1.7107	88.30	87.41	50.32	19.37	-862.9	-247.5	1.7901
3	-0.17	2.51	12.53	11.54	46.78	48.15	0.5037	0.2153	0.0474	1.5251	76.33	74.92	54.35	42.80	-1035.3	-531.7	1.5851
4	1.12	3.08	5.48	10.00	44.71	55.59	0.4227	0.0857	0.0189	1.6697	90.02	89.29	58.34	48.34	-1200.1	-718.2	1.6742
5	4.53	5.82	6.73	10.49	38.16	51.21	0.4557	0.0975	0.0209	1.8590	89.65	88.73	64.21	53.73	-1362.9	-810.0	1.7033

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1895	1.6894	85.25	86.28	41.89	1.1895	1.6894	85.26	86.28

STATOR 1

RUN NO 11, SPEED CODE 10, POINT NO 21

SL	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	β-1 DEGREE	β-2 DEGREE	M-1	M-2	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	15.967	12.763	1004.4	690.7	685.9	689.2	733.7	-45.4	47.1	-3.7	0.8905	0.5883	1.6062	1.1825	1.5581	1.1825
2	8.900	6.260	983.4	791.2	738.2	791.1	649.7	-10.5	41.4	-0.8	0.8661	0.6791	1.7422	1.1896	1.6649	1.1896
3	2.751	0.286	794.0	659.6	608.4	656.6	510.2	-63.2	40.0	-5.5	0.6876	0.5631	1.5693	1.1710	1.5106	1.1710
4	-1.838	-4.534	816.6	736.8	671.0	736.4	465.3	-23.8	34.7	-1.9	0.7073	0.6324	1.6433	1.1761	1.6378	1.1761
5	-6.536	-7.660	821.2	733.7	637.7	750.7	517.5	66.3	39.1	5.2	0.6981	0.6178	1.6305	1.2182	1.7791	1.2182

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-3.77	-1.37	7.49	50.81	52.30	60.56	0.4718	0.1419	0.0301	0.9428	73.96	75.53
2	-5.61	-1.89	8.51	42.15	59.91	71.06	0.3564	0.0697	0.0170	0.9728	82.66	83.83
3	-5.52	-0.47	3.81	45.48	50.22	57.70	0.3663	0.0410	0.0111	0.9888	73.16	74.64
4	-9.86	-3.72	7.57	36.60	57.54	64.91	0.2760	0.0643	0.0191	0.9818	65.92	66.84
5	-5.82	1.23	16.98	33.91	56.03	62.23	0.2825	0.1538	0.0485	0.9573	81.92	83.30

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10676.	184.43	1.1895	1.6379	79.86	81.19	1.1895	0.9695	79.87

ROTOR 2

RUN NO 11, SPEED CODE 10, POINT NO 21

SL	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	β-1 DEGREE	β-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-I	V'-1 FT/SEC	V'-2 FT/SEC
1	10.244	9.776	798.1	1166.4	796.9	838.0	-44.3	811.4	-3.2	44.0	0.6878	0.9513	856.0	891.4	1.0362	0.6865	1202.4	841.8
2	5.647	5.254	918.3	1053.3	918.2	841.2	-10.7	633.8	-0.7	37.0	0.8011	0.8577	955.6	971.0	1.1629	0.7380	1333.0	906.2
3	-0.111	0.704	810.0	907.8	807.6	766.8	-62.9	486.0	-4.5	32.4	0.7028	0.7353	1059.4	1058.7	1.1997	0.7752	1382.7	957.1
4	-5.234	-3.709	846.1	802.6	845.6	687.3	-22.3	414.9	-1.5	31.1	0.7354	0.6473	1165.9	1154.2	1.2677	0.8139	1458.6	1009.4
5	-7.881	-7.406	838.2	858.7	835.5	706.8	67.1	484.8	4.6	34.2	0.7140	0.6837	1275.1	1256.8	1.2512	0.8344	1468.7	1048.1

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	β'-1 DEGREE	β'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	PO/PO INLET
1	-1.53	2.92	19.25	42.59	66.06	83.76	0.3011	0.1869	0.0435	1.7569	85.64	84.46	48.42	5.43	-900.4	-80.0	2.8248
2	-5.27	-0.46	12.28	24.64	76.00	89.04	0.3202	0.1753	0.0419	1.5587	81.12	79.91	46.48	21.84	-966.3	-337.1	2.7113
3	0.79	5.37	8.53	17.51	65.42	62.43	0.3089	0.1091	0.0248	1.5697	86.97	86.14	54.26	36.76	-1122.4	-572.7	2.4667
4	-0.82	2.99	4.71	7.53	69.85	72.93	0.3080	0.1850	0.0395	1.3830	72.36	71.09	54.56	47.03	-1188.2	-739.2	2.2717
5	-1.96	0.22	0.64	7.92	67.05	73.31	0.2860	0.1387	0.0341	1.4369	80.02	78.97	55.24	47.32	-1208.0	-772.1	2.3429

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.3749	2.4887	79.11	81.57	43.92	1.1559	1.5195	80.94	82.03

STATOR 2

RUN NO 11, SPEED CODE 10, POINT NO 21

SL	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	β-1 DEGREE	β-2 DEGREE	M-1	M-2	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	7.593	0.441	1214.3	1055.4	909.6	1037.7	804.5	-192.6	41.7	-10.5	0.9979	0.8470	2.5498	1.4257	1.5875	1.2057
2	4.200	-0.255	1095.4	1009.1	894.6	997.0	632.1	-155.8	35.3	-8.9	0.8971	0.8160	2.5067	1.3915	1.4360	1.1693
3	1.909	-0.616	949.1	913.5	815.1	908.6	486.1	-94.3	30.6	-5.9	0.7725	0.7398	2.3461	1.3585	1.4965	1.1601
4	-1.091	-0.631	845.7	809.0	736.5	801.0	415.7	-113.4	29.4	-8.0	0.6851	0.6531	2.1816	1.3373	1.3274	1.1375
5	-4.795	-0.943	911.2	842.7	769.6	842.1	487.7	-30.0	32.4	-2.0	0.7297	0.6700	2.2005	1.3844	1.3495	1.1366

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-5.71	-3.69	0.75	52.22	87.52	101.50	0.1322	0.2071	0.0469	0.9024	68.17	70.15
2	-10.24	-6.37	1.44	44.20	91.93	100.47	0.0841	0.1924	0.0472	0.9211	63.95	65.72
3	-13.90	-8.60	4.38	36.72	85.54	92.54	0.0469	0.1709	0.0455	0.9434	75.30	77.12
4	-14.65	-8.44	2.06	37.44	76.38	81.43	0.0426	0.1483	0.0417	0.9601	61.00	62.50
5	-12.06	-5.18	8.73	34.44	77.28	82.56	0.0733	0.2016	0.0596	0.9401	65.02	66.46

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10676.	184.43	1.3749	2.3283	72.62	75.61	1.1559	0.9355	67.40

TABLE XX(b) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA (Tip Radially Distorted Inlet Flow, 100 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 11, SPEED CODE 10, POINT NO 3

SL	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'-1	V'-1 FT/SEC	V'-2 FT/SEC
1	14.855	15.908	653.3	989.3	653.3	636.6	0.0	757.2	0.0	49.9	0.6061	0.8741	675.5	760.3	0.8718	0.5625	939.7	636.6
2	7.763	8.184	719.9	963.8	719.9	698.3	0.0	664.3	0.0	43.6	0.6732	0.8454	861.5	900.7	1.0498	0.6467	1122.7	737.2
3	4.137	2.320	745.5	783.9	745.5	577.2	0.0	530.3	0.0	42.6	0.6995	0.6761	1033.5	1041.0	1.1957	0.6647	1274.4	770.7
4	0.368	-2.598	732.5	790.2	732.5	634.2	0.0	471.4	0.0	36.6	0.6861	0.6816	1198.0	1181.3	1.3152	0.8211	1404.2	951.9
5	-6.752	-6.004	642.2	784.2	642.2	583.2	0.0	524.2	0.0	41.8	0.5950	0.6626	1360.6	1321.7	1.3941	0.8348	1504.5	987.9

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	PO/PO INLET
1	-2.01	2.29	19.86	45.53	43.17	49.45	0.5167	0.2216	0.0510	1.6649	85.87	84.85	45.81	0.27	-675.5	-3.1	1.7172
2	-1.40	2.06	9.03	31.39	46.33	58.07	0.5020	0.1326	0.0335	1.7318	89.27	88.43	50.10	18.71	-861.5	-236.4	1.8108
3	-0.26	2.42	11.24	12.74	46.81	48.76	0.5175	0.2120	0.0477	1.5569	77.52	76.10	54.25	41.51	-1033.5	-510.6	1.6184
4	1.26	3.23	5.33	10.31	44.50	55.67	0.4285	0.0808	0.0179	1.6860	90.75	90.07	58.50	48.18	-1198.0	-709.9	1.6893
5	4.88	6.17	6.69	10.87	37.76	50.71	0.4657	0.1041	0.0223	1.8719	89.17	88.19	64.56	53.69	-1360.6	-797.4	1.7153

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1928	1.7079	65.64	86.66	41.80	1.1928	1.7080	85.65	86.67

STATOR 1

RUN NO 11, SPEED CODE 10, POINT NO 3

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	15.736	12.278	1003.9	665.1	674.3	663.7	743.8	-43.4	47.9	-3.7	0.8891	0.5646	1.6190	1.1847	1.5697	1.1847
2	8.451	4.916	985.5	773.5	732.6	773.5	658.9	3.2	42.0	0.2	0.8672	0.6618	1.7599	1.1920	1.6830	1.1920
3	2.289	-1.415	808.9	664.1	611.5	663.7	529.4	-22.9	40.9	-2.0	0.6997	0.5656	1.6102	1.1770	1.5501	1.1770
4	-2.219	-5.851	815.1	722.2	664.4	721.5	472.2	32.3	35.4	2.6	0.7052	0.6183	1.6592	1.1784	1.6553	1.1784
5	-6.680	-8.229	817.6	718.8	624.4	713.8	527.9	84.5	40.3	6.8	0.6936	0.6033	1.6420	1.2222	1.7915	1.2222

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-2.93	-0.53	7.52	51.62	51.78	59.43	0.4989	0.1422	0.0301	0.9428	74.41	75.95
2	-5.03	-1.31	9.51	41.73	59.96	70.79	0.3755	0.0742	0.0181	0.9710	83.46	84.60
3	-4.63	0.42	7.34	42.84	50.89	59.46	0.3646	0.0213	0.0058	0.9940	75.34	76.78
4	-9.19	-3.05	12.01	32.83	57.46	64.61	0.2747	0.0629	0.0186	0.9822	86.80	87.69
5	-4.66	2.39	18.56	33.49	53.27	61.53	0.2947	0.1554	0.0489	0.9573	81.50	82.93

