NASA TECHNICAL MEMORANDUM

NASA TM X-2904

NASA TM X-2904

PERFORMANCE OF TRANSONIC FAN STAGE WITH WEIGHT FLOW PER UNIT ANNULUS AREA OF 178 KILOGRAMS PER SECOND PER SQUARE METER (36.5 (LB/SEC)/(FT^2))

by Royce D. Moore, Donald C. Urasek, and George Kovich

Lewis Research Center
Cleveland, Ohio 44135

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION • WASHINGTON, D. C. • NOVEMBER 1973

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA TM X-2904		

4. Title and Subtitle	5. Report Date
PERFORMANCE OF TRANSONIC FAN STAGE WITH WEIGHT FLOW PER UNIT ANNULUS AREA OF 178 KILOGRAMS PER SECOND PER SQUARE METER (36.5 (LB/SEC)/(FT^2))	November 1973
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Royce D. Moore, Donald C. Urasek, and George Kovich	E-7081
	10. Work Unit No. 501-24

9. Performing Organization Name and Address	11. Contract or Grant No.
Lewis Research Center National Aeronautics and Space Administration Cleveland, Ohio 44135	
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address	Technical Memorandum
National Aeronautics and Space Administration Washington, D.C. 20546	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

The overall and blade-element performances are presented over the stable flow operating range from 50 to 100 percent of design speed. Stage peak efficiency of 0.834 was obtained at a weight flow of 26.4 kg/sec (58.3 lb/sec) and a pressure ratio of 1.581. The stall margin for the stage was 7.5 percent based on weight flow and pressure ratio at stall and peak efficiency conditions. The rotor minimum losses were approximately equal to design except in the blade vibration damper region. Stator minimum losses were less than design except in the tip and damper regions.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Turbomachinery; Compressors; Transonic compressors; Axial flow compressors; Turbofans	Unclassified - unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	91	Domestic, $3.75 Foreign, $6.25

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

PERFORMANCE OF TRANSONIC FAN STAGE WITH WEIGHT FLOW PER UNIT ANNULUS AREA OF 178 KILOGRAMS PER SECOND PER SQUARE METER (36.5 (LB/SEC)/(FT^2))

by Royce D. Moore, Donald C. Urasek, and George Kovich

Lewis Research Center

SUMMARY

The overall performance and blade-element performance of a transonic fan stage are presented. The stage, designed to investigate the effect of weight flow per unit annulus area on the performance of compressors, had a design flow of 178 kilograms per second per square meter. Detailed radial and circumferential (behind stator) surveys of the flow conditions were made over the stable operating range at rotative speeds from 50 to 100 percent of design speed. The stage peak efficiency of 0.834 was obtained at a weight flow of 26.4 kilograms per second and a pressure ratio of 1.581. The stall margin from this stage was 7.5 percent, based on pressure ratio and weight flow at the peak efficiency and stall conditions. The rotor peak efficiency of 0.860 occurred at a weight flow of 26.4 kilograms per second and a pressure ratio of 1.611. Except in the region of the rotor vibration damper, the rotor minimum losses were approximately equal to design values. However, they occurred at less than design incidence angle. The minimum loss values for the stator were less than design values except in the tip and in the region behind the rotor dampers. As with the rotor, the stator minimum losses occurred at less than design incidence angles except behind the damper region.

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 toward 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 of blade solidity, blade aspect ratio, blade

loading, area margin above choke, different blade shapes, weight flow per unit annulus area, velocity ratio, and blade spacing on efficiency and performance (refs. 1 to 7).

A series of tests are being conducted to evaluate the effect of weight flow per unit annulus area on the performance of axial-flow fan stages. The three stages in this series were designed for weight flows per unit annulus area of 178, 198, and 208 kilograms per second per square meter (refs. 8 and 9). All three stages were designed to produce a pressure ratio of 1.57, and all had the same meridional flow path geometry.

In the present investigation an axial-flow fan stage designed for 178 kilograms per second per square meter was tested. This report presents the aerodynamic design parameters and the overall and blade-element performance. 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 data were obtained at 11 radial positions. The stage presented in this report has been designated "stage 16-11" with the rotor being rotor 16 and the stator being stator 11. The data in this report are presented in tabular and in plotted form. The symbols and equations are defined in appendixes A and B. The definitions and units used for the tabular data are presented in appendix C.

AERODYNAMIC DESIGN

Three computer programs were used in the design of this compressor stage: the streamline analysis program, the blade geometry program, and the blade coordinate program. These three computer programs are described in references 1, 4, and 10, respectively; only a brief description of each is presented herein.

The streamline analysis program (ref. 1) was used to calculate the flow field parameters at several axial locations, including planes approximating the blade leading and trailing edges for both the rotor and stator. The weight flow, rotative speed, flow path geometry, and radial distributions of total pressure and temperature are inputs in this program. The program accounts for both streamline curvature and entropy gradients; boundary-layer blockage factors are also included.

The distributions of velocity vector, total pressure, and total temperature calculated in the streamline analysis program are used in the blade geometry program to compute blade geometry parameters (ref. 4). Total loss, which is calculated within the program, is based on a calculated shock loss (as related to the selected blade shape) and a profile loss. The profile losses used for this stage are based on loss - diffusion factor correlations that include the data presented in reference 1 for the rotor and reference 11 for the stator.

The blade geometry parameters are used in the blade coordinate program (ref. 10) to compute blade elements on conical surfaces passing through the blade. The blade

elements are then stacked on a line passing through their centers of gravity, and Cartesian blade coordinates, which are used directly in fabrication, are computed.

The overall design parameters for stage 16-11 are listed in table I, and the flow path is shown in figure 1. This stage was designed for an overall pressure ratio of 1.57 at a weight flow of 26.5 kilograms per second (178.2 (kg/sec)/m^2 of annulus area). The design tip speed was 425 meters per second. The stage was designed for a tip solidity of 1.3 for both rotor and stator. This resulted in 44 rotor blades with an aspect ratio of 2.6 and 48 stator blades with an aspect ratio of 2.3.

The blade-element design parameters for rotor 16 are presented in table II. This rotor was designed for a radially constant total pressure ratio of 1.6. The stator blade-element design parameters are given in table III. The blade geometry is presented in table IV for rotor 16 and in table V for stator 11. Both the rotor and stator used multiple-circular-arc blade shapes.

APPARATUS AND PROCEDURE

Compressor Test Facility

The compressor stage was tested in the Lewis single-stage compressor facility (described in detail in ref. 4). A schematic is shown in figure 2. Atmospheric air enters the test facility at an inlet located on the roof of the building and flows through the flow measuring orifice and into the plenum chamber upstream of the test stage. The air then passes through the experimental compressor stage into the collector and is exhausted to the atmosphere.

Test Stage

Photographs of the rotor and stator are shown in figures 3 and 4. Each rotor blade has a vibration damper located at about 50 percent span from the outlet rotor tip. The maximum thickness of the damper was 0.215 centimeter. The radial tip clearance of the rotor was a nominal 0.050 centimeter at ambient nonrotating conditions. The axial spacing between the rotor hub trailing edge and the stator hub leading edge was 3.148 centimeters (0.7 rotor tip chord).

Instrumentation

The compressor weight flow was determined from measurements on a calibrated

thin-plate orifice. The orifice temperature was determined from an average of two Chromel/Alumel thermocouples. Orifice pressures were measured by calibrated transducers.

Radial surveys of the flow were made upstream of the rotor, between the rotor and stator, and downstream of the stator (fig. 1). Photographs of the survey probes are shown in figure 5. Total pressure, total temperature, and flow angle were measured with the combination probe (fig. 5(a)), and the static pressure was measured with an 8° C-shaped wedge probe (fig. 5(b)). Each probe was positioned with a null-balancing, stream-directional sensitive control system that automatically alined the probe to the direction of flow. The thermocouple was iron/constantan. The probes were alined in an air calibration tunnel. A combination probe and a wedge static probe were used at each of the three measuring stations.

Inner- and outer-wall static-pressure taps were located at the same axial stations as the survey probes. The circumferential locations of both types of survey probes along with inner- and outer-wall static-pressure taps are shown in figure 6. The combination probe downstream of the stator (station 3) traversed circumferentially one stator blade passage (7.5°) counterclockwise from the nominal value shown.

An electronic speed counter, in conjunction with a magnetic pickup, was used to measure rotative speed (rpm). Strain gages were mounted on both the rotor and stator blades to monitor stresses and vibrations.

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

A further indication of the consistency of the data can be observed by comparing the integrated weight flows at each measuring station with the orifice weight flow in table VII.

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, radial surveys were taken at five weight flows. At 50, 60, and 80 percent of design speed, radial surveys were taken for the near-stall weight flow only. Data were recorded at 11 radial positions for each speed and weight flow.

At each radial position the combination probe behind the stator was traversed circumferentially to nine different locations across the stator gap. The wedge probe was set at midgap because previous 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 at stations 1 and 2. All probes were then traversed to the next radial position, and the circumferential traverse procedure was 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 detected by a sudden drop in stage outlet total pressure. This pressure was measured by a probe located at midpassage and was recorded on an X-Y plotter. Stall was corroborated by large increases in the measured blade stresses on both rotor and stator along with a sudden increase in noise level.

Calculation Procedure

The measured total temperatures and pressures were corrected for Mach number and streamline slope. These corrections were based on the instrument probe calibrations given in reference 12. The stream static pressures were corrected for Mach number and streamline slope based on an average calibration for the wedge probes used.

Because of the physical construction of the C-shaped static-pressure wedges, it was not possible to obtain static-pressure measurements at 5, 10, and 95 percent of span. The static pressure at 95 percent span was obtained by assuming a linear variation in static pressure between the values at the inner wall and the probe measurement at 90 percent span. A similar variation was assumed between the static-pressure measurements at the outer wall and the 30 percent span to obtain the static pressure at 5 and 10 percent span.

At each radial position, averaged values of the nine circumferential measurements of pressure, temperature, and flow angle downstream of the stator (station 3) were obtained. 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 measured values of pressure, temperature, and flow angle were used to calculate axial and tangential velocities at each circumferential position. The flow angles presented for each radial position are calculated based on these mass-averaged axial and tangential velocities. 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 data, measured at the three measuring stations, were translated to the blade leading and trailing edges by the method presented in reference 4.

The weight flow at stall was obtained in the following manner: During operation in the near-stall condition, 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.

Orifice weight flow, total pressures, static pressures, and temperatures were all corrected to sea-level conditions based on the rotor inlet conditions.

RESULTS AND DISCUSSION

The results from this investigation will be presented in three main sections. The overall performances for the rotor and the stage are given first. Radial distributions of several performance parameters are then presented for the rotor and stator followed by the blade-element data. The data presented are computer plotted and occasionally a data point will be omitted because it falls outside the range of the parameters shown in the figure. A brief discussion of the results is included.

All plotted data, together with some additional performance parameters, are listed in tabular form. The overall performance data are given in table VI (p. 25). The blade-element data are presented for the rotor in table VII (p. 27) and for the stator in table VIII (p. 45). The definitions and units used for the tabular data are listed in appendix C.

Overall Performance

The overall performance for rotor 16 and for stage 16-11 are presented in figures 7 and 8. For both of these computer plotted figures, data are presented for speeds from 50 to 100 percent of design speed. For the 50, 60, and 80 percent of design speeds the

overall performance is presented for the near-stall condition, only. For the 70, 90, and 100 percent of design speeds 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 8 was determined using the method discussed in the section Calculation Procedure.

Rotor. - The peak efficiency for rotor 16 at design speed was 0.860. The peak efficiency occurred at a weight flow of 26.4 kilograms per second. The measured pressure ratio was 1.611, and temperature ratio was 1.170. These compare with the design values of 1.601 and 1.162, respectively. At the lower speeds, values of efficiency up to 0.88 were obtained for this rotor.

Stage. - The peak efficiency for stage 16-11 at the design speed was 0.834. The peak efficiency for this stage occurred at the same weight flow as peak efficiency for the rotor. The measured total pressure ratio of 1.581 was slightly higher than the design value of 1.574. The measured temperature ratio of 1.168 was also higher than the design value of 1.162. The calculated stall margin for stage 16-11 was 7.5 percent at design speed. For the lower speeds measured efficiencies ranged up to 0.86 for this stage.

Radial Distributions

The radial distributions of several parameters are presented for design speed in figure 9 for rotor 16 and in figure 10 for stator 11. 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 with the larger increases occurring in the tip region. The blade loading (diffusion factor) also continued to increase with decreasing weight flow. The effect of the damper on efficiency is evident at all three weight flows.

The peak efficiency for this rotor occurred at the design weight flow. At this weight flow, the measured pressure ratio is slightly higher than design from the tip to the damper region and less than design from the damper to the hub. The deviation angle was less than design from the tip to the damper and then greater than design from the damper to the hub. Except in the damper region, the measured efficiency and losses were close to design.

Stator. - At the peak efficiency weight flow of 26.4 kilograms per second, the stator deviation angles were less than design except in the tip and hub regions. Although the diffusion factor was less than design in the tip region, the losses in this region were approximately equal to design. The losses in the hub region increased sharply from the 90 to 95 percent span position. The suction-surface incidence angles were less than design except in the damper region.

Variations with Incidence Angle

The variations of selected blade-element parameters with suction-surface incidence angle are presented in figure 11 for the rotor and in figure 12 for the stator. The data are presented for 70, 90, and 100 percent of design speed for blade-element locations of 5, 10, 30, 45, 70, 90, and 95 percent span from the rotor 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 incidence angle curves are presented primarily for future use in comparing the performance of these blades with other blade shapes. Thus, only a few brief observations will be made from the curves at present.

Rotor. - The absolute values of minimum loss are approximately equal to design values except at 45 percent span, where the flow is affected by the midspan dampers. For the 5, 10, 30, 70, and 90 percent spans, the minimum loss occurred at angles less than the design incidence angle of zero degrees. At 45 and 95 percent span, the minimum loss occurred at slightly greater than design incidence angle. At the minimum loss condition the deviation angles were less than design at 5, 10, 30, and 45 percent spans, whereas at the other locations they were greater than design. The rotor pressure ratio and efficiency were greater than design for 5, 10, 30, and 45 percent spans and less than design for the other locations.

Stator. - The absolute values of minimum loss were less than the design loss values except at the 5 and 45 percent spans. The stator blades were designed for minimum loss to occur at zero incidence angle. Except at 5 and 45 percent spans, the minimum loss occurred at large negative incidence angles. For 5 and 45 percent spans, the losses were relatively constant over a range of incidence angles. The deviation angles corresponding to minimum loss were less than the design values except at the 5 percent span.

Discussion of Performance

The measured overall peak efficiency for rotor 16 occurred at a weight flow of

26.4 kilograms per second. However, examination of all the blade-element data at design speed indicates that peak efficiency would have probably occurred at a higher weight flow if the rotor had no dampers. As can be observed from figure 11, the minimum loss for the rotor blade elements occur at incidence angles less than those for the overall peak efficiency for all elements except in the damper and hub regions. (See 50-percent-span locations in table VII(c) and (d), pp. 29 and 30.) Behind the dampers the element efficiency was 0.05 lower for a weight flow of 27.16 kilograms per second than that for the overall peak efficiency weight flow of 26.44 kilograms per second. Although the minimum losses occurred at a flow greater than design over most of the blade height, the high losses in the damper region counterbalanced this trend and maximum efficiency occurred near design weight flow.

It is estimated that the dampers resulted in about a 0.02 decrease in overall efficiency for the higher weight flow and about a 0.01 decrease in overall efficiency for a weight flow of 26.4 kilograms per second. No allowances for damper losses or damper blockages were made in the design of this rotor, and it appears that this rotor could have met design efficiency had it been tested without the vibration dampers.

At the near-stall conditions the blade loadings (as indicated by the diffusion factors) for the rotor tip elements are significantly lower than the loadings obtained from the other two rotors in this weight flow per unit annulus area study (refs. 8 and 9). It may be significant, however, that these three rotors experienced stalling conditions at approximately the same weight flow.

The design stator losses correspond to a decrease in overall efficiency of 0.034 for the stage as compared to the rotor only. Examination of the overall performance data (table VI(a)) indicates that the measured decrease in overall efficiency chargeable to the stator is less than 0.03 for all weight flows except the maximum flow.

SUMMARY OF RESULTS

This report has presented 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 to investigate the effects of weight flow per unit annulus area on performance, was designed for 178 kilograms per second per square meter. Detailed radial surveys of the flow conditions in front of the rotor, between the rotor and stator, and behind the stator were made over the stage stable operating flow range at rotative speeds from 50 to 100 percent of design speed. Flow and performance parameters were calculated across 11 radial positions. The following principle results were obtained:

1. The rotor minimum losses were approximately equal to design values except in the region of the dampers. However, minimum loss occurred at less than design incidence angles except in the damper region.

2. The stator minimum losses were less than design values except near the tip and in the damper region. The minimum loss occurred at less than design incidence angle except in the region behind the rotor dampers.

3. At design speed, the stage peak efficiency of 0.834 occurred at a pressure ratio of 1.581 and a weight flow of 26.4 kilograms per second. Stage stall margin was 7.5 percent based on pressure ratio and weight flow at the peak efficiency and stall conditions.

4. The rotor peak efficiency of 0.860 occurred at a pressure ratio of 1.611 and a weight flow of 26.4 kilograms per second.

Lewis Research Center,
National Aeronautics and Space Administration,
Cleveland, Ohio, July 5, 1973,
501-24.

APPENDIX A

SYMBOLS

A_{an} annulus area at rotor leading edge, 0.149 m^2

A_f frontal area at rotor leading edge, 0.199 m^2

C_p specific heat at constant pressure, 1004 J/(kg)(K)

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 β'_m cos α_c/cos α_s), deg

γ ratio of specific heats, 1.40

δ ratio of rotor-inlet total pressure to standard pressure of 10.13 N/cm^2

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

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

η efficiency

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 -

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

Mean incidence angle -

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

Deviation angle -

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

Diffusion factor -

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

Total loss coefficient -

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

Profile loss coefficient -

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

Total loss parameter -

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

Profile loss parameter -

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

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 -

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

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 -

$$\frac{\left(\frac{W\sqrt{\theta}}{\delta}\right)}{A_{an}} \tag{B13}$$

Weight flow per unit frontal area -

$$\frac{\left(\frac{W\sqrt{\theta}}{\delta}\right)}{A_f} \tag{B14}$$

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 -

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

Polytropic efficiency -

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

APPENDIX C

DEFINITIONS 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 one)
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 the blade mean camber line at the leading edge and the meridional plane, deg
KOC	angle between the blade mean camber line at the trailing edge and the meridional plane, deg
KTC	angle between the blade mean camber line at the transition point and the 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 the blade
RI	inlet radius (leading edge of blade), cm
RO	outlet radius (trailing edge of blade), cm
RP	radial position
RPM	equivalent rotative speed, rpm
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
ZOC	axial distance to blade trailing edge from inlet, cm
ZTC	axial distance to transition point from inlet, cm

REFERENCES

1. 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.

2. 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.

3. 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.

4. 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.

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. Moore, Royce D.; and Reid, Lonnie: Performance of a Single-Stage Axial-Flow Transonic Compressor Stage with a Blade Tip Solidity of 1.7. NASA TM X-2658, 1972.

7. Urasek, Donald C.; Moore, Royce D.; and Osborn, Walter M.: Performance of a Single-Stage Transonic Compressor with a Blade-Tip Solidity of 1.3. NASA TM X-2645, 1972.

8. Kovich, George; Moore, Royce D.; and Urasek, Donald C.: Performance of Transonic Fan Stage with Weight Flow per Unit Annulus Area of 198 Kilograms per Second per Square Meter (40.6 (lb/sec)/ft^2). NASA TM X-2905, 1973.

9. Urasek, Donald C.; Kovich, George; and Moore, Royce D.: Performance of Transonic Fan Stage Compressor With Weight Flow per Unit Annulus Area of 208 Kilograms per Second per Square Meter (42.6 (lb/sec)/ft^2). NASA TM X-2903, 1973.

10. 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.

11. 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.

12. Glawe, George E.; Krause, Lloyd N.; and Dudzinski, Thomas J.: A Small Combination Sensing Probe for Measurement of Temperature, Pressure, and Flow Direction. NASA TN D-4816, 1968.

TABLE I. - DESIGN OVERALL PARAMETERS

FOR STAGE 16-11

ROTOR TOTAL PRESSURE RATIO	1.601
STAGE TOTAL PRESSURE RATIO	1.574
ROTOR TOTAL TEMPERATURE RATIO	1.162
STAGE TOTAL TEMPERATURE RATIO	1.162
ROTOR ADIABATIC EFFICIENCY	0.885
STAGE ADIABATIC EFFICIENCY	0.851
ROTOR POLYTROPIC EFFICIENCY	0.892
STAGE POLYTROPIC EFFICIENCY	0.860
ROTOR HEAD RISE COEFFICIENT	0.231
STAGE HEAD RISE COEFFICIENT	0.222
FLOW COEFFICIENT	0.395
WT FLOW PER UNIT FRONTAL AREA	132.959
WT FLOW PER UNIT ANNULUS AREA	178.205
WT FLOW	26.535
RPM	16100.000
TIP SPEED	424.943

TABLE II. - DESIGN BLADE-ELEMENT PARAMETERS FOR ROTOR 16

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
TIP	25.204	24.905	0.	49.5	70.3	66.4	288.2	1.206	10.13	1.601
1	24.683	24.364	-0.	46.9	69.4	65.3	288.2	1.192	10.13	1.601
2	24.123	23.824	-0.	44.9	68.4	64.1	288.2	1.181	10.13	1.601
3	21.814	21.662	0.	43.0	65.0	59.5	288.2	1.163	10.13	1.601
4	20.034	20.041	0.	43.6	62.7	55.1	288.2	1.158	10.13	1.601
5	19.733	19.771	0.	43.8	62.3	54.2	288.2	1.157	10.13	1.601
6	19.430	19.501	0.	44.0	61.9	53.3	288.2	1.156	10.13	1.601
7	19.126	19.231	0.	44.2	61.5	52.4	288.2	1.156	10.13	1.601
8	18.821	18.960	0.	44.4	61.1	51.3	288.2	1.155	10.13	1.601
9	16.946	17.339	0.	46.0	58.7	44.1	288.2	1.152	10.13	1.601
10	14.280	15.178	0.	49.4	55.1	29.2	288.2	1.153	10.13	1.601
11	13.570	14.637	0.	50.7	54.0	23.9	288.2	1.154	10.13	1.601
HUB	12.700	14.097	-0.	52.2	52.6	17.7	288.2	1.156	10.13	1.601

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
TIP	152.0	186.7	451.3	303.3	152.0	121.3	0.	141.9	424.9	419.9
1	156.4	185.6	444.6	303.2	156.4	126.9	-0.	135.4	416.2	410.8
2	160.6	185.3	437.3	301.1	160.6	131.4	-0.	130.7	406.7	401.7
3	171.3	190.0	405.7	273.6	171.3	138.9	0.	129.6	367.8	365.2
4	174.4	195.7	380.1	247.6	174.4	141.7	0.	134.9	337.8	337.9
5	174.6	196.8	375.7	243.1	174.6	142.1	0.	136.2	332.7	333.3
6	174.8	198.1	371.3	238.6	174.8	142.5	0.	137.5	327.6	328.8
7	174.9	199.3	366.8	234.0	174.9	142.9	0.	138.9	322.5	324.2
8	174.9	200.7	362.3	229.5	174.9	143.3	0.	140.5	317.3	319.7
9	173.7	210.0	334.3	203.1	173.7	145.9	0.	151.0	285.7	292.3
10	168.2	227.8	293.7	169.7	168.2	148.1	0.	173.0	240.8	255.9
11	166.3	234.1	282.9	162.0	166.3	148.1	0.	181.2	228.8	246.8
HUB	163.9	241.3	269.6	155.2	163.9	147.9	-0.	190.6	214.1	237.7

	ABS MACH NO		REL MACH NO		MERID MACH NO		STREAMLINE SLOPE		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
TIP	0.456	0.513	1.354	0.853	0.456	0.333	-5.69	-8.95	0.798	1.523
1	0.470	0.512	1.335	0.837	0.470	0.350	-5.32	-7.96	0.811	1.504
2	0.483	0.514	1.315	0.835	0.483	0.364	-4.81	-6.94	0.818	1.491
3	0.517	0.532	1.224	0.766	0.517	0.389	-1.49	-2.62	0.811	1.470
4	0.526	0.551	1.148	0.696	0.526	0.399	1.65	0.54	0.813	1.450
5	0.527	0.554	1.135	0.684	0.527	0.400	2.22	1.07	0.814	1.447
6	0.528	0.558	1.121	0.672	0.528	0.402	2.80	1.61	0.816	1.445
7	0.528	0.562	1.108	0.660	0.528	0.403	3.39	2.14	0.818	1.444
8	0.528	0.566	1.094	0.647	0.528	0.404	4.00	2.68	0.820	1.443
9	0.524	0.595	1.009	0.575	0.524	0.413	8.07	6.08	0.840	1.442
10	0.507	0.649	0.885	0.484	0.507	0.422	15.13	11.27	0.880	1.293
11	0.501	0.668	0.852	0.462	0.501	0.423	17.37	12.73	0.891	1.240
HUB	0.493	0.690	0.812	0.444	0.493	0.423	20.34	14.26	0.903	1.165

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
TIP	0.	2.6	0.0	4.9	0.449	0.699	0.249	0.171	0.039	0.027
1	5.00	2.7	-0.0	4.4	0.432	0.748	0.202	0.131	0.032	0.021
2	10.00	3.0	-0.0	4.0	0.421	0.792	0.163	0.097	0.026	0.016
3	30.00	4.1	0.0	3.2	0.433	0.879	0.096	0.046	0.016	0.008
4	45.00	4.9	0.0	3.3	0.459	0.913	0.073	0.037	0.013	0.007
5	47.50	5.0	0.0	3.4	0.464	0.917	0.071	0.036	0.013	0.006
6	50.00	5.2	0.0	3.5	0.469	0.921	0.068	0.036	0.012	0.006
7	52.50	5.3	0.0	3.6	0.475	0.924	0.066	0.035	0.012	0.006
8	55.00	5.5	0.0	3.7	0.480	0.927	0.065	0.035	0.012	0.006
9	70.00	6.3	0.0	4.7	0.513	0.943	0.056	0.035	0.011	0.007
10	90.00	7.3	-0.0	7.2	0.558	0.940	0.072	0.070	0.014	0.014
11	95.00	7.6	-0.0	8.2	0.569	0.931	0.088	0.088	0.017	0.017
HUB	100.00	7.6	-0.2	9.0	0.571	0.919	0.114	0.114	0.022	0.022

TABLE III. - DESIGN BLADE-ELEMENT PARAMETERS FOR STATOR 11

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
TIP	24.394	24.384	44.7	0.	44.7	0.	347.1	1.000	16.22	0.976
1	23.974	23.968	42.5	-0.	42.5	-0.	343.6	1.000	16.22	0.980
2	23.505	23.525	40.7	-0.	40.7	-0.	340.5	1.000	16.22	0.984
3	21.604	21.713	39.2	0.	39.2	0.	335.3	1.000	16.22	0.989
4	20.157	20.342	39.9	0.	39.9	0.	333.6	1.000	16.22	0.988
5	19.914	20.114	40.1	0.	40.1	0.	333.4	1.000	16.22	0.988
6	19.672	19.886	40.3	0.	40.3	0.	333.2	1.000	16.22	0.987
7	19.429	19.658	40.5	0.	40.5	0.	333.0	1.000	16.22	0.987
8	19.186	19.430	40.7	0.	40.7	0.	332.9	1.000	16.22	0.987
9	17.729	18.074	42.1	0.	42.1	0.	332.1	1.000	16.22	0.985
10	15.788	16.295	45.2	0.	45.2	0.	332.2	1.000	16.22	0.973
11	15.306	15.848	46.4	0.	46.4	0.	332.7	1.000	16.22	0.963
HUB	14.643	15.240	48.2	-0.	48.2	-0.	333.5	1.000	16.22	0.945

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
TIP	204.7	149.8	204.7	149.8	145.5	149.8	144.0	0.	0.	0.
1	203.6	151.9	203.6	151.9	150.0	151.9	137.6	-0.	0.	0.
2	203.2	153.8	203.2	153.8	154.0	153.8	132.5	-0.	0.	0.
3	205.5	157.6	205.5	157.6	159.2	157.6	129.9	0.	0.	0.
4	209.2	158.5	209.2	158.5	160.5	158.5	134.2	0.	0.	0.
5	210.0	158.7	210.0	158.7	160.7	158.7	135.2	0.	0.	0.
6	210.9	158.8	210.9	158.8	161.0	158.8	136.3	0.	0.	0.
7	211.9	159.0	211.9	159.0	161.2	159.0	137.5	0.	0.	0.
8	212.9	159.2	212.9	159.2	161.5	159.2	138.8	0.	0.	0.
9	220.2	160.6	220.2	160.6	163.3	160.6	147.7	0.	0.	0.
10	234.3	157.3	234.3	157.3	165.1	157.3	166.3	0.	0.	0.
11	239.3	154.0	239.3	154.0	165.1	154.0	173.3	0.	0.	0.
HUB	247.2	148.1	247.2	148.1	164.8	148.1	184.2	-0.	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		STREAMLINE SLOPE		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
TIP	0.566	0.408	0.566	0.408	0.402	0.408	-1.18	-0.08	1.029	0.879
1	0.565	0.416	0.565	0.416	0.417	0.416	-0.63	0.16	1.012	0.854
2	0.567	0.423	0.567	0.423	0.430	0.423	-0.08	0.39	0.999	0.835
3	0.578	0.438	0.578	0.438	0.448	0.438	1.62	1.23	0.990	0.824
4	0.591	0.441	0.591	0.441	0.454	0.441	2.98	1.92	0.988	0.836
5	0.594	0.442	0.594	0.442	0.454	0.442	3.23	2.04	0.987	0.839
6	0.597	0.443	0.597	0.443	0.455	0.443	3.48	2.16	0.987	0.843
7	0.600	0.443	0.600	0.443	0.456	0.443	3.74	2.28	0.986	0.847
8	0.603	0.444	0.603	0.444	0.457	0.444	4.01	2.41	0.986	0.851
9	0.626	0.448	0.626	0.448	0.464	0.448	5.82	3.22	0.984	0.882
10	0.670	0.439	0.670	0.439	0.472	0.439	8.89	4.35	0.953	0.949
11	0.685	0.429	0.685	0.429	0.472	0.429	9.75	4.50	0.933	0.974
HUB	0.708	0.411	0.708	0.411	0.472	0.411	10.98	4.61	0.899	1.014

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
TIP	0.	6.3	-0.0	14.1	0.545	0.	0.133	0.133	0.053	0.053
1	5.00	6.3	0.0	12.6	0.516	0.	0.103	0.103	0.040	0.040
2	10.00	6.4	0.0	11.3	0.491	0.	0.083	0.083	0.031	0.031
3	30.00	6.4	0.0	9.7	0.454	0.	0.055	0.055	0.019	0.019
4	45.00	6.4	0.0	9.4	0.451	0.	0.058	0.058	0.019	0.019
5	47.50	6.4	0.0	9.3	0.451	0.	0.059	0.059	0.019	0.019
6	50.00	6.4	0.0	9.3	0.452	0.	0.060	0.060	0.019	0.019
7	52.50	6.4	0.0	9.3	0.453	0.	0.060	0.060	0.019	0.019
8	55.00	6.3	0.0	9.2	0.454	0.	0.061	0.061	0.019	0.019
9	70.00	6.3	0.0	9.1	0.462	0.	0.066	0.066	0.019	0.019
10	90.00	6.3	0.0	9.2	0.508	0.	0.103	0.103	0.027	0.027
11	95.00	6.3	0.0	9.4	0.534	0.	0.136	0.136	0.034	0.034
HUB	100.00	6.2	-0.0	9.6	0.575	0.	0.192	0.192	0.046	0.046

TABLE IV. - BLADE GEOMETRY FOR ROTOR 16

RP	PERCENT SPAN	RADII RI	RO	BLADE ANGLES KIC	KTC	KOC	DELTA INC	CONE ANGLE
TIP	0.	25.204	24.905	67.60	66.34	61.49	2.51	-9.339
1	5.	24.683	24.364	66.48	65.43	60.78	2.75	-9.519
2	10.	24.123	23.824	65.30	64.30	60.02	3.00	-8.557
3	30.	21.814	21.662	60.91	58.82	56.21	4.07	-3.692
4	45.	20.034	20.041	57.80	54.80	51.78	4.90	0.161
5	48.	19.733	19.771	57.28	54.09	50.84	5.04	0.819
6	50.	19.430	19.501	56.76	53.37	49.85	5.18	1.482
7	53.	19.126	19.231	56.24	52.64	48.79	5.32	2.149
8	55.	18.821	18.960	55.72	51.89	47.68	5.46	2.817
9	70.	16.946	17.339	52.48	47.42	39.33	6.29	7.105
10	90.	14.280	15.178	47.87	41.70	21.76	7.35	13.772
11	95.	13.570	14.637	46.64	40.42	15.40	7.59	15.655
HUB	100.	12.700	14.097	45.12	39.00	8.18	7.85	19.355

RP	BLADE THICKNESSES TI	TM	TO	AXIAL DIMENSIONS ZIC	ZMC	ZTC	ZOC
TIP	0.051	0.151	0.051	1.016	1.891	2.284	2.839
1	0.051	0.161	0.051	0.978	1.892	2.263	2.879
2	0.051	0.171	0.051	0.935	1.894	2.239	2.923
3	0.051	0.213	0.051	0.756	1.895	2.101	3.111
4	0.051	0.247	0.051	0.629	1.895	1.950	3.258
5	0.051	0.252	0.051	0.608	1.894	1.921	3.284
6	0.051	0.258	0.051	0.585	1.893	1.889	3.311
7	0.051	0.263	0.051	0.562	1.892	1.857	3.339
8	0.051	0.269	0.051	0.538	1.890	1.822	3.367
9	0.051	0.304	0.051	0.394	1.878	1.591	3.551
10	0.051	0.355	0.051	0.168	1.843	1.190	3.832
11	0.051	0.369	0.051	0.096	1.827	1.065	3.904
HUB	0.051	0.386	0.051	0.000	1.804	0.902	3.977

RP	AERO CHORD	SETTING ANGLE	TOTAL CAMBER	SOLIDITY	X FACTOR	PHISS	AREA RATIO
TIP	4.612	66.12	6.11	1.289	0.717	4.88	1.041
1	4.629	65.10	5.69	1.322	0.723	4.88	1.040
2	4.627	63.95	5.28	1.352	0.750	5.05	1.040
3	4.620	58.90	4.70	1.488	0.944	6.88	1.041
4	4.618	54.86	6.03	1.614	0.989	8.10	1.040
5	4.618	54.11	6.44	1.637	0.993	8.32	1.040
6	4.618	53.34	6.91	1.661	0.996	8.54	1.040
7	4.619	52.53	7.45	1.687	0.998	8.77	1.041
8	4.620	51.70	8.04	1.713	1.000	9.00	1.041
9	4.634	46.06	13.15	1.893	0.978	10.16	1.041
10	4.705	35.86	26.11	2.237	0.865	10.77	1.040
11	4.739	32.48	31.24	2.353	0.822	10.61	1.040
HUB	4.846	28.47	36.94	2.533	0.760	10.23	1.040

TABLE V. - BLADE GEOMETRY FOR STATOR 11

RP	PERCENT SPAN	RADII RI	RO	BLADE ANGLES KIC	KTC	KOC	DELTA INC	CONE ANGLE
TIP	0.	24.394	24.384	38.40	30.24	-14.05	6.31	-0.154
1	5.	23.974	23.968	36.19	29.03	-12.57	6.33	-0.088
2	10.	23.505	23.525	34.36	28.05	-11.35	6.35	0.291
3	30.	21.604	21.713	32.84	27.50	-9.73	6.37	1.627
4	45.	20.157	20.342	33.53	28.27	-9.36	6.36	2.773
5	48.	19.914	20.114	33.71	28.44	-9.32	6.36	2.980
6	50.	19.672	19.886	33.91	28.63	-9.29	6.35	3.194
7	53.	19.429	19.658	34.12	28.83	-9.26	6.35	3.414
8	55.	19.186	19.430	34.35	29.04	-9.24	6.35	3.639
9	70.	17.729	18.074	35.84	30.43	-9.10	6.32	5.169
10	90.	15.788	16.295	39.05	33.22	-9.23	6.26	7.636
11	95.	15.306	15.848	40.26	34.23	-9.36	6.24	8.196
HUB	100.	14.643	15.240	42.17	35.82	-9.60	6.21	9.064

RP	BLADE THICKNESSES TI	TM	TO	AXIAL DIMENSIONS ZIC	ZMC	ZTC	ZOC
TIP	0.051	0.279	0.051	7.098	8.822	8.554	10.875
1	0.051	0.279	0.051	7.073	8.829	8.467	10.876
2	0.051	0.279	0.051	7.051	8.834	8.388	10.877
3	0.051	0.279	0.051	7.033	8.840	8.239	10.877
4	0.051	0.279	0.051	7.038	8.838	8.181	10.876
5	0.051	0.279	0.051	7.040	8.838	8.173	10.876
6	0.051	0.279	0.051	7.042	8.838	8.165	10.876
7	0.051	0.279	0.051	7.044	8.838	8.158	10.876
8	0.051	0.279	0.051	7.046	8.838	8.151	10.876
9	0.051	0.279	0.051	7.058	8.834	8.105	10.874
10	0.051	0.279	0.051	7.089	8.824	8.060	10.868
11	0.051	0.279	0.051	7.102	8.822	8.054	10.867
HUB	0.051	0.279	0.051	7.125	8.818	8.051	10.867

