N73-14983

NASA TECHNICAL MEMORANDUM

NASA TM X-2658

NASA TM X-2658

CASE FILE COPY

PERFORMANCE OF A SINGLE-STAGE AXIAL-FLOW TRANSONIC COMPRESSOR STAGE WITH A BLADE TIP SOLIDITY OF 1.7

by Royce D. Moore and Lonnie Reid

Lewis Research Center

Cleveland, Ohio 44135

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION • WASHINGTON, D. C. • DECEMBER 1972

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA TM X-2658		

4. Title and Subtitle	5. Report Date
PERFORMANCE OF A SINGLE-STAGE AXIAL-FLOW TRANSONIC COMPRESSOR STAGE WITH A BLADE TIP SOLIDITY OF 1.7	December 1972
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
Royce D. Moore and Lonnie Reid	E-6730
	10. Work Unit No.
9. Performing Organization Name and Address Lewis Research Center National Aeronautics and Space Administration Cleveland, Ohio 44135	501-24
	11. Contract or Grant No.
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, D.C. 20546	Technical Memorandum
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

The overall and blade-element performance of a transonic compressor stage is presented over the stable operating range at rotative speeds from 50 to 100 percent of design speed. Stage peak efficiency of 0.784 was obtained at a weight flow of 28.6 kilograms per second (194.9 kg/sec/m^2 of annulus area) and a pressure ratio of 1.706. Stall margin at design speed was 11.4 percent. The peak efficiency being significantly less than design efficiency was attributed to (1) the stator loss and the radial gradient of losses being much higher than design, (2) the losses and blockages associated with the rotor part-span dampers not being incorporated into the design, and (3) the mismatch of the rotor and stator blade elements.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Compressor Solidity Transonic compressor	Unclassified - unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	112	$3.00

* For sale by the National Technical Information Service, Springfield, Virginia 22151

CONTENTS

PERFORMANCE OF A SINGLE-STAGE AXIAL-FLOW TRANSONIC COMPRESSOR STAGE WITH A BLADE TIP SOLIDITY OF 1.7

by Royce D. Moore and Lonnie Reid

Lewis Research Center

SUMMARY

The overall and blade-element performance of a transonic compressor stage is presented. This stage has a blade tip solidity of 1.7 for both rotor and stator. Detailed radial and circumferential (behind stators) surveys of the flow conditions were made over the stable operating range at rotative speeds from 50 to 100 percent of design speed. Stage peak efficiency of 0.784 was obtained at a pressure ratio of 1.706 and a weight flow of 28.6 kilograms per second (194.9 kg/sec/m^2 of annulus area). This compares to design weight flow of 29.5 kilograms per second, efficiency of 0.843, and pressure ratio of 1.750. The rotor peak efficiency of 0.838 was also less than the design efficiency of 0.890. At peak efficiency the losses were greater than the design values over the entire blade span for both rotor and stator. Stall margin at design speed was 11.4 percent for the stage, based on weight flow and total pressure ratio at peak efficiency and stall.

The peak efficiency being significantly less than design efficiency was attributed to (1) the stator losses and the radial gradient of losses being much higher than design, (2) the losses and blockages associated with the rotor part-span dampers not being incorporated into the design, and (3) the mismatch of the rotor and stator blade elements.

INTRODUCTION

A research program on axial-flow fans and compressors for advanced airbreathing engines is currently being conducted at the NASA Lewis Research Center. This program is primarily directed towards providing technology to permit reducing the size and weight of fans and compressors while maintaining high levels of performance. In support of this program, experimental studies are being conducted on the effect on efficiency and stall margin of blade solidity, blade aspect ratio, blade loading, area margin above choke, different blade shapes, weight flow per unit annular area, velocity ratio, and blade spacing (refs. 1 to 6).

In one series of tests, the results showed that the efficiency and pressure ratio were higher for a rotor with a blade tip solidity of 1.5 than for a rotor with a solidity of 1.1 (ref. 6). To increase the blade tip solidity the subsonic (rearward) portion of the blade was lengthened. Since the number of blades was the same for both rotors, other parameters such as blade aspect ratio were also affected.

Another series of tests is being conducted involving the effect of blade solidity on the performance of axial-flow compressor stages. The blade tip solidities of 1.3, 1.5, and 1.7 are being changed by varying the number of blades while maintaining the same velocity diagrams and flow path. These stages were designed such that the tip solidity of both the rotor and stator blades would be the same.

In the present investigation, the axial-flow compressor stage with the tip solidity of 1.7 was tested. This report presents the aerodynamic design parameters, along with the overall and blade-element performance, of the stage. Data were obtained over the stable operating range of the stage for six rotative speeds from 50 to 100 percent of design speed. Blade-element survey data were obtained at 11 radial positions. The stage presented in this report has been designated stage 12-5, with the rotor being rotor 12 and the stator being stator 5. The data presented in this report are in tabular form as well as in machine-plotted form. The symbols and equations are defined in appendixes A and B. The abbreviations and units used for the tabular data are defined in appendix C.

AERODYNAMIC DESIGN

Several computer programs have been developed to aid in the design of compressors and fans. The programs used in the design of this compressor stage were a streamline analysis program, a blade geometry program, and a blade coordinates program. These programs are presented in detail in references 1, 2, and 7; thus, only a brief description of each is presented in this report.

The streamline analysis program (ref. 1) calculates the velocity vector diagrams at several axial locations, including planes approximating the blade leading and trailing edges. This program accounts for both streamline curvatures and entropy gradients. Boundary layer blockage factors are also included. Weight flow, rotor speed, flow path geometry, and radial distributions of total pressure and temperature are the inputs to this program.

The calculated velocity vectors and total pressure and temperature distributions from the streamline analysis program are then used in the blade geometry program (ref. 1). This program calculates the blade geometry which will satisfy the vector diagrams. Losses are calculated within the program. They are based on a calculated shock loss (as related to the particular blade shape) and a profile loss. The losses used for this stage are based on the loss - diffusion-factor correlations that include the data presented in reference 2 for the rotor and in reference 8 for the stator.

After the blade geometry is defined for both the rotor and the stator, the blade coordinate program presented in reference 7 is used to compute the blade elements on conical surfaces approximating the stream surfaces passing through the blade. The program then stacks these blade elements on a radial line about their center of gravity and computes the Cartesian blade coordinates for fabrication.

The overall design parameters for stage 12-5 are listed in table I, and the flow path is shown in figure 1. This stage was designed for an overall pressure ratio of 1.750 and an efficiency of 0.843 at a weight flow of 29.5 kilograms per second (200.6 kg/ sec/m^2 of annulus area). The design tip speed was 422.9 meters per second. This stage was designed for a tip solidity of 1.7 (both rotor and stator). This resulted in 56 rotor blades with an aspect ratio of 2.4 and 62 stator blades with an aspect ratio 2.0.

The blade-element design parameters for rotor 12 are presented in table II. This rotor was designed for a radially constant total pressure ratio of 1.8. The stator blade-element design parameters are given in table III. The blade geometry is presented in table IV for rotor 12 and in table V for stator 5. Both the rotor and stator used multiple-circular-arc blade shapes.

APPARATUS AND PROCEDURE

Compressor Test Facility

The compressor test facility is the same as that described in reference 1. A schematic view of the facility is shown in figure 2. The drive system consists of an electric motor with a variable-frequency speed control. The drive motor is coupled to a 5.521:1 ratio speed-increaser gearbox that drives the test rotor. Atmospheric air enters from a line on the roof of the building and flows through the orifice and into the plenum chamber just upstream of the test rotor. The air then passes through the compressor stage and the collector valve and exhausts to the atmosphere.

Test Stage

Rotor 12 is shown in figure 3. The rotor, which has 56 blades, has a tip diameter of 50.8 centimeters. Each blade is made with a vibration damper located at about 48 percent of span from the tip. The stator blades (stator 5) are shown mounted in the outer casing in figure 4. The 62 blades were supported on the outer surface only.

Instrumentation

The compressor weight flow was determined from measurements on a calibrated thin-plate orifice that was 38.9 centimeters in diameter. The orifice temperature was determined from an average of two Chromel-Alumel thermocouples. Orifices pressures were measured by calibrated transducers.

Radial surveys of the flow were made at three axial locations: upstream of the rotor, between the rotor and the stator, and downstream of the stator (see fig. 1). Two combination probes (fig. 5(a)) and two 8° wedge probes (fig. 5(b)) were used at each axial measuring station. The probes were located approximately 90° apart, with the two like probes located opposite each other (fig. 6). The combination probes at station 3 were circumferentially traversed 5.8° (1 stator blade gap) counterclockwise from the nominal values shown in figure 6. The wedge probes were used to determine static pressure; and the combination probes were used to determine total pressure, total temperature, and flow angle. Each probe had associated null-balancing equipment that automatically alined the probe to the direction of flow. Iron-constantan thermocouples were used in the combination probes to determine stream temperatures. Calibrated transducers were used to measure all pressures.

Static pressure taps were also installed on both the outer and inner walls of the compressor casing. These pressure taps were at the same axial location as the probes but were offset in the circumferential direction (see fig. 6). The rotative speed of the test rotor was determined by an electronic speed counter. The test data were recorded by a central data recording system.

The estimated errors of the data, based on inherent accuracies of the instrumentation and recording system are as follows:

Weight flow, kg/sec	±0.3
Rotative speed, rpm	±30
Flow angle, deg	±1
Temperature, K	±0.6
Rotor-inlet total pressure, N/cm^2	±0.01
Rotor-outlet total pressure, N/cm^2	±0.10
Stator-outlet total pressure, N/cm^2	±0.10
Rotor-inlet static pressure, N/cm^2	±0.04
Rotor-outlet static pressure, N/cm^2	±0.07
Stator-outlet static pressure, N/cm^2	±0.07

Test Procedure

The stage survey data were taken over a range of weight flows from maximum flow to the near-stall conditions. At 70, 90, and 100 percent of design speed, surveys were made at five weight flows. At 50, 60, and 80 percent of design speed, surveys were made at the near-stall weight flow only. Data were recorded at 11 radial positions for each speed and weight flow. At each radial position the two combination probes behind the stator were circumferentially traversed to nine different locations across the stator gap. The wedge probes were set at mid-gap because preliminary studies showed that the static pressure across the stator gap was constant. Values of pressure, temperature, and flow angle were recorded at each circumferential position. At the last circumferential position, values of pressure, temperature, and flow angle were also recorded for stations 1 and 2. All probes were then traversed to the next radial position and the circumferential-traverse procedure repeated.

At each of the six rotative speeds, the back pressure on the stage was increased (by closing the sleeve valve in the collector) until a stalled condition was evident. Stall was detected by a sudden drop in stage-outlet total pressure, which was measured by a probe located at midpassage and recorded on an X-Y plotter. Stall was also correlated by large increases in blade stresses on both rotor and stator, along with a sudden increase in noise level. The weight flow at stall was obtained in the following manner: From a condition near stall, the sleeve valve was slowly closed in small increments. At each increment, the weight flow was obtained. The weight flow obtained just before stall occurred is called the stall weight flow. The pressure ratio at stall was obtained by extrapolating the total pressure obtained from the survey data to the stall weight flow.

Calculation Procedure

All the data shown herein have been corrected to standard-day conditions at the rotor inlet. The blade-element data have been translated from the measuring stations to correspond to conditions at the blade edges. The translation procedure described in reference 2 was used.

Due to the physical construction of the 8° wedge probe, static pressure could not be measured at the 5-, 10-, and 95-percent-span locations. Thus, a linear interpolation between the outer-wall static pressure and the value of static pressure at 30-percent span was used to obtain static pressure at 5- and 10-percent span. At 95-percent span, an interpolation between the static pressures at 90-percent span and the inner wall was used to obtain the static pressure.

At each radial survey position, nine circumferential values of pressure, temperature, and flow angle were measured downstream of the stator (station 3). The nine values of total temperature were mass-averaged to obtain the stator-outlet total temperature. The nine values of total pressure were energy-averaged. The flow angle presented for each radial position is calculated based on mass-averaged axial and tangential velocities. All the blade-element data presented at the stator outlet are based on these averaged values of pressure, temperature, and flow angle.

To obtain the overall performance, the radial values of total temperature were mass-averaged and the values of total pressure were energy-averaged. At each measuring station, the integrated weight flow was computed based on the radial survey data. The agreement between the integrated weight flow at each station and the orifice weight flow is shown in figure 7 to indicate the consistency of the data. Except at the low-speed - low-weight-flow conditions at the stator outlet (fig. 7(c)), the integrated weight flows are within 5 percent of the orifice weight flow. At the low-speed - low-weight-flow condition, the stator-outlet integrated weight flow is approximately 10 percent lower than the orifice weight flow.

RESULTS AND DISCUSSION

The overall performances for the rotor and the stage are presented first. Radial distributions of several performance parameters are then presented for both the rotor and the stator, followed by the blade-element data. Finally, a brief discussion of the data is given.

All the plotted data, together with some additional performance parameters, are listed in tabular form. The overall performance data are presented in table VI. The blade-element data are given first for the rotor and then for the stator in tables VII to XVIII. The abbreviations and units used for the tabular data are defined in appendix C.

Overall Performance

The overall performance for rotor 12 is presented in figure 8, and the overall performance for stage 12-5 is presented in figure 9. For both machine-plotted figures, data are presented for speeds from 50 to 100 percent of design speed. For 50, 60, and 80 percent of design speed, the overall performance is presented for the near-stall condition only. For 70, 90, and 100 percent of design speed, data are presented at several weight flows from choke to the near-stall conditions. Design-point values are shown as solid symbols in both figures. The stall line (dashed line) shown in figure 9 was determined based on the method discussed in the section Test Procedure.

The peak efficiency for rotor 12 at design speed was 0.838, compared to the design value of 0.890. The peak efficiency occurred at a weight flow of 28.6 kilograms per second. This corresponds to a weight flow per unit annulus area of 194.9 kilograms per second per square meter. The measured total pressure ratio was 1.787 and the temperature ratio was 1.215. These compare to design values of 1.800 and 1.205, respectively.

The stage overall performance trends with respect to design values were similar to those for the rotor. The stage peak efficiency was 0.784, compared to the design value of 0.843. At peak efficiency, the weight flow was 28.6 kilograms per second, compared to the design value of 29.5 kilograms per second. The measured pressure ratio of 1.706 was less than the design value of 1.750, but the temperature ratio of 1.211 was higher than the design value of 1.205. The maximum-flow condition of the stage was experienced before the design weight flow was obtained.

At the lower speeds, efficiencies as high as 0.880 and 0.796 were measured for the rotor and stage, respectively. At design speed, the stall margin was 11.4 percent for the stage.

Radial Distributions

The radial distributions of several parameters for 100 percent of design speed are presented in figure 10 for rotor 12 and in figure 11 for stator 5. In each figure, data are presented for three weight flows: near choke, peak efficiency, and near stall. The design values are shown by the solid symbols. Temperature-rise efficiency, temperature ratio, pressure ratio, suction-surface incidence angle, meridional velocity ratio, deviation angle, total-loss parameter, total-loss coefficient, and diffusion factor are presented as functions of percent span from the blade tip.

Rotor. - As the weight flow was reduced, the pressure ratio and temperature ratio increased across the entire rotor blade span. The blade loading (diffusion factor) also continued to increase with decreasing weight flow. The rotor losses increased in the tip region but were relatively unaffected from the region of the damper to the hub.

At the peak efficiency weight flow of 28.6 kilograms per second, the blade loading was just slightly higher than the design values. However, the losses in the damper and hub region were much greater than the design values. In the tip region the losses were only slightly greater than design. The deviation angles were less than design values in the tip region and at the hub, and were higher than design values from the damper to 90 percent of span.

Stator. - At the peak efficiency weight flow of 28.6 kilograms per second, the stator blade loading (diffusion factor) agreed reasonably well with the design values. However, the measured losses were considerably larger than the design values. Except in the damper region, the incidence angles agreed within 2° of the design values. The measured deviation angles were greater than design over the entire blade span.

Variations with Incidence Angle

The variations of selected blade-element parameters with suction-surface incidence angle are presented in figure 12 for the rotor and in figure 13 for the stator. The data are presented for 70, 90, and 100 percent of design speed for blade-element locations of 5, 10, 30, 52.5, 70, 90, and 95 percent of span from the blade tip. Design values are shown by solid symbols. In addition to all the parameters which were shown in the radial distribution plots, inlet relative Mach number is also presented. The various curves as a function of incidence angle are presented primarily for future correlation in comparing the performance of these blades with other blade designs. Thus, only a few brief observations will be made from the curves.

Rotor. - The rotor blades were designed for minimum loss to occur at zero incidence angle. The incidence angle associated with minimum loss was not obtained for the 5-, 10-, 30-, and 70-percent spans. At each of these spans, the losses continued to decrease as the flow was increased (decreasing incidence angle) to the maximum-flow condition. At 52.5-, 90-, and 95-percent span, the suction-surface incidence angle corresponding to minimum loss was about 1°. At 5-, 10-, 30-, and 95-percent spans, the deviation angles were less than design, whereas at the other locations they were greater than design. The effect of the damper is evident at the 52.5-percent-span location. The rotor pressure ratio and efficiency are considerably less than design, while the losses are much greater than the design values.

Stator. - The suction-surface incidence angle corresponding to minimum loss was within 2° of the design incidence angle, except at 52.5-percent span. At 52.5-percent span, the minimum-loss incidence angle is 4°. The minimum losses were considerably greater than design, except at the 52.5- and 70-percent-span locations: For those two locations, minimum losses were about the same as design. The deviation angle was greater than design for all percent-span locations.

Discussion of Performance

The maximum flow for this high-solidity stage is somewhat less than the design flow. At the maximum-flow conditions, the stator losses are substantially greater than both the design and minimum-loss values for all the blade elements. Except in the region behind the rotor dampers, the stator incidence angles are also less than the design values. Thus, it appears that the stator blading and its mismatch with the rotor could be limiting the stage flow.

The data indicated that the minimum loss for the rotor was not attained for the 5-, 10-, 30-, and 70-percent-span locations. If the stator had not been limiting the maximum flow, the rotor overall efficiency would probably be higher and occur at a higher flow. However, the rotor would not have achieved the design efficiency even if each element was reset to its minimum-loss condition because no allowances were made for the damper losses and blockage due to the dampers in the design of this stage.

The stator minimum losses are higher than the design values for all elements. The difference between minimum loss and design decreases from the tip to the 70-percent-span location and then increases to the hub. Thus, the radial gradients of losses are also greater than design. These higher loss levels and higher radial loss gradients are probably related to the high blade surface area, radial boundary flows, and secondary flows of the high-solidity blading. Adjusting the stator elements for these higher losses and loss gradients and resetting the rotor elements would probably result in some improvement in the stage efficiency. However, at the high level of blade solidity, this stage could not be expected to achieve the design performance.

SUMMARY OF RESULTS

This report presents both the aerodynamic design parameters and the overall and blade-element performance of a transonic compressor stage. This stage, which is one of a series designed to investigate blade solidity, has a tip solidity of 1.7 for both rotor and stator. Detailed radial surveys of the flow conditions in front of and behind the rotor and behind the stator were made over the stable operating flow range of the stage at rotative speeds from 50 to 100 percent of design speed. Flow and performance parameters were calculated across 11 blade elements. The following principal results were obtained from this investigation:

1. Stage peak efficiency of 0.784 was significantly less than the design efficiency of 0.843. This decrease is attributed to (1) the stator losses and radial gradient of losses being much greater than design, (2) losses and blockages associated with the rotor part-span damper not being incorporated into the design, and (3) the mismatch of the rotor and stator blade elements.

2. Stage peak efficiency was obtained at a weight flow of 28.6 kilograms per second and a pressure ratio of 1.706. This compares to the design weight flow of 29.5 kilograms per second and the design pressure ratio of 1.750.

3. Stall margin for this stage at design speed was 11.4 percent, based on weight

flow and total pressure at peak efficiency and stall.

4. Rotor peak efficiency of 0.838 occurred at a pressure ratio of 1.787. Design efficiency was 0.890 and design pressure ratio was 1.800.

5. The maximum flow for this high-solidity stage was less than the design weight flow.

Lewis Research Center,
National Aeronautics and Space Administration,
Cleveland, Ohio, July 27, 1972,
501-24.

APPENDIX A

SYMBOLS

A_{an}	annulus area at rotor leading edge, 0.147 m^2
A_f	frontal area at rotor leading edge, 0.198 m^2
C_p	specific heat at constant pressure, 1004 J/(kg)(K)
c	aerodynamic chord, cm
D	diffusion factor
g	acceleration of gravity, 9.8 m/sec^2
i_{mc}	mean incidence angle, angle between inlet air direction and line tangent to blade mean camber line at leading edge, deg
i_{ss}	suction-surface incidence angle, angle between inlet air direction and line tangent to blade suction surface at leading edge, deg
J	mechanical equivalent of heat
N	rotative speed, rpm
P	total pressure, N/cm^2
p	static pressure, N/cm^2
r	radius, cm
SM	stall margin
T	total temperature, K
U	wheel speed, m/sec
V	air velocity, m/sec
W	weight flow, kg/sec
Z	axial distance referenced from rotor-blade-hub leading edge, cm
α_c	cone angle, deg
α_s	slope of streamline, deg
β	air angle, angle between air velocity and axial direction, deg
β_c'	relative meridional air angle based on cone angle, arctan ($\tan \beta_m' \cos \alpha_c / \cos \alpha_s$), deg
γ	ratio of specific heats (1.40)

δ ratio of rotor-inlet total pressure to standard pressure of 10.13 newtons per square centimeter

δ^o deviation angle, angle between exit air direction and tangent to blade mean camber line at trailing edge, deg

η efficiency

θ ratio of rotor-inlet total temperature to standard temperature of 288.2 K

κ_{mc} angle between blade mean camber line and meridional plane, deg

κ_{ss} angle between blade suction-surface camber line at leading edge and meridional plane, deg

σ solidity, ratio of chord to spacing

$\overline{\omega}$ total-loss coefficient

$\overline{\omega}_p$ profile-loss coefficient

$\overline{\omega}_s$ shock-loss coefficient

Subscripts:

ad adiabatic (temperature rise)

id ideal

LE blade leading edge

m meridional direction

mom momentum rise

p polytropic

TE blade trailing edge

z axial direction

θ tangential direction

1 instrumentation plane upstream of rotor

2 instrumentation plane between rotor and stator

3 instrumentation plane downstream of stator

Superscript:

' relative to blade

APPENDIX B

EQUATIONS

Suction-surface incidence angle:

$$i_{ss} = (\beta'_c)_{LE} - \kappa_{ss} \tag{B1}$$

Mean incidence angle:

$$i_{mc} = (\beta'_c)_{LE} - (\kappa_{mc})_{LE} \tag{B2}$$

Deviation angle:

$$\delta^o = (\beta'_c)_{TE} - (\kappa_{mc})_{TE} \tag{B3}$$

Diffusion factor:

$$D = 1 - \frac{V'_{TE}}{V'_{LE}} + \left| \frac{(rV_\theta)_{TE} - (rV_\theta)_{LE}}{(r_{TE} + r_{LE})\sigma(V'_{LE})} \right| \tag{B4}$$

Total-loss coefficient:

$$\overline{\omega} = \frac{(P'_{id})_{TE} - (P')_{TE}}{(P')_{LE} - (p)_{LE}} \tag{B5}$$

Profile-loss coefficient:

$$\overline{\omega}_p = \overline{\omega} - \overline{\omega}_s \tag{B6}$$

Total-loss parameter:

$$\frac{\overline{\omega} \cos (\beta'_m)_{TE}}{2\sigma} \tag{B7}$$

Profile-loss parameter:

$$\frac{\overline{\omega}_p \cos (\beta'_m)_{TE}}{2\sigma} \tag{B8}$$

Adiabatic (temperature rise) efficiency:

$$\eta_{ad} = \frac{\left(\frac{P_{TE}}{P_{LE}}\right)^{(\gamma-1)/\gamma} - 1}{\frac{T_{TE}}{T_{LE}} - 1} \tag{B9}$$

Momentum-rise efficiency:

$$\eta_{mom} = \frac{\left(\frac{P_{TE}}{P_{LE}}\right)^{(\gamma-1)/\gamma} - 1}{\frac{(UV_\theta)_{TE} - (UV_\theta)_{LE}}{T_{LE} gJC_p}} \tag{B10}$$

Equivalent weight flow:

$$\frac{w\sqrt{\theta}}{\delta} \tag{B11}$$

Equivalent rotative speed:

$$\frac{N}{\sqrt{\theta}} \tag{B12}$$

Weight flow per unit annulus area:

$$\frac{\frac{w\sqrt{\theta}}{\delta}}{A_{an}} \tag{B13}$$

Weight flow per unit frontal area:

$$\frac{\frac{W\sqrt{\theta}}{\delta}}{A_f} \tag{B14}$$

Head-rise coefficient:

$$\frac{gJC_pT_{LE}}{U_{tip}^2}\left[\left(\frac{P_{TE}}{P_{LE}}\right)^{(\gamma-1)/\gamma} - 1\right] \tag{B15}$$

Flow coefficient:

$$\left(\frac{V_z}{U_{tip}}\right)_{LE} \tag{B16}$$

Stall margin:

$$SM = \left[\frac{\left(\frac{P_{TE}}{P_{LE}}\right)_{stall}}{\left(\frac{P_{TE}}{P_{LE}}\right)_{ref}} \times \frac{\left(\frac{W\sqrt{\theta}}{\delta}\right)_{ref}}{\left(\frac{W\sqrt{\theta}}{\delta}\right)_{stall}} - 1\right] \times 100 \tag{B17}$$

Polytropic efficiency:

$$\eta_p = \exp\left[\frac{\left(P_{TE}/P_{LE}\right)^{(\gamma-1)/\gamma}}{T_{TE}/T_{LE}}\right] \tag{B18}$$

APPENDIX C

ABBREVIATIONS AND UNITS USED IN TABLES

ABS	absolute
AERO CHORD	aerodynamic chord, cm
AREA RATIO	ratio of actual flow area to critical area (where local Mach number is 1)
BETAM	meridional air angle, deg
CONE ANGLE	angle between axial direction and conical surface representing blade element, deg
DELTA INC	difference between mean camber blade angle and suction-surface blade angle at leading edge, deg
DEV	deviation angle (defined by eq. (B3)), deg
D-FACT	diffusion factor (defined by eq. (B4))
EFF	adiabatic efficiency (defined by eq. (B9))
IN	inlet (leading edge of blade)
INCIDENCE	incidence angle (suction surface defined by eq. (B1) and mean defined by eq. (B2)), deg
KIC	angle between blade mean camber line at leading edge and meridional plane, deg
KOC	angle between blade mean camber line at trailing edge and meridional plane, deg
KTC	angle between blade mean camber line at transition point and meridional plane, deg
LOSS COEFF	loss coefficient (total defined by eq. (B5) and profile defined by eq. (B6))
LOSS PARAM	loss parameter (total defined by eq. (B7) and profile defined by eq. (B8))
MERID	meridional
MERID VEL R	meridional velocity ratio
OUT	outlet (trailing edge of blade)
PERCENT SPAN	percent of blade span from tip at rotor outlet

PHISS	suction-surface camber ahead of assumed shock location, deg
PRESS	pressure, N/cm^2
PROF	profile
RADII	radius, cm
REL	relative to blade
RI	inlet radius (leading edge of blade), cm
RO	outlet radius (trailing edge of blade), cm
RP	radial position
RPM	equivalent rotative speed, revolutions per minute
SETTING ANGLE	angle between aerodynamic chord and meridional plane, deg
SOLIDITY	ratio of aerodynamic chord to blade spacing
SPEED	speed, m/sec
SS	suction surface
STREAMLINE SLOPE	slope of streamline, deg
TANG	tangential
TEMP	temperature, K
TI	thickness of blade at leading edge, cm
TM	thickness of blade at maximum thickness, cm
TO	thickness of blade at trailing edge, cm
TOT	total
TOTAL CAMBER	difference between inlet and outlet blade mean camber lines, deg
VEL	velocity, m/sec
WT FLOW	equivalent weight flow, kg/sec
X FACTOR	ratio of suction-surface camber ahead of assumed shock location of a multiple-circular-arc blade section to that of a double-circular-arc blade section
ZIC	axial distance to blade leading edge from inlet, cm
ZMC	axial distance to blade maximum thickness point from inlet, cm

REFERENCES

1. Urasek, Donald C.; and Janetzke, David C.: Performance of Tandem-Bladed Transonic Compressor Rotor with Tip Speed of 1375 Feet per Second. NASA TM X-2484, 1972.
2. Ball, Calvin L.; Janetzke, David C.; and Reid, Lonnie: Performance of 1380-Foot-Per-Second-Tip-Speed Axial-Flow Compressor Rotor with Blade Tip Solidity of 1.5. NASA TM X-2379, 1972.
3. Hager, Roy D.; Janetzke, David C.; and Reid, Lonnie: Performance of a 1380-Foot-Per-Second-Tip-Speed Axial-Flow Compressor Rotor with a Blade Tip Solidity of 1.3. NASA TM X-2448, 1972.
4. Janetzke, David C.; Ball, Calvin L.; and Hager, Roy D.: Performance of 1380-Foot-Per-Second-Tip-Speed Axial-Flow Compressor Rotor with Blade Tip Solidity of 1.1. NASA TM X-2449, 1972.
5. Lewis, George W., Jr.; and Urasek, Donald C.: Comparison of the Effect of Two Damper Sizes on the Performance of a Low-Solidity Axial-Flow Transonic Compressor Rotor. NASA TM X-2536, 1972.
6. Hartmann, Melvin J.; Benser, William A.; Hauser, Cavour H.; and Ruggeri, Robert S.: Fan and Compressor Technology. Aircraft Propulsion. NASA SP-259, 1971, pp. 1-36.
7. Crouse, James E.; Janetzke, David C.; and Schwirian, Richard E.: A Computer Program for Composing Compressor Blading from Simulated Circular-Arc Elements on Conical Surfaces. NASA TN D-5437, 1969.
8. Keenan, M. J.; Harley, K. G.; and Bogardus, G. A.: Experimental Evaluation of Transonic Stators, Data and Performance Report, Multiple-Circular-Arc Stator A. Rep. PWA-3260, Pratt & Whitney Aircraft (NASA CR-54621), 1968.

TABLE I. - DESIGN OVERALL PARAMETERS FOR STAGE 12-5

ROTOR TOTAL PRESSURE RATIO	1.800
STAGE TOTAL PRESSURE RATIO	1.750
ROTOR TOTAL TEMPERATURE RATIO	1.205
STAGE TOTAL TEMPERATURE RATIO	1.205
ROTOR ADIABATIC EFFICIENCY	0.890
STAGE ADIABATIC EFFICIENCY	0.843
ROTOR POLYTROPIC EFFICIENCY	0.898
STAGE POLYTROPIC EFFICIENCY	0.855
ROTOR HEAD RISE COEFFICIENT	0.296
STAGE HEAD RISE COEFFICIENT	0.281
FLOW COEFFICIENT	0.473
WT FLOW PER UNIT FRONTAL AREA	149.172
WT FLOW PER UNIT ANNULUS AREA	200.600
WT FLOW	29.484
RPM	16100.000
TIP SPEED	422.888

TABLE II. - DESIGN BLADE-ELEMENT PARAMETERS FOR ROTOR 12

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
TIP	25.082	24.701	0.	50.1	65.6	58.7	288.2	1.252	10.13	1.800
1	24.574	24.193	-0.	47.8	64.6	57.6	288.2	1.237	10.13	1.800
2	24.026	23.685	0.	46.2	63.5	56.5	288.2	1.225	10.13	1.800
3	21.755	21.653	0.	45.0	60.0	51.1	288.2	1.206	10.13	1.800
4	20.286	20.383	0.	45.6	58.2	46.7	288.2	1.200	10.13	1.800
5	19.988	20.129	0.	45.8	57.9	45.7	288.2	1.199	10.13	1.800
6	19.687	19.875	0.	46.0	57.5	44.6	288.2	1.199	10.13	1.800
7	19.385	19.621	0.	46.2	57.2	43.5	288.2	1.198	10.13	1.800
8	19.081	19.367	0.	46.4	56.9	42.3	288.2	1.197	10.13	1.800
9	16.881	17.589	0.	48.4	54.7	32.5	288.2	1.194	10.13	1.800
10	14.154	15.557	0.	52.2	52.2	15.7	288.2	1.195	10.13	1.800
11	13.423	15.049	0.	53.6	51.6	9.9	288.2	1.197	10.13	1.800
HUB	12.700	14.541	-0.	55.1	50.9	3.4	288.2	1.199	10.13	1.800

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
TIP	191.9	228.6	464.4	282.3	191.9	146.8	0.	175.3	422.9	416.5
1	196.9	226.7	458.7	284.1	196.9	152.3	-0.	168.0	414.3	407.9
2	201.6	226.1	452.5	283.2	201.6	156.4	0.	163.3	405.1	399.3
3	211.5	230.7	423.4	259.5	211.5	163.1	0.	163.2	366.8	365.1
4	211.9	236.0	402.3	240.7	211.9	165.1	0.	168.6	342.0	343.7
5	211.6	237.2	397.9	236.8	211.6	165.5	0.	170.0	337.0	339.4
6	211.1	238.6	393.4	232.9	211.1	165.8	0.	171.5	331.9	335.1
7	210.5	240.0	388.8	229.0	210.5	166.1	0.	173.2	326.8	330.8
8	209.8	241.5	384.1	225.1	209.8	166.4	0.	174.9	321.7	326.5
9	201.7	253.2	348.8	199.5	201.7	168.2	0.	189.2	284.6	296.6
10	185.0	272.4	301.9	173.4	185.0	166.9	0.	215.3	238.6	262.3
11	179.6	279.2	288.9	168.1	179.6	165.6	0.	224.8	226.3	253.7
HUB	174.0	286.9	275.9	164.3	174.0	164.0	-0.	235.4	214.1	245.2

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	STREAMLINE SLOPE IN	STREAMLINE SLOPE OUT	MERID VEL R	PEAK SS MACH NO
TIP	0.583	0.623	1.411	0.770	0.583	0.400	-6.69	-6.65	0.765	1.604
1	0.599	0.622	1.396	0.779	0.599	0.418	-5.94	-5.61	0.773	1.591
2	0.614	0.623	1.379	0.781	0.614	0.431	-5.03	-4.54	0.776	1.580
3	0.647	0.643	1.296	0.723	0.647	0.454	-0.49	0.09	0.771	1.548
4	0.648	0.660	1.231	0.673	0.648	0.462	2.76	3.16	0.779	1.531
5	0.647	0.664	1.217	0.663	0.647	0.463	3.44	3.79	0.782	1.528
6	0.646	0.668	1.203	0.653	0.646	0.465	4.14	4.44	0.785	1.525
7	0.644	0.673	1.189	0.642	0.644	0.466	4.85	5.10	0.789	1.521
8	0.642	0.678	1.174	0.632	0.642	0.467	5.58	5.77	0.793	1.517
9	0.615	0.715	1.063	0.564	0.615	0.475	11.26	10.88	0.834	1.482
10	0.560	0.775	0.915	0.493	0.560	0.475	20.03	17.86	0.903	1.342
11	0.543	0.796	0.874	0.479	0.543	0.472	22.97	19.81	0.922	1.272
HUB	0.525	0.820	0.833	0.470	0.525	0.469	26.11	21.84	0.942	1.201

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
TIP	0.	2.5	0.0	4.9	0.503	0.725	0.256	0.151	0.039	0.023
1	5.00	2.7	-0.0	4.4	0.486	0.772	0.207	0.107	0.032	0.017
2	10.00	3.0	0.0	4.1	0.475	0.811	0.168	0.074	0.026	0.012
3	30.00	4.0	0.0	3.8	0.486	0.888	0.102	0.028	0.017	0.005
4	42.50	4.7	-0.0	3.9	0.503	0.913	0.083	0.021	0.014	0.004
5	45.00	4.9	-0.0	3.9	0.507	0.917	0.080	0.021	0.013	0.004
6	47.50	5.0	-0.0	4.0	0.511	0.920	0.078	0.021	0.013	0.004
7	50.00	5.1	-0.0	4.2	0.515	0.923	0.076	0.022	0.013	0.004
8	52.50	5.3	-0.0	4.3	0.518	0.926	0.075	0.023	0.013	0.004
9	70.00	6.1	-0.0	5.5	0.540	0.943	0.066	0.034	0.011	0.006
10	90.00	7.0	-0.0	8.1	0.552	0.937	0.091	0.086	0.015	0.014
11	95.00	7.1	-0.0	9.0	0.550	0.928	0.112	0.111	0.018	0.018
HUB	100.00	7.3	0.0	10.0	0.542	0.916	0.142	0.142	0.021	0.021

TABLE III. - DESIGN BLADE-ELEMENT PARAMETERS FOR STATOR 5

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
TIP	24.384	24.384	45.2	0.	45.2	0.	360.8	1.001	18.24	0.956
1	23.946	23.950	42.9	-0.	42.9	-0.	356.4	1.000	18.24	0.966
2	23.507	23.541	41.4	0.	41.4	0.	353.1	1.000	18.24	0.973
3	21.742	21.902	40.0	0.	40.0	0.	347.5	1.000	18.24	0.980
4	20.634	20.883	40.4	0.	40.4	0.	345.8	1.000	18.24	0.978
5	20.412	20.681	40.6	0.	40.6	0.	345.6	1.000	18.24	0.978
6	20.191	20.479	40.7	0.	40.7	0.	345.4	1.000	18.24	0.978
7	19.970	20.278	40.9	0.	40.9	0.	345.2	1.000	18.24	0.977
8	19.750	20.078	41.0	0.	41.0	0.	345.0	1.000	18.24	0.977
9	18.217	18.711	42.3	0.	42.3	0.	344.0	1.000	18.24	0.973
10	16.514	17.246	44.9	0.	44.9	0.	344.4	1.000	18.24	0.955
11	16.103	16.897	45.9	0.	45.9	0.	344.9	1.000	18.24	0.942
HUB	15.697	16.485	46.9	-0.	46.9	-0.	345.6	1.000	18.24	0.924

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
TIP	250.5	176.5	250.5	176.5	176.6	176.5	177.6	0.	0.	0.
1	249.2	181.1	249.2	181.1	182.4	181.1	169.8	-0.	0.	0.
2	248.9	184.5	248.9	184.5	186.8	184.5	164.5	0.	0.	0.
3	252.7	190.3	252.7	190.3	193.5	190.3	162.6	0.	0.	0.
4	256.8	191.6	256.8	191.6	195.5	191.6	166.5	0.	0.	0.
5	257.8	191.9	257.8	191.9	195.9	191.9	167.6	0.	0.	0.
6	258.9	192.3	258.9	192.3	196.3	192.3	168.8	0.	0.	0.
7	260.1	192.7	260.1	192.7	196.7	192.7	170.1	0.	0.	0.
8	261.3	193.1	261.3	193.1	197.1	193.1	171.5	0.	0.	0.
9	271.4	197.0	271.4	197.0	200.7	197.0	182.7	0.	0.	0.
10	287.4	196.8	287.4	196.8	203.6	196.8	202.8	0.	0.	0.
11	292.7	194.9	292.7	194.9	203.8	194.9	210.1	0.	0.	0.
HUB	298.5	192.1	298.5	192.1	203.8	192.1	218.1	-0.	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	STREAMLINE SLOPE IN	STREAMLINE SLOPE OUT	MERID VEL R	PEAK SS MACH NO
TIP	0.688	0.474	0.688	0.474	0.485	0.474	-0.32	-0.25	0.999	1.008
1	0.689	0.490	0.689	0.490	0.504	0.490	0.30	0.06	0.993	0.985
2	0.692	0.502	0.692	0.502	0.519	0.502	0.88	0.36	0.987	0.970
3	0.710	0.523	0.710	0.523	0.543	0.523	3.13	1.55	0.984	0.968
4	0.724	0.528	0.724	0.528	0.551	0.528	4.77	2.29	0.980	0.982
5	0.728	0.529	0.728	0.529	0.553	0.529	5.12	2.44	0.980	0.986
6	0.731	0.531	0.731	0.531	0.554	0.531	5.50	2.58	0.980	0.990
7	0.735	0.532	0.735	0.532	0.556	0.532	5.89	2.73	0.979	0.995
8	0.739	0.533	0.739	0.533	0.558	0.533	6.29	2.88	0.979	1.000
9	0.772	0.546	0.772	0.546	0.571	0.546	9.61	3.93	0.982	1.079
10	0.823	0.545	0.823	0.545	0.583	0.545	14.80	5.02	0.967	1.200
11	0.840	0.539	0.840	0.539	0.585	0.539	16.39	5.16	0.957	1.244
HUB	0.858	0.530	0.858	0.530	0.586	0.530	18.06	5.28	0.942	1.296

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
TIP	0.	6.1	-0.0	10.7	0.504	0.	0.169	0.169	0.050	0.050
1	5.00	6.1	0.0	9.7	0.471	0.	0.124	0.124	0.036	0.036
2	10.00	6.1	-0.0	8.9	0.447	0.	0.098	0.098	0.028	0.028
3	30.00	6.2	0.0	8.0	0.416	0.	0.070	0.070	0.018	0.018
4	42.50	6.1	0.0	7.8	0.415	0.	0.073	0.073	0.018	0.018
5	45.00	6.1	-0.0	7.7	0.416	0.	0.074	0.074	0.018	0.018
6	47.50	6.1	0.0	7.7	0.416	0.	0.075	0.075	0.018	0.018
7	50.00	6.1	0.0	7.7	0.417	0.	0.076	0.076	0.018	0.018
8	52.50	6.1	0.0	7.7	0.417	0.	0.076	0.076	0.018	0.018
9	70.00	6.1	0.0	7.4	0.421	0.	0.082	0.082	0.018	0.018
10	90.00	6.0	0.0	7.4	0.454	0.	0.126	0.126	0.025	0.025
11	95.00	5.9	0.0	7.5	0.471	0.	0.157	0.157	0.031	0.031
HUB	100.00	6.0	0.1	7.6	0.493	0.	0.202	0.200	0.039	0.038

TABLE IV. - BLADE GEOMETRY FOR ROTOR 12

RP	PERCENT SPAN	RADII RI	RO	BLADE ANGLES KIC	KTC	KOC	DELTA INC	CONE ANGLE
TIP	0.	25.082	24.701	62.94	59.88	53.63	2.48	-9.153
1	5.	24.574	24.193	61.72	58.75	53.00	2.71	-8.837
2	10.	24.026	23.685	60.46	57.49	52.18	2.97	-7.649
3	30.	21.755	21.653	55.97	52.11	47.29	4.05	-1.993
4	43.	20.286	20.383	53.51	48.61	42.81	4.72	1.777
5	45.	19.988	20.129	53.04	47.88	41.76	4.86	2.547
6	48.	19.687	19.875	52.57	47.18	40.61	4.99	3.330
7	50.	19.385	19.621	52.11	46.48	39.39	5.13	4.118
8	53.	19.081	19.367	51.66	45.78	38.10	5.26	4.912
9	70.	16.881	17.589	48.56	41.34	27.00	6.15	10.867
10	90.	14.154	15.557	45.46	37.53	7.52	6.98	18.794
11	95.	13.423	15.049	44.84	37.06	0.79	7.13	21.014
HUB	100.	12.700	14.541	44.32	36.83	-6.63	7.23	22.968

RP	BLADE THICKNESSES TI	TM	TO	AXIAL DIMENSIONS ZIC	ZMC	ZTC	ZOC
TIP	0.051	0.153	0.051	1.032	2.136	2.188	3.397
1	0.051	0.162	0.051	0.986	2.136	2.152	3.435
2	0.051	0.172	0.051	0.938	2.136	2.109	3.474
3	0.051	0.216	0.051	0.744	2.127	1.901	3.648
4	0.051	0.244	0.051	0.626	2.118	1.741	3.766
5	0.051	0.250	0.051	0.602	2.116	1.706	3.791
6	0.051	0.256	0.051	0.579	2.113	1.671	3.816
7	0.051	0.262	0.051	0.555	2.110	1.634	3.842
8	0.051	0.267	0.051	0.531	2.107	1.596	3.868
9	0.051	0.309	0.051	0.362	2.079	1.312	4.054
10	0.051	0.360	0.051	0.138	2.026	0.921	4.260
11	0.051	0.373	0.051	0.070	2.007	0.809	4.304
HUB	0.051	0.387	0.051	0.000	1.986	0.694	4.345

RP	AERO CHORD	SETTING ANGLE	TOTAL CAMBER	SOLIDITY	X FACTOR	PHISS	AREA RATIO
TIP	4.727	59.19	9.31	1.693	0.798	5.65	1.051
1	4.737	58.08	8.72	1.731	0.833	5.72	1.049
2	4.733	56.86	8.27	1.768	0.871	5.86	1.045
3	4.722	51.53	8.68	1.939	1.024	7.26	1.032
4	4.722	47.74	10.70	2.070	1.091	8.47	1.028
5	4.723	46.91	11.28	2.099	1.103	8.74	1.028
6	4.725	46.06	11.96	2.129	1.111	8.99	1.027
7	4.727	45.19	12.72	2.160	1.116	9.23	1.026
8	4.730	44.28	13.56	2.193	1.119	9.47	1.025
9	4.775	37.27	21.55	2.469	1.091	10.69	1.015
10	4.928	26.75	37.94	2.956	0.965	10.94	1.007
11	4.996	23.48	44.06	3.128	0.910	10.63	1.008
HUB	5.072	19.98	50.95	3.319	0.847	10.16	1.010

TABLE V. - BLADE GEOMETRY FOR STATOR 5

RP	PERCENT SPAN	RADII RI	RO	BLADE ANGLES KIC	KTC	KOC	DELTA INC	CONE ANGLE
TIP	0	24.384	24.384	39.06	32.28	-10.69	6.10	0.057
1	5.	23.946	23.950	36.81	30.88	-9.66	6.12	0.064
2	10.	23.507	23.541	35.22	29.91	-8.95	6.14	0.492
3	30.	21.742	21.902	33.91	29.32	-7.97	6.15	2.315
4	43.	20.634	20.883	34.33	29.84	-7.77	6.14	3.596
5	45.	20.412	20.681	34.47	29.99	-7.74	6.14	3.870
6	48.	20.191	20.479	34.63	30.14	-7.72	6.13	4.151
7	50.	19.970	20.278	34.79	30.31	-7.70	6.13	4.440
8	53.	19.750	20.078	34.98	30.49	-7.68	6.12	4.736
9	70.	18.217	18.711	36.43	30.46	-7.41	6.06	7.110
10	90.	16.514	17.246	39.41	31.43	-7.40	5.95	10.502
11	95.	16.103	16.897	40.56	31.83	-7.47	5.91	11.400
HUB	100.	15.697	16.485	41.85	32.28	-7.57	5.87	11.330

RP	BLADE THICKNESSES TI	TM	TO	AXIAL DIMENSIONS ZIC	ZMC	ZTC	ZOC
TIP	0.051	0.279	0.051	7.679	9.468	8.849	11.587
1	0.051	0.279	0.051	7.652	9.474	8.774	11.587
2	0.051	0.279	0.051	7.633	9.478	8.714	11.587
3	0.051	0.279	0.051	7.616	9.481	8.602	11.586
4	0.051	0.279	0.051	7.618	9.480	8.563	11.585
5	0.051	0.279	0.051	7.619	9.480	8.557	11.584
6	0.051	0.279	0.051	7.621	9.480	8.550	11.584
7	0.051	0.279	0.051	7.622	9.479	8.544	11.584
8	0.051	0.279	0.051	7.623	9.479	8.538	11.583
9	0.051	0.279	0.051	7.622	9.478	8.476	11.582
10	0.051	0.279	0.051	7.634	9.473	8.428	11.579
11	0.051	0.279	0.051	7.640	9.471	8.421	11.578
HUB	0.051	0.279	0.051	7.647	9.469	8.415	11.577

RP	AERO CHORD	SETTING ANGLE	TOTAL CAMBER	SOLIDITY	X FACTOR	PHISS	AREA RATIO
TIP	4.190	19.21	49.75	1.696	0.600	10.87	1.148
1	4.189	18.01	46.48	1.726	0.600	9.81	1.130
2	4.190	17.17	44.17	1.758	0.600	9.03	1.115
3	4.193	16.42	41.88	1.896	0.600	7.96	1.084
4	4.198	16.59	42.10	1.995	0.600	7.74	1.070
5	4.199	16.66	42.22	2.017	0.600	7.71	1.067
6	4.200	16.73	42.34	2.038	0.600	7.68	1.064
7	4.202	16.80	42.49	2.060	0.600	7.66	1.061
8	4.203	16.89	42.66	2.083	0.600	7.65	1.058
9	4.220	16.82	43.84	2.255	0.707	8.88	1.049
10	4.255	17.38	46.81	2.487	0.826	10.64	1.050
11	4.266	17.65	48.03	2.551	0.864	11.33	1.055
HUB	4.264	17.94	49.42	2.615	0.903	12.10	1.061

TABLE VI. - OVERALL PERFORMANCE FOR STAGE 12-5. SI UNITS.