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10658.	184.01	1.1928	1.6569	80.43	81.75	1.1928	0.9701	80.45

ROTOR 2

RUN NO 11, SPEED CODE 10, POINT NO 3

SL	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'-I	V'-1 FT/SEC	V'-2 FT/SEC
1	9.635	9.416	794.7	1148.1	793.5	806.9	-42.4	816.7	-3.0	45.2	0.6838	0.9327	854.5	889.9	1.0305	0.6582	1197.5	810.2
2	5.658	4.236	915.4	1035.7	915.4	769.8	2.7	670.0	0.2	40.3	0.7975	0.8388	954.0	969.3	1.1501	0.6840	1320.2	844.6
3	-2.471	-0.772	807.9	879.0	807.6	669.5	-21.4	569.7	-1.5	40.4	0.6989	0.7048	1057.6	1056.9	1.1659	0.6639	1347.8	828.0
4	-6.666	-4.583	810.6	822.9	810.1	597.3	34.9	566.0	2.5	43.4	0.7005	0.6548	1163.9	1152.2	1.2006	0.6659	1389.6	836.9
5	-8.094	-7.975	794.4	840.5	769.8	605.0	85.6	583.5	6.2	43.9	0.6721	0.6588	1272.9	1254.7	1.2064	0.7083	1426.0	903.6

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	PO/PO INLET
1	-1.57	2.88	18.97	43.23	66.33	93.19	0.3276	-0.0564	-0.0131	1.9823	104.08	104.46	46.38	5.15	-896.9	-73.1	3.2220
2	-5.71	-0.92	11.16	25.32	76.50	94.94	0.3620	0.0097	0.0023	1.7494	99.09	99.01	46.04	20.73	-951.2	-299.3	3.0549
3	-0.26	4.32	7.63	17.16	66.96	79.66	0.3866	0.0445	0.0102	1.6835	95.00	94.66	53.21	36.05	-1079.0	-487.3	2.7140
4	-0.96	2.85	2.12	9.98	66.87	69.84	0.3988	0.1398	0.0313	1.5617	83.70	82.65	54.42	44.44	-1129.1	-586.2	2.5879
5	-0.67	1.31	1.21	8.45	65.37	68.96	0.3668	0.1096	0.0267	1.5884	87.13	86.27	56.33	47.88	-1187.5	-671.2	2.6081

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.3982	2.8094	85.89	87.76	43.38	1.1722	1.6956	93.96	94.40

STATOR 2

RUN NO 11, SPEED CODE 10, POINT NO 3

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/ TO1
1	7.733	0.345	1187.3	920.1	868.4	920.0	809.7	14.7	43.2	0.9	0.9705	0.7256	3.0222	1.4283	1.8614	1.2053
2	4.583	-0.562	1068.2	854.5	833.4	854.4	666.1	-14.9	38.6	-1.0	0.8687	0.6768	2.9277	1.3983	1.6744	1.1745
3	2.351	-0.680	908.0	692.2	707.7	691.2	569.0	-38.5	38.8	-3.2	0.7304	0.5449	2.6620	1.3749	1.6518	1.1686
4	-0.979	-0.690	846.4	610.5	630.9	609.9	567.2	-27.5	41.9	-2.6	0.6769	0.4771	2.5454	1.3765	1.5353	1.1648
5	-4.554	-0.870	874.1	629.9	647.6	629.7	587.0	18.5	42.2	1.7	0.6875	0.4849	2.5523	1.4206	1.5544	1.1623

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-4.20	-2.18	12.17	42.31	97.30	115.89	0.2257	0.1369	0.0315	0.9379	93.94	94.45
2	-6.75	-2.89	9.32	39.60	98.01	109.85	0.2021	0.1108	0.0275	0.9567	90.38	91.05
3	-5.91	-0.60	7.12	41.99	82.84	88.43	0.2451	0.0859	0.0230	0.9741	90.72	91.33
4	-2.14	4.07	7.53	44.49	72.78	77.16	0.2803	0.0624	0.0177	0.9835	78.71	79.95
5	-2.24	4.64	12.45	40.54	72.52	77.12	0.2791	0.0787	0.0233	0.9787	82.15	83.22

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10658.	184.01	1.3982	2.7172	82.71	84.92	1.1722	0.9672	87.60

TABLE XX(c) – OVERALL PERFORMANCE AND BLADE-ELEMENT DATA
(Tip Radially Distorted Inlet Flow, 100 Percent Speed)

U. S. CUSTOMARY UNITS

ROTOR 1

RUN NO 11, SPEED CODE 10, POINT NO 4

SL	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'-I	V'-1 FT/SEC	V'-2 FT/SEC
1	15.246	16.032	632.0	992.0	632.0	546.4	0.0	827.9	0.0	56.6	0.5850	0.8694	677.8	762.9	0.8578	0.4823	926.8	550.3
2	8.565	8.487	691.9	942.8	691.9	625.1	0.0	705.7	0.0	48.5	0.6447	0.8195	864.5	903.8	1.0318	0.5700	1107.2	655.7
3	3.595	2.751	722.0	839.9	722.0	578.9	0.0	608.6	0.0	46.5	0.6753	0.7204	1037.1	1044.6	1.1820	0.6216	1263.7	724.7
4	-0.897	-2.311	705.6	794.3	705.6	562.5	0.0	560.7	0.0	44.9	0.6587	0.6747	1202.2	1185.4	1.3013	0.7141	1394.0	840.6
5	-7.236	-7.974	615.7	800.5	615.7	506.9	0.0	619.5	0.0	50.6	0.5689	0.6656	1365.3	1326.3	1.3838	0.7232	1497.7	869.7

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	PO/PO INLET
1	-0.91	3.39	12.82	53.69	42.27	45.31	0.6204	0.1661	0.0380	1.7971	90.70	89.92	46.91	-6.78	-677.8	65.0	1.8541
2	-0.14	3.33	7.92	33.77	45.17	56.48	0.5776	0.0545	0.0139	1.8712	96.08	95.73	51.37	17.60	-864.5	-198.1	1.9506
3	0.68	3.36	6.73	18.19	45.96	54.04	0.5694	0.0943	0.0226	1.8139	91.59	90.87	55.20	37.01	-1037.1	-436.0	1.8813
4	2.32	4.27	5.10	11.58	43.58	53.45	0.5276	0.0700	0.0156	1.8790	93.22	92.60	59.53	47.95	-1202.2	-624.7	1.8744
5	5.90	7.19	7.22	11.37	36.91	47.78	0.5658	0.1097	0.0232	2.0947	90.21	89.15	65.58	54.22	-1365.3	-706.7	1.9256

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.2206	1.8990	91.06	91.82	40.89	1.2206	1.8996	91.11	91.86

STATOR 1

RUN NO 11, SPEED CODE 10, POINT NO 4

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/TO1
1	15.798	12.292	996.1	525.7	575.2	523.4	813.2	-48.9	54.8	-5.3	0.8735	0.4376	1.7481	1.2026	1.6944	1.2026
2	8.617	5.231	955.6	652.7	650.6	652.4	700.0	-20.3	47.1	-1.8	0.8322	0.5486	1.8957	1.2045	1.8190	1.2045
3	3.308	-0.246	855.8	615.5	602.8	614.0	607.5	-42.1	45.2	-3.9	0.7355	0.5158	1.8522	1.2038	1.7844	1.2038
4	-1.123	-3.903	811.8	609.0	587.4	608.3	560.4	29.1	43.7	2.7	0.6913	0.5085	1.8401	1.2108	1.8393	1.2108
5	-6.317	-7.041	827.4	605.8	543.6	605.5	623.8	17.5	49.0	1.7	0.6901	0.4945	1.8433	1.2634	2.0030	1.2634

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOT-STG	%EFF-P TOT-STG
1	4.00	6.40	5.95	60.11	47.54	52.96	0.6508	0.1455	0.0308	0.9428	80.20	81.59
2	0.12	3.83	7.50	48.89	58.24	67.83	0.4981	0.0732	0.0179	0.9732	91.06	91.76
3	-0.27	4.77	5.39	49.15	55.72	63.46	0.4877	0.0518	0.0141	0.9843	88.20	89.11
4	-0.95	5.19	12.17	40.91	55.25	62.32	0.4429	0.0624	0.0185	0.9829	90.20	90.99
5	4.04	11.09	13.43	47.32	50.47	59.96	0.5024	0.1566	0.0496	0.9573	83.21	84.74

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10695.	179.96	1.2206	1.8415	86.31	87.42	1.2206	0.9697	86.36

ROTOR 2

RUN NO 11, SPEED CODE 10, POINT NO 4

SL	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'-I	V'-1 FT/SEC	V'-2 FT/SEC
1	9.513	9.114	612.2	1036.9	610.3	696.5	-47.8	768.2	-4.5	47.6	0.5131	0.8275	857.5	893.0	0.9151	0.5647	1091.8	707.6
2	3.496	3.841	745.7	949.2	745.5	667.8	-18.9	674.5	-1.5	45.2	0.6326	0.7534	957.3	972.7	1.0420	0.5805	1228.3	731.4
3	-1.792	-0.588	694.1	866.1	693.0	604.6	-40.3	620.2	-3.3	45.7	0.5859	0.6797	1061.3	1060.6	1.0985	0.5870	1301.5	748.0
4	-4.732	-3.670	660.8	831.4	660.2	466.0	29.2	688.5	2.5	55.9	0.5541	0.6429	1168.0	1156.2	1.1038	0.5106	1316.3	660.2
5	-6.972	-6.639	683.0	835.1	682.8	588.9	17.7	592.1	1.5	45.0	0.5613	0.6372	1277.3	1259.0	1.1774	0.6789	1432.8	889.7

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-P TOT	%EFF-A TOT	B'-1 DEGREE	B'-2 DEGREE	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	PO/PO INLET
1	5.94	10.39	23.92	45.79	59.67	89.62	0.3578	-0.0454	-0.0104	1.8958	102.98	103.24	55.89	10.10	-905.3	-124.8	3.3272
2	0.82	5.61	14.46	28.55	74.24	88.16	0.4091	0.1093	0.0257	1.6899	90.30	89.56	52.57	24.02	-976.2	-298.2	3.2099
3	4.37	8.95	7.85	21.77	69.03	79.20	0.4254	0.1691	0.0388	1.6478	84.02	82.87	57.84	36.07	-1101.6	-440.4	3.0477
4	4.51	8.32	2.73	14.83	66.07	60.19	0.4996	0.2669	0.0591	1.6301	75.87	74.17	59.89	45.05	-1138.8	-467.7	2.9996
5	4.21	6.39	1.71	13.03	65.39	76.19	0.3772	0.1340	0.0323	1.6655	86.30	85.28	61.41	48.38	-1259.6	-666.9	3.0700

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	WC1/A1 LBM/SEC SQFT	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.4485	3.1156	85.13	87.27	38.61	1.1867	1.6918	86.12	87.11