RP	AERO CHORD	SETTING ANGLE	TOTAL CAMBER	SOLIDITY	X FACTOR	PHISS	AREA RATIO
TIP	4.053	19.32	52.46	1.270	0.600	13.50	1.317
1	4.052	18.06	48.76	1.291	0.600	12.22	1.298
2	4.053	17.07	45.71	1.317	0.600	11.13	1.281
3	4.055	16.15	42.57	1.430	0.600	9.68	1.246
4	4.057	16.44	42.89	1.531	0.600	9.40	1.227
5	4.058	16.53	43.03	1.549	0.600	9.37	1.223
6	4.059	16.62	43.19	1.568	0.600	9.35	1.219
7	4.060	16.72	43.38	1.587	0.600	9.34	1.214
8	4.060	16.82	43.59	1.607	0.600	9.33	1.209
9	4.068	17.52	44.94	1.736	0.600	9.26	1.182
10	4.085	19.06	48.27	1.946	0.600	9.47	1.148
11	4.090	19.65	49.62	2.006	0.600	9.64	1.140
HUB	4.098	20.59	51.77	2.095	0.600	9.92	1.128

TABLE VI. - OVERALL PERFORMANCE FOR STAGE 16-11

(a) 100 Percent of design speed

Parameter	Reading number				
	1057	1058	1059	1060	1061
ROTOR TOTAL PRESSURE RATIO	1.390	1.480	1.561	1.611	1.647
STAGE TOTAL PRESSURE RATIO	1.362	1.461	1.535	1.581	1.612
ROTOR TOTAL TEMPERATURE RATIO	1.123	1.142	1.159	1.170	1.179
STAGE TOTAL TEMPERATURE RATIO	1.122	1.141	1.156	1.168	1.178
ROTOR TEMP. RISE EFFICIENCY	0.802	0.834	0.855	0.860	0.855
STAGE TEMP. RISE EFFICIENCY	0.758	0.813	0.832	0.834	0.821
ROTOR MOMENTUM RISE EFFICIENCY	0.827	0.863	0.885	0.897	0.891
ROTOR HEAD RISE COEFFICIENT	0.158	0.189	0.216	0.234	0.246
STAGE HEAD RISE COEFFICIENT	0.147	0.182	0.207	0.224	0.234
FLOW COEFFICIENT	0.375	0.372	0.366	0.355	0.338
WT FLOW PER UNIT FRONTAL AREA	138.36	137.44	136.11	132.47	127.91
WT FLOW PER UNIT ANNULUS AREA	185.44	184.21	182.42	177.55	171.43
WT FLOW AT ORIFICE	27.61	27.43	27.16	26.44	25.53
WT FLOW AT ROTOR INLET	27.64	27.46	27.14	26.42	25.43
WT FLOW AT ROTOR OUTLET	28.69	28.43	28.42	27.90	27.13
WT FLOW AT STATOR OUTLET	28.20	27.78	27.60	27.15	26.72
ROTATIVE SPEED	16123.0	16139.5	16159.0	16103.4	16102.8
PERCENT OF DESIGN SPEED	100.1	100.2	100.4	100.0	100.0

(b) 90 Percent of design speed

Parameter	Reading number				
	1062	1063	1064	1065	1066
ROTOR TOTAL PRESSURE RATIO	1.285	1.350	1.426	1.473	1.497
STAGE TOTAL PRESSURE RATIO	1.264	1.338	1.408	1.452	1.470
ROTOR TOTAL TEMPERATURE RATIO	1.090	1.105	1.122	1.134	1.144
STAGE TOTAL TEMPERATURE RATIO	1.090	1.104	1.120	1.132	1.142
ROTOR TEMP. RISE EFFICIENCY	0.822	0.852	0.877	0.872	0.847
STAGE TEMP. RISE EFFICIENCY	0.768	0.836	0.858	0.851	0.817
ROTOR MOMENTUM RISE EFFICIENCY	0.853	0.897	0.910	0.905	0.879
ROTOR HEAD RISE COEFFICIENT	0.147	0.177	0.210	0.231	0.241
STAGE HEAD RISE COEFFICIENT	0.137	0.171	0.203	0.222	0.229
FLOW COEFFICIENT	0.378	0.372	0.359	0.339	0.312
WT FLOW PER UNIT FRONTAL AREA	128.15	126.06	123.06	117.42	109.51
WT FLOW PER UNIT ANNULUS AREA	171.75	168.96	164.94	157.38	146.77
WT FLOW AT ORIFICE	25.58	25.16	24.56	23.43	21.85
WT FLOW AT ROTOR INLET	25.59	25.21	24.50	23.37	21.74
WT FLOW AT ROTOR OUTLET	26.49	25.85	25.72	24.71	23.27
WT FLOW AT STATOR OUTLET	26.27	25.69	24.97	24.04	22.83
ROTATIVE SPEED	14502.6	14506.6	14511.1	14513.0	14509.4
PERCENT OF DESIGN SPEED	90.1	90.1	90.1	90.1	90.1

(c) 80 Percent of design speed

Parameter	Reading number
	1067
ROTOR TOTAL PRESSURE RATIO	1.374
STAGE TOTAL PRESSURE RATIO	1.352
ROTOR TOTAL TEMPERATURE RATIO	1.115
STAGE TOTAL TEMPERATURE RATIO	1.114
ROTOR TEMP. RISE EFFICIENCY	0.828
STAGE TEMP. RISE EFFICIENCY	0.792
ROTOR MOMENTUM RISE EFFICIENCY	0.861
ROTOR HEAD RISE COEFFICIENT	0.237
STAGE HEAD RISE COEFFICIENT	0.224
FLOW COEFFICIENT	0.287
WT FLOW PER UNIT FRONTAL AREA	92.17
WT FLOW PER UNIT ANNULUS AREA	123.54
WT FLOW AT ORIFICE	18.40
WT FLOW AT ROTOR INLET	18.22
WT FLOW AT ROTOR OUTLET	19.74
WT FLOW AT STATOR OUTLET	19.34
ROTATIVE SPEED	12913.1
PERCENT OF DESIGN SPEED	80.2

TABLE VI. - Concluded. OVERALL PERFORMANCE FOR STAGE 16-11

(d) 70 Percent of design speed

Parameter	Reading number				
	1068	1069	1070	1071	1072
ROTOR TOTAL PRESSURE RATIO	1.154	1.193	1.224	1.250	1.269
STAGE TOTAL PRESSURE RATIO	1.142	1.188	1.218	1.241	1.255
ROTOR TOTAL TEMPERATURE RATIO	1.049	1.059	1.069	1.077	1.087
STAGE TOTAL TEMPERATURE RATIO	1.049	1.059	1.068	1.076	1.085
ROTOR TEMP. RISE EFFICIENCY	0.859	0.874	0.866	0.850	0.813
STAGE TEMP. RISE EFFICIENCY	0.789	0.856	0.859	0.835	0.788
ROTOR MOMENTUM RISE EFFICIENCY	0.915	0.924	0.917	0.904	0.860
ROTOR HEAD RISE COEFFICIENT	0.137	0.171	0.196	0.217	0.231
STAGE HEAD RISE COEFFICIENT	0.127	0.166	0.191	0.210	0.220
FLOW COEFFICIENT	0.383	0.360	0.337	0.312	0.280
WT FLOW PER UNIT FRONTAL AREA	104.12	98.67	93.02	86.75	78.98
WT FLOW PER UNIT ANNULUS AREA	139.54	132.25	124.67	116.27	105.85
WT FLOW AT ORIFICE	20.78	19.69	18.56	17.31	15.76
WT FLOW AT ROTOR INLET	20.80	19.68	18.55	17.29	15.67
WT FLOW AT ROTOR OUTLET	21.33	20.25	19.21	18.26	16.87
WT FLOW AT STATOR OUTLET	21.20	19.91	18.76	17.66	16.37
ROTATIVE SPEED	11230.5	11222.0	11228.5	11241.5	11246.2
PERCENT OF DESIGN SPEED	69.8	69.7	69.7	69.8	69.9

(e) 60 Percent of design speed

Parameter	Reading number
	1073
ROTOR TOTAL PRESSURE RATIO	1.192
STAGE TOTAL PRESSURE RATIO	1.182
ROTOR TOTAL TEMPERATURE RATIO	1.064
STAGE TOTAL TEMPERATURE RATIO	1.062
ROTOR TEMP. RISE EFFICIENCY	0.806
STAGE TEMP. RISE EFFICIENCY	0.784
ROTOR MOMENTUM RISE EFFICIENCY	0.857
ROTOR HEAD RISE COEFFICIENT	0.231
STAGE HEAD RISE COEFFICIENT	0.219
FLOW COEFFICIENT	0.268
WT FLOW PER UNIT FRONTAL AREA	65.67
WT FLOW PER UNIT ANNULUS AREA	88.01
WT FLOW AT ORIFICE	13.11
WT FLOW AT ROTOR INLET	12.97
WT FLOW AT ROTOR OUTLET	14.04
WT FLOW AT STATOR OUTLET	13.61
ROTATIVE SPEED	9631.0
PERCENT OF DESIGN SPEED	59.8

(f) 50 Percent of design speed

Parameter	Reading number
	1074
ROTOR TOTAL PRESSURE RATIO	1.132
STAGE TOTAL PRESSURE RATIO	1.125
ROTOR TOTAL TEMPERATURE RATIO	1.045
STAGE TOTAL TEMPERATURE RATIO	1.044
ROTOR TEMP. RISE EFFICIENCY	0.807
STAGE TEMP. RISE EFFICIENCY	0.785
ROTOR MOMENTUM RISE EFFICIENCY	0.856
ROTOR HEAD RISE COEFFICIENT	0.231
STAGE HEAD RISE COEFFICIENT	0.219
FLOW COEFFICIENT	0.259
WT FLOW PER UNIT FRONTAL AREA	53.57
WT FLOW PER UNIT ANNULUS AREA	71.79
WT FLOW AT ORIFICE	10.69
WT FLOW AT ROTOR INLET	10.57
WT FLOW AT ROTOR OUTLET	11.51
WT FLOW AT STATOR OUTLET	11.11
ROTATIVE SPEED	8060.5
PERCENT OF DESIGN SPEED	50.1

TABLE VII. - BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(a) 100 Percent of design speed; reading number 1057

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	29.5	68.5	63.0	289.0	1.137	10.07	1.374
2	24.122	23.823	0.2	27.9	67.3	61.6	288.8	1.129	10.11	1.382
3	21.814	21.661	-0.1	27.3	64.2	58.8	288.2	1.115	10.13	1.367
4	20.033	20.041	0.3	32.5	61.5	53.9	288.0	1.124	10.14	1.373
5	19.733	19.771	0.7	33.6	61.0	54.8	288.0	1.123	10.14	1.344
6	19.431	19.500	-0.2	33.8	60.8	57.3	288.1	1.116	10.14	1.297
7	19.126	19.230	-0.1	34.2	60.3	58.2	288.0	1.112	10.14	1.281
8	18.821	18.961	-0.1	35.3	59.9	56.9	287.9	1.115	10.14	1.290
9	16.947	17.338	-0.1	31.8	57.1	43.7	287.9	1.119	10.15	1.432
10	14.280	15.176	-0.1	36.1	53.1	32.4	287.7	1.126	10.15	1.455
11	13.571	14.638	-0.1	38.2	52.1	27.4	287.7	1.132	10.13	1.483

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	164.1	187.2	448.5	358.2	164.1	162.9	-0.6	92.3	416.8	411.4
2	170.1	191.5	441.1	356.0	170.1	169.3	0.7	89.5	407.7	402.6
3	178.3	189.7	409.3	325.6	178.3	168.6	-0.3	86.9	368.1	365.6
4	183.1	199.5	383.6	285.6	183.1	168.2	0.9	107.3	338.0	338.2
5	183.4	192.6	378.2	278.0	183.4	160.4	2.2	106.6	333.0	333.6
6	184.0	177.7	376.8	273.7	184.0	147.7	-0.7	98.9	328.1	329.3
7	184.3	171.1	372.3	269.0	184.3	141.6	-0.5	96.1	323.0	324.8
8	184.8	175.1	368.1	261.6	184.8	143.0	-0.5	101.1	317.8	320.2
9	185.6	218.8	341.5	256.9	185.6	185.9	-0.5	115.4	286.2	292.8
10	181.2	232.3	301.9	222.3	181.2	187.6	-0.4	136.9	241.0	256.2
11	178.6	241.1	290.9	213.3	178.6	189.5	-0.4	149.2	229.2	247.2

	ABS MACH NO		REL MACH NO		MERID MACH NO			MERID PEAK SS
RP	IN	OUT	IN	OUT	IN	OUT		VEL R MACH NO
1	0.493	0.529	1.348	1.013	0.493	0.461		0.992 1.486
2	0.512	0.544	1.328	1.012	0.512	0.481		0.995 1.465
3	0.539	0.543	1.237	0.933	0.539	0.483		0.945 1.453
4	0.555	0.571	1.162	0.817	0.555	0.481		0.918 1.419
5	0.556	0.550	1.146	0.794	0.556	0.458		0.875 1.411
6	0.557	0.507	1.141	0.781	0.557	0.421		0.802 1.420
7	0.558	0.488	1.128	0.768	0.558	0.404		0.769 1.417
8	0.560	0.500	1.116	0.746	0.560	0.408		0.774 1.413
9	0.563	0.632	1.035	0.742	0.563	0.537		1.001 1.394
10	0.549	0.672	0.914	0.643	0.549	0.543		1.035 1.275
11	0.540	0.698	0.880	0.618	0.540	0.549		1.061 1.225

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	1.9	-0.9	2.1	0.279	0.693	0.183	0.113	0.031	0.019
2	10.00	1.9	-1.1	1.5	0.267	0.749	0.146	0.083	0.026	0.015
3	30.00	3.2	-0.8	2.6	0.276	0.813	0.107	0.059	0.019	0.010
4	45.00	3.7	-1.2	2.1	0.341	0.762	0.157	0.124	0.029	0.023
5	47.50	3.7	-1.3	3.9	0.349	0.715	0.189	0.158	0.033	0.028
6	50.00	4.0	-1.2	7.5	0.353	0.663	0.212	0.181	0.034	0.029
7	52.50	4.1	-1.2	9.4	0.355	0.656	0.213	0.183	0.033	0.029
8	55.00	4.2	-1.3	9.2	0.370	0.655	0.222	0.194	0.035	0.031
9	70.00	4.7	-1.6	4.3	0.338	0.908	0.070	0.052	0.013	0.010
10	90.00	5.4	-1.9	10.4	0.368	0.900	0.096	0.094	0.018	0.018
11	95.00	5.7	-1.9	11.7	0.380	0.902	0.105	0.104	0.020	0.020

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(b) 100 Percent of design speed; reading number 1058

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	36.1	68.6	62.5	288.9	1.168	10.07	1.499
2	24.122	23.823	-0.2	33.5	67.5	61.3	288.8	1.155	10.11	1.498
3	21.814	21.661	-0.2	32.9	64.4	58.2	288.1	1.140	10.13	1.487
4	20.033	20.041	-0.2	38.4	61.8	53.2	288.1	1.146	10.14	1.483
5	19.733	19.771	-0.2	39.5	61.4	55.0	288.0	1.143	10.14	1.439
6	19.431	19.500	-0.2	39.1	61.0	57.2	287.8	1.136	10.14	1.399
7	19.126	19.230	-0.1	39.7	60.6	57.5	288.0	1.133	10.14	1.387
8	18.821	18.961	-0.1	40.2	60.1	55.9	288.0	1.134	10.14	1.398
9	16.947	17.338	-0.1	36.2	57.4	44.7	287.9	1.130	10.15	1.485
10	14.280	15.176	-0.1	39.8	53.5	33.5	287.7	1.133	10.15	1.488
11	13.571	14.638	-0.1	42.0	52.5	26.7	287.7	1.141	10.13	1.527

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	163.3	192.2	448.2	336.3	163.3	155.3	-0.4	113.3	417.0	411.6
2	168.7	193.6	441.0	336.4	168.7	161.4	-0.5	106.9	407.0	402.0
3	177.0	192.8	409.5	307.4	177.0	161.9	-0.5	104.8	368.8	366.2
4	181.6	202.8	384.6	265.5	181.6	158.9	-0.5	126.0	338.6	338.7
5	182.0	192.4	380.4	258.8	182.0	148.5	-0.5	122.3	333.5	334.2
6	182.2	179.8	376.1	257.4	182.2	139.5	-0.5	113.4	328.5	329.7
7	182.8	176.2	372.1	252.4	182.8	135.6	-0.5	112.5	323.6	325.4
8	183.1	180.7	367.2	246.1	183.1	138.1	-0.5	116.6	317.9	320.3
9	183.5	211.1	340.8	239.6	183.5	170.3	-0.5	124.8	286.7	293.3
10	178.7	223.5	300.7	206.0	178.7	171.8	-0.4	142.9	241.4	256.5
11	176.4	237.3	289.7	197.5	176.4	176.4	-0.4	158.7	229.4	247.4

	ABS MACH NO		REL MACH NO		MERID MACH NO				MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT			VEL R	MACH NO
1	0.491	0.537	1.347	0.939	0.491	0.434			0.951	1.489
2	0.508	0.544	1.328	0.946	0.508	0.454			0.957	1.471
3	0.535	0.546	1.237	0.871	0.535	0.459			0.915	1.461
4	0.550	0.575	1.164	0.753	0.550	0.450			0.875	1.433
5	0.551	0.544	1.151	0.732	0.551	0.420			0.816	1.430
6	0.552	0.509	1.139	0.728	0.552	0.395			0.766	1.428
7	0.553	0.498	1.127	0.714	0.553	0.384			0.742	1.424
8	0.554	0.512	1.112	0.697	0.554	0.391			0.754	1.419
9	0.556	0.605	1.032	0.686	0.556	0.488			0.928	1.405
10	0.541	0.642	0.910	0.592	0.541	0.494			0.962	1.282
11	0.533	0.683	0.876	0.568	0.533	0.508			1.000	1.230

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.0	-0.8	1.6	0.345	0.731	0.191	0.121	0.033	0.021
2	10.00	2.1	-0.9	1.2	0.327	0.790	0.143	0.079	0.025	0.014
3	30.00	3.4	-0.6	2.0	0.335	0.857	0.098	0.049	0.017	0.009
4	45.00	4.0	-0.9	1.5	0.412	0.816	0.140	0.104	0.026	0.019
5	47.50	4.2	-0.9	4.1	0.418	0.766	0.177	0.143	0.031	0.025
6	50.00	4.3	-0.9	7.3	0.407	0.740	0.190	0.158	0.031	0.026
7	52.50	4.4	-1.0	8.7	0.412	0.737	0.191	0.161	0.030	0.026
8	55.00	4.4	-1.0	8.2	0.423	0.749	0.187	0.159	0.031	0.026
9	70.00	5.0	-1.3	5.3	0.395	0.917	0.069	0.051	0.013	0.009
10	90.00	5.8	-1.5	11.5	0.425	0.906	0.096	0.094	0.018	0.017
11	95.00	6.1	-1.5	11.0	0.439	0.909	0.104	0.104	0.020	0.020

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(c) 100 Percent of design speed; reading number 1059

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	40.9	69.0	60.9	288.9	1.198	10.05	1.630
2	24.122	23.823	-0.2	37.7	67.8	60.6	288.8	1.178	10.11	1.609
3	21.814	21.661	-0.2	37.9	64.7	57.9	288.0	1.158	10.14	1.574
4	20.033	20.041	-0.2	41.8	62.2	52.8	288.0	1.161	10.14	1.567
5	19.733	19.771	-0.1	42.3	61.8	53.1	288.0	1.159	10.14	1.545
6	19.431	19.500	-0.2	42.2	61.4	54.8	288.2	1.154	10.14	1.507
7	19.126	19.230	-0.2	42.7	61.0	55.1	288.0	1.150	10.14	1.492
8	18.821	18.961	-0.2	43.1	60.6	53.6	288.0	1.151	10.14	1.503
9	16.947	17.338	-0.1	40.1	57.9	44.7	287.9	1.143	10.15	1.538
10	14.280	15.176	-0.1	43.2	54.2	34.7	287.8	1.137	10.15	1.516
11	13.571	14.638	-0.1	45.2	53.1	26.3	287.8	1.150	10.14	1.567

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	160.5	205.0	447.9	318.3	160.5	154.9	-0.4	134.3	417.8	412.3
2	166.4	199.9	441.1	322.0	166.4	158.0	-0.5	122.3	408.0	403.0
3	174.5	195.4	408.2	290.3	174.5	154.3	-0.5	120.0	368.5	365.9
4	178.5	205.4	383.2	253.5	178.5	153.2	-0.5	136.7	338.6	338.7
5	178.8	201.5	379.0	248.3	178.8	148.9	-0.5	135.7	333.7	334.3
6	179.4	191.6	374.8	246.1	179.4	141.9	-0.5	128.7	328.6	329.7
7	179.9	188.2	370.8	241.6	179.9	138.4	-0.5	127.5	323.8	325.5
8	180.2	191.8	366.7	236.3	180.2	140.2	-0.5	131.0	318.8	321.2
9	180.4	209.5	339.4	225.5	180.4	160.3	-0.4	135.0	287.0	293.7
10	175.0	216.1	298.9	191.8	175.0	157.6	-0.4	147.8	241.8	257.0
11	172.9	234.3	288.0	184.3	172.9	165.2	-0.4	166.2	229.9	248.0

	ABS MACH NO		REL MACH NO		MERID MACH NO				MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT			VEL R	MACH NO
1	0.482	0.567	1.345	0.881	0.482	0.429			0.965	1.499
2	0.501	0.557	1.327	0.898	0.501	0.440			0.950	1.481
3	0.527	0.550	1.233	0.817	0.527	0.434			0.884	1.467
4	0.540	0.579	1.159	0.715	0.540	0.432			0.859	1.443
5	0.541	0.568	1.146	0.699	0.541	0.420			0.833	1.440
6	0.542	0.539	1.133	0.693	0.542	0.399			0.791	1.436
7	0.544	0.530	1.122	0.680	0.544	0.390			0.769	1.434
8	0.545	0.541	1.110	0.666	0.545	0.395			0.778	1.433
9	0.546	0.596	1.027	0.642	0.546	0.456			0.889	1.419
10	0.529	0.618	0.903	0.549	0.529	0.451			0.901	1.292
11	0.522	0.671	0.870	0.528	0.522	0.473			0.955	1.240

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.3	-0.4	0.0	0.402	0.758	0.198	0.126	0.036	0.023
2	10.00	2.4	-0.6	0.5	0.372	0.817	0.141	0.075	0.026	0.014
3	30.00	3.7	-0.3	1.7	0.388	0.875	0.096	0.046	0.017	0.008
4	45.00	4.5	-0.4	1.0	0.449	0.852	0.124	0.087	0.023	0.016
5	47.50	4.6	-0.5	2.3	0.455	0.831	0.142	0.107	0.026	0.020
6	50.00	4.7	-0.5	4.9	0.447	0.805	0.161	0.128	0.028	0.022
7	52.50	4.8	-0.6	6.3	0.451	0.806	0.159	0.128	0.027	0.022
8	55.00	4.9	-0.6	5.9	0.461	0.817	0.153	0.123	0.027	0.021
9	70.00	5.5	-0.8	5.3	0.442	0.915	0.077	0.057	0.014	0.011
10	90.00	6.5	-0.9	12.7	0.473	0.919	0.086	0.083	0.016	0.015
11	95.00	6.7	-0.9	10.6	0.488	0.914	0.104	0.103	0.020	0.020

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(d) 100 Percent of design speed; reading number 1060

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	43.8	69.4	60.5	289.0	1.218	10.08	1.693
2	24.122	23.823	-0.2	41.2	68.4	60.2	289.1	1.194	10.11	1.673
3	21.814	21.661	-0.2	40.8	65.4	57.9	288.0	1.169	10.14	1.624
4	20.033	20.041	-0.2	43.8	63.0	53.2	287.9	1.167	10.14	1.615
5	19.733	19.771	-0.1	43.9	62.6	53.3	288.0	1.165	10.14	1.593
6	19.431	19.500	-0.2	44.2	62.2	53.8	288.0	1.162	10.14	1.575
7	19.126	19.230	-0.2	45.1	61.9	53.1	287.8	1.162	10.14	1.573
8	18.821	18.961	-0.2	45.2	61.4	52.0	287.8	1.162	10.14	1.572
9	16.947	17.338	-0.1	43.8	58.8	45.2	287.8	1.151	10.14	1.571
10	14.280	15.176	-0.1	45.8	55.3	34.9	287.8	1.144	10.14	1.548
11	13.571	14.638	-0.1	48.2	54.2	25.6	287.8	1.156	10.14	1.599

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	156.2	208.8	444.7	305.6	156.2	150.6	-0.4	144.6	416.0	410.6
2	161.3	204.0	438.4	308.6	161.3	153.4	-0.4	134.4	407.2	402.2
3	168.7	196.2	404.7	279.3	168.7	148.5	-0.5	128.2	367.4	364.8
4	172.2	204.0	379.3	245.5	172.2	147.2	-0.5	141.2	337.5	337.7
5	172.3	200.3	374.3	241.4	172.3	144.3	-0.4	138.9	331.8	332.5
6	173.0	196.0	371.0	238.2	173.0	140.6	-0.5	136.6	327.7	328.9
7	172.9	196.9	366.5	231.3	172.9	139.0	-0.5	139.6	322.7	324.5
8	173.2	198.3	362.1	227.4	173.2	139.9	-0.5	140.6	317.5	319.9
9	173.2	206.4	334.8	211.4	173.2	149.0	-0.4	142.8	286.1	292.7
10	167.4	212.7	293.8	180.8	167.4	148.2	-0.4	152.6	241.0	256.1
11	165.4	232.1	283.0	171.5	165.4	154.6	-0.4	173.1	229.2	247.3

	ABS MACH NO		REL MACH NO		MERID MACH NO			
RP	IN	OUT	IN	OUT	IN	OUT	MERID VEL R	PEAK SS MACH NO
1	0.468	0.573	1.333	0.839	0.468	0.414	0.964	1.503
2	0.484	0.565	1.316	0.855	0.484	0.425	0.951	1.491
3	0.508	0.549	1.220	0.782	0.508	0.416	0.880	1.479
4	0.520	0.573	1.145	0.690	0.520	0.414	0.855	1.458
5	0.520	0.563	1.130	0.678	0.520	0.405	0.837	1.454
6	0.522	0.550	1.120	0.669	0.522	0.395	0.813	1.454
7	0.522	0.553	1.107	0.650	0.522	0.390	0.804	1.454
8	0.523	0.558	1.093	0.639	0.523	0.393	0.808	1.452
9	0.523	0.585	1.011	0.599	0.523	0.422	0.860	1.447
10	0.505	0.606	0.886	0.515	0.505	0.422	0.885	1.300
11	0.498	0.662	0.853	0.489	0.498	0.441	0.935	1.249

	PERCENT	INCIDENCE		DEV	D-FACT	EFF.	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.8	0.0	-0.4	0.435	0.746	0.224	0.153	0.042	0.029
2	10.00	3.0	-0.0	0.1	0.409	0.816	0.153	0.087	0.028	0.016
3	30.00	4.4	0.3	1.7	0.416	0.879	0.099	0.049	0.018	0.009
4	45.00	5.2	0.3	1.4	0.469	0.878	0.107	0.070	0.020	0.013
5	47.50	5.3	0.3	2.5	0.469	0.863	0.121	0.086	0.022	0.016
6	50.00	5.5	0.3	4.0	0.469	0.855	0.127	0.093	0.023	0.017
7	52.50	5.6	0.3	4.3	0.482	0.852	0.132	0.100	0.024	0.018
8	55.00	5.7	0.3	4.3	0.486	0.851	0.135	0.104	0.024	0.019
9	70.00	6.4	0.1	5.8	0.483	0.909	0.087	0.066	0.016	0.012
10	90.00	7.5	0.2	12.9	0.505	0.923	0.088	0.086	0.016	0.016
11	95.00	7.8	0.2	9.9	0.529	0.921	0.102	0.102	0.020	0.019

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(e) 100 Percent of design speed; reading number 1061

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	46.9	70.4	60.8	289.1	1.227	10.07	1.736
2	24.122	23.823	-0.2	44.7	69.4	59.9	289.1	1.208	10.10	1.724
3	21.814	21.661	-0.2	43.7	66.5	58.1	288.2	1.179	10.14	1.658
4	20.033	20.041	-0.2	45.7	64.1	53.5	287.8	1.174	10.14	1.648
5	19.733	19.771	-0.2	46.2	63.7	53.8	288.1	1.173	10.14	1.630
6	19.431	19.500	-0.2	46.4	63.3	53.5	287.9	1.172	10.14	1.619
7	19.126	19.230	-0.2	47.5	62.9	52.5	287.9	1.173	10.14	1.617
8	18.821	18.961	-0.2	47.7	62.6	51.5	287.8	1.173	10.15	1.616
9	16.947	17.338	-0.1	46.7	60.1	45.2	287.7	1.159	10.15	1.598
10	14.280	15.176	-0.1	48.2	56.6	34.9	287.6	1.150	10.15	1.573
11	13.571	14.638	-0.1	50.3	55.6	25.0	287.7	1.161	10.14	1.624

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	148.3	210.0	442.0	294.7	148.3	143.6	-0.4	153.2	416.0	410.6
2	153.0	208.1	435.2	295.1	153.0	147.8	-0.4	146.5	407.0	401.9
3	160.3	196.9	401.4	269.7	160.3	142.4	-0.4	136.0	367.6	365.0
4	164.5	203.7	376.3	239.2	164.5	142.3	-0.4	145.8	338.0	338.1
5	164.9	200.3	372.2	234.6	164.9	138.6	-0.4	144.6	333.2	333.8
6	165.0	198.9	367.4	230.1	165.0	137.1	-0.4	144.1	327.8	329.0
7	165.1	200.5	362.9	222.7	165.1	135.5	-0.4	147.7	322.7	324.5
8	165.0	201.8	358.2	218.0	165.0	135.8	-0.4	149.3	317.5	319.8
9	164.4	206.1	329.9	200.6	164.4	141.5	-0.4	149.9	285.6	292.2
10	158.9	211.3	288.6	171.7	158.9	140.9	-0.4	157.5	240.6	255.7
11	157.0	231.2	277.7	162.8	157.0	147.5	-0.4	177.9	228.7	246.7

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.444	0.574	1.322	0.806	0.444	0.393	0.968	1.525
2	0.458	0.574	1.303	0.813	0.458	0.407	0.966	1.513
3	0.482	0.549	1.207	0.752	0.482	0.397	0.888	1.505
4	0.496	0.571	1.133	0.670	0.496	0.398	0.865	1.486
5	0.496	0.560	1.120	0.656	0.496	0.388	0.841	1.485
6	0.497	0.557	1.107	0.644	0.497	0.384	0.831	1.483
7	0.497	0.561	1.093	0.623	0.497	0.379	0.821	1.482
8	0.497	0.565	1.079	0.611	0.497	0.380	0.823	1.482
9	0.495	0.582	0.994	0.566	0.495	0.399	0.861	1.479
10	0.478	0.600	0.868	0.488	0.478	0.400	0.887	1.314
11	0.472	0.658	0.835	0.463	0.472	0.420	0.940	1.260

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	3.7	1.0	-0.0	0.464	0.751	0.229	0.155	0.042	0.029
2	10.00	4.0	1.0	-0.2	0.446	0.809	0.169	0.101	0.031	0.019
3	30.00	5.5	1.4	1.9	0.442	0.868	0.115	0.061	0.020	0.011
4	45.00	6.3	1.4	1.7	0.485	0.881	0.110	0.069	0.020	0.013
5	47.50	6.4	1.4	2.9	0.489	0.867	0.124	0.085	0.022	0.015
6	50.00	6.6	1.4	3.6	0.492	0.858	0.133	0.096	0.024	0.017
7	52.50	6.7	1.4	3.7	0.508	0.850	0.144	0.109	0.026	0.020
8	55.00	6.9	1.4	3.8	0.514	0.850	0.147	0.113	0.027	0.021
9	70.00	7.7	1.4	5.8	0.514	0.899	0.104	0.080	0.019	0.015
10	90.00	8.9	1.5	12.8	0.531	0.920	0.096	0.094	0.018	0.017
11	95.00	9.2	1.6	9.3	0.556	0.925	0.102	0.102	0.020	0.020

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(f) 90 Percent of design speed; reading number 1062

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	24.3	68.6	63.1	289.5	1.091	10.05	1.253
2	24.122	23.823	-0.2	23.4	67.3	62.5	289.1	1.086	10.11	1.244
3	21.814	21.661	-0.2	23.2	64.1	59.1	288.0	1.080	10.14	1.254
4	20.033	20.041	-0.1	26.4	61.5	54.5	287.8	1.086	10.15	1.269
5	19.733	19.771	-0.2	26.8	61.2	54.4	287.7	1.087	10.14	1.261
6	19.431	19.500	-0.2	27.5	60.7	54.7	287.9	1.087	10.14	1.248
7	19.126	19.230	-0.2	29.6	60.3	55.2	287.9	1.089	10.14	1.231
8	18.821	18.961	-0.2	31.7	59.8	55.8	288.0	1.093	10.15	1.237
9	16.947	17.338	-0.1	29.5	57.1	43.3	287.8	1.094	10.15	1.326
10	14.280	15.176	-0.1	34.0	53.2	31.5	287.6	1.100	10.15	1.356
11	13.571	14.638	-0.1	36.2	52.1	26.4	287.6	1.106	10.14	1.382

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	146.9	167.7	403.1	337.7	146.9	152.8	-0.4	69.1	375.0	370.1
2	153.3	167.5	397.7	333.1	153.3	153.7	-0.4	66.5	366.5	362.0
3	161.2	170.4	369.0	305.3	161.2	156.6	-0.5	67.1	331.5	329.1
4	165.2	178.6	346.3	275.9	165.2	160.0	-0.4	79.3	303.9	304.1
5	165.3	176.8	342.8	271.4	165.3	157.8	-0.4	79.7	299.9	300.5
6	165.9	172.7	339.2	265.3	165.9	153.2	-0.5	79.8	295.4	296.4
7	165.9	167.3	334.5	254.6	165.9	145.5	-0.4	82.6	290.0	291.6
8	166.5	170.7	331.2	245.7	166.5	145.2	-0.4	89.7	285.9	288.0
9	167.1	200.7	307.3	240.2	167.1	174.7	-0.4	98.7	257.5	263.4
10	162.6	215.5	271.2	209.5	162.6	178.6	-0.4	120.6	216.6	230.2
11	160.6	224.2	261.6	202.0	160.6	180.9	-0.4	132.4	206.1	222.3

	ABS MACH NO		REL MACH NO		MERID MACH NO				MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT			VEL R	MACH NO
1	0.439	0.482	1.204	0.969	0.439	0.439			1.040	1.357
2	0.459	0.482	1.191	0.959	0.459	0.443			1.003	1.339
3	0.485	0.493	1.110	0.884	0.485	0.454			0.971	1.347
4	0.498	0.517	1.043	0.799	0.498	0.463			0.968	1.341
5	0.498	0.512	1.033	0.786	0.498	0.457			0.955	1.346
6	0.500	0.499	1.022	0.767	0.500	0.443			0.923	1.347
7	0.500	0.482	1.008	0.734	0.500	0.419			0.877	1.349
8	0.501	0.491	0.998	0.707	0.501	0.418			0.872	1.351
9	0.504	0.583	0.926	0.698	0.504	0.508			1.046	1.282
10	0.490	0.628	0.817	0.610	0.490	0.520			1.098	1.140
11	0.483	0.653	0.787	0.589	0.483	0.527			1.127	1.096

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.0	-0.8	2.2	0.227	0.733	0.126	0.097	0.022	0.017
2	10.00	1.9	-1.1	2.4	0.224	0.750	0.114	0.088	0.019	0.015
3	30.00	3.1	-0.9	2.9	0.234	0.834	0.079	0.060	0.014	0.010
4	45.00	3.7	-1.2	2.8	0.275	0.816	0.101	0.088	0.018	0.016
5	47.50	3.9	-1.1	3.6	0.280	0.790	0.117	0.104	0.021	0.018
6	50.00	4.0	-1.2	4.9	0.289	0.751	0.140	0.128	0.024	0.022
7	52.50	4.1	-1.3	6.4	0.313	0.691	0.180	0.169	0.030	0.029
8	55.00	4.1	-1.3	6.1	0.338	0.675	0.199	0.189	0.034	0.033
9	70.00	4.6	-1.7	3.9	0.305	0.894	0.076	0.073	0.015	0.014
10	90.00	5.5	-1.9	9.5	0.330	0.912	0.080	0.080	0.015	0.015
11	95.00	5.7	-1.9	10.7	0.340	0.914	0.088	0.088	0.017	0.017

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(g) 90 Percent of design speed; reading number 1063

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	31.2	68.8	62.4	289.6	1.115	10.06	1.350
2	24.122	23.823	-0.2	30.4	67.6	61.9	289.3	1.107	10.11	1.341
3	21.814	21.661	-0.2	29.1	64.4	58.5	288.0	1.099	10.14	1.342
4	20.033	20.041	-0.2	33.0	61.9	53.4	287.9	1.107	10.14	1.351
5	19.733	19.771	-0.2	33.4	61.5	53.2	287.9	1.107	10.14	1.342
6	19.431	19.500	-0.2	33.5	61.1	53.9	287.9	1.105	10.14	1.325
7	19.126	19.230	-0.1	34.5	60.7	53.7	287.6	1.105	10.14	1.316
8	18.821	18.961	4.9	33.8	60.1	59.4	287.6	1.106	10.14	1.294
9	16.947	17.338	-0.1	33.8	57.6	44.5	287.7	1.101	10.15	1.358
10	14.280	15.176	-0.1	38.2	53.8	32.2	287.7	1.106	10.15	1.379
11	13.571	14.638	-0.1	39.9	52.7	26.0	287.6	1.113	10.14	1.409