(a) 100 Percent design speed

PARAMETER	READING				
	310	311	305	313	314
ROTOR TOTAL PRESSURE RATIO	1.708	1.748	1.787	1.843	1.850
STAGE TOTAL PRESSURE RATIO	1.603	1.664	1.706	1.740	1.741
ROTOR TOTAL TEMPERATURE RATIO	1.198	1.207	1.215	1.229	1.235
STAGE TOTAL TEMPERATURE RATIO	1.193	1.201	1.211	1.223	1.227
ROTOR TEMP. RISE EFFICIENCY	0.834	0.837	0.838	0.833	0.817
STAGE TEMP. RISE EFFICIENCY	0.747	0.778	0.784	0.770	0.757
ROTOR MOMENTUM RISE EFFICIENCY	0.811	0.824	0.836	0.843	0.822
ROTOR HEAD RISE COEFFICIENT	0.263	0.274	0.293	0.306	0.304
STAGE HEAD RISE COEFFICIENT	0.229	0.248	0.268	0.275	0.271
FLOW COEFFICIENT	0.418	0.412	0.406	0.378	0.368
WT FLOW PER UNIT FRONTAL AREA	148.31	147.19	144.90	137.33	135.38
WT FLOW PER UNIT ANNULUS AREA	199.45	197.94	194.86	184.69	182.07
WT FLOW AT ORIFICE	29.31	29.09	28.64	27.14	26.76
WT FLOW AT ROTOR INLET	30.03	29.80	29.19	27.85	27.37
WT FLOW AT ROTOR OUTLET	29.22	28.97	28.21	27.29	26.17
WT FLOW AT STATOR OUTLET	30.62	29.73	29.17	27.31	26.75
ROTATIVE SPEED	16246.6	16275.9	16067.0	16183.2	16286.8
PERCENT OF DESIGN SPEED	100.9	101.1	99.8	100.5	101.2

(b) 90 Percent design speed

PARAMETER	READING				
	315	316	319	320	321
ROTOR TOTAL PRESSURE RATIO	1.533	1.567	1.593	1.628	1.644
STAGE TOTAL PRESSURE RATIO	1.414	1.486	1.534	1.563	1.573
ROTOR TOTAL TEMPERATURE RATIO	1.153	1.161	1.167	1.176	1.184
STAGE TOTAL TEMPERATURE RATIO	1.149	1.156	1.163	1.171	1.179
ROTOR TEMP. RISE EFFICIENCY	0.848	0.851	0.850	0.849	0.831
STAGE TEMP. RISE EFFICIENCY	0.699	0.768	0.796	0.795	0.771
ROTOR MOMENTUM RISE EFFICIENCY	0.830	0.845	0.849	0.852	0.833
ROTOR HEAD RISE COEFFICIENT	0.259	0.273	0.284	0.300	0.307
STAGE HEAD RISE COEFFICIENT	0.208	0.239	0.260	0.273	0.278
FLOW COEFFICIENT	0.419	0.411	0.400	0.378	0.354
WT FLOW PER UNIT FRONTAL AREA	136.96	134.84	132.06	126.02	119.55
WT FLOW PER UNIT ANNULUS AREA	184.19	181.33	177.59	169.47	160.77
WT FLOW AT ORIFICE	27.07	26.65	26.10	24.91	23.63
WT FLOW AT ROTOR INLET	27.70	27.28	26.69	25.47	24.10
WT FLOW AT ROTOR OUTLET	26.89	26.53	25.91	24.71	23.00
WT FLOW AT STATOR OUTLET	27.94	26.50	26.61	25.08	23.66
ROTATIVE SPEED	14500.8	14508.6	14489.5	14457.2	14450.8
PERCENT OF DESIGN SPEED	90.1	90.1	90.0	89.8	89.8

TABLE VI. - Continued. OVERALL PERFORMANCE FOR STAGE 12-5. SI UNITS.

(c) 80 Percent design speed

PARAMETER	READING
	322
ROTOR TOTAL PRESSURE RATIO	1.472
STAGE TOTAL PRESSURE RATIO	1.415
ROTOR TOTAL TEMPERATURE RATIO	1.145
STAGE TOTAL TEMPERATURE RATIO	1.141
ROTOR TEMP. RISE EFFICIENCY	0.807
STAGE TEMP. RISE EFFICIENCY	0.739
ROTOR MOMENTUM RISE EFFICIENCY	0.807
ROTOR HEAD RISE COEFFICIENT	0.298
STAGE HEAD RISE COEFFICIENT	0.266
FLOW COEFFICIENT	0.322
WT FLOW PER UNIT FRONTAL AREA	99.52
WT FLOW PER UNIT ANNULUS AREA	133.84
WT FLOW AT ORIFICE	19.67
WT FLOW AT ROTOR INLET	20.02
WT FLOW AT ROTOR OUTLET	19.07
WT FLOW AT STATOR OUTLET	19.37
ROTATIVE SPEED	12826.2
PERCENT OF DESIGN SPEED	79.7

(d) 70 Percent design speed

PARAMETER	READING				
	323	324	325	326	327
ROTOR TOTAL PRESSURE RATIO	1.259	1.286	1.314	1.340	1.350
STAGE TOTAL PRESSURE RATIO	1.206	1.241	1.270	1.295	1.302
ROTOR TOTAL TEMPERATURE RATIO	1.078	1.085	1.093	1.104	1.111
STAGE TOTAL TEMPERATURE RATIO	1.076	1.082	1.091	1.100	1.108
ROTOR TEMP. RISE EFFICIENCY	0.874	0.880	0.869	0.842	0.803
STAGE TEMP. RISE EFFICIENCY	0.723	0.773	0.780	0.767	0.726
ROTOR MOMENTUM RISE EFFICIENCY	0.855	0.868	0.862	0.840	0.805
ROTOR HEAD RISE COEFFICIENT	0.226	0.248	0.269	0.287	0.294
STAGE HEAD RISE COEFFICIENT	0.183	0.212	0.234	0.253	0.257
FLOW COEFFICIENT	0.424	0.407	0.383	0.347	0.314
WT FLOW PER UNIT FRONTAL AREA	112.83	108.38	102.97	94.90	86.71
WT FLOW PER UNIT ANNULUS AREA	151.74	145.75	138.48	127.62	116.61
WT FLOW AT ORIFICE	22.30	21.42	20.35	18.76	17.14
WT FLOW AT ROTOR INLET	22.71	21.87	20.81	19.11	17.44
WT FLOW AT ROTOR OUTLET	22.14	21.33	20.23	18.52	16.56
WT FLOW AT STATOR OUTLET	22.30	21.04	19.81	18.07	16.39
ROTATIVE SPEED	11244.9	11223.2	11256.5	11280.7	11302.0
PERCENT OF DESIGN SPEED	69.8	69.7	69.9	70.1	70.2

TABLE VI. - Concluded. OVERALL PERFORMANCE FOR STAGE 12-5. SI UNITS.

(e) 60 Percent design speed

PARAMETER	READING
	328
ROTOR TOTAL PRESSURE RATIO	1.246
STAGE TOTAL PRESSURE RATIO	1.210
ROTOR TOTAL TEMPERATURE RATIO	1.080
STAGE TOTAL TEMPERATURE RATIO	1.078
ROTOR TEMP. RISE EFFICIENCY	0.806
STAGE TEMP. RISE EFFICIENCY	0.716
ROTOR MOMENTUM RISE EFFICIENCY	0.803
ROTOR HEAD RISE COEFFICIENT	0.292
STAGE HEAD RISE COEFFICIENT	0.253
FLOW COEFFICIENT	0.306
WT FLOW PER UNIT FRONTAL AREA	73.09
WT FLOW PER UNIT ANNULUS AREA	98.29
WT FLOW AT ORIFICE	14.45
WT FLOW AT ROTOR INLET	14.69
WT FLOW AT ROTOR OUTLET	13.81
WT FLOW AT STATOR OUTLET	13.41
ROTATIVE SPEED	9643.7
PERCENT OF DESIGN SPEED	59.9

(f) 50 Percent design speed

PARAMETER	READING
	329
ROTOR TOTAL PRESSURE RATIO	1.165
STAGE TOTAL PRESSURE RATIO	1.140
ROTOR TOTAL TEMPERATURE RATIO	1.055
STAGE TOTAL TEMPERATURE RATIO	1.054
ROTOR TEMP. RISE EFFICIENCY	0.816
STAGE TEMP. RISE EFFICIENCY	0.710
ROTOR MOMENTUM RISE EFFICIENCY	0.804
ROTOR HEAD RISE COEFFICIENT	0.290
STAGE HEAD RISE COEFFICIENT	0.247
FLOW COEFFICIENT	0.306
WT FLOW PER UNIT FRONTAL AREA	61.42
WT FLOW PER UNIT ANNULUS AREA	82.59
WT FLOW AT ORIFICE	12.14
WT FLOW AT ROTOR INLET	12.36
WT FLOW AT ROTOR OUTLET	11.55
WT FLOW AT STATOR OUTLET	10.95
ROTATIVE SPEED	8046.4
PERCENT OF DESIGN SPEED	50.0

TABLE VII. - BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12,

100 PERCENT DESIGN SPEED. SI UNITS.

(a) Reading 310

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	44.8	64.9	53.9	288.7	1.239	9.97	1.806
2	24.026	23.685	0.0	40.4	62.9	53.6	288.5	1.219	10.13	1.759
3	21.755	21.653	0.0	41.2	59.3	49.5	288.1	1.198	10.15	1.725
4	20.287	20.383	0.0	47.7	57.5	46.5	288.0	1.197	10.15	1.650
5	19.987	20.129	0.0	48.6	57.2	47.4	287.8	1.195	10.15	1.617
6	19.688	19.875	0.0	48.9	56.9	48.8	288.1	1.190	10.15	1.581
7	19.385	19.621	0.0	49.4	56.6	47.8	287.9	1.188	10.15	1.585
8	19.080	19.367	0.0	48.7	56.2	45.6	288.2	1.187	10.15	1.605
9	16.881	17.589	0.0	45.8	54.1	35.2	287.8	1.174	10.15	1.671
10	14.155	15.557	0.0	49.5	51.6	18.4	288.0	1.183	10.15	1.718
11	13.424	15.049	0.0	53.2	50.8	5.6	287.9	1.204	10.15	1.841

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	194.8	244.4	459.5	294.3	194.8	173.5	0.0	172.1	416.2	409.8
2	207.5	237.5	455.2	305.2	207.5	181.0	0.0	153.8	405.2	399.5
3	217.9	237.5	427.2	275.3	217.9	178.8	0.0	156.4	367.5	365.8
4	219.5	238.7	408.3	233.2	219.5	160.5	0.0	176.7	344.3	345.9
5	218.8	232.7	403.9	227.3	218.8	153.8	0.0	174.6	339.5	341.9
6	218.6	225.1	400.3	224.6	218.6	148.0	0.0	169.6	335.4	338.6
7	218.1	226.8	396.3	219.7	218.1	147.6	0.0	172.2	331.0	335.0
8	218.0	232.1	392.1	219.0	218.0	153.2	0.0	174.3	325.9	330.8
9	209.4	249.5	357.1	212.8	209.4	174.0	0.0	178.9	289.4	301.5
10	192.0	272.9	309.3	186.9	192.0	177.3	0.0	207.5	242.5	266.6
11	186.4	298.0	295.0	179.3	186.4	178.4	0.0	238.7	228.6	256.3

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.592	0.673	1.395	0.811	0.592	0.478	0.891	1.602
2	0.633	0.659	1.390	0.846	0.633	0.502	0.872	1.567
3	0.668	0.666	1.311	0.772	0.668	0.501	0.820	1.538
4	0.674	0.669	1.253	0.654	0.674	0.450	0.731	1.525
5	0.672	0.652	1.240	0.637	0.672	0.431	0.703	1.525
6	0.671	0.630	1.228	0.629	0.671	0.414	0.677	1.524
7	0.669	0.636	1.216	0.616	0.669	0.414	0.677	1.523
8	0.669	0.652	1.202	0.615	0.669	0.430	0.703	1.517
9	0.640	0.711	1.092	0.606	0.640	0.495	0.831	1.480
10	0.583	0.781	0.940	0.535	0.583	0.507	0.923	1.360
11	0.565	0.855	0.895	0.514	0.565	0.512	0.957	1.279

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	3.1	0.3	0.7	0.467	0.772	0.208	0.106	0.035	0.018
2	10.00	2.3	-0.7	1.3	0.425	0.801	0.172	0.078	0.029	0.013
3	30.00	3.3	-0.7	2.2	0.450	0.853	0.127	0.053	0.021	0.009
4	42.50	4.0	-0.7	3.7	0.534	0.779	0.199	0.135	0.033	0.022
5	45.00	4.2	-0.7	5.7	0.540	0.757	0.218	0.157	0.035	0.025
6	47.50	4.4	-0.6	8.2	0.539	0.736	0.235	0.175	0.036	0.027
7	50.00	4.5	-0.6	8.5	0.547	0.748	0.226	0.168	0.035	0.026
8	52.50	4.6	-0.7	7.5	0.544	0.774	0.206	0.151	0.033	0.024
9	70.00	5.6	-0.6	8.2	0.508	0.907	0.094	0.059	0.016	0.010
10	90.00	6.4	-0.6	10.8	0.515	0.912	0.116	0.108	0.019	0.017
11	95.00	6.4	-0.8	4.8	0.529	0.935	0.101	0.099	0.016	0.016

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12,

100 PERCENT DESIGN SPEED. SI UNITS.

(b) Reading 311

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	47.1	65.4	54.5	288.8	1.255	9.98	1.854
2	24.026	23.685	0.0	42.2	63.5	53.8	288.6	1.233	10.12	1.821
3	21.755	21.653	0.0	43.7	59.8	50.0	288.1	1.206	10.15	1.767
4	20.287	20.383	0.0	48.5	58.1	46.2	288.0	1.207	10.15	1.719
5	19.987	20.129	0.0	49.2	57.6	46.8	287.6	1.204	10.15	1.679
6	19.688	19.875	0.0	49.5	57.0	46.9	288.2	1.199	10.15	1.651
7	19.385	19.621	0.0	50.2	56.9	47.2	288.2	1.197	10.15	1.638
8	19.080	19.367	0.0	49.5	56.5	45.7	287.9	1.193	10.14	1.642
9	16.881	17.589	0.0	47.0	54.3	35.0	288.0	1.179	10.15	1.691
10	14.155	15.557	0.0	51.1	51.9	18.2	287.8	1.186	10.15	1.737
11	13.424	15.049	0.0	53.8	51.2	6.2	288.0	1.205	10.14	1.846

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	192.8	245.1	462.4	287.7	192.8	166.9	0.0	179.5	420.4	413.8
2	204.6	239.7	457.9	300.9	204.6	177.6	0.0	161.0	409.7	403.9
3	215.1	237.2	427.9	266.6	215.1	171.4	0.0	164.0	369.9	368.2
4	216.7	242.7	409.7	232.4	216.7	160.9	0.0	181.7	347.7	349.4
5	216.0	236.5	403.6	225.8	216.0	154.7	0.0	178.9	341.0	343.4
6	216.4	231.3	397.4	219.8	216.4	150.1	0.0	176.0	333.4	336.6
7	216.2	229.9	395.5	216.5	216.2	147.2	0.0	176.5	331.3	335.3
8	215.1	231.2	389.7	215.3	215.1	150.3	0.0	175.7	325.0	329.9
9	206.8	247.6	354.1	206.2	206.8	168.9	0.0	181.1	287.4	299.5
10	189.3	269.6	307.0	178.3	189.3	169.3	0.0	209.8	241.7	265.6
11	183.3	293.3	292.3	174.2	183.3	173.1	0.0	236.7	227.8	255.3

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.585	0.671	1.403	0.787	0.585	0.457	0.866	1.625
2	0.624	0.661	1.396	0.830	0.624	0.490	0.868	1.593
3	0.659	0.662	1.311	0.744	0.659	0.478	0.797	1.555
4	0.664	0.679	1.256	0.650	0.664	0.450	0.743	1.548
5	0.663	0.661	1.239	0.631	0.663	0.432	0.716	1.538
6	0.663	0.646	1.218	0.614	0.663	0.419	0.694	1.519
7	0.663	0.643	1.212	0.605	0.663	0.412	0.681	1.529
8	0.659	0.648	1.195	0.603	0.659	0.421	0.699	1.520
9	0.632	0.703	1.082	0.585	0.632	0.479	0.817	1.479
10	0.575	0.770	0.932	0.509	0.575	0.484	0.894	1.358
11	0.555	0.839	0.885	0.498	0.555	0.495	0.945	1.277

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	3.5	0.8	1.3	0.489	0.757	0.230	0.121	0.039	0.020
2	10.00	2.9	-0.1	1.5	0.442	0.800	0.180	0.080	0.030	0.013
3	30.00	3.8	-0.2	2.7	0.476	0.856	0.129	0.051	0.021	0.008
4	42.50	4.6	-0.1	3.4	0.540	0.809	0.180	0.111	0.030	0.019
5	45.00	4.6	-0.2	5.0	0.547	0.784	0.203	0.139	0.033	0.023
6	47.50	4.5	-0.5	6.4	0.551	0.774	0.212	0.154	0.034	0.025
7	50.00	4.8	-0.3	7.8	0.557	0.770	0.216	0.157	0.034	0.025
8	52.50	4.9	-0.4	7.7	0.551	0.787	0.201	0.147	0.032	0.023
9	70.00	5.7	-0.4	8.0	0.523	0.905	0.098	0.065	0.016	0.011
10	90.00	6.7	-0.3	10.6	0.540	0.920	0.108	0.101	0.017	0.016
11	95.00	6.7	-0.4	5.3	0.541	0.934	0.105	0.103	0.017	0.016

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12,

100 PERCENT DESIGN SPEED. SI UNITS.

(c) Reading 305

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	50.1	65.7	54.2	288.8	1.266	9.97	1.887
2	24.026	23.685	0.0	46.1	63.9	53.6	288.6	1.244	10.12	1.854
3	21.755	21.653	0.0	46.5	60.7	50.2	288.2	1.217	10.15	1.806
4	20.287	20.383	0.0	49.9	58.6	44.8	288.1	1.216	10.15	1.774
5	19.987	20.129	0.0	50.2	58.3	44.8	288.0	1.215	10.15	1.755
6	19.688	19.875	0.0	50.9	57.7	45.0	288.0	1.211	10.15	1.721
7	19.385	19.621	0.0	51.8	57.3	44.9	287.9	1.208	10.15	1.701
8	19.080	19.367	0.0	51.9	56.9	43.5	287.9	1.204	10.15	1.702
9	16.881	17.589	0.0	49.2	54.6	34.0	287.9	1.185	10.15	1.720
10	14.155	15.557	0.0	52.0	52.4	17.9	287.9	1.189	10.15	1.757
11	13.424	15.049	0.0	54.6	51.7	4.9	287.9	1.207	10.15	1.880

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	185.9	244.7	451.8	268.3	185.9	156.9	0.0	187.8	411.8	405.4
2	197.5	239.7	449.8	280.4	197.5	166.3	0.1	172.7	404.1	398.4
3	208.2	237.8	425.2	255.6	208.2	163.6	0.0	172.6	370.8	369.1
4	209.7	245.3	402.0	222.6	209.7	157.8	0.0	187.8	343.0	344.7
5	209.0	243.0	397.9	219.0	209.0	155.5	0.0	186.8	338.6	341.0
6	209.3	237.5	391.7	211.9	209.3	149.7	0.1	184.3	331.1	334.3
7	208.8	234.8	386.7	205.2	208.8	145.2	0.0	184.5	325.5	329.5
8	208.0	235.9	380.7	200.8	208.0	145.7	0.0	185.5	318.9	323.7
9	200.4	245.7	346.2	193.5	200.4	160.4	0.0	186.1	282.4	294.2
10	182.8	264.5	299.7	171.1	182.8	162.8	0.1	208.5	237.6	261.1
11	177.7	292.0	286.8	169.9	177.7	169.2	0.0	237.9	225.1	252.4

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.563	0.666	1.368	0.730	0.563	0.427	0.844	1.602
2	0.601	0.658	1.368	0.769	0.601	0.456	0.842	1.582
3	0.636	0.660	1.299	0.710	0.636	0.454	0.786	1.573
4	0.641	0.684	1.229	0.620	0.641	0.440	0.753	1.541
5	0.639	0.677	1.216	0.610	0.639	0.433	0.744	1.542
6	0.640	0.661	1.198	0.590	0.640	0.417	0.715	1.525
7	0.638	0.655	1.182	0.572	0.638	0.405	0.695	1.519
8	0.636	0.659	1.164	0.561	0.636	0.407	0.700	1.508
9	0.611	0.695	1.055	0.547	0.611	0.454	0.801	1.477
10	0.554	0.752	0.908	0.487	0.554	0.463	0.890	1.338
11	0.537	0.834	0.867	0.485	0.537	0.483	0.952	1.267

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	3.8	1.1	1.0	0.525	0.747	0.253	0.155	0.043	0.026
2	10.00	3.4	0.4	1.3	0.484	0.790	0.200	0.107	0.034	0.018
3	30.00	4.7	0.7	2.9	0.503	0.846	0.144	0.064	0.024	0.011
4	42.50	5.1	0.3	2.1	0.559	0.824	0.176	0.112	0.030	0.019
5	45.00	5.3	0.4	3.0	0.562	0.812	0.188	0.127	0.032	0.021
6	47.50	5.2	0.2	4.5	0.570	0.794	0.207	0.151	0.034	0.025
7	50.00	5.2	0.1	5.6	0.581	0.790	0.212	0.159	0.035	0.026
8	52.50	5.2	-0.0	5.4	0.584	0.803	0.201	0.153	0.033	0.025
9	70.00	6.1	-0.0	7.0	0.552	0.904	0.106	0.076	0.018	0.013
10	90.00	7.2	0.2	10.3	0.552	0.925	0.105	0.101	0.017	0.016
11	95.00	7.3	0.1	4.1	0.548	0.953	0.077	0.076	0.012	0.012

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12,

100 PERCENT DESIGN SPEED. SI UNITS.

(d) Reading 313

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	51.8	67.8	55.0	288.7	1.277	10.00	1.954
2	24.026	23.685	0.0	51.2	66.0	54.1	288.5	1.267	10.12	1.922
3	21.755	21.653	0.0	49.9	62.4	50.5	288.1	1.233	10.15	1.855
4	20.287	20.383	0.0	51.9	60.6	45.8	288.0	1.227	10.15	1.830
5	19.987	20.129	0.0	52.5	60.1	44.9	288.1	1.227	10.15	1.823
6	19.688	19.875	0.0	53.8	59.8	45.3	288.2	1.226	10.15	1.798
7	19.385	19.621	0.0	55.0	59.5	45.1	288.0	1.223	10.15	1.780
8	19.080	19.367	0.0	54.3	59.1	43.1	288.0	1.220	10.15	1.787
9	16.881	17.589	0.0	51.2	56.3	35.6	288.0	1.196	10.15	1.765
10	14.155	15.557	0.0	53.0	54.3	20.1	288.0	1.197	10.14	1.795
11	13.424	15.049	0.0	55.6	53.7	6.2	288.1	1.215	10.14	1.911

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	170.3	246.0	450.4	265.1	170.3	152.0	0.0	193.4	417.0	410.5
2	181.3	244.5	446.5	261.4	181.3	153.2	0.0	190.5	408.1	402.3
3	192.8	237.5	416.2	240.4	192.8	153.0	0.0	181.7	368.9	367.2
4	194.0	243.4	395.0	215.4	194.0	150.3	0.0	191.5	344.1	345.8
5	194.4	243.5	390.2	208.9	194.4	148.1	0.0	193.3	338.3	340.7
6	194.7	240.8	387.4	202.3	194.7	142.3	0.0	194.3	335.0	338.1
7	193.6	238.7	381.6	194.0	193.6	136.9	0.0	195.5	328.9	332.9
8	193.7	241.3	376.7	192.8	193.7	140.7	0.0	196.1	323.1	328.0
9	189.8	241.1	341.7	185.7	189.8	151.0	0.0	188.0	284.2	296.1
10	172.1	258.4	295.0	165.6	172.1	155.4	0.0	206.4	239.7	263.4
11	167.1	287.8	282.1	163.6	167.1	162.7	0.0	237.4	227.4	254.9

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.513	0.667	1.357	0.719	0.513	0.412	0.892	1.662
2	0.548	0.666	1.350	0.712	0.548	0.417	0.845	1.636
3	0.586	0.655	1.265	0.663	0.586	0.422	0.794	1.600
4	0.590	0.675	1.201	0.597	0.590	0.417	0.775	1.585
5	0.591	0.675	1.186	0.579	0.591	0.410	0.762	1.577
6	0.592	0.667	1.178	0.560	0.592	0.394	0.731	1.581
7	0.588	0.662	1.160	0.538	0.588	0.380	0.707	1.576
8	0.589	0.671	1.145	0.536	0.589	0.391	0.726	1.568
9	0.576	0.677	1.037	0.521	0.576	0.424	0.795	1.523
10	0.519	0.730	0.890	0.468	0.519	0.439	0.903	1.369
11	0.503	0.817	0.850	0.464	0.503	0.462	0.974	1.299

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	5.9	3.2	1.8	0.535	0.761	0.250	0.140	0.041	0.023
2	10.00	5.5	2.5	1.8	0.534	0.770	0.236	0.133	0.039	0.022
3	30.00	6.4	2.4	3.2	0.535	0.828	0.175	0.094	0.029	0.015
4	42.50	7.1	2.4	3.0	0.572	0.831	0.179	0.111	0.030	0.019
5	45.00	7.1	2.2	3.1	0.583	0.826	0.188	0.124	0.032	0.021
6	47.50	7.3	2.3	4.7	0.596	0.807	0.210	0.146	0.035	0.024
7	50.00	7.4	2.3	5.7	0.611	0.803	0.215	0.155	0.035	0.025
8	52.50	7.4	2.2	5.1	0.608	0.821	0.198	0.141	0.033	0.023
9	70.00	7.7	1.6	8.6	0.570	0.898	0.121	0.086	0.020	0.014
10	90.00	9.1	2.1	12.5	0.563	0.923	0.116	0.111	0.018	0.018
11	95.00	9.2	2.1	5.3	0.562	0.945	0.096	0.095	0.015	0.015

TABLE VII. - Concluded. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12, 100 PERCENT DESIGN SPEED. SI UNITS.

(e) Reading 314

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	57.7	68.3	55.9	288.7	1.304	10.00	1.960
2	24.026	23.685	0.0	55.3	67.1	55.3	288.5	1.284	10.12	1.938
3	21.755	21.653	0.0	51.0	63.4	50.8	288.1	1.239	10.15	1.868
4	20.287	20.383	0.0	53.1	61.6	46.9	288.1	1.230	10.15	1.841
5	19.987	20.129	0.0	53.4	61.0	46.1	288.2	1.230	10.15	1.826
6	19.688	19.875	0.0	54.2	60.1	45.5	287.7	1.228	10.15	1.800
7	19.385	19.621	0.0	54.5	60.1	46.0	288.3	1.227	10.14	1.788
8	19.080	19.367	0.0	54.8	59.6	44.3	287.8	1.222	10.15	1.788
9	16.881	17.589	0.0	52.7	57.0	35.9	288.0	1.199	10.15	1.774
10	14.155	15.557	0.0	54.1	54.9	20.3	287.9	1.199	10.15	1.806
11	13.424	15.049	0.0	56.5	54.0	6.0	287.9	1.215	10.14	1.904

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	164.6	249.3	445.4	237.5	164.6	133.1	0.0	210.8	413.9	407.4
2	174.2	247.2	447.7	247.4	174.2	140.8	0.0	203.2	412.5	406.6
3	185.5	237.8	413.7	236.8	185.5	149.7	0.0	184.7	369.8	368.1
4	188.1	242.1	394.9	212.8	188.1	145.5	0.0	193.6	347.2	348.9
5	188.2	240.7	388.4	206.9	188.2	143.6	0.0	193.3	339.8	342.2
6	192.1	239.9	385.3	200.1	192.1	140.3	0.0	194.6	334.0	337.2
7	192.2	238.8	385.5	199.7	192.2	138.6	0.0	194.5	334.2	338.3
8	191.9	240.3	378.8	193.6	191.9	138.5	0.0	196.3	326.7	331.6
9	186.3	242.3	342.2	181.5	186.3	147.0	0.0	192.6	287.1	299.2
10	170.9	260.1	297.1	162.5	170.9	152.4	0.0	210.8	243.1	267.1
11	165.7	286.5	281.8	158.8	165.7	157.9	0.0	239.0	227.9	255.5

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.495	0.669	1.339	0.637	0.495	0.357	0.809	1.663
2	0.526	0.669	1.351	0.669	0.526	0.381	0.808	1.673
3	0.562	0.654	1.254	0.651	0.562	0.412	0.807	1.622
4	0.571	0.670	1.198	0.589	0.571	0.402	0.773	1.615
5	0.571	0.665	1.178	0.572	0.571	0.397	0.763	1.601
6	0.584	0.664	1.171	0.554	0.584	0.388	0.731	1.585
7	0.584	0.661	1.171	0.553	0.584	0.384	0.721	1.603
8	0.583	0.667	1.151	0.537	0.583	0.384	0.722	1.590
9	0.565	0.680	1.038	0.509	0.565	0.412	0.789	1.549
10	0.516	0.735	0.896	0.459	0.516	0.431	0.892	1.396
11	0.499	0.813	0.849	0.451	0.499	0.448	0.953	1.305

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	6.5	3.8	2.7	0.602	0.698	0.335	0.227	0.054	0.037
2	10.00	6.5	3.6	3.0	0.575	0.733	0.283	0.171	0.045	0.028
3	30.00	7.4	3.3	3.5	0.543	0.818	0.190	0.106	0.031	0.017
4	42.50	8.1	3.3	4.1	0.580	0.826	0.187	0.113	0.031	0.019
5	45.00	8.0	3.1	4.3	0.586	0.815	0.203	0.135	0.034	0.022
6	47.50	7.6	2.6	4.9	0.600	0.802	0.218	0.154	0.036	0.025
7	50.00	8.0	2.9	6.7	0.599	0.797	0.222	0.154	0.036	0.025
8	52.50	7.9	2.7	6.3	0.608	0.813	0.207	0.145	0.034	0.024
9	70.00	8.5	2.3	8.9	0.586	0.893	0.128	0.089	0.021	0.015
10	90.00	9.6	2.6	12.7	0.579	0.926	0.112	0.104	0.018	0.017
11	95.00	9.5	2.4	5.1	0.580	0.941	0.102	0.101	0.016	0.016

TABLE VIII. - BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12,

90 PERCENT DESIGN SPEED. SI UNITS.

(a) Reading 315

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	38.4	65.3	54.0	288.5	1.178	10.01	1.573
2	24.026	23.685	0.0	37.9	63.5	53.3	288.6	1.164	10.11	1.550
3	21.755	21.653	0.0	39.0	59.9	49.8	288.1	1.149	10.15	1.522
4	20.287	20.383	0.0	43.3	58.0	44.8	287.9	1.153	10.14	1.513
5	19.987	20.129	0.0	43.4	57.6	44.9	287.8	1.152	10.15	1.493
6	19.688	19.875	0.0	44.9	57.2	44.8	288.0	1.151	10.15	1.479
7	19.385	19.621	0.0	44.3	56.9	45.2	288.1	1.149	10.15	1.465
8	19.080	19.367	0.0	45.3	56.5	43.4	288.1	1.147	10.15	1.475
9	16.881	17.589	0.0	44.0	54.2	33.8	288.0	1.140	10.15	1.516
10	14.155	15.557	0.0	48.0	51.6	16.2	287.9	1.147	10.15	1.573
11	13.424	15.049	0.0	51.7	50.8	6.2	287.8	1.161	10.15	1.636

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	171.8	216.1	411.0	288.2	171.8	169.3	0.0	134.3	373.4	367.6
2	182.1	215.0	407.8	283.8	182.1	169.6	0.0	132.2	364.9	359.7
3	191.7	212.0	381.8	255.4	191.7	164.7	0.0	133.5	330.2	328.7
4	192.7	219.9	363.4	225.5	192.7	160.1	0.0	150.8	308.1	309.6
5	192.4	216.2	358.8	221.8	192.4	157.2	0.0	148.5	302.9	305.0
6	192.3	214.1	355.3	213.8	192.3	151.8	0.0	151.0	298.7	301.6
7	192.0	210.1	351.5	213.4	192.0	150.5	0.0	146.7	294.4	298.0
8	191.7	213.6	347.4	207.1	191.7	150.3	0.0	151.8	289.8	294.2
9	185.0	227.1	316.2	196.5	185.0	163.3	0.0	157.8	256.5	267.3
10	170.8	252.3	274.8	175.8	170.8	168.8	0.0	187.5	215.2	236.6
11	166.0	268.2	262.9	167.2	166.0	166.2	0.0	210.5	203.8	228.5

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.518	0.606	1.239	0.808	0.518	0.475	0.985	1.469
2	0.551	0.606	1.233	0.800	0.551	0.478	0.932	1.441
3	0.582	0.602	1.159	0.725	0.582	0.468	0.859	1.424
4	0.586	0.625	1.104	0.641	0.586	0.455	0.831	1.423
5	0.585	0.614	1.091	0.630	0.585	0.447	0.817	1.421
6	0.584	0.608	1.079	0.607	0.584	0.431	0.789	1.422
7	0.583	0.596	1.067	0.606	0.583	0.427	0.784	1.424
8	0.582	0.607	1.055	0.589	0.582	0.427	0.784	1.423
9	0.561	0.651	0.958	0.564	0.561	0.468	0.883	1.382
10	0.515	0.728	0.829	0.508	0.515	0.487	0.988	1.197
11	0.500	0.774	0.792	0.483	0.500	0.480	1.001	1.134

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	3.4	0.7	0.8	0.392	0.777	0.182	0.131	0.031	0.022
2	10.00	2.9	-0.1	1.0	0.395	0.812	0.146	0.100	0.025	0.017
3	30.00	3.9	-0.2	2.5	0.421	0.855	0.113	0.079	0.019	0.013
4	42.50	4.5	-0.2	2.0	0.480	0.824	0.149	0.121	0.026	0.021
5	45.00	4.6	-0.3	3.2	0.481	0.800	0.171	0.145	0.029	0.025
6	47.50	4.7	-0.3	4.2	0.498	0.785	0.185	0.160	0.031	0.027
7	50.00	4.8	-0.3	5.8	0.490	0.775	0.194	0.170	0.032	0.028
8	52.50	4.9	-0.4	5.4	0.504	0.796	0.178	0.155	0.029	0.026
9	70.00	5.7	-0.5	6.8	0.482	0.905	0.093	0.083	0.016	0.014
10	90.00	6.3	-0.7	8.6	0.481	0.941	0.077	0.077	0.012	0.012
11	95.00	6.4	-0.8	5.4	0.499	0.936	0.096	0.096	0.015	0.015

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12,

90 PERCENT DESIGN SPEED. SI UNITS.

(b) Reading 316

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.574	24.193	0.0	41.8	65.7	54.1	288.8	1.192	10.01	1.613
2	24.026	23.685	0.0	40.7	64.0	53.2	288.7	1.176	10.11	1.597
3	21.755	21.653	0.0	40.6	60.4	50.0	288.0	1.157	10.15	1.559
4	20.287	20.383	0.0	44.6	58.5	44.7	288.1	1.160	10.14	1.552
5	19.987	20.129	0.0	45.7	58.1	44.5	288.2	1.160	10.15	1.538
6	19.688	19.875	0.0	46.3	57.8	44.5	287.8	1.159	10.15	1.521
7	19.385	19.621	0.0	46.3	57.4	44.4	288.2	1.157	10.14	1.512
8	19.080	19.367	0.0	47.0	57.1	43.0	288.0	1.155	10.15	1.515
9	16.881	17.589	0.0	45.5	54.7	34.0	287.9	1.144	10.15	1.537
10	14.155	15.557	0.0	49.1	52.2	16.5	287.9	1.151	10.14	1.588
11	13.424	15.049	0.0	52.5	51.5	5.8	287.8	1.165	10.15	1.657

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	168.1	216.4	409.1	275.3	168.1	161.4	0.0	144.1	373.0	367.2
2	178.0	215.9	406.0	273.5	178.0	163.8	0.0	140.7	365.0	359.8
3	187.1	211.1	379.3	249.3	187.1	160.2	0.0	137.5	330.0	328.4
4	188.7	220.0	361.1	220.5	188.7	156.8	0.0	154.4	307.9	309.4
5	188.6	218.0	357.4	213.5	188.6	152.3	0.0	156.0	303.6	305.7
6	188.4	215.2	353.4	208.4	188.4	148.6	0.0	155.7	299.0	301.9
7	188.3	213.3	349.9	206.2	188.3	147.3	0.0	154.2	294.9	298.5
8	187.8	215.4	345.7	200.9	187.8	146.9	0.0	157.6	290.3	294.7
9	181.3	225.2	314.1	190.5	181.3	157.8	0.0	160.7	256.5	267.3
10	166.9	249.2	272.4	170.2	166.9	163.2	0.0	188.3	215.3	236.6
11	162.5	267.7	260.9	163.8	162.5	162.9	0.0	212.4	204.1	228.8

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID VEL R	PEAK SS MACH NO
RP	IN	OUT	IN	OUT	IN	OUT		
1	0.506	0.603	1.231	0.767	0.506	0.449	0.960	1.477
2	0.538	0.606	1.226	0.767	0.538	0.459	0.920	1.453
3	0.567	0.597	1.150	0.705	0.567	0.453	0.856	1.437
4	0.573	0.623	1.096	0.625	0.573	0.444	0.831	1.435
5	0.572	0.617	1.084	0.604	0.572	0.431	0.807	1.437
6	0.572	0.609	1.073	0.590	0.572	0.421	0.789	1.438
7	0.571	0.603	1.061	0.583	0.571	0.417	0.782	1.439
8	0.570	0.611	1.049	0.570	0.570	0.416	0.782	1.440
9	0.549	0.644	0.951	0.545	0.549	0.451	0.871	1.389
10	0.503	0.717	0.821	0.490	0.503	0.470	0.978	1.204
11	0.489	0.771	0.785	0.472	0.489	0.469	1.003	1.141

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	3.9	1.2	0.9	0.428	0.762	0.207	0.156	0.035	0.026
2	10.00	3.4	0.5	0.9	0.424	0.814	0.153	0.106	0.026	0.018
3	30.00	4.5	0.4	2.7	0.436	0.864	0.112	0.077	0.019	0.013
4	42.50	5.0	0.3	1.9	0.493	0.838	0.144	0.116	0.025	0.020
5	45.00	5.1	0.3	2.8	0.507	0.816	0.166	0.139	0.028	0.024
6	47.50	5.2	0.3	4.0	0.514	0.802	0.180	0.153	0.030	0.026
7	50.00	5.4	0.2	5.0	0.513	0.796	0.187	0.161	0.031	0.027
8	52.50	5.5	0.2	5.0	0.524	0.814	0.171	0.147	0.029	0.025
9	70.00	6.2	0.1	7.0	0.499	0.907	0.095	0.084	0.016	0.014
10	90.00	7.0	-0.0	8.9	0.498	0.935	0.087	0.087	0.014	0.014
11	95.00	7.0	-0.1	4.9	0.510	0.938	0.096	0.096	0.015	0.015

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12,

90 PERCENT DESIGN SPEED. SI UNITS.

(c) Reading 319

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	46.1	66.5	54.5	289.2	1.202	10.01	1.640
2	24.026	23.685	0.0	42.4	64.7	53.6	288.9	1.186	10.11	1.628
3	21.755	21.653	0.0	43.5	61.2	50.0	288.0	1.167	10.14	1.595
4	20.287	20.383	0.0	46.7	59.3	44.5	287.9	1.167	10.15	1.588
5	19.987	20.129	0.0	47.2	59.0	44.2	287.5	1.166	10.15	1.574
6	19.688	19.875	0.0	48.4	58.5	43.7	288.0	1.166	10.15	1.563
7	19.385	19.621	0.0	48.5	58.2	43.5	287.8	1.164	10.15	1.548
8	19.080	19.367	0.0	47.9	57.8	42.4	287.8	1.161	10.15	1.550
9	16.881	17.589	0.0	47.0	55.4	34.2	287.9	1.147	10.15	1.551
10	14.155	15.557	0.0	50.5	52.9	16.2	287.8	1.154	10.15	1.599
11	13.424	15.049	0.0	53.9	52.2	4.8	287.9	1.167	10.15	1.668

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	162.5	217.1	406.8	258.8	162.5	150.4	0.0	156.5	373.0	367.2
2	172.2	214.8	403.5	266.9	172.2	158.5	0.0	145.0	364.9	359.7
3	181.4	211.9	376.9	239.1	181.4	153.8	0.0	145.8	330.4	328.9
4	182.7	220.6	358.1	212.4	182.7	151.4	0.0	160.5	308.0	309.5
5	182.4	219.0	353.7	207.3	182.4	148.7	0.0	160.8	303.1	305.2
6	182.8	218.3	350.4	200.6	182.8	145.0	0.0	163.1	298.9	301.8
7	182.3	216.0	345.7	197.2	182.3	143.2	0.0	161.7	293.8	297.3
8	182.0	217.0	341.9	196.9	182.0	145.4	0.0	161.1	289.5	293.8
9	176.3	223.2	310.8	184.2	176.3	152.3	0.0	163.2	256.0	266.7
10	162.2	246.9	269.2	163.4	162.2	157.0	0.0	190.5	214.8	236.1
11	157.8	266.3	257.5	157.5	157.8	157.0	0.0	215.1	203.5	228.2

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.488	0.602	1.222	0.717	0.488	0.417	0.925	1.493
2	0.519	0.599	1.216	0.745	0.519	0.442	0.920	1.469
3	0.549	0.597	1.141	0.674	0.549	0.433	0.848	1.457
4	0.553	0.623	1.085	0.600	0.553	0.428	0.829	1.457
5	0.553	0.619	1.072	0.586	0.553	0.420	0.815	1.457
6	0.554	0.616	1.061	0.567	0.554	0.410	0.793	1.457
7	0.552	0.610	1.047	0.557	0.552	0.405	0.785	1.457
8	0.551	0.614	1.036	0.557	0.551	0.412	0.799	1.459
9	0.533	0.637	0.939	0.526	0.533	0.435	0.864	1.395
10	0.488	0.709	0.810	0.469	0.488	0.451	0.967	1.208
11	0.474	0.766	0.774	0.453	0.474	0.452	0.995	1.144

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	4.6	1.9	1.3	0.474	0.752	0.226	0.173	0.038	0.029
2	10.00	4.2	1.2	1.2	0.439	0.804	0.170	0.122	0.029	0.020
3	30.00	5.2	1.2	2.7	0.465	0.857	0.125	0.088	0.021	0.015
4	42.50	5.8	1.1	1.8	0.515	0.846	0.144	0.114	0.025	0.020
5	45.00	5.9	1.1	2.4	0.523	0.834	0.157	0.128	0.027	0.022
6	47.50	6.0	1.0	3.1	0.537	0.819	0.174	0.146	0.030	0.025
7	50.00	6.1	1.0	4.1	0.538	0.810	0.183	0.156	0.031	0.026
8	52.50	6.2	0.9	4.3	0.532	0.831	0.164	0.138	0.028	0.023
9	70.00	6.9	0.8	7.2	0.516	0.910	0.094	0.084	0.016	0.014
10	90.00	7.7	0.7	8.6	0.518	0.934	0.091	0.091	0.015	0.015
11	95.00	7.7	0.6	3.9	0.529	0.941	0.095	0.095	0.015	0.015

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12, 90 PERCENT DESIGN SPEED. SI UNITS.