STATOR 2

RUN NO 11, SPEED CODE 10, POINT NO 4

SL	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	PO/PO INLET	TO/TO INLET	PO/PO STAGE	TO2/TO1
1	7.866	0.619	1062.8	739.4	741.4	739.3	761.5	14.6	46.0	1.1	0.8511	0.5715	3.2155	1.4346	1.8371	1.1929
2	4.725	0.122	970.6	682.8	700.4	682.8	672.0	4.2	43.9	0.4	0.7723	0.5278	3.1442	1.4214	1.6538	1.1800
3	2.327	0.049	885.2	586.3	633.2	585.9	618.6	-20.0	44.3	-1.9	0.6962	0.4496	3.0061	1.4237	1.6236	1.1825
4	-1.576	-0.374	851.9	536.7	499.7	536.6	689.9	-4.8	54.0	-0.5	0.6601	0.4059	2.9395	1.4530	1.5976	1.2021
5	-5.582	-1.120	863.5	582.8	625.1	582.5	595.7	20.3	43.7	2.0	0.6606	0.4359	2.9725	1.4930	1.6127	1.1823

SL	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOT-STG	%EFF-P TOT-STG
1	-1.41	0.61	12.38	44.88	93.75	108.17	0.3057	0.0895	0.0206	0.9662	97.66	97.86
2	-1.65	2.22	10.67	43.56	91.30	100.85	0.3009	0.0717	0.0178	0.9764	85.27	86.28
3	-0.38	4.93	8.35	46.28	82.14	85.67	0.3432	0.0661	0.0177	0.9815	80.81	82.06
4	10.00	16.20	9.60	54.55	63.89	76.56	0.3708	0.0746	0.0212	0.9810	70.34	72.21
5	-0.76	6.12	12.77	41.70	79.75	80.79	0.3250	0.1259	0.0372	0.9681	79.51	80.84

NCORR INLET RPM	WCORR INLET LBM/SEC	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD STAGE %
10695.	179.96	1.4485	3.0374	82.91	85.32	1.1867	0.9749	81.65

APPENDIX E

OVERALL PERFORMANCE AND VELOCITY VECTOR PARAMETERS FOR CIRCUMFERENTIALLY DISTORTED INLET FLOW

This appendix provides overall performance and velocity vector parameters for distorted inlet flow with casing treatment and design stator-settings. The data is presented at 70 percent and 100 percent of design speed. An overall-performance and stall data summary is given in Table XXI. Velocity vector parameters at the fan inlet and exit are given in Tables XXII and XXIII. Circumferential distributions of total pressure ratio and total temperature ratio are given in Table XXIV. The velocity vector parameters (V, V_m, and V_θ) are presented in feet per second and are based on standard day, inlet plenum conditions. The circumferential reference position is TDC looking forward. The relative position of the circumferential-distortion screen is 246° – 336° (hub) and 246° - 326° (tip)— tip is 100 percent span. $\beta°$ is defined as $\tan^{-1}$ ($\tan\beta/\cos\epsilon$), where ϵ is the design value.

TABLE XXI— OVERALL PERFORMANCE AND STALL DATA SUMMARY WITH CIRCUMFERENTIAL INLET FLOW DISTORTION

PERFORMANCE

Ref. Code	Percent of Design Speed	Number of Screen Location Points[1]	Corrected Flow[2] (lbm/sec)	P_{16}/P_6	$\eta_{ad,16}$ (%)
10-70-21	70	4	124.2	1.526	73.98
10-70-22	70	4	110.5	1.713	81.43
10-70-23	70	12	96.0	1.735	7.398
10-10-1	100	4	182.4	2.352	73.77
10-10-22	100	12	180.6	2.819	81.56
10-10-2	100	12	177.4	2.847	81.22

STALL POINT DATA

Percent of Design Speed Flow	Corrected Flow[2] (lbm/sec)	P_{16}/P_6	Stall Margin (%)
70	95.1	1.740	25.4
100	169.2	2.888	12.0

Notes: (1) See page 25
(2) Corrected flow = $W\sqrt{\theta}/\delta$

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TABLE XXII(a) — VELOCITY VECTOR PARAMETERS AT FAN INLET (Circumferentially Distorted Inlet Flow)

Ref. Code 10-70-21
$W\sqrt{\theta}/\delta$ = 124.2 lbm/sec
P_{16}/P_6 = 1.526
P_o = 2009 lbf/ft^2
T_o = 515.4°R

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
72°								
10	.979	.926	93.1	.28	314.	314.	-17.	35.4
30	.982	.908	92.0	.34	373.	372.	-13.	32.9
50	.983	.902	91.6	.35	389.	389.	-11.	28.1
70	.982	.904	91.6	.35	382.	382.	-10.	24.3
90	.979	.919	91.6	.30	332.	332.	-9.	18.7
MR	.981	.910	91.8	.33	363.	363.	-11.	
162°								
10	.979	.928	88.4	.28	310.	310.	8.	36.6
30	.980	.909	87.8	.33	364.	364.	14.	33.6
50	.983	.904	88.6	.35	384.	384.	9.	28.5
70	.982	.905	88.6	.34	380.	380.	10.	24.7
90	.981	.920	89.1	.30	336.	336.	6.	19.2
MR	.981	.912	88.6	.33	360.	360.	9.	
252°								
10	.970	.896	75.2	.34	373.	361.	95.	47.6
30	.956	.887	78.7	.33	363.	356.	71.	36.0
50	.987	.881	81.2	.34	380.	375.	58.	29.7
70	.968	.884	81.4	.35	391.	386.	58.	26.4
90	.977	.897	80.7	.35	388.	382.	63.	22.8
MR	.966	.889	80.0	.35	381.	375.	66.	
342°								
10	.974	.894	101.9	.35	388.	380.	-80.	37.0
30	.978	.882	100.0	.39	426.	419.	-74.	32.4
50	.980	.877	98.3	.40	441.	437.	-63.	29.3
70	.982	.880	98.2	.40	437.	433.	-62.	25.8
90	.981	.894	97.8	.37	405.	401.	-65.	21.3
MR	.980	.885	98.8	.38	422.	417.	-65.	

Ref. Code 10-70-22
$W\sqrt{\theta}/\delta$ = 110.5 lbm/sec
P_{16}/P_6 = 1.713
P_o = 2021 lbf/ft^2
T_o = 516.2°R

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
72°								
10	.984	.945	91.9	.24	267.	267.	-9.	31.5
30	.986	.931	90.8	.29	321.	320.	-5.	29.4
50	.987	.924	91.0	.31	342.	342.	-6.	25.3
70	.987	.927	90.3	.30	332.	332.	-1.	21.6
90	.985	.940	90.5	.26	286.	286.	-3.	16.3
MR	.986	.932	90.7	.28	315.	314.	-4.	
162°								
10	.983	.945	88.3	.24	262.	262.	8.	32.1
30	.984	.931	88.1	.28	311.	311.	10.	29.3
50	.986	.925	88.4	.31	338.	338.	9.	25.8
70	.985	.927	88.4	.30	330.	329.	9.	21.7
90	.985	.941	88.7	.26	286.	286.	6.	14.4
MR	.985	.933	88.4	.28	311.	311.	9.	
252°								
10	.977	.929	76.3	.27	298.	290.	71.	39.2
30	.966	.921	79.5	.26	291.	286.	53.	29.4
50	.967	.913	81.8	.29	319.	316.	46.	25.2
70	.974	.913	81.8	.31	339.	335.	48.	23.0
90	.983	.925	81.8	.30	327.	323.	46.	19.2
MR	.974	.920	80.8	.29	320.	316.	51.	
342°								
10	.980	.927	101.6	.28	312.	306.	-63.	32.1
30	.982	.911	100.3	.33	362.	356.	-66.	29.6
50	.984	.909	98.8	.34	374.	370.	-57.	25.5
70	.986	.912	98.5	.33	369.	365.	-55.	22.3
90	.988	.930	98.2	.29	318.	318.	-46.	17.1
MR	.984	.917	99.2	.32	351.	346.	-56.	

Ref. Code 10-10-1
$W\sqrt{\theta}/\delta$ = 182.4 lbm/sec
P_{16}/P_o = 2.352
P_o = 1445 lbf/ft^2
T_o = 514.5°R

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
72°								
10	.956	.816	97.8	.48	524.	519.	-71.	37.4
30	.959	.746	87.7	.61	658.	657.	26.	40.2
50	.962	.732	87.4	.64	684.	683.	31.	34.4
70	.958	.737	86.6	.62	671.	670.	39.	30.1
90	.954	.867	97.2	.49	540.	535.	-68.	20.2
MR	.958	.743	90.5	.58	[illegible]	[illegible]	-9.	
162°								
10	.949	.797	86.6	.51	551.	550.	33.	42.3
30	.953	.760	85.3	.58	628.	623.	51.	39.8
50	.961	.761	94.5	.55	600.	598.	-47.	29.3
70	.957	.788	94.7	.53	580.	579.	-47.	25.1
90	.956	.810	98.2	.49	536.	534.	-69.	20.8
MR	.956	.788	92.1	.53	579.	578.	-21.	
252°								
10	.931	.769	77.8	.53	575.	562.	122.	40.3
30	.904	.744	82.1	.53	551.	575.	80.	38.6
50	.911	.731	83.9	.57	615.	612.	66.	33.6
70	.922	.725	83.9	.55	625.	621.	64.	28.2
90	.945	.708	82.8	.56	604.	599.	78.	24.6
MR	.928	.749	82.6	.56	604.	599.	78.	
342°								
10	.938	.756	99.9	.56	612.	603.	-108.	40.5
30	.954	.721	97.3	.65	692.	687.	-87.	37.8
50	.964	.712	96.1	.66	708.	704.	-75.	32.8
70	.958	.717	96.0	.66	704.	700.	-73.	29.1
90	.955	.754	96.9	.59	638.	633.	-77.	23.5
MR	.964	.731	96.9	.63	675.	670.	-81.	

TABLE XXII(b) — VELOCITY VECTOR PARAMETERS AT FAN INLET (Circumferentially Distorted Inlet Flow)

Ref. Code 10-10-2

$W\sqrt{\theta}/\delta$ = 177.4 lbm/sec

P_{16}/P_6 = 2.847

P_o = 1501 lbf/ft^2

T_o = 504.0°R

12°

% span	P_6/P_o	p_6/P_o	$90-\beta°$	M	V	V_m	V_θ	$90-\beta'$
10	.950	.803	98.1	.50	541.	536.	-76.	38.4
30	.960	.778	95.5	.58	603.	600.	-58.	35.2
50	.966	.767	94.5	.57	617.	615.	-49.	30.2
70	.956	.773	94.4	.56	604.	604.	-47.	25.3
90	.954	.797	95.1	.52	562.	560.	-50.	21.5
MR	.956	.782	95.2	.56	589.	587.	-56.	