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	145.2	171.5	402.5	317.3	145.2	146.8	-0.4	88.8	375.0	370.1
2	151.5	170.6	397.2	312.8	151.5	147.2	-0.4	86.2	366.8	362.2
3	159.4	172.5	368.4	288.2	159.4	150.8	-0.4	83.8	331.7	329.4
4	162.9	182.1	345.6	255.7	162.9	152.6	-0.4	99.2	304.3	304.4
5	162.7	180.1	341.3	250.9	162.7	150.3	-0.5	99.2	299.5	300.1
6	163.3	175.1	338.1	247.7	163.3	146.1	-0.4	96.6	295.6	296.6
7	163.2	172.8	333.5	240.7	163.2	142.4	-0.4	97.9	290.5	292.0
8	156.8	146.5	313.7	239.5	156.2	121.8	13.5	81.4	285.6	287.7
9	163.7	191.5	305.1	223.3	163.7	159.2	-0.4	106.5	257.1	263.0
10	159.2	207.2	269.6	192.5	159.2	162.9	-0.4	128.1	217.1	230.7
11	157.4	218.9	259.6	186.9	157.4	168.0	-0.4	140.4	206.1	222.4

	ABS MACH NO		REL MACH NO		MERID MACH NO			
RP	IN	OUT	IN	OUT	IN	OUT	MERID PEAK SS VEL R	MACH NO
1	0.434	0.487	1.202	0.902	0.434	0.417	1.011	1.363
2	0.453	0.487	1.189	0.892	0.453	0.420	0.972	1.346
3	0.479	0.495	1.108	0.828	0.479	0.433	0.946	1.355
4	0.490	0.523	1.040	0.734	0.490	0.438	0.937	1.353
5	0.490	0.517	1.027	0.720	0.490	0.431	0.924	1.356
6	0.492	0.502	1.018	0.710	0.492	0.419	0.895	1.360
7	0.491	0.495	1.004	0.690	0.491	0.408	0.873	1.364
8	0.471	0.417	0.943	0.682	0.470	0.347	0.779	1.287
9	0.493	0.553	0.919	0.645	0.493	0.460	0.973	1.287
10	0.479	0.600	0.811	0.558	0.479	0.472	1.023	1.150
11	0.473	0.635	0.781	0.542	0.473	0.487	1.068	1.102

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.2	-0.6	1.6	0.295	0.778	0.130	0.100	0.023	0.017
2	10.00	2.1	-0.9	1.8	0.293	0.815	0.103	0.077	0.018	0.013
3	30.00	3.4	-0.7	2.2	0.294	0.884	0.067	0.047	0.012	0.008
4	45.00	4.1	-0.8	1.6	0.349	0.843	0.105	0.091	0.019	0.017
5	47.50	4.3	-0.8	2.4	0.354	0.823	0.120	0.107	0.022	0.020
6	50.00	4.4	-0.8	4.0	0.354	0.796	0.138	0.125	0.024	0.022
7	52.50	4.5	-0.8	4.9	0.366	0.775	0.155	0.142	0.027	0.025
8	55.00	4.4	-1.0	11.8	0.300	0.724	0.206	0.202	0.031	0.030
9	70.00	5.1	-1.2	5.1	0.362	0.908	0.070	0.068	0.013	0.013
10	90.00	6.1	-1.3	10.2	0.396	0.909	0.089	0.089	0.017	0.017
11	95.00	6.3	-1.3	10.3	0.400	0.914	0.094	0.094	0.018	0.018

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(h) 90 Percent of design speed; reading number 1064

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	38.0	69.5	61.2	289.9	1.146	10.06	1.459
2	24.122	23.823	-0.2	35.4	68.3	61.2	289.4	1.130	10.11	1.438
3	21.814	21.661	-0.2	34.6	65.1	58.2	288.2	1.116	10.14	1.421
4	20.033	20.041	-0.2	37.5	62.7	53.6	287.8	1.119	10.15	1.419
5	19.733	19.771	-0.2	37.6	62.4	53.1	288.1	1.119	10.15	1.417
6	19.431	19.500	-0.2	38.2	62.0	52.9	287.8	1.119	10.14	1.406
7	19.126	19.230	-0.2	39.5	61.6	52.0	287.8	1.121	10.14	1.408
8	18.821	18.961	-0.2	39.8	61.3	50.9	287.6	1.122	10.14	1.410
9	16.947	17.338	-0.2	39.2	58.7	44.5	287.5	1.114	10.15	1.413
10	14.280	15.176	-0.1	42.0	55.2	31.9	287.5	1.115	10.15	1.425
11	13.571	14.638	-0.1	44.1	54.2	25.2	287.5	1.122	10.13	1.450

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	140.0	180.4	400.6	295.6	140.0	142.2	-0.4	111.0	375.0	370.1
2	146.1	175.2	394.7	296.7	146.1	142.8	-0.4	101.6	366.3	361.7
3	154.0	173.3	365.6	271.0	154.0	142.6	-0.4	98.5	331.2	328.9
4	156.7	180.4	342.2	241.2	156.7	143.2	-0.4	109.8	303.8	303.9
5	157.3	180.4	339.2	238.4	157.3	143.0	-0.4	110.0	300.1	300.7
6	156.9	178.4	334.4	232.5	156.9	140.1	-0.4	110.4	294.9	295.9
7	157.3	180.0	330.7	225.5	157.3	138.9	-0.4	114.5	290.5	292.1
8	157.2	182.0	327.1	221.8	157.2	139.9	-0.4	116.4	286.5	288.6
9	156.7	189.3	302.1	205.6	156.7	146.7	-0.4	119.8	257.8	263.8
10	151.3	204.2	265.1	178.7	151.3	151.7	-0.4	136.7	217.3	231.0
11	149.1	215.3	254.8	170.8	149.1	154.6	-0.4	149.9	206.3	222.5

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.417	0.506	1.194	0.830	0.417	0.399	1.016	1.381
2	0.437	0.495	1.179	0.838	0.437	0.403	0.977	1.363
3	0.462	0.494	1.097	0.772	0.462	0.406	0.926	1.374
4	0.471	0.515	1.028	0.688	0.471	0.408	0.914	1.378
5	0.472	0.514	1.019	0.680	0.472	0.408	0.909	1.384
6	0.472	0.509	1.005	0.663	0.472	0.400	0.893	1.388
7	0.473	0.513	0.994	0.643	0.473	0.396	0.883	1.387
8	0.473	0.519	0.984	0.632	0.473	0.399	0.890	1.382
9	0.471	0.543	0.908	0.590	0.471	0.421	0.936	1.309
10	0.454	0.589	0.796	0.515	0.454	0.437	1.003	1.167
11	0.447	0.621	0.765	0.492	0.447	0.446	1.037	1.119

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.9	0.1	0.4	0.367	0.782	0.158	0.126	0.029	0.023
2	10.00	2.8	-0.2	1.1	0.343	0.840	0.108	0.080	0.019	0.014
3	30.00	4.1	0.1	2.0	0.349	0.908	0.062	0.041	0.011	0.007
4	45.00	5.0	0.1	1.8	0.395	0.887	0.085	0.069	0.016	0.013
5	47.50	5.1	0.1	2.3	0.397	0.879	0.092	0.077	0.017	0.014
6	50.00	5.3	0.1	3.1	0.405	0.860	0.108	0.093	0.020	0.017
7	52.50	5.4	0.1	3.2	0.421	0.849	0.120	0.107	0.022	0.019
8	55.00	5.6	0.1	3.2	0.426	0.845	0.126	0.114	0.023	0.021
9	70.00	6.3	0.0	5.1	0.426	0.908	0.080	0.077	0.015	0.014
10	90.00	7.5	0.1	9.9	0.445	0.929	0.076	0.076	0.015	0.015
11	95.00	7.8	0.2	9.5	0.460	0.919	0.098	0.098	0.019	0.019

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(i) 90 Percent of design speed; reading number 1065

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	43.5	70.6	61.0	290.3	1.165	10.06	1.527
2	24.122	23.823	-0.2	40.8	69.3	60.5	289.8	1.150	10.10	1.511
3	21.814	21.661	-0.2	38.6	66.3	58.5	287.9	1.130	10.14	1.473
4	20.033	20.041	-0.2	41.6	64.1	54.1	287.7	1.129	10.15	1.467
5	19.733	19.771	-0.2	41.2	63.7	53.7	287.8	1.129	10.15	1.460
6	19.431	19.500	-0.2	42.4	63.3	52.9	287.8	1.130	10.15	1.457
7	19.126	19.230	-0.2	43.7	62.9	51.7	287.6	1.133	10.14	1.459
8	18.821	18.961	-0.2	43.9	62.6	50.6	287.7	1.133	10.15	1.458
9	16.947	17.338	-0.2	44.0	60.3	44.8	287.4	1.124	10.15	1.444
10	14.280	15.176	-0.1	45.8	57.0	32.5	287.5	1.120	10.14	1.444
11	13.571	14.638	-0.1	47.6	56.0	24.7	287.4	1.127	10.13	1.474

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	132.7	185.5	398.7	277.8	132.7	134.6	-0.4	127.7	375.6	370.8
2	138.4	181.9	392.4	279.7	138.4	137.8	-0.4	118.8	366.7	362.2
3	145.7	173.4	362.4	259.1	145.7	135.5	-0.4	108.2	331.4	329.0
4	148.4	179.8	339.2	229.0	148.4	134.4	-0.4	119.4	304.6	304.7
5	148.5	178.8	335.2	227.1	148.5	134.6	-0.4	117.8	300.2	300.7
6	148.6	179.4	330.9	219.7	148.6	132.5	-0.4	121.0	295.2	296.3
7	148.6	182.1	326.8	212.2	148.6	131.7	-0.4	125.8	290.6	292.2
8	148.6	183.4	322.7	208.4	148.6	132.2	-0.4	127.1	286.1	288.2
9	147.1	186.9	296.9	189.7	147.1	134.5	-0.4	129.8	257.5	263.5
10	141.1	198.2	258.8	164.0	141.1	138.3	-0.3	142.1	216.6	230.2
11	139.1	212.2	249.0	157.5	139.1	143.1	-0.3	156.7	206.2	222.4

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.395	0.517	1.185	0.774	0.395	0.375	1.014	1.409
2	0.412	0.510	1.169	0.784	0.412	0.386	0.996	1.392
3	0.436	0.491	1.085	0.733	0.436	0.384	0.930	1.408
4	0.445	0.510	1.017	0.650	0.445	0.382	0.906	1.420
5	0.445	0.508	1.005	0.645	0.445	0.382	0.906	1.426
6	0.445	0.509	0.992	0.623	0.445	0.376	0.892	1.422
7	0.446	0.516	0.980	0.602	0.446	0.373	0.886	1.413
8	0.446	0.520	0.968	0.591	0.446	0.375	0.890	1.403
9	0.441	0.533	0.891	0.541	0.441	0.384	0.915	1.331
10	0.423	0.569	0.775	0.470	0.423	0.397	0.980	1.182
11	0.416	0.609	0.745	0.452	0.416	0.411	1.029	1.137

	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	0.1	0.424	0.781	0.177	0.142	0.032	0.026
2	10.00	3.9	0.9	0.4	0.399	0.834	0.127	0.097	0.023	0.018
3	30.00	5.3	1.3	2.2	0.385	0.898	0.077	0.053	0.014	0.009
4	45.00	6.3	1.4	2.3	0.434	0.894	0.087	0.068	0.016	0.012
5	47.50	6.4	1.4	2.8	0.430	0.884	0.096	0.078	0.017	0.014
6	50.00	6.6	1.4	3.1	0.446	0.874	0.107	0.090	0.019	0.016
7	52.50	6.7	1.4	2.9	0.465	0.857	0.125	0.111	0.023	0.020
8	55.00	6.9	1.4	2.9	0.470	0.853	0.132	0.119	0.024	0.022
9	70.00	7.9	1.6	5.4	0.478	0.895	0.101	0.097	0.019	0.018
10	90.00	9.2	1.9	10.5	0.493	0.922	0.091	0.091	0.017	0.017
11	95.00	9.6	2.1	9.0	0.507	0.921	0.105	0.105	0.020	0.020

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(j) 90 Percent of design speed; reading number 1066

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	47.1	72.2	61.2	290.8	1.177	10.05	1.565
2	24.122	23.823	-0.2	45.3	71.0	59.5	290.1	1.166	10.10	1.564
3	21.814	21.661	-0.2	42.3	68.1	59.0	288.0	1.139	10.14	1.495
4	20.033	20.041	-0.2	45.4	65.9	55.7	287.5	1.138	10.14	1.475
5	19.733	19.771	-0.2	46.7	65.6	55.0	287.4	1.139	10.14	1.473
6	19.431	19.500	-0.2	48.1	65.3	54.5	287.4	1.140	10.15	1.469
7	19.126	19.230	-0.2	49.5	65.0	53.9	287.4	1.142	10.15	1.464
8	18.821	18.961	-0.2	50.8	64.6	52.8	287.4	1.143	10.15	1.464
9	16.947	17.338	-0.2	47.9	62.5	44.7	287.4	1.134	10.15	1.465
10	14.280	15.176	-0.1	47.7	59.0	33.5	287.4	1.123	10.14	1.460
11	13.571	14.638	-0.1	49.2	58.0	25.5	287.4	1.130	10.14	1.485

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	120.8	188.1	394.5	265.4	120.8	128.0	-0.3	137.9	375.3	370.4
2	126.3	190.0	387.9	263.2	126.3	133.6	-0.3	135.1	366.4	361.9
3	133.7	172.8	357.7	248.3	133.7	127.8	-0.4	116.3	331.4	329.1
4	136.0	174.8	333.6	217.8	136.0	122.7	-0.4	124.4	304.3	304.4
5	135.9	175.8	329.5	210.2	135.9	120.5	-0.4	128.0	299.7	300.3
6	136.2	176.4	325.5	202.7	136.2	117.8	-0.4	131.4	295.3	296.4
7	135.9	177.1	321.2	195.1	135.9	115.0	-0.4	134.7	290.6	292.2
8	135.9	179.3	316.9	187.4	135.9	113.4	-0.4	138.9	285.9	288.1
9	134.3	187.1	290.5	176.7	134.3	125.5	-0.4	138.8	257.2	263.2
10	130.6	194.8	253.7	157.3	130.6	131.2	-0.3	144.0	217.1	230.7
11	129.1	208.2	243.7	150.9	129.1	136.2	-0.3	157.6	206.3	222.6

	ABS MACH NO		REL MACH NO		MERID MACH NO			
RP	IN	OUT	IN	OUT	IN	OUT	MERID VEL R	PEAK SS MACH NO
1	0.358	0.521	1.169	0.735	0.358	0.354	1.059	1.451
2	0.375	0.530	1.152	0.733	0.375	0.372	1.057	1.436
3	0.399	0.487	1.068	0.700	0.399	0.360	0.956	1.459
4	0.407	0.494	0.998	0.615	0.407	0.347	0.903	1.478
5	0.407	0.496	0.985	0.594	0.407	0.340	0.886	1.469
6	0.407	0.498	0.974	0.572	0.407	0.332	0.865	1.460
7	0.407	0.500	0.961	0.550	0.407	0.325	0.846	1.450
8	0.406	0.506	0.948	0.529	0.406	0.320	0.834	1.440
9	0.402	0.531	0.869	0.502	0.402	0.356	0.934	1.361
10	0.390	0.557	0.758	0.450	0.390	0.375	1.004	1.208
11	0.386	0.597	0.728	0.432	0.386	0.390	1.055	1.158

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	5.5	2.8	0.3	0.459	0.773	0.197	0.158	0.036	0.029
2	10.00	5.6	2.6	-0.6	0.450	0.819	0.153	0.118	0.029	0.022
3	30.00	7.1	3.0	2.8	0.415	0.873	0.103	0.074	0.018	0.013
4	45.00	8.2	3.3	3.9	0.463	0.851	0.131	0.107	0.023	0.019
5	47.50	8.4	3.3	4.2	0.481	0.844	0.140	0.118	0.025	0.021
6	50.00	8.5	3.4	4.6	0.499	0.830	0.157	0.137	0.027	0.024
7	52.50	8.7	3.4	5.1	0.518	0.811	0.179	0.162	0.031	0.028
8	55.00	8.9	3.5	5.1	0.537	0.802	0.193	0.178	0.034	0.031
9	70.00	10.0	3.7	5.3	0.520	0.860	0.149	0.145	0.028	0.027
10	90.00	11.3	3.9	11.5	0.511	0.928	0.090	0.090	0.017	0.017
11	95.00	11.6	4.0	9.8	0.524	0.923	0.106	0.106	0.020	0.020

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(k) 80 Percent of design speed; reading number 1067

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	47.4	73.6	62.1	290.4	1.137	10.09	1.413
2	24.122	23.823	-0.2	44.8	72.4	60.6	289.3	1.130	10.12	1.410
3	21.814	21.661	-0.2	44.6	69.8	60.0	288.0	1.113	10.13	1.365
4	20.033	20.041	-0.2	48.7	67.9	55.6	287.7	1.115	10.14	1.362
5	19.733	19.771	-0.1	49.2	67.6	54.8	287.7	1.115	10.14	1.363
6	19.431	19.500	-0.2	49.9	67.3	54.3	287.6	1.115	10.14	1.358
7	19.126	19.230	-0.2	51.5	67.0	54.2	287.8	1.115	10.14	1.353
8	18.821	18.961	-0.2	51.9	66.6	53.1	287.6	1.115	10.14	1.352
9	16.947	17.338	-0.1	47.1	64.3	44.3	287.7	1.106	10.14	1.361
10	14.280	15.176	-0.1	46.6	60.7	31.9	287.6	1.099	10.14	1.364
11	13.571	14.638	-0.1	48.2	59.7	25.2	287.6	1.103	10.13	1.375

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	98.6	163.7	348.7	237.0	98.6	110.9	-0.3	120.5	334.2	329.9
2	103.4	164.1	342.3	237.0	103.4	116.5	-0.3	115.6	326.1	322.0
3	108.4	151.1	314.4	215.5	108.4	107.7	-0.3	106.0	294.8	292.7
4	109.9	158.0	292.4	184.6	109.9	104.4	-0.3	118.6	270.7	270.8
5	110.1	159.0	289.0	180.1	110.1	103.9	-0.3	120.3	266.9	267.5
6	110.0	158.6	284.9	175.0	110.0	102.2	-0.3	121.3	262.5	263.5
7	110.1	158.0	281.3	168.1	110.1	98.4	-0.3	123.7	258.6	260.0
8	110.1	159.5	277.5	163.6	110.1	98.3	-0.3	125.6	254.4	256.3
9	110.3	168.1	254.9	159.7	110.3	114.3	-0.3	123.2	229.5	234.7
10	108.5	177.9	221.8	143.9	108.5	122.2	-0.3	129.3	193.2	205.3
11	107.3	186.8	212.8	137.6	107.3	124.5	-0.3	139.3	183.5	197.9

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.291	0.459	1.030	0.664	0.291	0.311	1.124	1.411
2	0.306	0.462	1.013	0.668	0.306	0.328	1.126	1.404
3	0.322	0.429	0.934	0.611	0.322	0.305	0.993	1.394
4	0.327	0.449	0.869	0.524	0.327	0.297	0.950	1.346
5	0.327	0.452	0.859	0.512	0.327	0.295	0.943	1.338
6	0.327	0.451	0.847	0.497	0.327	0.290	0.929	1.328
7	0.327	0.449	0.836	0.478	0.327	0.280	0.894	1.319
8	0.327	0.453	0.825	0.465	0.327	0.279	0.892	1.309
9	0.328	0.481	0.758	0.457	0.328	0.327	1.036	1.236
10	0.323	0.512	0.659	0.414	0.323	0.352	1.126	1.089
11	0.319	0.538	0.632	0.396	0.319	0.359	1.160	1.043

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	6.9	4.2	1.2	0.451	0.759	0.198	0.179	0.035	0.032
2	10.00	7.0	4.0	0.5	0.432	0.791	0.168	0.151	0.030	0.027
3	30.00	8.9	4.8	3.8	0.428	0.822	0.143	0.133	0.024	0.022
4	45.00	10.1	5.2	3.8	0.495	0.806	0.175	0.172	0.031	0.030
5	47.50	10.3	5.3	3.9	0.505	0.803	0.182	0.179	0.032	0.032
6	50.00	10.5	5.4	4.4	0.514	0.796	0.192	0.190	0.034	0.033
7	52.50	10.7	5.4	5.4	0.533	0.786	0.205	0.204	0.036	0.035
8	55.00	10.9	5.5	5.4	0.543	0.784	0.212	0.211	0.037	0.037
9	70.00	11.9	5.6	4.9	0.503	0.868	0.139	0.139	0.026	0.026
10	90.00	13.0	5.6	9.9	0.486	0.938	0.078	0.078	0.015	0.015
11	95.00	13.3	5.7	9.5	0.498	0.924	0.108	0.108	0.021	0.021

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(l) 70 Percent of design speed; reading number 1068

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	18.8	68.4	63.2	288.8	1.046	10.10	1.124
2	24.122	23.823	-0.2	18.4	67.1	62.3	288.5	1.043	10.13	1.126
3	21.814	21.661	-0.2	18.2	64.0	59.7	288.3	1.040	10.13	1.127
4	20.033	20.041	-0.2	20.9	61.6	55.3	287.9	1.043	10.14	1.138
5	19.733	19.771	-0.2	21.3	61.1	54.6	288.1	1.044	10.14	1.140
6	19.431	19.500	-0.2	22.2	60.8	53.4	288.1	1.046	10.14	1.144
7	19.126	19.230	-0.2	25.4	60.3	51.7	288.1	1.051	10.14	1.147
8	18.821	18.961	-0.2	26.8	59.9	50.4	288.1	1.054	10.14	1.149
9	16.947	17.338	-0.1	26.3	57.2	43.4	287.8	1.053	10.14	1.177
10	14.280	15.176	-0.1	31.6	53.1	30.9	287.8	1.058	10.14	1.201
11	13.571	14.638	-0.1	33.5	52.1	26.0	287.8	1.062	10.13	1.215

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	114.7	129.7	311.3	272.7	114.7	122.8	-0.3	41.8	289.1	285.3
2	119.9	132.1	308.4	269.4	119.9	125.3	-0.3	41.7	283.7	280.2
3	125.1	131.2	285.5	247.1	125.1	124.6	-0.3	41.1	256.3	254.5
4	127.8	138.1	268.5	226.7	127.8	129.0	-0.3	49.3	235.7	235.8
5	128.2	139.0	265.6	223.4	128.2	129.4	-0.4	50.5	232.2	232.7
6	128.2	141.3	262.5	219.2	128.2	130.8	-0.3	53.5	228.6	229.5
7	128.4	143.7	259.3	209.6	128.4	129.8	-0.4	61.5	224.9	226.2
8	128.6	145.8	256.4	204.3	128.6	130.2	-0.4	65.7	221.4	223.1
9	129.0	158.3	237.9	195.3	129.0	141.9	-0.3	70.0	199.5	204.1
10	126.2	172.9	210.4	171.6	126.2	147.3	-0.3	90.5	168.0	178.6
11	124.7	179.8	202.9	166.9	124.6	150.0	-0.3	99.1	159.8	172.4

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.341	0.378	0.924	0.794	0.341	0.357	1.071	1.120
2	0.357	0.385	0.917	0.786	0.357	0.366	1.045	1.106
3	0.373	0.384	0.850	0.722	0.373	0.364	0.996	1.096
4	0.381	0.404	0.801	0.663	0.381	0.377	1.009	1.064
5	0.382	0.406	0.792	0.653	0.382	0.379	1.010	1.058
6	0.382	0.413	0.783	0.641	0.382	0.382	1.020	1.051
7	0.383	0.419	0.773	0.611	0.383	0.379	1.011	1.044
8	0.384	0.425	0.765	0.595	0.384	0.379	1.012	1.037
9	0.385	0.463	0.710	0.571	0.385	0.415	1.100	0.984
10	0.376	0.507	0.627	0.503	0.376	0.432	1.167	0.876
11	0.372	0.527	0.605	0.489	0.372	0.440	1.203	0.841

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	1.7	-1.0	2.4	0.175	0.739	0.092	0.092	0.016	0.016
2	10.00	1.7	-1.3	2.2	0.176	0.808	0.064	0.064	0.011	0.011
3	30.00	3.1	-1.0	3.5	0.183	0.868	0.047	0.047	0.008	0.008
4	45.00	3.8	-1.1	3.6	0.213	0.882	0.049	0.049	0.009	0.009
5	47.50	3.9	-1.2	3.8	0.217	0.875	0.054	0.054	0.009	0.009
6	50.00	4.0	-1.2	3.5	0.227	0.845	0.072	0.072	0.013	0.013
7	52.50	4.1	-1.2	3.0	0.262	0.785	0.111	0.111	0.020	0.020
8	55.00	4.2	-1.3	2.7	0.279	0.747	0.141	0.141	0.026	0.026
9	70.00	4.7	-1.6	4.0	0.258	0.902	0.061	0.061	0.012	0.012
10	90.00	5.4	-1.9	8.9	0.284	0.919	0.068	0.068	0.013	0.013
11	95.00	5.7	-1.9	10.3	0.285	0.930	0.066	0.066	0.013	0.013

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(m) 70 Percent of design speed; reading number 1069

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	26.9	69.5	63.0	288.8	1.065	10.09	1.182
2	24.122	23.823	-0.2	24.7	68.3	62.2	288.4	1.058	10.13	1.179
3	21.814	21.661	-0.2	26.0	65.3	59.3	288.2	1.053	10.13	1.179
4	20.033	20.041	-0.2	28.1	63.0	55.4	288.2	1.055	10.14	1.182
5	19.733	19.771	-0.2	28.7	62.6	54.6	288.1	1.055	10.14	1.182
6	19.431	19.500	-0.2	29.8	62.2	53.3	288.1	1.057	10.14	1.187
7	19.126	19.230	-0.2	31.9	61.8	51.7	288.1	1.061	10.14	1.191
8	18.821	18.961	-0.2	32.6	61.5	50.3	288.1	1.063	10.14	1.192
9	16.947	17.338	-0.1	32.9	58.9	43.8	287.9	1.060	10.14	1.203
10	14.280	15.176	-0.1	36.7	55.1	31.3	287.9	1.063	10.14	1.219
11	13.571	14.638	-0.1	38.4	54.1	25.5	287.8	1.067	10.13	1.255

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	108.6	130.2	310.1	255.3	108.6	116.1	-0.3	58.9	290.1	286.4
2	113.3	131.0	305.7	254.8	113.3	119.0	-0.3	54.8	283.6	280.1
3	118.0	130.5	282.8	229.9	118.0	117.3	-0.3	57.1	256.6	254.9
4	120.4	134.8	264.9	209.3	120.4	118.9	-0.3	63.5	235.6	235.7
5	120.3	135.3	261.1	204.7	120.3	118.6	-0.3	65.1	231.5	231.9
6	120.7	138.2	258.9	200.8	120.7	120.0	-0.3	68.6	228.8	229.6
7	120.7	141.1	255.6	193.3	120.7	119.8	-0.3	74.5	225.0	226.2
8	120.4	143.3	252.0	189.1	120.4	120.7	-0.3	77.2	221.1	222.7
9	120.1	150.6	232.4	175.3	120.1	126.4	-0.3	81.8	198.6	203.2
10	117.1	164.3	204.9	154.1	117.1	131.7	-0.3	98.3	167.9	178.4
11	115.6	172.8	197.1	150.1	115.6	135.5	-0.3	107.3	159.3	171.9

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.322	0.375	0.920	0.736	0.322	0.335	1.069	1.154
2	0.336	0.379	0.908	0.738	0.336	0.345	1.050	1.136
3	0.351	0.379	0.841	0.668	0.351	0.341	0.994	1.125
4	0.358	0.391	0.788	0.608	0.358	0.345	0.988	1.087
5	0.358	0.393	0.777	0.595	0.358	0.345	0.986	1.077
6	0.359	0.401	0.771	0.583	0.359	0.348	0.995	1.075
7	0.359	0.409	0.761	0.561	0.359	0.348	0.993	1.067
8	0.358	0.415	0.750	0.548	0.358	0.350	1.003	1.059
9	0.358	0.438	0.692	0.510	0.358	0.368	1.053	1.001
10	0.348	0.479	0.610	0.449	0.348	0.384	1.125	0.893
11	0.344	0.504	0.586	0.438	0.344	0.396	1.172	0.856

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.8	0.1	2.1	0.248	0.752	0.122	0.122	0.021	0.021
2	10.00	2.8	-0.2	2.1	0.233	0.830	0.077	0.077	0.013	0.013
3	30.00	4.4	0.3	3.1	0.255	0.909	0.043	0.043	0.007	0.007
4	45.00	5.2	0.3	3.6	0.284	0.892	0.058	0.058	0.010	0.010
5	47.50	5.3	0.3	3.7	0.293	0.880	0.066	0.066	0.012	0.012
6	50.00	5.5	0.3	3.4	0.305	0.873	0.074	0.074	0.013	0.013
7	52.50	5.6	0.3	2.9	0.331	0.840	0.100	0.100	0.018	0.018
8	55.00	5.8	0.3	2.6	0.340	0.816	0.121	0.121	0.023	0.023
9	70.00	6.5	0.2	4.5	0.340	0.900	0.073	0.073	0.014	0.014
10	90.00	7.4	0.1	9.3	0.359	0.924	0.072	0.072	0.014	0.014
11	95.00	7.7	0.1	9.8	0.359	0.928	0.077	0.077	0.015	0.015

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(n) 70 Percent of design speed; reading number 1070

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	34.1	70.6	62.2	288.7	1.081	10.11	1.228
2	24.122	23.823	-0.2	32.0	69.4	61.8	288.7	1.071	10.13	1.223
3	21.814	21.661	-0.2	31.9	66.7	59.8	288.2	1.063	10.13	1.211
4	20.033	20.041	-0.2	33.7	64.5	55.9	288.1	1.064	10.13	1.212
5	19.733	19.771	-0.2	34.8	64.1	54.9	288.1	1.065	10.14	1.214
6	19.431	19.500	-0.2	35.3	63.8	53.3	287.9	1.067	10.13	1.219
7	19.126	19.230	-0.2	37.0	63.5	52.4	288.0	1.069	10.13	1.218
8	18.821	18.961	-0.2	38.1	63.1	51.3	287.9	1.070	10.14	1.218
9	16.947	17.338	-0.2	37.6	60.7	44.0	287.8	1.068	10.14	1.228
10	14.280	15.176	-0.1	40.7	57.1	30.8	287.9	1.069	10.13	1.240
11	13.571	14.638	-0.1	42.4	56.2	24.8	287.9	1.072	10.13	1.253

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	102.5	134.1	307.7	238.4	102.5	111.1	-0.3	75.2	289.9	286.1
2	106.8	132.7	303.4	238.2	106.8	112.5	-0.3	70.3	283.7	280.2
3	110.8	128.1	279.6	216.3	110.8	108.8	-0.3	67.6	256.4	254.6
4	112.4	132.3	261.3	196.1	112.4	110.1	-0.3	73.4	235.6	235.7
5	112.6	133.6	258.2	191.0	112.6	109.8	-0.3	76.2	232.1	232.5
6	112.5	137.2	255.1	187.4	112.5	112.0	-0.3	79.3	228.7	229.5
7	112.5	138.1	251.8	180.6	112.5	110.2	-0.3	83.1	224.9	226.1
8	112.3	139.4	248.4	175.5	112.3	109.7	-0.3	86.0	221.3	222.9
9	111.9	148.3	228.8	163.2	111.9	117.4	-0.3	90.5	199.3	204.0
10	108.6	161.4	200.1	142.4	108.6	122.3	-0.3	105.3	167.8	178.3
11	107.2	169.5	192.5	138.0	107.2	125.2	-0.3	114.3	159.6	172.2

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.304	0.384	0.912	0.683	0.304	0.318	1.084	1.181
2	0.317	0.382	0.900	0.685	0.317	0.324	1.054	1.164
3	0.329	0.370	0.830	0.625	0.329	0.314	0.982	1.149
4	0.334	0.382	0.777	0.567	0.334	0.318	0.979	1.113
5	0.335	0.386	0.767	0.552	0.335	0.317	0.975	1.105
6	0.335	0.397	0.758	0.542	0.335	0.324	0.996	1.100
7	0.334	0.399	0.748	0.521	0.334	0.318	0.980	1.091
8	0.334	0.403	0.738	0.507	0.334	0.317	0.977	1.084
9	0.333	0.430	0.680	0.473	0.333	0.340	1.050	1.027
10	0.323	0.469	0.594	0.414	0.323	0.355	1.126	0.911
11	0.318	0.493	0.572	0.401	0.318	0.364	1.168	0.874

	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	1.4	0.317	0.742	0.158	0.157	0.028	0.028
2	10.00	4.0	1.0	1.7	0.301	0.831	0.094	0.094	0.016	0.016
3	30.00	5.7	1.6	3.6	0.308	0.891	0.062	0.062	0.010	0.010
4	45.00	6.7	1.8	4.1	0.337	0.882	0.075	0.075	0.013	0.013
5	47.50	6.9	1.8	4.1	0.351	0.875	0.082	0.082	0.014	0.014
6	50.00	7.1	1.9	3.4	0.360	0.873	0.087	0.087	0.016	0.016
7	52.50	7.2	1.9	3.6	0.381	0.840	0.115	0.115	0.021	0.021
8	55.00	7.4	2.0	3.6	0.395	0.824	0.132	0.132	0.024	0.024
9	70.00	8.3	2.0	4.6	0.393	0.893	0.089	0.089	0.017	0.017
10	90.00	9.4	2.1	8.8	0.410	0.923	0.082	0.082	0.016	0.016
11	95.00	9.7	2.2	9.1	0.415	0.927	0.088	0.088	0.017	0.017

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(o) 70 Percent of design speed; reading number 1071

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	39.9	71.9	62.6	288.7	1.092	10.11	1.262
2	24.122	23.823	-0.2	36.5	70.9	61.4	288.4	1.084	10.13	1.260
3	21.814	21.661	-0.2	37.6	68.2	59.7	288.1	1.075	10.13	1.243
4	20.033	20.041	-0.2	39.7	66.2	56.1	288.0	1.073	10.13	1.237
5	19.733	19.771	-0.2	40.2	65.9	54.8	288.1	1.074	10.13	1.241
6	19.431	19.500	-0.2	41.3	65.6	53.5	288.1	1.076	10.13	1.242
7	19.126	19.230	-0.2	42.6	65.2	52.9	288.2	1.077	10.13	1.242
8	18.821	18.961	-0.2	44.2	64.9	51.6	288.0	1.079	10.14	1.242
9	16.947	17.338	-0.1	42.0	62.6	43.6	288.0	1.075	10.13	1.249
10	14.280	15.176	-0.1	43.9	59.1	31.0	287.9	1.072	10.13	1.255
11	13.571	14.638	-0.1	45.5	58.1	24.7	288.0	1.075	10.13	1.265

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	95.4	135.5	306.9	226.0	95.4	103.9	-0.3	87.0	291.4	287.7
2	98.7	135.6	301.0	227.6	98.7	109.0	-0.3	80.7	284.1	280.6
3	102.5	129.8	276.7	203.6	102.5	102.8	-0.3	79.3	256.7	254.9
4	104.0	132.1	258.0	182.4	104.0	101.6	-0.3	84.4	235.8	235.9
5	103.9	134.8	254.7	178.4	103.9	102.9	-0.3	87.0	232.2	232.7
6	103.8	136.7	251.2	172.8	103.8	102.7	-0.3	90.3	228.4	229.2
7	104.0	137.4	248.4	167.5	104.0	101.1	-0.3	93.0	225.3	226.6
8	103.9	139.3	244.9	160.7	103.9	99.8	-0.3	97.2	221.5	223.1
9	103.2	147.9	224.4	151.7	103.2	109.8	-0.3	99.0	199.1	203.6
10	100.8	158.7	196.3	133.3	100.8	114.3	-0.2	110.1	168.2	178.7
11	99.5	166.4	188.4	128.3	99.5	116.6	-0.2	118.7	159.8	172.3

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.282	0.386	0.908	0.644	0.282	0.296	1.090	1.220
2	0.292	0.388	0.892	0.652	0.292	0.312	1.104	1.201
3	0.304	0.373	0.821	0.585	0.304	0.296	1.003	1.181
4	0.309	0.380	0.765	0.525	0.309	0.292	0.977	1.141
5	0.308	0.388	0.756	0.513	0.308	0.296	0.991	1.134
6	0.308	0.393	0.745	0.497	0.308	0.295	0.989	1.125
7	0.309	0.395	0.737	0.482	0.309	0.291	0.972	1.120
8	0.308	0.400	0.727	0.462	0.308	0.287	0.960	1.111
9	0.306	0.427	0.666	0.438	0.306	0.317	1.064	1.048
10	0.299	0.460	0.582	0.386	0.299	0.331	1.133	0.930
11	0.295	0.483	0.559	0.372	0.295	0.338	1.172	0.892

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	5.3	2.5	1.7	0.370	0.746	0.175	0.174	0.030	0.030
2	10.00	5.4	2.4	1.3	0.343	0.817	0.119	0.119	0.021	0.021
3	30.00	7.3	3.2	3.4	0.361	0.857	0.096	0.096	0.016	0.016
4	45.00	8.4	3.5	4.4	0.395	0.854	0.108	0.108	0.019	0.019
5	47.50	8.7	3.6	3.9	0.404	0.860	0.106	0.106	0.019	0.019
6	50.00	8.9	3.7	3.7	0.421	0.846	0.121	0.121	0.022	0.022
7	52.50	9.0	3.7	4.1	0.437	0.828	0.141	0.141	0.025	0.025
8	55.00	9.2	3.7	3.9	0.460	0.812	0.160	0.160	0.029	0.029
9	70.00	10.2	3.9	4.2	0.442	0.878	0.116	0.116	0.022	0.022
10	90.00	11.4	4.0	9.0	0.451	0.927	0.085	0.085	0.016	0.016
11	95.00	11.7	4.1	9.0	0.458	0.925	0.098	0.098	0.019	0.019

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(p) 70 Percent of design speed; reading number 1072