(d) Reading 320

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	51.6	67.7	55.0	289.0	1.216	10.02	1.693
2	24.026	23.685	0.0	46.6	66.2	53.5	288.9	1.200	10.11	1.675
3	21.755	21.653	0.0	46.8	62.6	50.1	288.1	1.177	10.15	1.632
4	20.287	20.383	0.0	48.9	60.8	45.4	288.0	1.173	10.15	1.616
5	19.987	20.129	0.0	49.8	60.4	44.3	287.6	1.173	10.15	1.617
6	19.688	19.875	0.0	50.8	60.1	43.3	287.9	1.175	10.15	1.611
7	19.385	19.621	0.0	51.8	59.7	42.7	287.4	1.173	10.14	1.600
8	19.080	19.367	0.0	51.0	59.3	41.9	288.1	1.169	10.15	1.598
9	16.881	17.589	0.0	49.3	57.1	35.2	287.8	1.153	10.15	1.573
10	14.155	15.557	0.0	53.5	54.7	17.2	287.9	1.156	10.15	1.604
11	13.424	15.049	0.0	54.6	53.9	5.2	287.7	1.169	10.14	1.693

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	152.9	219.7	402.8	237.8	152.9	136.5	0.0	172.1	372.6	366.9
2	160.6	216.4	397.4	250.2	160.6	148.7	0.0	157.2	363.6	358.4
3	170.4	211.7	370.9	226.2	170.4	145.1	0.0	154.3	329.4	327.9
4	171.8	217.3	351.8	203.3	171.8	142.8	0.0	163.8	307.0	308.4
5	171.6	218.6	347.9	197.3	171.6	141.2	0.0	166.9	302.6	304.8
6	171.7	219.5	344.0	190.5	171.7	138.6	0.0	170.2	298.1	301.0
7	171.5	218.9	339.8	184.0	171.5	135.3	0.0	172.1	293.4	296.9
8	171.5	218.7	336.0	184.9	171.5	137.7	0.0	170.0	289.0	293.3
9	165.5	218.7	304.5	174.4	165.5	142.6	0.0	165.9	255.6	266.3
10	151.9	238.5	262.8	148.5	151.9	141.9	0.0	191.7	214.4	235.6
11	148.0	262.4	251.2	152.8	148.0	152.2	0.0	213.8	202.9	227.5

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.458	0.606	1.207	0.656	0.458	0.376	0.892	1.522
2	0.482	0.600	1.193	0.694	0.482	0.413	0.926	1.499
3	0.514	0.594	1.119	0.634	0.514	0.407	0.851	1.489
4	0.519	0.611	1.062	0.572	0.519	0.402	0.831	1.492
5	0.518	0.616	1.050	0.556	0.518	0.398	0.823	1.496
6	0.518	0.618	1.038	0.536	0.518	0.390	0.807	1.498
7	0.518	0.617	1.026	0.519	0.518	0.381	0.789	1.500
8	0.517	0.617	1.014	0.521	0.517	0.388	0.803	1.502
9	0.499	0.622	0.918	0.496	0.499	0.405	0.861	1.413
10	0.456	0.682	0.788	0.425	0.456	0.406	0.934	1.222
11	0.444	0.753	0.753	0.439	0.444	0.437	1.028	1.156

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	5.8	3.1	1.8	0.532	0.752	0.242	0.186	0.040	0.031
2	10.00	5.6	2.6	1.2	0.481	0.794	0.193	0.143	0.032	0.024
3	30.00	6.7	2.6	2.8	0.497	0.849	0.141	0.102	0.023	0.017
4	42.50	7.3	2.5	2.6	0.535	0.850	0.149	0.116	0.025	0.020
5	45.00	7.4	2.6	2.6	0.547	0.851	0.150	0.118	0.026	0.020
6	47.50	7.5	2.5	2.8	0.563	0.834	0.172	0.140	0.029	0.024
7	50.00	7.6	2.5	3.3	0.576	0.831	0.175	0.145	0.030	0.025
8	52.50	7.7	2.4	3.8	0.566	0.846	0.161	0.132	0.027	0.022
9	70.00	8.5	2.4	8.2	0.540	0.903	0.108	0.098	0.018	0.016
10	90.00	9.4	2.4	9.6	0.564	0.927	0.107	0.107	0.017	0.017
11	95.00	9.4	2.3	4.3	0.535	0.963	0.062	0.062	0.010	0.010

TABLE VIII. - Concluded. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12,

90 PERCENT DESIGN SPEED. SI UNITS.

(e) Reading 321

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	57.3	69.3	56.3	289.4	1.229	10.03	1.718
2	24.026	23.685	0.0	52.4	67.6	54.1	289.3	1.216	10.11	1.702
3	21.755	21.653	0.0	49.6	64.4	50.8	287.8	1.185	10.15	1.650
4	20.287	20.383	0.0	51.1	62.5	45.9	287.9	1.179	10.15	1.639
5	19.987	20.129	0.0	52.1	62.1	45.2	288.0	1.179	10.14	1.632
6	19.688	19.875	0.0	53.4	61.8	44.5	287.5	1.180	10.14	1.623
7	19.385	19.621	0.0	54.6	61.4	43.3	288.3	1.182	10.14	1.621
8	19.080	19.367	0.0	54.4	61.1	42.2	287.5	1.177	10.14	1.621
9	16.881	17.589	0.0	53.1	58.9	35.9	287.9	1.159	10.15	1.582
10	14.155	15.557	0.0	54.4	56.3	18.4	287.8	1.157	10.14	1.612
11	13.424	15.049	0.0	56.7	55.6	4.6	288.0	1.170	10.14	1.691

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	140.5	222.0	397.7	215.9	140.5	119.9	0.0	186.8	372.1	366.3
2	149.6	219.4	393.4	228.3	149.6	133.9	0.0	173.7	363.8	358.7
3	158.1	210.7	365.2	216.0	158.1	136.6	0.0	160.4	329.3	327.7
4	159.6	216.1	345.8	195.0	159.6	135.7	0.0	168.2	306.8	308.3
5	159.8	216.1	341.7	188.6	159.8	132.9	0.0	170.4	302.1	304.2
6	159.6	216.3	337.6	180.9	159.6	129.1	0.0	173.6	297.5	300.4
7	159.7	218.4	334.2	173.7	159.7	126.5	0.0	178.1	293.5	297.1
8	159.6	218.8	329.9	171.6	159.6	127.2	0.0	177.9	288.8	293.1
9	154.4	215.6	298.4	159.9	154.4	129.5	0.0	172.4	255.4	266.1
10	142.9	233.7	257.4	143.2	142.9	135.9	0.0	190.1	214.2	235.4
11	139.4	259.1	246.6	142.7	139.4	142.3	0.0	216.6	203.5	228.1

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.419	0.609	1.187	0.592	0.419	0.329	0.853	1.561
2	0.448	0.604	1.177	0.629	0.448	0.369	0.895	1.536
3	0.475	0.589	1.098	0.603	0.475	0.382	0.864	1.533
4	0.480	0.606	1.040	0.547	0.480	0.381	0.850	1.541
5	0.481	0.606	1.028	0.529	0.481	0.373	0.831	1.543
6	0.480	0.607	1.016	0.508	0.480	0.362	0.809	1.548
7	0.480	0.612	1.004	0.487	0.480	0.354	0.792	1.553
8	0.480	0.615	0.993	0.483	0.480	0.358	0.797	1.548
9	0.463	0.610	0.896	0.453	0.463	0.367	0.839	1.434
10	0.428	0.667	0.771	0.409	0.428	0.388	0.951	1.237
11	0.417	0.742	0.737	0.409	0.417	0.407	1.021	1.174

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	7.5	4.8	3.1	0.592	0.730	0.279	0.218	0.045	0.035
2	10.00	7.1	4.1	1.8	0.544	0.759	0.243	0.188	0.040	0.031
3	30.00	8.4	4.3	3.5	0.522	0.832	0.167	0.123	0.027	0.020
4	42.50	9.0	4.3	3.1	0.554	0.846	0.161	0.123	0.027	0.021
5	45.00	9.1	4.2	3.5	0.567	0.839	0.171	0.133	0.029	0.022
6	47.50	9.2	4.3	3.9	0.586	0.826	0.188	0.151	0.031	0.025
7	50.00	9.4	4.2	3.9	0.604	0.814	0.205	0.169	0.035	0.029
8	52.50	9.4	4.2	4.1	0.604	0.835	0.183	0.149	0.031	0.025
9	70.00	10.3	4.2	8.9	0.584	0.881	0.142	0.132	0.023	0.022
10	90.00	11.0	4.1	10.8	0.574	0.928	0.110	0.110	0.018	0.018
11	95.00	11.1	4.0	3.8	0.570	0.953	0.083	0.083	0.013	0.013

TABLE IX. - BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12,

80 PERCENT DESIGN SPEED. SI UNITS. READING 322.

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	57.3	71.0	57.3	289.8	1.176	10.07	1.513
2	24.026	23.685	0.0	52.5	69.6	54.5	289.0	1.170	10.13	1.510
3	21.755	21.653	0.0	51.8	66.8	52.0	287.9	1.148	10.14	1.469
4	20.287	20.383	0.0	53.7	65.1	46.4	287.9	1.144	10.14	1.470
5	19.987	20.129	0.0	54.5	64.8	45.9	287.8	1.144	10.14	1.466
6	19.688	19.875	0.0	55.6	64.5	45.8	287.8	1.143	10.14	1.455
7	19.385	19.621	0.0	57.3	64.1	45.9	288.0	1.142	10.14	1.443
8	19.080	19.367	0.0	57.7	63.8	44.6	287.6	1.141	10.14	1.442
9	16.881	17.589	0.0	52.5	61.4	35.5	287.9	1.125	10.14	1.440
10	14.155	15.557	0.0	53.6	58.5	19.3	287.7	1.122	10.14	1.455
11	13.424	15.049	0.0	55.5	57.6	5.3	287.8	1.132	10.14	1.517

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	113.7	193.7	349.7	193.3	113.7	104.6	0.0	163.0	330.7	325.6
2	120.2	193.4	345.1	203.2	120.2	117.9	0.0	153.4	323.5	318.9
3	125.8	184.9	318.8	185.5	125.8	114.2	0.0	145.4	293.0	291.6
4	126.3	191.7	300.2	164.7	126.3	113.5	0.0	154.4	272.4	273.7
5	126.3	191.4	296.9	159.7	126.3	111.1	0.0	155.8	268.7	270.6
6	126.1	189.9	292.9	153.9	126.1	107.4	0.0	156.6	264.4	266.9
7	126.1	188.3	289.2	146.0	126.1	101.6	0.0	158.5	260.3	263.4
8	126.1	189.6	285.5	142.1	126.1	101.2	0.0	160.3	256.1	260.0
9	123.7	192.2	257.9	143.7	123.7	117.0	0.0	152.5	226.4	235.9
10	116.2	205.8	222.5	129.4	116.2	122.1	0.0	165.7	189.8	208.6
11	113.9	229.7	212.8	130.5	113.9	130.0	0.0	189.4	179.8	201.5

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.337	0.538	1.036	0.537	0.337	0.291	0.920	1.521
2	0.357	0.540	1.026	0.567	0.357	0.329	0.981	1.508
3	0.375	0.521	0.950	0.523	0.375	0.322	0.908	1.493
4	0.376	0.542	0.895	0.466	0.376	0.321	0.899	1.448
5	0.377	0.541	0.885	0.452	0.377	0.314	0.879	1.441
6	0.376	0.537	0.873	0.435	0.376	0.304	0.852	1.430
7	0.376	0.532	0.862	0.413	0.376	0.287	0.806	1.417
8	0.376	0.537	0.852	0.402	0.376	0.287	0.803	1.406
9	0.368	0.549	0.769	0.410	0.368	0.334	0.946	1.295
10	0.346	0.591	0.662	0.372	0.346	0.351	1.051	1.112
11	0.339	0.662	0.633	0.376	0.339	0.375	1.141	1.051

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	9.2	6.5	4.1	0.581	0.715	0.282	0.247	0.044	0.039
2	10.00	9.1	6.1	2.2	0.536	0.733	0.262	0.230	0.043	0.038
3	30.00	10.8	6.7	4.7	0.535	0.787	0.209	0.188	0.033	0.030
4	42.50	11.6	6.9	3.6	0.576	0.806	0.206	0.194	0.034	0.032
5	45.00	11.8	6.9	4.2	0.588	0.803	0.211	0.201	0.035	0.033
6	47.50	12.0	7.0	5.2	0.601	0.792	0.227	0.218	0.037	0.036
7	50.00	12.1	6.9	6.6	0.623	0.776	0.247	0.240	0.040	0.039
8	52.50	12.2	6.9	6.5	0.631	0.783	0.243	0.238	0.040	0.039
9	70.00	12.8	6.7	8.5	0.565	0.881	0.144	0.144	0.024	0.024
10	90.00	13.3	6.3	11.7	0.550	0.924	0.118	0.118	0.019	0.019
11	95.00	13.2	6.0	4.5	0.537	0.957	0.077	0.077	0.012	0.012

TABLE X. - BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12, 70 PERCENT DESIGN SPEED. SI UNITS.

(a) Reading 323

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	28.7	65.2	54.6	288.7	1.081	10.05	1.249
2	24.026	23.685	0.0	28.3	63.6	53.8	288.5	1.076	10.12	1.241
3	21.755	21.653	0.0	29.7	60.1	50.3	288.1	1.071	10.14	1.243
4	20.287	20.383	0.0	33.4	58.2	46.3	288.1	1.074	10.14	1.242
5	19.987	20.129	0.0	34.7	57.8	45.3	287.9	1.075	10.14	1.240
6	19.688	19.875	0.0	36.5	57.5	43.9	288.2	1.079	10.14	1.244
7	19.385	19.621	0.0	38.2	57.1	42.6	288.1	1.082	10.15	1.244
8	19.080	19.367	0.0	37.7	56.8	41.7	287.9	1.080	10.14	1.246
9	16.881	17.589	0.0	37.6	54.4	33.9	288.0	1.076	10.15	1.268
10	14.155	15.557	0.0	43.6	51.6	16.8	287.9	1.085	10.14	1.306
11	13.424	15.049	0.0	47.2	50.9	8.3	288.0	1.094	10.14	1.339

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	133.6	165.9	318.6	251.6	133.6	145.6	0.0	79.6	289.2	284.7
2	140.4	166.1	315.6	247.8	140.4	146.3	0.0	78.7	282.7	278.7
3	147.2	165.4	295.5	225.0	147.2	143.7	0.0	82.0	256.3	255.1
4	148.1	168.4	281.1	203.6	148.1	140.6	0.0	92.8	239.0	240.1
5	147.8	168.8	277.5	197.4	147.8	138.7	0.0	96.2	234.9	236.5
6	147.8	171.2	275.2	191.2	147.8	137.7	0.0	101.7	232.1	234.3
7	147.7	172.5	272.0	184.2	147.7	135.6	0.0	106.6	228.4	231.2
8	147.1	173.3	268.4	183.5	147.1	137.1	0.0	106.0	224.5	227.9
9	142.0	181.3	244.2	173.0	142.0	143.6	0.0	110.6	198.7	207.0
10	132.0	201.7	212.6	152.6	132.0	146.0	0.0	139.1	166.7	183.2
11	128.8	213.3	204.1	146.5	128.8	144.9	0.0	156.5	158.4	177.5

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.398	0.479	0.950	0.727	0.398	0.421	1.090	1.241
2	0.419	0.481	0.943	0.718	0.419	0.424	1.042	1.217
3	0.441	0.480	0.885	0.654	0.441	0.417	0.976	1.189
4	0.444	0.489	0.842	0.591	0.444	0.408	0.949	1.164
5	0.443	0.490	0.832	0.573	0.443	0.403	0.939	1.155
6	0.443	0.496	0.824	0.554	0.443	0.399	0.931	1.153
7	0.442	0.500	0.815	0.533	0.442	0.393	0.918	1.145
8	0.441	0.502	0.804	0.532	0.441	0.398	0.932	1.136
9	0.425	0.528	0.731	0.504	0.425	0.418	1.011	1.060
10	0.394	0.589	0.635	0.445	0.394	0.426	1.106	0.918
11	0.384	0.622	0.609	0.427	0.384	0.423	1.125	0.872

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	3.3	0.6	1.4	0.282	0.814	0.107	0.105	0.018	0.017
2	10.00	3.0	0.0	1.5	0.285	0.832	0.093	0.092	0.016	0.015
3	30.00	4.1	0.1	3.0	0.310	0.902	0.056	0.056	0.009	0.009
4	42.50	4.7	0.0	3.6	0.356	0.866	0.086	0.086	0.014	0.014
5	45.00	4.8	-0.1	3.6	0.372	0.845	0.103	0.103	0.017	0.017
6	47.50	5.0	-0.0	3.4	0.392	0.810	0.134	0.134	0.023	0.023
7	50.00	5.0	-0.1	3.2	0.414	0.789	0.156	0.156	0.027	0.027
8	52.50	5.1	-0.1	3.6	0.407	0.816	0.136	0.136	0.023	0.023
9	70.00	5.9	-0.2	6.9	0.385	0.921	0.066	0.066	0.011	0.011
10	90.00	6.4	-0.6	9.2	0.398	0.935	0.077	0.077	0.012	0.012
11	95.00	6.4	-0.7	7.4	0.412	0.926	0.104	0.104	0.016	0.016

TABLE X. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12,

70 PERCENT DESIGN SPEED. SI UNITS.

(b) Reading 324

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	34.0	66.0	54.2	288.5	1.092	10.06	1.287
2	24.026	23.685	0.0	32.1	64.5	53.8	288.4	1.087	10.12	1.278
3	21.755	21.653	0.0	33.8	61.2	50.6	288.2	1.080	10.14	1.271
4	20.287	20.383	0.0	37.1	59.4	46.0	288.0	1.081	10.14	1.275
5	19.987	20.129	0.0	38.3	59.0	45.0	288.0	1.082	10.14	1.274
6	19.688	19.875	0.0	39.9	58.6	43.6	288.1	1.086	10.14	1.275
7	19.385	19.621	0.0	41.9	58.3	42.3	288.0	1.087	10.14	1.274
8	19.080	19.367	0.0	41.4	58.0	41.3	288.1	1.086	10.14	1.277
9	16.881	17.589	0.0	40.8	55.8	34.1	288.0	1.080	10.14	1.284
10	14.155	15.557	0.0	46.2	52.9	16.0	287.9	1.087	10.14	1.320
11	13.424	15.049	0.0	49.1	52.1	7.0	288.0	1.095	10.14	1.352

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	128.3	166.0	315.7	235.5	128.3	137.6	0.0	92.9	288.4	284.0
2	135.0	165.1	313.1	236.7	135.0	139.9	0.0	87.6	282.5	278.5
3	140.8	162.6	292.0	212.7	140.8	135.1	0.0	90.4	255.8	254.6
4	141.3	167.8	277.4	192.6	141.3	133.8	0.0	101.3	238.7	239.8
5	140.9	168.4	273.9	186.9	140.9	132.2	0.0	104.4	234.9	236.6
6	141.1	170.2	271.0	180.5	141.1	130.6	0.0	109.1	231.4	233.6
7	140.5	171.4	267.6	172.4	140.5	127.5	0.0	114.5	227.8	230.6
8	140.2	172.4	264.5	172.2	140.2	129.4	0.0	113.9	224.3	227.7
9	135.3	177.6	240.4	162.4	135.3	134.5	0.0	116.0	198.7	207.1
10	125.7	198.9	208.5	143.3	125.7	137.8	0.0	143.5	166.4	182.9
11	122.6	210.8	199.4	139.0	122.6	138.0	0.0	159.4	157.3	176.4

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.382	0.477	0.941	0.677	0.382	0.395	1.073	1.257
2	0.403	0.476	0.935	0.682	0.403	0.403	1.037	1.236
3	0.421	0.470	0.873	0.615	0.421	0.391	0.960	1.205
4	0.423	0.485	0.830	0.557	0.423	0.387	0.947	1.189
5	0.422	0.487	0.819	0.541	0.422	0.382	0.938	1.173
6	0.422	0.491	0.811	0.521	0.422	0.377	0.926	1.166
7	0.420	0.495	0.800	0.498	0.420	0.368	0.908	1.158
8	0.419	0.498	0.791	0.498	0.419	0.374	0.923	1.150
9	0.404	0.515	0.718	0.471	0.404	0.390	0.994	1.074
10	0.375	0.579	0.622	0.417	0.375	0.401	1.096	0.927
11	0.365	0.614	0.594	0.405	0.365	0.402	1.126	0.875

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	4.2	1.4	1.0	0.338	0.810	0.125	0.122	0.021	0.021
2	10.00	3.9	0.9	1.4	0.323	0.839	0.101	0.100	0.017	0.017
3	30.00	5.2	1.1	3.2	0.351	0.890	0.072	0.072	0.012	0.012
4	42.50	5.9	1.2	3.2	0.394	0.886	0.082	0.082	0.014	0.014
5	45.00	6.0	1.2	3.3	0.409	0.869	0.097	0.097	0.016	0.016
6	47.50	6.1	1.1	3.1	0.429	0.835	0.129	0.129	0.022	0.022
7	50.00	6.2	1.1	3.0	0.455	0.819	0.147	0.147	0.025	0.025
8	52.50	6.4	1.1	3.3	0.448	0.842	0.128	0.128	0.022	0.022
9	70.00	7.2	1.1	7.1	0.424	0.922	0.071	0.071	0.012	0.012
10	90.00	7.7	0.7	8.4	0.435	0.950	0.063	0.063	0.010	0.010
11	95.00	7.6	0.5	6.2	0.438	0.944	0.083	0.083	0.013	0.013

TABLE X. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12,

70 PERCENT DESIGN SPEED. SI UNITS.

(c) Reading 325

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	39.7	67.2	54.5	288.5	1.106	10.08	1.322
2	24.026	23.685	0.0	38.2	65.8	53.6	288.4	1.099	10.12	1.318
3	21.755	21.653	0.0	38.7	62.6	50.4	288.1	1.090	10.14	1.305
4	20.287	20.383	0.0	41.3	60.9	46.1	288.2	1.090	10.14	1.305
5	19.987	20.129	0.0	42.5	60.6	44.6	288.1	1.091	10.14	1.309
6	19.688	19.875	0.0	43.7	60.3	43.5	288.0	1.094	10.14	1.307
7	19.385	19.621	0.0	45.8	59.9	42.6	288.2	1.096	10.14	1.302
8	19.080	19.367	0.0	45.4	59.6	41.7	287.9	1.093	10.14	1.301
9	16.881	17.589	0.0	44.8	57.3	33.9	288.0	1.086	10.14	1.302
10	14.155	15.557	0.0	48.5	54.7	16.1	288.0	1.091	10.14	1.335
11	13.424	15.049	0.0	51.5	53.8	6.0	287.9	1.100	10.14	1.370

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	121.8	165.8	314.1	220.1	121.8	127.7	0.0	105.8	289.5	285.0
2	127.2	165.7	310.7	219.7	127.2	130.3	0.0	102.4	283.4	279.4
3	132.6	162.4	288.4	199.1	132.6	126.8	0.0	101.4	256.1	254.9
4	132.9	167.0	273.7	180.7	132.9	125.4	0.0	110.3	239.3	240.4
5	132.8	169.1	270.4	175.2	132.8	124.8	0.0	114.2	235.5	237.2
6	132.2	169.8	266.8	169.5	132.2	122.9	0.0	117.3	231.8	234.0
7	132.5	170.4	264.1	161.5	132.5	118.9	0.0	122.1	228.5	231.3
8	131.9	170.5	260.5	160.2	131.9	119.7	0.0	121.5	224.6	228.0
9	127.5	175.2	236.1	149.9	127.5	124.4	0.0	123.4	198.7	207.1
10	118.7	195.5	205.1	134.8	118.7	129.5	0.0	146.4	167.3	183.9
11	115.9	209.7	196.4	131.2	115.9	130.5	0.0	164.1	158.6	177.8

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.362	0.473	0.935	0.628	0.362	0.364	1.048	1.287
2	0.379	0.475	0.926	0.629	0.379	0.373	1.024	1.269
3	0.396	0.467	0.861	0.573	0.396	0.365	0.957	1.231
4	0.397	0.481	0.817	0.520	0.397	0.361	0.943	1.206
5	0.396	0.487	0.807	0.505	0.396	0.359	0.940	1.198
6	0.395	0.489	0.796	0.488	0.395	0.353	0.929	1.190
7	0.395	0.490	0.788	0.464	0.395	0.342	0.897	1.183
8	0.394	0.491	0.777	0.461	0.394	0.344	0.907	1.173
9	0.380	0.507	0.704	0.434	0.380	0.360	0.976	1.090
10	0.353	0.568	0.610	0.391	0.353	0.376	1.092	0.946
11	0.345	0.609	0.584	0.381	0.345	0.379	1.126	0.896

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	5.3	2.6	1.3	0.396	0.783	0.163	0.159	0.027	0.027
2	10.00	5.3	2.3	1.3	0.385	0.826	0.125	0.123	0.021	0.021
3	30.00	6.6	2.6	3.1	0.400	0.881	0.088	0.088	0.015	0.014
4	42.50	7.5	2.7	3.3	0.437	0.877	0.100	0.100	0.017	0.017
5	45.00	7.6	2.7	2.9	0.453	0.876	0.104	0.104	0.018	0.018
6	47.50	7.7	2.8	3.0	0.469	0.846	0.134	0.134	0.023	0.023
7	50.00	7.8	2.7	3.2	0.496	0.820	0.162	0.162	0.028	0.028
8	52.50	7.9	2.7	3.6	0.492	0.838	0.145	0.145	0.025	0.025
9	70.00	8.8	2.6	6.9	0.473	0.908	0.092	0.092	0.015	0.015
10	90.00	9.4	2.4	8.5	0.469	0.944	0.075	0.075	0.012	0.012
11	95.00	9.4	2.3	5.1	0.473	0.943	0.090	0.090	0.014	0.014

TABLE X. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12,

70 PERCENT DESIGN SPEED. SI UNITS.

(d) Reading 326

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	46.9	69.6	55.5	288.5	1.121	10.07	1.353
2	24.026	23.685	0.0	45.4	67.9	53.9	288.4	1.115	10.13	1.354
3	21.755	21.653	0.0	45.3	65.0	51.2	288.2	1.102	10.14	1.331
4	20.287	20.383	0.0	47.1	63.5	45.8	288.0	1.102	10.14	1.336
5	19.987	20.129	0.0	48.0	63.0	44.5	288.1	1.103	10.14	1.337
6	19.688	19.875	0.0	49.2	62.7	44.2	288.1	1.103	10.14	1.331
7	19.385	19.621	0.0	51.1	62.4	43.7	288.0	1.104	10.14	1.322
8	19.080	19.367	0.0	51.3	62.1	42.6	288.1	1.103	10.14	1.323
9	16.881	17.589	0.0	49.2	59.7	33.2	288.0	1.095	10.14	1.327
10	14.155	15.557	0.0	51.4	57.1	16.4	288.0	1.095	10.14	1.347
11	13.424	15.049	0.0	54.0	56.1	5.3	287.8	1.101	10.14	1.380

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	107.8	165.3	309.1	199.6	107.8	112.9	0.0	120.7	289.8	285.3
2	115.3	167.1	306.4	199.2	115.3	117.4	0.0	118.9	283.9	279.9
3	119.7	161.3	283.5	181.2	119.7	113.5	0.0	114.6	257.0	255.8
4	119.7	167.9	267.7	164.0	119.7	114.2	0.0	123.0	239.5	240.6
5	120.2	169.6	264.9	159.2	120.2	113.5	0.0	126.1	236.0	237.7
6	120.1	168.8	261.9	153.9	120.1	110.4	0.0	127.8	232.8	235.0
7	119.5	168.0	258.1	145.9	119.5	105.4	0.0	130.8	228.8	231.6
8	119.5	168.8	255.2	143.4	119.5	105.5	0.0	131.8	225.5	228.9
9	116.6	175.4	230.9	137.0	116.6	114.7	0.0	132.7	199.3	207.7
10	108.7	191.0	199.8	124.2	108.7	119.2	0.0	149.3	167.7	184.3
11	106.6	205.8	191.0	121.4	106.6	120.9	0.0	166.6	158.5	177.7

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.320	0.469	0.917	0.566	0.320	0.320	1.048	1.340
2	0.343	0.475	0.911	0.567	0.343	0.334	1.018	1.314
3	0.356	0.461	0.844	0.518	0.356	0.325	0.949	1.276
4	0.356	0.481	0.797	0.470	0.356	0.327	0.955	1.244
5	0.358	0.486	0.788	0.456	0.358	0.325	0.944	1.235
6	0.357	0.483	0.780	0.440	0.357	0.316	0.919	1.229
7	0.356	0.481	0.768	0.417	0.356	0.302	0.882	1.218
8	0.356	0.483	0.759	0.411	0.356	0.302	0.883	1.210
9	0.347	0.505	0.687	0.395	0.347	0.330	0.984	1.118
10	0.323	0.553	0.593	0.360	0.323	0.345	1.097	0.967
11	0.316	0.597	0.567	0.352	0.316	0.351	1.135	0.912

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	7.8	5.0	2.3	0.466	0.748	0.215	0.210	0.035	0.034
2	10.00	7.3	4.4	1.5	0.459	0.789	0.176	0.173	0.029	0.029
3	30.00	9.1	5.0	3.9	0.465	0.839	0.136	0.135	0.022	0.022
4	42.50	10.0	5.2	3.1	0.499	0.842	0.148	0.148	0.025	0.025
5	45.00	10.0	5.1	2.8	0.513	0.842	0.151	0.151	0.026	0.026
6	47.50	10.2	5.2	3.6	0.528	0.823	0.173	0.173	0.029	0.029
7	50.00	10.3	5.2	4.4	0.553	0.802	0.198	0.198	0.033	0.033
8	52.50	10.5	5.2	4.6	0.557	0.810	0.193	0.193	0.032	0.032
9	70.00	11.2	5.0	6.2	0.525	0.891	0.123	0.123	0.021	0.021
10	90.00	11.8	4.8	8.8	0.511	0.939	0.089	0.089	0.014	0.014
11	95.00	11.6	4.5	4.4	0.512	0.959	0.069	0.069	0.011	0.011

TABLE X. - Concluded. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12, 70 PERCENT DESIGN SPEED. SI UNITS.

(e) Reading 327

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.574	24.193	0.0	60.2	71.5	58.2	288.6	1.145	10.09	1.374
2	24.026	23.685	0.0	54.8	70.2	56.1	288.4	1.133	10.13	1.362
3	21.755	21.653	0.0	50.4	67.5	51.9	288.1	1.112	10.14	1.345
4	20.287	20.383	0.0	51.0	65.8	46.3	288.1	1.109	10.14	1.348
5	19.987	20.129	0.0	51.7	65.5	45.8	288.1	1.109	10.14	1.346
6	19.688	19.875	0.0	53.1	65.1	45.4	288.2	1.109	10.14	1.339
7	19.385	19.621	0.0	55.1	64.8	45.6	288.1	1.108	10.14	1.332
8	19.080	19.367	0.0	55.3	64.5	44.3	288.0	1.107	10.14	1.329
9	16.881	17.589	0.0	52.0	62.0	34.4	288.0	1.098	10.14	1.336
10	14.155	15.557	0.0	52.9	59.2	17.8	287.9	1.096	10.14	1.352
11	13.424	15.049	0.0	55.1	58.4	5.4	287.9	1.103	10.14	1.391

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	97.2	171.2	306.0	161.4	97.2	85.1	0.0	148.6	290.2	285.7
2	102.5	167.2	301.9	172.7	102.5	96.3	0.0	136.7	284.0	280.0
3	106.9	162.0	279.0	167.5	106.9	103.4	0.0	124.8	257.8	256.6
4	107.8	167.7	262.7	152.7	107.8	105.5	0.0	130.3	239.6	240.7
5	108.0	167.6	259.9	148.7	108.0	103.7	0.0	131.6	236.5	238.1
6	108.0	166.8	256.6	142.6	108.0	100.1	0.0	133.4	232.8	235.0
7	107.9	165.4	253.5	135.3	107.9	94.7	0.0	135.6	229.5	232.3
8	107.6	166.3	250.1	132.3	107.6	94.6	0.0	136.8	225.8	229.2
9	106.3	172.3	226.5	128.6	106.3	106.1	0.0	135.7	200.0	208.4
10	100.3	186.3	195.6	118.1	100.3	112.5	0.0	148.5	167.9	184.6
11	98.1	204.2	187.0	117.3	98.1	116.8	0.0	167.5	159.3	178.6

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.288	0.481	0.906	0.453	0.288	0.239	0.876	1.383
2	0.304	0.472	0.895	0.487	0.304	0.272	0.940	1.360
3	0.317	0.461	0.828	0.477	0.317	0.294	0.967	1.321
4	0.320	0.479	0.780	0.436	0.320	0.301	0.979	1.279
5	0.321	0.478	0.772	0.425	0.321	0.296	0.961	1.273
6	0.321	0.476	0.762	0.407	0.321	0.286	0.927	1.262
7	0.320	0.472	0.753	0.386	0.320	0.270	0.878	1.255
8	0.319	0.475	0.743	0.378	0.319	0.270	0.880	1.245
9	0.316	0.495	0.672	0.370	0.316	0.305	0.998	1.148
10	0.297	0.538	0.580	0.341	0.297	0.325	1.121	0.987
11	0.291	0.591	0.555	0.340	0.291	0.338	1.191	0.935

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	9.7	6.9	5.0	0.612	0.656	0.345	0.338	0.053	0.051
2	10.00	9.6	6.6	3.8	0.555	0.695	0.292	0.287	0.046	0.045
3	30.00	11.5	7.4	4.6	0.515	0.790	0.198	0.197	0.032	0.031
4	42.50	12.3	7.6	3.5	0.539	0.815	0.188	0.188	0.031	0.031
5	45.00	12.4	7.6	4.0	0.549	0.815	0.192	0.192	0.032	0.032
6	47.50	12.5	7.6	4.8	0.567	0.801	0.210	0.210	0.035	0.035
7	50.00	12.7	7.6	6.2	0.591	0.788	0.227	0.227	0.037	0.037
8	52.50	12.9	7.6	6.3	0.597	0.791	0.227	0.227	0.037	0.037
9	70.00	13.5	7.3	7.4	0.556	0.880	0.144	0.144	0.024	0.024
10	90.00	13.9	6.9	10.2	0.531	0.936	0.099	0.099	0.016	0.016
11	95.00	13.9	6.8	4.6	0.524	0.963	0.066	0.066	0.011	0.011

TABLE XI. - BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12, 60 PERCENT DESIGN SPEED. SI UNITS. READING 328.

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.574	24.193	0.0	59.9	72.1	57.9	288.6	1.105	10.10	1.266
2	24.026	23.685	0.0	55.8	70.8	56.4	288.5	1.096	10.13	1.256
3	21.755	21.653	0.0	50.3	68.0	52.2	288.2	1.080	10.14	1.240
4	20.287	20.383	0.0	50.3	66.4	46.4	288.1	1.079	10.14	1.247
5	19.987	20.129	0.0	51.0	66.0	45.9	288.0	1.079	10.14	1.243
6	19.688	19.875	0.0	52.4	65.7	45.9	288.1	1.078	10.13	1.238
7	19.385	19.621	0.0	54.4	65.3	45.5	288.1	1.078	10.14	1.233
8	19.080	19.367	0.0	54.7	65.1	44.2	288.1	1.077	10.13	1.233
9	16.881	17.589	0.0	52.5	62.7	34.8	288.0	1.071	10.14	1.234
10	14.155	15.557	0.0	52.5	59.7	17.6	287.9	1.069	10.13	1.248
11	13.424	15.049	0.0	54.9	58.9	5.8	287.9	1.074	10.14	1.271

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	80.2	146.8	260.6	138.3	80.2	73.5	0.0	127.0	248.0	244.2
2	84.4	142.8	256.7	145.1	84.4	80.2	0.0	118.1	242.4	239.0
3	88.8	137.1	236.6	142.8	88.8	87.6	0.0	105.5	219.3	218.3
4	89.8	143.1	223.8	132.5	89.8	91.4	0.0	110.0	205.0	206.0
5	89.7	142.4	220.8	128.7	89.7	89.5	0.0	110.7	201.7	203.2
6	89.8	141.5	218.4	123.8	89.8	86.2	0.0	112.1	199.1	201.0
7	89.8	140.8	215.3	117.0	89.8	82.0	0.0	114.5	195.7	198.1
8	89.5	142.0	212.5	114.4	89.5	82.0	0.0	116.0	192.8	195.7
9	88.3	146.3	192.2	108.5	88.3	89.1	0.0	116.0	170.8	177.9
10	83.6	159.3	165.7	101.7	83.6	96.9	0.0	126.5	143.1	157.2
11	81.8	173.4	158.2	100.3	81.8	99.7	0.0	141.8	135.5	151.9

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID VEL R	PEAK SS MACH NO
RP	IN	OUT	IN	OUT	IN	OUT		
1	0.237	0.417	0.770	0.393	0.237	0.209	0.917	1.190
2	0.250	0.407	0.759	0.414	0.250	0.229	0.950	1.170
3	0.263	0.394	0.700	0.410	0.263	0.252	0.986	1.128
4	0.266	0.412	0.662	0.381	0.266	0.263	1.019	1.099
5	0.265	0.410	0.653	0.370	0.265	0.258	0.998	1.090
6	0.266	0.407	0.647	0.356	0.266	0.248	0.960	1.085
7	0.266	0.405	0.637	0.337	0.266	0.236	0.913	1.073
8	0.265	0.409	0.629	0.329	0.265	0.236	0.916	1.066
9	0.261	0.423	0.569	0.314	0.261	0.258	1.010	0.984
10	0.247	0.463	0.490	0.295	0.247	0.281	1.160	0.843
11	0.242	0.504	0.468	0.292	0.242	0.290	1.220	0.797

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	10.3	7.5	4.7	0.609	0.664	0.327	0.327	0.050	0.050
2	10.00	10.2	7.3	4.1	0.564	0.698	0.281	0.281	0.044	0.044
3	30.00	12.0	7.9	4.9	0.511	0.793	0.188	0.188	0.030	0.030
4	42.50	12.9	8.1	3.6	0.527	0.822	0.177	0.177	0.029	0.029
5	45.00	13.0	8.1	4.2	0.537	0.813	0.189	0.189	0.031	0.031
6	47.50	13.2	8.2	5.3	0.554	0.805	0.199	0.199	0.033	0.033
7	50.00	13.3	8.1	6.2	0.580	0.792	0.218	0.218	0.035	0.035
8	52.50	13.5	8.2	6.1	0.587	0.798	0.214	0.214	0.035	0.035
9	70.00	14.1	8.0	7.8	0.560	0.874	0.149	0.149	0.025	0.025
10	90.00	14.4	7.5	10.0	0.521	0.939	0.093	0.093	0.015	0.015
11	95.00	14.4	7.3	4.9	0.518	0.959	0.073	0.073	0.012	0.012

TABLE XII. - BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 12, 50 PERCENT DESIGN SPEED. SI UNITS. READING 329.

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.574	24.193	0.0	56.2	72.1	57.6	288.6	1.069	10.11	1.176
2	24.026	23.685	0.0	54.8	70.7	56.4	288.4	1.065	10.13	1.172
3	21.755	21.653	0.0	49.9	67.9	51.9	288.3	1.054	10.13	1.162
4	20.287	20.383	0.0	49.9	66.5	46.2	288.0	1.054	10.13	1.167
5	19.987	20.129	0.0	49.9	66.1	45.6	288.1	1.054	10.13	1.165
6	19.688	19.875	0.0	50.8	65.8	45.3	288.1	1.053	10.13	1.161
7	19.385	19.621	0.0	53.1	65.4	44.9	288.1	1.054	10.13	1.158
8	19.080	19.367	0.0	53.4	65.2	43.8	288.0	1.053	10.13	1.158
9	16.881	17.589	0.0	52.3	62.8	34.8	288.0	1.049	10.14	1.157
10	14.155	15.557	0.0	52.4	59.8	17.6	287.8	1.048	10.13	1.165
11	13.424	15.049	0.0	54.5	59.1	5.1	287.9	1.052	10.13	1.185

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	67.1	119.5	218.0	124.3	67.1	66.5	0.0	99.2	207.5	204.3
2	71.2	118.6	215.0	123.7	71.2	68.5	0.0	96.9	202.8	200.0
3	74.1	114.6	197.2	119.6	74.1	73.8	0.0	87.7	182.7	181.9
4	74.5	119.8	186.8	111.4	74.5	77.1	0.0	91.7	171.3	172.1
5	74.5	119.1	184.0	109.6	74.5	76.7	0.0	91.1	168.3	169.5
6	74.5	118.2	181.5	106.3	74.5	74.7	0.0	91.6	165.5	167.1
7	74.6	118.1	179.4	100.2	74.6	71.0	0.0	94.4	163.2	165.2
8	74.5	118.9	177.4	98.2	74.5	70.8	0.0	95.5	161.0	163.5
9	73.0	121.9	159.9	90.8	73.0	74.5	0.0	96.4	142.3	148.3
10	69.3	132.8	137.8	85.0	69.3	81.0	0.0	105.2	119.2	131.0
11	67.8	146.5	131.9	85.5	67.8	85.1	0.0	119.3	113.1	126.9

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.198	0.343	0.643	0.357	0.198	0.191	0.991	0.993
2	0.210	0.342	0.634	0.356	0.210	0.197	0.961	0.975
3	0.219	0.332	0.582	0.346	0.219	0.213	0.995	0.937
4	0.220	0.347	0.552	0.323	0.220	0.223	1.035	0.918
5	0.220	0.345	0.543	0.318	0.220	0.222	1.029	0.909
6	0.220	0.342	0.536	0.308	0.220	0.217	1.004	0.901
7	0.220	0.342	0.530	0.290	0.220	0.206	0.952	0.895
8	0.220	0.344	0.524	0.285	0.220	0.205	0.951	0.890
9	0.216	0.354	0.472	0.264	0.216	0.217	1.020	0.820
10	0.205	0.387	0.407	0.248	0.205	0.236	1.169	0.701
11	0.200	0.428	0.389	0.249	0.200	0.248	1.255	0.665

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	10.2	7.5	4.5	0.560	0.686	0.283	0.283	0.044	0.044
2	10.00	10.1	7.1	4.1	0.551	0.714	0.250	0.250	0.039	0.039
3	30.00	11.9	7.9	4.6	0.508	0.815	0.159	0.159	0.025	0.025
4	42.50	13.0	8.3	3.4	0.522	0.832	0.161	0.161	0.027	0.027
5	45.00	13.1	8.2	3.9	0.523	0.827	0.168	0.168	0.028	0.028
6	47.50	13.2	8.2	4.7	0.534	0.817	0.180	0.180	0.030	0.030
7	50.00	13.4	8.2	5.6	0.564	0.799	0.204	0.204	0.033	0.033
8	52.50	13.5	8.3	5.8	0.570	0.804	0.202	0.202	0.033	0.033
9	70.00	14.3	8.1	7.8	0.557	0.874	0.144	0.144	0.024	0.024
10	90.00	14.5	7.6	10.0	0.518	0.928	0.109	0.109	0.018	0.018
11	95.00	14.6	7.4	4.3	0.505	0.964	0.064	0.064	0.010	0.010

TABLE XIII. - BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

100 PERCENT DESIGN SPEED. SI UNITS.

(a) Reading 310

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	39.4	7.4	39.4	7.4	357.6	0.996	18.01	0.908
2	23.508	23.541	35.0	4.0	35.0	4.0	351.6	0.995	17.81	0.935
3	21.742	21.902	35.9	2.3	35.9	2.3	345.1	0.997	17.50	0.951
4	20.635	20.884	42.7	2.0	42.7	2.0	344.9	0.992	16.75	0.964
5	20.411	20.681	43.6	1.2	43.6	1.2	343.8	0.993	16.41	0.973
6	20.190	20.480	44.0	0.6	44.0	0.6	342.8	0.994	16.05	0.988
7	19.969	20.277	44.4	0.2	44.4	0.2	342.1	0.994	16.09	0.984
8	19.748	20.079	43.6	-0.0	43.6	-0.0	342.2	0.993	16.29	0.974
9	18.217	18.712	39.5	-0.0	39.5	-0.0	338.0	0.998	16.95	0.961
10	16.515	17.247	41.7	4.3	41.7	4.3	340.8	1.006	17.43	0.907
11	16.104	16.896	45.2	6.6	45.2	6.6	346.5	0.998	18.68	0.822

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	273.9	219.5	273.9	219.5	211.7	217.7	173.9	28.3	0.	0.
2	270.1	225.5	270.1	225.5	221.2	225.0	155.0	15.9	0.	0.
3	265.7	224.8	265.7	224.8	215.2	224.6	155.8	8.8	0.	0.
4	257.5	217.3	257.5	217.3	189.3	217.2	174.5	7.7	0.	0.
5	249.5	216.1	249.5	216.1	180.6	216.1	172.2	4.6	0.	0.
6	240.5	214.5	240.5	214.5	173.1	214.5	167.0	2.1	0.	0.
7	241.7	215.3	241.7	215.3	172.6	215.3	169.2	0.7	0.	0.
8	248.1	217.6	248.1	217.6	179.8	217.6	171.0	-0.1	0.	0.
9	271.3	242.8	271.3	242.8	209.2	242.8	172.7	-0.0	0.	0.
10	293.9	259.7	293.9	259.7	219.5	258.9	195.5	19.4	0.	0.
11	314.6	255.6	314.6	255.6	221.9	253.9	223.1	29.5	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.764	0.601	0.764	0.601	0.590	0.596	1.028	0.996
2	0.759	0.624	0.759	0.624	0.622	0.623	1.017	0.883
3	0.753	0.628	0.753	0.628	0.610	0.628	1.044	0.911
4	0.727	0.607	0.727	0.607	0.535	0.607	1.147	1.043
5	0.704	0.604	0.704	0.604	0.509	0.604	1.196	1.029
6	0.677	0.600	0.677	0.600	0.487	0.600	1.239	0.993
7	0.682	0.603	0.682	0.603	0.487	0.603	1.247	1.007
8	0.701	0.610	0.701	0.610	0.508	0.610	1.210	1.011
9	0.780	0.690	0.780	0.690	0.601	0.690	1.160	1.012
10	0.850	0.737	0.850	0.737	0.635	0.735	1.180	1.144
11	0.910	0.720	0.910	0.720	0.642	0.716	1.144	1.326

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	2.6	-3.5	17.1	0.353	0.	0.287	0.287	0.083	0.083
2	10.00	-0.2	-6.3	13.0	0.311	0.	0.205	0.205	0.058	0.058
3	30.00	2.0	-4.2	10.2	0.299	0.	0.157	0.157	0.041	0.041
4	42.50	8.4	2.2	9.8	0.317	0.	0.122	0.122	0.031	0.031
5	45.00	9.2	3.1	9.0	0.299	0.	0.097	0.097	0.024	0.024
6	47.50	9.4	3.3	8.3	0.275	0.	0.045	0.045	0.011	0.011
7	50.00	9.7	3.6	7.9	0.277	0.	0.059	0.059	0.014	0.014
8	52.50	8.6	2.5	7.7	0.287	0.	0.092	0.092	0.022	0.022
9	70.00	3.3	-2.8	7.4	0.245	0.	0.117	0.117	0.026	0.026
10	90.00	2.8	-3.2	11.6	0.234	0.	0.248	0.248	0.050	0.050
11	95.00	5.2	-0.7	14.0	0.304	0.	0.430	0.425	0.084	0.083

TABLE XIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

100 PERCENT DESIGN SPEED. SI UNITS.

(b) Reading 311

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	41.9	7.5	41.9	7.5	362.4	0.991	18.51	0.926
2	23.508	23.541	36.9	4.5	36.9	4.5	355.9	0.994	18.43	0.941
3	21.742	21.902	38.6	2.0	38.6	2.0	347.5	0.998	17.93	0.968
4	20.635	20.884	43.4	2.2	43.4	2.2	347.6	0.992	17.44	0.961
5	20.411	20.681	44.2	1.8	44.2	1.8	346.1	0.994	17.05	0.970
6	20.190	20.480	44.6	0.8	44.6	0.8	345.5	0.994	16.76	0.981
7	19.969	20.277	45.2	0.4	45.2	0.4	344.9	0.993	16.62	0.985
8	19.748	20.079	44.4	0.3	44.4	0.3	343.6	0.996	16.65	0.983
9	18.217	18.712	40.9	0.7	40.9	0.7	339.5	0.997	17.16	0.969
10	16.515	17.247	43.6	3.7	43.6	3.7	341.3	1.005	17.63	0.931
11	16.104	16.896	46.0	5.6	46.0	5.6	347.1	0.998	18.73	0.875

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	271.6	203.0	271.6	203.0	202.2	201.3	181.4	26.5	0.	0.
2	270.2	207.4	270.2	207.4	216.1	206.7	162.3	16.3	0.	0.
3	261.9	207.8	261.9	207.8	204.7	207.7	163.4	7.3	0.	0.
4	261.2	199.4	261.2	199.4	189.8	199.3	179.5	7.8	0.	0.
5	253.2	195.0	253.2	195.0	181.6	194.9	176.5	6.0	0.	0.
6	246.7	193.3	246.7	193.3	175.7	193.3	173.2	2.8	0.	0.
7	244.4	193.2	244.4	193.2	172.1	193.2	173.5	1.3	0.	0.
8	246.4	194.7	246.4	194.7	176.1	194.7	172.3	0.9	0.	0.
9	267.1	213.2	267.1	213.2	202.0	213.2	174.9	2.8	0.	0.
10	286.5	227.5	286.5	227.5	207.5	227.0	197.6	14.8	0.	0.
11	307.7	235.2	307.7	235.2	213.9	234.1	221.2	22.9	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.751	0.550	0.751	0.550	0.559	0.546	0.996	1.046
2	0.754	0.568	0.754	0.568	0.603	0.566	0.957	0.935
3	0.738	0.575	0.738	0.575	0.577	0.574	1.014	0.969
4	0.736	0.552	0.736	0.552	0.535	0.552	1.050	1.074
5	0.713	0.540	0.713	0.540	0.511	0.539	1.073	1.055
6	0.693	0.535	0.693	0.535	0.494	0.535	1.100	1.032
7	0.687	0.535	0.687	0.535	0.484	0.535	1.123	1.033
8	0.694	0.540	0.694	0.540	0.496	0.540	1.106	1.020
9	0.764	0.598	0.764	0.598	0.578	0.598	1.056	1.029
10	0.825	0.637	0.825	0.637	0.597	0.636	1.094	1.165
11	0.886	0.657	0.886	0.657	0.616	0.654	1.094	1.315

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	5.1	-1.0	17.1	0.418	0.	0.236	0.236	0.068	0.068
2	10.00	1.7	-4.5	13.5	0.386	0.	0.188	0.188	0.053	0.053
3	30.00	4.7	-1.5	10.0	0.363	0.	0.105	0.105	0.028	0.028
4	42.50	9.1	3.0	10.0	0.400	0.	0.129	0.129	0.032	0.032
5	45.00	9.8	3.6	9.5	0.396	0.	0.103	0.103	0.025	0.025
6	47.50	10.0	3.9	8.5	0.385	0.	0.069	0.069	0.017	0.017
7	50.00	10.5	4.4	8.1	0.379	0.	0.056	0.056	0.014	0.014
8	52.50	9.5	3.4	8.0	0.375	0.	0.062	0.062	0.015	0.015
9	70.00	4.6	-1.4	8.2	0.343	0.	0.097	0.097	0.022	0.022
10	90.00	4.7	-1.3	11.1	0.331	0.	0.191	0.191	0.038	0.038
11	95.00	6.0	0.1	13.0	0.358	0.	0.311	0.309	0.061	0.060

TABLE XIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

100 PERCENT DESIGN SPEED. SI UNITS.

(c) Reading 305

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	45.2	7.1	45.2	7.1	365.7	0.992	18.81	0.938
2	23.508	23.541	41.0	4.8	41.0	4.8	359.1	0.995	18.77	0.956
3	21.742	21.902	41.5	2.4	41.5	2.4	350.8	0.997	18.33	0.968
4	20.635	20.884	45.0	2.8	45.0	2.8	350.3	0.992	18.00	0.959
5	20.411	20.681	45.3	2.1	45.3	2.1	349.9	0.992	17.81	0.959
6	20.190	20.480	46.0	1.5	46.0	1.5	348.8	0.992	17.46	0.972
7	19.969	20.277	46.9	1.1	46.9	1.1	347.7	0.992	17.27	0.979
8	19.748	20.079	46.9	1.1	46.9	1.1	346.7	0.993	17.28	0.977
9	18.217	18.712	43.4	1.3	43.4	1.3	341.2	0.997	17.46	0.969
10	16.515	17.247	44.7	3.6	44.7	3.6	342.3	1.006	17.84	0.935
11	16.104	16.896	46.9	5.3	46.9	5.3	347.6	0.998	19.07	0.874

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	267.4	195.5	267.4	195.5	188.5	194.0	189.7	24.3	0.	0.
2	265.2	201.7	265.2	201.7	200.1	201.0	174.0	16.8	0.	0.
3	259.2	197.3	259.2	197.3	194.0	197.1	171.9	8.3	0.	0.
4	262.4	191.3	262.4	191.3	185.6	191.1	185.5	9.3	0.	0.
5	259.3	187.8	259.3	187.8	182.5	187.7	184.2	7.0	0.	0.
6	252.2	186.4	252.2	186.4	175.1	186.3	181.4	4.8	0.	0.
7	248.2	185.9	248.2	185.9	169.4	185.9	181.3	3.5	0.	0.
8	249.0	186.0	249.0	186.0	170.1	186.0	181.9	3.7	0.	0.
9	261.7	197.0	261.7	197.0	190.3	196.9	179.7	4.5	0.	0.
10	279.0	207.2	279.0	207.2	198.1	206.8	196.4	13.0	0.	0.
11	304.4	213.0	304.4	213.0	208.0	212.1	222.3	19.7	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.734	0.526	0.734	0.526	0.518	0.522	1.029	1.105
2	0.735	0.548	0.735	0.548	0.555	0.546	1.004	1.021
3	0.726	0.541	0.726	0.541	0.543	0.541	1.016	1.028
4	0.736	0.526	0.736	0.526	0.521	0.525	1.030	1.114
5	0.727	0.516	0.727	0.516	0.512	0.516	1.029	1.103
6	0.706	0.513	0.706	0.513	0.491	0.513	1.064	1.086
7	0.695	0.512	0.695	0.512	0.475	0.512	1.097	1.086
8	0.699	0.513	0.699	0.513	0.477	0.513	1.093	1.088
9	0.745	0.548	0.745	0.548	0.542	0.548	1.035	1.067
10	0.799	0.575	0.799	0.575	0.567	0.574	1.044	1.160
11	0.875	0.590	0.875	0.590	0.598	0.588	1.020	1.326