42°

% span	P_6/P_o	p_6/P_o	$90-\beta°$	M	V	V_m	V_θ	$90-\beta'$
10	.987	.807	93.4	.50	545.	544.	-32.	40.7
30	.961	.779	92.5	.56	603.	602.	-26.	36.3
50	.961	.771	92.0	.57	618.	617.	-22.	30.9
70	.960	.777	92.0	.56	604.	604.	-21.	26.7
90	.968	.803	92.9	.51	553.	552.	-28.	21.8
MR	.960	.787	92.5	.54	587.	586.	-26.	

72°

% span	P_6/P_o	p_6/P_o	$90-\beta°$	M	V	V_m	V_θ	$90-\beta'$
10	.959	.805	92.1	.47	512.	511.	-20.	39.3
30	.962	.792	91.4	.54	582.	581.	-15.	35.7
50	.966	.783	91.9	.55	602.	602.	-20.	30.8
70	.960	.785	91.7	.54	590.	590.	-17.	26.8
90	.967	.811	92.3	.49	535.	534.	-21.	21.0
MR	.961	.797	91.9	.52	565.	565.	-19.	

102°

% span	P_6/P_o	p_6/P_o	$90-\beta°$	M	V	V_m	V_θ	$90-\beta'$
10	.965	.809	90.7	.51	559.	559.	-7.	42.9
30	.966	.779	91.2	.56	609.	609.	-13.	37.1
50	.964	.766	91.3	.58	629.	629.	-14.	31.8
70	.963	.771	91.2	.57	618.	618.	-13.	27.4
90	.960	.797	91.7	.52	568.	568.	-17.	22.2
MR	.963	.783	91.3	.55	598.	598.	-14.	

132°

% span	P_6/P_o	p_6/P_o	$90-\beta°$	M	V	V_m	V_θ	$90-\beta'$
10	.954	.823	90.9	.46	506.	506.	-8.	39.7
30	.960	.787	89.4	.54	586.	586.	7.	36.7
50	.966	.776	90.2	.57	614.	614.	-2.	31.2
70	.963	.782	90.5	.55	600.	600.	-5.	26.9
90	.958	.808	91.4	.50	544.	544.	-13.	21.4
MR	.961	.793	90.5	.53	576.	576.	-5.	

162°

% span	P_6/P_o	p_6/P_o	$90-\beta°$	M	V	V_m	V_θ	$90-\beta'$
10	.987	.806	89.0	.50	547.	547.	10.	42.8
30	.956	.777	89.3	.55	599.	599.	7.	37.3
50	.963	.760	89.8	.59	639.	639.	2.	32.3
70	.962	.771	90.1	.57	617.	617.	-1.	27.6
90	.961	.798	90.3	.52	567.	567.	-3.	22.4
MR	.960	.781	89.8	.55	597.	597.	2.	

192°

% span	P_6/P_o	p_6/P_o	$90-\beta°$	M	V	V_m	V_θ	$90-\beta'$
10	.954	.812	87.9	.49	530.	530.	20.	42.4
30	.951	.780	87.8	.54	587.	586.	25.	37.4
50	.953	.764	88.9	.57	619.	619.	12.	31.8
70	.960	.773	89.8	.56	611.	611.	2.	27.4
90	.950	.789	90.6	.50	549.	549.	-6.	21.7
MR	.954	.784	89.2	.54	584.	583.	8.	

222°

% span	P_6/P_o	p_6/P_o	$90-\beta°$	M	V	V_m	V_θ	$90-\beta'$
10	.948	.801	83.4	.50	542.	538.	63.	45.0
30	.947	.775	84.3	.54	589.	586.	59.	38.6
50	.965	.759	87.2	.59	642.	641.	31.	32.8
70	.961	.764	87.9	.58	628.	628.	23.	28.8
90	.969	.797	89.2	.52	566.	565.	8.	22.5
MR	.957	.778	87.0	.55	598.	597.	32.	

252°

% span	P_6/P_o	p_6/P_o	$90-\beta°$	M	V	V_m	V_θ	$90-\beta'$
10	.934	.780	78.6	.51	560.	549.	111.	48.3
30	.903	.764	82.9	.51	560.	556.	69.	37.8
50	.911	.748	83.9	.55	596.	593.	63.	32.0
70	.924	.745	84.3	.55	609.	606.	60.	28.4
90	.950	.777	83.6	.54	590.	586.	66.	24.1
MR	.927	.769	83.1	.54	587.	582.	72.	

282°

% span	P_6/P_o	p_6/P_o	$90-\beta°$	M	V	V_m	V_θ	$90-\beta'$
10	.857	.767	87.4	.40	440.	440.	20.	37.1
30	.839	.747	91.0	.41	452.	452.	-8.	29.4
50	.839	.731	90.8	.45	489.	489.	-4.	25.7
70	.838	.737	90.6	.43	474.	474.	-5.	21.8
90	.836	.750	90.8	.40	435.	435.	-4.	17.5
MR	.840	.748	90.3	.42	459.	459.	-2.	

312°

% span	P_6/P_o	p_6/P_o	$90-\beta°$	M	V	V_m	V_θ	$90-\beta'$
10	.894	.757	101.8	.49	538.	527.	-107.	36.9
30	.857	.728	97.3	.49	532.	528.	-68.	31.8
50	.843	.722	96.6	.47	518.	514.	-59.	28.7
70	.834	.726	96.4	.45	491.	488.	-54.	21.6
90	.850	.739	99.3	.45	496.	489.	-80.	18.6
MR	.852	.733	98.1	.47	511.	506.	-72.	

342°

% span	P_6/P_o	p_6/P_o	$90-\beta°$	M	V	V_m	V_θ	$90-\beta'$
10	.943	.784	100.6	.52	567.	557.	-106.	36.8
30	.953	.781	98.9	.59	640.	636.	-97.	35.1
50	.962	.764	101.0	.58	630.	618.	-120.	33.4
70	.959	.771	100.7	.57	614.	603.	-116.	28.0
90	.959	.776	93.9	.56	604.	603.	-94.	22.0
MR	.957	.769	98.1	.57	614.	608.	-87.	

TABLE XXII(c) — VELOCITY VECTOR PARAMETERS AT FAN INLET
(Circumferentially Distorted Inlet Flow)

Ref. Code 10-10-22
$W\sqrt{\theta}/\delta$ = 180.6 lbm/sec
P_{16}/P_6 = 2.819
P_o = 1491 lbf/ft^2
T_o = 500.8°R

12°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.962	.792	98.1	.52	565.	559.	-80.	39.8
30	.961	.758	95.7	.59	639.	636.	-63.	36.6
50	.958	.746	94.6	.61	657.	655.	-53.	31.6
70	.955	.748	93.8	.60	649.	647.	-43.	27.9
90	.958	.784	95.1	.54	588.	586.	-52.	22.4
MR	.957	.764	96.1	.58	624.	621.	-66.	

42°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.960	.797	93.7	.52	568.	567.	-37.	41.7
30	.960	.764	93.9	.58	628.	627.	-42.	36.9
50	.956	.749	92.9	.60	647.	646.	-33.	31.8
70	.956	.754	92.3	.59	640.	640.	-26.	28.0
90	.956	.786	93.4	.54	581.	580.	-35.	22.4
MR	.957	.768	93.2	.57	616.	615.	-34.	

72°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.958	.807	91.6	.50	545.	545.	-14.	41.6
30	.962	.770	90.1	.57	619.	619.	-1.	38.0
50	.962	.780	96.0	.56	603.	600.	-63.	29.8
70	.960	.784	95.2	.55	592.	590.	-53.	25.6
90	.955	.791	90.8	.53	571.	571.	-8.	22.6
MR	.959	.785	92.7	.54	589.	588.	-28.	

102°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.963	.801	91.6	.52	565.	565.	-16.	40.7
30	.964	.770	92.1	.58	623.	622.	-23.	37.5
50	.961	.756	91.8	.60	643.	642.	-20.	32.0
70	.962	.769	91.7	.59	632.	632.	-19.	27.9
90	.958	.793	92.2	.53	573.	573.	-22.	22.4
MR	.961	.775	91.9	.56	610.	609.	-20.	

132°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.954	.820	92.0	.47	514.	514.	-18.	39.9
30	.957	.780	90.1	.55	594.	594.	-1.	37.0
50	.964	.770	91.2	.58	623.	623.	-13.	31.8
70	.961	.772	90.9	.57	615.	615.	-9.	27.8
90	.957	.803	92.2	.51	552.	552.	-21.	21.9
MR	.959	.786	91.2	.54	586.	586.	-13.	

162°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.958	.801	89.4	.51	556.	556.	5.	42.2
30	.949	.789	89.6	.56	606.	606.	4.	37.6
50	.960	.755	90.6	.60	644.	644.	-7.	32.4
70	.959	.761	90.1	.58	630.	630.	-1.	28.1
90	.956	.788	90.8	.53	578.	578.	-8.	22.7
MR	.956	.773	90.2	.56	607.	607.	-2.	

192°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.959	.812	88.4	.49	535.	535.	15.	42.5
30	.956	.776	87.6	.55	598.	598.	25.	37.9
50	.953	.763	89.2	.57	620.	620.	9.	31.8
70	.959	.770	89.7	.57	617.	616.	3.	27.7
90	.947	.799	91.6	.50	545.	545.	-15.	21.4
MR	.954	.782	89.5	.54	587.	587.	5.	

222°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.949	.800	83.8	.50	546.	542.	58.	45.0
30	.949	.768	84.1	.58	605.	602.	62.	39.4
50	.957	.751	87.2	.60	646.	646.	32.	33.4
70	.959	.761	88.5	.58	632.	632.	17.	28.5
90	.956	.792	89.8	.53	571.	571.	2.	22.6
MR	.956	.773	87.2	.56	605.	604.	29.	

252°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.932	.773	77.8	.52	570.	558.	120.	49.4
30	.905	.748	82.5	.53	575.	570.	75.	38.6
50	.911	.733	83.6	.57	613.	610.	68.	32.9
70	.926	.740	84.0	.58	622.	619.	65.	29.1
90	.949	.771	83.9	.56	599.	595.	65.	24.6
MR	.927	.753	82.5	.55	600.	595.	78.	

282°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.854	.761	85.1	.41	450.	448.	39.	38.7
30	.831	.738	88.6	.41	455.	455.	11.	30.3
50	.835	.722	87.2	.46	504.	503.	24.	27.1
70	.835	.733	89.3	.43	476.	476.	6.	22.1
90	.835	.748	89.5	.40	440.	440.	4.	17.9
MR	.836	.739	88.3	.42	465.	465.	13.	

312°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.879	.750	99.0	.48	525.	519.	-82.	37.4
30	.841	.720	94.7	.48	519.	518.	-43.	31.9
50	.833	.710	94.5	.48	527.	526.	-41.	28.7
70	.829	.714	94.3	.47	509.	508.	-38.	22.8
90	.830	.732	95.8	.43	469.	466.	-48.	18.3
MR	.838	.724	95.4	.46	506.	504.	-48.	