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	49.4	73.8	63.1	288.6	1.111	10.11	1.290
2	24.122	23.823	-0.2	44.3	72.8	61.6	288.5	1.099	10.13	1.286
3	21.814	21.661	-0.2	43.9	70.4	59.7	288.3	1.086	10.13	1.265
4	20.033	20.041	-0.2	45.4	68.5	55.8	288.2	1.083	10.14	1.260
5	19.733	19.771	-0.2	46.4	68.2	55.0	288.0	1.083	10.13	1.261
6	19.431	19.500	-0.2	47.9	67.9	54.3	288.0	1.084	10.13	1.260
7	19.126	19.230	-0.2	49.5	67.5	53.7	288.0	1.085	10.14	1.258
8	18.821	18.961	-0.2	50.7	67.2	52.9	288.0	1.085	10.13	1.256
9	16.947	17.338	-0.2	46.3	64.9	44.3	287.9	1.079	10.13	1.261
10	14.280	15.176	-0.1	46.0	61.4	31.7	287.8	1.075	10.13	1.265
11	13.571	14.638	-0.1	47.4	60.3	25.1	287.8	1.078	10.13	1.275

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	84.4	140.7	303.0	202.1	84.4	91.5	-0.2	106.8	290.8	287.0
2	87.8	138.8	297.6	208.9	87.8	99.4	-0.2	96.9	284.1	280.6
3	91.6	132.3	273.0	189.2	91.6	95.3	-0.3	91.8	257.0	255.2
4	93.0	135.2	253.5	168.7	93.0	95.0	-0.3	96.2	235.6	235.7
5	93.0	136.2	250.7	164.0	93.0	94.0	-0.3	98.6	232.5	232.9
6	93.2	137.0	247.3	157.5	93.2	91.9	-0.2	101.6	228.8	229.6
7	93.3	137.8	244.2	151.1	93.3	89.5	-0.3	104.8	225.4	226.7
8	93.1	138.6	240.8	145.7	93.1	87.8	-0.3	107.2	221.8	223.5
9	93.4	146.2	220.5	140.9	93.4	100.9	-0.2	105.7	199.5	204.1
10	92.0	155.6	192.0	127.0	92.0	108.0	-0.2	112.0	168.2	178.8
11	91.0	163.6	184.0	122.2	91.0	110.7	-0.2	120.4	159.7	172.3

	ABS MACH NO		REL MACH NO		MERID MACH NO			
RP	IN	OUT	IN	OUT	IN	OUT	MERID VEL R	PEAK SS MACH NO
1	0.249	0.398	0.895	0.572	0.249	0.259	1.084	1.264
2	0.260	0.395	0.880	0.594	0.260	0.283	1.132	1.247
3	0.271	0.378	0.808	0.541	0.271	0.273	1.040	1.222
4	0.275	0.387	0.751	0.484	0.275	0.272	1.021	1.176
5	0.276	0.391	0.742	0.470	0.276	0.269	1.010	1.172
6	0.276	0.393	0.732	0.452	0.276	0.263	0.986	1.162
7	0.276	0.395	0.723	0.433	0.276	0.256	0.959	1.155
8	0.276	0.397	0.713	0.418	0.276	0.252	0.943	1.147
9	0.277	0.421	0.653	0.406	0.277	0.291	1.081	1.079
10	0.273	0.450	0.569	0.367	0.273	0.312	1.174	0.952
11	0.270	0.474	0.545	0.354	0.270	0.320	1.216	0.911

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	7.2	4.5	2.2	0.466	0.678	0.264	0.262	0.045	0.045
2	10.00	7.4	4.4	1.5	0.418	0.749	0.193	0.192	0.034	0.034
3	30.00	9.5	5.4	3.5	0.420	0.811	0.146	0.146	0.025	0.025
4	45.00	10.7	5.8	4.0	0.452	0.823	0.149	0.149	0.026	0.026
5	47.50	10.9	5.9	4.2	0.466	0.822	0.154	0.154	0.027	0.027
6	50.00	11.1	5.9	4.5	0.487	0.813	0.166	0.166	0.029	0.029
7	52.50	11.3	6.0	4.9	0.509	0.800	0.183	0.183	0.032	0.032
8	55.00	11.5	6.1	5.2	0.526	0.789	0.199	0.199	0.035	0.035
9	70.00	12.5	6.2	4.9	0.489	0.864	0.140	0.140	0.026	0.026
10	90.00	13.6	6.3	9.7	0.473	0.926	0.093	0.093	0.018	0.018
11	95.00	13.9	6.3	9.4	0.480	0.923	0.108	0.108	0.021	0.021

TABLE VII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(q) 60 Percent of design speed; reading number 1073

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	53.3	74.9	63.4	289.0	1.085	10.11	1.212
2	24.122	23.823	-0.2	45.8	73.6	62.0	288.5	1.077	10.13	1.203
3	21.814	21.661	-0.2	43.3	71.3	60.0	288.3	1.062	10.13	1.189
4	20.033	20.041	-0.2	45.1	69.3	56.0	288.0	1.061	10.13	1.186
5	19.733	19.771	-0.2	45.8	69.0	55.0	288.0	1.061	10.13	1.186
6	19.431	19.500	-0.2	47.3	68.7	54.5	287.8	1.061	10.13	1.185
7	19.126	19.230	-0.2	48.9	68.4	53.8	288.0	1.062	10.13	1.185
8	18.821	18.961	-0.2	50.3	68.1	53.0	288.1	1.063	10.13	1.184
9	16.947	17.338	-0.2	46.3	65.9	44.8	287.8	1.058	10.13	1.186
10	14.280	15.176	-0.1	46.0	62.2	31.1	287.7	1.055	10.13	1.192
11	13.571	14.638	-0.1	47.2	61.3	25.7	287.8	1.057	10.13	1.195

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	67.4	123.2	258.2	164.4	67.4	73.6	-0.2	98.8	249.0	245.8
2	71.4	118.4	253.8	175.9	71.4	82.5	-0.2	84.9	243.3	240.3
3	74.7	112.3	232.8	163.6	74.7	81.8	-0.2	77.0	220.3	218.7
4	76.3	115.1	216.2	145.4	76.3	81.2	-0.2	81.5	202.0	202.1
5	76.4	116.4	213.2	141.4	76.4	81.1	-0.2	83.4	198.8	199.2
6	76.4	116.6	210.2	135.9	76.4	79.0	-0.2	85.7	195.6	196.3
7	76.6	117.5	207.8	130.8	76.6	77.3	-0.2	88.6	193.0	194.1
8	76.5	118.4	205.0	125.6	76.5	75.6	-0.2	91.1	190.0	191.4
9	76.7	124.3	187.6	120.8	76.7	85.8	-0.2	89.9	171.0	175.0
10	75.9	134.3	162.9	109.0	75.9	93.3	-0.2	96.6	143.9	153.0
11	75.2	139.1	156.3	105.0	75.2	94.6	-0.2	102.0	136.8	147.6

	ABS MACH NO		REL MACH NO		MERID MACH NO			
RP	IN	OUT	IN	OUT	IN	OUT	MERID VEL R	PEAK SS MACH NO
1	0.199	0.351	0.761	0.469	0.199	0.210	1.093	1.101
2	0.211	0.339	0.749	0.504	0.211	0.236	1.155	1.081
3	0.220	0.324	0.687	0.471	0.220	0.236	1.096	1.060
4	0.225	0.332	0.639	0.420	0.225	0.234	1.065	1.019
5	0.226	0.336	0.630	0.408	0.226	0.234	1.063	1.011
6	0.226	0.336	0.621	0.392	0.226	0.228	1.033	1.003
7	0.226	0.339	0.614	0.377	0.226	0.223	1.009	0.998
8	0.226	0.341	0.606	0.362	0.226	0.218	0.988	0.991
9	0.227	0.360	0.555	0.350	0.227	0.248	1.118	0.933
10	0.224	0.390	0.481	0.317	0.224	0.271	1.229	0.820
11	0.222	0.405	0.462	0.305	0.222	0.275	1.259	0.786

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	8.3	5.5	2.5	0.507	0.664	0.278	0.278	0.047	0.047
2	10.00	8.2	5.2	1.9	0.430	0.709	0.226	0.226	0.039	0.039
3	30.00	10.4	6.3	3.8	0.408	0.816	0.137	0.137	0.023	0.023
4	45.00	11.5	6.6	4.3	0.444	0.820	0.149	0.149	0.026	0.026
5	47.50	11.7	6.7	4.1	0.457	0.818	0.155	0.155	0.027	0.027
6	50.00	11.9	6.8	4.6	0.477	0.808	0.168	0.168	0.029	0.029
7	52.50	12.2	6.8	5.0	0.498	0.799	0.180	0.180	0.032	0.032
8	55.00	12.4	6.9	5.3	0.518	0.789	0.196	0.196	0.034	0.034
9	70.00	13.4	7.1	5.4	0.484	0.862	0.140	0.140	0.026	0.026
10	90.00	14.5	7.1	9.1	0.467	0.932	0.085	0.085	0.016	0.016
11	95.00	14.8	7.2	10.0	0.472	0.922	0.109	0.109	0.021	0.021

TABLE VII. - Concluded. BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 16

(r) 50 Percent of design speed; reading number 1074

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.684	24.364	-0.2	54.1	75.5	63.9	288.8	1.059	10.11	1.146
2	24.122	23.823	-0.2	46.6	74.2	62.3	288.7	1.053	10.13	1.139
3	21.814	21.661	-0.2	43.3	71.9	59.9	288.3	1.044	10.13	1.130
4	20.033	20.041	-0.2	45.2	70.0	56.0	288.1	1.042	10.13	1.128
5	19.733	19.771	-0.2	45.7	69.7	55.2	288.0	1.043	10.13	1.128
6	19.431	19.500	-0.2	47.4	69.4	54.5	288.0	1.043	10.13	1.127
7	19.126	19.230	-0.2	49.0	69.1	54.2	287.9	1.043	10.13	1.126
8	18.821	18.961	-0.2	50.5	68.7	53.4	287.8	1.044	10.13	1.125
9	16.947	17.338	-0.2	46.7	66.5	44.7	287.8	1.041	10.13	1.128
10	14.280	15.176	-0.1	45.6	62.9	31.3	287.8	1.038	10.13	1.132
11	13.571	14.638	-0.1	47.0	62.1	25.6	287.7	1.040	10.13	1.135

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	53.9	102.5	215.3	136.6	53.9	60.2	-0.1	83.0	208.3	205.6
2	57.5	98.7	211.5	145.8	57.5	67.8	-0.2	71.7	203.3	200.8
3	60.2	94.1	193.9	136.7	60.2	68.5	-0.2	64.5	184.1	182.9
4	61.6	96.4	180.2	121.6	61.6	67.9	-0.2	68.3	169.1	169.2
5	61.8	97.1	177.8	118.7	61.8	67.8	-0.2	69.5	166.6	166.9
6	61.7	97.7	175.3	113.6	61.7	66.0	-0.2	72.0	163.9	164.4
7	61.8	97.5	173.1	109.5	61.8	64.0	-0.2	73.5	161.5	162.4
8	62.1	98.2	170.7	105.0	62.1	62.5	-0.2	75.7	158.9	160.0
9	62.3	104.1	156.2	100.4	62.3	71.4	-0.2	75.8	143.1	146.4
10	61.6	112.2	135.4	91.9	61.6	78.5	-0.2	80.2	120.4	128.0
11	60.8	117.1	130.1	88.6	60.8	79.9	-0.2	85.6	114.9	123.9

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.159	0.295	0.634	0.393	0.159	0.173	1.117	0.932
2	0.169	0.285	0.623	0.421	0.169	0.195	1.180	0.912
3	0.177	0.273	0.571	0.396	0.177	0.198	1.138	0.893
4	0.182	0.280	0.531	0.353	0.182	0.197	1.103	0.860
5	0.182	0.282	0.525	0.344	0.182	0.197	1.098	0.854
6	0.182	0.283	0.517	0.330	0.182	0.192	1.070	0.847
7	0.182	0.283	0.511	0.318	0.182	0.186	1.035	0.842
8	0.183	0.285	0.504	0.305	0.183	0.181	1.007	0.834
9	0.184	0.303	0.461	0.292	0.184	0.208	1.146	0.785
10	0.182	0.327	0.399	0.268	0.182	0.229	1.275	0.690
11	0.179	0.342	0.384	0.259	0.179	0.233	1.314	0.665

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	8.9	6.1	3.0	0.511	0.672	0.263	0.263	0.044	0.044
2	10.00	8.8	5.8	2.2	0.435	0.711	0.218	0.218	0.037	0.037
3	30.00	11.0	6.9	3.7	0.407	0.817	0.133	0.133	0.022	0.022
4	45.00	12.2	7.3	4.3	0.443	0.826	0.140	0.140	0.024	0.024
5	47.50	12.4	7.4	4.3	0.452	0.817	0.153	0.153	0.027	0.027
6	50.00	12.6	7.5	4.6	0.476	0.808	0.165	0.165	0.029	0.029
7	52.50	12.8	7.5	5.4	0.494	0.800	0.176	0.176	0.030	0.030
8	55.00	13.0	7.5	5.8	0.515	0.789	0.192	0.192	0.033	0.033
9	70.00	14.1	7.8	5.3	0.487	0.850	0.153	0.153	0.029	0.029
10	90.00	15.2	7.9	9.3	0.457	0.936	0.080	0.080	0.015	0.015
11	95.00	15.7	8.1	10.0	0.464	0.928	0.100	0.100	0.019	0.019

TABLE VIII. - BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(a) 100 Percent of design speed; reading number 1057

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	25.4	0.7	25.4	0.7	328.6	0.999	13.83	0.956
2	23.505	23.525	24.0	-0.7	24.0	-0.7	326.1	0.999	13.97	0.978
3	21.605	21.714	23.9	-4.8	23.9	-4.8	321.3	1.002	13.85	0.992
4	20.157	20.343	28.9	-3.8	28.9	-3.8	323.8	0.994	13.92	0.970
5	19.914	20.114	30.0	-4.1	30.0	-4.1	323.4	0.994	13.63	0.980
6	19.672	19.886	30.4	-5.2	30.4	-5.2	321.6	0.999	13.15	1.007
7	19.428	19.657	30.7	-5.6	30.7	-5.6	320.1	1.002	12.99	1.015
8	19.187	19.431	31.8	-5.8	31.8	-5.8	321.0	0.998	13.08	1.006
9	17.729	18.075	27.8	-4.1	27.8	-4.1	322.1	0.999	14.53	0.978
10	15.789	16.294	31.5	-4.2	31.5	-4.2	323.8	0.997	14.77	0.968
11	15.306	15.847	33.2	-2.1	33.2	-2.1	325.7	1.001	15.02	0.965

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	218.4	178.5	218.4	178.5	197.3	178.4	93.8	2.2	0.	0.
2	223.1	192.9	223.1	192.9	203.8	192.9	90.7	-2.4	0.	0.
3	215.3	194.3	215.3	194.3	196.8	193.6	87.2	-16.2	0.	0.
4	220.9	188.8	220.9	188.8	193.5	188.4	106.7	-12.4	0.	0.
5	211.6	184.3	211.6	184.3	183.3	183.8	105.8	-13.2	0.	0.
6	194.0	180.9	194.0	180.9	167.4	180.1	98.0	-16.4	0.	0.
7	186.1	178.6	186.1	178.6	159.9	177.8	95.1	-17.6	0.	0.
8	189.7	178.0	189.7	178.0	161.3	177.1	99.9	-18.1	0.	0.
9	241.7	216.5	241.7	216.5	213.7	215.9	112.8	-15.6	0.	0.
10	252.2	230.4	252.2	230.4	215.1	229.7	131.6	-17.0	0.	0.
11	260.2	244.6	260.2	244.6	217.6	244.5	142.7	-9.0	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO			
RP	IN	OUT	IN	OUT	IN	OUT	MERID PEAK SS VEL R	MACH NO
1	0.624	0.504	0.624	0.504	0.564	0.504	0.904	0.624
2	0.641	0.549	0.641	0.549	0.586	0.549	0.946	0.641
3	0.622	0.557	0.622	0.557	0.569	0.555	0.984	0.622
4	0.637	0.540	0.637	0.540	0.558	0.539	0.974	0.637
5	0.608	0.527	0.608	0.527	0.527	0.525	1.003	0.608
6	0.556	0.517	0.556	0.517	0.480	0.515	1.076	0.556
7	0.533	0.511	0.533	0.511	0.458	0.508	1.112	0.533
8	0.544	0.509	0.544	0.509	0.462	0.506	1.098	0.568
9	0.704	0.625	0.704	0.625	0.623	0.623	1.010	0.704
10	0.736	0.667	0.736	0.667	0.628	0.666	1.068	0.736
11	0.760	0.709	0.760	0.709	0.635	0.709	1.124	0.760

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	-10.8	-17.1	13.3	0.345	0.	0.192	0.192	0.075	0.075
2	10.00	-10.4	-16.7	10.6	0.294	0.	0.091	0.091	0.034	0.034
3	30.00	-9.0	-15.3	5.0	0.265	0.	0.034	0.034	0.012	0.012
4	45.00	-4.7	-11.0	5.6	0.321	0.	0.126	0.126	0.041	0.041
5	47.50	-3.7	-10.1	5.2	0.310	0.	0.089	0.089	0.029	0.029
6	50.00	-3.5	-9.9	4.1	0.255	0.	-0.038	-0.038	-0.012	-0.012
7	52.50	-3.4	-9.7	3.6	0.230	0.	-0.085	-0.085	-0.027	-0.027
8	55.00	-2.6	-8.9	3.4	0.254	0.	-0.032	-0.032	-0.010	-0.010
9	70.00	-8.0	-14.3	5.0	0.256	0.	0.079	0.079	0.023	0.023
10	90.00	-7.5	-13.8	5.0	0.236	0.	0.105	0.105	0.027	0.027
11	95.00	-6.9	-13.1	7.3	0.203	0.	0.112	0.112	0.028	0.028

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(b) 100 Percent of design speed; reading number 1058

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	31.6	0.3	31.6	0.3	337.3	0.998	15.10	0.973
2	23.505	23.525	29.3	-1.3	29.3	-1.3	333.5	1.000	15.15	0.994
3	21.605	21.714	29.2	-4.1	29.2	-4.1	328.4	1.002	15.06	0.994
4	20.157	20.343	34.6	-2.7	34.6	-2.7	330.1	0.994	15.03	0.971
5	19.914	20.114	35.8	-3.7	35.8	-3.7	329.3	0.995	14.60	0.991
6	19.672	19.886	35.5	-4.7	35.5	-4.7	326.9	0.999	14.18	1.009
7	19.428	19.657	36.1	-5.8	36.1	-5.8	326.3	1.000	14.07	1.011
8	19.187	19.431	36.5	-6.0	36.5	-6.0	326.6	0.997	14.18	1.004
9	17.729	18.075	32.3	-4.2	32.3	-4.2	325.4	0.999	15.06	0.989
10	15.789	16.294	35.2	-5.1	35.2	-5.1	326.0	0.997	15.10	0.983
11	15.306	15.847	37.2	-2.3	37.2	-2.3	328.4	1.000	15.47	0.963

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	219.4	174.7	219.4	174.7	186.8	174.7	115.1	0.8	0.	0.
2	221.1	185.1	221.1	185.1	192.8	185.0	108.3	-4.1	0.	0.
3	215.3	181.1	215.3	181.1	187.9	180.6	105.1	-12.8	0.	0.
4	220.5	171.8	220.5	171.8	181.5	171.6	125.3	-8.0	0.	0.
5	207.7	167.2	207.7	167.2	168.5	166.8	121.4	-10.9	0.	0.
6	193.5	161.8	193.5	161.8	157.5	161.3	112.4	-13.3	0.	0.
7	188.9	158.6	188.9	158.6	152.6	157.8	111.3	-15.9	0.	0.
8	193.4	159.5	193.4	159.5	155.4	158.6	115.2	-16.6	0.	0.
9	228.6	186.3	228.6	186.3	193.3	185.8	122.0	-13.5	0.	0.
10	238.1	193.4	238.1	193.4	194.5	192.6	137.4	-17.2	0.	0.
11	251.2	201.6	251.2	201.6	200.2	201.4	151.8	-8.1	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.618	0.486	0.618	0.486	0.526	0.486	0.935	0.680
2	0.627	0.519	0.627	0.519	0.547	0.519	0.960	0.627
3	0.615	0.511	0.615	0.511	0.537	0.510	0.961	0.615
4	0.629	0.484	0.629	0.484	0.518	0.484	0.946	0.769
5	0.590	0.471	0.590	0.471	0.479	0.470	0.990	0.744
6	0.550	0.456	0.550	0.456	0.448	0.454	1.024	0.682
7	0.537	0.447	0.537	0.447	0.433	0.444	1.034	0.674
8	0.550	0.450	0.550	0.450	0.442	0.447	1.021	0.695
9	0.659	0.530	0.659	0.530	0.557	0.528	0.961	0.659
10	0.688	0.551	0.688	0.551	0.562	0.549	0.990	0.688
11	0.727	0.573	0.727	0.573	0.579	0.572	1.006	0.760

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	-4.5	-10.9	12.8	0.406	0.	0.121	0.121	0.047	0.047
2	10.00	-5.0	-11.4	10.1	0.356	0.	0.028	0.028	0.011	0.011
3	30.00	-3.6	-10.0	5.7	0.350	0.	0.029	0.029	0.010	0.010
4	45.00	1.1	-5.3	6.7	0.417	0.	0.122	0.122	0.040	0.040
5	47.50	2.1	-4.3	5.6	0.400	0.	0.043	0.043	0.014	0.014
6	50.00	1.6	-4.8	4.6	0.370	0.	-0.047	-0.047	-0.015	-0.015
7	52.50	2.0	-4.3	3.5	0.372	0.	-0.062	-0.062	-0.019	-0.019
8	55.00	2.2	-4.1	3.3	0.386	0.	-0.022	-0.022	-0.007	-0.007
9	70.00	-3.6	-9.9	5.0	0.355	0.	0.044	0.044	0.013	0.013
10	90.00	-3.7	-10.0	4.2	0.353	0.	0.062	0.062	0.016	0.016
11	95.00	-3.0	-9.2	7.1	0.354	0.	0.124	0.124	0.031	0.031

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(c) 100 Percent of design speed; reading number 1059

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	36.2	1.5	36.2	1.5	346.0	0.994	16.39	0.973
2	23.505	23.525	33.4	-0.2	33.4	-0.2	340.3	0.999	16.27	0.988
3	21.605	21.714	34.0	-2.6	34.0	-2.6	333.6	1.001	15.96	0.989
4	20.157	20.343	37.9	-1.9	37.9	-1.9	334.3	0.994	15.89	0.972
5	19.914	20.114	38.6	-2.9	38.6	-2.9	333.8	0.994	15.67	0.977
6	19.672	19.886	38.5	-3.7	38.5	-3.7	332.6	0.995	15.28	0.995
7	19.428	19.657	39.0	-4.6	39.0	-4.6	331.4	0.998	15.14	1.000
8	19.187	19.431	39.4	-4.6	39.4	-4.6	331.5	0.997	15.24	0.993
9	17.729	18.075	36.1	-2.7	36.1	-2.7	329.1	0.997	15.61	0.982
10	15.789	16.294	38.8	-3.7	38.8	-3.7	327.3	1.001	15.39	0.989
11	15.306	15.847	40.5	-0.4	40.5	-0.4	330.8	0.999	15.88	0.954

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	230.8	179.9	230.8	179.9	186.2	179.8	136.4	4.7	0.	0.
2	225.3	183.1	225.3	183.1	188.1	183.1	124.0	-0.5	0.	0.
3	215.0	173.0	215.0	173.0	178.2	172.8	120.3	-7.9	0.	0.
4	221.2	165.1	221.2	165.1	174.4	165.0	136.0	-5.6	0.	0.
5	216.1	161.0	216.1	161.0	168.9	160.8	134.7	-8.1	0.	0.
6	204.8	157.3	204.8	157.3	160.3	157.0	127.5	-10.2	0.	0.
7	200.5	154.6	200.5	154.6	155.9	154.1	126.2	-12.4	0.	0.
8	204.0	154.8	204.0	154.8	157.7	154.3	129.4	-12.3	0.	0.
9	223.8	165.7	223.8	165.7	180.8	165.5	132.0	-7.9	0.	0.
10	227.0	169.6	227.0	169.6	177.0	169.2	142.1	-11.1	0.	0.
11	244.6	171.7	244.6	171.7	185.9	171.7	159.0	-1.1	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.644	0.496	0.644	0.496	0.520	0.495	0.966	0.832
2	0.633	0.508	0.633	0.508	0.529	0.508	0.973	0.766
3	0.609	0.483	0.609	0.483	0.504	0.483	0.970	0.753
4	0.627	0.462	0.627	0.462	0.494	0.461	0.946	0.844
5	0.612	0.450	0.612	0.450	0.478	0.449	0.952	0.833
6	0.579	0.439	0.579	0.439	0.453	0.439	0.979	0.782
7	0.567	0.432	0.567	0.432	0.441	0.430	0.989	0.772
8	0.577	0.433	0.577	0.433	0.446	0.431	0.978	0.789
9	0.640	0.466	0.640	0.466	0.517	0.466	0.916	0.760
10	0.652	0.478	0.652	0.478	0.508	0.477	0.956	0.767
11	0.703	0.482	0.703	0.482	0.535	0.482	0.923	0.851

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	0.1	-6.3	14.1	0.442	0.	0.112	0.112	0.043	0.043
2	10.00	-1.0	-7.3	11.2	0.397	0.	0.052	0.052	0.020	0.020
3	30.00	1.2	-5.2	7.1	0.404	0.	0.049	0.049	0.017	0.017
4	45.00	4.4	-2.0	7.4	0.461	0.	0.120	0.120	0.039	0.039
5	47.50	4.9	-1.5	6.4	0.467	0.	0.101	0.101	0.033	0.033
6	50.00	4.6	-1.7	5.6	0.445	0.	0.024	0.024	0.008	0.008
7	52.50	4.9	-1.5	4.7	0.446	0.	-0.001	-0.001	-0.000	-0.000
8	55.00	5.0	-1.3	4.7	0.456	0.	0.033	0.033	0.010	0.010
9	70.00	0.3	-6.0	6.4	0.438	0.	0.075	0.075	0.022	0.022
10	90.00	-0.2	-6.5	5.5	0.424	0.	0.044	0.044	0.011	0.011
11	95.00	0.4	-5.9	9.0	0.458	0.	0.164	0.164	0.041	0.041

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(d) 100 Percent of design speed; reading number 1060

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	39.2	2.1	39.2	2.1	352.0	0.990	17.06	0.969
2	23.505	23.525	36.8	0.9	36.8	0.9	345.2	0.998	16.90	0.985
3	21.605	21.714	37.0	-2.3	37.0	-2.3	336.7	1.001	16.46	0.987
4	20.157	20.343	40.0	-1.6	40.0	-1.6	336.0	0.997	16.37	0.974
5	19.914	20.114	40.2	-2.4	40.2	-2.4	335.5	0.997	16.16	0.981
6	19.672	19.886	40.5	-2.9	40.5	-2.9	334.7	0.999	15.98	0.989
7	19.428	19.657	41.4	-2.9	41.4	-2.9	334.5	0.998	15.95	0.987
8	19.187	19.431	41.5	-2.5	41.5	-2.5	334.4	0.997	15.94	0.988
9	17.729	18.075	39.9	-1.8	39.9	-1.8	331.4	0.998	15.93	0.983
10	15.789	16.294	41.5	-2.0	41.5	-2.0	329.3	1.001	15.71	0.987
11	15.306	15.847	43.7	1.7	43.7	1.7	332.6	0.998	16.21	0.944

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	232.8	176.9	232.8	176.9	180.5	176.8	147.0	6.4	0.	0.
2	227.4	179.2	227.4	179.2	182.1	179.2	136.2	2.7	0.	0.
3	213.9	165.4	213.9	165.4	170.9	165.3	128.6	-6.7	0.	0.
4	218.2	158.9	218.2	158.9	167.1	158.8	140.4	-4.5	0.	0.
5	213.7	155.9	213.7	155.9	163.3	155.8	137.9	-6.4	0.	0.
6	208.6	153.9	208.6	153.9	158.6	153.7	135.4	-7.7	0.	0.
7	208.7	152.6	208.7	152.6	156.5	152.4	138.1	-7.8	0.	0.
8	209.9	153.8	209.9	153.8	157.3	153.6	139.0	-6.8	0.	0.
9	217.8	153.7	217.8	153.7	167.1	153.6	139.7	-4.9	0.	0.
10	221.2	155.2	221.2	155.2	165.6	155.1	146.7	-5.3	0.	0.
11	239.4	150.8	239.4	150.8	173.0	150.7	165.5	4.4	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.644	0.484	0.644	0.484	0.499	0.483	0.979	0.899
2	0.635	0.493	0.635	0.493	0.508	0.493	0.984	0.849
3	0.602	0.459	0.602	0.459	0.481	0.459	0.967	0.810
4	0.616	0.441	0.616	0.441	0.472	0.441	0.951	0.875
5	0.603	0.433	0.603	0.433	0.461	0.433	0.954	0.855
6	0.588	0.428	0.588	0.428	0.447	0.427	0.969	0.835
7	0.589	0.424	0.589	0.424	0.441	0.424	0.974	0.851
8	0.592	0.428	0.592	0.428	0.444	0.427	0.977	0.852
9	0.619	0.429	0.619	0.429	0.475	0.429	0.919	0.824
10	0.632	0.434	0.632	0.434	0.473	0.434	0.937	0.813
11	0.685	0.420	0.685	0.420	0.495	0.420	0.871	0.911

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	3.0	-3.4	14.6	0.474	0.	0.126	0.126	0.049	0.049
2	10.00	2.4	-3.9	12.2	0.435	0.	0.064	0.064	0.024	0.024
3	30.00	4.1	-2.3	7.4	0.447	0.	0.061	0.061	0.021	0.021
4	45.00	6.5	0.2	7.8	0.488	0.	0.114	0.114	0.037	0.037
5	47.50	6.5	0.1	7.0	0.488	0.	0.086	0.086	0.028	0.028
6	50.00	6.6	0.2	6.4	0.480	0.	0.055	0.055	0.017	0.017
7	52.50	7.3	1.0	6.4	0.488	0.	0.063	0.063	0.020	0.020
8	55.00	7.1	0.8	6.7	0.482	0.	0.056	0.056	0.017	0.017
9	70.00	4.1	-2.2	7.3	0.484	0.	0.075	0.075	0.021	0.021
10	90.00	2.6	-3.7	7.3	0.472	0.	0.056	0.056	0.014	0.014
11	95.00	3.6	-2.6	11.0	0.535	0.	0.207	0.207	0.052	0.052

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(e) 100 Percent of design speed; reading number 1061

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	42.3	2.2	42.3	2.2	354.8	0.994	17.48	0.974
2	23.505	23.525	40.3	1.5	40.3	1.5	349.3	0.999	17.41	0.982
3	21.605	21.714	39.8	-1.3	39.8	-1.3	339.8	1.000	16.80	0.985
4	20.157	20.343	42.0	-0.6	42.0	-0.6	338.0	0.999	16.72	0.972
5	19.914	20.114	42.5	-1.1	42.5	-1.1	338.0	0.998	16.54	0.978
6	19.672	19.886	42.8	-1.3	42.8	-1.3	337.4	0.998	16.42	0.981
7	19.428	19.657	43.8	-1.1	43.8	-1.1	337.8	0.996	16.40	0.979
8	19.187	19.431	44.1	-0.7	44.1	-0.7	337.6	0.995	16.39	0.979
9	17.729	18.075	42.8	-0.9	42.8	-0.9	333.6	0.997	16.22	0.976
10	15.789	16.294	44.0	-0.3	44.0	-0.3	330.8	1.002	15.96	0.981
11	15.306	15.847	46.0	2.2	46.0	2.2	333.9	0.998	16.46	0.939

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	231.5	178.3	231.5	178.3	171.2	178.2	155.7	6.8	0.	0.
2	229.3	180.3	229.3	180.3	174.8	180.2	148.5	4.6	0.	0.
3	212.8	161.7	212.8	161.7	163.4	161.7	136.3	-3.7	0.	0.
4	216.7	154.0	216.7	154.0	161.1	154.0	145.0	-1.6	0.	0.
5	212.3	151.5	212.3	151.5	156.5	151.5	143.6	-2.9	0.	0.
6	210.3	149.8	210.3	149.8	154.4	149.8	142.8	-3.4	0.	0.
7	211.2	148.7	211.2	148.7	152.4	148.7	146.2	-2.7	0.	0.
8	212.1	148.9	212.1	148.9	152.4	148.9	147.5	-1.8	0.	0.
9	215.6	143.6	215.6	143.6	158.1	143.6	146.6	-2.3	0.	0.
10	218.0	143.9	218.0	143.9	156.9	143.9	151.4	-0.8	0.	0.
11	236.7	138.0	236.7	138.0	164.5	137.9	170.2	5.2	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.637	0.485	0.637	0.485	0.472	0.484	1.040	0.958
2	0.637	0.493	0.637	0.493	0.485	0.493	1.031	0.930
3	0.596	0.446	0.596	0.446	0.458	0.446	0.989	0.861
4	0.610	0.426	0.610	0.426	0.453	0.426	0.956	0.906
5	0.596	0.419	0.596	0.419	0.439	0.419	0.968	0.893
6	0.591	0.414	0.591	0.414	0.434	0.414	0.970	0.886
7	0.593	0.411	0.593	0.411	0.428	0.411	0.976	0.906
8	0.596	0.412	0.596	0.412	0.428	0.412	0.977	0.910
9	0.610	0.399	0.610	0.399	0.448	0.399	0.908	0.875
10	0.621	0.401	0.621	0.401	0.447	0.401	0.917	0.853
11	0.675	0.383	0.675	0.383	0.469	0.382	0.839	0.951

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	6.1	-0.2	14.9	0.479	0.	0.110	0.110	0.043	0.043
2	10.00	6.0	-0.4	12.8	0.452	0.	0.073	0.073	0.028	0.028
3	30.00	7.0	0.6	8.4	0.470	0.	0.069	0.069	0.024	0.024
4	45.00	8.5	2.1	8.8	0.509	0.	0.127	0.127	0.041	0.041
5	47.50	8.8	2.5	8.2	0.508	0.	0.101	0.101	0.033	0.033
6	50.00	8.9	2.5	8.0	0.508	0.	0.089	0.089	0.028	0.028
7	52.50	9.7	3.4	8.2	0.517	0.	0.097	0.097	0.031	0.031
8	55.00	9.7	3.4	8.6	0.516	0.	0.098	0.098	0.030	0.030
9	70.00	7.0	0.7	8.2	0.531	0.	0.108	0.108	0.031	0.031
10	90.00	5.0	-1.2	8.9	0.517	0.	0.083	0.083	0.021	0.021
11	95.00	5.8	-0.4	11.5	0.587	0.	0.232	0.232	0.058	0.058

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(f) 90 Percent of design speed; reading number 1062

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	20.9	0.9	20.9	0.9	315.9	1.001	12.60	0.946
2	23.505	23.525	20.2	-0.9	20.2	-0.9	314.0	1.003	12.58	0.985
3	21.605	21.714	20.3	-4.7	20.3	-4.7	311.1	1.001	12.72	0.989
4	20.157	20.343	23.3	-4.8	23.3	-4.8	312.6	0.998	12.87	0.983
5	19.914	20.114	23.7	-4.8	23.7	-4.8	312.6	0.998	12.79	0.986
6	19.672	19.886	24.4	-5.3	24.4	-5.3	312.9	0.998	12.66	0.994
7	19.428	19.657	26.4	-5.4	26.4	-5.4	313.4	0.998	12.49	1.006
8	19.187	19.431	28.4	-5.4	28.4	-5.4	314.7	0.995	12.55	1.001
9	17.729	18.075	25.8	-4.1	25.8	-4.1	314.8	0.999	13.45	0.983
10	15.789	16.294	29.6	-4.3	29.6	-4.3	316.3	0.999	13.76	0.976
11	15.306	15.847	31.4	-2.2	31.4	-2.2	318.1	1.001	14.01	0.969

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	196.8	159.8	196.8	159.8	183.8	159.8	70.2	2.4	0.	0.
2	194.9	177.8	194.9	177.8	182.8	177.8	67.4	-2.7	0.	0.
3	193.7	183.4	193.7	183.4	181.6	182.8	67.3	-15.2	0.	0.
4	199.6	187.9	199.6	187.9	183.4	187.3	78.9	-15.8	0.	0.
5	196.9	186.9	196.9	186.9	180.4	186.2	79.1	-15.7	0.	0.
6	191.4	186.2	191.4	186.2	174.3	185.4	79.1	-17.2	0.	0.
7	183.9	186.1	183.9	186.1	164.7	185.3	81.8	-17.4	0.	0.
8	186.5	186.0	186.5	186.0	164.1	185.1	88.7	-17.4	0.	0.
9	221.7	212.7	221.7	212.7	199.6	212.1	96.5	-15.1	0.	0.
10	234.5	230.7	234.5	230.7	203.9	230.0	115.9	-17.5	0.	0.
11	242.7	243.9	242.7	243.9	207.1	243.7	126.6	-9.2	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.570	0.458	0.570	0.458	0.532	0.458	0.870	0.570
2	0.566	0.513	0.566	0.513	0.531	0.513	0.972	0.566
3	0.565	0.533	0.565	0.533	0.530	0.531	1.006	0.565
4	0.582	0.546	0.582	0.546	0.535	0.544	1.021	0.582
5	0.574	0.543	0.574	0.543	0.525	0.541	1.032	0.574
6	0.556	0.541	0.556	0.541	0.507	0.539	1.064	0.556
7	0.533	0.540	0.533	0.540	0.477	0.538	1.125	0.533
8	0.539	0.539	0.539	0.539	0.475	0.537	1.128	0.539
9	0.649	0.621	0.649	0.621	0.584	0.619	1.063	0.649
10	0.688	0.676	0.688	0.676	0.598	0.674	1.128	0.688
11	0.713	0.716	0.713	0.716	0.608	0.715	1.177	0.713