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	8.4	2.2	16.8	0.448	0.	0.206	0.206	0.059	0.059
2	10.00	5.8	-0.4	13.7	0.408	0.	0.147	0.147	0.042	0.042
3	30.00	7.7	1.5	10.4	0.405	0.	0.107	0.107	0.028	0.028
4	42.50	10.7	4.5	10.5	0.438	0.	0.136	0.136	0.034	0.034
5	45.00	10.8	4.7	9.9	0.444	0.	0.138	0.138	0.034	0.034
6	47.50	11.4	5.3	9.2	0.432	0.	0.097	0.097	0.024	0.024
7	50.00	12.2	6.1	8.8	0.423	0.	0.076	0.076	0.018	0.018
8	52.50	12.0	5.9	8.8	0.423	0.	0.084	0.084	0.020	0.020
9	70.00	7.1	1.0	8.7	0.394	0.	0.100	0.100	0.022	0.022
10	90.00	5.8	-0.1	10.9	0.386	0.	0.189	0.189	0.038	0.038
11	95.00	7.0	1.1	12.7	0.427	0.	0.320	0.317	0.063	0.062

TABLE XIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

100 PERCENT DESIGN SPEED. SI UNITS.

(d) Reading 313

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	47.0	6.0	47.0	6.0	368.7	1.000	19.54	0.927
2	23.508	23.541	46.4	4.8	46.4	4.8	365.4	0.995	19.45	0.949
3	21.742	21.902	45.1	2.2	45.1	2.2	355.2	0.995	18.82	0.960
4	20.635	20.884	47.1	1.6	47.1	1.6	353.3	0.991	18.57	0.946
5	20.411	20.681	47.8	1.4	47.8	1.4	353.4	0.989	18.50	0.943
6	20.190	20.480	49.1	1.3	49.1	1.3	353.4	0.987	18.25	0.952
7	19.969	20.277	50.4	1.2	50.4	1.2	352.2	0.988	18.07	0.958
8	19.748	20.079	49.6	1.5	49.6	1.5	351.2	0.989	18.14	0.953
9	18.217	18.712	45.6	0.8	45.6	0.8	344.5	0.992	17.91	0.953
10	16.515	17.247	46.0	3.8	46.0	3.8	344.8	1.001	18.21	0.922
11	16.104	16.896	48.2	4.6	48.2	4.6	350.0	0.994	19.37	0.873

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	267.0	183.8	267.0	183.8	182.0	182.8	195.4	19.2	0.	0.
2	264.9	192.2	264.9	192.2	182.6	191.5	192.0	16.2	0.	0.
3	255.2	180.6	255.2	180.6	180.0	180.5	181.0	7.1	0.	0.
4	258.2	172.0	258.2	172.0	175.8	171.9	189.2	4.7	0.	0.
5	257.4	169.5	257.4	169.5	172.9	169.4	190.6	4.2	0.	0.
6	253.0	168.6	253.0	168.6	165.6	168.6	191.3	3.8	0.	0.
7	249.4	167.5	249.4	167.5	158.9	167.5	192.1	3.6	0.	0.
8	252.5	167.8	252.5	167.8	163.6	167.8	192.3	4.5	0.	0.
9	254.1	169.0	254.1	169.0	177.8	169.0	181.5	2.3	0.	0.
10	270.5	177.0	270.5	177.0	188.0	176.6	194.5	11.7	0.	0.
11	297.7	185.2	297.7	185.2	198.5	184.6	221.8	14.7	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.730	0.489	0.730	0.489	0.497	0.486	1.004	1.144
2	0.727	0.516	0.727	0.516	0.501	0.514	1.049	1.145
3	0.709	0.491	0.709	0.491	0.500	0.490	1.003	1.091
4	0.720	0.468	0.720	0.468	0.490	0.468	0.978	1.141
5	0.717	0.462	0.717	0.462	0.482	0.462	0.980	1.149
6	0.704	0.460	0.704	0.460	0.461	0.460	1.018	1.156
7	0.694	0.457	0.694	0.457	0.442	0.457	1.054	1.165
8	0.705	0.459	0.705	0.459	0.457	0.458	1.025	1.160
9	0.717	0.466	0.717	0.466	0.502	0.466	0.951	1.082
10	0.768	0.486	0.768	0.486	0.534	0.485	0.939	1.148
11	0.849	0.508	0.849	0.508	0.566	0.506	0.930	1.324

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	10.2	4.1	15.7	0.503	0.	0.243	0.243	0.070	0.070
2	10.00	11.2	5.1	13.8	0.463	0.	0.172	0.172	0.049	0.049
3	30.00	11.3	5.1	10.2	0.471	0.	0.142	0.142	0.037	0.037
4	42.50	12.8	6.7	9.3	0.512	0.	0.185	0.185	0.046	0.046
5	45.00	13.4	7.2	9.2	0.520	0.	0.196	0.196	0.049	0.049
6	47.50	14.5	8.4	9.0	0.514	0.	0.170	0.170	0.042	0.042
7	50.00	15.7	9.5	8.9	0.510	0.	0.154	0.154	0.037	0.037
8	52.50	14.7	8.6	9.2	0.512	0.	0.168	0.168	0.040	0.040
9	70.00	9.3	3.3	8.2	0.489	0.	0.163	0.163	0.036	0.036
10	90.00	7.0	1.1	11.1	0.478	0.	0.241	0.241	0.048	0.048
11	95.00	8.2	2.3	12.0	0.510	0.	0.338	0.336	0.066	0.066

TABLE XIII. - Concluded. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

100 PERCENT DESIGN SPEED. SI UNITS.

(e) Reading 314

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.947	23.950	53.5	6.4	53.5	6.4	376.4	0.986	19.60	0.931
2	23.508	23.541	50.9	4.8	50.9	4.8	370.4	0.989	19.60	0.942
3	21.742	21.902	46.3	2.2	46.3	2.2	356.9	0.994	18.96	0.953
4	20.635	20.884	48.4	1.7	48.4	1.7	354.5	0.990	18.69	0.941
5	20.411	20.681	48.7	1.5	48.7	1.5	354.6	0.988	18.53	0.945
6	20.190	20.480	49.6	1.3	49.6	1.3	353.4	0.989	18.27	0.952
7	19.969	20.277	49.9	1.3	49.9	1.3	353.6	0.986	18.14	0.956
8	19.748	20.079	50.1	1.7	50.1	1.7	351.8	0.989	18.14	0.954
9	18.217	18.712	47.1	0.8	47.1	0.8	345.4	0.990	18.00	0.947
10	16.515	17.247	47.2	3.9	47.2	3.9	345.2	1.001	18.33	0.916
11	16.104	16.896	49.3	4.7	49.3	4.7	349.8	0.996	19.31	0.878

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	265.0	182.2	265.0	182.2	157.7	181.0	213.0	20.4	0.	0.
2	263.9	187.2	263.9	187.2	166.5	186.6	204.7	15.8	0.	0.
3	254.5	174.8	254.5	174.8	175.8	174.6	184.0	6.8	0.	0.
4	255.6	165.6	255.6	165.6	169.7	165.5	191.2	4.9	0.	0.
5	253.6	164.3	253.6	164.3	167.2	164.2	190.6	4.4	0.	0.
6	251.6	165.9	251.6	165.9	163.1	165.8	191.5	3.8	0.	0.
7	249.9	165.2	249.9	165.2	161.1	165.1	191.1	3.8	0.	0.
8	250.9	165.2	250.9	165.2	160.9	165.2	192.5	4.9	0.	0.
9	253.7	164.6	253.7	164.6	172.6	164.6	186.0	2.2	0.	0.
10	270.4	173.2	270.4	173.2	183.6	172.8	198.5	11.9	0.	0.
11	294.4	183.1	294.4	183.1	191.8	182.4	223.4	15.0	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID VEL R	PEAK SS MACH NO
RP	IN	OUT	IN	OUT	IN	OUT		
1	0.715	0.483	0.715	0.483	0.426	0.480	1.148	1.279
2	0.718	0.500	0.718	0.500	0.453	0.498	1.120	1.239
3	0.705	0.473	0.705	0.473	0.487	0.473	0.993	1.112
4	0.711	0.450	0.711	0.450	0.472	0.450	0.976	1.158
5	0.704	0.446	0.704	0.446	0.465	0.446	0.982	1.151
6	0.700	0.452	0.700	0.452	0.454	0.451	1.016	1.159
7	0.694	0.450	0.694	0.450	0.447	0.450	1.025	1.154
8	0.699	0.451	0.699	0.451	0.449	0.451	1.026	1.163
9	0.715	0.453	0.715	0.453	0.486	0.453	0.954	1.116
10	0.768	0.475	0.768	0.475	0.521	0.474	0.941	1.180
11	0.839	0.502	0.839	0.502	0.546	0.500	0.951	1.341

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	16.7	10.6	16.1	0.523	0.	0.239	0.239	0.069	0.069
2	10.00	15.7	9.5	13.8	0.494	0.	0.200	0.200	0.057	0.057
3	30.00	12.4	6.3	10.2	0.496	0.	0.168	0.168	0.044	0.044
4	42.50	14.1	8.0	9.5	0.534	0.	0.206	0.206	0.052	0.052
5	45.00	14.3	8.2	9.3	0.533	0.	0.196	0.196	0.049	0.049
6	47.50	15.0	8.9	9.0	0.522	0.	0.171	0.171	0.042	0.042
7	50.00	15.2	9.0	9.0	0.519	0.	0.159	0.159	0.039	0.039
8	52.50	15.2	9.1	9.4	0.519	0.	0.166	0.166	0.040	0.040
9	70.00	10.9	4.8	8.2	0.510	0.	0.184	0.184	0.041	0.041
10	90.00	8.3	2.4	11.3	0.495	0.	0.260	0.260	0.052	0.052
11	95.00	9.4	3.5	12.1	0.513	0.	0.331	0.328	0.065	0.064

TABLE XIV. - BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

90 PERCENT DESIGN SPEED. SI UNITS.

(a) Reading 315

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.947	23.950	33.4	6.0	33.4	6.0	339.9	0.994	15.74	0.901
2	23.508	23.541	33.0	3.3	33.0	3.3	336.0	0.996	15.68	0.938
3	21.742	21.902	34.1	2.3	34.1	2.3	331.1	0.997	15.45	0.932
4	20.635	20.884	38.2	2.2	38.2	2.2	331.9	0.994	15.35	0.932
5	20.411	20.681	38.3	1.9	38.3	1.9	331.5	0.995	15.16	0.939
6	20.190	20.480	39.8	1.6	39.8	1.6	331.5	0.994	15.02	0.943
7	19.969	20.277	39.2	1.3	39.2	1.3	331.0	0.994	14.87	0.956
8	19.748	20.079	40.1	1.0	40.1	1.0	330.6	0.995	14.96	0.953
9	18.217	18.712	38.0	0.4	38.0	0.4	328.2	0.995	15.39	0.941
10	16.515	17.247	40.3	5.0	40.3	5.0	330.2	1.005	15.96	0.877
11	16.104	16.896	43.7	7.8	43.7	7.8	334.2	1.001	16.60	0.811

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	246.7	213.3	246.7	213.3	206.0	212.1	135.7	22.2	0.	0.
2	244.7	225.9	244.7	225.9	205.3	225.5	133.2	12.9	0.	0.
3	237.0	217.8	237.0	217.8	196.2	217.6	132.9	8.8	0.	0.
4	240.8	221.6	240.8	221.6	189.3	221.4	148.9	8.5	0.	0.
5	236.3	220.5	236.3	220.5	185.4	220.4	146.5	7.4	0.	0.
6	232.2	220.1	232.2	220.1	178.3	220.0	148.6	6.0	0.	0.
7	228.0	222.7	228.0	222.7	176.7	222.7	144.1	5.0	0.	0.
8	231.0	225.7	231.0	225.7	176.6	225.7	148.8	3.9	0.	0.
9	247.6	247.5	247.6	247.5	195.2	247.5	152.4	1.9	0.	0.
10	273.1	272.8	273.1	272.8	208.4	271.7	176.6	23.8	0.	0.
11	284.7	268.0	284.7	268.0	205.9	265.5	196.7	36.5	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID VEL R	PEAK SS MACH NO
RP	IN	OUT	IN	OUT	IN	OUT		
1	0.699	0.599	0.699	0.599	0.584	0.596	1.030	0.722
2	0.698	0.641	0.698	0.641	0.585	0.640	1.098	0.749
3	0.679	0.620	0.679	0.620	0.562	0.620	1.109	0.770
4	0.690	0.632	0.690	0.632	0.542	0.632	1.170	0.880
5	0.676	0.629	0.676	0.629	0.531	0.629	1.189	0.861
6	0.664	0.629	0.664	0.629	0.510	0.628	1.234	0.877
7	0.651	0.637	0.651	0.637	0.505	0.637	1.260	0.843
8	0.661	0.646	0.661	0.646	0.505	0.646	1.278	0.873
9	0.716	0.717	0.716	0.717	0.564	0.717	1.268	0.887
10	0.796	0.793	0.796	0.793	0.607	0.790	1.304	1.031
11	0.829	0.774	0.829	0.774	0.599	0.766	1.290	1.165

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	-3.4	-9.6	15.6	0.269	0.	0.357	0.357	0.103	0.103
2	10.00	-2.3	-8.4	12.2	0.217	0.	0.223	0.223	0.063	0.063
3	30.00	0.2	-5.9	10.3	0.219	0.	0.255	0.255	0.067	0.067
4	42.50	3.9	-2.2	10.0	0.225	0.	0.251	0.251	0.063	0.063
5	45.00	3.9	-2.3	9.7	0.212	0.	0.233	0.233	0.058	0.058
6	47.50	5.2	-0.9	9.3	0.201	0.	0.222	0.222	0.054	0.054
7	50.00	4.5	-1.7	9.0	0.170	0.	0.178	0.178	0.043	0.043
8	52.50	5.2	-0.9	8.7	0.172	0.	0.185	0.185	0.044	0.044
9	70.00	1.7	-4.3	7.8	0.133	0.	0.205	0.205	0.045	0.045
10	90.00	1.3	-4.6	12.3	0.111	0.	0.359	0.359	0.072	0.072
11	95.00	3.8	-2.2	15.2	0.165	0.	0.522	0.522	0.101	0.101

TABLE XIV. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

90 PERCENT DESIGN SPEED. SI UNITS.

(b) Reading 316

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	36.8	7.4	36.8	7.4	344.2	0.991	16.14	0.929
2	23.508	23.541	35.7	5.1	35.7	5.1	339.4	0.995	16.15	0.942
3	21.742	21.902	35.8	1.6	35.8	1.6	333.1	0.998	15.83	0.965
4	20.635	20.884	39.5	2.2	39.5	2.2	334.1	0.995	15.75	0.958
5	20.411	20.681	40.7	2.1	40.7	2.1	334.4	0.994	15.61	0.961
6	20.190	20.480	41.4	1.6	41.4	1.6	333.5	0.995	15.44	0.965
7	19.969	20.277	41.3	1.4	41.3	1.4	333.6	0.992	15.33	0.971
8	19.748	20.079	41.9	1.2	41.9	1.2	332.6	0.995	15.38	0.968
9	18.217	18.712	39.6	0.6	39.6	0.6	329.4	0.996	15.59	0.961
10	16.515	17.247	41.6	3.4	41.6	3.4	331.4	1.004	16.11	0.931
11	16.104	16.896	44.7	5.4	44.7	5.4	335.4	1.000	16.81	0.883

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	243.2	185.7	243.2	185.7	194.9	184.2	145.6	24.1	0.	0.
2	242.8	191.5	242.8	191.5	197.1	190.7	141.8	17.1	0.	0.
3	234.2	192.4	234.2	192.4	190.1	192.4	136.9	5.4	0.	0.
4	239.6	192.6	239.6	192.6	184.9	192.5	152.5	7.5	0.	0.
5	235.9	190.9	235.9	190.9	178.9	190.8	153.9	7.0	0.	0.
6	232.0	188.9	232.0	188.9	174.2	188.8	153.3	5.2	0.	0.
7	229.7	189.8	229.7	189.8	172.6	189.7	151.5	4.6	0.	0.
8	231.3	190.9	231.3	190.9	172.1	190.8	154.6	4.2	0.	0.
9	243.5	203.4	243.5	203.4	187.7	203.4	155.2	2.3	0.	0.
10	267.4	225.4	267.4	225.4	200.1	225.0	177.4	13.4	0.	0.
11	282.4	228.6	282.4	228.6	200.9	227.6	198.5	21.6	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.684	0.515	0.684	0.515	0.548	0.511	0.945	0.823
2	0.688	0.534	0.688	0.534	0.558	0.532	0.968	0.821
3	0.668	0.542	0.668	0.542	0.542	0.541	1.012	0.805
4	0.684	0.542	0.684	0.542	0.528	0.542	1.041	0.906
5	0.672	0.537	0.672	0.537	0.510	0.537	1.067	0.914
6	0.661	0.532	0.661	0.532	0.496	0.532	1.084	0.910
7	0.654	0.535	0.654	0.535	0.491	0.535	1.099	0.894
8	0.660	0.538	0.660	0.538	0.491	0.538	1.109	0.914
9	0.702	0.579	0.702	0.579	0.541	0.579	1.084	0.911
10	0.776	0.641	0.776	0.641	0.580	0.640	1.124	1.041
11	0.819	0.649	0.819	0.649	0.583	0.646	1.133	1.179

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-0.0	-6.2	17.1	0.381	0.	0.264	0.264	0.076	0.076
2	10.00	0.5	-5.6	14.1	0.357	0.	0.214	0.214	0.061	0.061
3	30.00	1.9	-4.3	9.6	0.326	0.	0.136	0.136	0.036	0.036
4	42.50	5.2	-0.9	10.0	0.347	0.	0.155	0.155	0.039	0.039
5	45.00	6.3	0.1	9.9	0.344	0.	0.148	0.148	0.037	0.037
6	47.50	6.8	0.6	9.3	0.341	0.	0.139	0.139	0.034	0.034
7	50.00	6.6	0.4	9.1	0.328	0.	0.116	0.116	0.028	0.028
8	52.50	7.0	0.9	8.9	0.330	0.	0.126	0.126	0.030	0.030
9	70.00	3.3	-2.7	8.1	0.302	0.	0.140	0.140	0.031	0.031
10	90.00	2.6	-3.3	10.8	0.277	0.	0.209	0.209	0.042	0.042
11	95.00	4.7	-1.2	12.8	0.310	0.	0.328	0.328	0.064	0.064

TABLE XIV. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

90 PERCENT DESIGN SPEED. SI UNITS.

(c) Reading 319

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	41.3	7.3	41.3	7.3	347.5	0.995	16.41	0.950
2	23.508	23.541	37.6	5.0	37.6	5.0	342.5	0.998	16.46	0.962
3	21.742	21.902	38.7	1.5	38.7	1.5	336.0	0.998	16.18	0.977
4	20.635	20.884	41.7	2.4	41.7	2.4	336.0	0.995	16.11	0.970
5	20.411	20.681	42.3	2.1	42.3	2.1	335.2	0.997	15.98	0.971
6	20.190	20.480	43.4	1.6	43.4	1.6	335.9	0.993	15.86	0.973
7	19.969	20.277	43.5	1.4	43.5	1.4	335.0	0.993	15.71	0.980
8	19.748	20.079	42.9	1.2	42.9	1.2	334.0	0.994	15.73	0.978
9	18.217	18.712	41.2	0.5	41.2	0.5	330.1	0.996	15.74	0.974
10	16.515	17.247	43.2	3.1	43.2	3.1	332.0	1.002	16.22	0.940
11	16.104	16.896	46.3	5.1	46.3	5.1	336.1	0.997	16.92	0.899

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	239.6	182.1	239.6	182.1	180.0	180.6	158.1	23.0	0.	0.
2	239.5	189.0	239.5	189.0	189.8	188.3	146.1	16.4	0.	0.
3	232.5	187.9	232.5	187.9	181.6	187.9	145.2	5.0	0.	0.
4	238.1	187.7	238.1	187.7	177.7	187.5	158.5	7.7	0.	0.
5	235.6	186.5	235.6	186.5	174.2	186.4	158.6	6.7	0.	0.
6	233.5	185.1	233.5	185.1	169.6	185.0	160.6	5.3	0.	0.
7	230.7	185.6	230.7	185.6	167.3	185.5	158.9	4.6	0.	0.
8	232.2	186.0	232.2	186.0	170.1	186.0	157.9	3.8	0.	0.
9	239.5	194.1	239.5	194.1	180.3	194.1	157.6	1.6	0.	0.
10	262.2	210.4	262.2	210.4	191.1	210.1	179.5	11.5	0.	0.
11	278.1	216.5	278.1	216.5	192.2	215.6	201.0	19.3	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.669	0.501	0.669	0.501	0.503	0.497	1.003	0.918
2	0.674	0.524	0.674	0.524	0.535	0.522	0.992	0.854
3	0.660	0.526	0.660	0.526	0.515	0.526	1.035	0.867
4	0.677	0.526	0.677	0.526	0.505	0.526	1.055	0.950
5	0.670	0.523	0.670	0.523	0.496	0.522	1.070	0.949
6	0.663	0.519	0.663	0.519	0.481	0.519	1.091	0.961
7	0.655	0.521	0.655	0.521	0.475	0.521	1.109	0.948
8	0.661	0.523	0.661	0.523	0.484	0.523	1.093	0.937
9	0.688	0.550	0.688	0.550	0.518	0.550	1.077	0.933
10	0.758	0.595	0.758	0.595	0.552	0.594	1.099	1.061
11	0.804	0.612	0.804	0.612	0.556	0.609	1.122	1.203

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	4.5	-1.6	16.9	0.403	0.	0.191	0.191	0.055	0.055
2	10.00	2.4	-3.8	13.9	0.365	0.	0.145	0.145	0.041	0.041
3	30.00	4.8	-1.4	9.5	0.350	0.	0.090	0.090	0.024	0.024
4	42.50	7.4	1.3	10.1	0.370	0.	0.115	0.115	0.029	0.029
5	45.00	7.9	1.8	9.8	0.367	0.	0.110	0.110	0.027	0.027
6	47.50	8.9	2.7	9.4	0.369	0.	0.105	0.105	0.026	0.026
7	50.00	8.8	2.7	9.1	0.357	0.	0.080	0.080	0.019	0.019
8	52.50	8.0	1.8	8.8	0.357	0.	0.089	0.089	0.021	0.021
9	70.00	4.9	-1.2	7.9	0.332	0.	0.095	0.095	0.021	0.021
10	90.00	4.3	-1.7	10.5	0.323	0.	0.191	0.191	0.038	0.038
11	95.00	6.3	0.4	12.5	0.346	0.	0.292	0.292	0.057	0.057

TABLE XIV. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

90 PERCENT DESIGN SPEED. SI UNITS.

(d) Reading 320

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	47.0	6.5	47.0	6.5	351.4	0.993	16.96	0.948
2	23.508	23.541	41.8	4.9	41.8	4.9	346.6	0.995	16.92	0.963
3	21.742	21.902	42.1	1.7	42.1	1.7	339.0	0.997	16.56	0.974
4	20.635	20.884	44.1	2.1	44.1	2.1	337.8	0.995	16.40	0.970
5	20.411	20.681	45.0	2.1	45.0	2.1	337.4	0.995	16.41	0.965
6	20.190	20.480	46.1	1.9	46.1	1.9	338.3	0.991	16.35	0.965
7	19.969	20.277	47.1	1.8	47.1	1.8	337.1	0.992	16.23	0.969
8	19.748	20.079	46.1	1.5	46.1	1.5	336.9	0.993	16.21	0.969
9	18.217	18.712	43.7	0.1	43.7	0.1	331.8	0.996	15.96	0.969
10	16.515	17.247	46.6	3.1	46.6	3.1	332.8	1.001	16.28	0.940
11	16.104	16.896	47.1	4.5	47.1	4.5	336.2	0.998	17.17	0.892

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	237.7	173.0	237.7	173.0	162.0	171.9	173.9	19.6	0.	0.
2	237.4	179.3	237.4	179.3	176.8	178.7	158.4	15.3	0.	0.
3	229.3	174.0	229.3	174.0	170.2	174.0	153.6	5.0	0.	0.
4	232.3	171.6	232.3	171.6	166.7	171.5	161.8	6.2	0.	0.
5	232.8	170.2	232.8	170.2	164.6	170.1	164.6	6.2	0.	0.
6	232.6	169.9	232.6	169.9	161.4	169.8	167.5	5.7	0.	0.
7	231.0	170.0	231.0	170.0	157.3	169.9	169.1	5.3	0.	0.
8	231.3	170.2	231.3	170.2	160.3	170.1	166.7	4.6	0.	0.
9	231.9	168.7	231.9	168.7	167.6	168.7	160.2	0.4	0.	0.
10	248.4	178.7	248.4	178.7	170.6	178.4	180.6	9.8	0.	0.
11	272.7	183.8	272.7	183.8	185.6	183.2	199.8	14.4	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.659	0.472	0.659	0.472	0.450	0.469	1.061	1.034
2	0.663	0.493	0.663	0.493	0.494	0.491	1.010	0.941
3	0.647	0.483	0.647	0.483	0.480	0.483	1.022	0.928
4	0.657	0.478	0.657	0.478	0.472	0.477	1.029	0.976
5	0.659	0.474	0.659	0.474	0.466	0.473	1.033	0.994
6	0.658	0.473	0.658	0.473	0.456	0.473	1.052	1.012
7	0.654	0.474	0.654	0.474	0.445	0.474	1.080	1.025
8	0.655	0.474	0.655	0.474	0.454	0.474	1.061	1.001
9	0.662	0.473	0.662	0.473	0.479	0.473	1.006	0.956
10	0.713	0.501	0.713	0.501	0.490	0.500	1.046	1.081
11	0.786	0.514	0.786	0.514	0.535	0.512	0.987	1.198

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	10.2	4.1	16.2	0.460	0.	0.207	0.207	0.059	0.059
2	10.00	6.6	0.5	13.8	0.416	0.	0.146	0.146	0.041	0.041
3	30.00	8.2	2.0	9.6	0.411	0.	0.105	0.105	0.028	0.028
4	42.50	9.8	3.7	9.8	0.428	0.	0.119	0.119	0.030	0.030
5	45.00	10.6	4.4	9.8	0.436	0.	0.139	0.139	0.034	0.034
6	47.50	11.5	5.4	9.6	0.439	0.	0.140	0.140	0.034	0.034
7	50.00	12.4	6.2	9.5	0.435	0.	0.123	0.123	0.030	0.030
8	52.50	11.2	5.1	9.2	0.431	0.	0.125	0.125	0.030	0.030
9	70.00	7.4	1.4	7.5	0.423	0.	0.123	0.123	0.027	0.027
10	90.00	7.7	1.8	10.5	0.416	0.	0.209	0.209	0.042	0.042
11	95.00	7.2	1.3	11.9	0.456	0.	0.323	0.323	0.063	0.063

TABLE XIV. - Concluded. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5, 90 PERCENT DESIGN SPEED. SI UNITS.

(e) Reading 321

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	53.2	6.3	53.2	6.3	355.6	0.994	17.23	0.946
2	23.508	23.541	48.0	4.9	48.0	4.9	351.8	0.994	17.21	0.959
3	21.742	21.902	45.0	1.5	45.0	1.5	341.0	0.997	16.74	0.971
4	20.635	20.884	46.5	2.0	46.5	2.0	339.5	0.995	16.63	0.961
5	20.411	20.681	47.4	2.0	47.4	2.0	339.5	0.994	16.55	0.961
6	20.190	20.480	48.8	2.0	48.8	2.0	339.1	0.992	16.46	0.963
7	19.969	20.277	50.1	1.9	50.1	1.9	340.7	0.989	16.44	0.962
8	19.748	20.079	49.8	1.8	49.8	1.8	338.5	0.992	16.44	0.958
9	18.217	18.712	47.8	0.1	47.8	0.1	333.7	0.994	16.05	0.965
10	16.515	17.247	47.7	3.3	47.7	3.3	333.1	1.002	16.35	0.934
11	16.104	16.896	49.6	4.2	49.6	4.2	336.9	0.996	17.15	0.895

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	235.7	166.5	235.7	166.5	141.3	165.5	188.7	18.2	0.	0.
2	235.7	172.5	235.7	172.5	157.9	171.9	175.1	14.7	0.	0.
3	225.8	163.6	225.8	163.6	159.5	163.5	159.8	4.4	0.	0.
4	229.2	158.4	229.2	158.4	157.8	158.3	166.2	5.7	0.	0.
5	228.1	157.5	228.1	157.5	154.3	157.4	168.0	5.6	0.	0.
6	227.1	156.6	227.1	156.6	149.6	156.5	170.9	5.5	0.	0.
7	228.1	156.4	228.1	156.4	146.4	156.4	175.0	5.3	0.	0.
8	228.4	154.9	228.4	154.9	147.4	154.8	174.5	4.8	0.	0.
9	224.8	152.5	224.8	152.5	151.2	152.5	166.4	0.1	0.	0.
10	242.0	160.5	242.0	160.5	162.8	160.2	179.1	9.2	0.	0.
11	265.6	166.9	265.6	166.9	172.0	166.4	202.4	12.3	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.649	0.451	0.649	0.451	0.389	0.448	1.172	1.154
2	0.653	0.470	0.653	0.470	0.437	0.469	1.089	1.062
3	0.634	0.451	0.634	0.451	0.448	0.451	1.025	0.974
4	0.646	0.438	0.646	0.438	0.445	0.438	1.003	1.010
5	0.643	0.436	0.643	0.436	0.435	0.435	1.020	1.022
6	0.640	0.434	0.640	0.434	0.421	0.433	1.046	1.044
7	0.641	0.433	0.641	0.433	0.412	0.433	1.068	1.070
8	0.645	0.429	0.645	0.429	0.416	0.429	1.051	1.066
9	0.639	0.425	0.639	0.425	0.429	0.425	1.009	1.010
10	0.693	0.447	0.693	0.447	0.466	0.446	0.984	1.076
11	0.763	0.464	0.763	0.464	0.494	0.463	0.968	1.227

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	16.4	10.3	15.9	0.503	0.	0.218	0.218	0.063	0.063
2	10.00	12.7	6.6	13.8	0.461	0.	0.164	0.164	0.046	0.046
3	30.00	11.2	5.0	9.5	0.456	0.	0.124	0.124	0.033	0.033
4	42.50	12.2	6.1	9.8	0.483	0.	0.160	0.160	0.040	0.040
5	45.00	13.0	6.9	9.8	0.485	0.	0.159	0.159	0.039	0.039
6	47.50	14.2	8.1	9.7	0.488	0.	0.155	0.155	0.038	0.038
7	50.00	15.4	9.2	9.6	0.493	0.	0.159	0.159	0.038	0.038
8	52.50	14.9	8.8	9.4	0.499	0.	0.173	0.173	0.041	0.041
9	70.00	11.5	5.4	7.5	0.484	0.	0.144	0.144	0.032	0.032
10	90.00	8.8	2.8	10.7	0.475	0.	0.239	0.239	0.048	0.048
11	95.00	9.7	3.8	11.6	0.508	0.	0.328	0.328	0.064	0.064

TABLE XV. - BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5, 80 PERCENT DESIGN SPEED. SI UNITS. READING 322.

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	53.4	6.6	53.4	6.6	340.7	0.995	15.24	0.955
2	23.508	23.541	48.2	5.3	48.2	5.3	338.2	0.993	15.29	0.962
3	21.742	21.902	47.6	2.0	47.6	2.0	330.4	0.997	14.89	0.970
4	20.635	20.884	49.3	2.2	49.3	2.2	329.4	0.995	14.91	0.956
5	20.411	20.681	50.2	1.9	50.2	1.9	329.1	0.994	14.86	0.956
6	20.190	20.480	51.3	1.8	51.3	1.8	328.9	0.994	14.75	0.961
7	19.969	20.277	53.2	1.7	53.2	1.7	328.9	0.992	14.63	0.967
8	19.748	20.079	53.5	1.7	53.5	1.7	328.1	0.994	14.62	0.967
9	18.217	18.712	47.2	0.5	47.2	0.5	323.8	0.998	14.60	0.971
10	16.515	17.247	46.9	3.0	46.9	3.0	322.9	1.004	14.75	0.955
11	16.104	16.896	48.4	3.9	48.4	3.9	325.9	0.999	15.38	0.917

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	205.2	142.1	205.2	142.1	122.5	141.1	164.7	16.4	0.	0.
2	207.2	147.9	207.2	147.9	138.0	147.3	154.5	13.6	0.	0.
3	196.1	137.3	196.1	137.3	132.3	137.2	144.8	4.9	0.	0.
4	201.1	131.7	201.1	131.7	131.0	131.6	152.6	5.0	0.	0.
5	200.0	130.4	200.0	130.4	128.0	130.3	153.7	4.4	0.	0.
6	197.6	129.7	197.6	129.7	123.6	129.6	154.2	4.0	0.	0.
7	194.7	128.9	194.7	128.9	116.7	128.8	155.8	3.8	0.	0.
8	195.6	129.3	195.6	129.3	116.3	129.3	157.2	3.8	0.	0.
9	200.6	137.0	200.6	137.0	136.1	137.0	147.3	1.2	0.	0.
10	213.7	145.9	213.7	145.9	145.9	145.7	156.1	7.5	0.	0.
11	236.6	149.4	236.6	149.4	157.0	149.1	177.0	10.3	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.573	0.391	0.573	0.391	0.342	0.388	1.152	1.02[illegible]
2	0.581	0.409	0.581	0.409	0.387	0.408	1.067	0.950
3	0.555	0.383	0.555	0.383	0.374	0.383	1.037	0.900
4	0.570	0.368	0.570	0.368	0.372	0.368	1.005	0.947
5	0.567	0.364	0.567	0.364	0.363	0.364	1.018	0.956
6	0.560	0.362	0.560	0.362	0.350	0.362	1.049	0.961
7	0.552	0.361	0.552	0.361	0.331	0.360	1.104	0.978
8	0.555	0.362	0.555	0.362	0.330	0.362	1.111	0.987
9	0.574	0.386	0.574	0.386	0.390	0.386	1.006	0.898
10	0.615	0.411	0.615	0.411	0.420	0.410	0.998	0.939
11	0.684	0.420	0.684	0.420	0.454	0.419	0.949	1.072

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	16.6	10.4	16.3	0.517	0.	0.224	0.224	0.064	0.064
2	10.00	13.0	6.9	14.2	0.479	0.	0.187	0.187	0.053	0.053
3	30.00	13.7	7.6	10.0	0.487	0.	0.157	0.157	0.041	0.041
4	42.50	15.1	8.9	10.0	0.528	0.	0.220	0.220	0.055	0.055
5	45.00	15.8	9.7	9.7	0.532	0.	0.223	0.223	0.055	0.055
6	47.50	16.7	10.6	9.5	0.529	0.	0.201	0.201	0.049	0.049
7	50.00	18.4	12.3	9.4	0.526	0.	0.175	0.175	0.043	0.043
8	52.50	18.6	12.5	9.4	0.525	0.	0.172	0.172	0.041	0.041
9	70.00	11.0	4.9	7.9	0.476	0.	0.144	0.144	0.032	0.032
10	90.00	8.0	2.0	10.3	0.454	0.	0.199	0.199	0.040	0.040
11	95.00	8.5	2.6	11.4	0.503	0.	0.309	0.309	0.060	0.060

TABLE XVI. - BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

70 PERCENT DESIGN SPEED. SI UNITS.

(a) Reading 323

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	24.8	5.3	24.8	5.3	312.0	0.999	12.55	0.910
2	23.508	23.541	24.5	3.2	24.5	3.2	310.5	0.998	12.55	0.958
3	21.742	21.902	25.8	0.3	25.8	0.3	308.5	0.998	12.60	0.963
4	20.635	20.884	29.1	0.6	29.1	0.6	309.4	0.998	12.60	0.968
5	20.411	20.681	30.3	0.9	30.3	0.9	309.5	0.998	12.58	0.970
6	20.190	20.480	31.9	1.2	31.9	1.2	311.0	0.994	12.61	0.969
7	19.969	20.277	33.5	1.5	33.5	1.5	311.6	0.995	12.62	0.971
8	19.748	20.079	32.9	1.3	32.9	1.3	310.8	0.995	12.64	0.969
9	18.217	18.712	32.1	0.2	32.1	0.2	310.0	0.998	12.87	0.967
10	16.515	17.247	36.3	2.5	36.3	2.5	312.3	1.005	13.24	0.958
11	16.104	16.896	39.3	5.4	39.3	5.4	315.0	1.001	13.57	0.906

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	191.8	157.2	191.8	157.2	174.1	156.6	80.4	14.4	0.	0.
2	191.3	179.3	191.3	179.3	174.1	179.1	79.3	9.9	0.	0.
3	187.8	180.9	187.8	180.9	169.1	180.9	81.6	0.9	0.	0.
4	188.5	186.1	188.5	186.1	164.7	186.1	91.7	1.8	0.	0.
5	188.1	187.2	188.1	187.2	162.4	187.2	94.8	3.1	0.	0.
6	189.6	188.6	189.6	188.6	161.0	188.6	100.1	4.0	0.	0.
7	190.0	190.6	190.0	190.6	158.5	190.5	104.8	4.9	0.	0.
8	191.1	190.9	191.1	190.9	160.4	190.9	103.9	4.4	0.	0.
9	201.0	204.1	201.0	204.1	170.3	204.1	106.8	0.5	0.	0.
10	221.3	232.3	221.3	232.3	178.4	232.1	131.0	9.9	0.	0.
11	230.9	227.6	230.9	227.6	178.6	226.6	146.3	21.3	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.558	0.453	0.558	0.453	0.507	0.451	0.899	0.558
2	0.558	0.522	0.558	0.522	0.508	0.521	1.028	0.558
3	0.549	0.528	0.549	0.528	0.494	0.528	1.070	0.549
4	0.551	0.544	0.551	0.544	0.481	0.544	1.130	0.551
5	0.549	0.547	0.549	0.547	0.474	0.547	1.153	0.549
6	0.552	0.551	0.552	0.551	0.469	0.551	1.171	0.552
7	0.553	0.556	0.553	0.556	0.461	0.556	1.202	0.572
8	0.557	0.558	0.557	0.558	0.468	0.558	1.190	0.557
9	0.589	0.599	0.589	0.599	0.499	0.599	1.198	0.589
10	0.651	0.684	0.651	0.684	0.524	0.684	1.301	0.738
11	0.678	0.667	0.678	0.667	0.525	0.664	1.268	0.846

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-12.0	-18.2	14.9	0.280	0.	0.471	0.471	0.136	0.136
2	10.00	-10.7	-16.9	12.1	0.166	0.	0.223	0.223	0.063	0.063
3	30.00	-8.1	-14.3	8.2	0.150	0.	0.201	0.201	0.053	0.053
4	42.50	-5.2	-11.3	8.3	0.131	0.	0.173	0.173	0.043	0.043
5	45.00	-4.1	-10.3	8.7	0.125	0.	0.163	0.163	0.041	0.041
6	47.50	-2.7	-8.8	8.9	0.129	0.	0.163	0.163	0.040	0.040
7	50.00	-1.3	-7.4	9.2	0.123	0.	0.153	0.153	0.037	0.037
8	52.50	-2.0	-8.1	9.0	0.125	0.	0.161	0.161	0.039	0.039
9	70.00	-4.2	-10.2	7.6	0.100	0.	0.157	0.157	0.035	0.035
10	90.00	-2.7	-8.6	9.8	0.058	0.	0.170	0.170	0.034	0.034
11	95.00	-0.6	-6.6	12.7	0.117	0.	0.354	0.354	0.069	0.069

TABLE XVI. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

70 PERCENT DESIGN SPEED. SI UNITS.

(b) Reading 324

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	29.8	5.8	29.8	5.8	315.2	0.997	12.95	0.938
2	23.508	23.541	28.0	3.7	28.0	3.7	313.3	0.998	12.94	0.965
3	21.742	21.902	29.6	0.0	29.6	0.0	311.1	0.997	12.88	0.973
4	20.635	20.884	32.6	0.1	32.6	0.1	311.3	0.998	12.93	0.970
5	20.411	20.681	33.7	0.6	33.7	0.6	311.7	0.997	12.92	0.971
6	20.190	20.480	35.2	1.0	35.2	1.0	312.9	0.995	12.93	0.972
7	19.969	20.277	37.2	1.3	37.2	1.3	313.2	0.995	12.92	0.974
8	19.748	20.079	36.6	1.2	36.6	1.2	312.9	0.995	12.94	0.972
9	18.217	18.712	35.3	-0.1	35.3	-0.1	311.1	0.998	13.02	0.973
10	16.515	17.247	39.0	2.1	39.0	2.1	313.0	1.004	13.38	0.962
11	16.104	16.896	41.4	5.0	41.4	5.0	315.5	1.000	13.71	0.923

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	188.7	147.5	188.7	147.5	163.7	146.8	93.8	14.9	0.	0.
2	187.8	162.1	187.8	162.1	165.8	161.7	88.3	10.4	0.	0.
3	182.0	162.5	182.0	162.5	158.2	162.5	90.0	0.1	0.	0.
4	185.4	165.1	185.4	165.1	156.1	165.1	100.0	0.4	0.	0.
5	185.3	166.1	185.3	166.1	154.1	166.1	102.9	1.7	0.	0.
6	186.2	167.6	186.2	167.6	152.1	167.6	107.4	3.1	0.	0.
7	186.2	169.1	186.2	169.1	148.4	169.1	112.5	3.9	0.	0.
8	187.6	169.6	187.6	169.6	150.7	169.5	111.7	3.5	0.	0.
9	194.0	178.6	194.0	178.6	158.4	178.6	112.0	-0.3	0.	0.
10	214.8	201.6	214.8	201.6	167.0	201.5	135.1	7.3	0.	0.
11	225.2	200.0	225.2	200.0	168.9	199.2	149.0	17.5	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.546	0.422	0.546	0.422	0.474	0.420	0.897	0.546
2	0.545	0.467	0.545	0.467	0.481	0.466	0.975	0.545
3	0.529	0.470	0.529	0.470	0.460	0.470	1.027	0.529
4	0.539	0.478	0.539	0.478	0.454	0.478	1.057	0.539
5	0.539	0.481	0.539	0.481	0.448	0.481	1.078	0.579
6	0.540	0.485	0.540	0.485	0.441	0.485	1.102	0.617
7	0.540	0.489	0.540	0.489	0.430	0.489	1.140	0.657
8	0.545	0.491	0.545	0.491	0.437	0.491	1.125	0.645
9	0.566	0.519	0.566	0.519	0.462	0.519	1.127	0.636
10	0.629	0.587	0.629	0.587	0.489	0.586	1.206	0.784
11	0.659	0.580	0.659	0.580	0.495	0.578	1.179	0.874

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-7.0	-13.1	15.5	0.339	0.	0.338	0.338	0.097	0.097
2	10.00	-7.2	-13.3	12.6	0.255	0.	0.193	0.193	0.055	0.055
3	30.00	-4.3	-10.4	8.0	0.237	0.	0.155	0.155	0.041	0.041
4	42.50	-1.6	-7.8	7.9	0.243	0.	0.168	0.168	0.042	0.042
5	45.00	-0.7	-6.8	8.3	0.238	0.	0.162	0.162	0.040	0.040
6	47.50	0.6	-5.5	8.8	0.236	0.	0.154	0.154	0.038	0.038
7	50.00	2.4	-3.7	9.0	0.232	0.	0.142	0.142	0.035	0.035
8	52.50	1.6	-4.5	8.8	0.233	0.	0.152	0.152	0.036	0.036
9	70.00	-1.0	-7.1	7.3	0.206	0.	0.136	0.136	0.030	0.030
10	90.00	0.0	-5.9	9.5	0.178	0.	0.163	0.163	0.033	0.033
11	95.00	1.5	-4.4	12.4	0.223	0.	0.305	0.305	0.060	0.060

TABLE XVI. - *Continued.* BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

70 PERCENT DESIGN SPEED. SI UNITS.

(c) Reading 325

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	35.3	6.2	35.3	6.2	319.1	0.998	13.32	0.952
2	23.508	23.541	33.9	4.0	33.9	4.0	317.0	0.998	13.34	0.968
3	21.742	21.902	34.4	0.2	34.4	0.2	314.0	0.997	13.23	0.973
4	20.635	20.884	36.8	0.5	36.8	0.5	314.2	0.997	13.24	0.972
5	20.411	20.681	37.9	1.0	37.9	1.0	314.4	0.997	13.27	0.970
6	20.190	20.480	39.0	1.3	39.0	1.3	315.0	0.995	13.25	0.971
7	19.969	20.277	41.1	1.4	41.1	1.4	315.7	0.994	13.20	0.974
8	19.748	20.079	40.7	1.1	40.7	1.1	314.8	0.995	13.19	0.974
9	18.217	18.712	39.3	-0.1	39.3	-0.1	312.9	0.997	13.20	0.975
10	16.515	17.247	41.5	2.2	41.5	2.2	314.2	1.002	13.53	0.958
11	16.104	16.896	44.0	4.6	44.0	4.6	316.7	0.999	13.89	0.930

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	185.0	140.0	185.0	140.0	151.0	139.2	106.9	15.1	0.	0.
2	185.0	150.5	185.0	150.5	153.5	150.1	103.2	10.6	0.	0.
3	179.0	147.9	179.0	147.9	147.8	147.9	101.0	0.6	0.	0.
4	181.9	150.3	181.9	150.3	145.6	150.3	108.9	1.2	0.	0.
5	183.5	151.0	183.5	151.0	144.9	151.0	112.6	2.6	0.	0.
6	183.4	151.5	183.4	151.5	142.5	151.5	115.4	3.4	0.	0.
7	182.6	151.8	182.6	151.8	137.7	151.7	119.9	3.7	0.	0.
8	182.9	152.0	182.9	152.0	138.7	151.9	119.2	3.0	0.	0.
9	188.2	158.7	188.2	158.7	145.7	158.7	119.2	-0.2	0.	0.
10	208.3	175.9	208.3	175.9	156.0	175.7	138.0	6.7	0.	0.
11	220.7	179.1	220.7	179.1	158.7	178.6	153.4	14.4	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.531	0.397	0.531	0.397	0.433	0.395	0.922	0.606
2	0.533	0.430	0.533	0.430	0.442	0.429	0.978	0.593
3	0.517	0.424	0.517	0.424	0.427	0.424	1.001	0.593
4	0.526	0.431	0.526	0.431	0.421	0.431	1.032	0.643
5	0.531	0.433	0.531	0.433	0.419	0.433	1.042	0.667
6	0.530	0.435	0.530	0.435	0.412	0.435	1.063	0.685
7	0.527	0.435	0.527	0.435	0.397	0.435	1.102	0.717
8	0.528	0.436	0.528	0.436	0.401	0.436	1.095	0.708
9	0.546	0.457	0.546	0.457	0.423	0.457	1.089	0.704
10	0.607	0.507	0.607	0.507	0.455	0.507	1.126	0.813
11	0.644	0.516	0.644	0.516	0.463	0.514	1.125	0.913

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-1.5	-7.6	15.8	0.387	0.	0.275	0.275	0.079	0.079
2	10.00	-1.3	-7.4	13.0	0.329	0.	0.179	0.179	0.051	0.051
3	30.00	0.5	-5.7	8.2	0.321	0.	0.162	0.162	0.043	0.043
4	42.50	2.5	-3.6	8.2	0.321	0.	0.160	0.160	0.040	0.040
5	45.00	3.4	-2.7	8.7	0.325	0.	0.173	0.173	0.043	0.043
6	47.50	4.4	-1.7	9.0	0.323	0.	0.167	0.167	0.041	0.041
7	50.00	6.3	0.2	9.1	0.322	0.	0.153	0.153	0.037	0.037
8	52.50	5.8	-0.4	8.8	0.320	0.	0.152	0.152	0.036	0.036
9	70.00	3.0	-3.0	7.4	0.296	0.	0.137	0.137	0.030	0.030
10	90.00	2.6	-3.4	9.6	0.279	0.	0.192	0.192	0.039	0.039
11	95.00	4.1	-1.8	12.0	0.308	0.	0.290	0.290	0.057	0.057

TABLE XVI. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5, 70 PERCENT DESIGN SPEED. SI UNITS.