342°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.935	.788	105.8	.50	567.	526.	-149.	38.1
30	.948	.721	94.2	.64	685.	683.	-50.	35.0
50	.955	.707	92.0	.67	716.	716.	-25.	34.7
70	.967	.715	91.9	.66	705.	705.	-23.	30.4
90	.949	.761	100.7	.53	581.	571.	-107.	21.1
MR	.951	.789	96.0	.61	659.	655.	-65.	

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TABLE XXII(d) — VELOCITY VECTOR PARAMETERS AT FAN INLET (Circumferentially Distorted Inlet Flow)

Ref. Code 10-70-23
$W\sqrt{\theta}/\delta$ = 96.0 lbm/sec
P_{16}/P_o = 1.735
P_o = 2041 lbf/ft^2
T_o = 514.3°R

12°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.987	.958	96.9	.21	230.	228.	-28.	24.7
30	.990	.949	96.6	.25	272.	270.	-31.	24.5
50	.989	.950	96.0	.24	268.	266.	-28.	19.7
70	.989	.956	95.2	.22	246.	245.	-22.	15.9
90	.988	.967	95.0	.18	199.	198.	-17.	11.3
MR	.989	.956	95.8	.22	245.	243.	-25.	

42°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.989	.961	93.2	.20	223.	223.	-13.	27.0
30	.989	.951	93.3	.24	265.	265.	-15.	24.6
50	.989	.951	93.4	.24	264.	264.	-16.	19.8
70	.989	.955	92.6	.22	248.	248.	-11.	16.9
90	.989	.966	92.4	.18	202.	202.	-8.	11.6
MR	.989	.957	92.9	.22	245.	242.	-12.	

72°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.987	.961	91.0	.20	221.	221.	-4.	27.2
30	.989	.952	90.1	.23	260.	260.	-0.	24.8
50	.990	.950	90.1	.24	270.	270.	-1.	20.6
70	.990	.959	89.9	.23	252.	252.	0.	16.8
90	.988	.968	90.1	.18	206.	206.	-0.	11.9
MR	.989	.956	90.1	.22	244.	244.	-1.	

102°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.989	.961	90.5	.20	223.	223.	-2.	27.6
30	.990	.950	90.2	.24	270.	270.	-1.	24.6
50	.989	.950	91.0	.24	270.	270.	-5.	20.5
70	.990	.954	91.0	.23	254.	254.	-4.	16.8
90	.988	.966	91.0	.19	206.	206.	-4.	11.9
MR	.989	.956	90.8	.22	247.	247.	-4.	

132°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.986	.961	89.2	.19	212.	212.	3.	26.7
30	.987	.952	88.6	.23	253.	253.	6.	24.5
50	.990	.949	88.6	.24	271.	271.	7.	20.9
70	.989	.954	88.6	.23	256.	256.	6.	17.1
90	.988	.963	88.7	.19	211.	211.	5.	12.3
MR	.988	.956	88.7	.22	244.	244.	6.	

162°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.990	.961	88.5	.20	227.	227.	6.	26.4
30	.987	.950	88.2	.23	259.	259.	8.	23.1
50	.989	.948	89.0	.25	280.	280.	5.	21.8
70	.989	.951	89.0	.24	263.	263.	5.	17.6
90	.986	.962	89.0	.20	220.	220.	4.	12.8
MR	.989	.954	88.8	.23	252.	252.	6.	

192°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.987	.968	86.5	.21	229.	229.	18.	29.3
30	.989	.960	86.0	.24	268.	267.	19.	26.1
50	.987	.947	86.6	.25	279.	273.	17.	21.2
70	.989	.950	86.8	.24	266.	266.	16.	17.9
90	.986	.959	87.3	.20	217.	217.	10.	12.7
MR	.988	.952	86.6	.23	253.	253.	16.	

222°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.985	.955	81.9	.21	236.	234.	33.	30.8
30	.988	.946	81.2	.25	275.	272.	42.	27.6
50	.989	.944	85.0	.26	288.	287.	25.	22.5
70	.990	.946	85.4	.26	284.	283.	23.	19.2
90	.989	.957	86.0	.22	242.	241.	17.	14.2
MR	.989	.949	84.3	.24	268.	267.	27.	

252°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.981	.950	78.1	.22	240.	235.	49.	32.0
30	.972	.943	80.5	.21	234.	231.	39.	23.9
50	.973	.939	82.3	.23	257.	250.	34.	20.2
70	.980	.941	82.3	.24	268.	265.	36.	18.4
90	.987	.952	82.3	.23	253.	251.	34.	18.0
MR	.980	.946	81.5	.23	252.	249.	37.	

282°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.968	.943	85.4	.15	165.	164.	13.	21.7
30	.952	.937	87.4	.16	176.	176.	8.	17.6
50	.954	.935	87.8	.17	190.	190.	7.	15.0
70	.954	.936	87.7	.16	183.	182.	7.	12.4
90	.964	.942	87.5	.13	150.	150.	7.	8.8
MR	.954	.938	87.4	.16	174.	173.	8.	

312°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.967	.944	101.1	.19	206.	202.	-40.	23.8
30	.959	.939	100.4	.17	191.	188.	-34.	17.5
50	.954	.939	99.7	.18	170.	168.	-29.	12.7
70	.953	.941	99.6	.13	150.	148.	-25.	9.7
90	.959	.945	103.9	.14	157.	152.	-38.	8.6
MR	.958	.942	101.1	.16	173.	170.	-33.	

342°

% span	P_6/P_o	p_6/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	.985	.961	102.2	.22	250.	244.	-53.	27.1
30	.988	.943	98.9	.25	278.	275.	-40.	24.4
50	.988	.942	97.9	.26	291.	288.	-40.	20.8
70	.988	.949	97.7	.24	269.	266.	-36.	17.0
90	.986	.961	98.4	.20	220.	217.	-32.	12.2
MR	.987	.949	98.6	.24	263.	260.	-39.	

TABLE XXIII(a) — VELOCITY VECTOR PARAMETERS AT FAN EXIT (Circumferentially Distorted Inlet Flow)

Ref. Code 10-70-21
$W\sqrt{\theta}/\delta$ = 124.2 lbm/sec
P_{16}/P_6 = 1.526
P_o = 2009 lbf/ft^2
T_o = 515.4°R

% span	P16/Po	p16/Po	90-β°	M	V	Vm	Vθ	90-β'
				43°				
10	1.074	.970	94.1	.38	466.	465.	-33.	34.8
30	1.625	.910	92.7	.95	1068.	1067.	-50.	54.9
50	1.539	.926	90.9	.88	993.	992.	-16.	52.1
70	1.490	.987	95.0	.79	894.	891.	-78.	45.0
90	1.501	.980	91.8	.80	912.	912.	-24.	45.6
MR	1.501	.823	92.7	.97	1075.	1074.	-51.	
				133°				
10	1.084	.979	93.6	.38	464.	463.	-28.	34.6
30	1.619	.876	90.6	.98	1088.	1088.	-11.	56.8
50	1.530	.913	90.1	.89	994.	994.	-2.	52.6
70	1.478	1.001	95.3	.77	866.	861.	-80.	43.9
90	1.487	.980	91.4	.80	897.	897.	-22.	45.1
MR	1.491	.808	92.1	.98	1078.	1077.	-39.	
				226°				
10	1.195	1.035	94.1	.46	553.	552.	-40.	39.2
30	1.637	1.035	94.4	.84	957.	954.	-73.	51.2
50	1.512	1.042	94.7	.75	859.	857.	-70.	46.2
70	1.438	1.055	95.7	.68	781.	777.	-77.	41.3
90	1.454	1.064	91.6	.68	790.	790.	-21.	41.6
MR	1.486	1.048	94.0	.72	834.	832.	-58.	
				316°				
10	1.210	1.047	90.9	.48	551.	551.	-9.	40.8
30	1.612	1.050	92.9	.81	922.	921.	-47.	51.3
50	1.542	1.058	93.1	.78	860.	859.	-47.	47.1
70	1.499	1.061	93.9	.72	818.	816.	-56.	43.4
90	1.492	1.069	90.8	.71	810.	810.	-7.	42.8
MR	1.508	1.038	92.4	.73	836.	835.	-35.	

Ref. Code 10-70-22
$W\sqrt{\theta}/\delta$ = 110.5 lbm/sec
P_{16}/P_6 = 1.713
P_o = 2021 lbf/ft^2
T_o = 516.2°R

P16/Po	p16/Po	90-β°	M	V	Vm	Vθ	90-β'
			43°				
1.816	1.435	88.0	.59	703.	702.	24.	48.6
1.729	1.426	90.7	.53	632.	632.	-8.	41.7
1.617	1.430	91.6	.42	506.	506.	-14.	33.2
1.622	1.426	90.9	.43	520.	580.	-8.	32.3
1.630	1.428	88.2	.44	530.	530.	17.	31.8
1.687	1.429	89.8	.49	590.	590.	2.	
			133°				
1.810	1.433	88.0	.59	698.	698.	24.	48.3
1.722	1.426	90.7	.53	624.	624.	-8.	41.3
1.619	1.432	91.6	.42	504.	504.	-14.	33.1
1.626	1.430	91.3	.43	517.	517.	-11.	32.0
1.637	1.429	88.1	.45	534.	534.	18.	32.0
1.686	1.430	89.8	.49	586.	586.	2.	
			226°				
1.794	1.461	88.8	.58	689.	689.	14.	46.7
1.704	1.446	92.0	.49	587.	586.	-21.	39.4
1.623	1.446	93.3	.41	493.	492.	-29.	32.8
1.619	1.443	93.3	.41	492.	491.	-29.	30.3
1.643	1.443	88.8	.43	528.	528.	11.	31.6
1.673	1.447	91.2	.46	553.	553.	-18.	
			316°				
1.728	1.453	88.3	.50	606.	606.	18.	44.4
1.668	1.453	92.2	.45	536.	536.	-21.	36.9
1.622	1.453	93.0	.40	479.	479.	-25.	31.6
1.638	1.451	93.0	.42	501.	501.	-27.	30.9
1.661	1.450	88.8	.45	537.	537.	11.	32.0
1.661	1.452	91.1	.44	531.	531.	-10.	