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	-15.3	-21.6	13.4	0.321	0.	0.272	0.272	0.105	0.105
2	10.00	-14.1	-20.5	10.5	0.224	0.	0.077	0.077	0.029	0.029
3	30.00	-12.5	-18.9	5.0	0.202	0.	0.058	0.058	0.020	0.020
4	45.00	-10.3	-16.6	4.6	0.213	0.	0.084	0.084	0.027	0.027
5	47.50	-10.0	-16.4	4.5	0.206	0.	0.072	0.072	0.023	0.023
6	50.00	-9.5	-15.8	4.0	0.187	0.	0.032	0.032	0.010	0.010
7	52.50	-7.7	-14.0	3.9	0.157	0.	-0.032	-0.032	-0.010	-0.010
8	55.00	-6.0	-12.3	3.9	0.179	0.	-0.008	-0.008	-0.003	-0.003
9	70.00	-10.0	-16.3	5.0	0.185	0.	0.070	0.070	0.020	0.020
10	90.00	-9.4	-15.6	4.9	0.161	0.	0.089	0.089	0.023	0.023
11	95.00	-8.7	-14.9	7.2	0.133	0.	0.107	0.107	0.027	0.027

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(g) 90 Percent of design speed; reading number 1063

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	27.2	0.3	27.2	0.3	322.9	0.998	13.57	0.970
2	23.505	23.525	26.6	-1.2	26.6	-1.2	320.3	1.001	13.55	0.993
3	21.605	21.714	25.8	-5.0	25.8	-5.0	316.6	1.001	13.60	0.994
4	20.157	20.343	29.5	-4.0	29.5	-4.0	318.6	0.996	13.71	0.985
5	19.914	20.114	29.9	-4.3	29.9	-4.3	318.6	0.995	13.61	0.988
6	19.672	19.886	30.0	-4.9	30.0	-4.9	318.2	0.997	13.44	0.996
7	19.428	19.657	31.1	-5.2	31.1	-5.2	317.9	0.996	13.34	0.999
8	19.187	19.431	30.5	-5.4	30.5	-5.4	318.0	0.996	13.13	1.015
9	17.729	18.075	30.0	-4.8	30.0	-4.8	316.7	1.000	13.78	0.995
10	15.789	16.294	33.8	-5.3	33.8	-5.3	318.1	0.998	13.99	0.985
11	15.306	15.847	35.2	-2.9	35.2	-2.9	320.0	1.000	14.29	0.978

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	197.4	158.8	197.4	158.8	175.6	158.8	90.2	0.7	0.	0.
2	194.9	169.2	194.9	169.2	174.2	169.1	87.4	-3.5	0.	0.
3	193.3	170.4	193.3	170.4	174.1	169.7	84.0	-14.9	0.	0.
4	200.1	171.8	200.1	171.8	174.1	171.4	98.7	-12.1	0.	0.
5	197.2	169.7	197.2	169.7	170.9	169.2	98.4	-12.8	0.	0.
6	191.3	168.2	191.3	168.2	165.6	167.5	95.8	-14.4	0.	0.
7	187.8	166.3	187.8	166.3	160.9	165.6	96.9	-15.2	0.	0.
8	158.4	166.4	158.4	166.4	136.4	165.7	80.4	-15.6	0.	0.
9	208.0	183.7	208.0	183.7	180.0	183.0	104.1	-15.4	0.	0.
10	221.3	195.5	221.3	195.5	183.9	194.7	123.1	-18.0	0.	0.
11	232.9	207.9	232.9	207.9	190.3	207.7	134.2	-10.6	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS
RP	IN	OUT	IN	OUT	IN	OUT	VEL R MACH NO
1	0.565	0.450	0.565	0.450	0.503	0.450	0.904 0.565
2	0.560	0.482	0.560	0.482	0.501	0.482	0.971 0.560
3	0.559	0.489	0.559	0.489	0.503	0.487	0.975 0.559
4	0.578	0.493	0.578	0.493	0.502	0.492	0.985 0.578
5	0.569	0.487	0.569	0.487	0.493	0.485	0.990 0.569
6	0.551	0.482	0.551	0.482	0.477	0.480	1.012 0.551
7	0.541	0.477	0.541	0.477	0.463	0.475	1.029 0.541
8	0.452	0.477	0.452	0.477	0.389	0.475	1.215 0.452
9	0.604	0.529	0.604	0.529	0.523	0.527	1.017 0.604
10	0.644	0.565	0.644	0.565	0.535	0.562	1.059 0.644
11	0.679	0.600	0.679	0.600	0.555	0.600	1.091 0.679

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	-9.0	-15.3	12.8	0.371	0.	0.156	0.156	0.060	0.060
2	10.00	-7.7	-14.1	10.2	0.309	0.	0.034	0.034	0.013	0.013
3	30.00	-7.1	-13.4	4.7	0.297	0.	0.031	0.031	0.011	0.011
4	45.00	-4.0	-10.3	5.3	0.321	0.	0.073	0.073	0.024	0.024
5	47.50	-3.8	-10.1	5.0	0.321	0.	0.063	0.063	0.020	0.020
6	50.00	-3.9	-10.2	4.4	0.304	0.	0.019	0.019	0.006	0.006
7	52.50	-3.0	-9.4	4.0	0.302	0.	0.004	0.004	0.001	0.001
8	55.00	-3.8	-10.2	3.9	0.137	0.	-0.118	-0.118	-0.037	-0.037
9	70.00	-5.8	-12.1	4.3	0.281	0.	0.023	0.023	0.007	0.007
10	90.00	-5.2	-11.4	4.0	0.278	0.	0.061	0.061	0.016	0.016
11	95.00	-4.9	-11.2	6.5	0.260	0.	0.085	0.085	0.021	0.021

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(h) 90 Percent of design speed; reading number 1064

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	33.6	1.1	33.6	1.1	332.1	0.994	14.67	0.977
2	23.505	23.525	31.4	-0.3	31.4	-0.3	327.1	1.001	14.54	0.995
3	21.605	21.714	31.1	-3.7	31.1	-3.7	321.6	1.000	14.40	0.992
4	20.157	20.343	33.9	-2.9	33.9	-2.9	321.9	0.998	14.40	0.987
5	19.914	20.114	34.0	-3.3	34.0	-3.3	322.4	0.996	14.38	0.987
6	19.672	19.886	34.7	-3.4	34.7	-3.4	322.0	0.998	14.26	0.993
7	19.428	19.657	35.9	-3.4	35.9	-3.4	322.6	0.996	14.28	0.991
8	19.187	19.431	36.1	-3.1	36.1	-3.1	322.8	0.996	14.30	0.991
9	17.729	18.075	35.4	-3.4	35.4	-3.4	320.4	0.999	14.34	0.990
10	15.789	16.294	37.7	-4.3	37.7	-4.3	320.4	0.998	14.46	0.984
11	15.306	15.847	39.5	-1.5	39.5	-1.5	322.5	0.999	14.68	0.967

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	203.7	160.7	203.7	160.7	169.6	160.6	112.8	3.2	0.	0.
2	197.4	164.9	197.4	164.9	168.4	164.9	103.0	-1.0	0.	0.
3	191.3	156.9	191.3	156.9	163.9	156.6	98.7	-10.1	0.	0.
4	195.7	156.2	195.7	156.2	162.5	156.0	109.1	-8.0	0.	0.
5	195.4	155.3	195.4	155.3	162.0	155.1	109.2	-9.0	0.	0.
6	192.5	154.8	192.5	154.8	158.3	154.6	109.5	-9.3	0.	0.
7	193.3	154.7	193.3	154.7	156.6	154.4	113.3	-9.1	0.	0.
8	195.1	156.0	195.1	156.0	157.6	155.8	115.0	-8.4	0.	0.
9	202.1	160.1	202.1	160.1	164.7	159.8	117.1	-9.4	0.	0.
10	215.0	168.7	215.0	168.7	170.2	168.2	131.4	-12.6	0.	0.
11	225.1	172.6	225.1	172.6	173.6	172.5	143.3	-4.5	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.576	0.450	0.576	0.450	0.479	0.450	0.947	0.685
2	0.561	0.464	0.561	0.464	0.479	0.464	0.979	0.632
3	0.548	0.445	0.548	0.445	0.469	0.444	0.955	0.608
4	0.561	0.443	0.561	0.443	0.466	0.443	0.960	0.670
5	0.560	0.441	0.560	0.441	0.464	0.440	0.957	0.666
6	0.551	0.439	0.551	0.439	0.453	0.438	0.976	0.666
7	0.553	0.439	0.553	0.439	0.448	0.438	0.986	0.690
8	0.558	0.442	0.558	0.442	0.451	0.442	0.989	0.697
9	0.582	0.456	0.582	0.456	0.474	0.455	0.971	0.674
10	0.622	0.481	0.622	0.481	0.492	0.480	0.988	0.702
11	0.651	0.491	0.651	0.491	0.502	0.491	0.994	0.761

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	-2.6	-8.9	13.7	0.419	0.	0.116	0.116	0.045	0.045
2	10.00	-2.9	-9.3	11.0	0.365	0.	0.025	0.025	0.009	0.009
3	30.00	-1.8	-8.1	6.1	0.378	0.	0.044	0.044	0.015	0.015
4	45.00	0.4	-6.0	6.4	0.397	0.	0.069	0.069	0.023	0.023
5	47.50	0.3	-6.1	6.0	0.400	0.	0.068	0.068	0.022	0.022
6	50.00	0.8	-5.6	5.9	0.391	0.	0.038	0.038	0.012	0.012
7	52.50	1.8	-4.6	5.9	0.398	0.	0.048	0.048	0.015	0.015
8	55.00	1.8	-4.6	6.2	0.396	0.	0.048	0.048	0.015	0.015
9	70.00	-0.4	-6.7	5.8	0.386	0.	0.047	0.047	0.013	0.013
10	90.00	-1.3	-7.6	5.0	0.385	0.	0.070	0.070	0.018	0.018
11	95.00	-0.6	-6.8	7.9	0.394	0.	0.133	0.133	0.033	0.033

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(i) 90 Percent of design speed; reading number 1065

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	39.1	2.4	39.1	2.4	338.1	0.992	15.36	0.977
2	23.505	23.525	36.6	1.2	36.6	1.2	333.2	0.998	15.26	0.989
3	21.605	21.714	35.0	-2.9	35.0	-2.9	325.4	1.000	14.93	0.992
4	20.157	20.343	38.0	-2.5	38.0	-2.5	324.9	0.999	14.88	0.985
5	19.914	20.114	37.6	-2.4	37.6	-2.4	324.9	0.998	14.81	0.988
6	19.672	19.886	38.8	-2.4	38.8	-2.4	325.1	0.998	14.78	0.989
7	19.428	19.657	40.1	-2.0	40.1	-2.0	325.9	0.996	14.80	0.987
8	19.187	19.431	40.2	-2.0	40.2	-2.0	326.1	0.996	14.79	0.987
9	17.729	18.075	40.2	-3.0	40.2	-3.0	323.0	0.998	14.65	0.984
10	15.789	16.294	41.5	-2.4	41.5	-2.4	322.0	1.000	14.64	0.990
11	15.306	15.847	43.2	0.0	43.2	0.0	324.0	0.999	14.94	0.958

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	205.8	158.3	205.8	158.3	159.8	158.2	129.8	6.7	0.	0.
2	201.9	161.2	201.9	161.2	162.1	161.2	120.4	3.3	0.	0.
3	189.3	149.5	189.3	149.5	155.1	149.4	108.5	-7.6	0.	0.
4	192.8	145.9	192.8	145.9	151.9	145.7	118.7	-6.5	0.	0.
5	191.7	145.1	191.7	145.1	151.9	144.9	117.0	-6.1	0.	0.
6	191.4	145.2	191.4	145.2	149.2	145.1	119.9	-6.0	0.	0.
7	193.4	144.8	193.4	144.8	148.0	144.8	124.5	-5.1	0.	0.
8	194.4	145.4	194.4	145.4	148.4	145.3	125.6	-5.0	0.	0.
9	196.7	140.9	196.7	140.9	150.3	140.7	126.9	-7.4	0.	0.
10	205.9	151.8	205.9	151.8	154.2	151.7	136.6	-6.4	0.	0.
11	219.0	146.9	219.0	146.9	159.8	146.9	149.9	0.1	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.577	0.440	0.577	0.440	0.448	0.439	0.990	0.804
2	0.569	0.450	0.569	0.450	0.457	0.450	0.995	0.758
3	0.538	0.421	0.538	0.421	0.441	0.420	0.963	0.686
4	0.549	0.411	0.549	0.411	0.433	0.410	0.959	0.741
5	0.546	0.408	0.546	0.408	0.433	0.408	0.954	0.725
6	0.545	0.409	0.545	0.409	0.425	0.408	0.972	0.742
7	0.550	0.408	0.550	0.408	0.421	0.407	0.978	0.770
8	0.553	0.409	0.553	0.409	0.422	0.409	0.979	0.772
9	0.563	0.398	0.563	0.398	0.430	0.397	0.936	0.755
10	0.592	0.430	0.592	0.430	0.443	0.429	0.984	0.762
11	0.631	0.414	0.631	0.414	0.460	0.414	0.920	0.826

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.9	-3.4	15.0	0.462	0.	0.115	0.115	0.044	0.044
2	10.00	2.2	-4.1	12.5	0.421	0.	0.058	0.058	0.022	0.022
3	30.00	2.1	-4.2	6.8	0.424	0.	0.042	0.042	0.015	0.015
4	45.00	4.5	-1.9	6.8	0.455	0.	0.081	0.081	0.026	0.026
5	47.50	3.9	-2.5	6.9	0.450	0.	0.067	0.067	0.022	0.022
6	50.00	4.9	-1.5	6.9	0.450	0.	0.060	0.060	0.019	0.019
7	52.50	6.0	-0.4	7.2	0.461	0.	0.071	0.071	0.022	0.022
8	55.00	5.9	-0.5	7.3	0.460	0.	0.069	0.069	0.022	0.022
9	70.00	4.4	-1.9	6.1	0.479	0.	0.081	0.081	0.023	0.023
10	90.00	2.6	-3.7	6.8	0.439	0.	0.046	0.046	0.012	0.012
11	95.00	3.0	-3.2	9.4	0.497	0.	0.179	0.179	0.045	0.045

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(j) 90 Percent of design speed; reading number 1066

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	42.8	2.8	42.8	2.8	342.2	0.993	15.74	0.978
2	23.505	23.525	41.1	1.7	41.1	1.7	338.4	0.997	15.80	0.982
3	21.605	21.714	38.6	-1.9	38.6	-1.9	328.1	1.000	15.16	0.987
4	20.157	20.343	41.9	-1.8	41.9	-1.8	327.1	0.998	14.96	0.982
5	19.914	20.114	43.2	-2.0	43.2	-2.0	327.3	0.998	14.95	0.980
6	19.672	19.886	44.6	-1.4	44.6	-1.4	327.6	0.997	14.91	0.980
7	19.428	19.657	46.0	-1.3	46.0	-1.3	328.2	0.995	14.86	0.983
8	19.187	19.431	47.3	-1.2	47.3	-1.2	328.6	0.994	14.86	0.982
9	17.729	18.075	44.2	-0.6	44.2	-0.6	326.0	0.996	14.87	0.977
10	15.789	16.294	43.5	-0.5	43.5	-0.5	322.8	1.002	14.81	0.986
11	15.306	15.847	44.8	1.1	44.8	1.1	324.6	1.000	15.06	0.956

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	206.3	159.8	206.3	159.8	151.4	159.6	140.1	7.8	0.	0.
2	208.2	163.4	208.2	163.4	156.8	163.3	137.0	4.7	0.	0.
3	186.7	141.3	186.7	141.3	145.9	141.2	116.6	-4.7	0.	0.
4	185.4	131.0	185.4	131.0	138.1	130.9	123.7	-4.2	0.	0.
5	185.6	129.5	185.6	129.5	135.3	129.4	127.1	-4.5	0.	0.
6	185.4	128.8	185.4	128.8	131.9	128.8	130.2	-3.1	0.	0.
7	185.2	128.8	185.2	128.8	128.6	128.7	133.3	-2.9	0.	0.
8	186.6	128.5	186.6	128.5	126.5	128.4	137.2	-2.6	0.	0.
9	194.8	128.8	194.8	128.8	139.7	128.8	135.8	-1.3	0.	0.
10	201.1	139.4	201.1	139.4	145.9	139.4	138.4	-1.3	0.	0.
11	213.8	132.1	213.8	132.1	151.6	132.1	150.7	2.5	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.574	0.441	0.574	0.441	0.422	0.440	1.054	0.873
2	0.584	0.453	0.584	0.453	0.440	0.453	1.042	0.868
3	0.528	0.395	0.528	0.395	0.413	0.395	0.968	0.742
4	0.525	0.366	0.525	0.366	0.391	0.366	0.948	0.778
5	0.526	0.362	0.526	0.362	0.383	0.362	0.957	0.800
6	0.525	0.360	0.525	0.360	0.373	0.360	0.976	0.820
7	0.524	0.360	0.524	0.360	0.364	0.360	1.001	0.839
8	0.528	0.359	0.528	0.359	0.358	0.359	1.015	0.864
9	0.554	0.361	0.554	0.361	0.398	0.361	0.922	0.821
10	0.577	0.393	0.577	0.393	0.418	0.393	0.956	0.782
11	0.614	0.371	0.614	0.371	0.435	0.371	0.871	0.840

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	6.6	0.3	15.4	0.474	0.	0.108	0.108	0.042	0.042
2	10.00	6.8	0.4	13.0	0.456	0.	0.087	0.087	0.033	0.033
3	30.00	5.8	-0.6	7.8	0.470	0.	0.074	0.074	0.026	0.026
4	45.00	8.3	2.0	7.5	0.518	0.	0.106	0.106	0.034	0.034
5	47.50	9.5	3.2	7.3	0.530	0.	0.118	0.118	0.038	0.038
6	50.00	10.7	4.4	7.9	0.533	0.	0.114	0.114	0.036	0.036
7	52.50	11.9	5.6	8.0	0.535	0.	0.098	0.098	0.031	0.031
8	55.00	13.0	6.6	8.1	0.543	0.	0.103	0.103	0.032	0.032
9	70.00	8.4	2.1	8.5	0.540	0.	0.122	0.122	0.035	0.035
10	90.00	4.5	-1.7	8.7	0.482	0.	0.068	0.068	0.017	0.017
11	95.00	4.7	-1.6	10.4	0.552	0.	0.195	0.195	0.048	0.048

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(k) 80 Percent of design speed; reading number 1067

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	43.2	4.0	43.2	4.0	330.1	0.997	14.26	0.985
2	23.505	23.525	40.8	3.0	40.8	3.0	326.9	0.999	14.27	0.986
3	21.605	21.714	41.0	-1.4	41.0	-1.4	320.5	0.999	13.83	0.989
4	20.157	20.343	45.3	-0.4	45.3	-0.4	320.7	0.997	13.81	0.981
5	19.914	20.114	45.8	-0.7	45.8	-0.7	320.8	0.997	13.82	0.979
6	19.672	19.886	46.5	-0.7	46.5	-0.7	320.6	0.997	13.77	0.983
7	19.428	19.657	48.2	-0.8	48.2	-0.8	320.9	0.997	13.71	0.986
8	19.187	19.431	48.6	-0.7	48.6	-0.7	320.7	0.997	13.71	0.986
9	17.729	18.075	43.5	-0.4	43.5	-0.4	318.2	0.998	13.80	0.982
10	15.789	16.294	42.5	-0.6	42.5	-0.6	316.0	1.001	13.83	0.987
11	15.306	15.847	43.9	0.8	43.9	0.8	317.2	1.000	13.93	0.966

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	178.7	138.9	178.7	138.9	130.2	138.5	122.4	9.7	0.	0.
2	179.2	140.0	179.2	140.0	135.7	139.8	117.1	7.4	0.	0.
3	161.9	119.8	161.9	119.8	122.1	119.8	106.3	-2.9	0.	0.
4	166.0	115.0	166.0	115.0	116.9	115.0	117.9	-0.8	0.	0.
5	166.7	114.4	166.7	114.4	116.2	114.4	119.5	-1.4	0.	0.
6	165.7	114.5	165.7	114.5	114.0	114.5	120.3	-1.3	0.	0.
7	164.3	114.6	164.3	114.6	109.6	114.6	122.4	-1.6	0.	0.
8	165.4	114.5	165.4	114.5	109.3	114.5	124.1	-1.4	0.	0.
9	175.1	118.1	175.1	118.1	127.0	118.1	120.5	-0.7	0.	0.
10	184.1	129.6	184.1	129.6	135.7	129.5	124.3	-1.3	0.	0.
11	192.1	121.7	192.1	121.7	138.4	121.7	133.2	1.6	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.503	0.387	0.503	0.387	0.366	0.387	1.064	0.772
2	0.507	0.392	0.507	0.392	0.384	0.392	1.031	0.749
3	0.460	0.338	0.460	0.338	0.347	0.338	0.981	0.685
4	0.473	0.324	0.473	0.324	0.333	0.324	0.984	0.755
5	0.474	0.322	0.474	0.322	0.331	0.322	0.985	0.763
6	0.472	0.323	0.472	0.323	0.325	0.323	1.004	0.767
7	0.468	0.323	0.468	0.323	0.312	0.323	1.046	0.782
8	0.471	0.323	0.471	0.323	0.311	0.323	1.047	0.792
9	0.502	0.334	0.502	0.334	0.364	0.334	0.930	0.731
10	0.531	0.368	0.531	0.368	0.392	0.368	0.954	0.701
11	0.554	0.345	0.554	0.345	0.399	0.345	0.879	0.741

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	7.1	0.7	16.6	0.467	0.	0.094	0.094	0.037	0.037
2	10.00	6.4	0.1	14.4	0.451	0.	0.086	0.086	0.033	0.033
3	30.00	8.2	1.8	8.4	0.495	0.	0.084	0.084	0.029	0.029
4	45.00	11.7	5.4	8.9	0.540	0.	0.137	0.137	0.045	0.045
5	47.50	12.1	5.7	8.6	0.546	0.	0.144	0.144	0.046	0.046
6	50.00	12.6	6.3	8.6	0.542	0.	0.124	0.124	0.039	0.039
7	52.50	14.0	7.7	8.5	0.539	0.	0.100	0.100	0.031	0.031
8	55.00	14.3	7.9	8.5	0.542	0.	0.100	0.100	0.031	0.031
9	70.00	7.7	1.4	8.7	0.523	0.	0.117	0.117	0.034	0.034
10	90.00	3.5	-2.7	8.7	0.469	0.	0.077	0.077	0.020	0.020
11	95.00	3.8	-2.5	10.1	0.534	0.	0.180	0.180	0.045	0.045

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(1) 70 Percent of design speed; reading number 1068

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	16.3	0.5	16.3	0.5	302.1	1.002	11.34	0.957
2	23.505	23.525	16.1	-1.8	16.1	-1.8	300.8	1.003	11.41	0.985
3	21.605	21.714	16.1	-4.8	16.1	-4.8	299.8	1.000	11.42	0.994
4	20.157	20.343	18.6	-5.7	18.6	-5.7	300.2	1.001	11.54	0.991
5	19.914	20.114	19.0	-5.6	19.0	-5.6	300.6	1.000	11.55	0.993
6	19.672	19.886	19.8	-5.4	19.8	-5.4	301.5	0.999	11.60	0.992
7	19.428	19.657	22.6	-5.1	22.6	-5.1	302.8	0.996	11.63	0.992
8	19.187	19.431	23.9	-4.5	23.9	-4.5	303.8	0.995	11.65	0.994
9	17.729	18.075	23.2	-5.4	23.2	-5.4	303.1	1.000	11.94	0.990
10	15.789	16.294	27.7	-5.6	27.7	-5.6	304.6	0.999	12.17	0.987
11	15.306	15.847	29.2	-3.8	29.2	-3.8	305.5	1.001	12.31	0.987

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	151.0	123.1	151.0	123.1	144.9	123.1	42.5	1.0	0.	0.
2	152.6	143.3	152.6	143.3	146.6	143.2	42.2	-4.5	0.	0.
3	148.1	148.2	148.1	148.2	142.3	147.7	41.2	-12.4	0.	0.
4	153.8	152.9	153.8	152.9	145.8	152.1	49.1	-15.1	0.	0.
5	154.5	155.0	154.5	155.0	146.1	154.3	50.2	-15.2	0.	0.
6	156.7	157.2	156.7	157.2	147.5	156.5	53.0	-14.9	0.	0.
7	158.4	159.0	158.4	159.0	146.2	158.4	60.9	-14.1	0.	0.
8	160.2	160.9	160.2	160.9	146.4	160.4	64.9	-12.7	0.	0.
9	173.6	173.9	173.6	173.9	159.6	173.1	68.5	-16.3	0.	0.
10	187.2	190.5	187.2	190.5	165.7	189.6	87.0	-18.5	0.	0.
11	194.0	201.2	194.0	201.2	169.3	200.7	94.8	-13.3	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.442	0.357	0.442	0.357	0.424	0.357	0.849	0.442
2	0.448	0.419	0.448	0.419	0.430	0.419	0.977	0.448
3	0.435	0.435	0.435	0.435	0.418	0.433	1.038	0.435
4	0.452	0.449	0.452	0.449	0.428	0.447	1.044	0.452
5	0.454	0.455	0.454	0.455	0.429	0.453	1.056	0.454
6	0.460	0.461	0.460	0.461	0.433	0.459	1.061	0.460
7	0.464	0.467	0.464	0.467	0.428	0.465	1.084	0.464
8	0.468	0.472	0.468	0.472	0.428	0.470	1.096	0.468
9	0.510	0.511	0.510	0.511	0.469	0.509	1.085	0.510
10	0.551	0.562	0.551	0.562	0.488	0.559	1.144	0.551
11	0.572	0.594	0.572	0.594	0.499	0.592	1.186	0.572

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	-19.9	-26.2	13.0	0.291	0.	0.339	0.339	0.131	0.131
2	10.00	-18.3	-24.6	9.6	0.177	0.	0.115	0.115	0.043	0.043
3	30.00	-16.7	-23.1	4.9	0.126	0.	0.050	0.050	0.018	0.018
4	45.00	-14.9	-21.3	3.7	0.142	0.	0.072	0.072	0.023	0.023
5	47.50	-14.8	-21.1	3.7	0.133	0.	0.055	0.055	0.018	0.018
6	50.00	-14.1	-20.5	3.9	0.135	0.	0.056	0.056	0.018	0.018
7	52.50	-11.5	-17.8	4.2	0.144	0.	0.055	0.055	0.017	0.017
8	55.00	-10.4	-16.8	4.7	0.145	0.	0.046	0.046	0.014	0.014
9	70.00	-12.6	-18.9	3.7	0.138	0.	0.060	0.060	0.017	0.017
10	90.00	-11.3	-17.5	3.7	0.126	0.	0.068	0.068	0.017	0.017
11	95.00	-10.9	-17.2	5.6	0.100	0.	0.064	0.064	0.016	0.016

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(m) 70 Percent of design speed; reading number 1069

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	23.7	-0.1	23.7	-0.1	307.6	0.997	11.92	0.984
2	23.505	23.525	21.8	-1.9	21.8	-1.9	305.1	1.001	11.94	0.996
3	21.605	21.714	23.2	-5.3	23.2	-5.3	303.4	1.001	11.94	0.996
4	20.157	20.343	25.2	-5.9	25.2	-5.9	303.9	0.999	11.98	0.996
5	19.914	20.114	25.8	-5.8	25.8	-5.8	304.1	0.999	11.98	0.996
6	19.672	19.886	26.8	-5.7	26.8	-5.7	304.7	0.998	12.03	0.995
7	19.428	19.657	28.8	-5.2	28.8	-5.2	305.6	0.997	12.07	0.992
8	19.187	19.431	29.4	-4.7	29.4	-4.7	306.3	0.996	12.09	0.993
9	17.729	18.075	29.5	-5.2	29.5	-5.2	305.2	1.000	12.20	0.999
10	15.789	16.294	32.7	-5.7	32.7	-5.7	306.1	1.000	12.36	0.994
11	15.306	15.847	34.0	-3.6	34.0	-3.6	307.1	1.001	12.51	0.990

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	149.1	124.3	149.1	124.3	136.5	124.3	59.9	-0.3	0.	0.
2	149.4	132.4	149.4	132.4	138.7	132.4	55.5	-4.5	0.	0.
3	145.3	132.3	145.3	132.3	133.5	131.7	57.3	-12.3	0.	0.
4	148.0	135.0	148.0	135.0	133.9	134.2	63.1	-13.8	0.	0.
5	148.2	135.5	148.2	135.5	133.4	134.8	64.6	-13.6	0.	0.
6	151.0	137.3	151.0	137.3	134.8	136.6	68.0	-13.6	0.	0.
7	153.4	138.3	153.4	138.3	134.4	137.7	73.8	-12.6	0.	0.
8	155.3	140.0	155.3	140.0	135.3	139.6	76.2	-11.5	0.	0.
9	162.3	150.8	162.3	150.8	141.3	150.2	79.9	-13.7	0.	0.
10	174.9	162.9	174.9	162.9	147.2	162.1	94.5	-16.3	0.	0.
11	183.3	171.4	183.3	171.4	151.9	171.1	102.6	-10.8	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.432	0.358	0.432	0.358	0.396	0.358	0.910	0.432
2	0.435	0.384	0.435	0.384	0.404	0.383	0.954	0.435
3	0.424	0.384	0.424	0.384	0.389	0.383	0.986	0.424
4	0.431	0.392	0.431	0.392	0.390	0.390	1.003	0.431
5	0.432	0.394	0.432	0.394	0.389	0.392	1.011	0.432
6	0.440	0.399	0.440	0.399	0.393	0.397	1.013	0.440
7	0.446	0.402	0.446	0.402	0.391	0.400	1.025	0.446
8	0.452	0.407	0.452	0.407	0.393	0.405	1.032	0.452
9	0.474	0.439	0.474	0.439	0.412	0.437	1.063	0.474
10	0.512	0.475	0.512	0.475	0.430	0.473	1.101	0.512
11	0.537	0.500	0.537	0.500	0.445	0.499	1.127	0.537

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	-12.5	-18.8	12.4	0.323	0.	0.134	0.134	0.052	0.052
2	10.00	-12.5	-18.9	9.4	0.266	0.	0.032	0.032	0.012	0.012
3	30.00	-9.6	-16.0	4.4	0.257	0.	0.030	0.030	0.011	0.011
4	45.00	-8.3	-14.6	3.5	0.257	0.	0.031	0.031	0.010	0.010
5	47.50	-7.9	-14.2	3.5	0.255	0.	0.030	0.030	0.010	0.010
6	50.00	-7.1	-13.5	3.6	0.263	0.	0.042	0.042	0.013	0.013
7	52.50	-5.4	-11.7	4.1	0.275	0.	0.059	0.059	0.019	0.019
8	55.00	-4.9	-11.3	4.5	0.273	0.	0.053	0.053	0.017	0.017
9	70.00	-6.3	-12.6	3.9	0.236	0.	0.009	0.009	0.002	0.002
10	90.00	-6.3	-12.5	3.5	0.229	0.	0.035	0.035	0.009	0.009
11	95.00	-6.1	-12.3	5.8	0.217	0.	0.055	0.055	0.014	0.014

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(n) 70 Percent of design speed; reading number 1070

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	30.4	0.1	30.4	0.1	312.2	0.996	12.41	0.988
2	23.505	23.525	28.6	-1.7	28.6	-1.7	309.2	1.000	12.39	0.997
3	21.605	21.714	28.8	-4.9	28.8	-4.9	306.4	1.000	12.27	1.000
4	20.157	20.343	30.5	-5.4	30.5	-5.4	306.6	1.000	12.29	0.997
5	19.914	20.114	31.6	-5.2	31.6	-5.2	306.8	0.999	12.30	0.997
6	19.672	19.886	32.0	-4.8	32.0	-4.8	307.1	0.999	12.35	0.992
7	19.428	19.657	33.7	-4.3	33.7	-4.3	308.0	0.997	12.35	0.994
8	19.187	19.431	34.7	-3.9	34.7	-3.9	308.2	0.997	12.35	0.996
9	17.729	18.075	34.1	-4.5	34.1	-4.5	307.3	0.999	12.45	0.994
10	15.789	16.294	36.6	-4.9	36.6	-4.9	307.6	0.999	12.56	0.995
11	15.306	15.847	38.0	-2.8	38.0	-2.8	308.6	1.000	12.69	0.984

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	151.1	122.0	151.1	122.0	130.4	122.0	76.4	0.1	0.	0.
2	149.0	127.0	149.0	127.0	130.9	127.0	71.3	-3.7	0.	0.
3	140.8	122.1	140.8	122.1	123.4	121.6	67.8	-10.5	0.	0.
4	143.5	122.1	143.5	122.1	123.6	121.5	72.9	-11.5	0.	0.
5	144.5	122.7	144.5	122.7	123.1	122.2	75.6	-11.1	0.	0.
6	148.1	123.3	148.1	123.3	125.5	122.8	78.6	-10.4	0.	0.
7	148.2	124.5	148.2	124.5	123.3	124.1	82.3	-9.2	0.	0.
8	149.1	125.7	149.1	125.7	122.6	125.4	84.9	-8.6	0.	0.
9	157.9	133.0	157.9	133.0	130.7	132.5	88.5	-10.4	0.	0.
10	169.7	144.7	169.7	144.7	136.1	144.2	101.3	-12.4	0.	0.
11	177.4	147.9	177.4	147.9	139.7	147.7	109.3	-7.3	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.435	0.350	0.435	0.350	0.375	0.350	0.936	0.440
2	0.431	0.365	0.431	0.365	0.378	0.365	0.970	0.431
3	0.408	0.352	0.408	0.352	0.358	0.351	0.985	0.408
4	0.416	0.352	0.416	0.352	0.358	0.351	0.983	0.421
5	0.419	0.354	0.419	0.354	0.357	0.353	0.993	0.450
6	0.429	0.356	0.429	0.356	0.364	0.354	0.979	0.468
7	0.429	0.359	0.429	0.359	0.357	0.358	1.007	0.498
8	0.432	0.363	0.432	0.363	0.355	0.362	1.023	0.515
9	0.459	0.384	0.459	0.384	0.380	0.383	1.014	0.502
10	0.494	0.419	0.494	0.419	0.397	0.418	1.059	0.531
11	0.517	0.428	0.517	0.428	0.407	0.427	1.057	0.568

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	-5.8	-12.2	12.6	0.388	0.	0.103	0.103	0.040	0.040
2	10.00	-5.8	-12.1	9.7	0.339	0.	0.025	0.025	0.009	0.009
3	30.00	-4.1	-10.4	4.8	0.327	0.	-0.003	-0.003	-0.001	-0.001
4	45.00	-3.0	-9.3	4.0	0.341	0.	0.025	0.025	0.008	0.008
5	47.50	-2.1	-8.5	4.1	0.343	0.	0.025	0.025	0.008	0.008
6	50.00	-1.9	-8.2	4.5	0.358	0.	0.063	0.063	0.020	0.020
7	52.50	-0.4	-6.7	5.0	0.354	0.	0.049	0.049	0.015	0.015
8	55.00	0.4	-6.0	5.3	0.351	0.	0.035	0.035	0.011	0.011
9	70.00	-1.7	-8.0	4.6	0.337	0.	0.041	0.041	0.012	0.012
10	90.00	-2.3	-8.6	4.3	0.317	0.	0.033	0.033	0.009	0.009
11	95.00	-2.1	-8.3	6.5	0.328	0.	0.093	0.093	0.025	0.025

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(o) 70 Percent of design speed; reading number 1071

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	36.0	1.1	36.0	1.1	315.4	0.997	12.76	0.991
2	23.505	23.525	32.9	0.3	32.9	0.3	312.6	1.000	12.76	0.996
3	21.605	21.714	34.3	-3.2	34.3	-3.2	309.7	0.999	12.60	0.996
4	20.157	20.343	36.4	-3.1	36.4	-3.1	309.1	1.000	12.53	0.997
5	19.914	20.114	36.9	-2.8	36.9	-2.8	309.4	0.999	12.58	0.993
6	19.672	19.886	37.9	-2.6	37.9	-2.6	309.9	0.999	12.59	0.992
7	19.428	19.657	39.2	-2.4	39.2	-2.4	310.4	0.997	12.58	0.993
8	19.187	19.431	40.8	-2.3	40.8	-2.3	310.7	0.997	12.58	0.993
9	17.729	18.075	38.4	-3.1	38.4	-3.1	309.5	0.998	12.66	0.991
10	15.789	16.294	39.8	-2.7	39.8	-2.7	308.8	0.999	12.72	0.995
11	15.306	15.847	41.2	-0.5	41.2	-0.5	309.6	1.000	12.82	0.978

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	150.4	120.1	150.4	120.1	121.7	120.1	88.4	2.3	0.	0.
2	150.7	123.0	150.7	123.0	126.6	123.0	81.8	0.7	0.	0.
3	141.0	113.6	141.0	113.6	116.5	113.5	79.5	-6.4	0.	0.
4	141.4	112.2	141.4	112.2	113.8	112.0	83.9	-6.0	0.	0.
5	143.9	112.1	143.9	112.1	115.2	111.9	86.4	-5.4	0.	0.
6	145.5	112.6	145.5	112.6	114.7	112.5	89.5	-5.1	0.	0.
7	145.6	113.1	145.6	113.1	112.8	113.0	92.1	-4.7	0.	0.
8	146.9	113.4	146.9	113.4	111.1	113.3	96.0	-4.5	0.	0.
9	155.7	118.5	155.7	118.5	122.0	118.4	96.8	-6.3	0.	0.
10	165.3	129.9	165.3	129.9	126.9	129.8	105.9	-6.1	0.	0.
11	172.4	125.9	172.4	125.9	129.7	125.9	113.5	-1.1	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.430	0.342	0.430	0.342	0.348	0.342	0.987	0.552
2	0.433	0.351	0.433	0.351	0.364	0.351	0.972	0.515
3	0.406	0.326	0.406	0.326	0.336	0.325	0.974	0.507
4	0.408	0.322	0.408	0.322	0.328	0.321	0.984	0.526
5	0.415	0.321	0.415	0.321	0.332	0.321	0.972	0.540
6	0.420	0.323	0.420	0.323	0.331	0.322	0.980	0.559
7	0.419	0.324	0.419	0.324	0.325	0.324	1.002	0.574
8	0.423	0.325	0.423	0.325	0.320	0.325	1.020	0.599
9	0.451	0.340	0.451	0.340	0.353	0.340	0.970	0.576
10	0.480	0.374	0.480	0.374	0.369	0.374	1.023	0.586
11	0.501	0.361	0.501	0.361	0.377	0.361	0.970	0.619