(d) Reading 326

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	42.6	5.9	42.6	5.9	323.3	0.997	13.62	0.962
2	23.508	23.541	41.1	4.5	41.1	4.5	321.5	0.997	13.71	0.968
3	21.742	21.902	41.0	0.2	41.0	0.2	317.4	0.997	13.50	0.974
4	20.635	20.884	42.6	1.3	42.6	1.3	317.5	0.996	13.54	0.970
5	20.411	20.681	43.5	1.3	43.5	1.3	317.7	0.995	13.56	0.967
6	20.190	20.480	44.6	1.1	44.6	1.1	318.0	0.994	13.49	0.970
7	19.969	20.277	46.6	1.0	46.6	1.0	317.9	0.993	13.41	0.974
8	19.748	20.079	46.8	0.9	46.8	0.9	317.6	0.994	13.41	0.973
9	18.217	18.712	43.8	-0.2	43.8	-0.2	315.3	0.995	13.46	0.969
10	16.515	17.247	44.6	2.4	44.6	2.4	315.2	1.002	13.65	0.958
11	16.104	16.896	46.8	4.1	46.8	4.1	316.8	1.001	13.99	0.935

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	180.2	129.5	180.2	129.5	132.6	128.9	122.0	13.2	0.	0.
2	182.4	138.2	182.4	138.2	137.5	137.8	119.8	10.8	0.	0.
3	174.1	131.4	174.1	131.4	131.5	131.4	114.2	0.6	0.	0.
4	179.4	133.0	179.4	133.0	132.0	133.0	121.5	3.1	0.	0.
5	180.7	132.4	180.7	132.4	131.1	132.3	124.3	2.9	0.	0.
6	179.0	131.8	179.0	131.8	127.4	131.8	125.8	2.6	0.	0.
7	176.8	131.6	176.8	131.6	121.4	131.6	128.5	2.4	0.	0.
8	177.5	131.1	177.5	131.1	121.6	131.1	129.3	2.0	0.	0.
9	185.1	137.0	185.1	137.0	133.6	137.0	128.1	-0.5	0.	0.
10	200.3	150.2	200.3	150.2	142.6	150.1	140.6	6.2	0.	0.
11	213.5	154.1	213.5	154.1	146.1	153.7	155.7	10.9	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.513	0.365	0.513	0.365	0.378	0.363	0.972	0.727
2	0.521	0.391	0.521	0.391	0.393	0.390	1.002	0.725
3	0.500	0.374	0.500	0.374	0.377	0.374	1.000	0.698
4	0.515	0.379	0.515	0.379	0.379	0.378	1.007	0.738
5	0.519	0.377	0.519	0.377	0.377	0.376	1.010	0.756
6	0.514	0.375	0.514	0.375	0.366	0.375	1.035	0.766
7	0.507	0.375	0.507	0.375	0.348	0.375	1.084	0.787
8	0.509	0.373	0.509	0.373	0.349	0.373	1.078	0.790
9	0.535	0.392	0.535	0.392	0.386	0.392	1.026	0.774
10	0.582	0.429	0.582	0.429	0.414	0.429	1.052	0.842
11	0.621	0.440	0.621	0.440	0.425	0.439	1.052	0.940

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	5.8	-0.3	15.5	0.456	0.	0.234	0.234	0.067	0.067
2	10.00	5.9	-0.3	13.4	0.412	0.	0.186	0.186	0.053	0.053
3	30.00	7.1	0.9	8.2	0.417	0.	0.163	0.163	0.043	0.043
4	42.50	8.3	2.2	9.1	0.423	0.	0.183	0.183	0.046	0.046
5	45.00	9.1	2.9	9.0	0.433	0.	0.199	0.199	0.049	0.049
6	47.50	10.1	3.9	8.9	0.431	0.	0.185	0.185	0.045	0.045
7	50.00	11.9	5.8	8.7	0.427	0.	0.160	0.160	0.039	0.039
8	52.50	11.8	5.7	8.6	0.432	0.	0.169	0.169	0.041	0.041
9	70.00	7.6	1.5	7.2	0.412	0.	0.173	0.173	0.038	0.038
10	90.00	5.7	-0.3	9.7	0.382	0.	0.206	0.206	0.041	0.041
11	95.00	6.9	1.0	11.5	0.407	0.	0.282	0.282	0.055	0.055

TABLE XVI. - Concluded. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

70 PERCENT DESIGN SPEED. SI UNITS.

(e) Reading 327

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	56.6	6.5	56.6	6.5	330.4	0.989	13.86	0.956
2	23.508	23.541	50.9	4.8	50.9	4.8	326.8	0.993	13.80	0.966
3	21.742	21.902	46.2	1.2	46.2	1.2	320.4	0.997	13.63	0.974
4	20.635	20.884	46.6	1.9	46.6	1.9	319.5	0.996	13.66	0.964
5	20.411	20.681	47.4	1.7	47.4	1.7	319.4	0.995	13.64	0.964
6	20.190	20.480	48.8	1.6	48.8	1.6	319.5	0.994	13.57	0.967
7	19.969	20.277	50.8	1.4	50.8	1.4	319.3	0.994	13.50	0.971
8	19.748	20.079	51.0	1.4	51.0	1.4	318.8	0.994	13.48	0.971
9	18.217	18.712	46.8	0.5	46.8	0.5	316.2	0.997	13.54	0.970
10	16.515	17.247	46.2	2.5	46.2	2.5	315.6	1.003	13.70	0.957
11	16.104	16.896	48.0	3.4	48.0	3.4	317.4	1.001	14.10	0.933

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	179.9	119.3	179.9	119.3	99.1	118.6	150.1	13.5	0.	0.
2	177.5	123.8	177.5	123.8	112.0	123.4	137.7	10.4	0.	0.
3	172.3	120.3	172.3	120.3	119.3	120.3	124.3	2.5	0.	0.
4	177.0	117.9	177.0	117.9	121.6	117.8	128.7	4.0	0.	0.
5	176.3	116.9	176.3	116.9	119.4	116.8	129.8	3.5	0.	0.
6	174.6	115.8	174.6	115.8	115.1	115.8	131.3	3.2	0.	0.
7	172.0	115.3	172.0	115.3	108.8	115.3	133.2	2.9	0.	0.
8	172.6	115.2	172.6	115.2	108.7	115.2	134.1	2.8	0.	0.
9	179.9	122.1	179.9	122.1	123.2	122.1	131.0	1.1	0.	0.
10	193.8	131.9	193.8	131.9	134.2	131.8	139.9	5.9	0.	0.
11	210.5	136.9	210.5	136.9	140.7	136.7	156.5	8.1	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.506	0.333	0.506	0.333	0.279	0.331	1.197	0.959
2	0.502	0.347	0.502	0.347	0.317	0.346	1.102	0.866
3	0.492	0.340	0.492	0.340	0.340	0.340	1.008	0.774
4	0.507	0.333	0.507	0.333	0.348	0.333	0.969	0.795
5	0.505	0.331	0.505	0.331	0.342	0.330	0.978	0.802
6	0.499	0.328	0.499	0.328	0.329	0.328	1.006	0.814
7	0.492	0.326	0.492	0.326	0.311	0.326	1.060	0.832
8	0.494	0.326	0.494	0.326	0.311	0.326	1.060	0.836
9	0.518	0.347	0.518	0.347	0.355	0.347	0.991	0.802
10	0.561	0.375	0.561	0.375	0.388	0.375	0.982	0.843
11	0.611	0.389	0.611	0.389	0.409	0.388	0.971	0.950

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	19.8	13.6	16.2	0.556	0.	0.274	0.274	0.079	0.079
2	10.00	15.7	9.5	13.8	0.506	0.	0.214	0.214	0.061	0.061
3	30.00	12.3	6.1	9.1	0.487	0.	0.173	0.173	0.046	0.046
4	42.50	12.3	6.2	9.7	0.510	0.	0.224	0.224	0.056	0.056
5	45.00	13.0	6.8	9.5	0.513	0.	0.227	0.227	0.056	0.056
6	47.50	14.2	8.1	9.3	0.515	0.	0.212	0.212	0.052	0.052
7	50.00	16.0	9.9	9.1	0.512	0.	0.193	0.193	0.047	0.047
8	52.50	16.1	10.0	9.1	0.513	0.	0.186	0.186	0.045	0.045
9	70.00	10.5	4.5	7.9	0.479	0.	0.181	0.181	0.040	0.040
10	90.00	7.3	1.3	9.9	0.455	0.	0.225	0.225	0.045	0.045
11	95.00	8.1	2.2	10.8	0.484	0.	0.299	0.299	0.059	0.059

TABLE XVII. - BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5, 60 PERCENT DESIGN SPEED. SI UNITS. READING 328.

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	56.4	6.7	56.4	6.7	318.9	0.993	12.78	0.963
2	23.508	23.541	52.0	4.5	52.0	4.5	316.3	0.995	12.72	0.972
3	21.742	21.902	46.2	1.0	46.2	1.0	311.2	0.999	12.57	0.979
4	20.635	20.884	46.0	1.6	46.0	1.6	310.9	0.997	12.64	0.971
5	20.411	20.681	46.7	1.9	46.7	1.9	310.7	0.997	12.60	0.972
6	20.190	20.480	48.2	1.8	48.2	1.8	310.6	0.996	12.55	0.974
7	19.969	20.277	50.2	1.5	50.2	1.5	310.6	0.996	12.50	0.976
8	19.748	20.079	50.4	1.2	50.4	1.2	310.3	0.996	12.50	0.975
9	18.217	18.712	47.4	0.4	47.4	0.4	308.4	0.998	12.51	0.976
10	16.515	17.247	46.0	2.1	46.0	2.1	307.9	1.003	12.65	0.966
11	16.104	16.896	47.9	3.3	47.9	3.3	309.2	1.001	12.89	0.947

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	154.1	101.6	154.1	101.6	85.3	100.9	128.4	11.9	0.	0.
2	150.9	104.6	150.9	104.6	92.9	104.3	119.0	8.3	0.	0.
3	145.5	100.9	145.5	100.9	100.7	100.9	105.1	1.8	0.	0.
4	151.1	100.3	151.1	100.3	104.9	100.3	108.7	2.8	0.	0.
5	149.9	99.0	149.9	99.0	102.7	99.0	109.2	3.3	0.	0.
6	148.2	98.1	148.2	98.1	98.9	98.0	110.4	3.1	0.	0.
7	146.6	97.1	146.6	97.1	93.9	97.1	112.5	2.5	0.	0.
8	147.5	96.7	147.5	96.7	94.0	96.7	113.7	2.0	0.	0.
9	152.3	102.5	152.3	102.5	103.1	102.5	112.0	0.7	0.	0.
10	165.7	112.0	165.7	112.0	115.2	111.9	119.1	4.1	0.	0.
11	178.7	112.9	178.7	112.9	119.8	112.7	132.5	6.4	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.439	0.287	0.439	0.287	0.243	0.285	1.183	0.829
2	0.431	0.297	0.431	0.297	0.265	0.296	1.123	0.761
3	0.419	0.288	0.419	0.288	0.290	0.288	1.002	0.660
4	0.436	0.287	0.436	0.287	0.303	0.287	0.956	0.674
5	0.432	0.283	0.432	0.283	0.296	0.283	0.964	0.677
6	0.427	0.280	0.427	0.280	0.285	0.280	0.991	0.687
7	0.422	0.278	0.422	0.278	0.271	0.277	1.034	0.706
8	0.425	0.277	0.425	0.277	0.271	0.277	1.029	0.712
9	0.441	0.294	0.441	0.294	0.299	0.294	0.994	0.692
10	0.482	0.321	0.482	0.321	0.335	0.321	0.971	0.720
11	0.520	0.323	0.520	0.323	0.349	0.323	0.940	0.806

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	19.6	13.5	16.4	0.560	0.	0.295	0.295	0.085	0.085
2	10.00	16.8	10.7	13.5	0.515	0.	0.233	0.233	0.066	0.066
3	30.00	12.3	6.2	9.0	0.493	0.	0.184	0.184	0.049	0.049
4	42.50	11.7	5.6	9.4	0.510	0.	0.240	0.240	0.060	0.060
5	45.00	12.3	6.2	9.7	0.513	0.	0.236	0.236	0.059	0.059
6	47.50	13.6	7.5	9.5	0.515	0.	0.224	0.224	0.055	0.055
7	50.00	15.4	9.3	9.2	0.518	0.	0.209	0.209	0.051	0.051
8	52.50	15.5	9.4	8.9	0.525	0.	0.211	0.211	0.051	0.051
9	70.00	11.1	5.1	7.8	0.487	0.	0.193	0.193	0.043	0.043
10	90.00	7.0	1.1	9.5	0.460	0.	0.230	0.230	0.046	0.046
11	95.00	7.9	2.0	10.7	0.503	0.	0.313	0.313	0.061	0.061

TABLE XVIII. - BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 5,

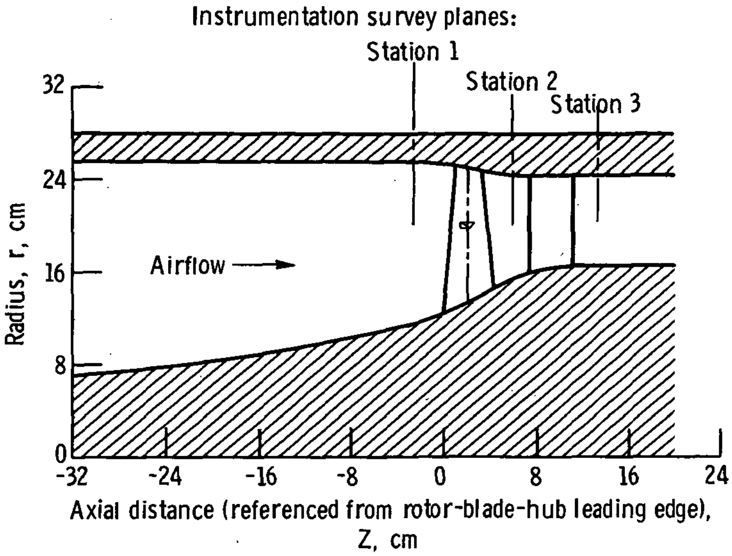
50 PERCENT DESIGN SPEED. SI UNITS. READING 329.

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	23.947	23.950	52.4	6.3	52.4	6.3	308.5	0.996	11.89	0.971
2	23.508	23.541	51.0	4.3	51.0	4.3	307.1	0.997	11.87	0.978
3	21.742	21.902	45.9	0.6	45.9	0.6	303.8	0.999	11.77	0.983
4	20.635	20.884	45.7	1.6	45.7	1.6	303.7	0.998	11.83	0.977
5	20.411	20.681	45.7	1.8	45.7	1.8	303.6	0.998	11.80	0.978
6	20.190	20.480	46.5	1.7	46.5	1.7	303.4	0.998	11.77	0.980
7	19.969	20.277	48.8	1.3	48.8	1.3	303.5	0.997	11.74	0.981
8	19.748	20.079	49.1	1.5	49.1	1.5	303.4	0.997	11.74	0.980
9	18.217	18.712	47.3	-0.0	47.3	-0.0	302.0	0.999	11.73	0.982
10	16.515	17.247	45.9	1.9	45.9	1.9	301.7	1.003	11.81	0.978
11	16.104	16.896	47.5	3.4	47.5	3.4	302.8	1.001	12.01	0.955

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	126.5	81.2	126.5	81.2	77.1	80.7	100.3	8.9	0.	0.
2	125.6	86.9	125.6	86.9	79.0	86.7	97.6	6.4	0.	0.
3	121.6	84.5	121.6	84.5	84.5	84.5	87.4	0.9	0.	0.
4	126.5	84.7	126.5	84.7	88.3	84.7	90.6	2.3	0.	0.
5	125.6	83.7	125.6	83.7	87.8	83.7	89.9	2.6	0.	0.
6	124.3	83.1	124.3	83.1	85.5	83.1	90.1	2.4	0.	0.
7	123.3	82.0	123.3	82.0	81.2	81.9	92.8	1.9	0.	0.
8	123.8	82.1	123.8	82.1	81.1	82.1	93.6	2.1	0.	0.
9	126.7	86.4	126.7	86.4	86.0	86.4	93.1	-0.0	0.	0.
10	138.1	96.5	138.1	96.5	96.1	96.5	99.1	3.2	0.	0.
11	151.1	91.4	151.1	91.4	102.1	91.2	111.5	5.3	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID VEL R	PEAK SS MACH NO
1	0.364	0.232	0.364	0.232	0.222	0.231	1.047	0.637
2	0.362	0.249	0.362	0.249	0.228	0.249	1.097	0.627
3	0.352	0.243	0.352	0.243	0.245	0.243	1.000	0.552
4	0.367	0.244	0.367	0.244	0.256	0.244	0.959	0.565
5	0.364	0.241	0.364	0.241	0.255	0.241	0.954	0.558
6	0.360	0.240	0.360	0.240	0.248	0.240	0.971	0.560
7	0.358	0.236	0.358	0.236	0.235	0.236	1.009	0.581
8	0.359	0.237	0.359	0.237	0.235	0.237	1.013	0.585
9	0.369	0.250	0.369	0.250	0.250	0.250	1.005	0.577
10	0.403	0.279	0.403	0.279	0.280	0.279	1.004	0.601
11	0.442	0.264	0.442	0.264	0.298	0.263	0.894	0.679

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	15.6	9.5	15.9	0.567	0.	0.329	0.329	0.095	0.095
2	10.00	15.8	9.7	13.2	0.514	0.	0.251	0.251	0.071	0.071
3	30.00	12.1	5.9	8.6	0.492	0.	0.208	0.208	0.055	0.055
4	42.50	11.4	5.3	9.3	0.504	0.	0.261	0.261	0.065	0.065
5	45.00	11.3	5.1	9.5	0.504	0.	0.256	0.256	0.063	0.063
6	47.50	11.9	5.8	9.4	0.503	0.	0.236	0.236	0.058	0.058
7	50.00	14.1	8.0	9.0	0.513	0.	0.229	0.229	0.056	0.056
8	52.50	14.2	8.1	9.2	0.513	0.	0.229	0.229	0.055	0.055
9	70.00	11.0	5.0	7.4	0.479	0.	0.201	0.201	0.045	0.045
10	90.00	7.0	1.0	9.3	0.437	0.	0.209	0.209	0.042	0.042
11	95.00	7.6	1.7	10.8	0.529	0.	0.358	0.358	0.070	0.070



Flow path coordinates		
Axial distance, Z, cm	Radius, r, cm	
	Inner	Outer
-30.480	7.303	25.400
-25.400	7.493	↓
-22.860	7.874	
-20.320	8.255	
-15.240	9.144	
-10.160	10.097	
-5.080	10.922	
[a]-2.540	11.659	
0	12.668	25.273
4.572	14.605	24.511
[a]6.096	15.240	24.397
7.620	15.748	24.384
11.176	16.510	↓
[a]13.462	↓	
15.240		
20.320		

[a]Instrumentation survey plane.

Figure 1. - Flow path for stage 12-5, showing axial location of instrumentation.

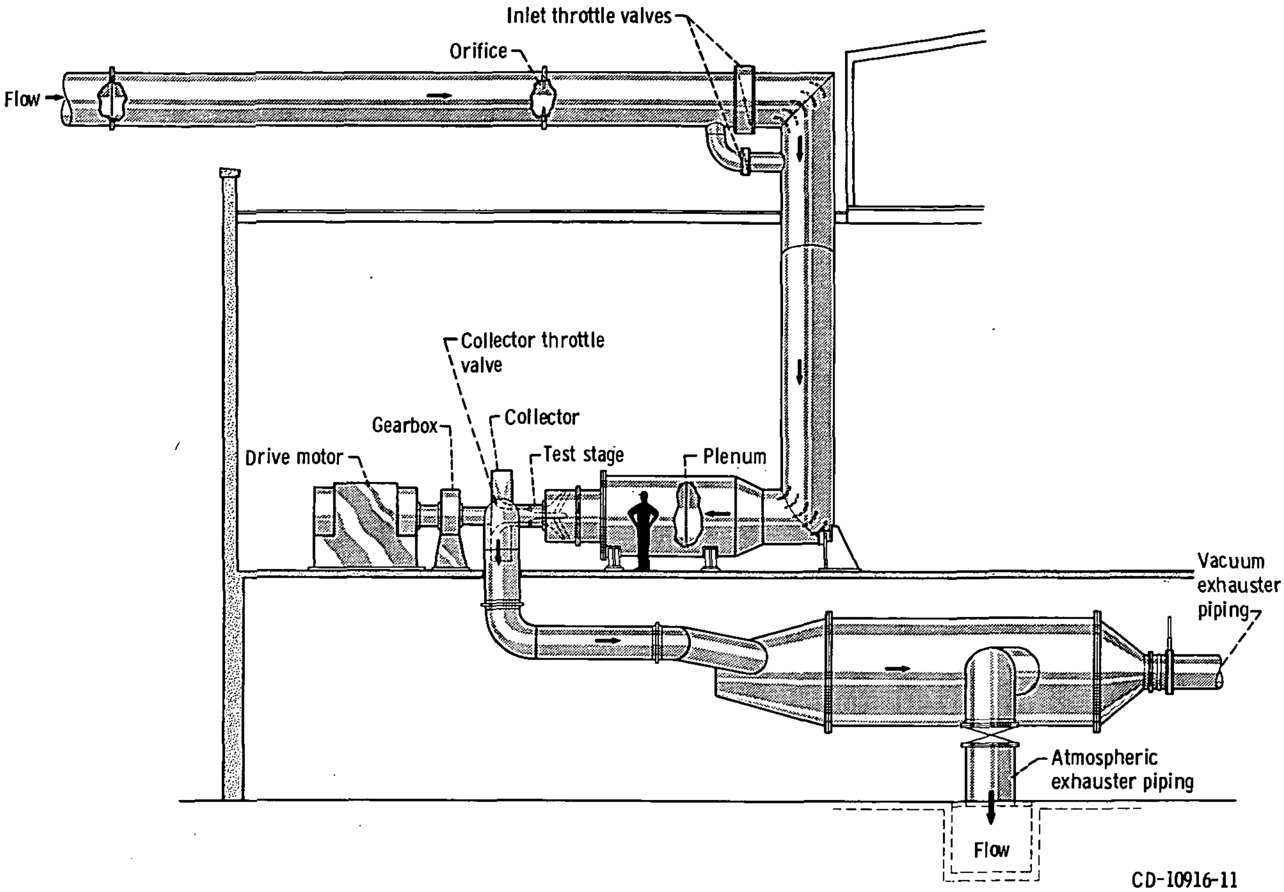


Figure 2. - Compressor test facility.

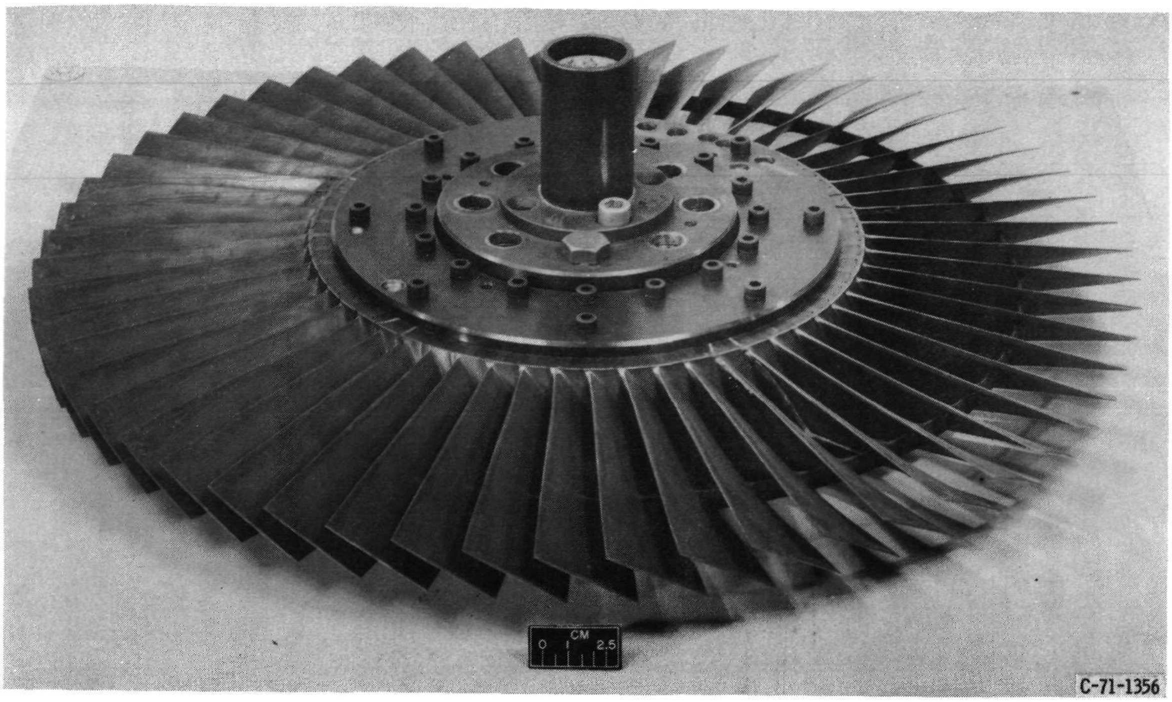


Figure 3. - Rotor 12.

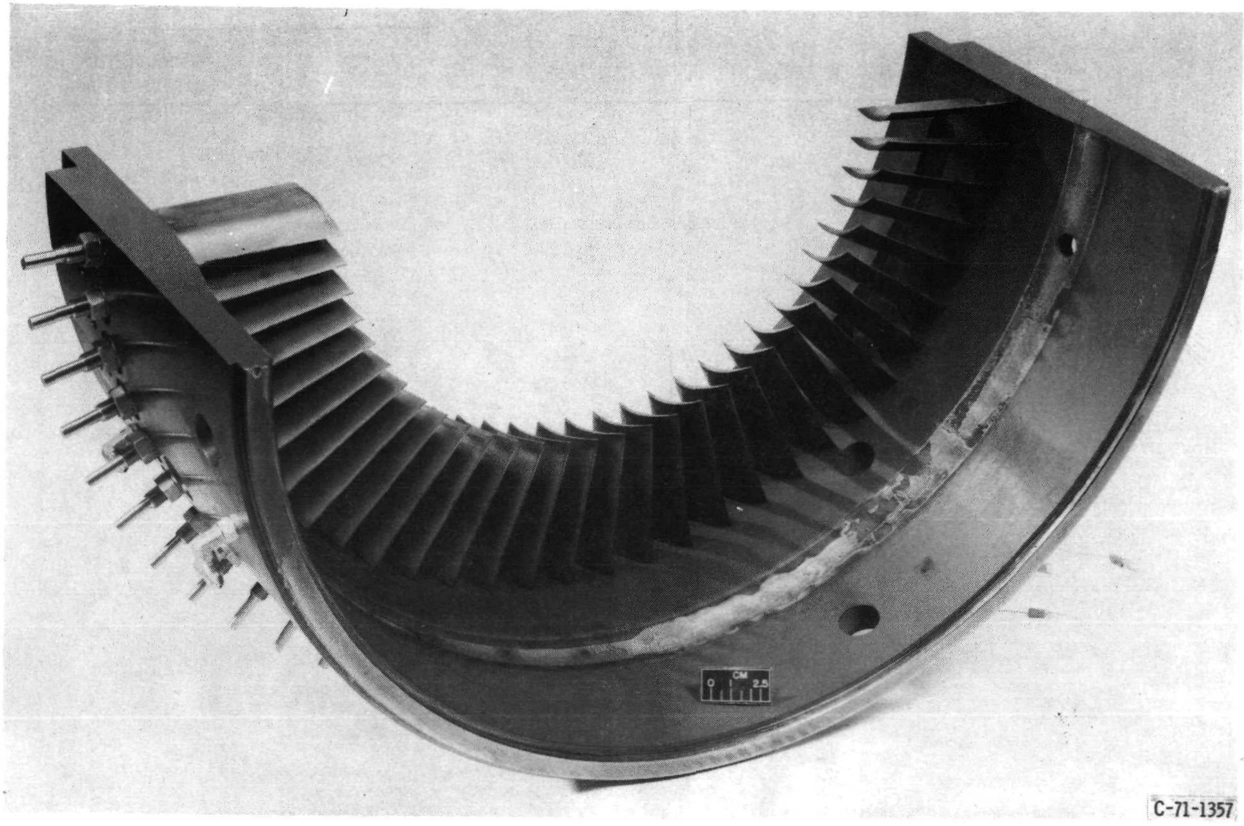
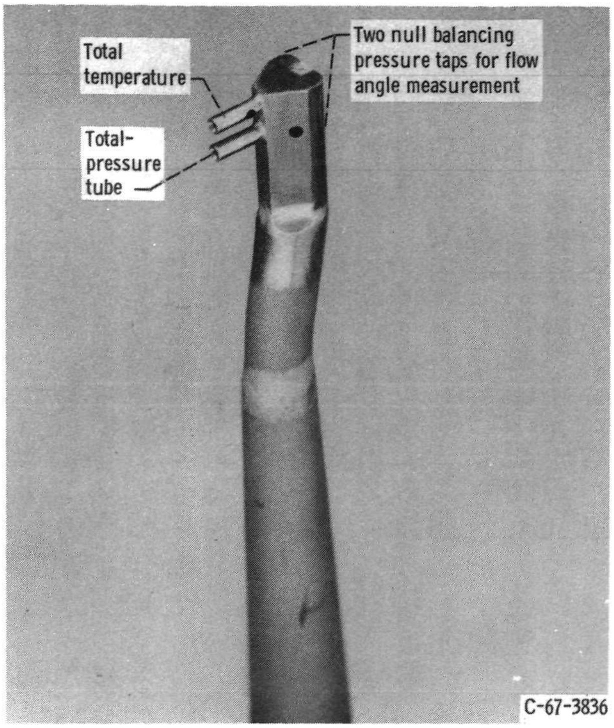
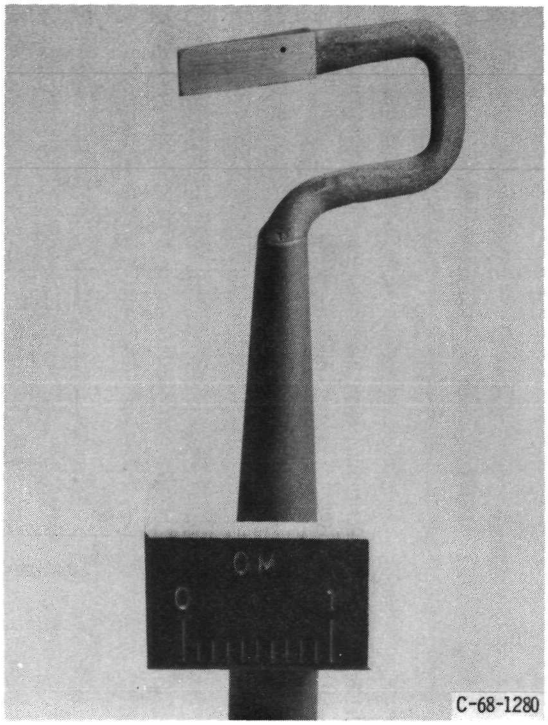


Figure 4. - Stator 5.

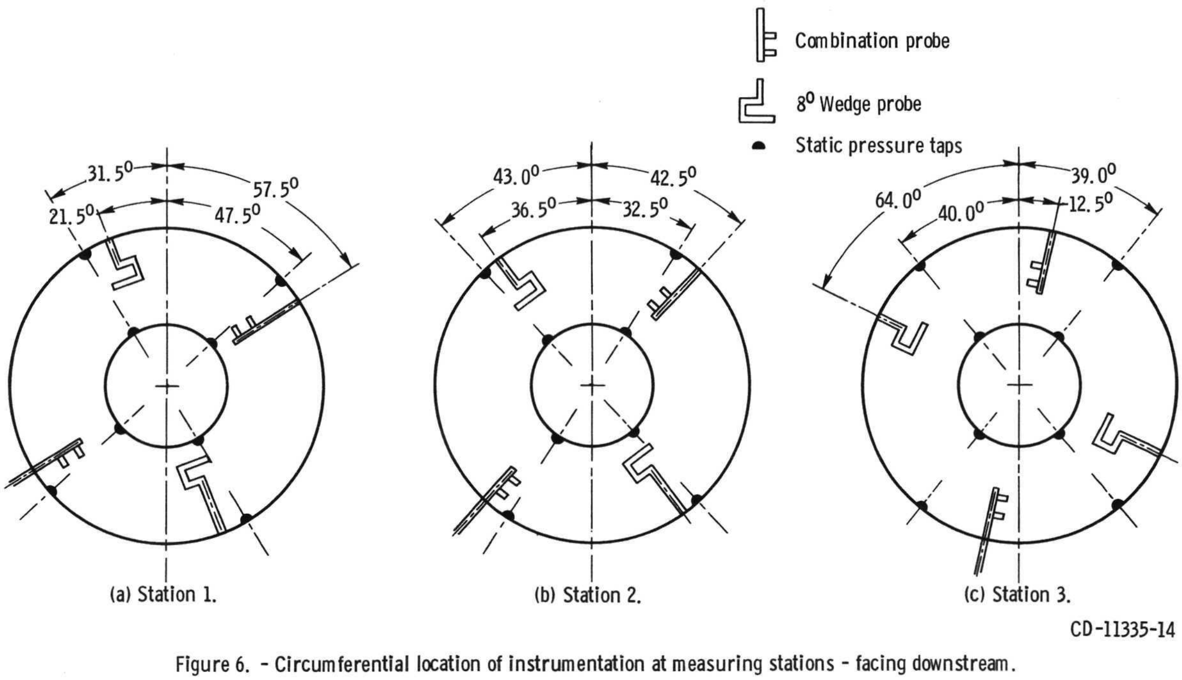


(a) Combination total pressure, total temperature, and flow angle probe (double barrel probe).



(b) Static pressure probe (8° wedge).

Figure 5. - Sensing probes.



(a) Station 1. (b) Station 2. (c) Station 3.

CD-11335-14

Figure 6. - Circumferential location of instrumentation at measuring stations - facing downstream.

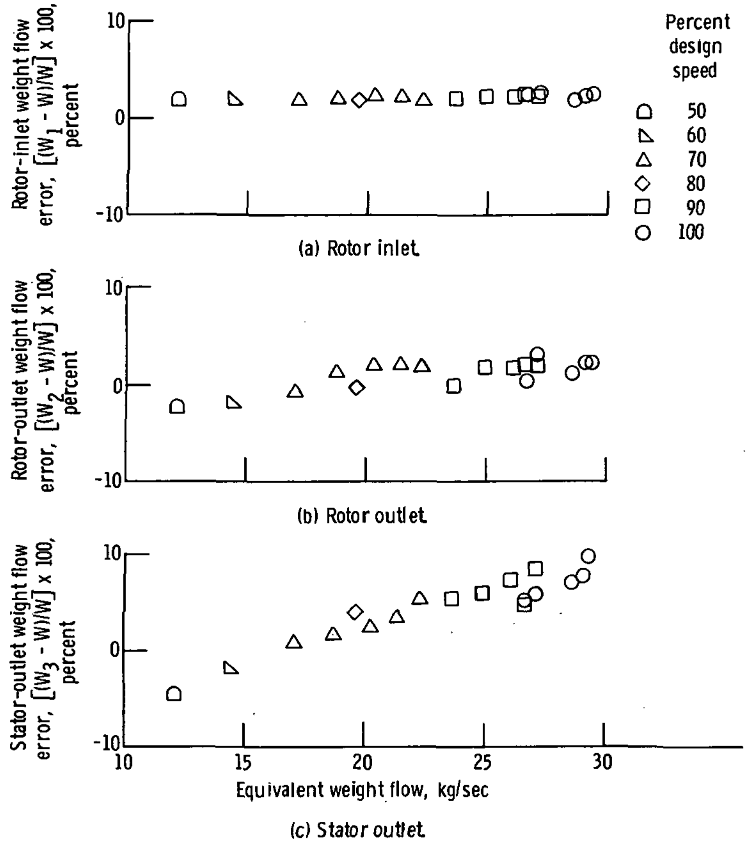


Figure 7. - Comparison of integrated weight flows with weight flow measured at orifice.

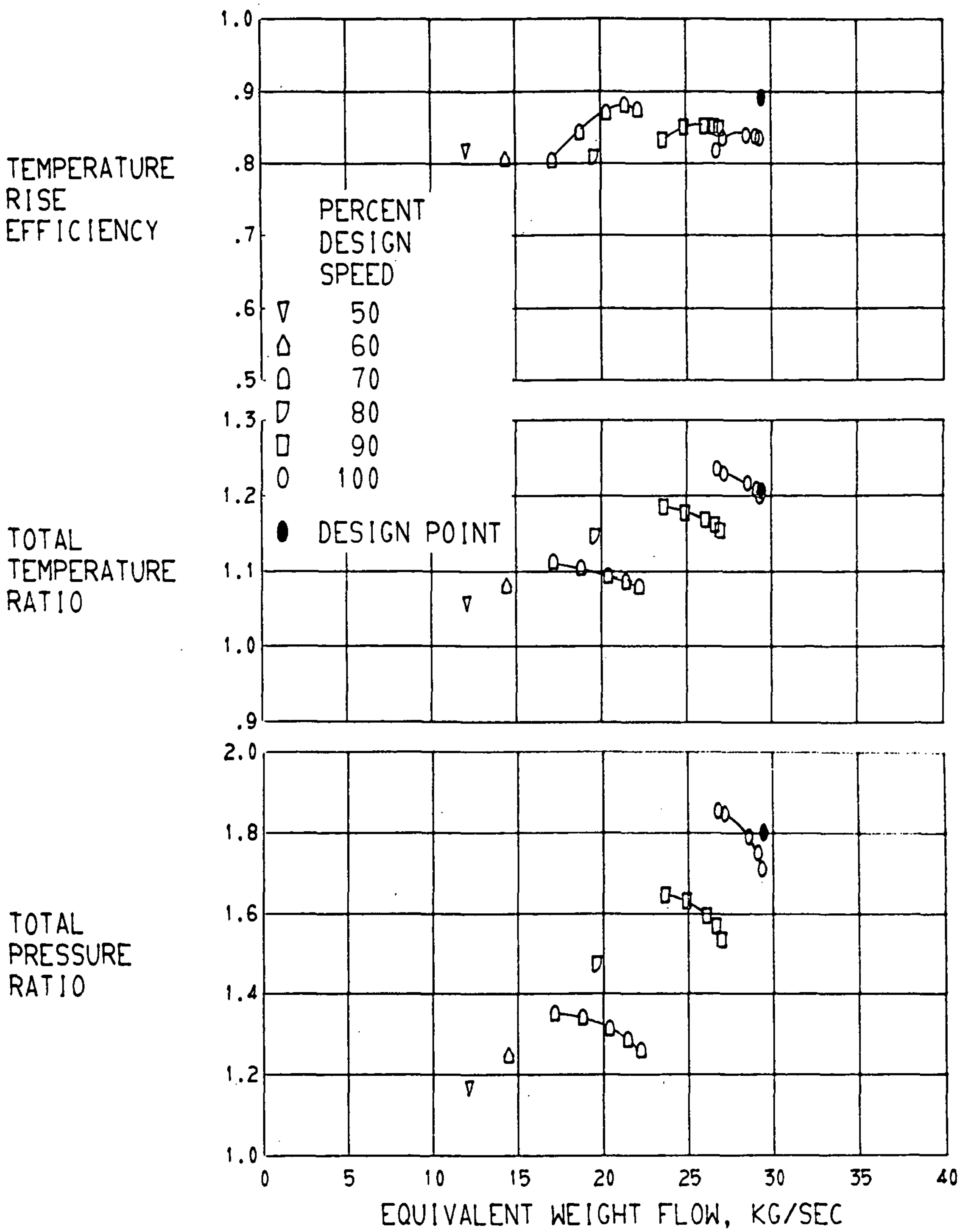


FIGURE 8. - OVERALL PERFORMANCE FOR ROTOR 12.

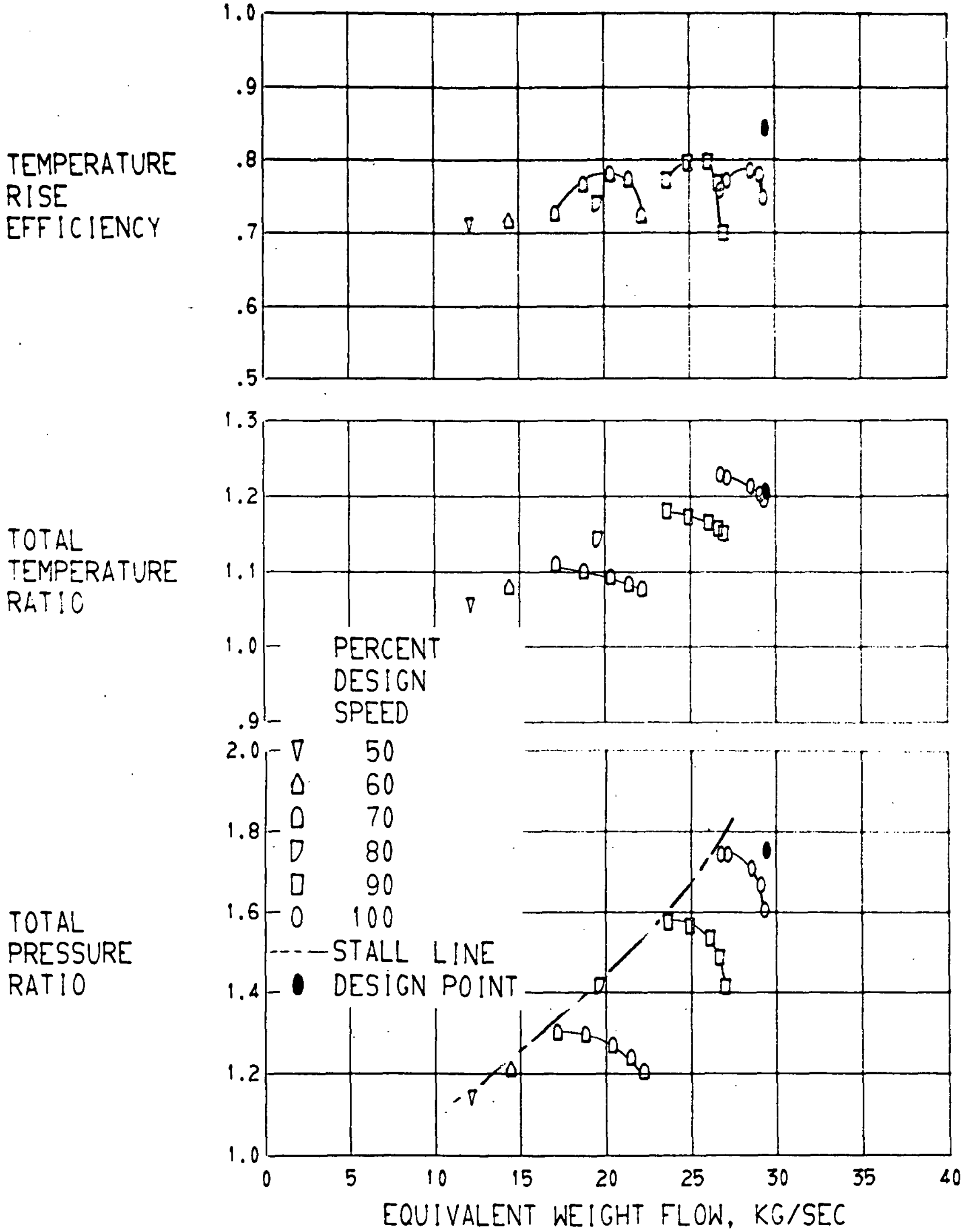


FIGURE 9. - OVERALL PERFORMANCE FOR STAGE 12 - 5.

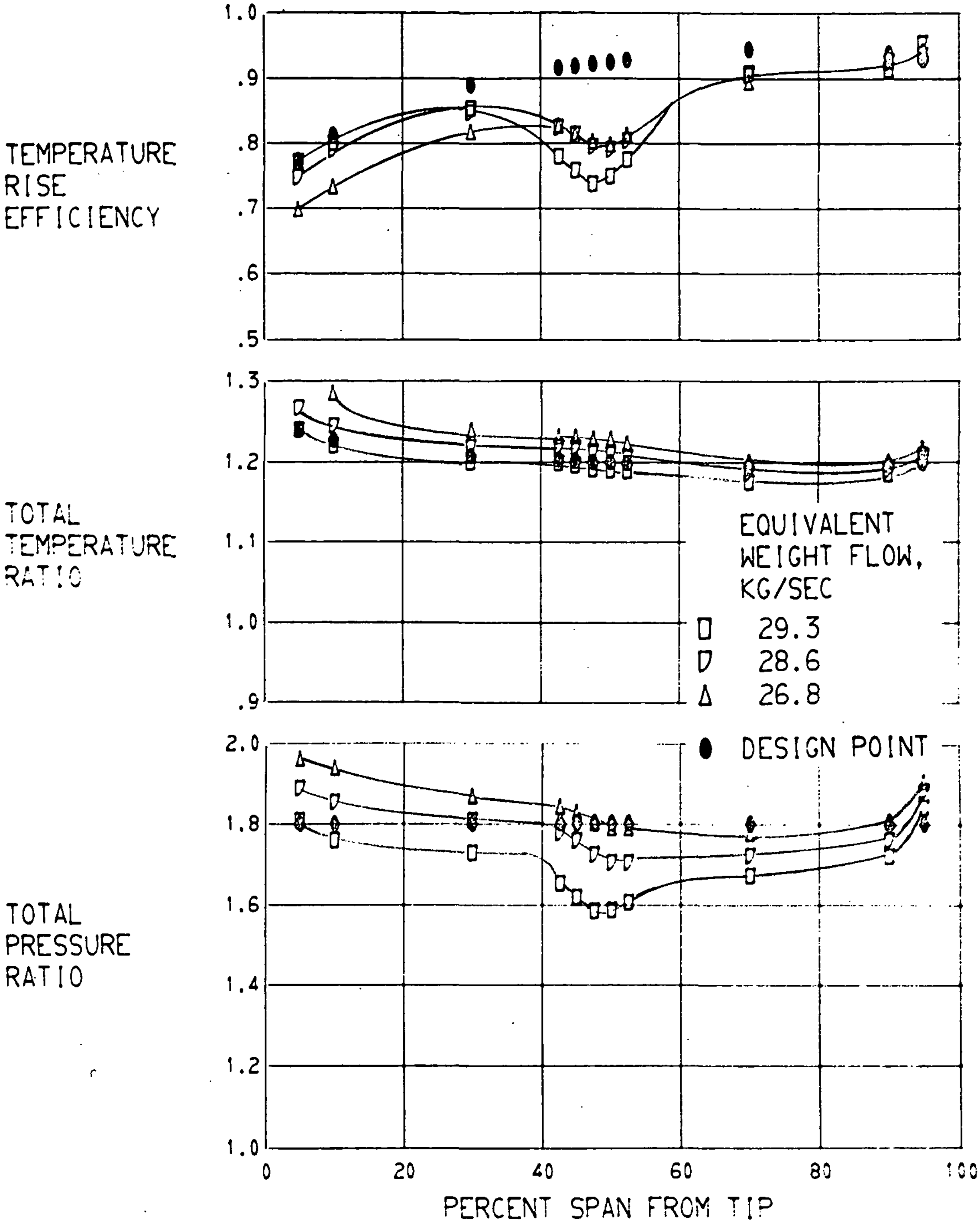


FIGURE 10 .-RADIAL DISTRIBUTION OF PERFORMANCE FOR ROTOR 12, 100 PERCENT DESIGN SPEED.

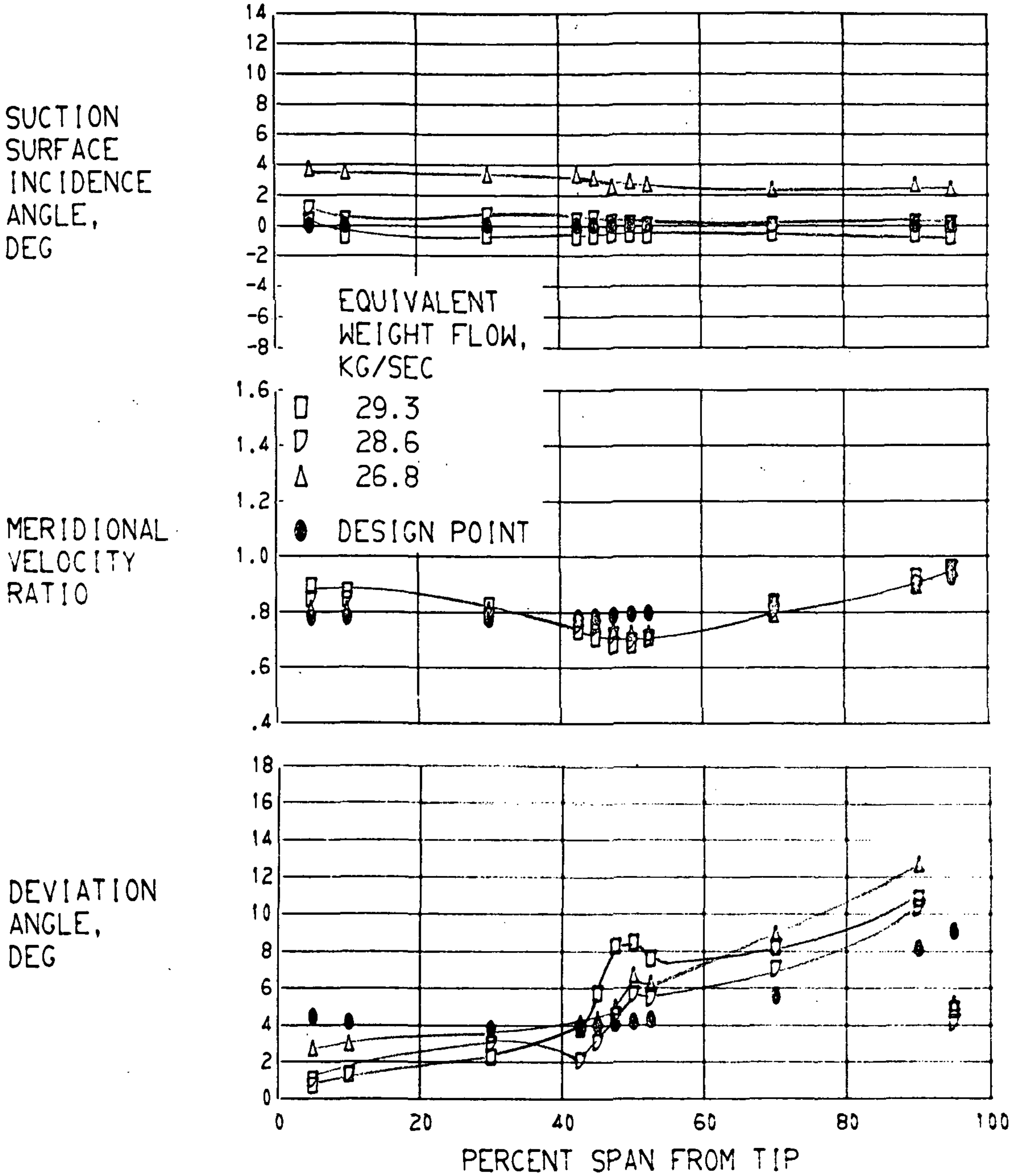


FIGURE 10 .-CONTINUED. RADIAL DISTRIBUTION OF PERFORMANCE FOR ROTOR 12. 100 PERCENT DESIGN SPEED.