Ref. Code 10-10-1
$W\sqrt{\theta}/\delta$ = 182.4 lbm/sec
P_{16}/P_o = 2.352
P_o = 1445 lbf/ft^2
T_o = 514.5°R

P16/Po	p16/Po	90-β°	M	V	Vm	Vθ	90-β'
			43°				
2.127	1.224	94.3	.92	1142.	1139.	-86.	48.6
2.612	1.195	91.7	1.09	1291.	1290.	-38.	51.2
2.214	1.136	91.5	1.02	1218.	1218.	-32.	47.6
2.188	1.164	92.9	.99	1180.	1178.	-60.	44.0
2.266	1.158	89.9	1.03	1223.	1223.	2.	44.6
2.270	1.174	91.9	1.02	1217.	1217.	-41.	
			133°				
2.181	1.288	99.2	.90	1116.	1101.	-178.	45.2
2.518	1.388	100.0	.96	1160.	1142.	-201.	43.7
2.254	1.337	100.7	.90	1080.	1061.	-201.	35.4
2.178	1.342	100.3	.86	1033.	1016.	-188.	37.2
2.268	1.225	93.0	.95	1163.	1161.	-61.	41.3
2.285	1.315	98.4	.93	1114.	1102.	-168.	
			226°				
1.940	1.350	96.6	.74	940.	934.	-108.	42.7
2.445	1.402	95.6	.93	1134.	1115.	-180.	43.5
2.254	1.423	100.8	.84	1032.	1014.	-193.	38.7
2.150	1.419	98.9	.79	972.	961.	-181.	36.4
2.138	1.240	90.6	.85	1039.	1039.	-11.	39.8
2.214	1.289	97.1	.84	1038.	1030.	-129.	
			316°				
1.754	1.432	90.6	.55	710.	710.	-8.	38.0
2.309	1.370	89.6	.90	1094.	1094.	8.	48.3
2.059	1.402	91.8	.78	937.	937.	-28.	40.7
2.064	1.481	96.3	.71	865.	860.	-94.	34.7
2.011	1.462	91.0	.69	862.	862.	-15.	34.7
2.079	1.429	91.3	.75	930.	930.	-31.	

TABLE XXIII(b) — VELOCITY VECTOR PARAMETERS AT FAN EXIT
(Circumferentially Distorted Inlet Flow)

Ref. Code 10-10-2
$W\sqrt{\theta}/\delta$ = 177.4 lbm/sec
P_{16}/P_6 = 2.847
P_0 = 1501 lbf/ft^2
T_0 = 504.0°R

16°

% span	P_{16}/P_0	p_{16}/P_0	90- β°	M	V	V_m	V_θ	90- β'
10	2.740	2.277	89.2	.62	794.	794.	11.	42.0
30	2.717	2.244	90.9	.53	688.	688.	-10.	34.8
50	2.542	2.238	93.6	.43	564.	563.	-36.	27.2
70	2.595	2.226	91.3	.47	622.	622.	-14.	28.3
90	2.667	2.230	87.9	.51	677.	677.	24.	29.4
HR	2.688	2.241	90.4	.52	675.	675.	-6.	

43°

% span	P_{16}/P_0	p_{16}/P_0	90- β°	M	V	V_m	V_θ	90- β'
10	2.915	2.208	88.6	.64	833.	833.	21.	43.1
30	2.786	2.208	89.9	.59	756.	758.	1.	37.5
50	2.543	2.208	91.2	.46	596.	596.	-13.	28.8
70	2.578	2.195	89.3	.49	639.	639.	8.	29.2
90	2.616	2.193	88.7	.51	668.	668.	15.	28.5
HR	2.696	2.202	89.6	.55	713.	713.	7.	

76°

% span	P_{16}/P_0	p_{16}/P_0	90- β°	M	V	V_m	V_θ	90- β'
10	2.947	2.288	89.0	.61	800.	800.	14.	42.2
30	2.766	2.286	90.2	.55	710.	710.	-3.	35.9
50	2.561	2.244	93.4	.44	578.	571.	-34.	27.8
70	2.603	2.240	91.7	.47	613.	613.	-18.	27.8
90	2.689	2.243	87.6	.52	675.	675.	28.	29.4
HR	2.710	2.282	90.2	.52	679.	679.	-2.	

103°

% span	P_{16}/P_0	p_{16}/P_0	90- β°	M	V	V_m	V_θ	90- β'
10	2.690	2.211	88.6	.63	813.	813.	20.	42.5
30	2.614	2.211	89.3	.60	764.	764.	9.	37.3
50	2.541	2.208	91.5	.45	586.	585.	-15.	28.4
70	2.593	2.195	89.5	.49	640.	640.	6.	29.2
90	2.628	2.194	88.3	.52	669.	669.	20.	29.0
HR	2.701	2.204	89.3	.55	704.	704.	8.	

136°

% span	P_{16}/P_0	p_{16}/P_0	90- β°	M	V	V_m	V_θ	90- β'
10	2.916	2.275	88.5	.61	784.	784.	21.	41.8
30	2.764	2.251	90.5	.55	706.	706.	-6.	35.6
50	2.554	2.237	93.7	.44	569.	568.	-37.	27.3
70	2.598	2.230	91.5	.47	612.	611.	-16.	27.8
90	2.678	2.234	87.6	.52	674.	673.	28.	29.3
HR	2.698	2.244	90.2	.52	674.	674.	-2.	

163°

% span	P_{16}/P_0	p_{16}/P_0	90- β°	M	V	V_m	V_θ	90- β'
10	2.868	2.201	88.5	.63	802.	801.	22.	42.1
30	2.818	2.200	89.5	.61	769.	769.	7.	38.1
50	2.523	2.197	91.8	.45	581.	580.	-18.	28.1
70	2.584	2.187	89.5	.49	638.	638.	6.	29.2
90	2.629	2.186	88.2	.52	674.	673.	21.	29.2
HR	2.692	2.194	89.4	.55	705.	705.	8.	

193°

% span	P_{16}/P_0	p_{16}/P_0	90- β°	M	V	V_m	V_θ	90- β'
10	2.845	2.213	88.4	.61	787.	787.	23.	41.6
30	2.829	2.213	89.2	.60	772.	772.	11.	38.3
50	2.536	2.212	91.7	.45	585.	585.	-17.	28.3
70	2.583	2.199	89.3	.49	637.	637.	8.	29.2
90	2.626	2.198	88.2	.51	671.	671.	21.	29.1
HR	2.692	2.207	89.2	.54	708.	703.	10.	

226°

% span	P_{16}/P_0	p_{16}/P_0	90- β°	M	V	V_m	V_θ	90- β'
10	2.884	2.259	88.6	.59	768.	768.	18.	41.2
30	2.733	2.241	90.3	.54	703.	703.	-4.	35.6
50	2.531	2.227	93.3	.43	566.	565.	-33.	27.3
70	2.576	2.227	91.7	.46	607.	607.	-18.	27.6
90	2.652	2.225	87.6	.51	673.	672.	28.	29.3
HR	2.667	2.235	90.1	.51	669.	669.	-2.	

253°

% span	P_{16}/P_0	p_{16}/P_0	90- β°	M	V	V_m	V_θ	90- β'
10	2.744	2.230	87.5	.55	724.	723.	31.	39.4
30	2.696	2.234	87.6	.53	681.	681.	28.	35.3
50	2.507	2.242	90.6	.40	526.	526.	-6.	26.1
70	2.531	2.236	89.1	.43	555.	554.	9.	25.9
90	2.560	2.230	87.5	.45	587.	586.	26.	26.0
HR	2.612	2.234	88.3	.48	624.	623.	18.	

286°

% span	P_{16}/P_0	p_{16}/P_0	90- β°	M	V	V_m	V_θ	90- β'
10	2.334	2.260	89.8	.21	286.	286.	1.	17.8
30	2.452	2.248	88.8	.36	464.	464.	10.	25.6
52	2.557	2.252	93.0	.43	588.	588.	-30.	27.1
70	2.593	2.252	91.0	.45	589.	589.	-11.	27.1
90	2.630	2.247	89.3	.48	630.	630.	8.	27.4
HR	2.554	2.280	90.4	.43	561.	561.	-4.	

313°

% span	P_{16}/P_0	p_{16}/P_0	90- β°	M	V	V_m	V_θ	90- β'
10	2.285	2.267	93.2	.11	142.	142.	-8.	8.8
30	2.363	2.235	88.0	.28	371.	371.	13.	20.8
50	2.580	2.225	87.7	.47	601.	601.	24.	29.9
70	2.651	2.205	89.5	.52	670.	670.	6.	30.4
90	2.721	2.213	91.3	.55	713.	713.	-16.	29.8
HR	2.599	2.195	89.6	.50	644.	644.	4.	

346°

% span	P_{16}/P_0	p_{16}/P_0	90- β°	M	V	V_m	V_θ	90- β'
10	2.565	2.228	89.2	.46	592.	592.	8.	33.7
30	2.566	2.234	91.6	.44	572.	572.	-16.	29.9
50	2.494	2.234	93.0	.40	518.	517.	-27.	26.5
70	2.632	2.224	91.9	.50	641.	641.	-21.	28.9
90	2.682	2.229	89.7	.52	680.	680.	4.	29.1
HR	2.600	2.230	91.0	.47	615.	615.	-11.	

TABLE XXIII(c) — VELOCITY VECTOR PARAMETERS AT FAN EXIT (Circumferentially Distorted Inlet Flow)

Ref. Code 10-10-22
$W\sqrt{\theta}/\delta$ = 180.6 lbm/sec
P_{16}/P_6 = 2.819
P_0 = 1491 lbf/ft^2
T_0 = 500.8°R

16°

% Span	P_{16}/P_0	p_{16}/P_0	90-β°	M	V	V_m	V_θ	90-β'
10	2.965	2.208	87.8	.66	848.	848.	32.	44.8
30	2.713	2.192	91.7	.56	721.	721.	-21.	35.8
50	2.493	2.173	94.0	.45	583.	582.	-41.	27.8
70	2.548	2.166	92.2	.49	636.	636.	-24.	28.6
90	2.619	2.174	87.7	.52	688.	687.	28.	29.9
MR	2.664	2.182	90.6	.54	703.	703.	-6.	

43°

% Span	P_{16}/P_0	p_{16}/P_0	90-β°	M	V	V_m	V_θ	90-β'
10	2.918	2.184	88.8	.67	869.	869.	18.	44.3
30	2.819	2.146	90.0	.64	817.	817.	0.	39.6
50	2.492	2.148	92.4	.47	612.	611.	-26.	29.2
70	2.583	2.136	89.6	.51	670.	670.	5.	30.4
90	2.618	2.138	87.6	.55	721.	720.	30.	31.1
MR	2.692	2.144	89.5	.58	755.	755.	7.	

76°

% Span	P_{16}/P_0	p_{16}/P_0	90-β°	M	V	V_m	V_θ	90-β'
10	2.907	2.206	87.1	.64	831.	830.	43.	44.4
30	2.744	2.193	89.8	.58	742.	742.	3.	37.4
50	2.502	2.181	94.0	.45	580.	579.	-41.	27.8
70	2.589	2.172	92.0	.49	632.	632.	-22.	28.6
90	2.622	2.180	87.8	.52	681.	681.	27.	29.7
MR	2.663	2.186	90.0	.54	699.	699.	0.	