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	-0.2	-6.5	13.7	0.423	0.	0.073	0.073	0.028	0.028
2	10.00	-1.5	-7.8	11.7	0.389	0.	0.057	0.057	0.014	0.014
3	30.00	1.5	-4.9	6.5	0.407	0.	0.037	0.037	0.013	0.013
4	45.00	2.9	-3.5	6.3	0.413	0.	0.025	0.025	0.008	0.008
5	47.50	3.2	-3.2	6.6	0.426	0.	0.063	0.063	0.020	0.020
6	50.00	4.0	-2.3	6.7	0.432	0.	0.069	0.069	0.022	0.022
7	52.50	5.1	-1.2	6.9	0.431	0.	0.062	0.062	0.020	0.020
8	55.00	6.5	0.1	7.0	0.440	0.	0.061	0.061	0.019	0.019
9	70.00	2.6	-3.7	6.0	0.428	0.	0.069	0.069	0.020	0.020
10	90.00	0.9	-5.4	6.6	0.386	0.	0.035	0.035	0.009	0.009
11	95.00	1.0	-5.2	8.8	0.433	0.	0.140	0.140	0.035	0.035

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(p) 70 Percent of design speed; reading number 1072

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	45.5	3.9	45.5	3.9	320.7	0.993	13.04	0.987
2	23.505	23.525	40.5	2.3	40.5	2.3	317.2	0.999	13.02	0.990
3	21.605	21.714	40.5	-1.4	40.5	-1.4	313.0	0.998	12.82	0.992
4	20.157	20.343	42.0	-0.9	42.0	-0.9	312.1	0.999	12.77	0.989
5	19.914	20.114	43.0	-0.9	43.0	-0.9	312.0	0.999	12.77	0.989
6	19.672	19.886	44.5	-0.7	44.5	-0.7	312.1	0.999	12.77	0.988
7	19.428	19.657	46.2	-0.8	46.2	-0.8	312.4	0.997	12.75	0.989
8	19.187	19.431	47.3	-0.7	47.3	-0.7	312.6	0.997	12.73	0.990
9	17.729	18.075	42.7	-0.3	42.7	-0.3	310.8	0.999	12.78	0.988
10	15.789	16.294	42.0	-0.6	42.0	-0.6	309.4	1.000	12.82	0.992
11	15.306	15.847	43.1	0.9	43.1	0.9	310.2	1.000	12.91	0.975

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	152.3	115.7	152.3	115.7	106.7	115.4	108.6	7.8	0.	0.
2	151.3	117.1	151.3	117.1	115.2	117.0	98.2	4.8	0.	0.
3	141.7	105.9	141.7	105.9	107.8	105.9	92.0	-2.5	0.	0.
4	142.9	102.0	142.9	102.0	106.2	102.0	95.6	-1.5	0.	0.
5	143.5	101.8	143.5	101.8	104.9	101.8	97.9	-1.6	0.	0.
6	143.6	101.2	143.6	101.2	102.4	101.2	100.7	-1.2	0.	0.
7	143.8	101.2	143.8	101.2	99.5	101.2	103.8	-1.5	0.	0.
8	144.0	101.6	144.0	101.6	97.6	101.6	105.9	-1.2	0.	0.
9	152.3	105.5	152.3	105.5	111.9	105.5	103.4	-0.5	0.	0.
10	161.0	116.4	161.0	116.4	119.7	116.3	107.6	-1.3	0.	0.
11	168.4	110.0	168.4	110.0	122.9	110.0	115.2	1.8	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS
RP	IN	OUT	IN	OUT	IN	OUT	VEL R MACH NO
1	0.432	0.327	0.432	0.327	0.303	0.326	1.082 0.696
2	0.432	0.332	0.432	0.332	0.329	0.331	1.016 0.632
3	0.406	0.302	0.406	0.302	0.309	0.302	0.983 0.596
4	0.410	0.291	0.410	0.291	0.305	0.291	0.961 0.610
5	0.412	0.290	0.412	0.290	0.301	0.290	0.970 0.624
6	0.412	0.288	0.412	0.288	0.294	0.288	0.988 0.643
7	0.413	0.288	0.413	0.288	0.286	0.288	1.017 0.663
8	0.413	0.290	0.413	0.290	0.280	0.290	1.041 0.677
9	0.439	0.301	0.439	0.301	0.323	0.301	0.943 0.629
10	0.466	0.334	0.466	0.334	0.347	0.334	0.972 0.607
11	0.488	0.315	0.488	0.315	0.356	0.315	0.895 0.639

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	9.3	3.0	16.5	0.496	0.	0.112	0.112	0.043	0.043
2	10.00	6.1	-0.3	13.7	0.461	0.	0.083	0.083	0.031	0.031
3	30.00	7.6	1.3	8.4	0.485	0.	0.076	0.078	0.027	0.027
4	45.00	8.5	2.1	8.5	0.507	0.	0.099	0.099	0.032	0.032
5	47.50	9.3	2.9	8.4	0.513	0.	0.103	0.103	0.033	0.033
6	50.00	10.6	4.3	8.6	0.520	0.	0.109	0.109	0.035	0.035
7	52.50	12.1	5.7	8.4	0.525	0.	0.100	0.100	0.031	0.031
8	55.00	13.0	6.7	8.6	0.525	0.	0.088	0.088	0.027	0.027
9	70.00	6.9	0.6	8.8	0.502	0.	0.098	0.098	0.028	0.028
10	90.00	3.0	-3.3	8.6	0.449	0.	0.056	0.056	0.014	0.014
11	95.00	3.0	-3.2	10.3	0.512	0.	0.165	0.165	0.041	0.041

TABLE VIII. - Continued. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

(q) 60 Percent of design speed; reading number 1073

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	49.6	4.9	49.6	4.9	313.5	0.993	12.25	0.986
2	23.505	23.525	42.1	2.6	42.1	2.6	310.6	0.997	12.19	0.992
3	21.605	21.714	39.9	-1.6	39.9	-1.6	306.2	0.999	12.05	0.994
4	20.157	20.343	41.8	-0.7	41.8	-0.7	305.6	0.999	12.02	0.993
5	19.914	20.114	42.5	-0.7	42.5	-0.7	305.7	0.999	12.02	0.991
6	19.672	19.886	44.1	-0.8	44.1	-0.8	305.5	0.999	12.01	0.991
7	19.428	19.657	45.6	-1.0	45.6	-1.0	305.9	0.997	12.00	0.992
8	19.187	19.431	47.1	-1.0	47.1	-1.0	306.1	0.997	12.00	0.992
9	17.729	18.075	42.8	-0.4	42.8	-0.4	304.5	1.000	12.02	0.992
10	15.789	16.294	41.9	-0.5	41.9	-0.5	303.6	1.000	12.08	0.993
11	15.306	15.847	42.9	0.8	42.9	0.8	304.0	1.001	12.10	0.984

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	131.9	98.5	131.9	98.5	85.5	98.1	100.4	8.4	0.	0.
2	128.3	98.9	128.3	98.9	95.1	98.8	86.1	4.4	0.	0.
3	120.3	90.2	120.3	90.2	92.2	90.1	77.2	-2.6	0.	0.
4	121.5	87.1	121.5	87.1	90.6	87.1	81.0	-1.1	0.	0.
5	122.6	86.5	122.6	86.5	90.4	86.5	82.8	-1.1	0.	0.
6	122.2	86.4	122.2	86.4	87.8	86.4	85.0	-1.3	0.	0.
7	122.7	86.4	122.7	86.4	85.8	86.4	87.6	-1.5	0.	0.
8	123.0	86.3	123.0	86.3	83.8	86.2	90.0	-1.4	0.	0.
9	129.3	90.2	129.3	90.2	94.9	90.2	87.9	-0.6	0.	0.
10	138.9	100.6	138.9	100.6	103.3	100.6	92.8	-0.8	0.	0.
11	143.2	95.4	143.2	95.4	104.9	95.3	97.6	1.4	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.377	0.281	0.377	0.281	0.244	0.280	1.147	0.660
2	0.368	0.283	0.368	0.283	0.273	0.282	1.039	0.560
3	0.347	0.259	0.347	0.259	0.266	0.259	0.977	0.503
4	0.351	0.250	0.351	0.250	0.262	0.250	0.961	0.520
5	0.354	0.248	0.354	0.248	0.261	0.248	0.956	0.530
6	0.353	0.248	0.353	0.248	0.254	0.248	0.984	0.545
7	0.354	0.248	0.354	0.248	0.248	0.248	1.007	0.562
8	0.355	0.248	0.355	0.248	0.242	0.248	1.029	0.578
9	0.375	0.260	0.375	0.260	0.275	0.260	0.950	0.537
10	0.404	0.290	0.404	0.290	0.300	0.290	0.974	0.526
11	0.417	0.275	0.417	0.275	0.305	0.275	0.909	0.542

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	13.4	7.1	17.4	0.524	0.	0.149	0.149	0.058	0.058
2	10.00	7.8	1.4	13.9	0.470	0.	0.092	0.092	0.035	0.035
3	30.00	7.1	0.7	8.1	0.482	0.	0.070	0.070	0.024	0.024
4	45.00	8.3	1.9	8.6	0.503	0.	0.092	0.092	0.030	0.030
5	47.50	8.8	2.4	8.6	0.514	0.	0.110	0.110	0.035	0.035
6	50.00	10.2	3.8	8.5	0.517	0.	0.103	0.103	0.033	0.033
7	52.50	11.5	5.2	8.3	0.523	0.	0.102	0.102	0.032	0.032
8	55.00	12.7	6.4	8.3	0.529	0.	0.099	0.099	0.031	0.031
9	70.00	7.0	0.7	8.7	0.498	0.	0.090	0.090	0.026	0.026
10	90.00	3.0	-3.3	8.8	0.446	0.	0.063	0.063	0.016	0.016
11	95.00	2.8	-3.4	10.2	0.499	0.	0.146	0.146	0.036	0.036

TABLE VIII. - Concluded. BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 11

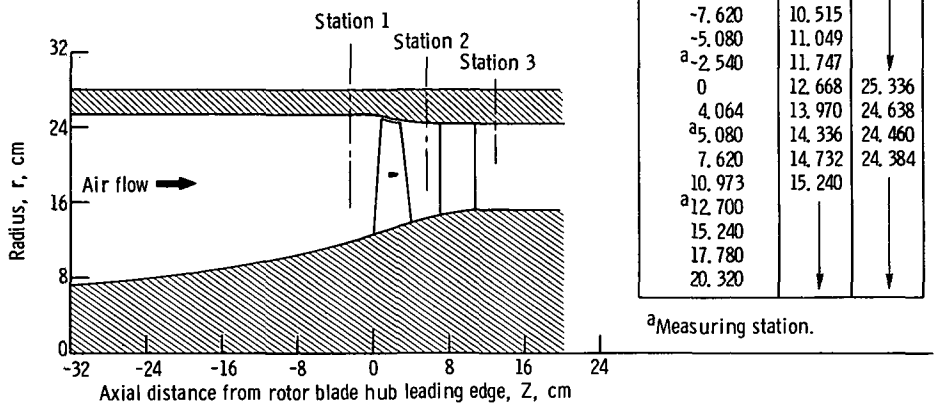
(r) 50 Percent of design speed; reading number 1074

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	23.973	23.967	50.5	6.0	50.5	6.0	305.9	0.996	11.59	0.989
2	23.505	23.525	43.0	3.4	43.0	3.4	304.1	0.998	11.54	0.995
3	21.605	21.714	40.0	-1.4	40.0	-1.4	300.9	0.999	11.45	0.996
4	20.157	20.343	41.9	-0.2	41.9	-0.2	300.3	0.999	11.43	0.994
5	19.914	20.114	42.5	-0.3	42.5	-0.3	300.3	0.999	11.43	0.994
6	19.672	19.886	44.2	-0.4	44.2	-0.4	300.4	0.999	11.42	0.994
7	19.428	19.657	45.7	-0.5	45.7	-0.5	300.3	0.999	11.41	0.994
8	19.187	19.431	47.2	-0.5	47.2	-0.5	300.4	0.998	11.41	0.995
9	17.729	18.075	43.2	-0.3	43.2	-0.3	299.7	0.999	11.43	0.994
10	15.789	16.294	41.6	-0.4	41.6	-0.4	298.8	1.000	11.47	0.996
11	15.306	15.847	42.8	0.8	42.8	0.8	299.1	1.001	11.50	0.988

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	109.4	81.3	109.4	81.3	69.7	80.9	84.4	8.5	0.	0.
2	106.5	82.8	106.5	82.8	77.9	82.7	72.7	5.0	0.	0.
3	100.6	75.1	100.6	75.1	77.0	75.1	64.7	-1.8	0.	0.
4	101.7	72.5	101.7	72.5	75.6	72.5	67.9	-0.2	0.	0.
5	102.2	72.1	102.2	72.1	75.4	72.1	69.0	-0.3	0.	0.
6	102.3	71.7	102.3	71.7	73.3	71.7	71.3	-0.5	0.	0.
7	101.6	71.7	101.6	71.7	70.9	71.7	72.8	-0.6	0.	0.
8	101.9	71.7	101.9	71.7	69.2	71.7	74.8	-0.7	0.	0.
9	108.2	75.3	108.2	75.3	78.8	75.2	74.1	-0.4	0.	0.
10	116.1	84.4	116.1	84.4	86.8	84.4	77.1	-0.6	0.	0.
11	120.5	80.1	120.5	80.1	88.4	80.1	81.8	1.1	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.315	0.234	0.315	0.234	0.201	0.232	1.161	0.561
2	0.308	0.239	0.308	0.239	0.225	0.238	1.062	0.477
3	0.292	0.217	0.292	0.217	0.223	0.217	0.975	0.424
4	0.295	0.210	0.295	0.210	0.220	0.210	0.959	0.438
5	0.297	0.209	0.297	0.209	0.219	0.209	0.957	0.444
6	0.297	0.208	0.297	0.208	0.213	0.208	0.978	0.460
7	0.295	0.208	0.295	0.208	0.206	0.208	1.011	0.470
8	0.296	0.207	0.296	0.207	0.201	0.207	1.035	0.484
9	0.315	0.218	0.315	0.218	0.229	0.218	0.955	0.456
10	0.339	0.245	0.339	0.245	0.253	0.245	0.973	0.436
11	0.352	0.232	0.352	0.232	0.258	0.232	0.906	0.456

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	14.3	7.9	18.5	0.525	0.	0.169	0.169	0.065	0.065
2	10.00	8.7	2.3	14.8	0.463	0.	0.084	0.084	0.032	0.032
3	30.00	7.2	0.8	8.3	0.484	0.	0.076	0.076	0.027	0.027
4	45.00	8.4	2.0	9.2	0.504	0.	0.101	0.101	0.033	0.033
5	47.50	8.8	2.4	9.1	0.512	0.	0.107	0.107	0.035	0.035
6	50.00	10.3	4.0	8.9	0.521	0.	0.109	0.109	0.035	0.035
7	52.50	11.6	5.3	8.8	0.520	0.	0.097	0.097	0.031	0.031
8	55.00	12.9	6.5	8.7	0.526	0.	0.092	0.092	0.028	0.028
9	70.00	7.4	1.1	8.8	0.501	0.	0.092	0.092	0.027	0.027
10	90.00	2.6	-3.6	8.8	0.442	0.	0.053	0.053	0.014	0.014
11	95.00	2.7	-3.6	10.2	0.499	0.	0.148	0.148	0.037	0.037



Flow path coordinates		
Axial distance, Z, cm	Radius, r, cm	
	Inner	Outer
-35.560	7.302	25.400
-30.480	7.302	
-25.400	7.493	
-20.320	8.255	
-15.240	9.144	
-12.700	9.589	
-10.160	10.096	
-7.620	10.515	
-5.080	11.049	
[a]-2.540	11.747	
0	12.668	25.336
4.064	13.970	24.638
[a]5.080	14.336	24.460
7.620	14.732	24.384
10.973	15.240	
[a]12.700		
15.240		
17.780		
20.320		

[a]Measuring station.

Figure 1. - Flow path for stage 16-11 showing axial location of instrumentation.

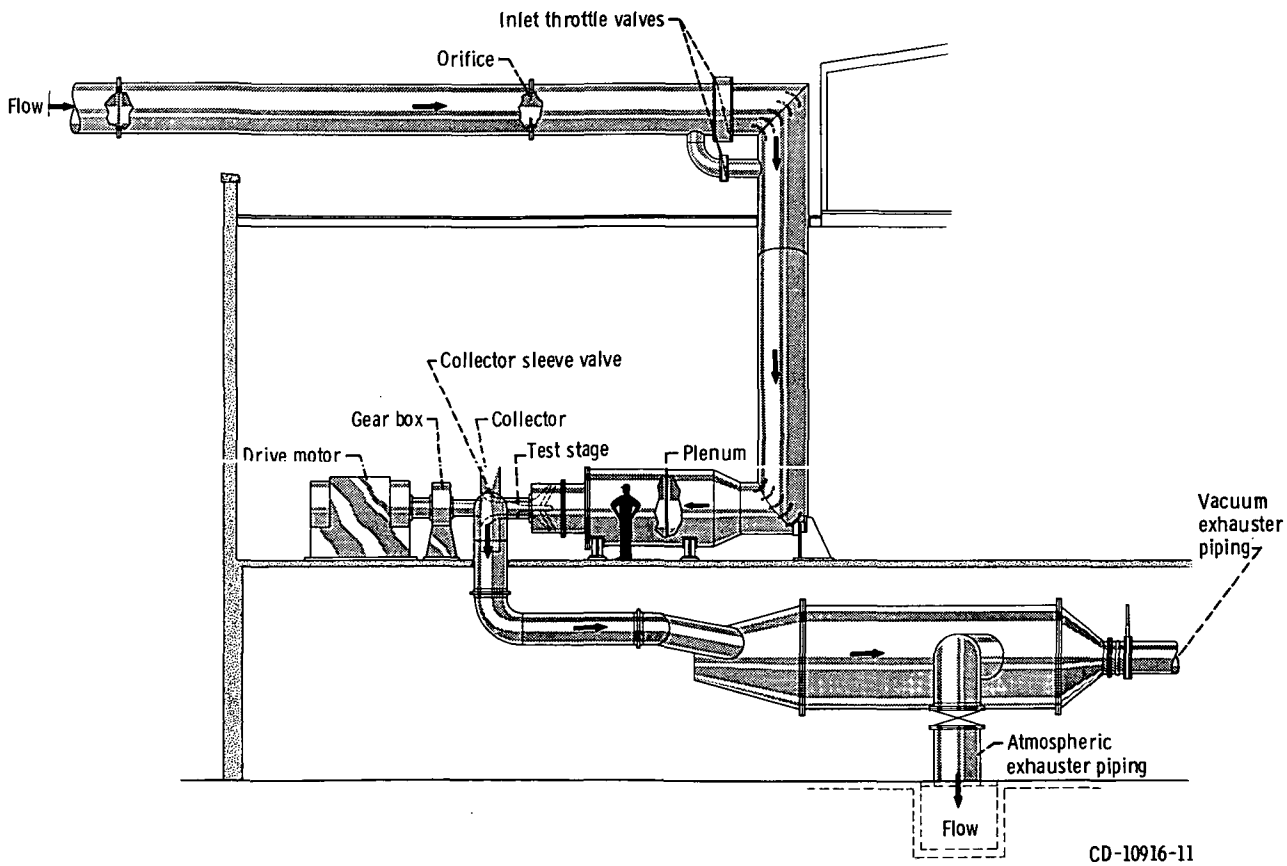


Figure 2. - Compressor test facility.

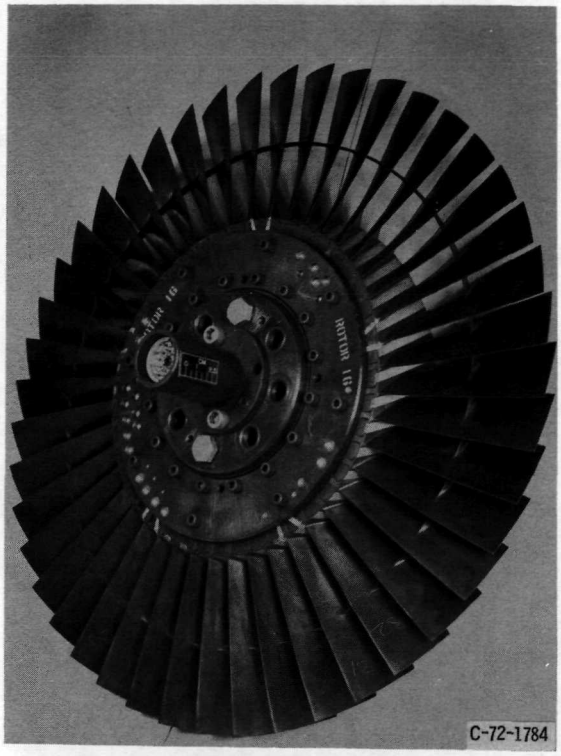


Figure 3. - Rotor 16.

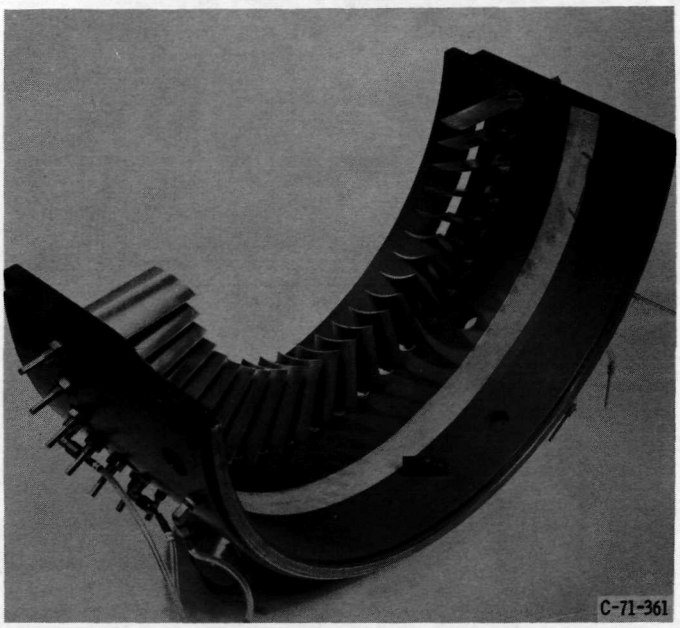
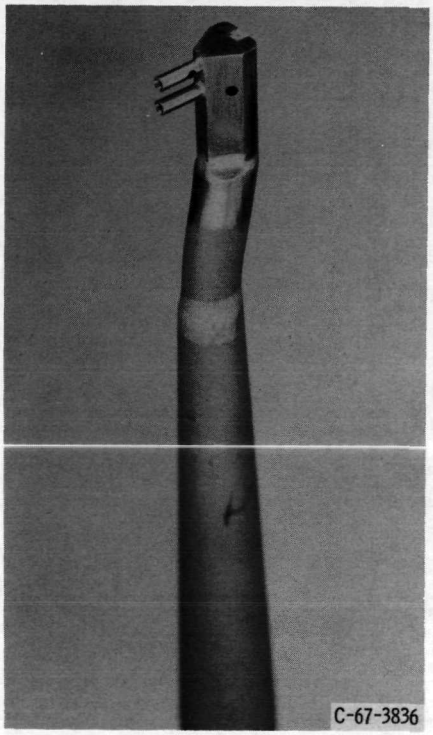
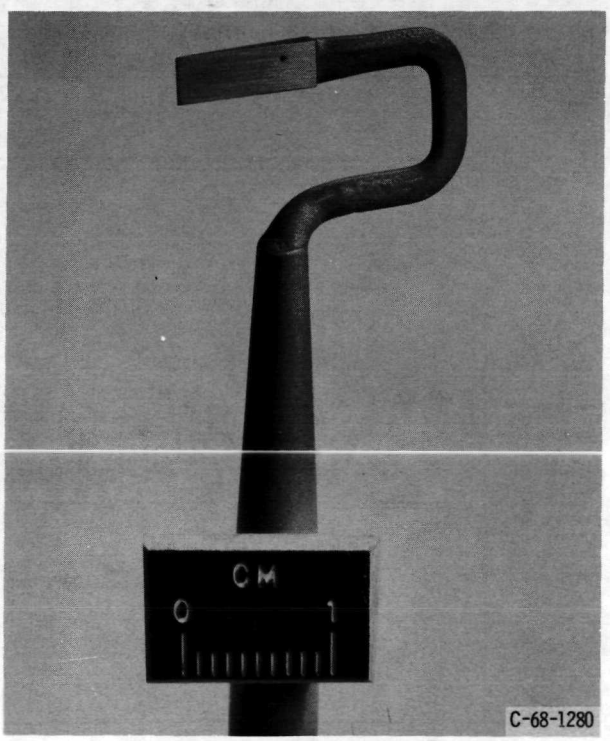


Figure 4. - Stator 11.



(a) Combination probe.



(b) Wedge probe.

Figure 5. - Survey probes.

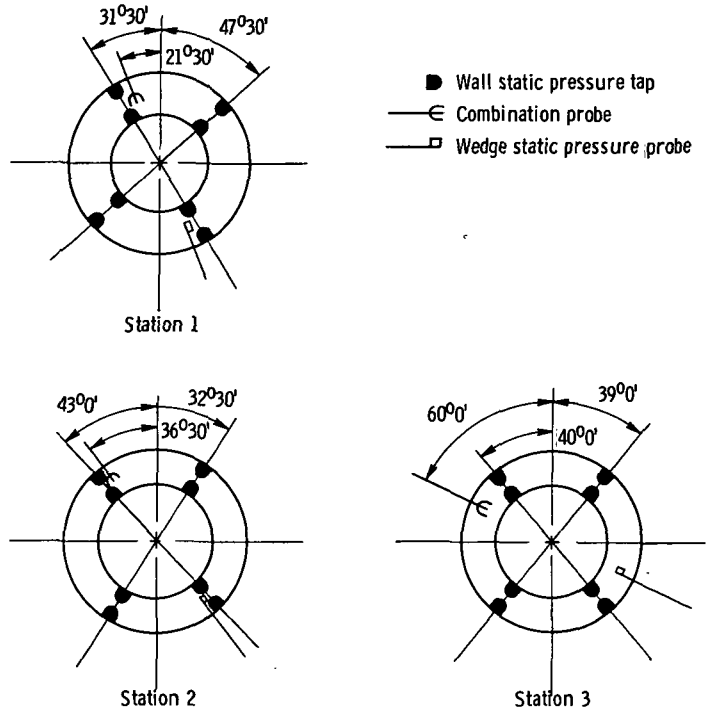


Figure 6. - Circumferential locations of measurements (looking downstream; clockwise rotation).

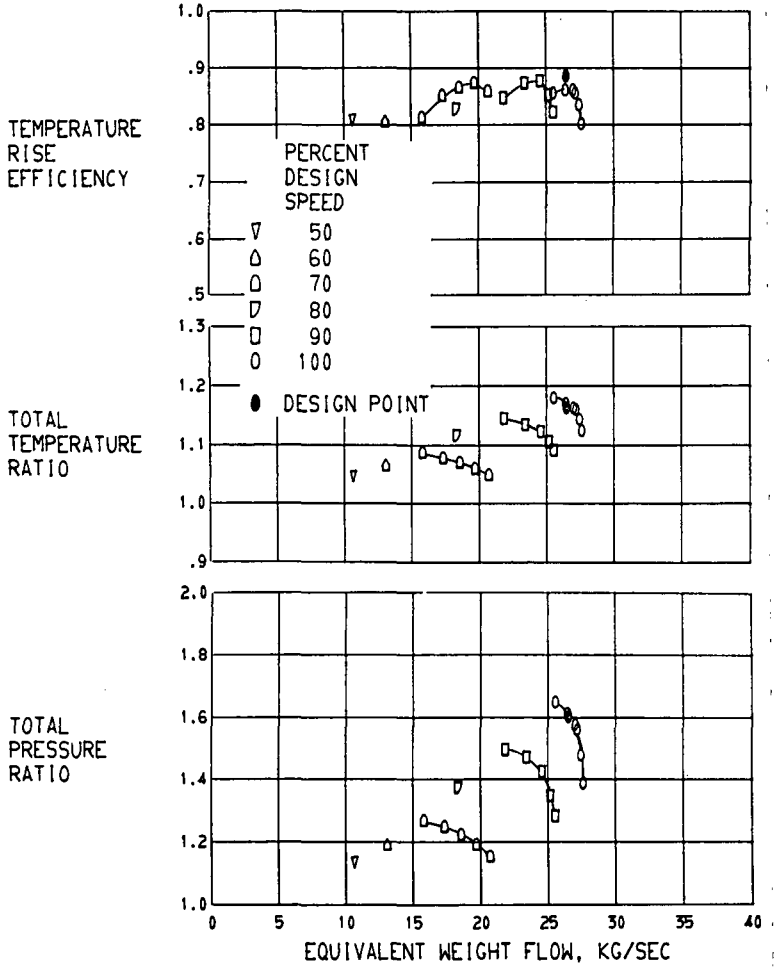


FIGURE 7. - OVERALL PERFORMANCE FOR ROTOR 16.

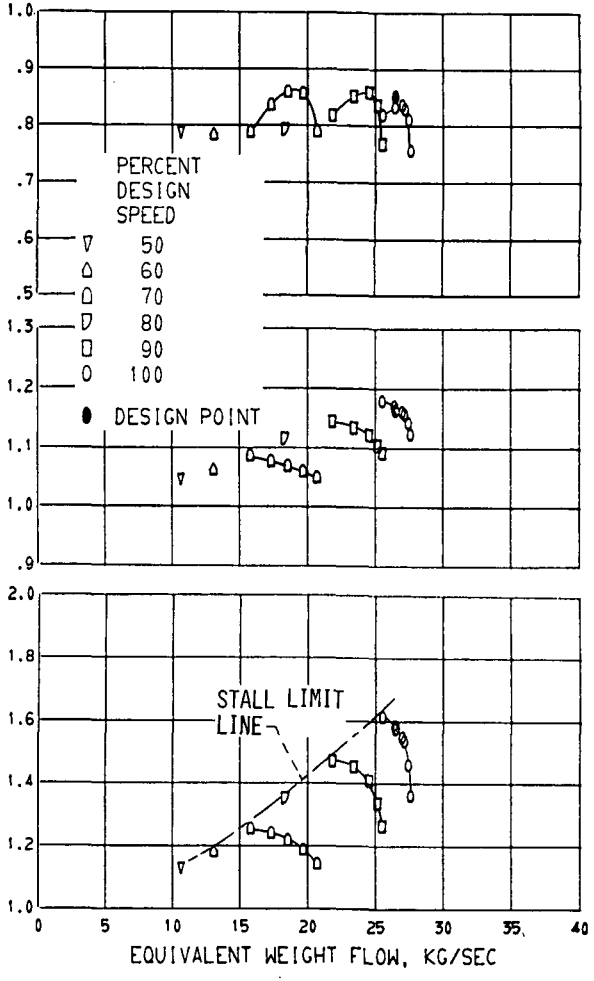


FIGURE 8. - OVERALL PERFORMANCE FOR STAGE 16-11.

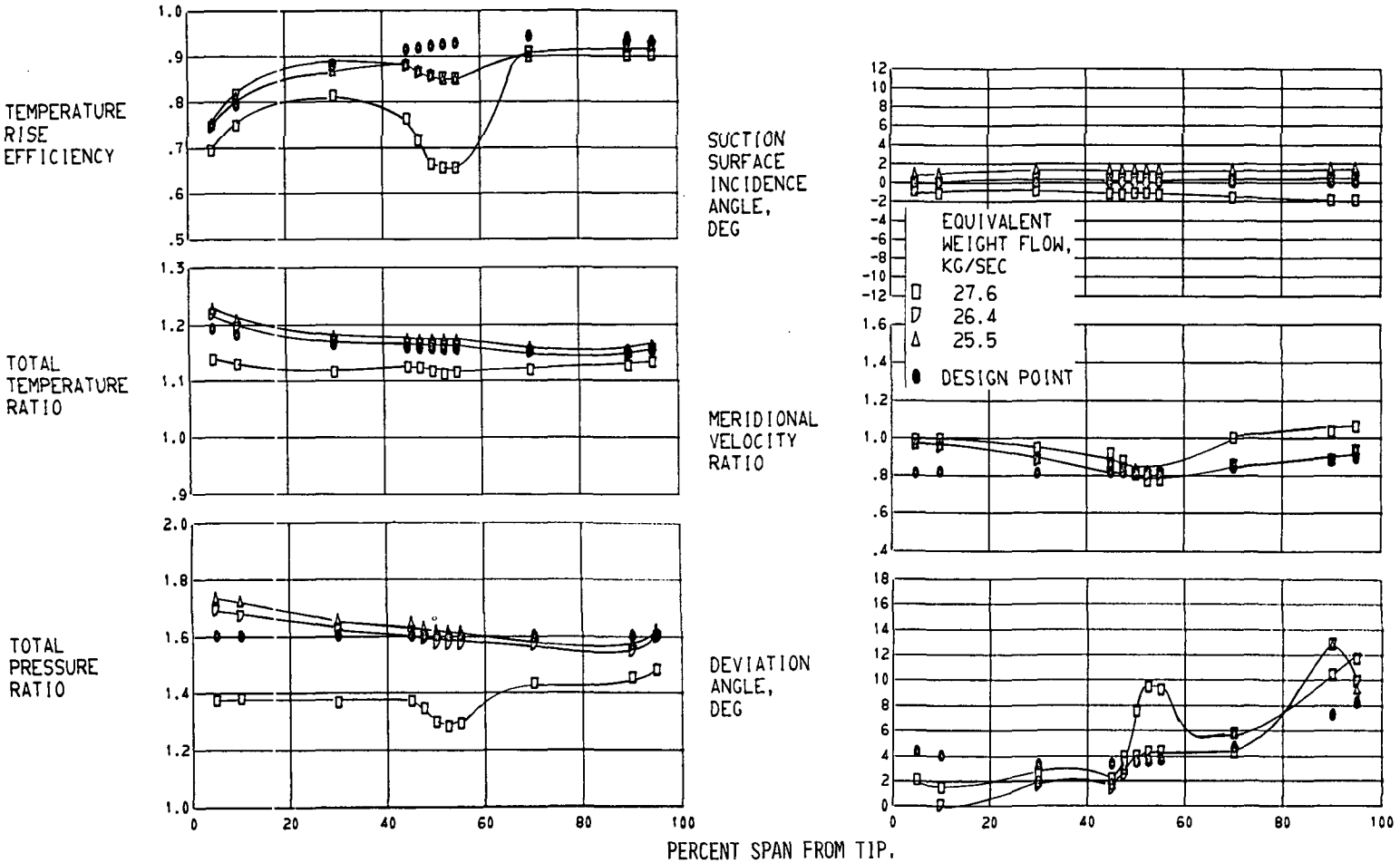


FIGURE 9. - RADIAL DISTRIBUTION OF PERFORMANCE FOR ROTOR 16. 100 PERCENT DESIGN SPEED.

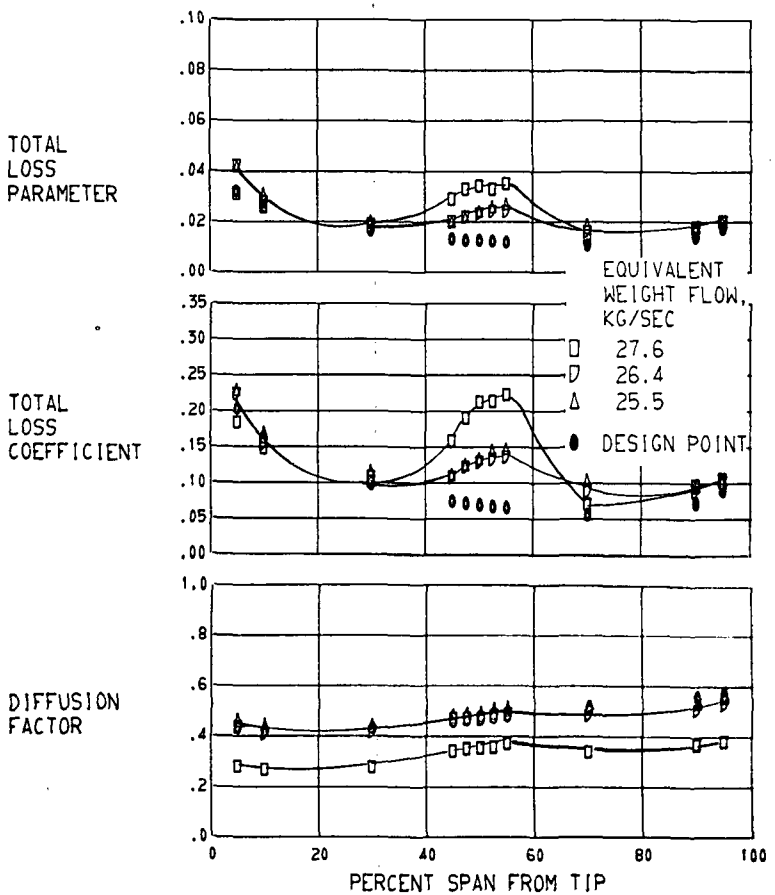


FIGURE 9 .-CONCLUDED. RADIAL DISTRIBUTION OF PERFORMANCE FOR ROTOR 16. 100 PERCENT DESIGN SPEED.