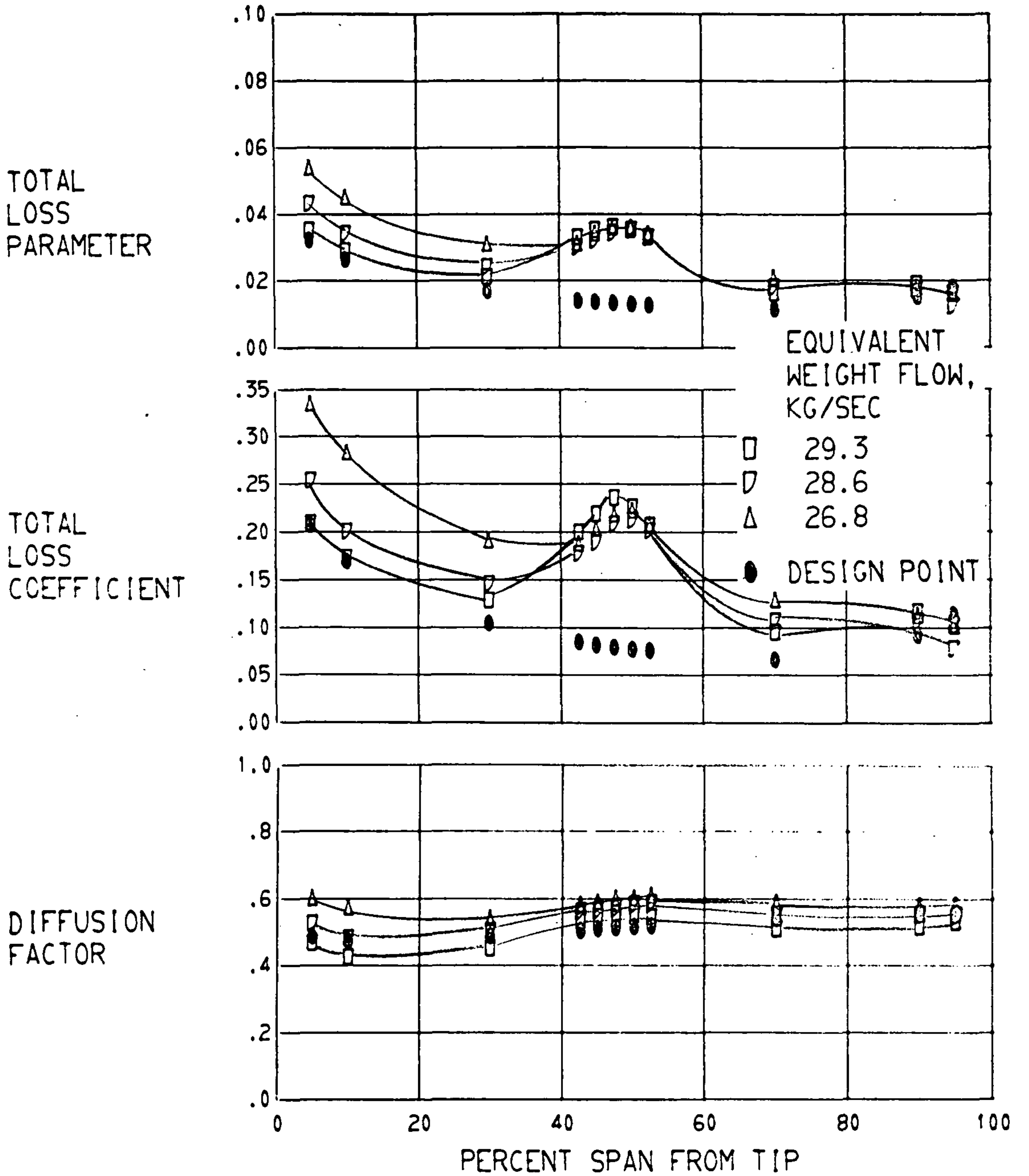


FIGURE 10 .-CONCLUDED. RADIAL DISTRIBUTION OF PERFORMANCE FOR ROTOR 12. 100 PERCENT DESIGN SPEED.

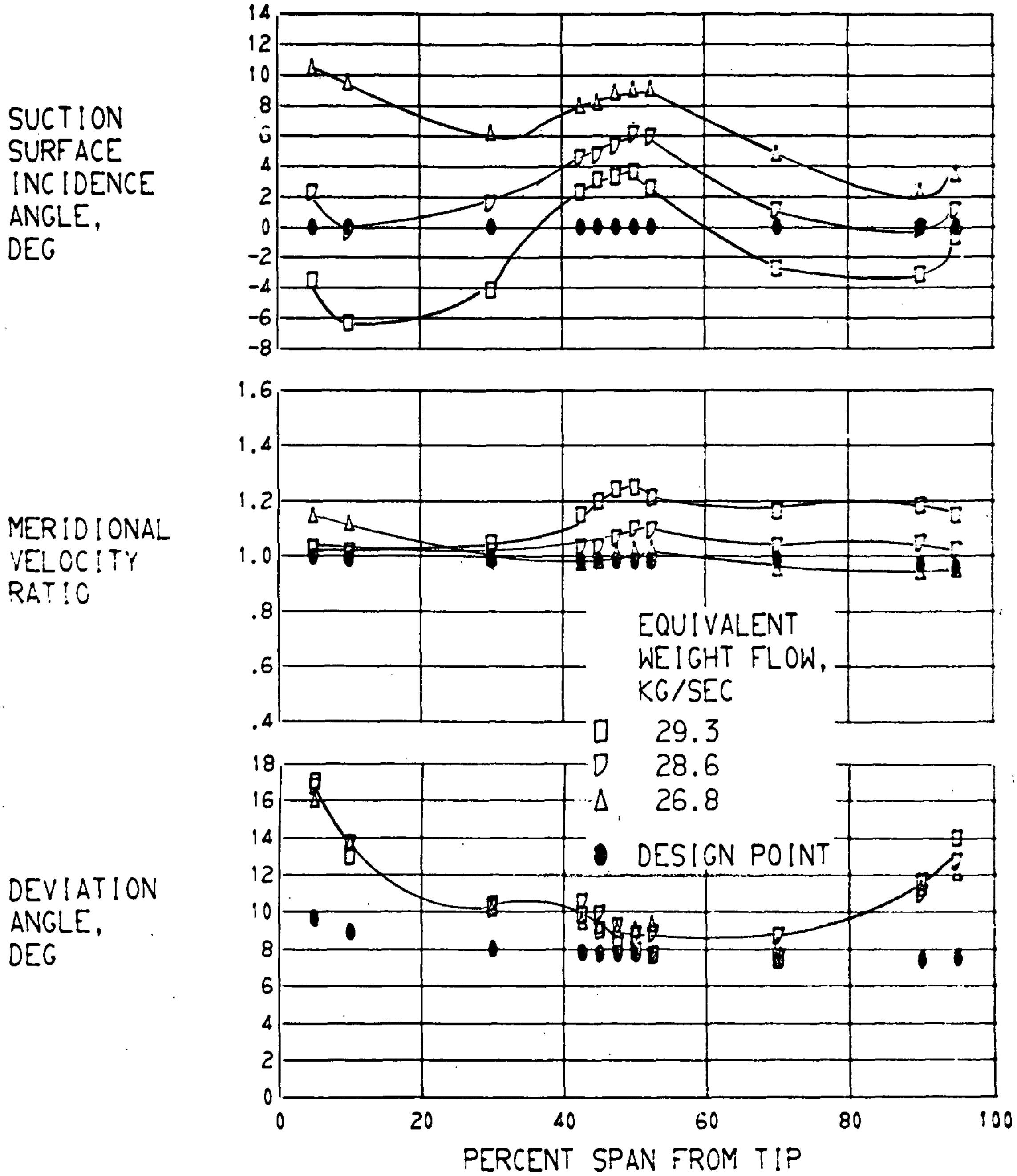


FIGURE 11 .-RADIAL DISTRIBUTION OF PERFORMANCE FOR STATOR 5. 100 PERCENT DESIGN SPEED.

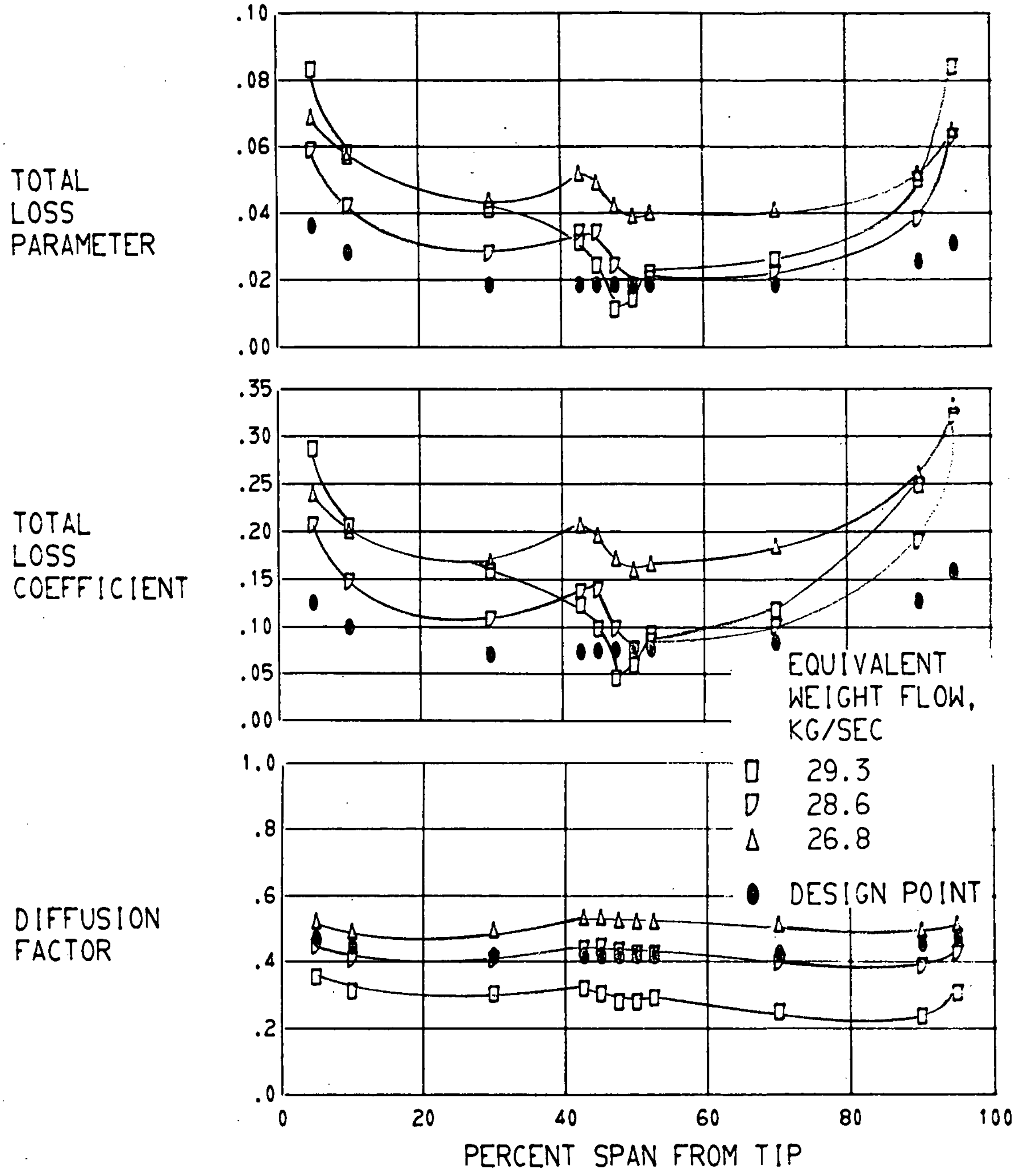
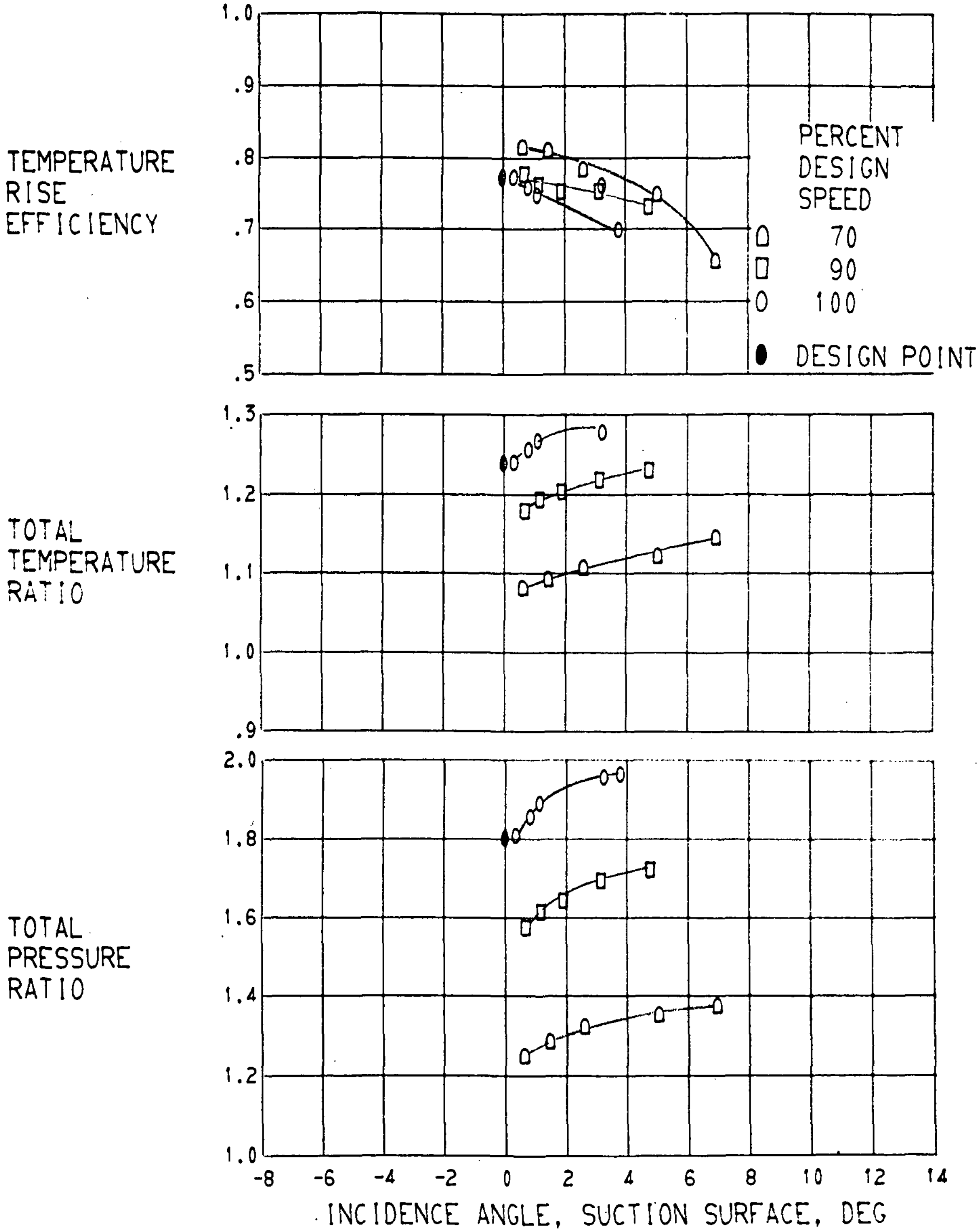
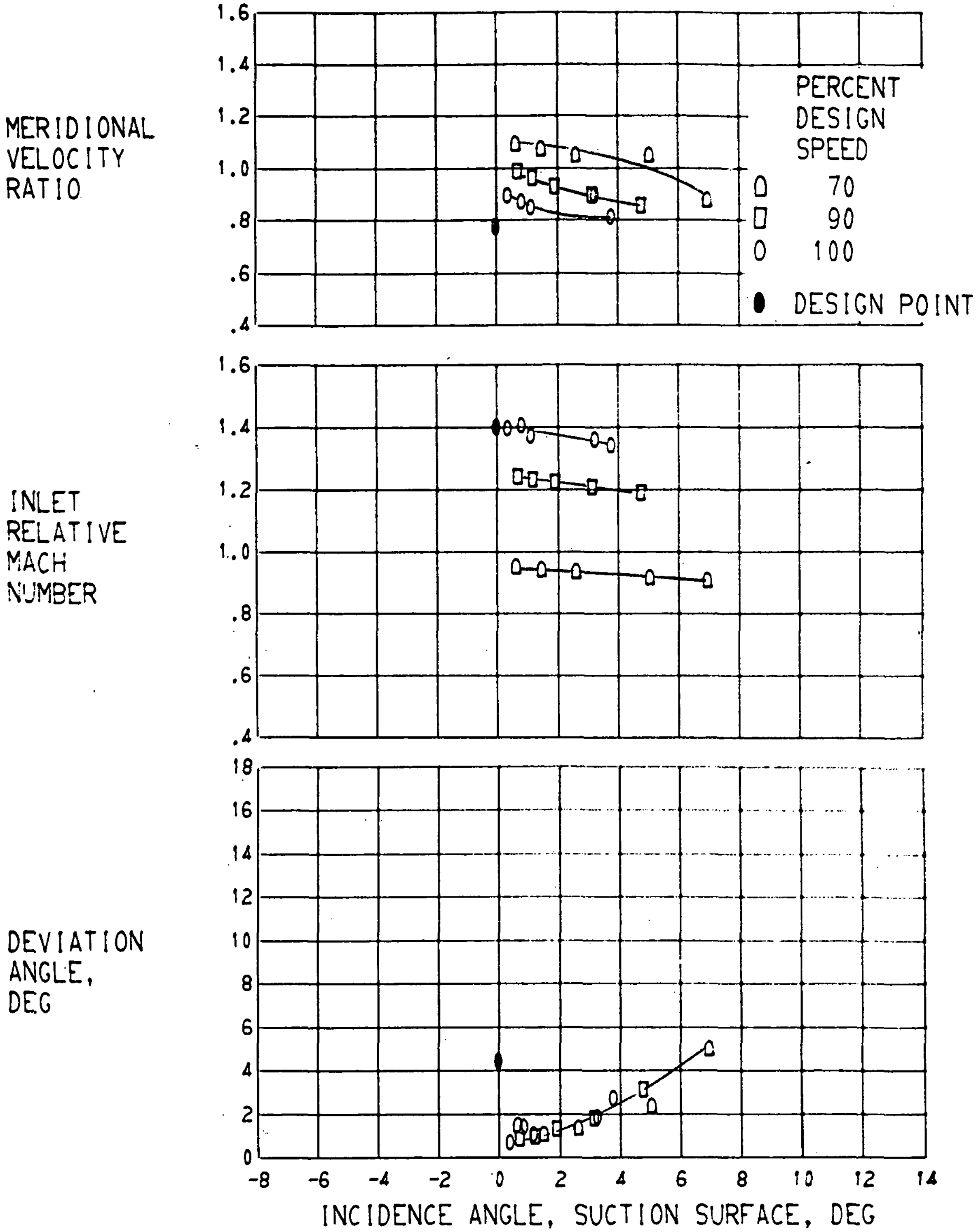


FIGURE 11 .-CONCLUDED. RADIAL DISTRIBUTION OF PERFORMANCE FOR STATOR 5. 100 PERCENT DESIGN SPEED.



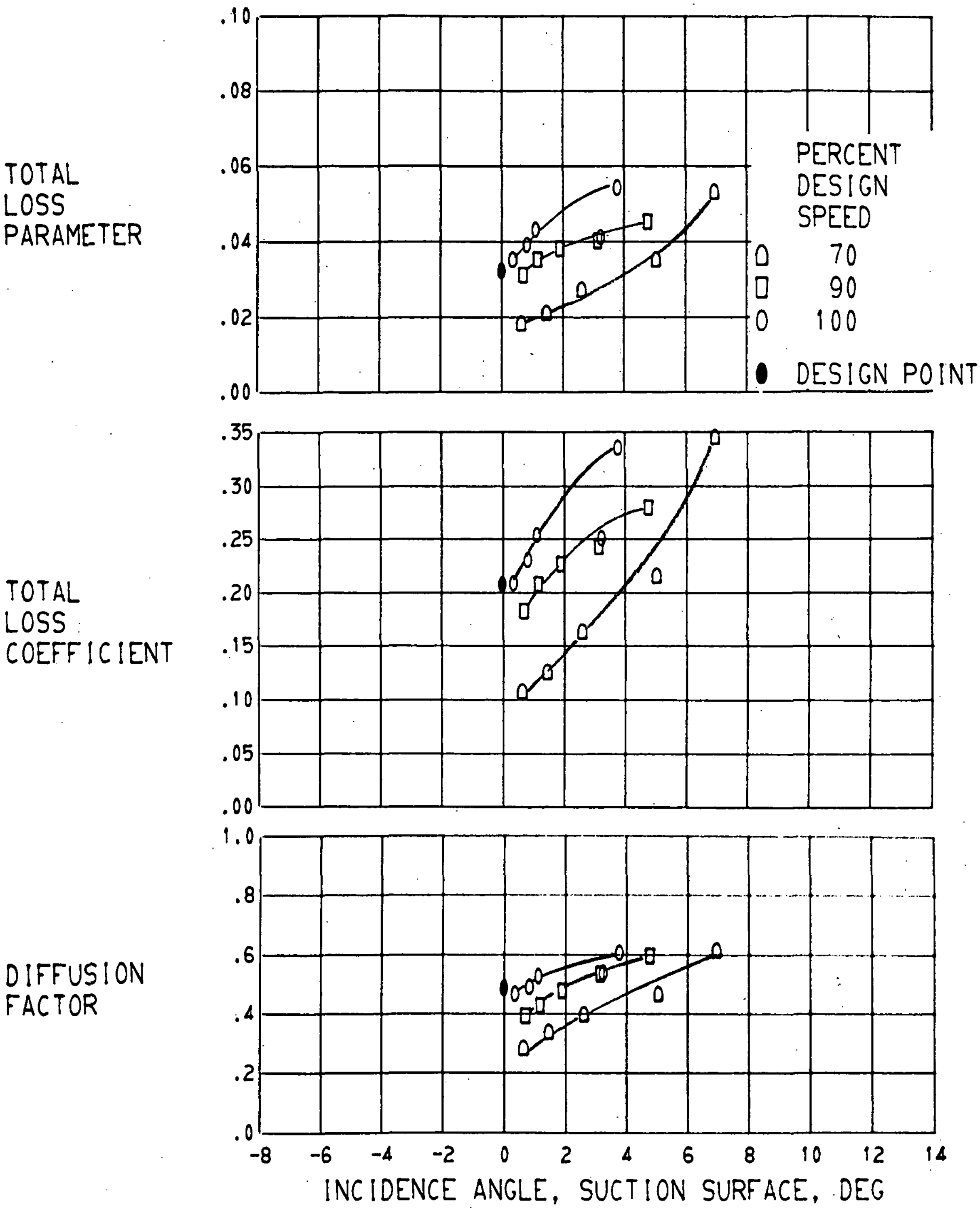
(A) 5.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



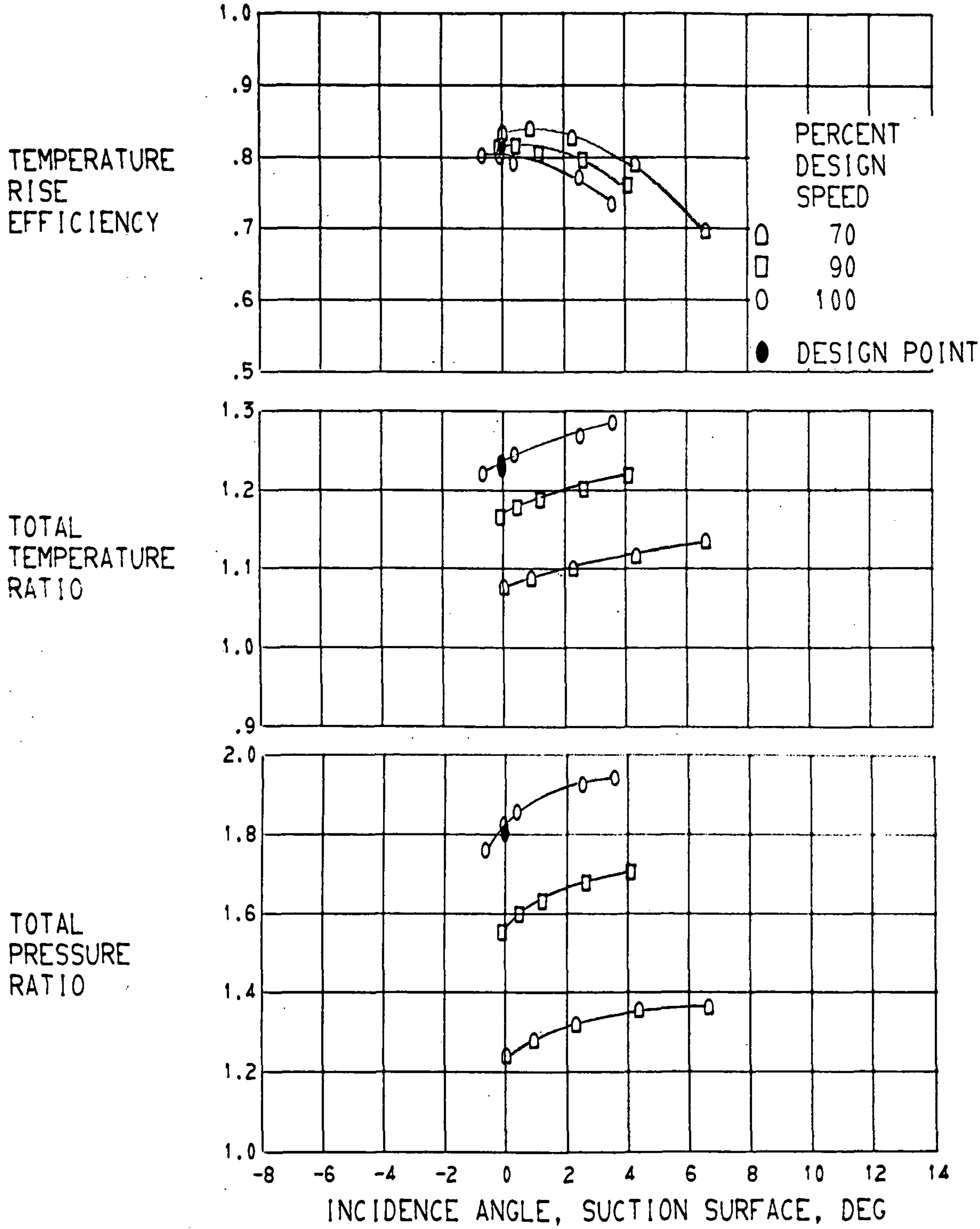
(A) CONTINUED. 5.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



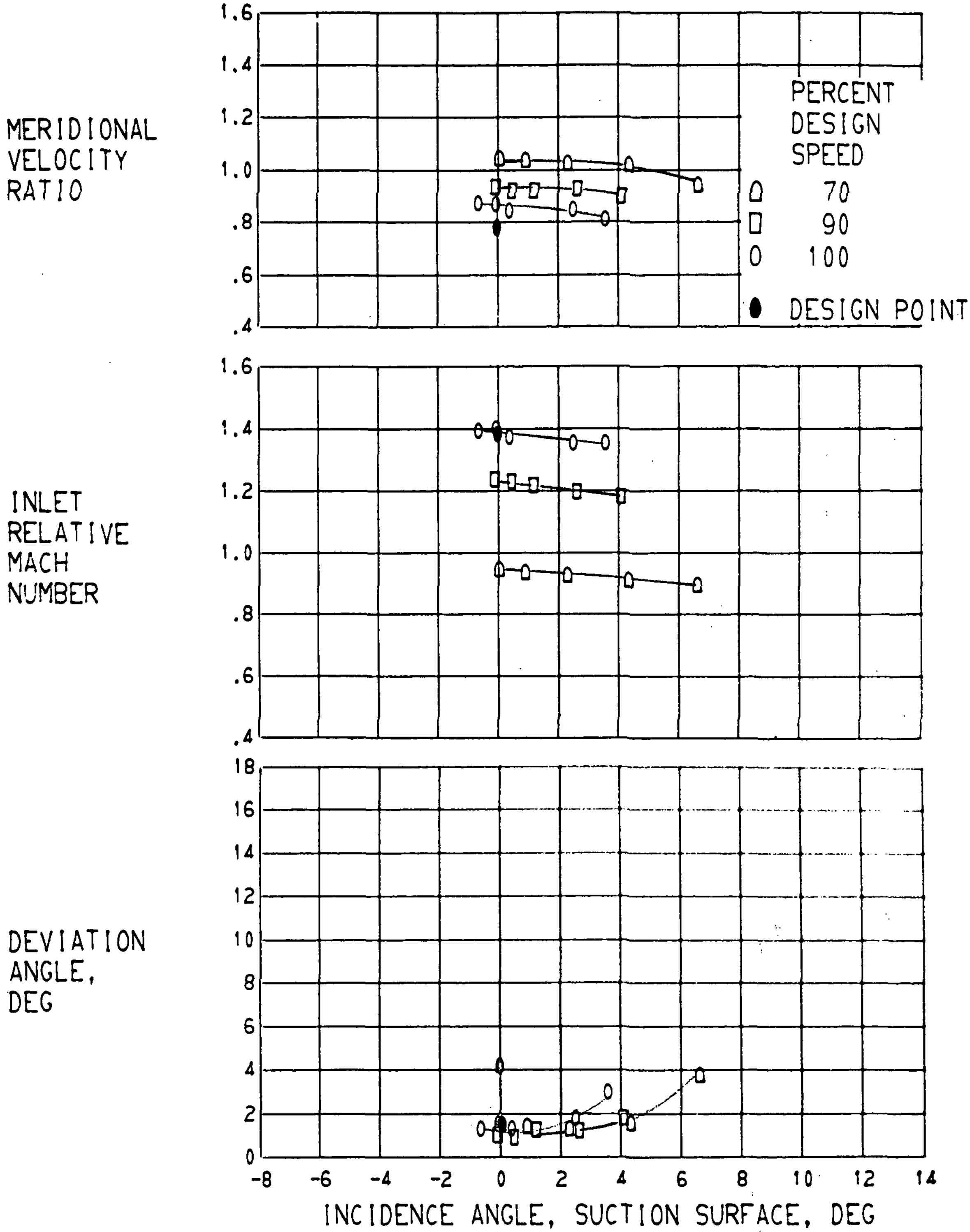
(A) CONCLUDED. 5.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



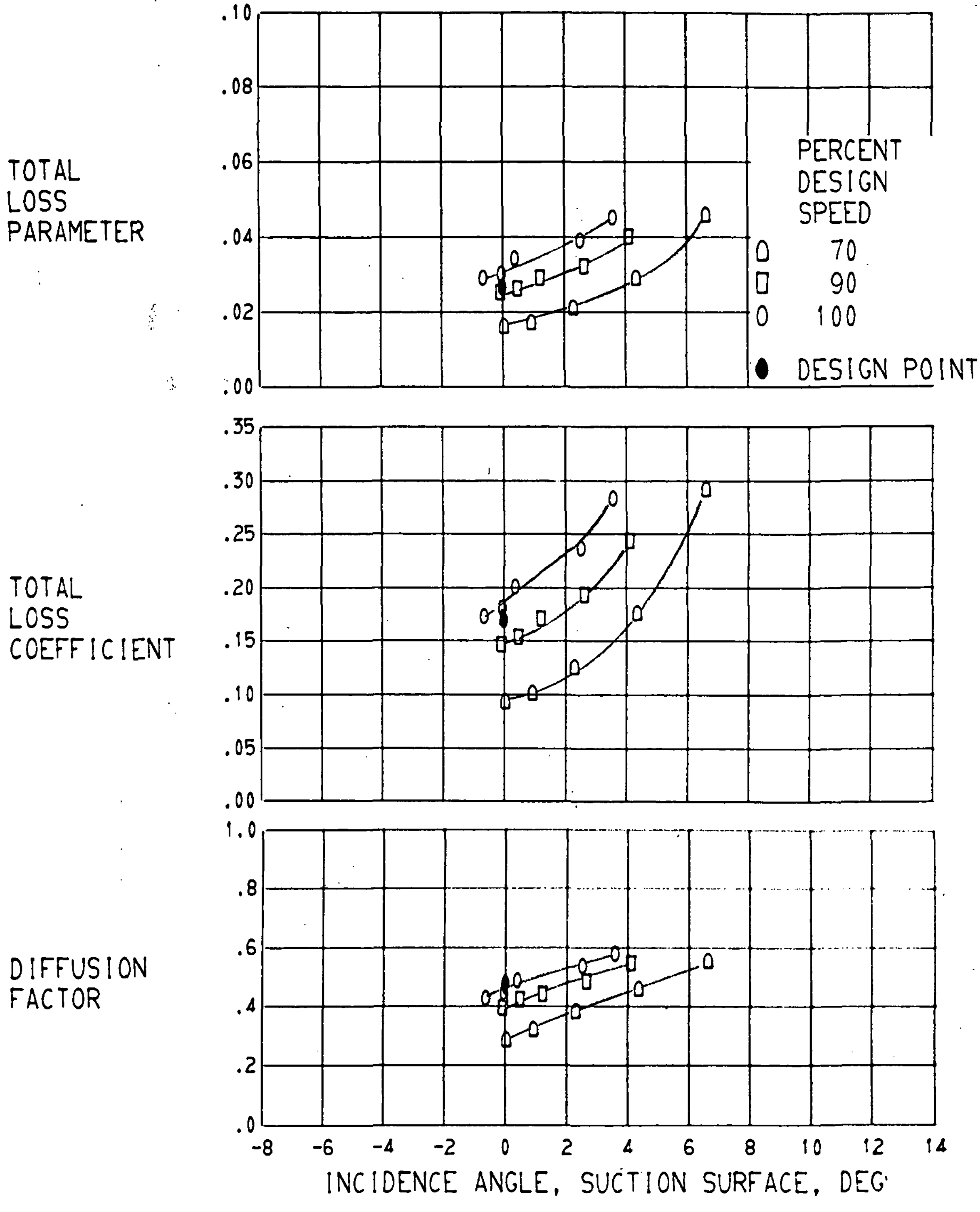
(B) 10.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



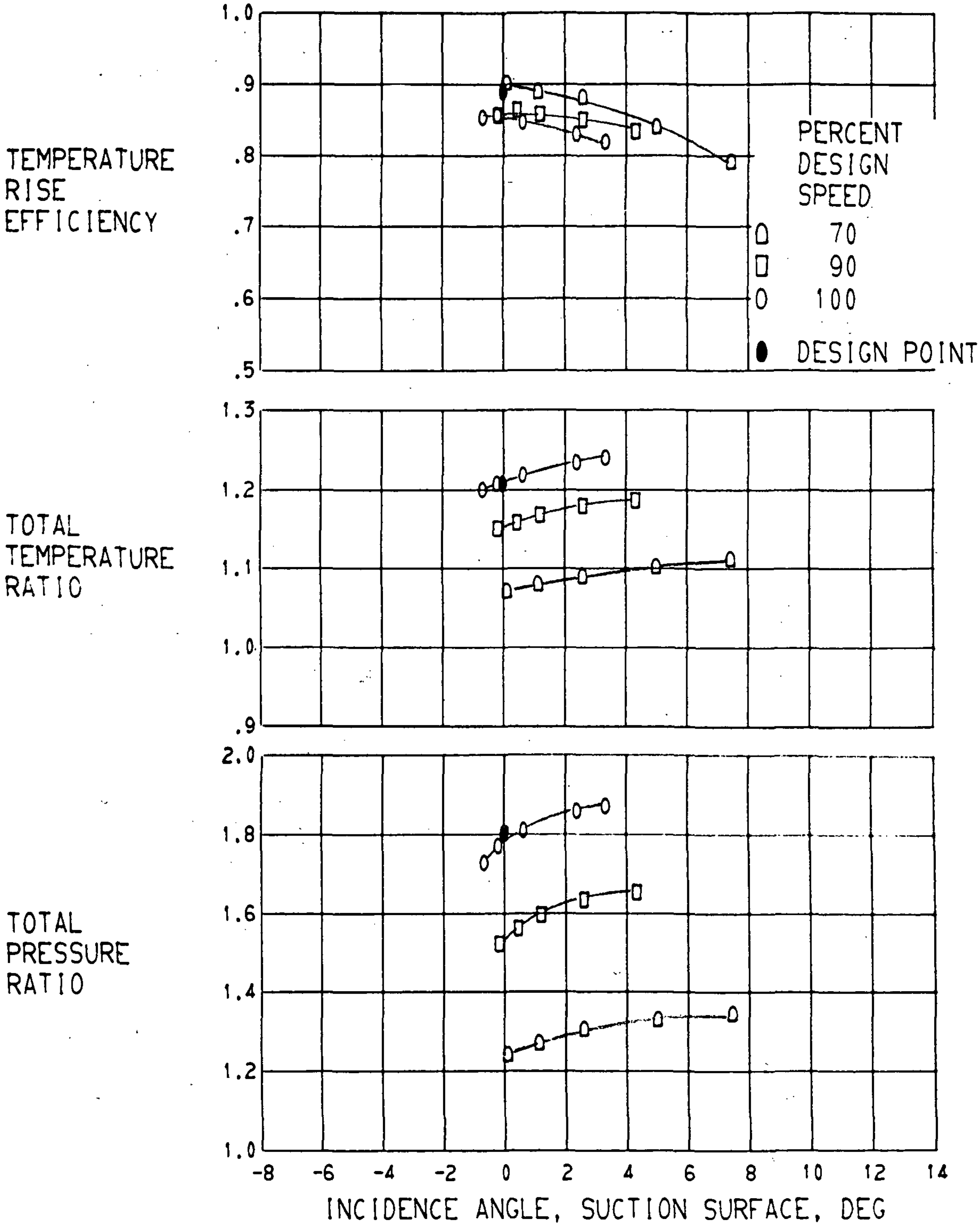
(B) CONTINUED. 10.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



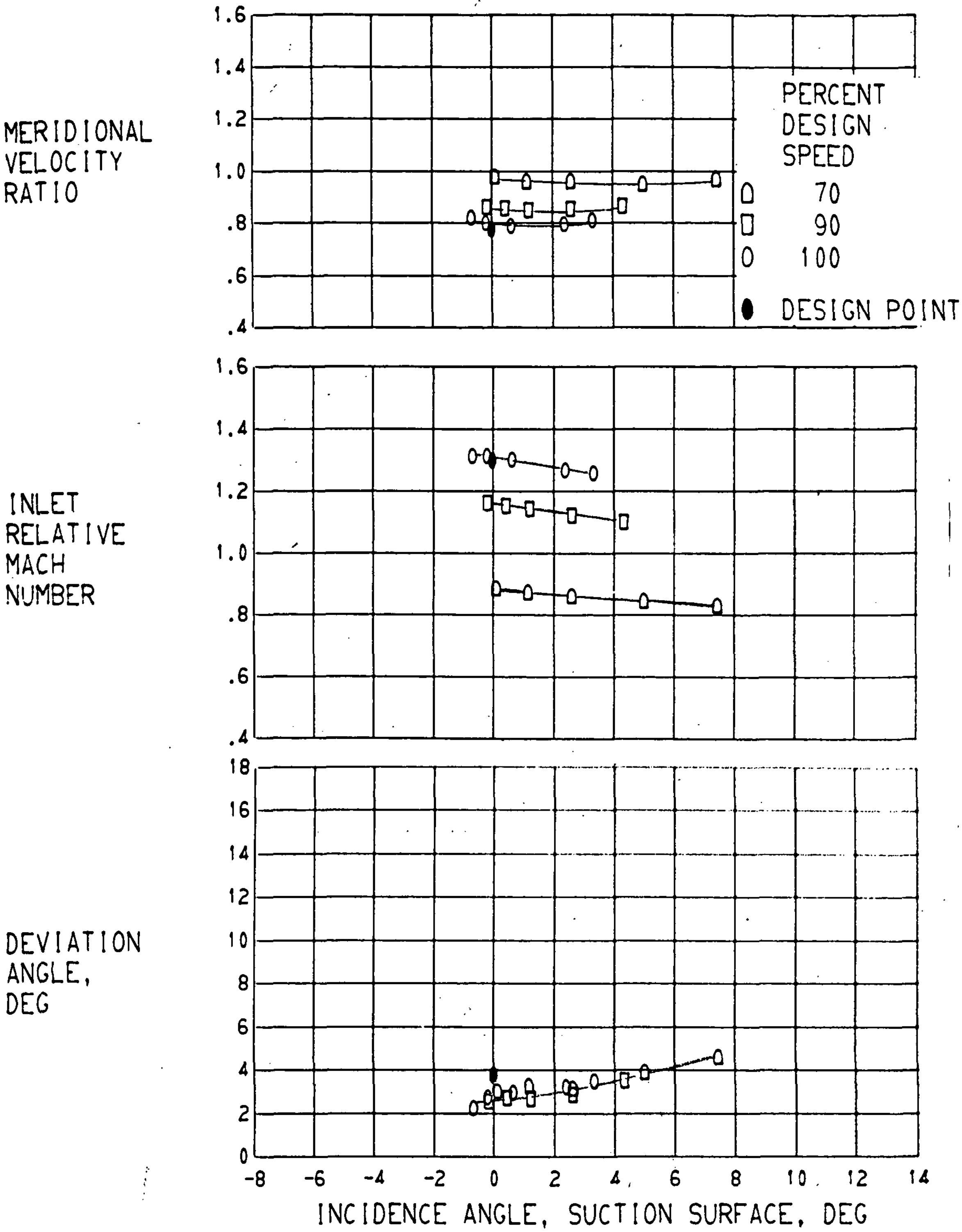
(B) CONCLUDED. 10.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



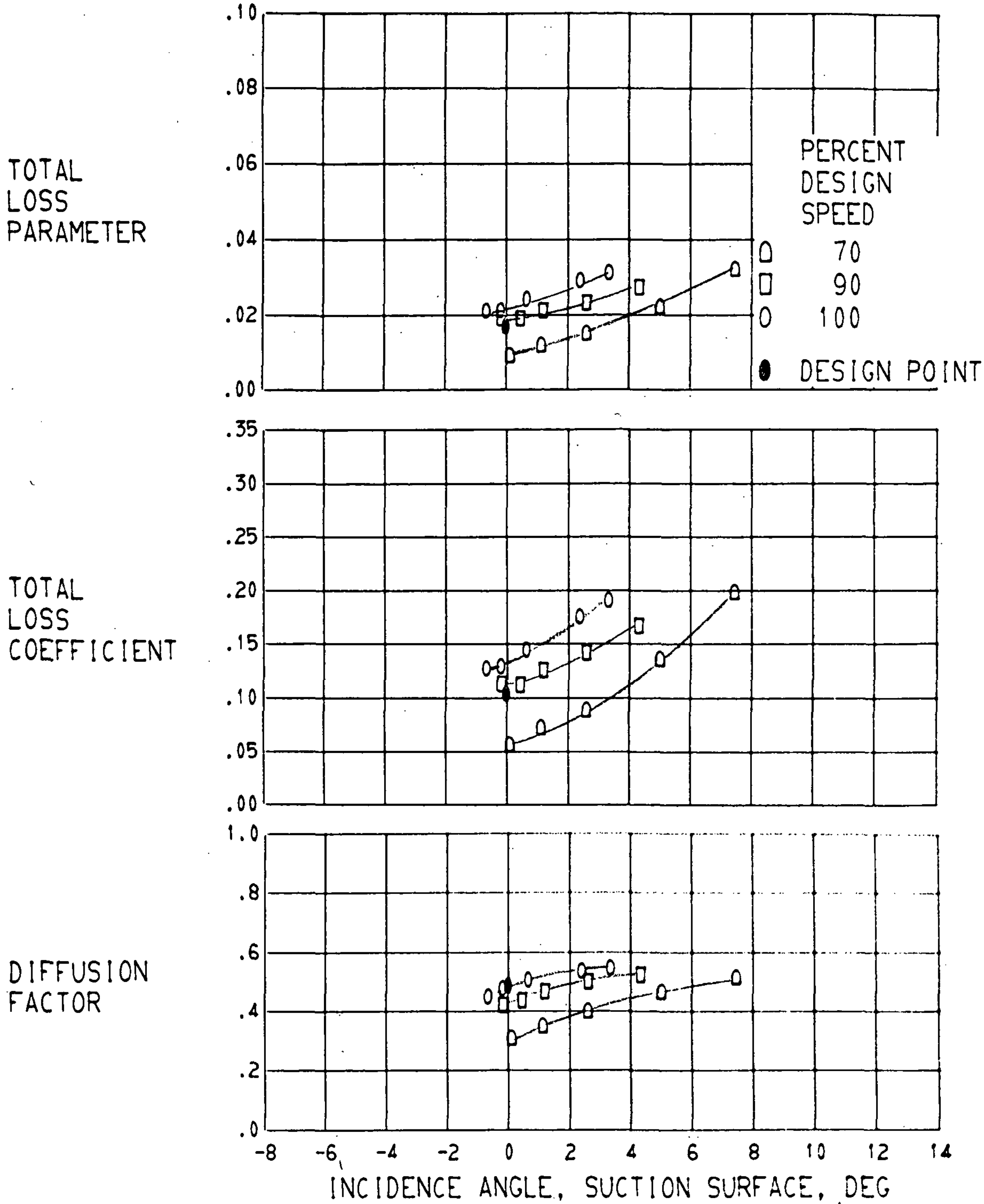
(C) 30.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