103°

% Span	P_{16}/P_0	p_{16}/P_0	90-β°	M	V	V_m	V_θ	90-β'
10	2.882	2.154	88.4	.65	838.	837.	24.	43.4
30	2.809	2.144	89.8	.63	806.	806.	3.	39.4
50	2.486	2.141	92.1	.47	602.	602.	-22.	29.0
70	2.548	2.132	89.7	.51	659.	659.	3.	30.0
90	2.608	2.134	87.6	.54	703.	702.	29.	30.6
MR	2.672	2.141	89.4	.57	735.	735.	8.	

136°

% Span	P_{16}/P_0	p_{16}/P_0	90-β°	M	V	V_m	V_θ	90-β'
10	2.880	2.197	87.2	.62	806.	805.	39.	43.3
30	2.743	2.187	90.5	.58	738.	738.	-6.	37.0
50	2.486	2.166	93.9	.45	578.	577.	-40.	27.7
70	2.547	2.162	91.8	.49	629.	629.	-20.	28.5
90	2.604	2.169	87.8	.52	675.	674.	26.	29.4
MR	2.644	2.178	90.2	.54	690.	690.	-2.	

163°

% Span	P_{16}/P_0	p_{16}/P_0	90-β°	M	V	V_m	V_θ	90-β'
10	2.842	2.151	88.2	.64	824.	823.	26.	43.1
30	2.812	2.147	89.8	.63	801.	801.	3.	39.2
50	2.475	2.142	93.6	.46	591.	591.	-37.	28.3
70	2.536	2.129	89.6	.51	650.	650.	5.	29.6
90	2.598	2.135	87.4	.54	691.	690.	31.	30.0
MR	2.662	2.141	89.3	.57	726.	726.	8.	

193°

% Span	P_{16}/P_0	p_{16}/P_0	90-β°	M	V	V_m	V_θ	90-β'
10	2.813	2.180	88.2	.63	812.	811.	26.	42.4
30	2.807	2.134	89.1	.64	814.	813.	13.	39.8
50	2.470	2.141	92.4	.46	594.	593.	-25.	28.5
70	2.526	2.129	89.6	.50	652.	652.	8.	29.7
90	2.580	2.133	87.8	.53	690.	690.	26.	29.8
MR	2.650	2.137	89.2	.56	728.	728.	10.	

226°

% Span	P_{16}/P_0	p_{16}/P_0	90-β°	M	V	V_m	V_θ	90-β'
10	2.844	2.214	88.6	.61	793.	793.	20.	42.2
30	2.712	2.192	90.6	.56	726.	726.	-7.	36.4
50	2.482	2.173	93.8	.44	576.	575.	-38.	27.7
70	2.536	2.170	91.8	.48	625.	625.	-20.	28.3
90	2.605	2.175	87.6	.52	682.	681.	28.	29.7
MR	2.693	2.184	90.2	.52	686.	686.	-9.	

253°

% Span	P_{16}/P_0	p_{16}/P_0	90-β°	M	V	V_m	V_θ	90-β'
10	2.740	2.163	87.9	.59	770.	769.	28.	41.2
30	2.705	2.169	87.9	.57	738.	735.	27.	37.5
50	2.434	2.169	91.2	.41	532.	532.	-11.	26.3
70	2.474	2.163	89.5	.44	574.	574.	5.	26.8
90	2.510	2.157	87.7	.47	613.	612.	24.	27.0
MR	2.582	2.164	88.7	.51	660.	660.	15.	

286°

% Span	P_{16}/P_0	p_{16}/P_0	90-β°	M	V	V_m	V_θ	90-β'
10	2.338	2.184	88.9	.31	418.	418.	8.	25.4
30	2.464	2.200	88.7	.41	529.	529.	12.	25.8
52	2.500	2.203	93.3	.43	555.	554.	-32.	27.0
70	2.527	2.200	90.7	.45	582.	582.	-7.	27.0
90	2.560	2.195	88.9	.47	621.	621.	12.	27.3
MR	2.601	2.198	90.2	.43	566.	566.	-2.	

313°

% Span	P_{16}/P_0	p_{16}/P_0	90-β°	M	V	V_m	V_θ	90-β'
10	2.261	2.193	88.6	.21	279.	279.	7.	17.2
30	2.475	2.169	86.4	.44	566.	564.	36.	30.7
50	2.523	2.184	89.7	.48	618.	618.	4.	30.2
70	2.531	2.149	89.3	.49	629.	629.	8.	28.9
90	2.583	2.151	90.9	.52	668.	668.	-11.	28.4
MR	2.514	2.135	89.2	.49	680.	630.	9.	

346°

% Span	P_{16}/P_0	p_{16}/P_0	90-β°	M	V	V_m	V_θ	90-β'
10	2.812	2.205	88.7	.60	774.	773.	18.	41.4
30	2.628	2.187	91.1	.52	666.	666.	-13.	33.9
50	2.515	2.183	92.3	.45	585.	584.	-24.	28.4
70	2.578	2.171	92.3	.50	644.	644.	-26.	28.9
90	2.663	2.186	88.6	.54	698.	698.	17.	30.1
MR	2.635	2.185	90.5	.52	676.	676.	-6.	

TABLE XXIII(d) — VELOCITY VECTOR PARAMETERS AT FAN EXIT (Circumferentially Distorted Inlet Flow)

Ref. Code 10-70-23
$W\sqrt{\theta}/\delta$ = 96.0 lbm/sec
P_{16}/P_o = 1.735
P_o = 2041 lbf/ft^2
T_o = 514.3°R

16°

% span	P_{16}/P_o	p_{16}/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	1.838	1.539	88.1	.51	612.	612.	20.	44.9
30	1.732	1.537	90.9	.42	503.	503.	-8.	38.6
50	1.647	1.522	92.1	.32	393.	392.	-14.	27.1
70	1.634	1.529	91.6	.31	381.	381.	-11.	26.9
90	1.635	1.529	90.4	.31	380.	380.	-3.	24.0
MR	1.698	1.523	90.6	.38	469.	469.	-5.	

43°

% span	P_{16}/P_o	p_{16}/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	1.823	1.519	87.6	.52	622.	621.	26.	45.1
30	1.741	1.526	89.8	.44	528.	528.	2.	37.1
50	1.672	1.527	89.9	.36	440.	440.	1.	30.2
70	1.666	1.525	89.4	.36	438.	438.	4.	28.4
90	1.649	1.524	90.2	.34	414.	414.	-1.	25.4
MR	1.715	1.524	89.3	.41	503.	503.	6.	

76°

% span	P_{16}/P_o	p_{16}/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	1.843	1.546	88.0	.51	612.	612.	21.	44.9
30	1.723	1.539	91.3	.41	490.	490.	-12.	34.9
50	1.644	1.532	92.6	.32	389.	389.	-18.	26.9
70	1.642	1.530	91.6	.32	393.	393.	-12.	25.6
90	1.647	1.532	90.4	.32	404.	404.	-3.	24.9
MR	1.700	1.536	90.8	.38	469.	469.	-7.	

103°

% span	P_{16}/P_o	p_{16}/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	1.821	1.519	87.8	.52	621.	620.	24.	45.0
30	1.750	1.523	89.9	.45	542.	542.	1.	37.8
50	1.676	1.527	90.3	.37	446.	446.	-3.	30.4
70	1.667	1.525	89.9	.36	440.	440.	1.	28.4
90	1.651	1.523	90.0	.34	423.	423.	0.	25.9
MR	1.718	1.523	89.5	.42	508.	508.	4.	

136°

% span	P_{16}/P_o	p_{16}/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	1.816	1.537	88.1	.49	594.	594.	20.	44.1
30	1.719	1.536	91.4	.40	484.	484.	-12.	34.8
50	1.648	1.532	92.7	.32	390.	390.	-18.	26.9
70	1.652	1.531	92.0	.33	405.	404.	-14.	26.2
90	1.662	1.532	90.4	.34	427.	427.	-4.	26.1
MR	1.697	1.534	91.0	.38	467.	467.	-8.	

163°

% span	P_{16}/P_o	p_{16}/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	1.816	1.520	87.8	.51	613.	612.	23.	44.6
30	1.755	1.525	89.8	.45	543.	543.	2.	37.8
50	1.680	1.526	90.3	.37	451.	451.	-4.	30.6
70	1.664	1.526	90.5	.35	433.	433.	-4.	27.9
90	1.663	1.525	90.1	.35	436.	436.	-1.	26.8
MR	1.719	1.524	89.7	.42	507.	507.	3.	

193°

% span	P_{16}/P_o	p_{16}/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	1.811	1.521	87.8	.51	607.	606.	23.	44.9
30	1.754	1.526	89.7	.45	542.	542.	3.	37.8
50	1.680	1.527	90.9	.37	450.	450.	-7.	30.5
70	1.660	1.526	91.0	.35	429.	429.	-7.	27.8
90	1.666	1.525	89.3	.36	441.	441.	5.	27.0
MR	1.718	1.525	89.7	.42	505.	505.	3.	

226°

% span	P_{16}/P_o	p_{16}/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	1.790	1.537	88.3	.47	569.	569.	17.	42.7
30	1.715	1.536	91.3	.40	483.	483.	-11.	34.5
50	1.641	1.529	92.9	.32	389.	389.	-20.	26.8
70	1.657	1.529	91.9	.34	418.	418.	-14.	26.9
90	1.680	1.535	90.2	.36	450.	450.	-1.	27.4
MR	1.695	1.534	90.9	.38	466.	466.	-7.	

253°

% span	P_{16}/P_o	p_{16}/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	1.776	1.533	87.5	.46	560.	559.	24.	42.0
30	1.714	1.532	89.3	.40	488.	488.	6.	35.1
50	1.668	1.528	90.4	.36	432.	432.	-3.	29.8
70	1.654	1.527	90.4	.34	416.	416.	-3.	27.0
90	1.659	1.526	89.8	.34	426.	426.	2.	26.1
MR	1.656	1.530	88.4	.39	471.	471.	5.	

286°

% span	P_{16}/P_o	p_{16}/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	1.690	1.538	88.8	.37	450.	450.	10.	35.8
30	1.691	1.539	90.0	.37	448.	448.	0.	33.0
52	1.638	1.531	92.6	.31	374.	374.	-17.	24.0
70	1.644	1.533	91.7	.32	390.	390.	-12.	25.4
90	1.653	1.534	89.9	.33	411.	411.	1.	25.4
MR	1.662	1.535	90.6	.34	416.	416.	-4.	

313°

% span	P_{16}/P_o	p_{16}/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	1.687	1.531	87.3	.38	456.	456.	22.	36.3
30	1.666	1.532	89.7	.35	422.	422.	2.	31.2
50	1.672	1.532	89.7	.36	432.	432.	2.	29.8
70	1.673	1.527	89.7	.36	443.	443.	2.	28.7
90	1.666	1.528	90.4	.35	436.	436.	-3.	26.6
MR	1.672	1.530	89.4	.36	438.	438.	4.	