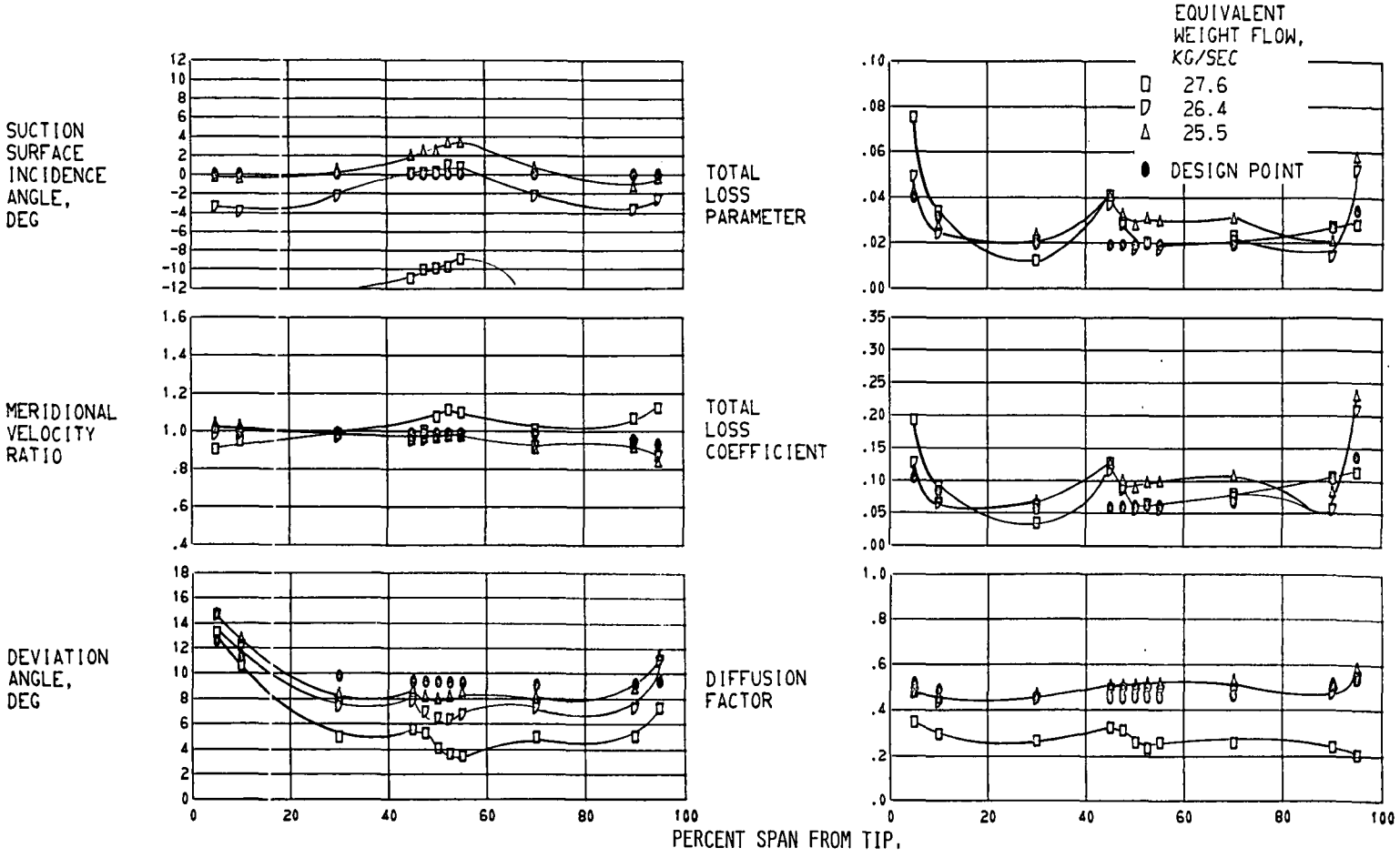
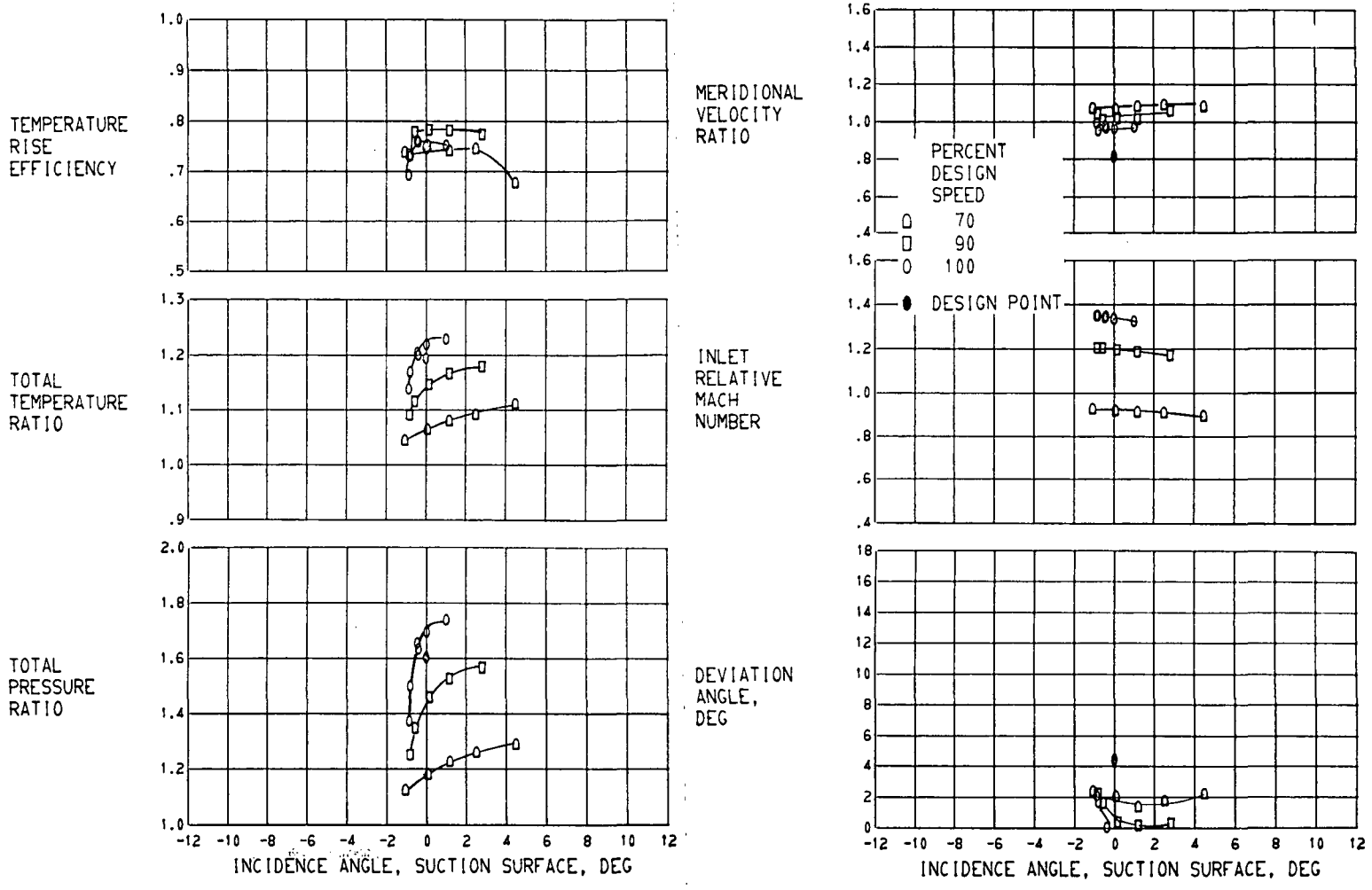
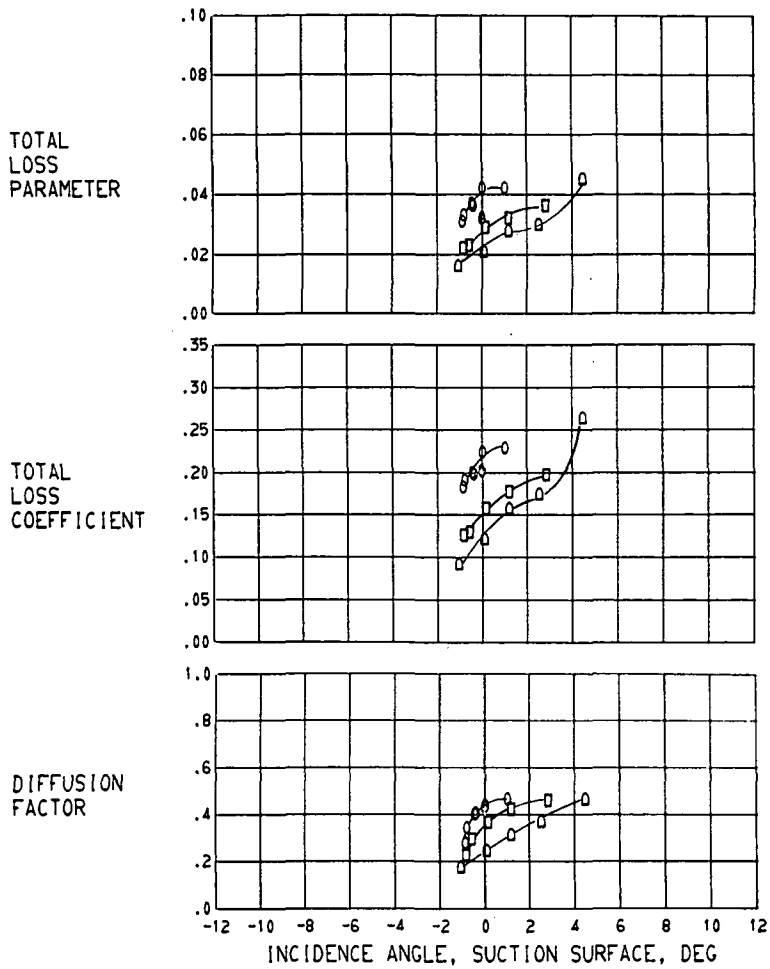


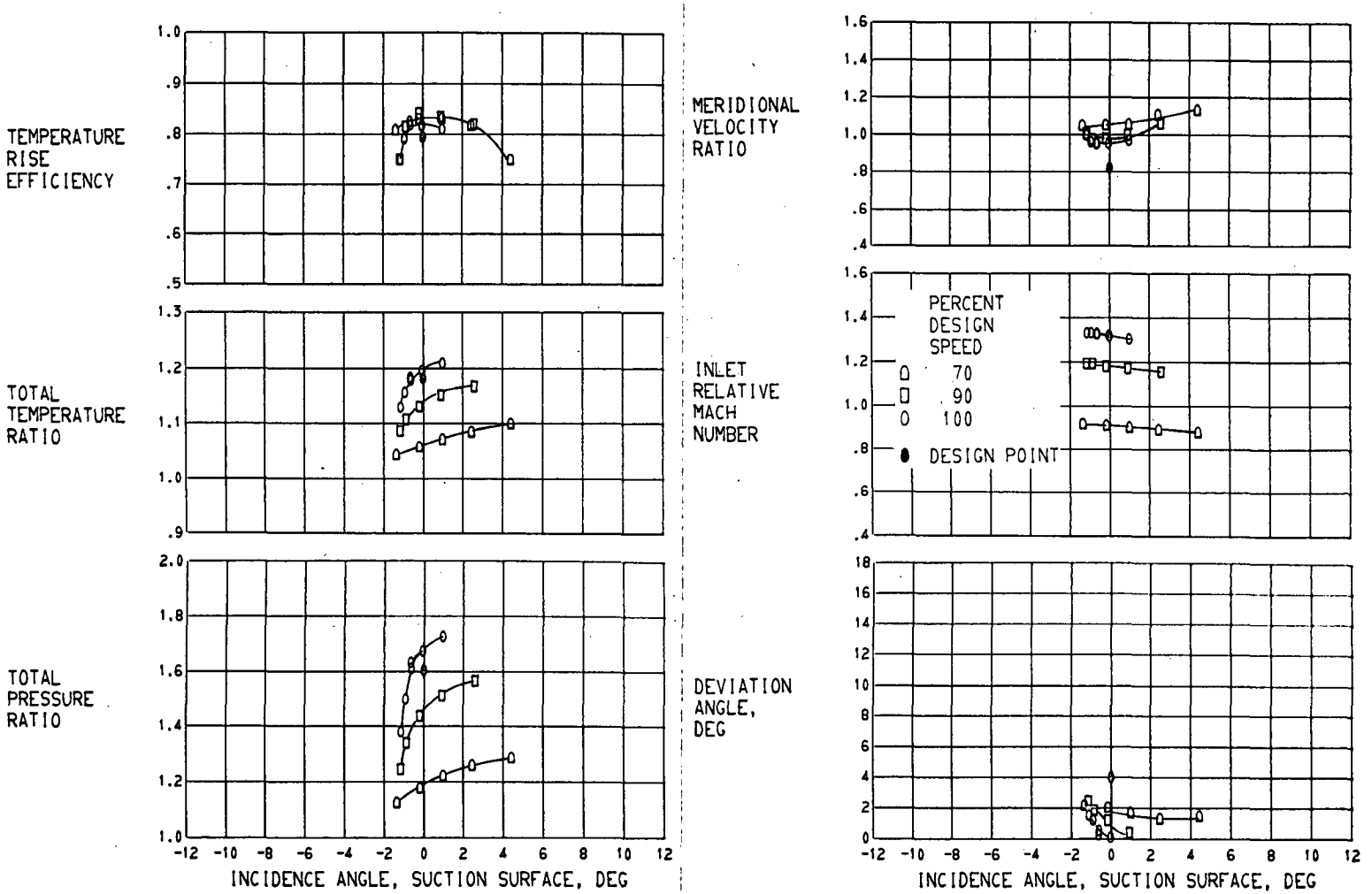
FIGURE 10. - RADIAL DISTRIBUTION OF PERFORMANCE FOR STATOR 11. 100 PERCENT DESIGN SPEED.

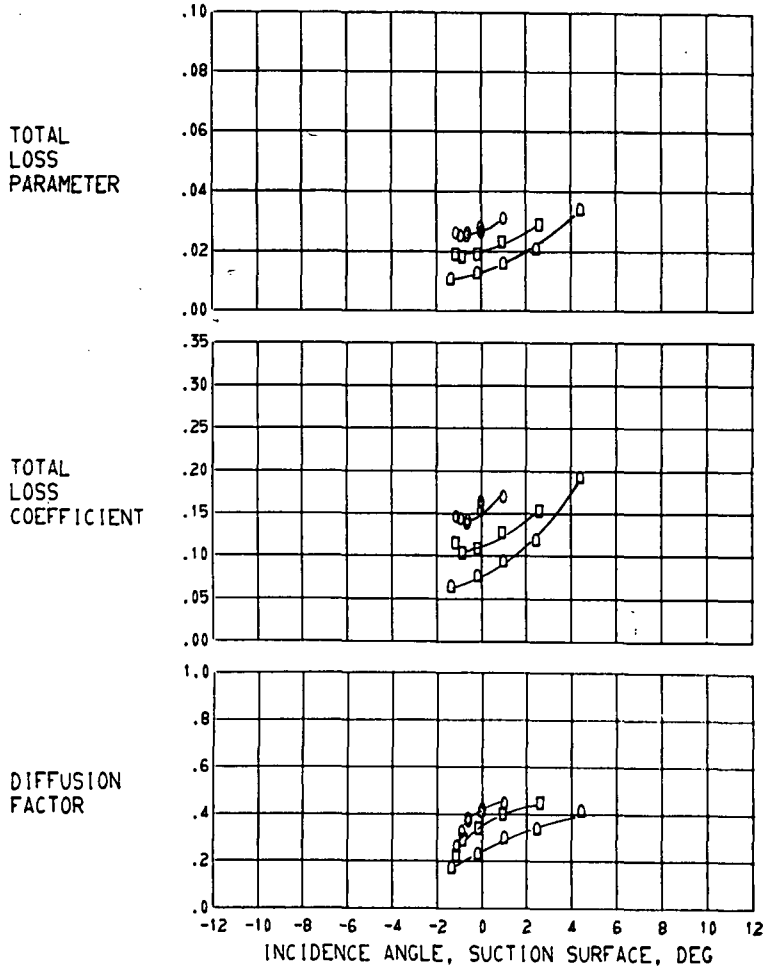

TEMPERATURE RISE EFFICIENCY
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
PERCENT DESIGN SPEED
70
90
100
DESIGN POINT
INCIDENCE ANGLE, SUCTION SURFACE, DEG
INCIDENCE ANGLE, SUCTION SURFACE, DEG



(A) 5.0 PERCENT SPAN.

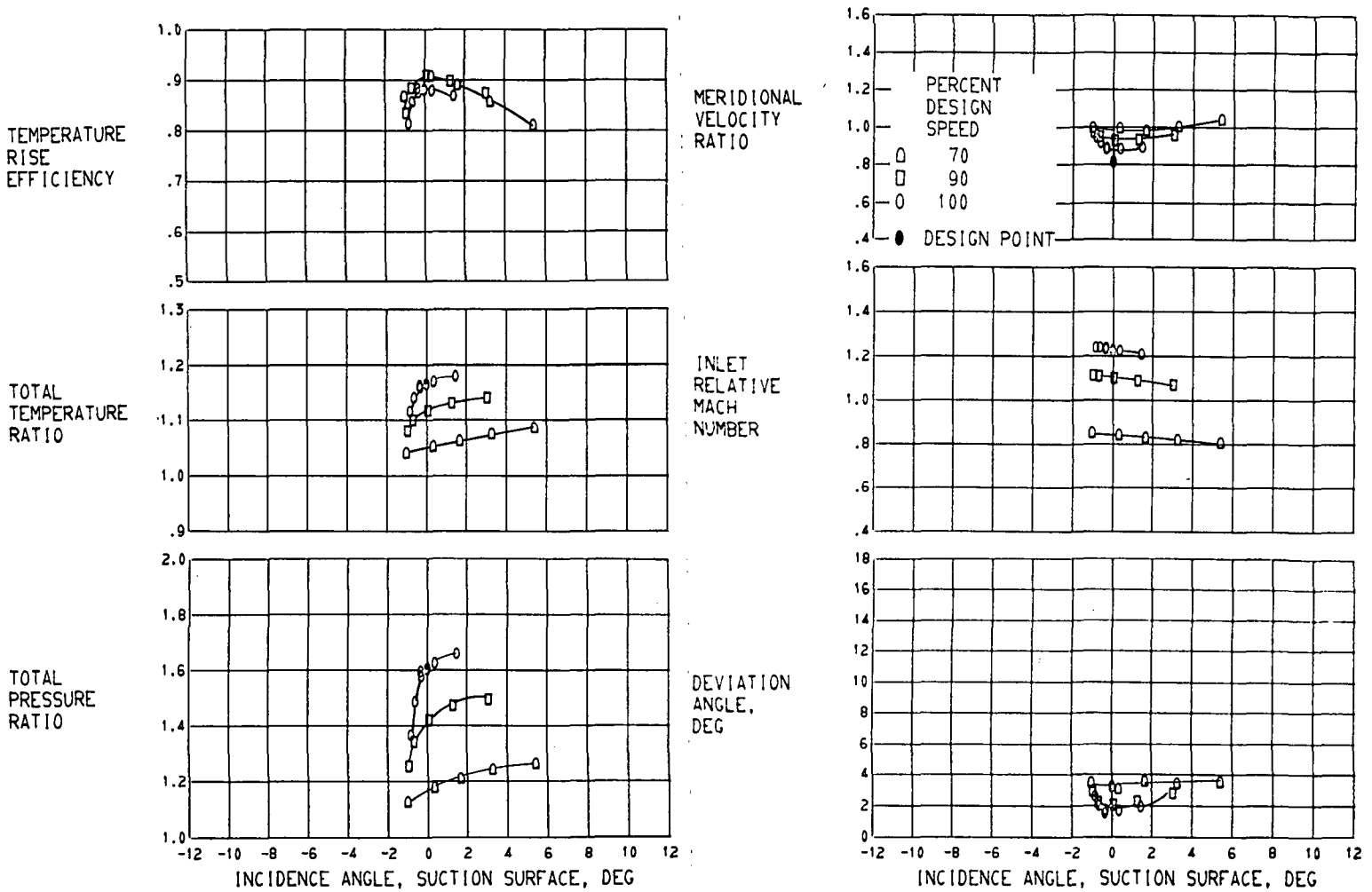
FIGURE 11. - BLADE ELEMENT PERFORMANCE FOR ROTOR 16.

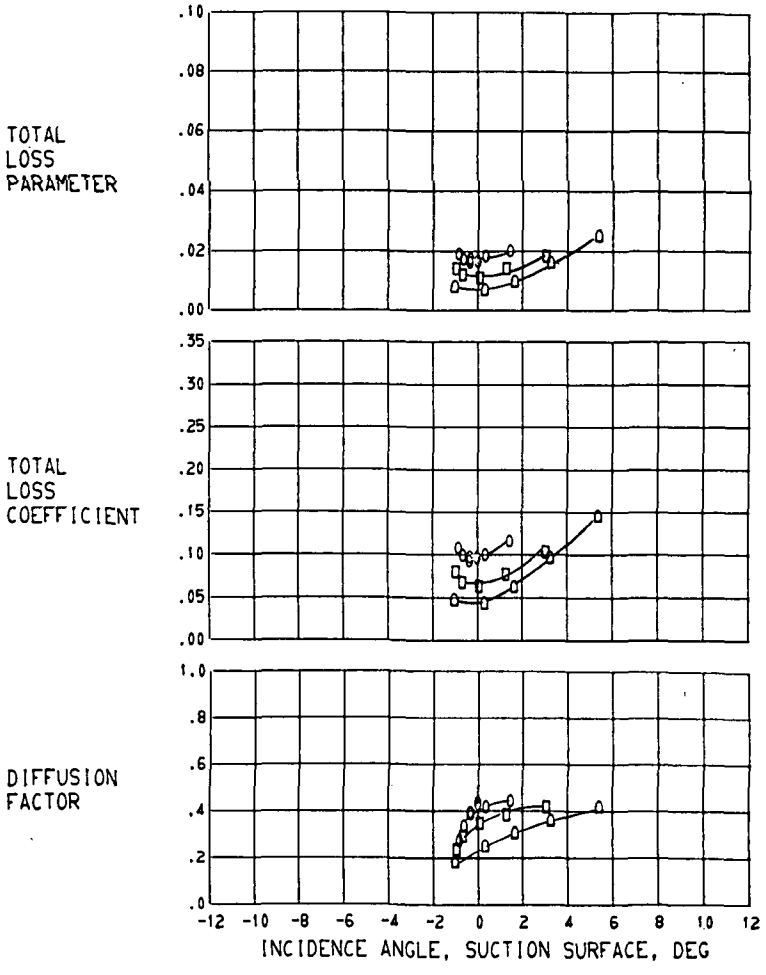

TEMPERATURE RISE EFFICIENCY
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
PERCENT DESIGN SPEED
70
90
100
DESIGN POINT
INCIDENCE ANGLE, SUCTION SURFACE, DEG
INCIDENCE ANGLE, SUCTION SURFACE, DEG



(B) 10.0 PERCENT SPAN.

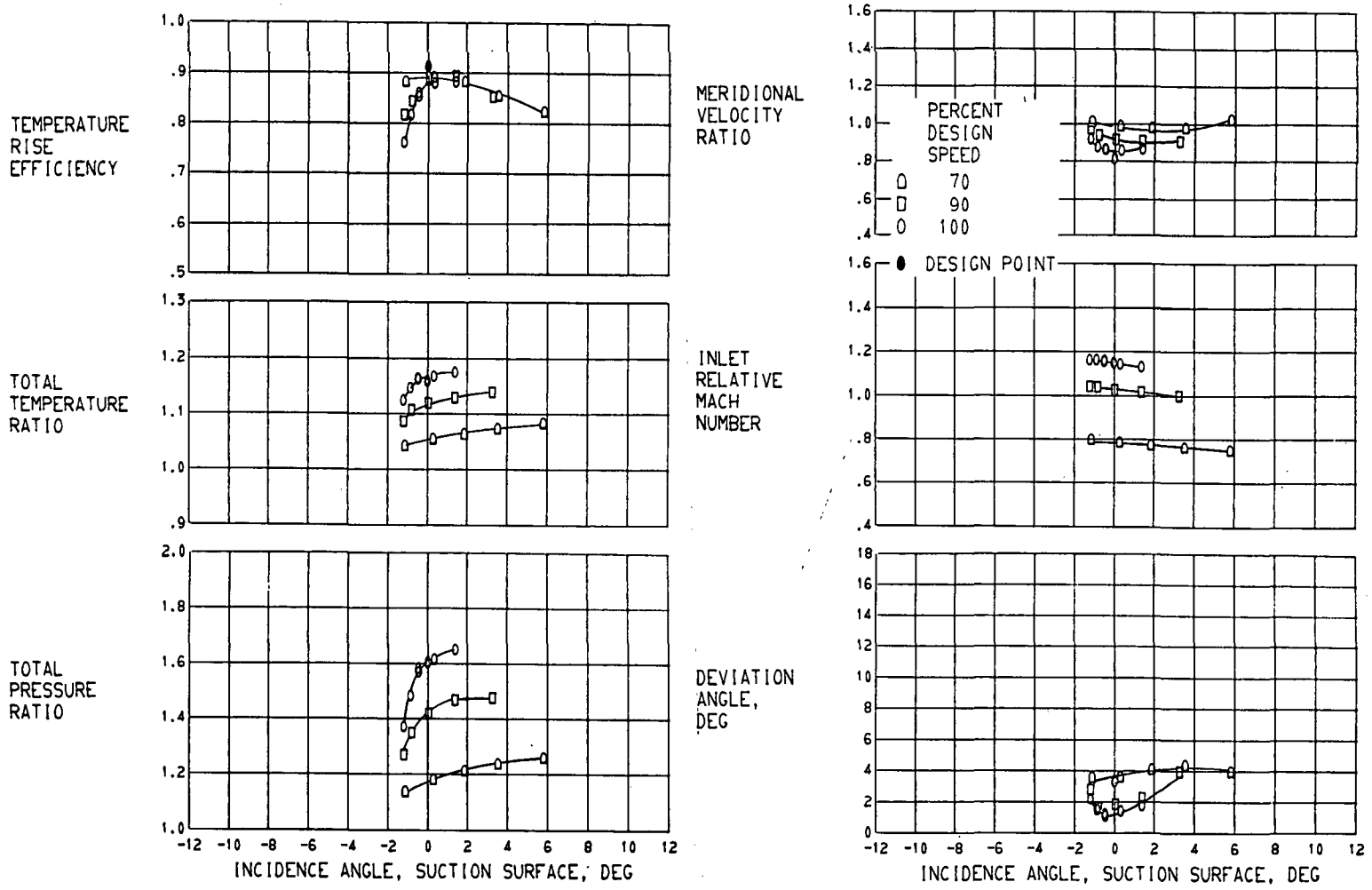
FIGURE 11. - BLADE ELEMENT PERFORMANCE FOR ROTOR 16.

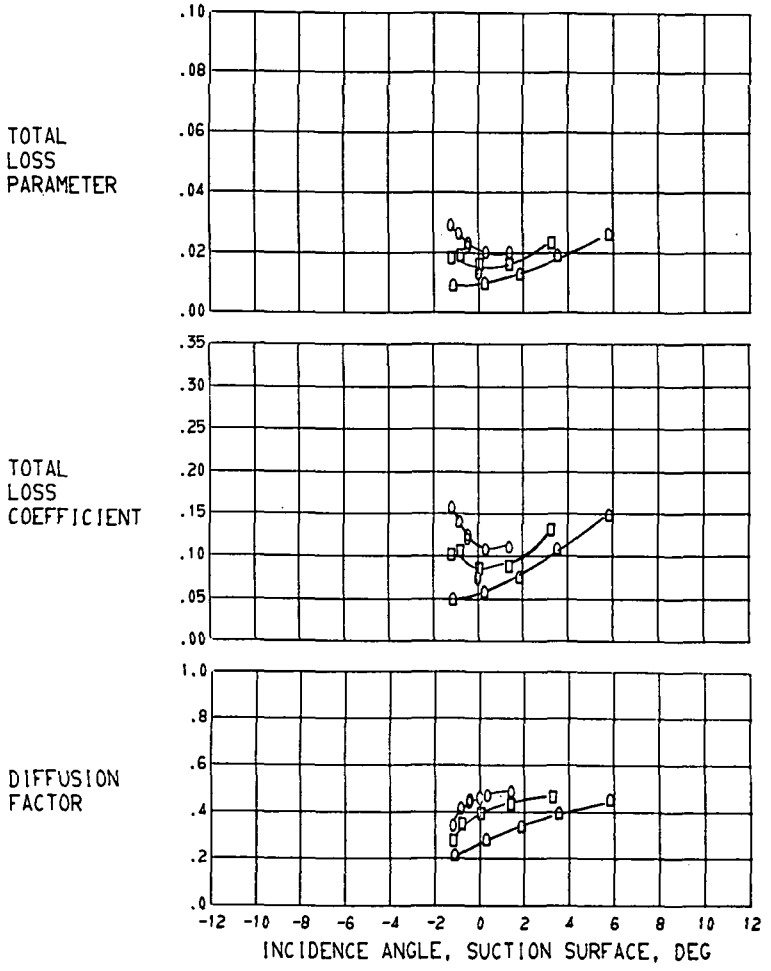

TEMPERATURE RISE EFFICIENCY
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
PERCENT DESIGN SPEED
70
90
100
DESIGN POINT
INCIDENCE ANGLE, SUCTION SURFACE, DEG
INCIDENCE ANGLE, SUCTION SURFACE, DEG



(C) 30.0 PERCENT SPAN.

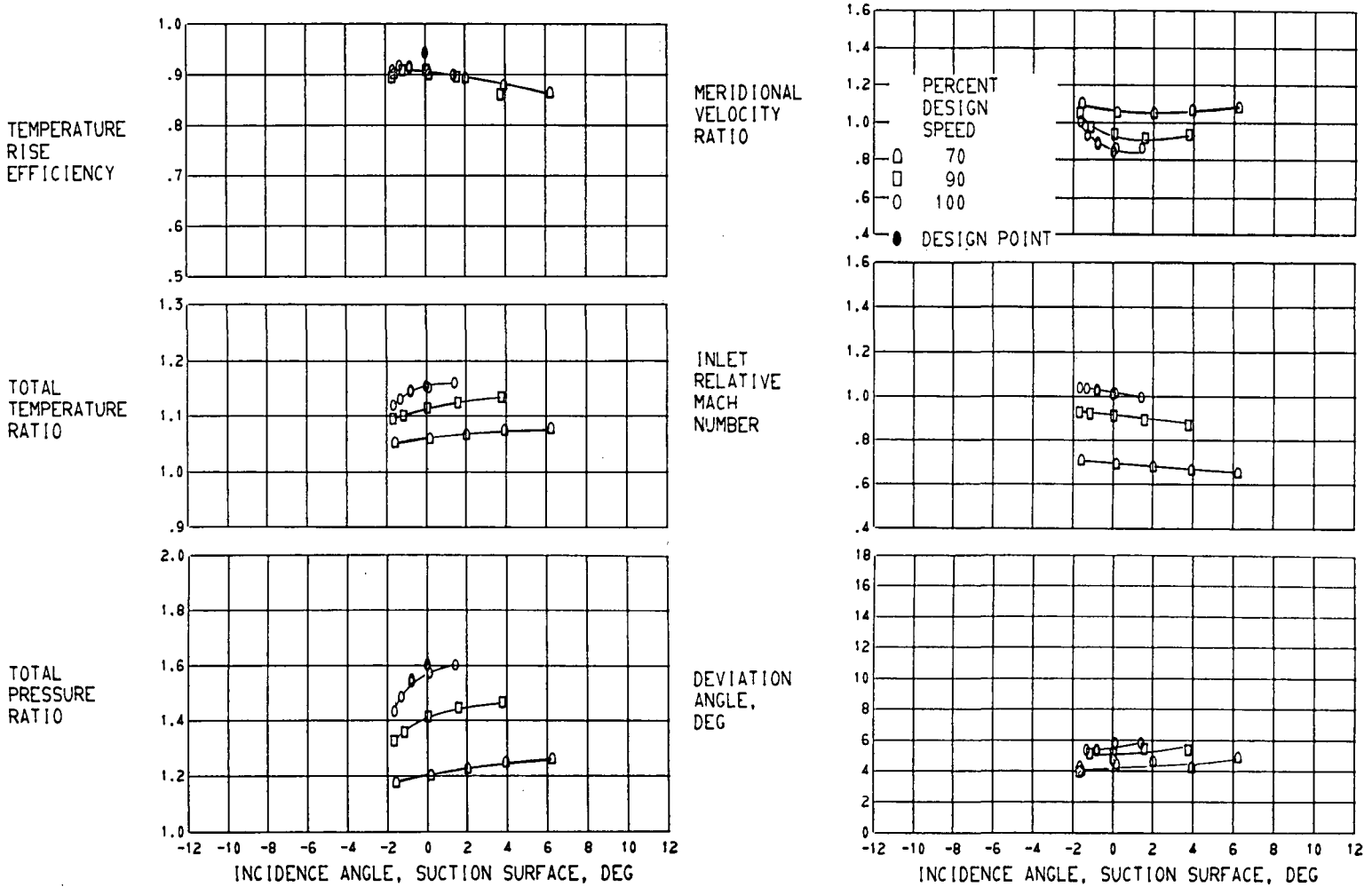
FIGURE 11. - BLADE ELEMENT PERFORMANCE FOR ROTOR 16.

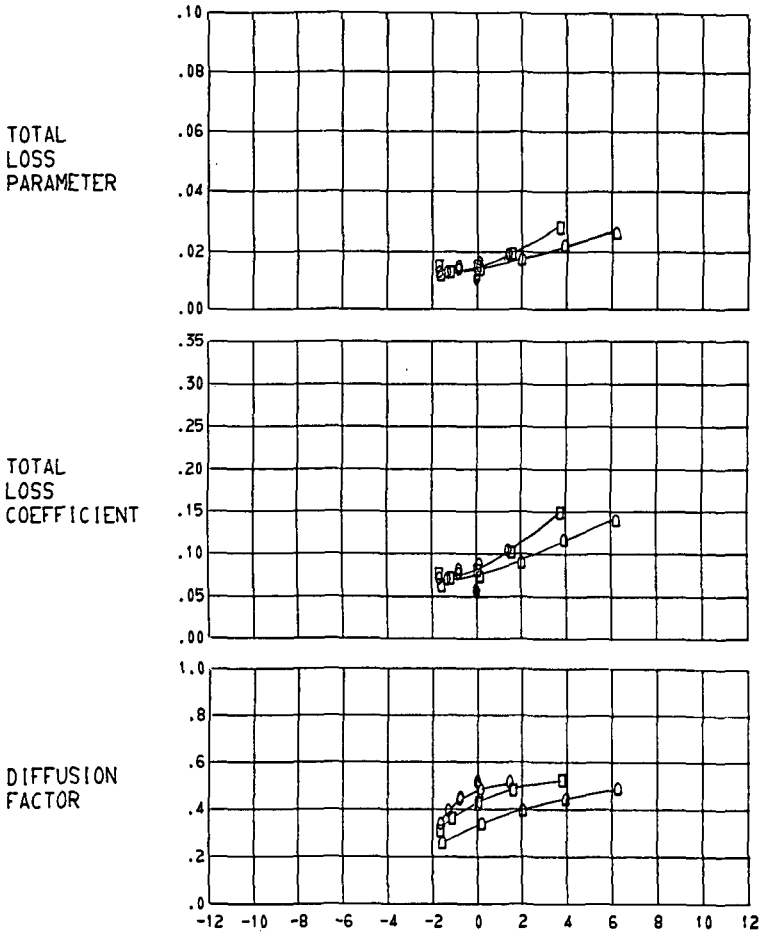

TEMPERATURE RISE EFFICIENCY
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
PERCENT DESIGN SPEED
70
90
100
DESIGN POINT
INCIDENCE ANGLE, SUCTION SURFACE, DEG
INCIDENCE ANGLE, SUCTION SURFACE, DEG



(D) 45.0 PERCENT SPAN.

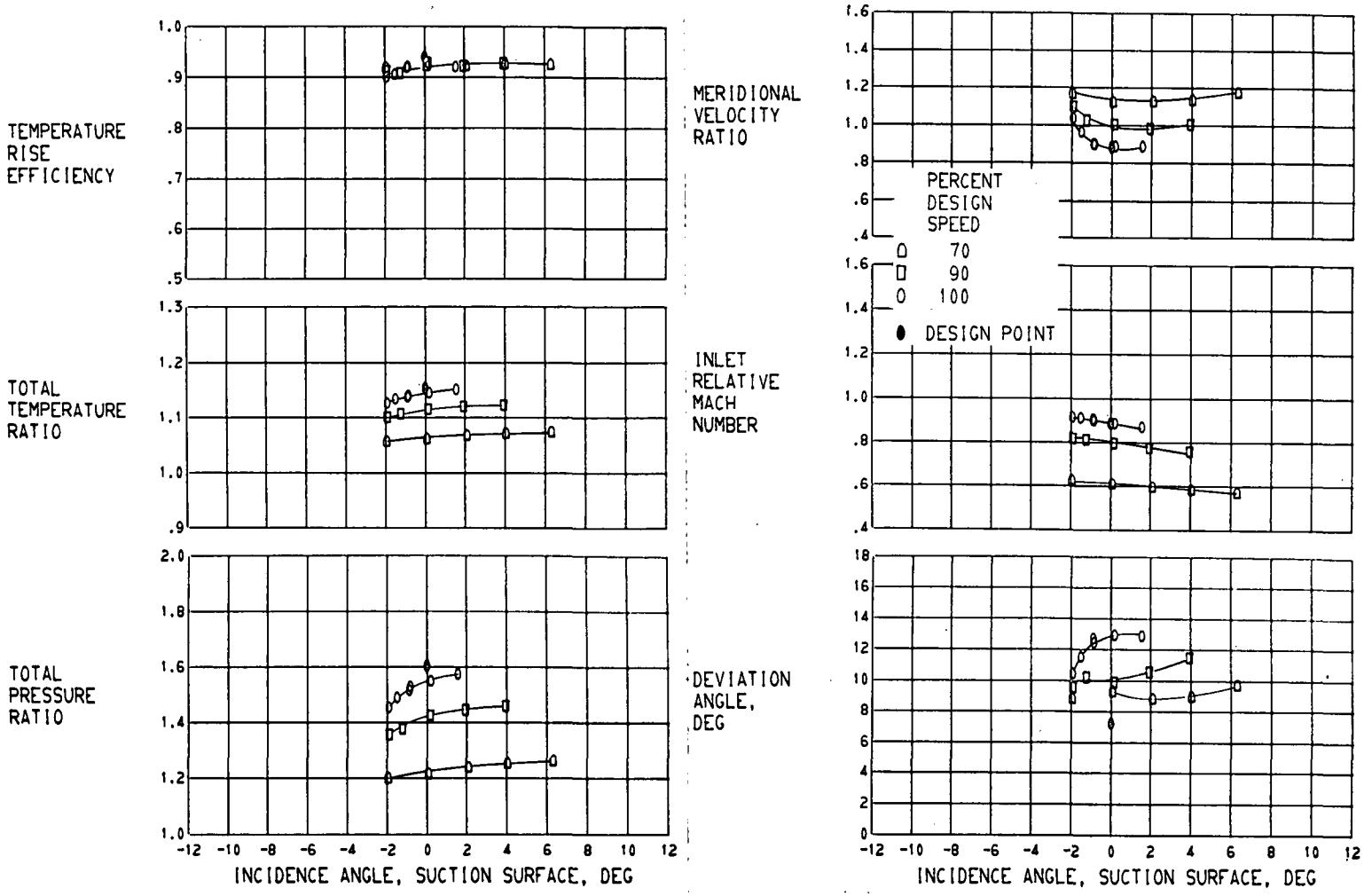
FIGURE 11. - BLADE ELEMENT PERFORMANCE FOR ROTOR 16.