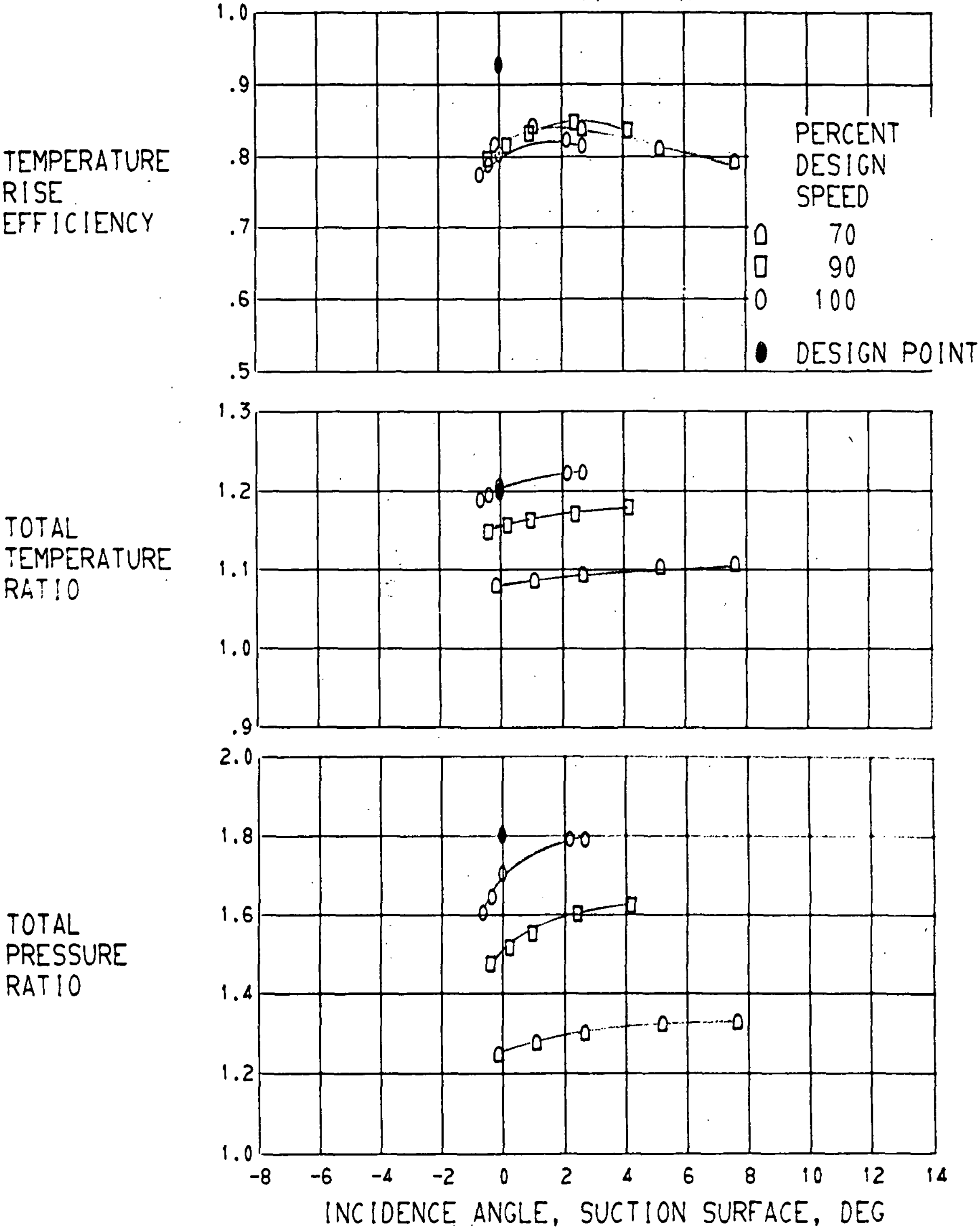
(C) CONTINUED. 30.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



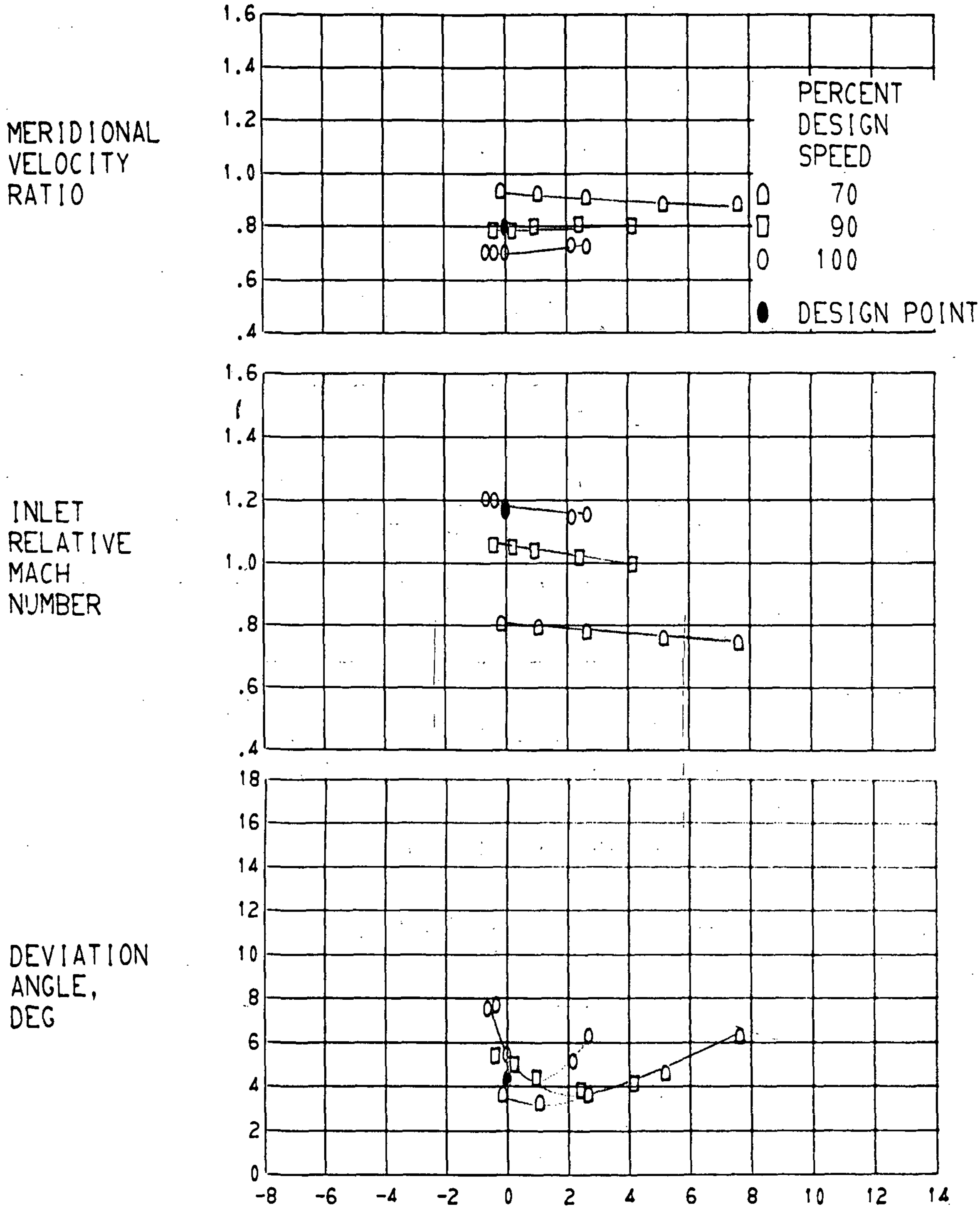
(C) CONCLUDED. 30.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



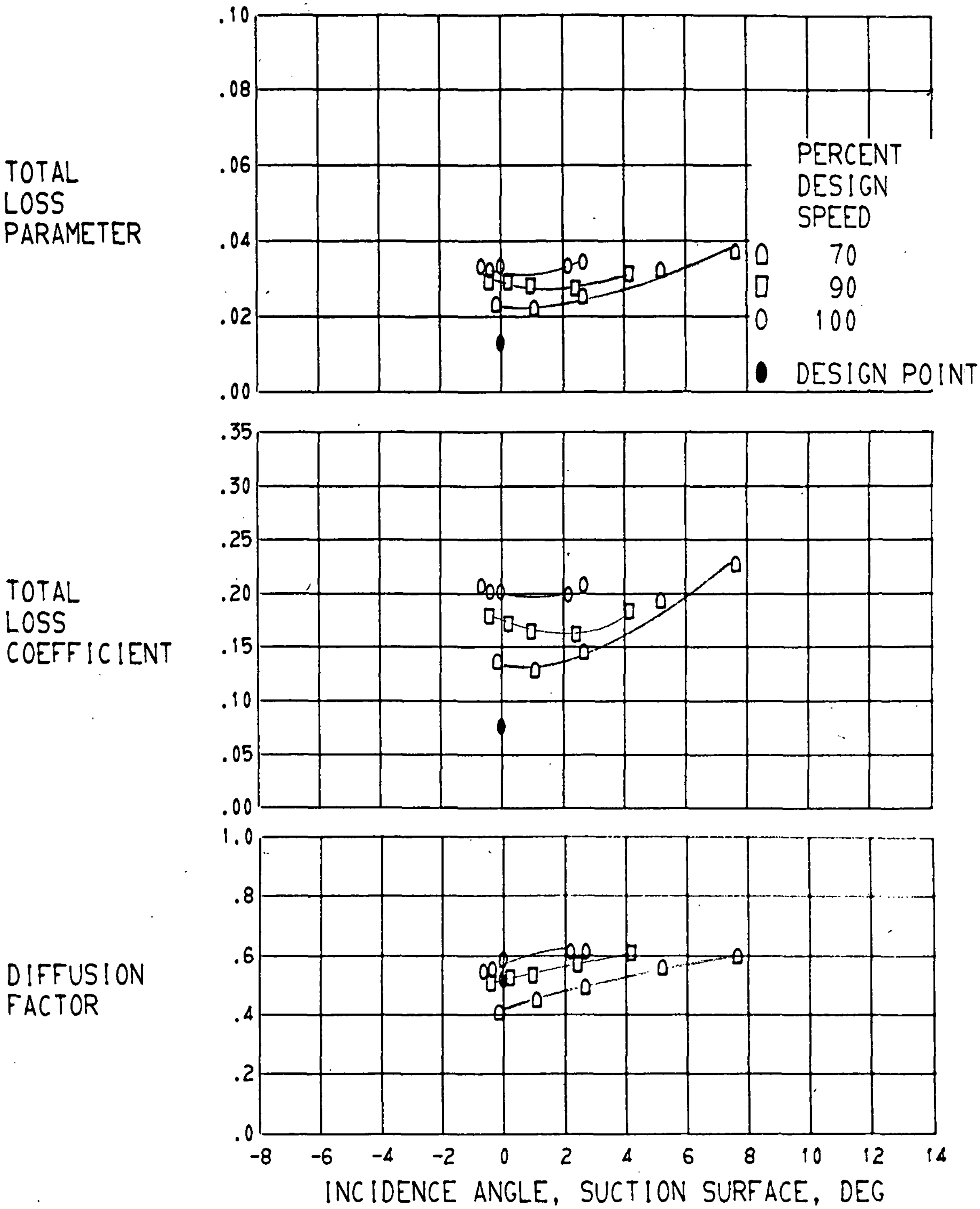
(D) 52.5 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



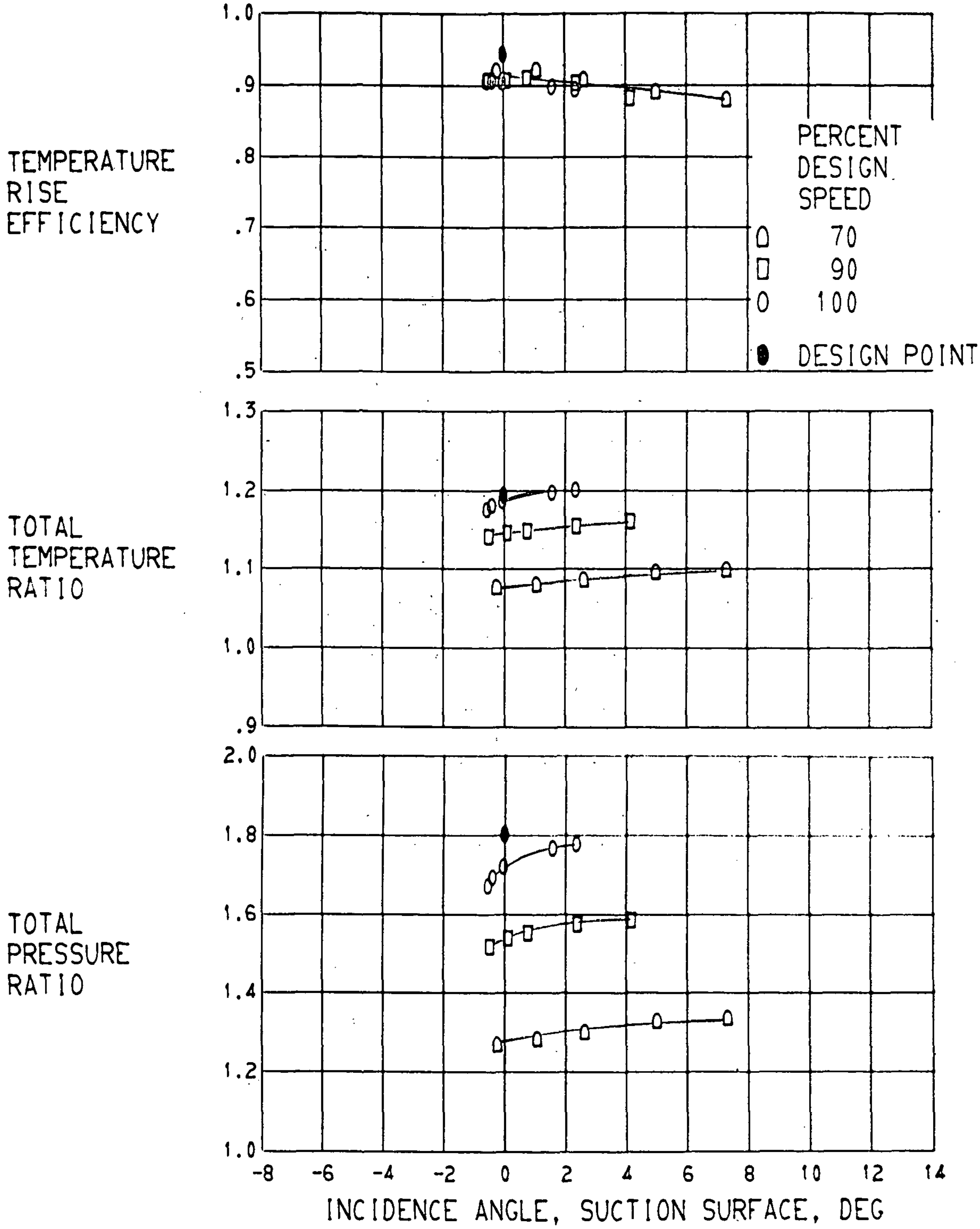
(D) CONTINUED. 52.5 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



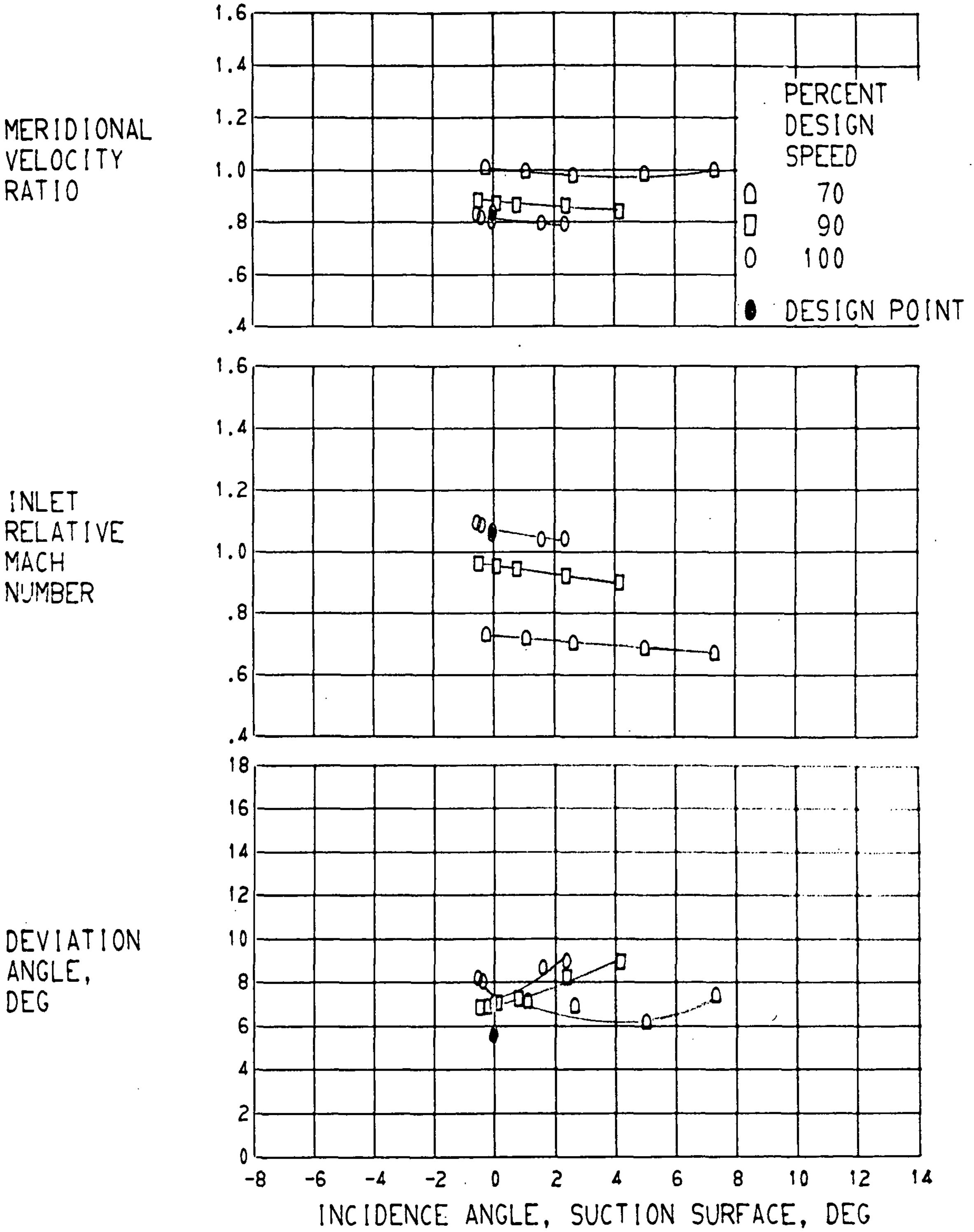
(D) CONCLUDED. 52.5 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



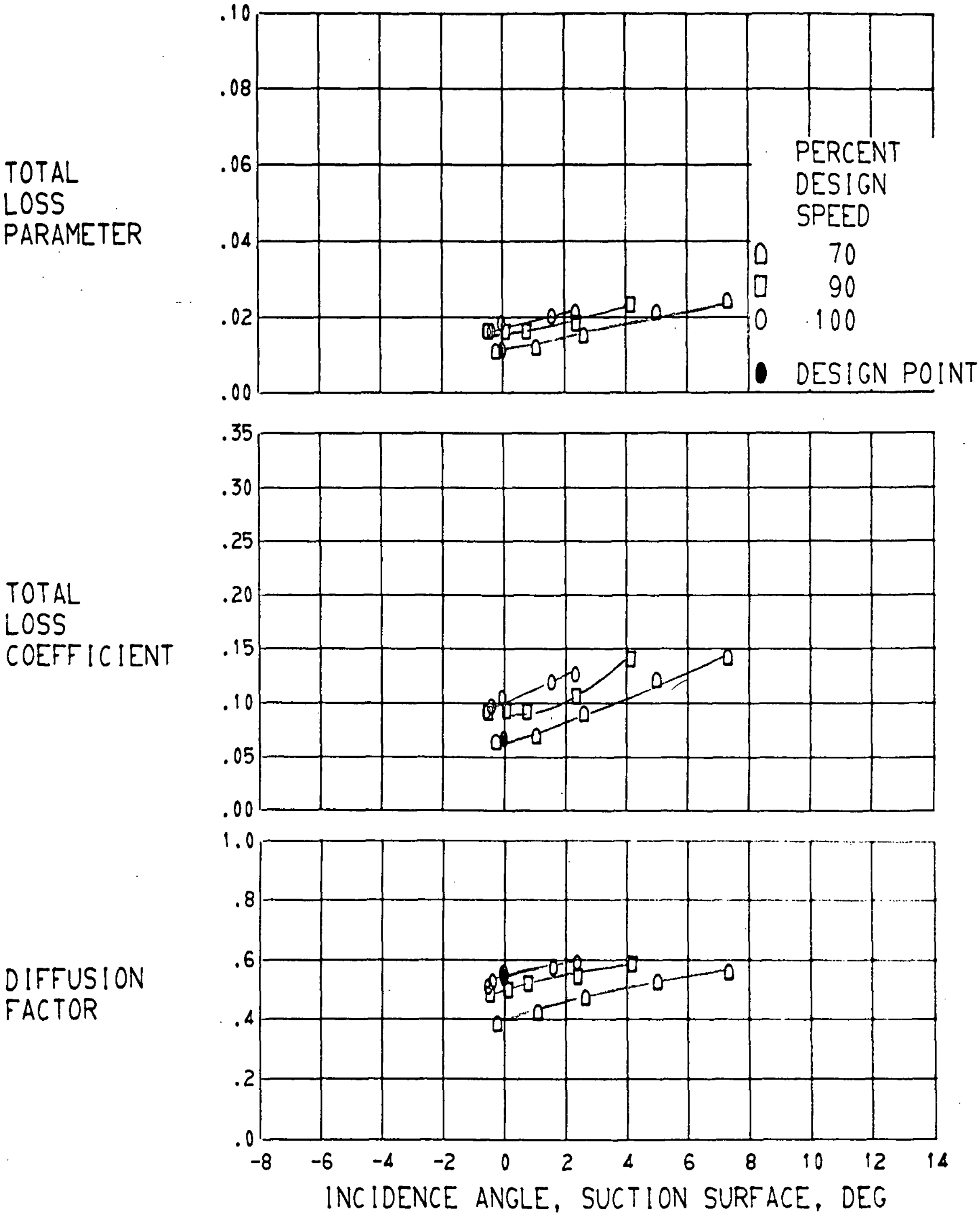
(E) 70.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



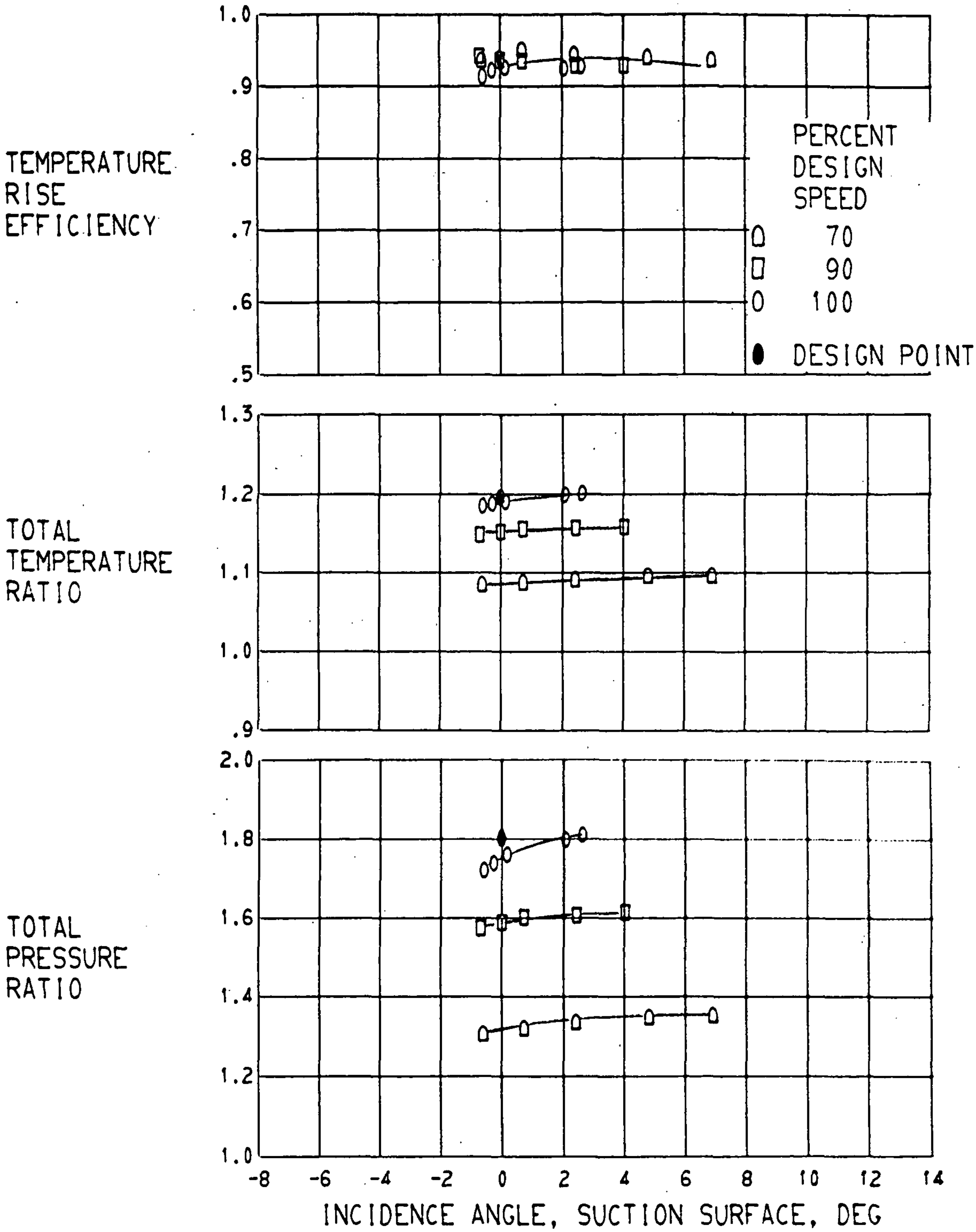
(E) CONTINUED. 70.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



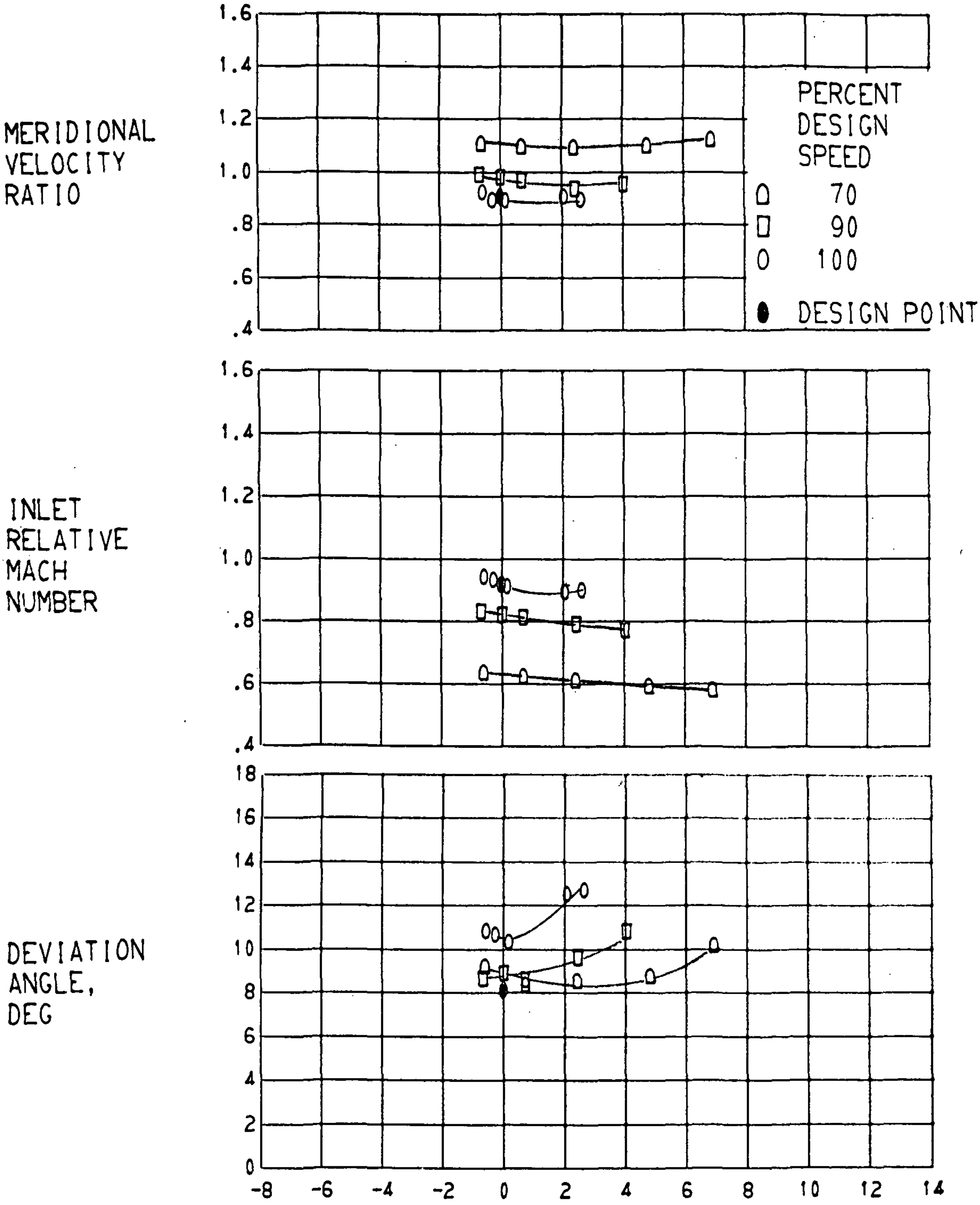
(E) CONCLUDED. 70.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



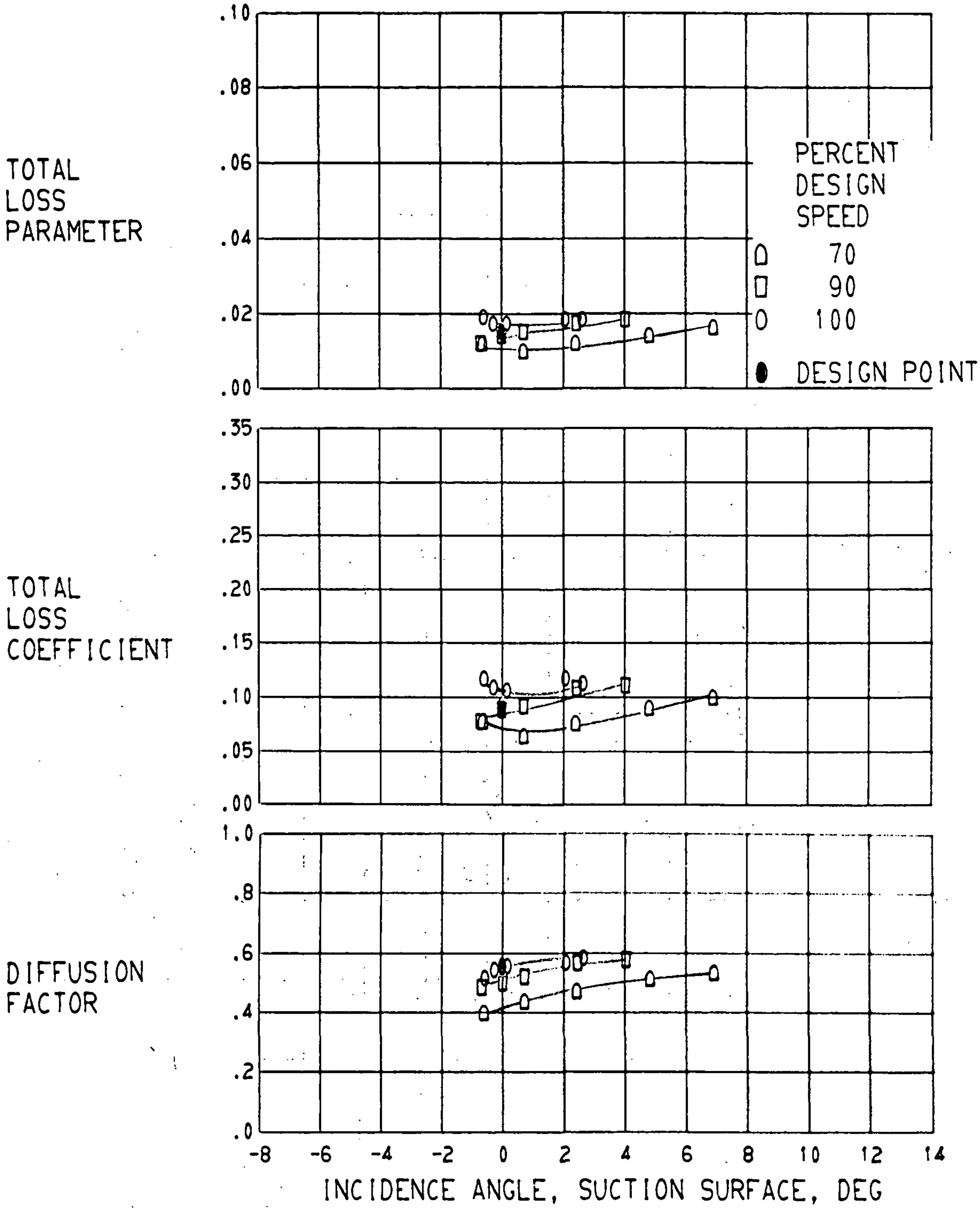
(F) 90.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



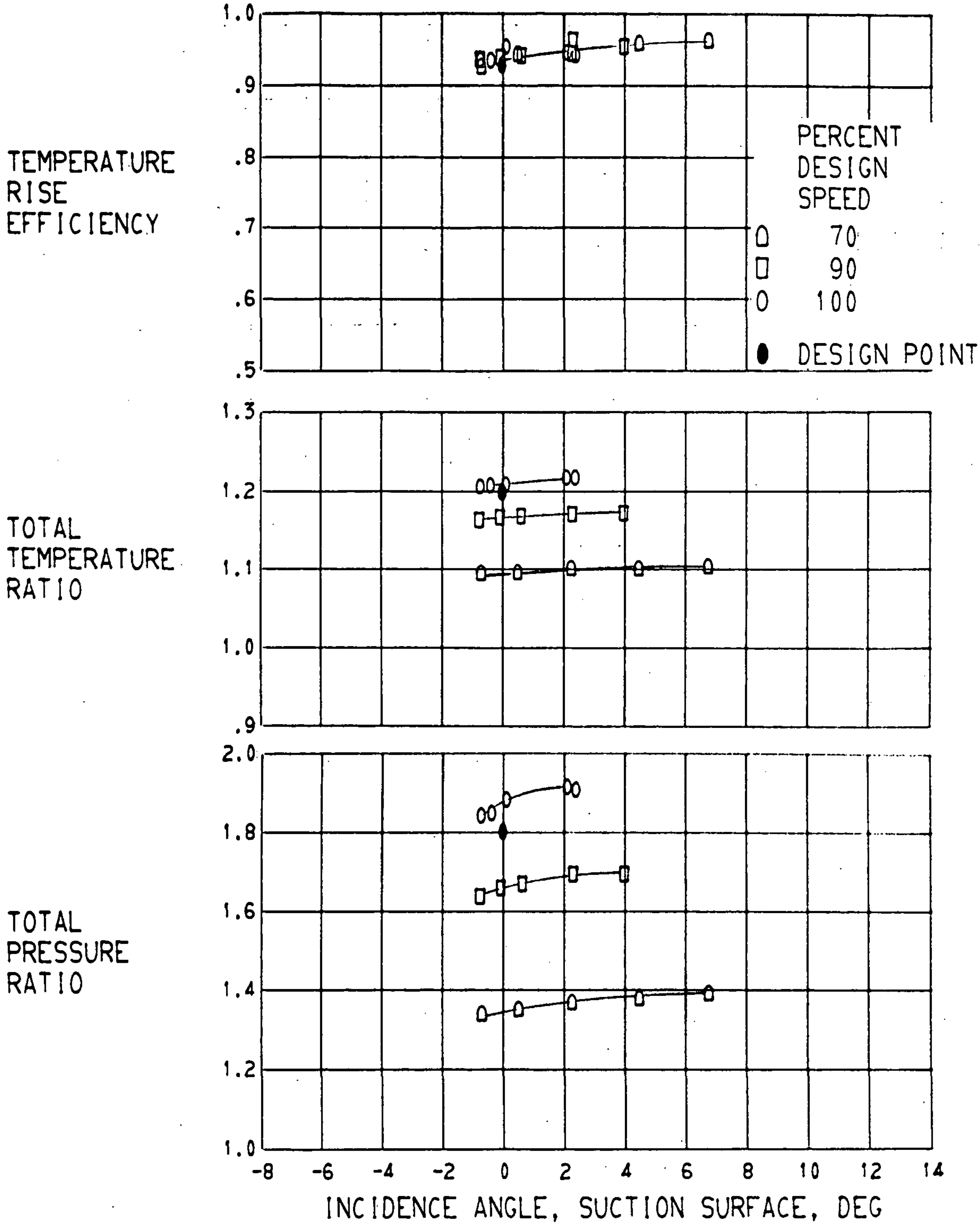
(F) CONTINUED. 90.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



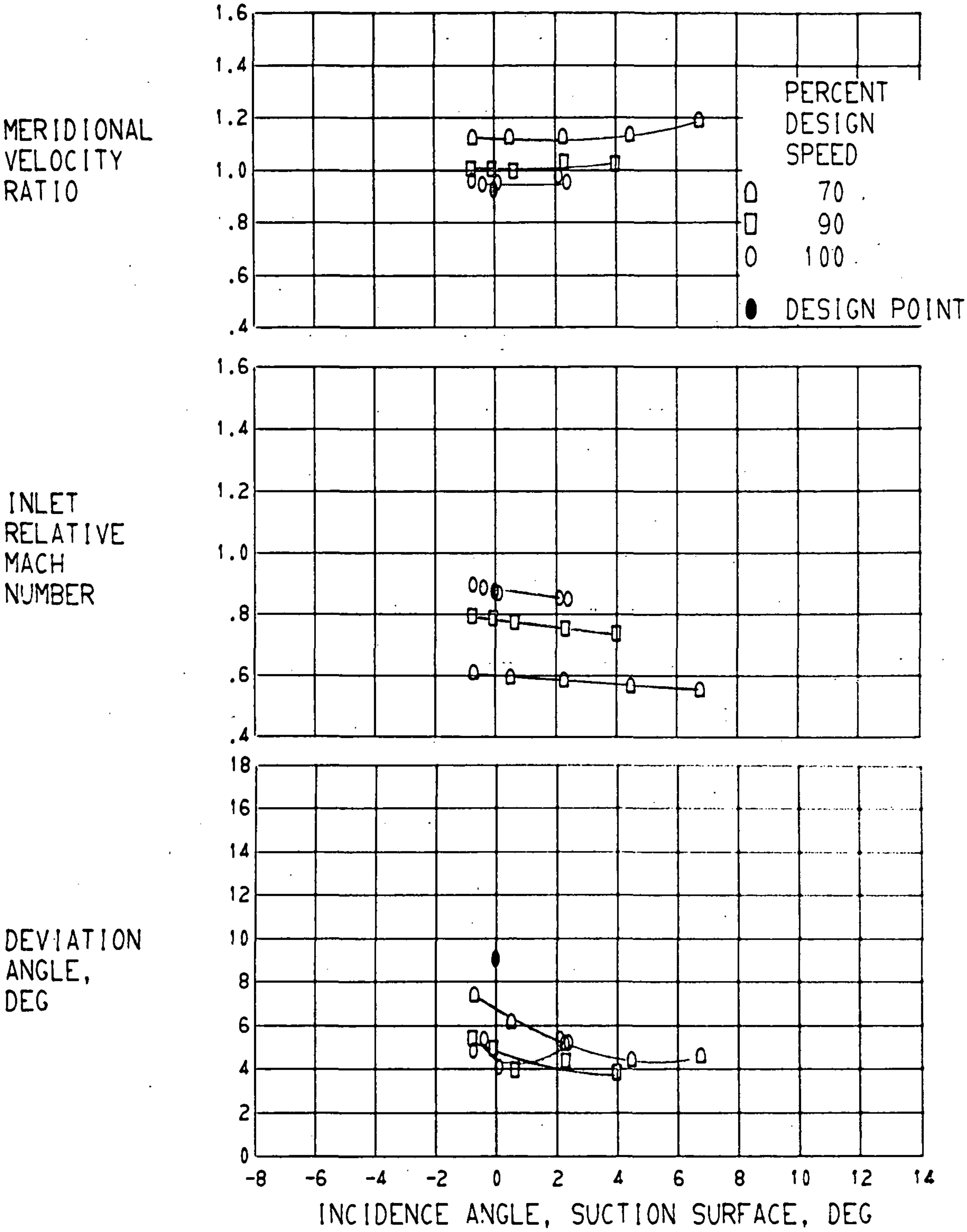
(F) CONCLUDED. 90.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



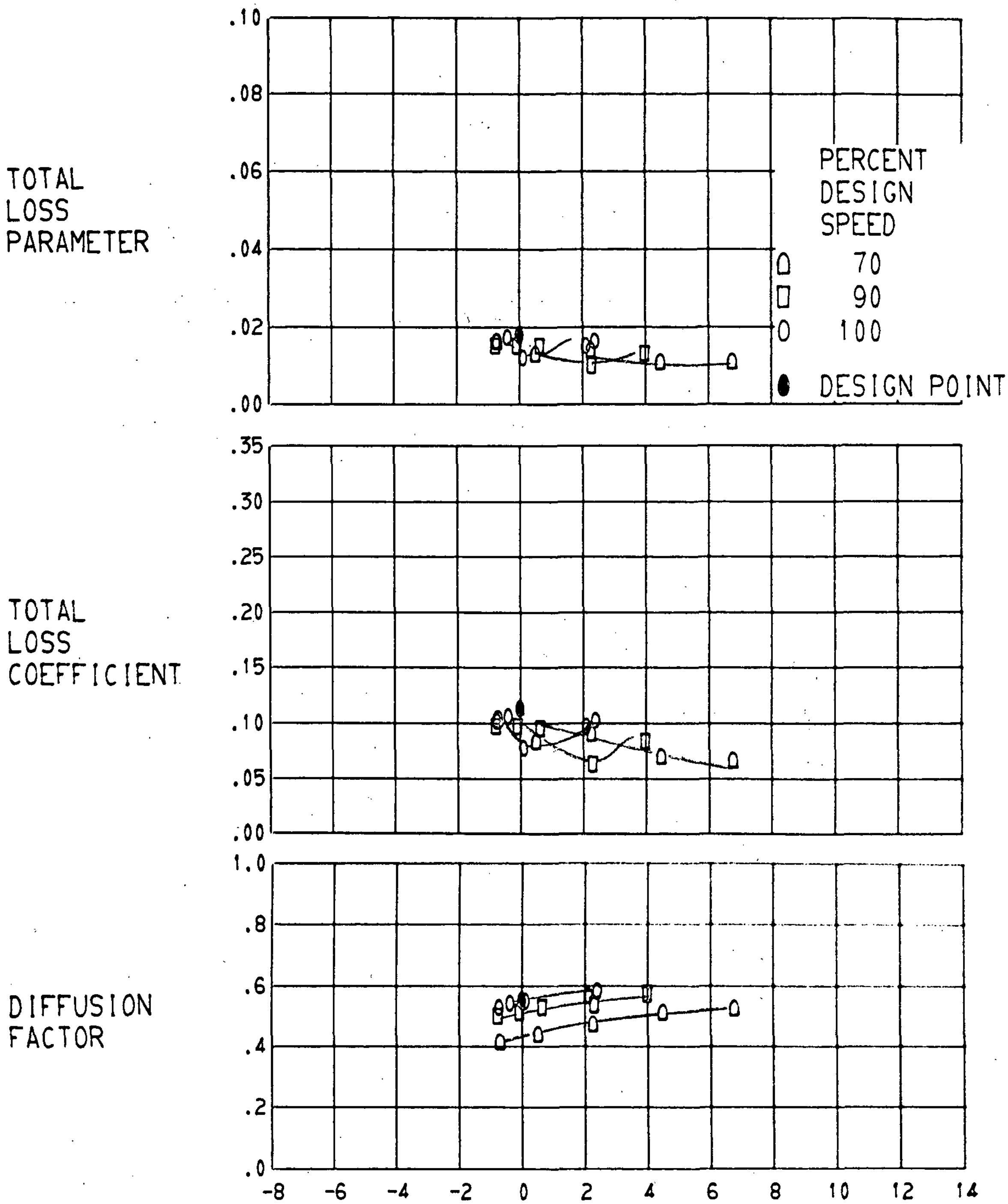
(G) 95.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



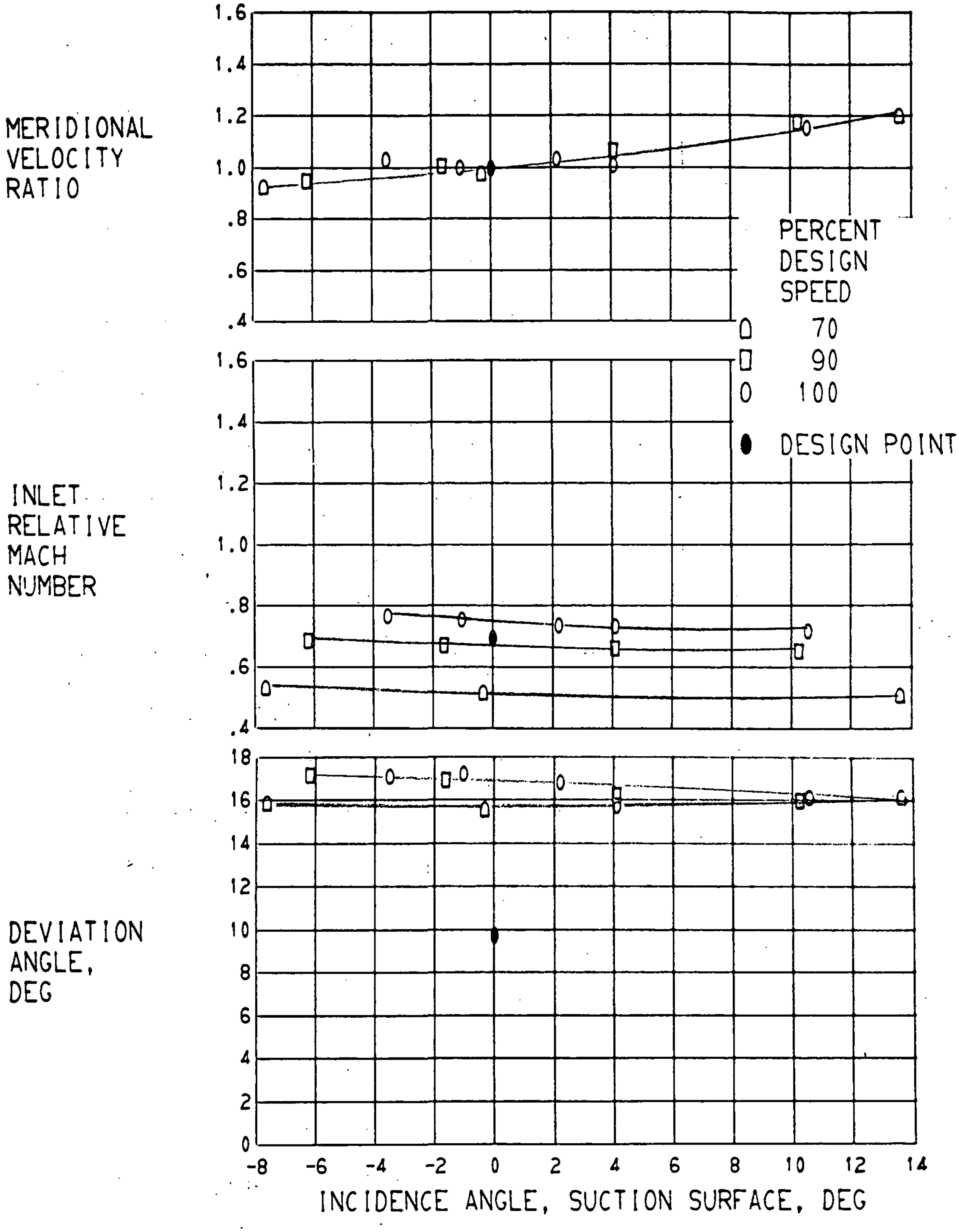
(G) CONTINUED. 95.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



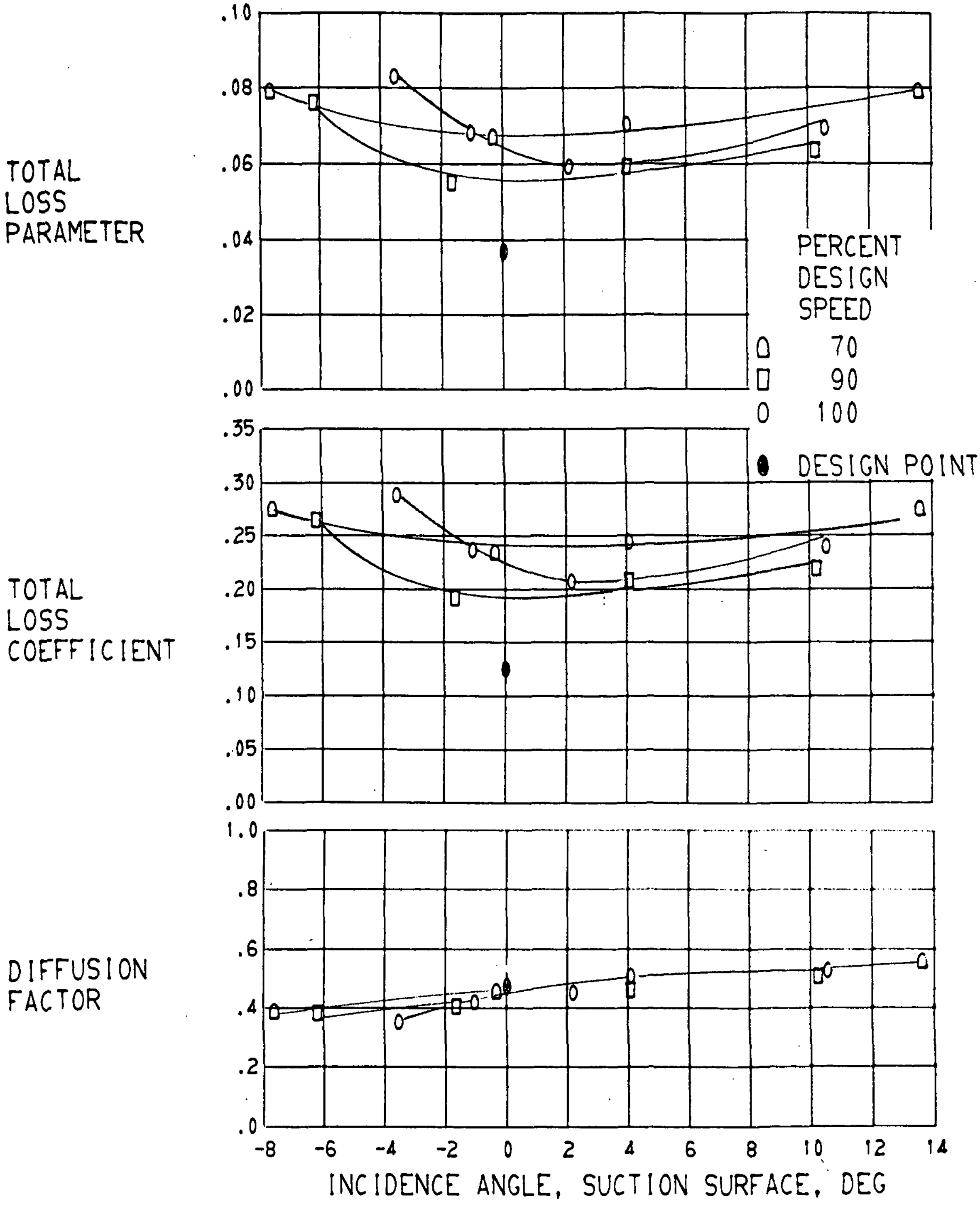
(G) CONCLUDED. 95.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR ROTOR 12.