346°

% span	P_{16}/P_o	p_{16}/P_o	90- β°	M	V	V_m	V_θ	90- β'
10	1.720	1.536	87.6	.41	491.	491.	20.	36.6
30	1.701	1.538	91.1	.38	462.	461.	-9.	33.3
50	1.636	1.530	93.4	.31	376.	376.	-22.	25.9
70	1.640	1.531	91.9	.32	386.	386.	-13.	25.1
90	1.662	1.534	90.0	.34	429.	427.	0.	26.0
MR	1.671	1.534	90.8	.35	430.	430.	-6.	

TABLE XXIV(a) — CIRCUMFERENTIAL DISTRIBUTIONS OF TOTAL PRESSURE RATIO AND TOTAL TEMPERATURE RATIO AT 2ND-STAGE STATOR EXIT (Circumferentially Distorted Inlet Flow)

Ref. Code 10-70-21
$W\sqrt{\theta}/\delta$ = 124.2 lbm/sec
P_{16}/P_6 = 1.526

P_o = 2009 lbf/ft^2
T_o = 515.4°R

Pressure Data

% Span	17°	110°	200°	287°
10	1.5914	1.5363	1.5250	1.4602
30	1.6457	1.5973	1.5902	1.5303
50	1.5301	1.4781	1.4654	1.3899
70	1.4368	1.4099	1.3984	1.3357
90	1.4632	1.4347	1.4255	1.3829
MR	1.531	1.490	1.479	1.420

Temperature Data

% Span	60°	147°	237°	330°
10	1.2106	1.2091	1.2009	1.2207
30	1.1887	1.1798	1.1692	1.2044
50	1.1614	1.1603	1.1484	1.1839
70	1.1472	1.1433	1.1340	1.1690
90	1.1622	1.1629	1.1551	1.1838
MR	1.1729	1.1699	1.1604	1.1916

Ref. Code 10-70-22
$W\sqrt{\theta}/\delta$ = 110.5 lbm/sec
P_{16}/P_6 = 1.713

P_o = 2021 lbf/ft^2
T_o = 516.2°R

Pressure Data

% Span	17°	110°	200°	287°
10	1.8387	1.8097	1.7889	1.7096
30	1.7153	1.7282	1.7202	1.6604
50	1.6269	1.6283	1.6250	1.5905
70	1.6232	1.6206	1.6160	1.5976
90	1.6249	1.6281	1.6267	1.6140
MR	1.690	1.686	1.678	1.635

Temperature Data

% Span	60°	147°	237°	330°
10	1.2166	1.2169	1.2096	1.2198
30	1.1967	1.1942	1.1880	1.2065
50	1.1878	1.1877	1.1811	1.2047
70	1.1845	1.1898	1.1850	1.2094
90	1.2176	1.2175	1.2128	1.2444
MR	1.2015	1.2018	1.1960	1.2179

Ref. Code 10-10-1
$W\sqrt{\theta}/\delta$ = 182.4 lbm/sec
P_{16}/P_o = 2.352

P_o = 1445 lbf/ft^2
T_o = 514.5°R

Pressure Data

% Span	17°	110°	200°	287°
10	2.4129	2.4610	2.4214	2.1136
30	2.4255	2.3706	2.3797	2.1860
50	2.3044	2.2310	2.2196	1.9210
70	2.1586	2.1252	2.0993	1.8828
90	2.1405	2.0975	2.0771	1.9067
MR	2.282	2.250	2.233	2.001

Temperature Data

% Span	60°	147°	237°	330°
10	1.4452	1.4206	1.4104	1.4409
30	1.3944	1.3744	1.3583	1.4119
50	1.3660	1.3517	1.3361	1.3912
70	1.3320	1.3296	1.3187	1.3777
90	1.3810	1.3740	1.3610	1.4016
MR	1.3816	1.3690	1.3559	1.4039

TABLE XXIV(b) — CIRCUMFERENTIAL DISTRIBUTION OF TOTAL PRESSURE RATIO AND TOTAL TEMPERATURE RATIO AT 2ND-STAGE STATOR EXIT (Circumferentially Distorted Inlet Flow)

Ref. Code 10-70-23
$W\sqrt{\theta}/\delta$ = 96.0 lbm/sec
P_{16}/P_o = 1.735
P_o = 2041 lbf/ft^2
T_o = 514.3°R

Pressure Data

% Span	20°	47°	77°	110°	137°	170°	197°	230°	260°	287°	320°	347°
10	1.8402	1.8361	1.8250	1.8278	1.8188	1.8175	1.8020	1.8090	1.7579	1.7280	1.7720	1.7828
30	1.7282	1.7403	1.7421	1.7332	1.7405	1.7299	1.7379	1.7216	1.6915	1.7089	1.7063	1.7145
50	1.6632	1.6531	1.6559	1.6721	1.6600	1.6744	1.6587	1.6739	1.6485	1.6522	1.6620	1.6482
70	1.6597	1.6490	1.6521	1.6728	1.6543	1.6750	1.6613	1.6750	1.6645	1.6488	1.6728	1.6454
90	1.6589	1.6437	1.6493	1.6661	1.6607	1.6678	1.6657	1.6727	1.6652	1.6552	1.6766	1.6549
MR	1.716	1.713	1.711	1.718	1.712	1.716	1.709	1.713	1.687	1.679	1.699	1.693

Temperature Data

% Span	30°	57°	90°	120°	147°	180°	207°	240°	269°	297°	330°	357°
10	1.2276	1.2258	1.2193	1.2163	1.2182	1.2160	1.2189	1.2123	1.2105	1.2146	1.2229	1.2298
30	1.2139	1.2134	1.2038	1.2023	1.2064	1.2006	1.2063	1.1984	1.2025	1.2151	1.2126	1.2164
50	1.2196	1.2158	1.2107	1.2072	1.2052	1.2058	1.2027	1.2026	1.2028	1.2173	1.2202	1.2191
70	1.2530	1.2421	1.2415	1.2345	1.2257	1.2261	1.2194	1.2194	1.2175	1.2319	1.2448	1.2456
90	1.2973	1.2862	1.2889	1.2812	1.2687	1.2702	1.2618	1.2608	1.2584	1.2649	1.2839	1.2910
MR	1.2430	1.2367	1.2322	1.2280	1.2253	1.2240	1.2224	1.2193	1.2189	1.2297	1.2378	1.2418

TABLE XXIV(c) – CIRCUMFERENTIAL DISTRIBUTION OF TOTAL PRESSURE RATIO AND TOTAL TEMPERATURE RATIO AT 2ND-STAGE STATOR EXIT (Circumferentially Distorted Inlet Flow)

Ref. Code 10-10-2

$W\sqrt{\theta}/\delta$ = 177.4 lbm/sec P_o = 1501 lbf/ft^2

P_{16}/P_6 = 2.847 T_o = 504.0°R

Pressure Data

% Span	20°	47°	77°	110°	137°	170°	197°	230°	260°	287°	320°	347°
10	2.9446	2.9045	2.9430	2.9190	2.9304	2.9009	2.8910	2.8521	2.6888	2.5220	2.5946	2.7918
30	2.7488	2.7625	2.7891	2.7783	2.8116	2.7778	2.7896	2.7452	2.6201	2.5979	2.6657	2.6871
50	2.5723	2.5574	2.5564	2.5464	2.5718	2.5480	2.5598	2.5270	2.4965	2.5437	2.6371	2.5316
70	2.5986	2.5783	2.5876	2.5746	2.6003	2.5735	2.5833	2.5501	2.5156	2.5528	2.6509	2.6464
90	2.6332	2.6221	2.6221	2.5950	2.6317	2.5958	2.6160	2.5772	2.5578	2.5990	2.7021	2.6866
MR	2.705	2.691	2.707	2.690	2.717	2.686	2.694	2.657	2.577	2.567	2.656	2.674

Temperature Data

% Span	30°	57°	90°	120°	147°	180°	207°	240°	267°	297°	330°	357°
10	1.4471	1.4413	1.4316	1.4341	1.4327	1.4290	1.4297	1.4249	1.4093	1.4344	1.4857	1.4877
30	1.4143	1.4083	1.3992	1.3948	1.3993	1.3921	1.3949	1.3848	1.3795	1.4296	1.4677	1.4500
50	1.4090	1.4038	1.3962	1.3938	1.3915	1.3925	1.3921	1.3882	1.3895	1.4640	1.4685	1.4329
70	1.4199		1.4027	1.4035	1.4039	1.4007	1.4048	1.4010	1.4050	1.4930	1.5114	1.4264
90	1.4661		1.4450	1.4386	1.4340	1.4446	1.4368	1.4404	1.4365	1.5173	1.5341	1.4572
MR	1.4334	1.4230	1.4163	1.4142	1.4135	1.4129	1.4123	1.4089	1.4046	1.4692	1.4965	1.4490

Ref. Code 10-10-22

$W\sqrt{\theta}/\delta$ = 180.6 lbm/sec P_o = 1491 lbf/ft^2

P_{16}/P_6 = 2.819 T_o = 500.8°R

Pressure Data

% Span	20°	47°	77°	110°	137°	170°	197°	230°	260°	287°	320°	347°
10	2.9754	2.9449	2.9246	2.9157	2.9070	2.8862	2.8661	2.8527	2.6903	2.5212	2.5511	2.8522
30	2.7870	2.7803	2.7803	2.7836	2.7893	2.7649	2.7582	2.7334	2.5843	2.5728	2.6311	2.6744
50	2.5234	2.5208	2.5159	2.5074	2.5201	2.4994	2.5034	2.4854	2.4261	2.4843	2.5435	2.5378
70	2.5467	2.5457	2.5416	2.5380	2.5423	2.5260	2.5275	2.5097	2.4404	2.4881	2.5536	2.5892
90	2.5657	2.5807	2.5675	2.5284	2.5689	2.5268	2.5544	2.5202	2.4783	2.5354	2.6100	2.6358
MR	2.690	2.683	2.674	2.664	2.675	2.650	2.649	2.628	2.528	2.521	2.581	2.661

Temperature Data

% Span	30°	57°	90°	120°	147°	180°	207°	240°	267°	297°	330°	357°
10	1.4598	1.4429	1.4423	1.4335	1.4340	1.4314	1.4288	1.4352	1.4083	1.4247	1.4813	1.4813
30	1.4179	1.4042	1.4025	1.3984	1.3967	1.3929	1.3914	1.3655	1.3718	1.4222	1.4601	1.4382
50	1.3988	1.3918	1.3935	1.3848	1.3864	1.3874	1.3854	1.3682	1.3772	1.4440	1.4823	1.4193
70	1.4094	1.3917	1.3890	1.3881	1.3915	1.4009	1.3957	1.3812	1.3884	1.4772	1.4996	1.4032
90	1.4477	1.4302	1.4352	1.4341	1.4264	1.4676	1.4308	1.4486	1.4198	1.4983	1.5447	1.4425
MR	1.4282	1.4134	1.4138	1.4091	1.4079	1.4175	1.4074	1.4072	1.3937	1.4540	1.4961	1.4349

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