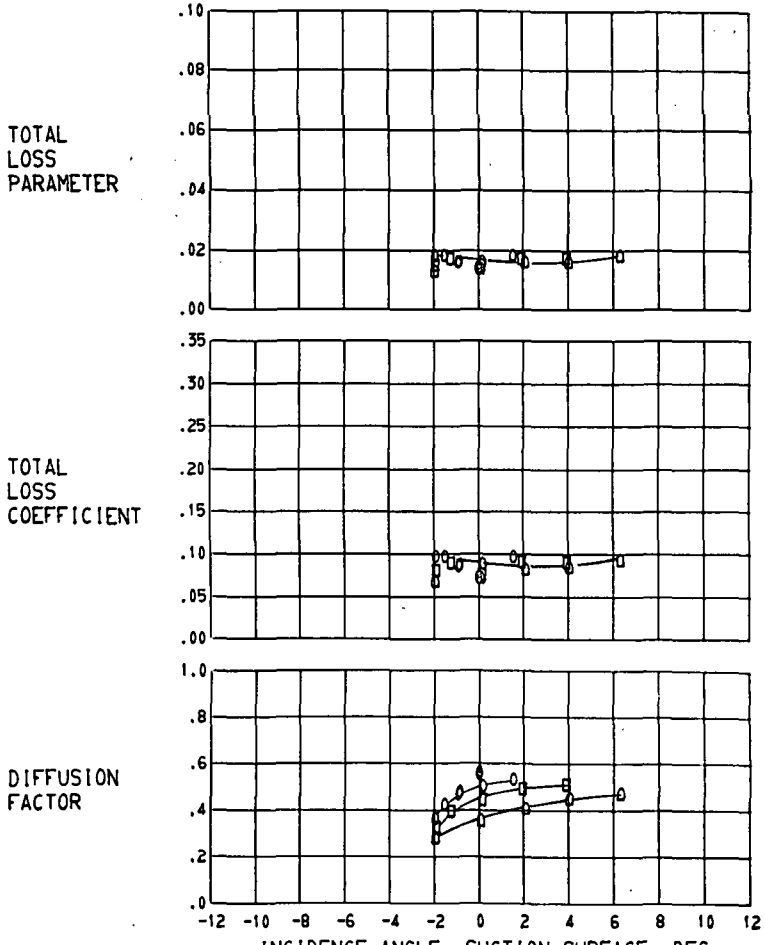

TEMPERATURE RISE EFFICIENCY
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
PERCENT DESIGN SPEED
70
90
100
DESIGN POINT
INCIDENCE ANGLE, SUCTION SURFACE, DEG
INCIDENCE ANGLE, SUCTION SURFACE, DEG



(E) 70.0 PERCENT SPAN

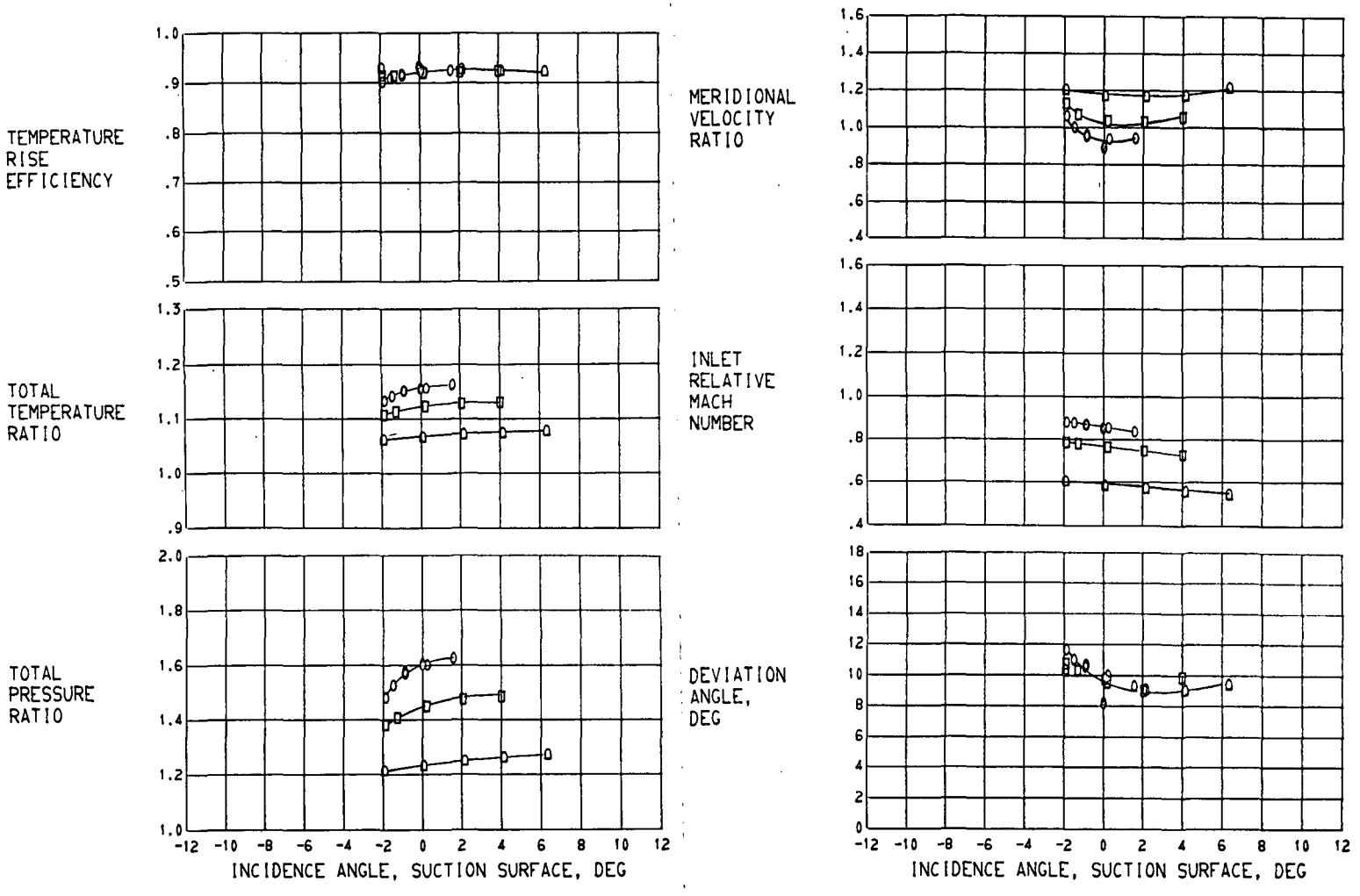
FIGURE 11. - BLADE ELEMENT PERFORMANCE FOR ROTOR 16.

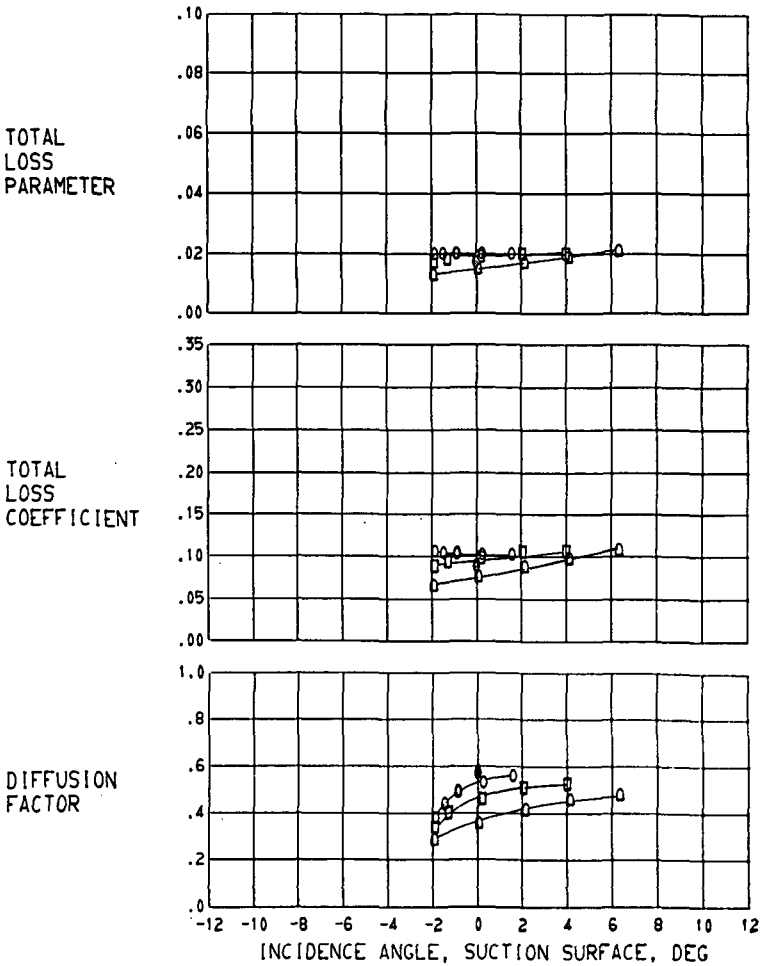

TEMPERATURE RISE EFFICIENCY
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
PERCENT DESIGN SPEED
70
90
100
DESIGN POINT
INCIDENCE ANGLE, SUCTION SURFACE, DEG
INCIDENCE ANGLE, SUCTION SURFACE, DEG



(F) 90.0 PERCENT SPAN.

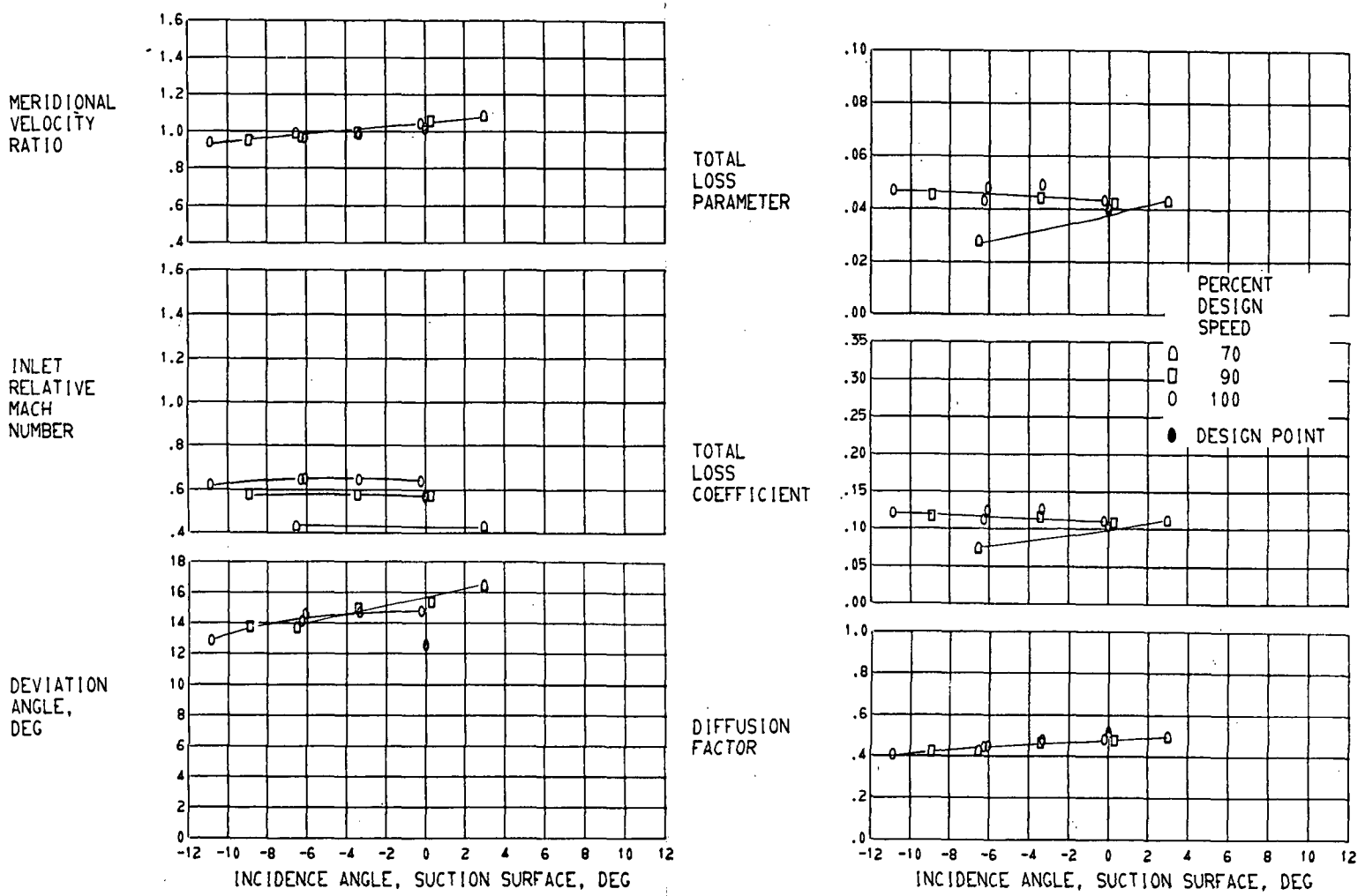
FIGURE 11. - BLADE ELEMENT PERFORMANCE FOR ROTOR 16.


TEMPERATURE RISE EFFICIENCY
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
INCIDENCE ANGLE, SUCTION SURFACE, DEG
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
INCIDENCE ANGLE, SUCTION SURFACE, DEG



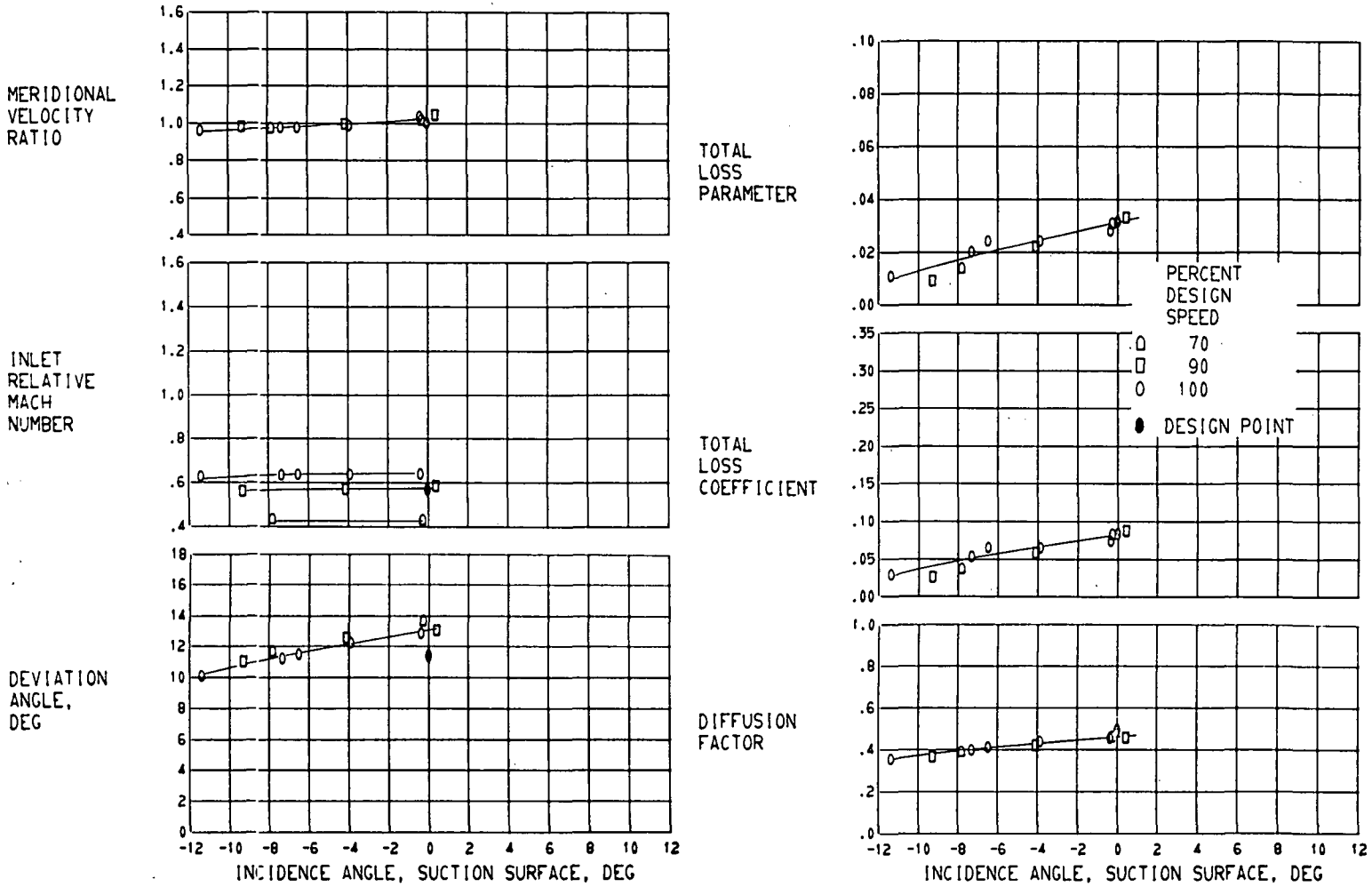
(G) 95.0 PERCENT SPAN.

FIGURE 11. - BLADE ELEMENT PERFORMANCE FOR ROTOR 16.



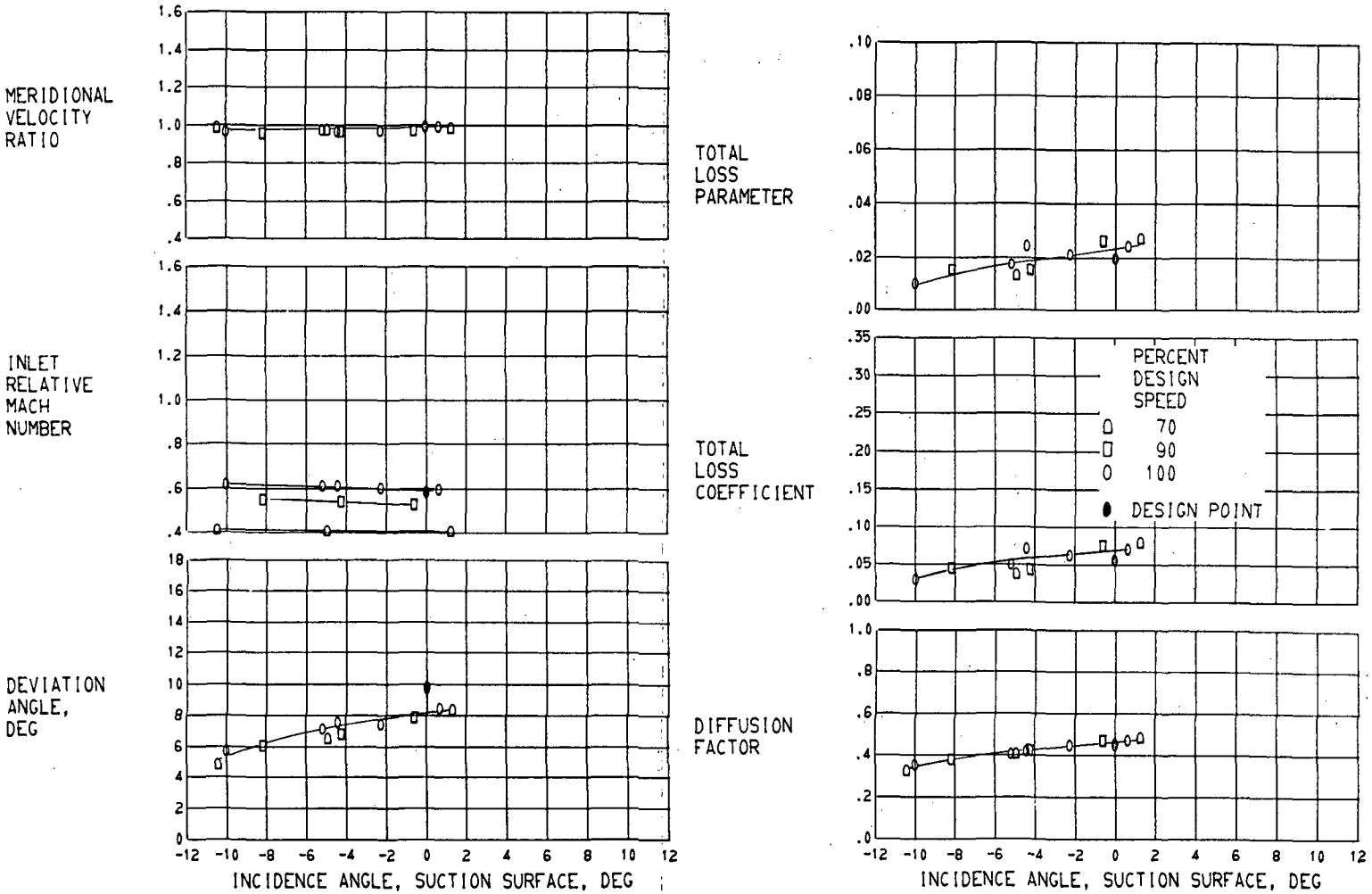
(A) 5.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR STATOR 11.



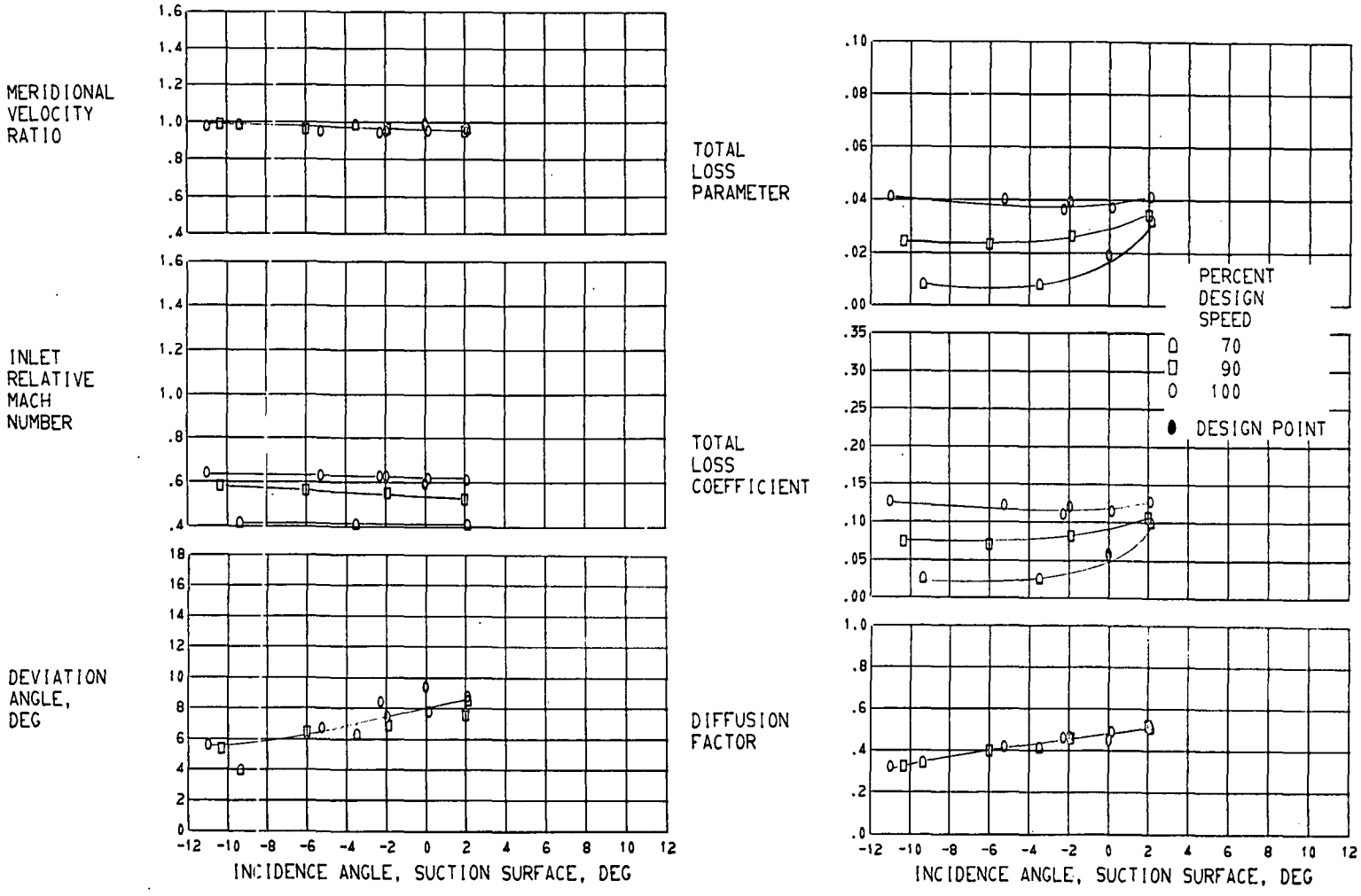
(B) 10.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR STATOR 11.



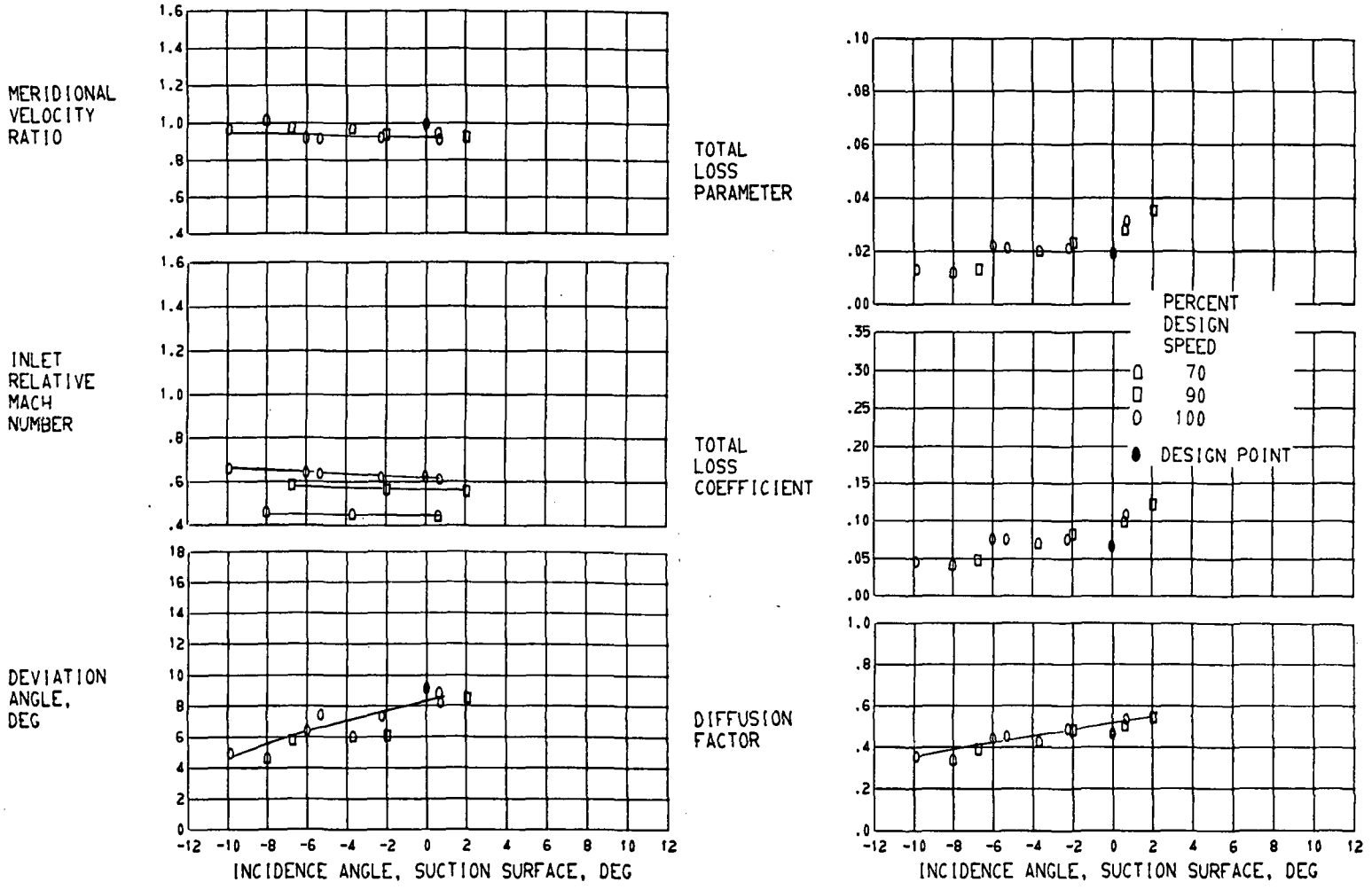
(C) 30.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR STATOR 11.



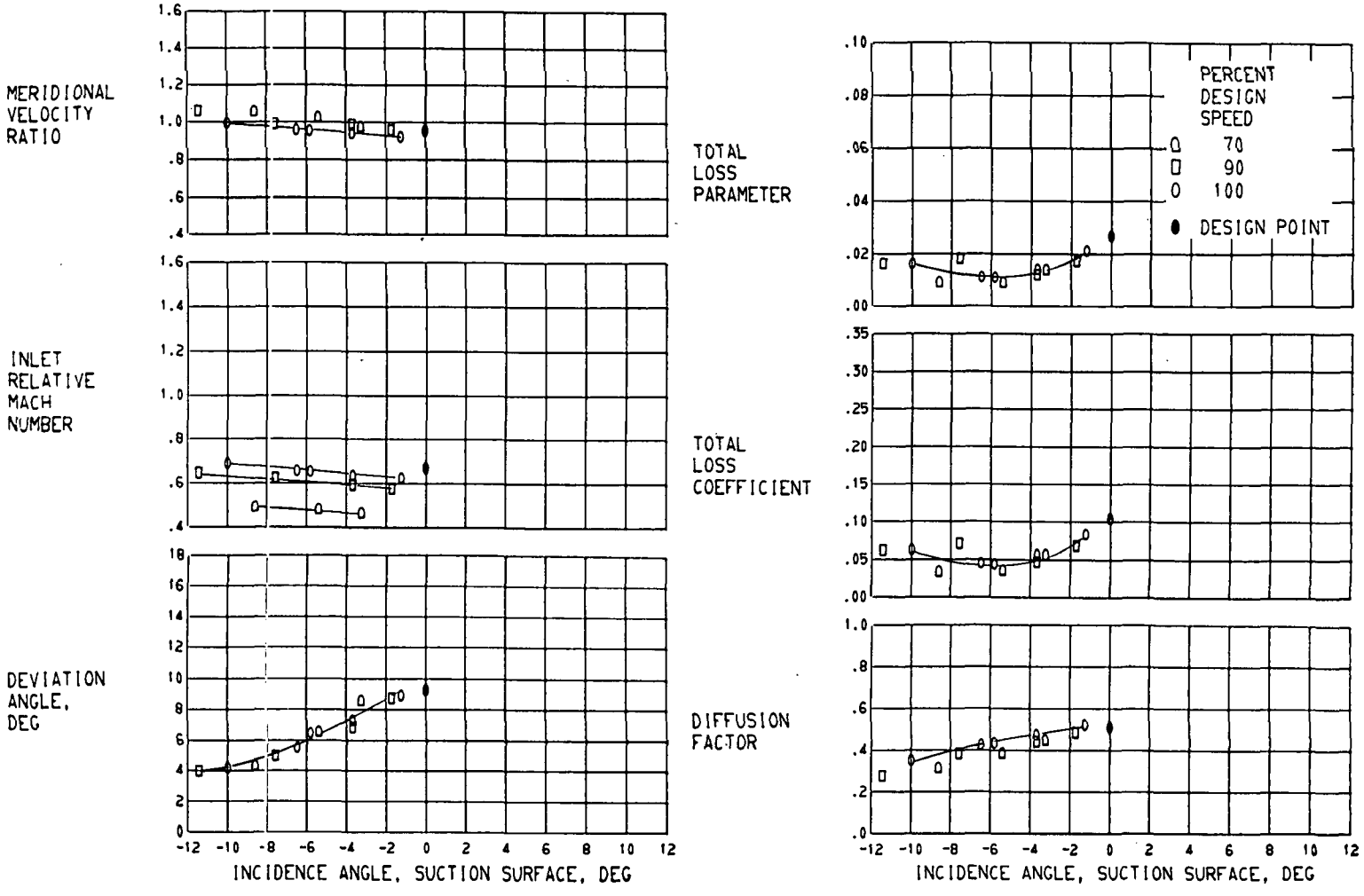
(D) 45.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR STATOR 11.



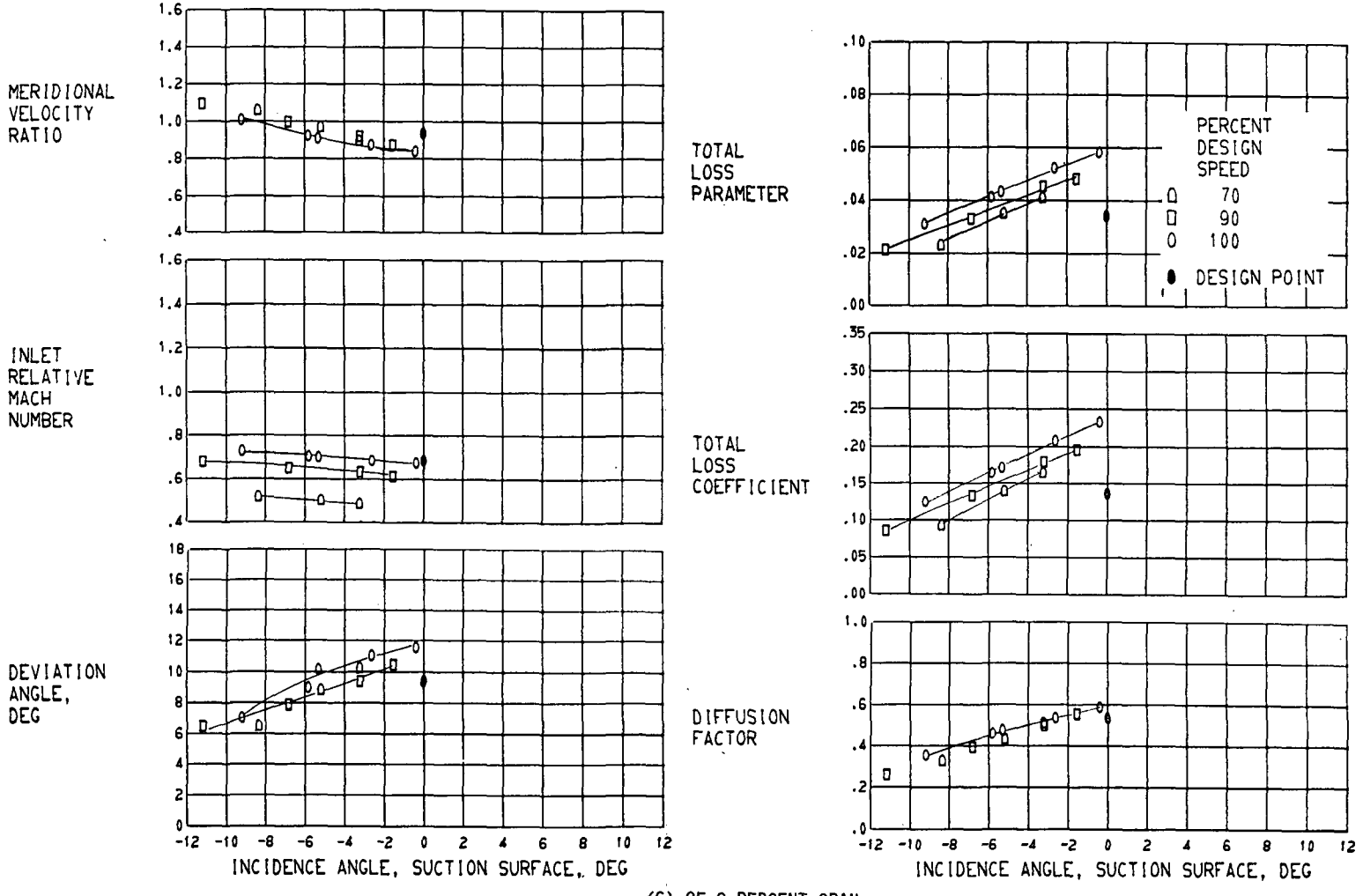
(E) 70.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR STATOR 11.



(F) 90.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR STATOR 11.



(G) 95.0 PERCENT SPAN.

FIGURE 12. - BLADE ELEMENT PERFORMANCE FOR STATOR 11.

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

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

SPECIAL FOURTH-CLASS RATE
BOOK

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