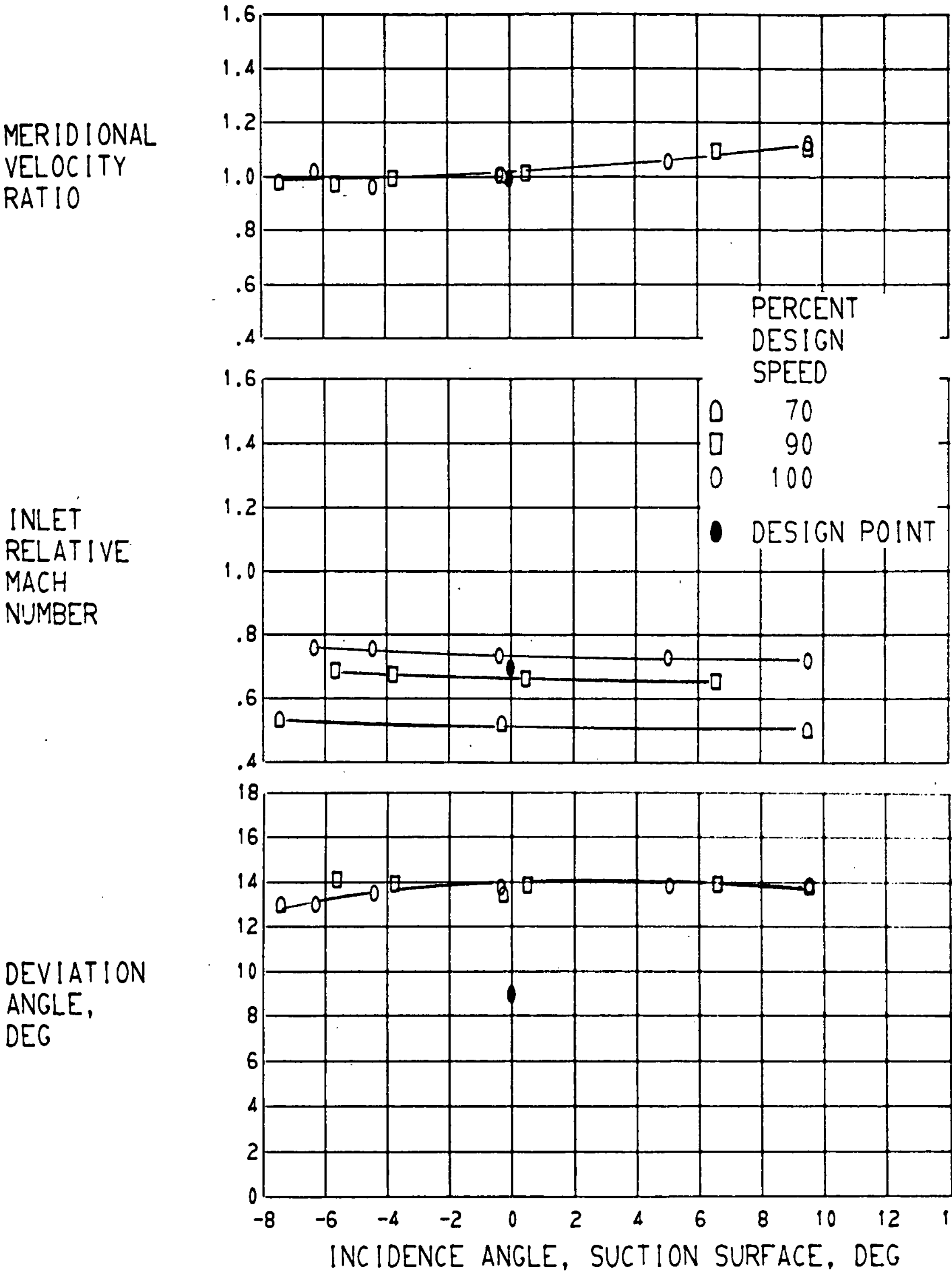
(A) 5.0 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.



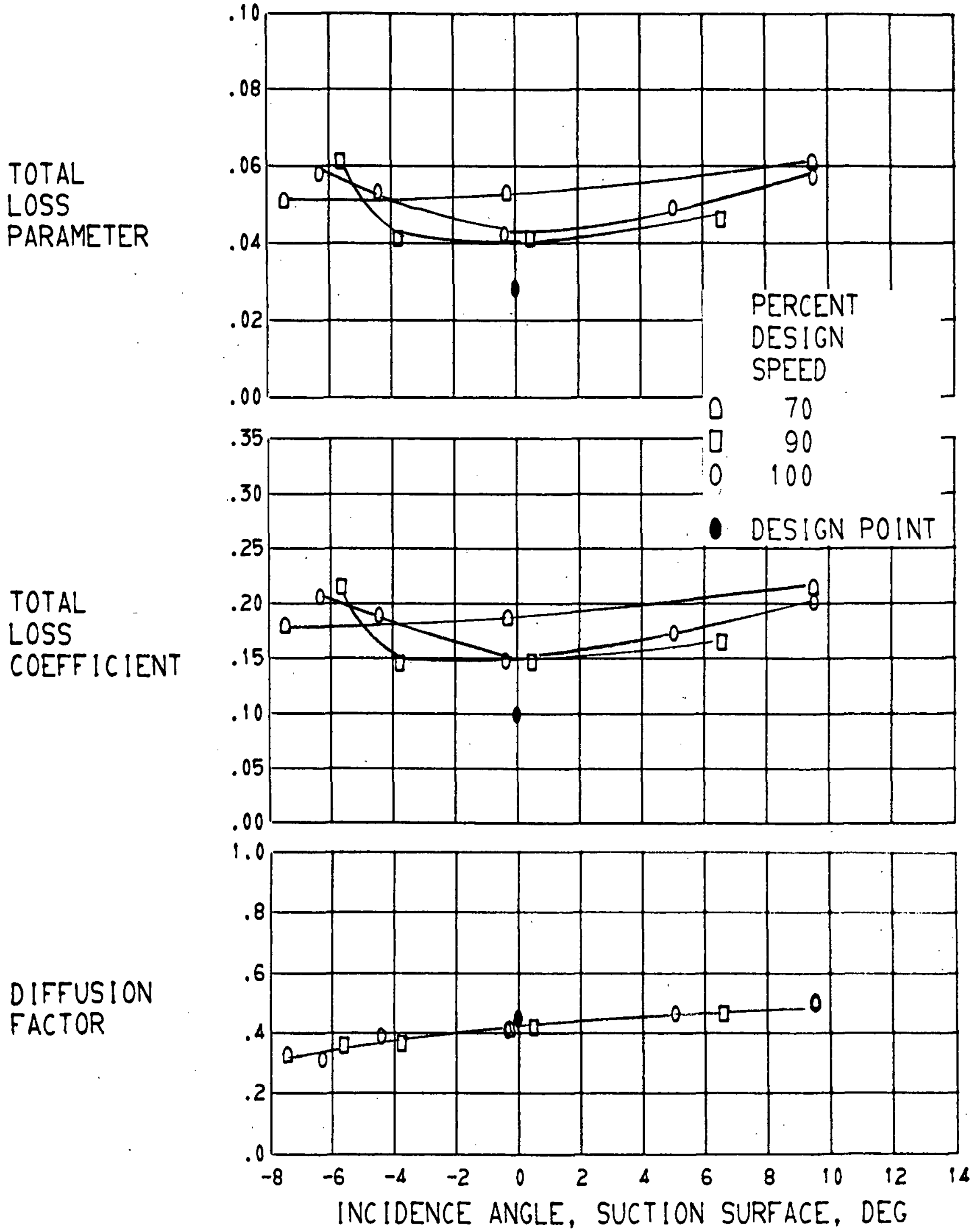
(A) CONCLUDED. 5.0 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.



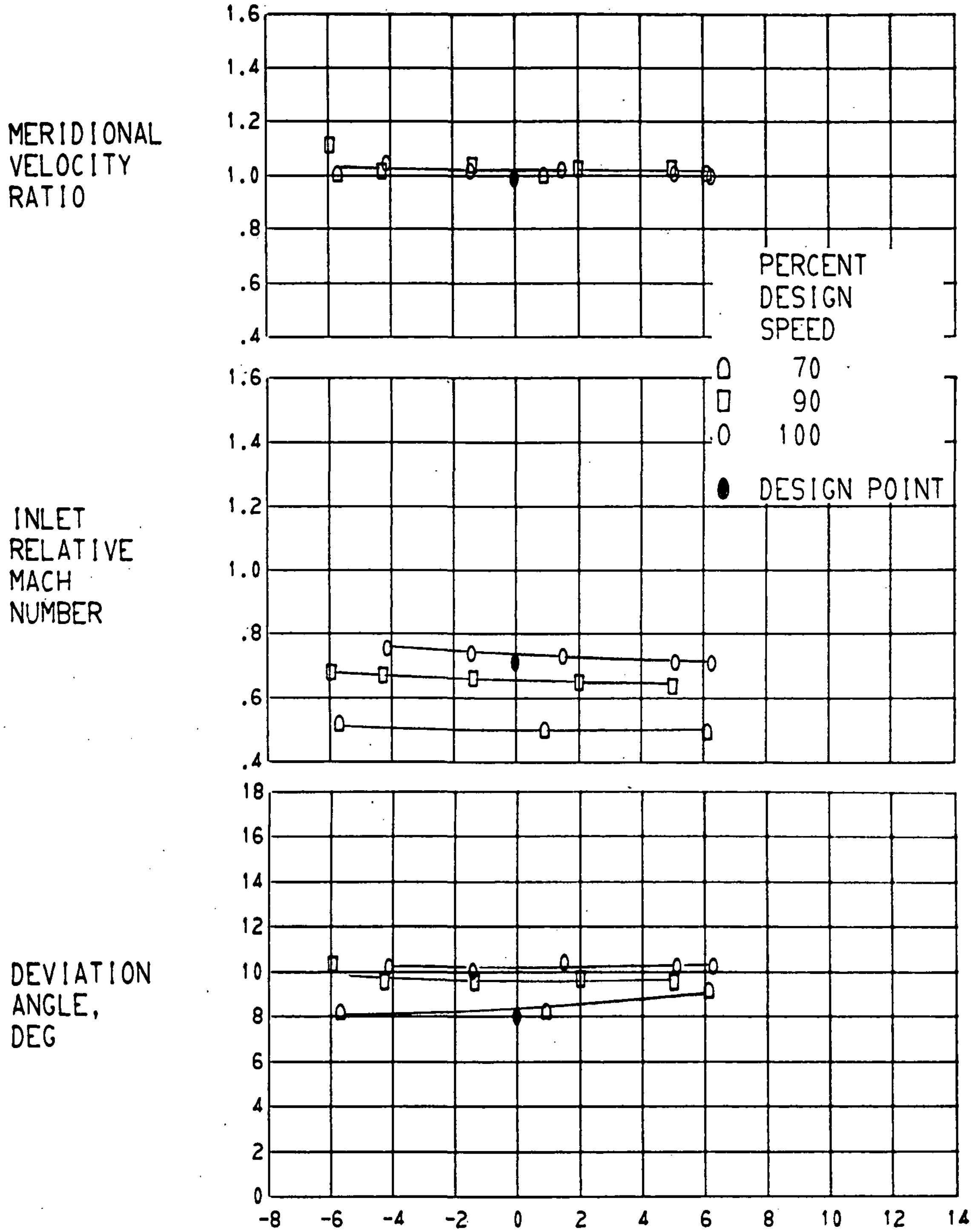
(B) 10.0 PERCENT SPAN.

FIGURE 13. - BLADE-ELEMENT PERFORMANCE FOR STATOR 5.



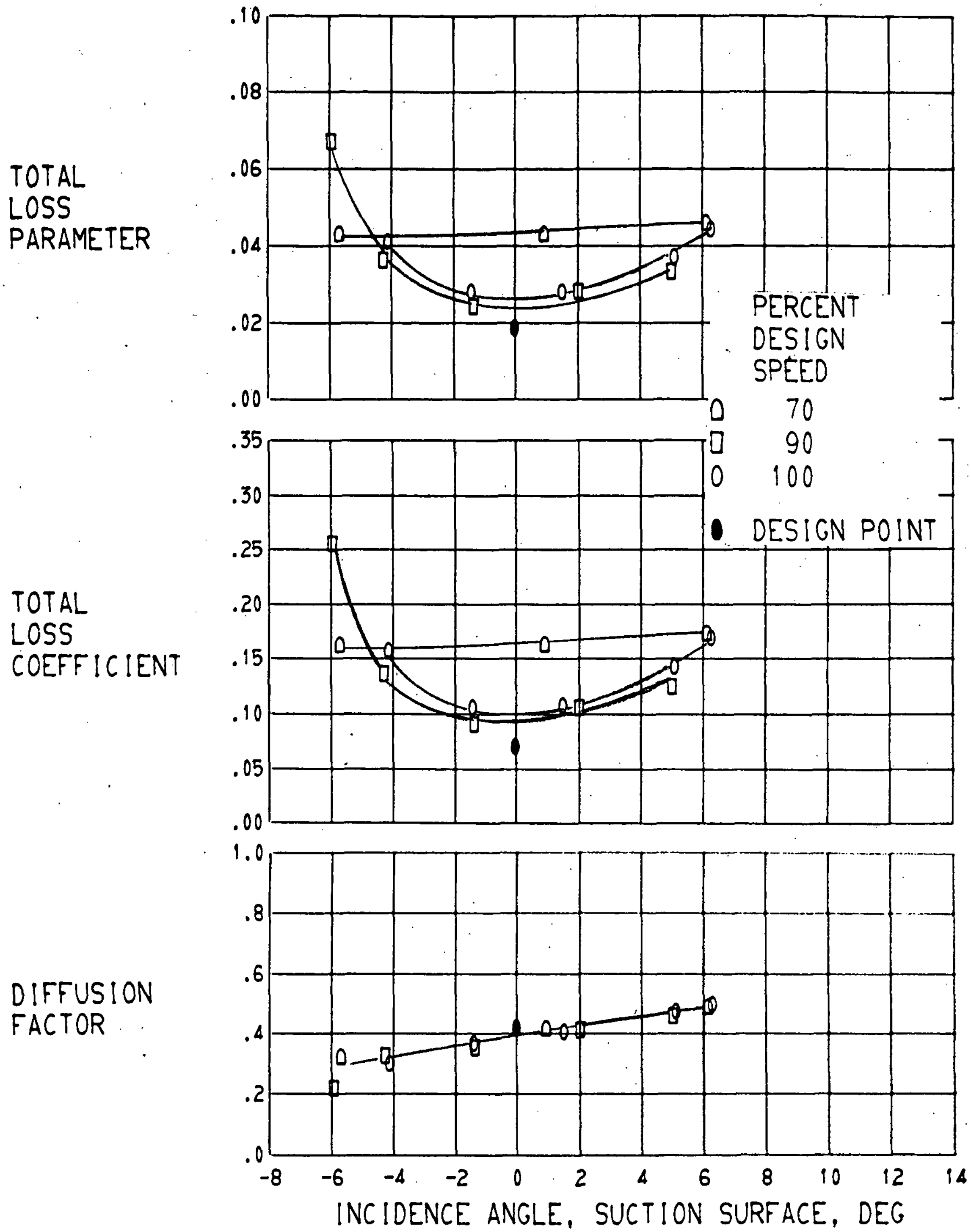
(B) CONCLUDED. 10.0 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.



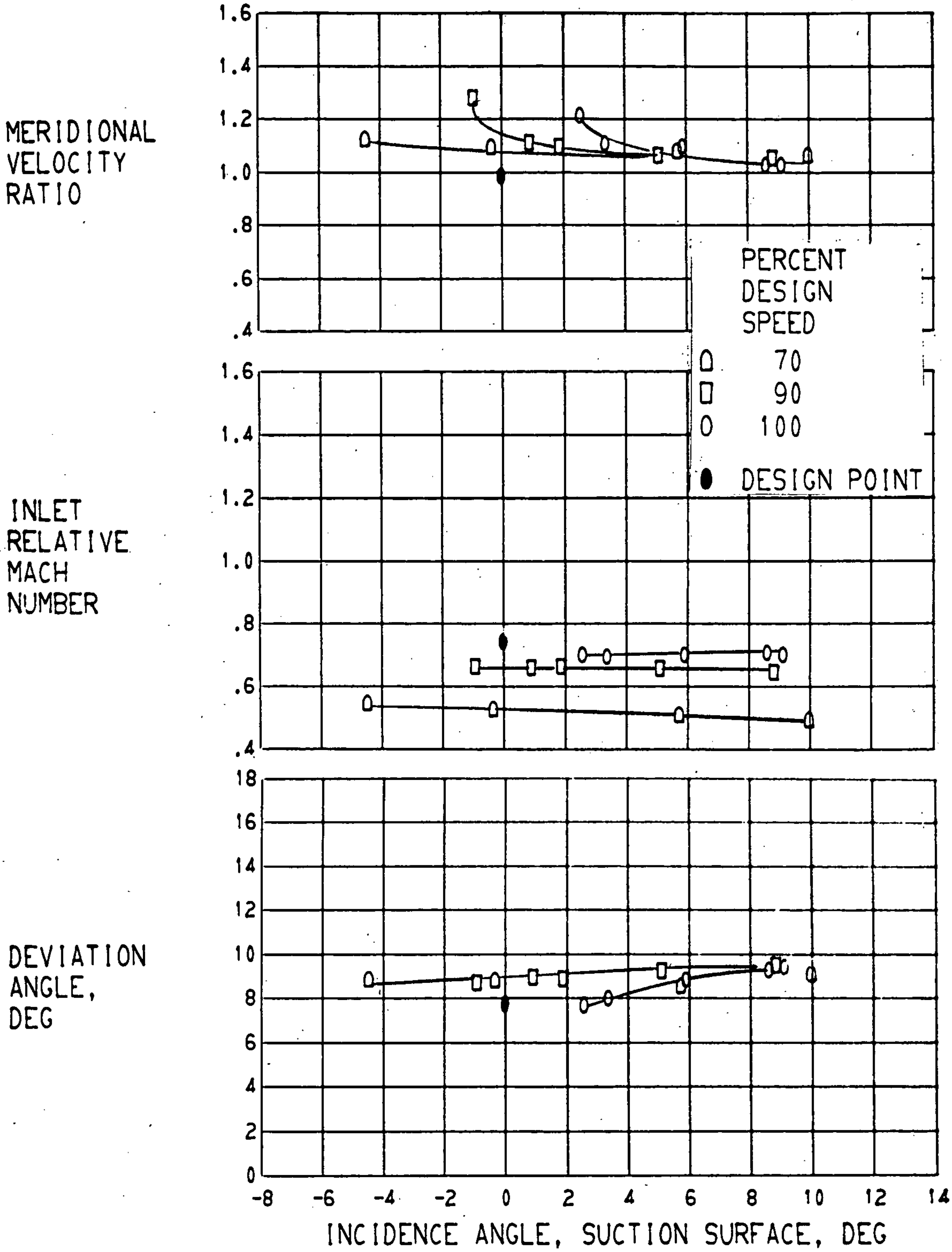
(C) 30.0 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.



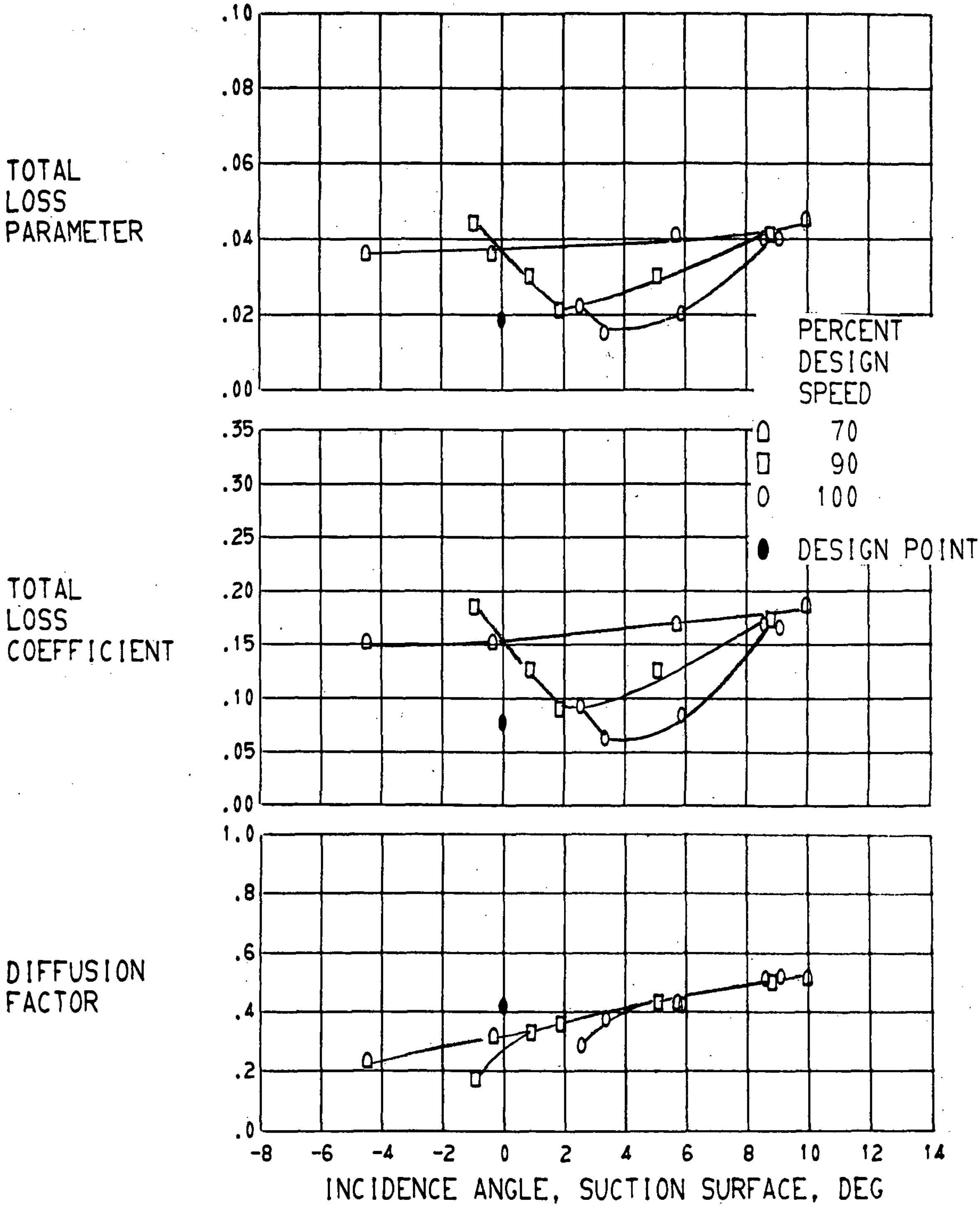
(C) CONCLUDED. 30.0 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.



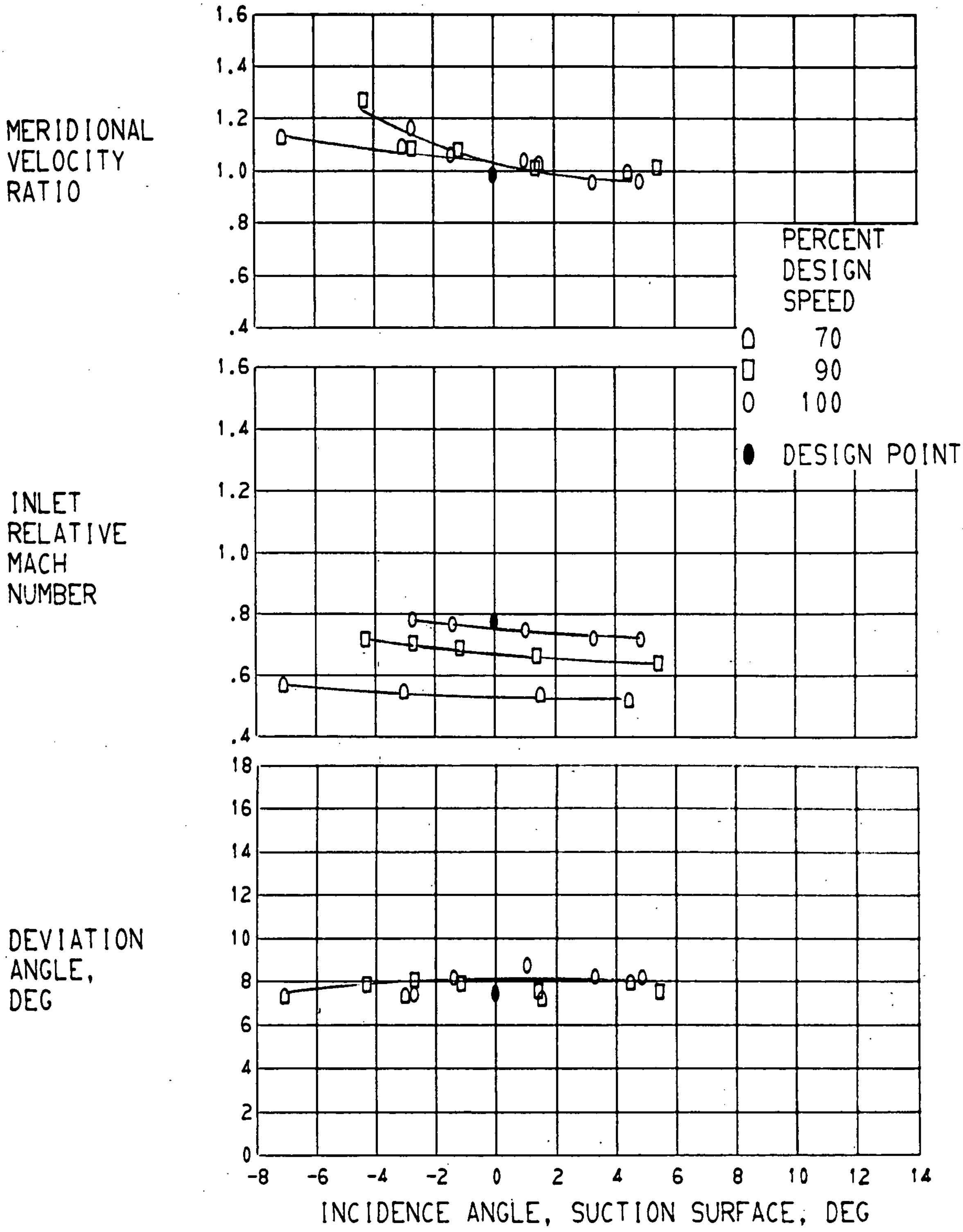
(D) 52.5 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.



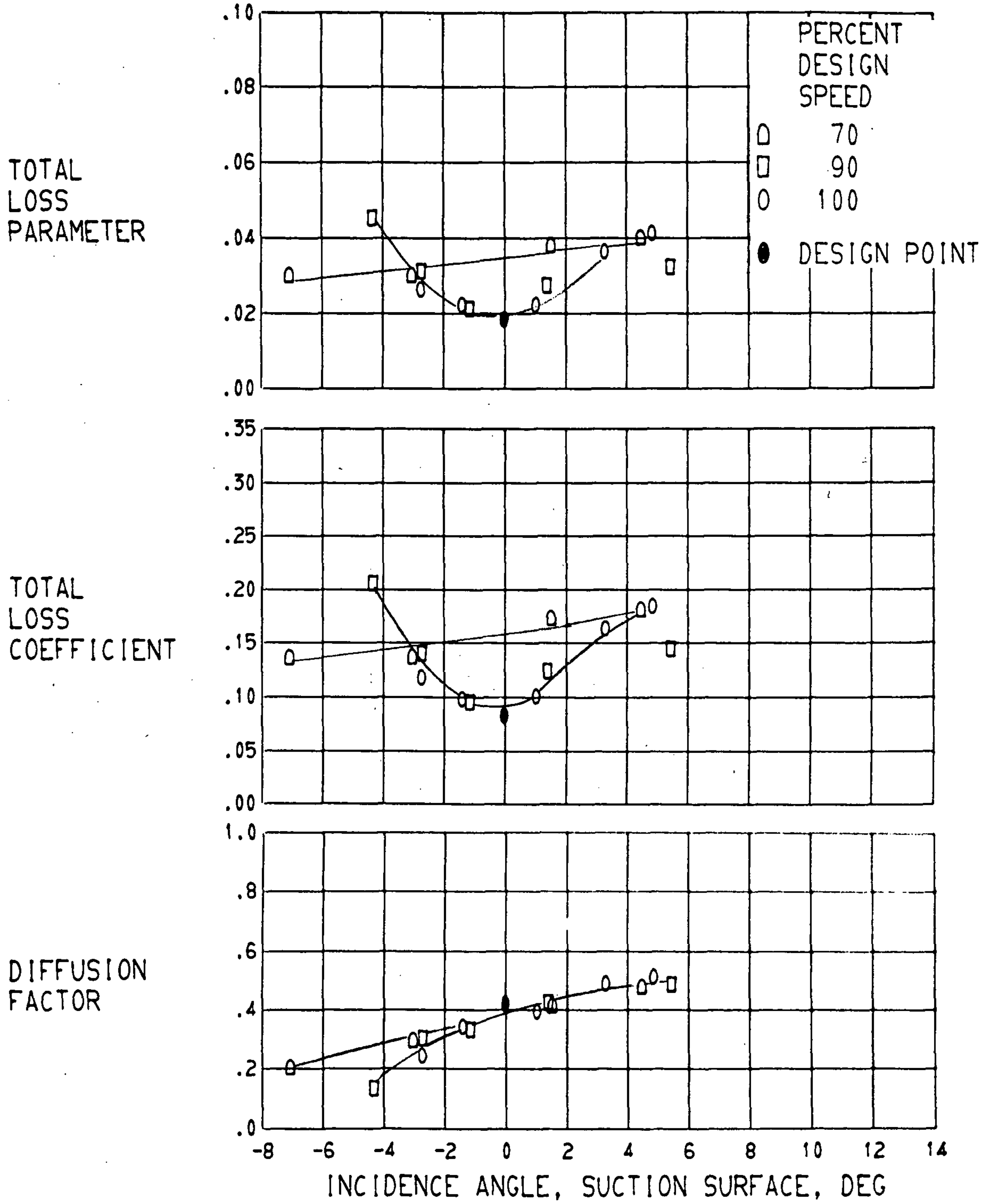
(D) CONCLUDED. 52.5 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.



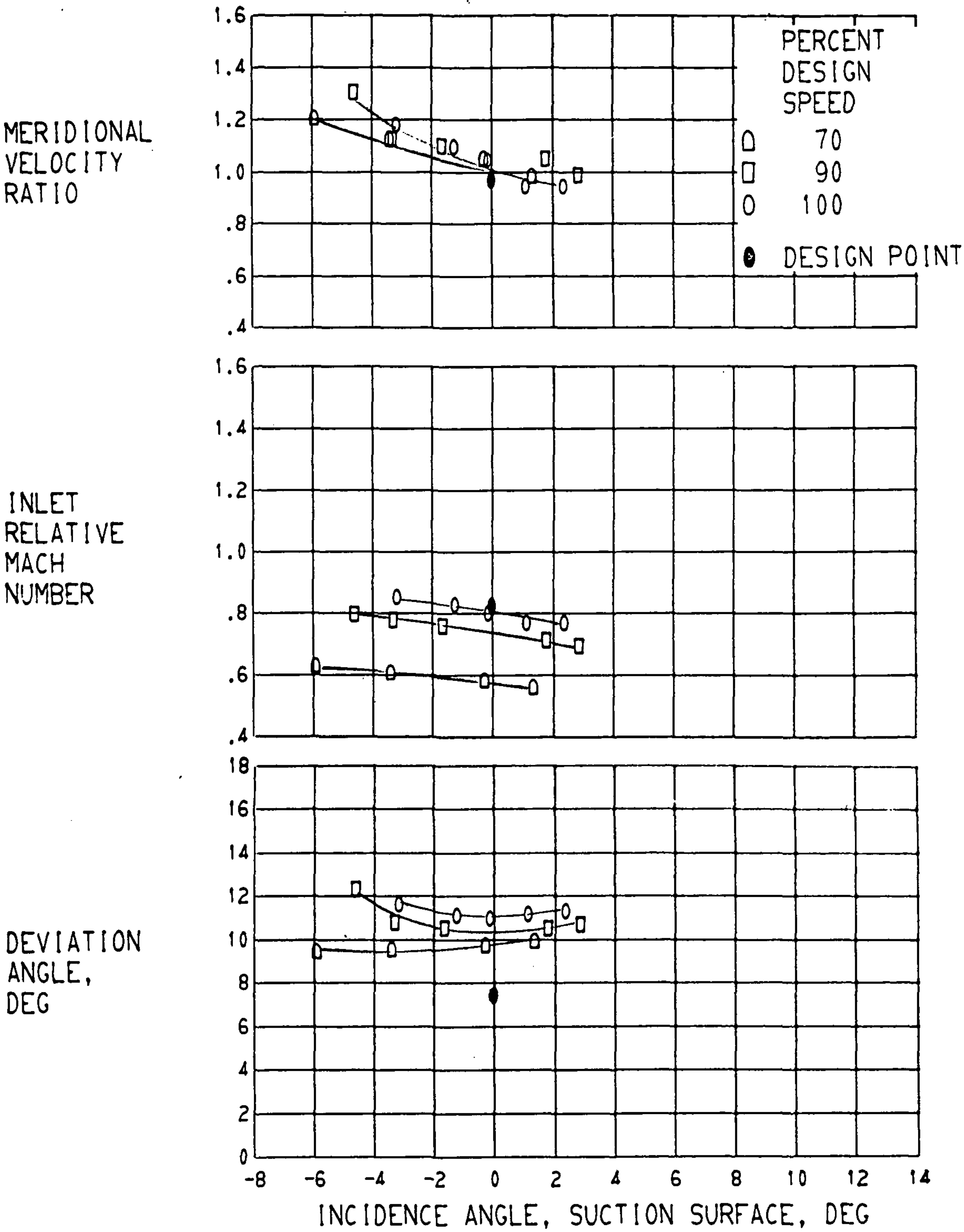
(E) 70.0 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.



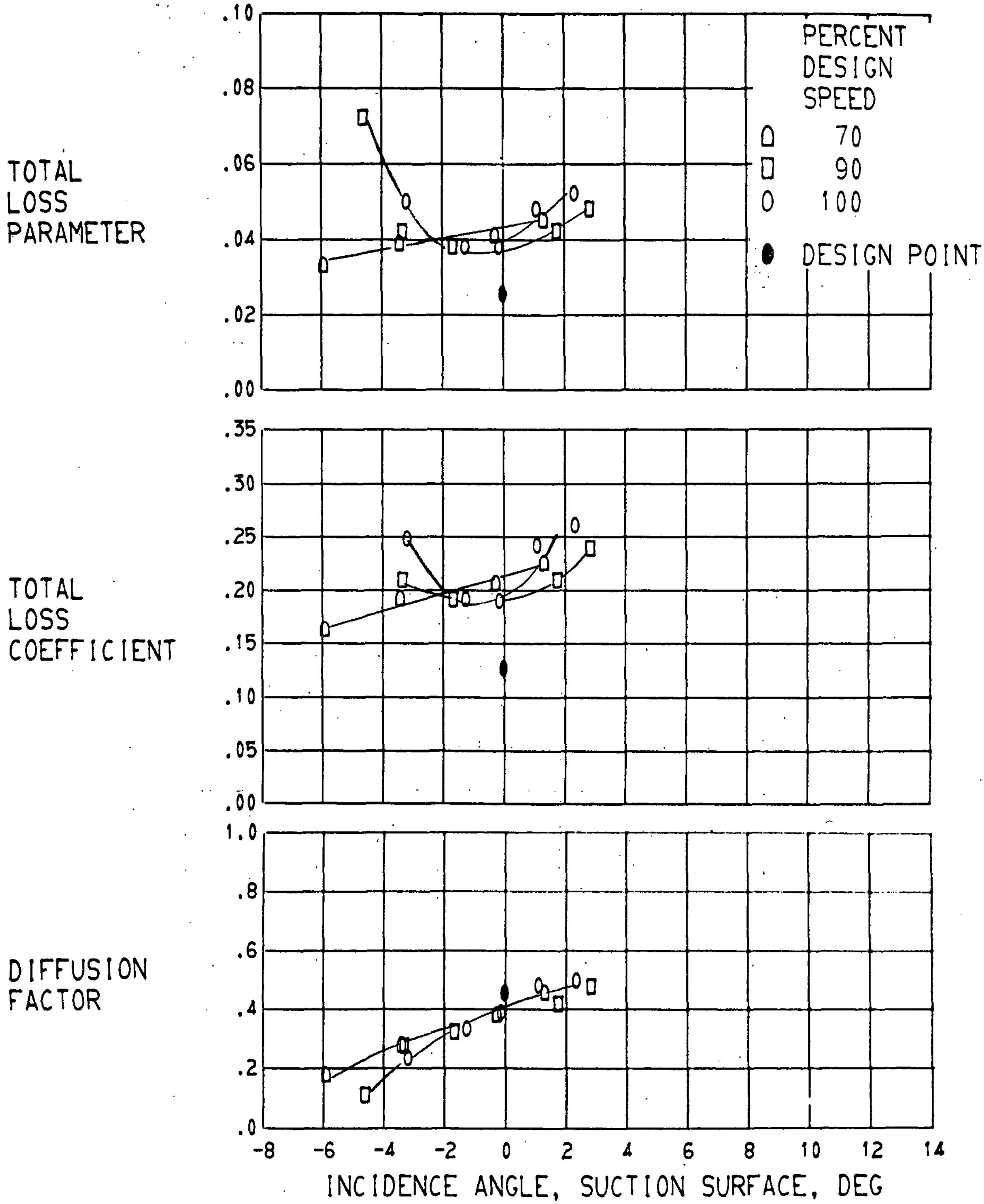
(E) CONCLUDED. 70.0 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.



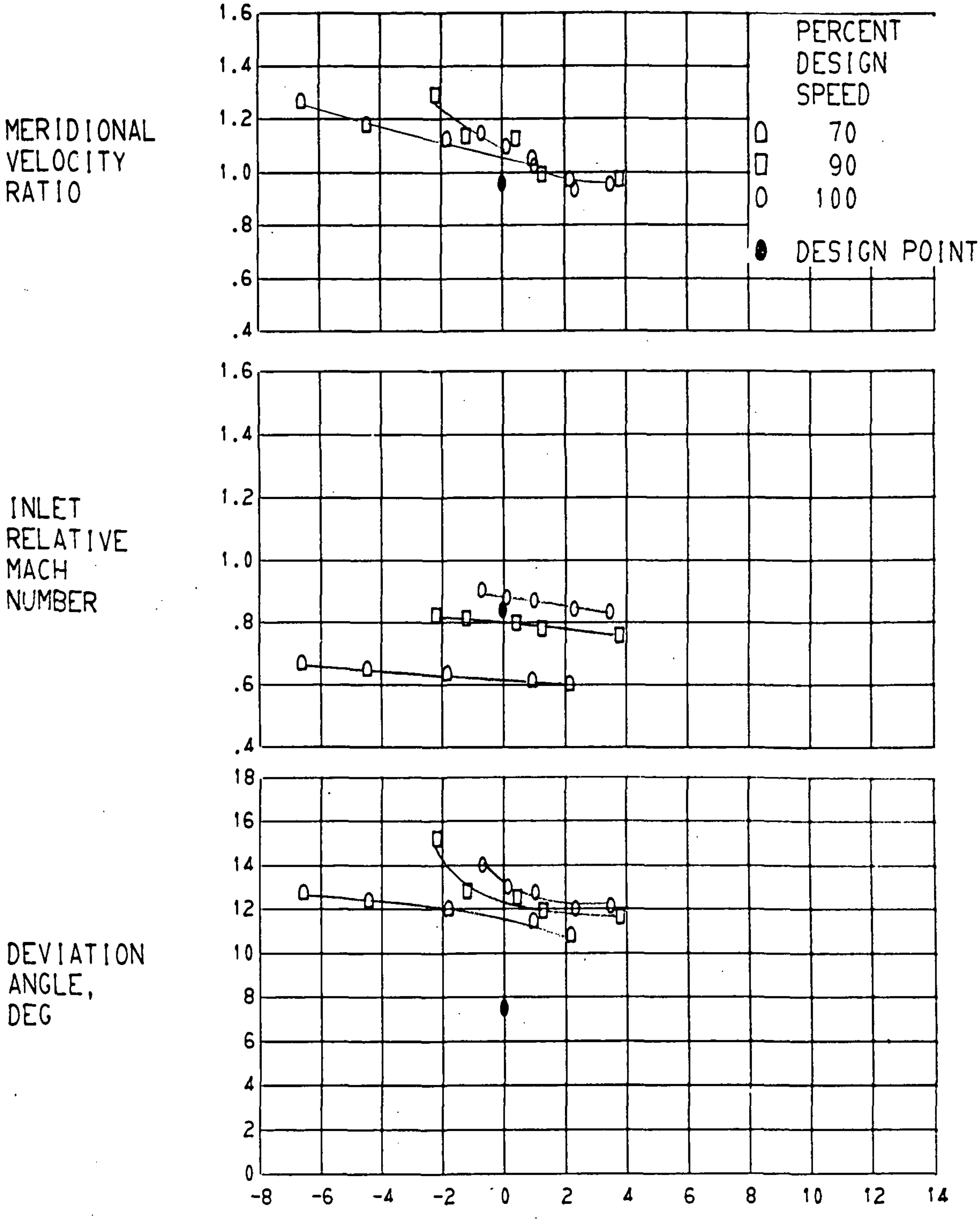
(F) 90.0 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.



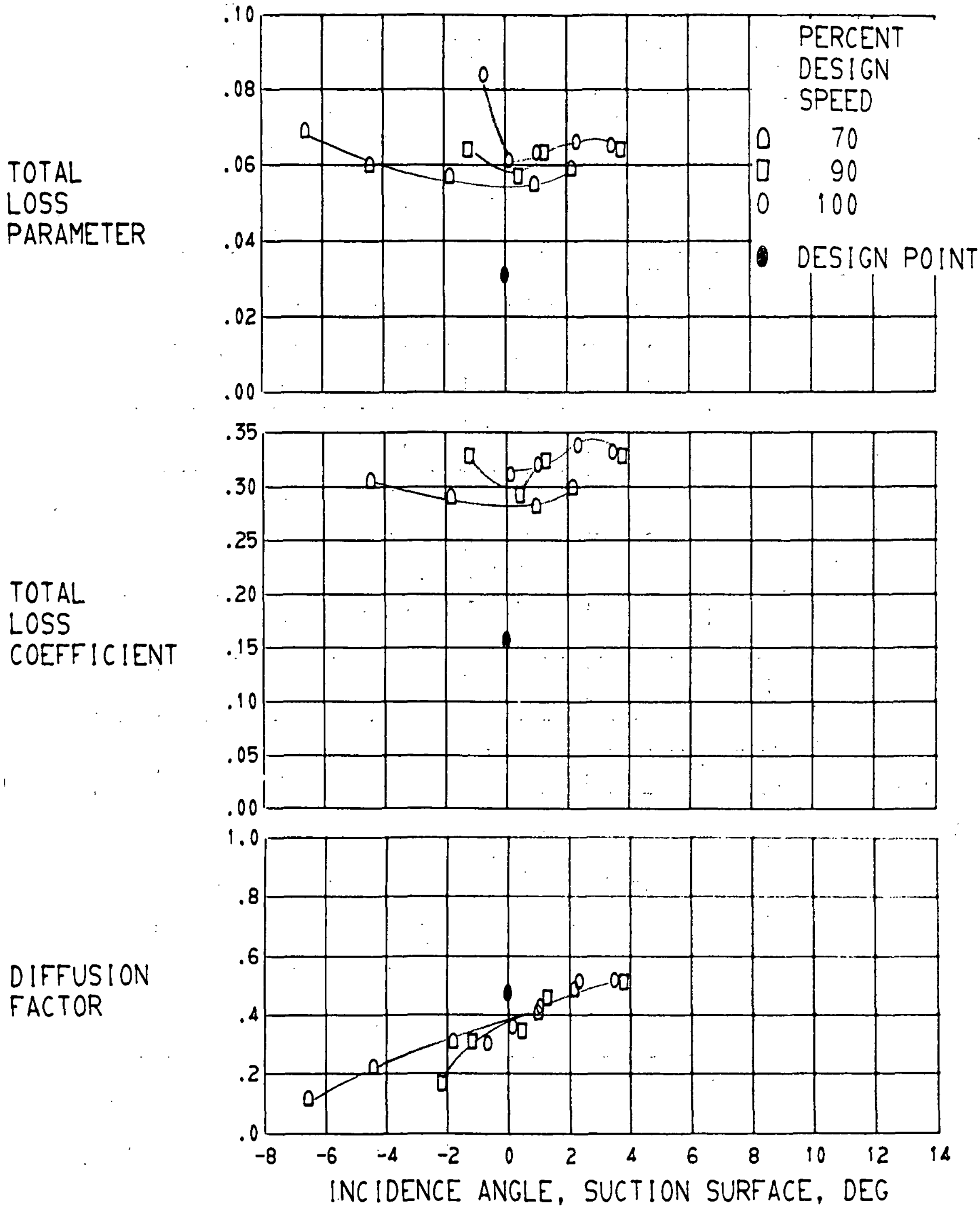
(F) CONCLUDED. 90.0 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.



(G) 95.0 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.



(G) CONCLUDED. 95.0 PERCENT SPAN.

FIGURE 13. - BLADE ELEMENT PERFORMANCE FOR STATOR 5.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

FIRST CLASS MAIL

POSTAGE AND FEES PAID
NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
451

U.S.MAIL

POSTMASTER: If Undeliverable (Section 158 Postal Manual) Do Not Return

---

"The aeronautical and space activities of the United States shall be conducted so as to contribute . . . to the expansion of human knowledge of phenomena in the atmosphere and space. The Administration shall provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof."

—National Aeronautics and Space Act of 1958

NASA SCIENTIFIC AND TECHNICAL PUBLICATIONS

TECHNICAL REPORTS: Scientific and technical information considered important, complete, and a lasting contribution to existing knowledge.

TECHNICAL NOTES: Information less broad in scope but nevertheless of importance as a contribution to existing knowledge.

TECHNICAL MEMORANDUMS: Information receiving limited distribution because of preliminary data, security classification, or other reasons. Also includes conference proceedings with either limited or unlimited distribution.

CONTRACTOR REPORTS: Scientific and technical information generated under a NASA contract or grant and considered an important contribution to existing knowledge.

TECHNICAL TRANSLATIONS: Information published in a foreign language considered to merit NASA distribution in English.

SPECIAL PUBLICATIONS: Information derived from or of value to NASA activities. Publications include final reports of major projects, monographs, data compilations, handbooks, sourcebooks, and special bibliographies.

TECHNOLOGY UTILIZATION PUBLICATIONS: Information on technology used by NASA that may be of particular interest in commercial and other non-aerospace applications. Publications include Tech Briefs, Technology Utilization Reports and Technology Surveys.

Details on the availability of these publications may be obtained from:

SCIENTIFIC AND TECHNICAL INFORMATION OFFICE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Washington, D.C. 20546