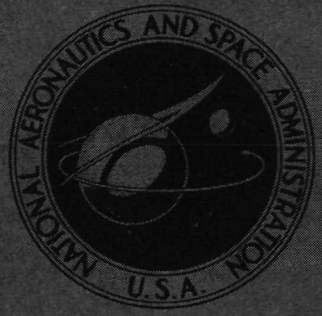
NASA TECHNICAL MEMORANDUM



NASA TM X-2536

NASA TM X-2536

COMPARISON OF THE EFFECT OF TWO DAMPER SIZES ON THE PERFORMANCE OF A LOW-SOLIDITY AXIAL-FLOW TRANSONIC COMPRESSOR ROTOR

by George W. Lewis, Jr., and Donald C. Urasek

Lewis Research Center
Cleveland, Ohio 44135

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

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA TM X-2536		

4. Title and Subtitle	5. Report Date
COMPARISON OF THE EFFECT OF TWO DAMPER SIZES ON THE PERFORMANCE OF A LOW-SOLIDITY AXIAL-FLOW TRANSONIC COMPRESSOR ROTOR	April 1972
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
George W. Lewis, Jr., and Donald C. Urasek	E-6536
	10. Work Unit No.
9. Performing Organization Name and Address	764-74
Lewis Research Center National Aeronautics and Space Administration Cleveland, Ohio 44135	11. Contract or Grant No.
	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 experimental performance of a 20-inch-diameter axial-flow transonic compressor rotor with small dampers is presented. The compressor rotor was tested earlier with large dampers which were twice in size, and comparisons of overall performance and radial distributions of selected flow and performance parameters are made. The rotor with small dampers experienced lower losses in the damper region which resulted in locally higher values of temperature rise efficiency and total pressure ratio. However, there was no appreciable effect on overall efficiency and pressure ratio. A greater stall margin was measured for the rotor with small dampers at design speed, but at 70 and 90 percent of design speed the rotor with large dampers had somewhat greater flow range.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Axial flow compressor rotor Effect of damper size 1.3 solidity	Unclassified - unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	89	$3.00

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

COMPARISON OF THE EFFECT OF TWO DAMPER SIZES ON THE PERFORMANCE OF A LOW-SOLIDITY AXIAL-FLOW TRANSONIC COMPRESSOR ROTOR

by George W. Lewis, Jr., and Donald C. Urasek

Lewis Research Center

SUMMARY

A 20-inch-diameter axial-flow transonic compressor rotor having small part-span dampers and a design tip speed of 1380 feet per second was tested. Radial surveys of the flow conditions at the blade inlet and outlet were made. The flow and performance parameters were calculated at the blade leading and trailing edges at eleven radial positions. The radial surveys were made over the rotor stable operating flow range at equivalent rotative speeds which varied from 50 to 100 percent of design speed. This same rotor was tested earlier with larger dampers, and comparisons of overall performance and radial distributions of selected flow and performance parameters were made. The rotor with small dampers experienced lower losses in the damper region which resulted in locally higher values of temperature rise efficiency and total pressure ratio. However, there was no appreciable effect on overall efficiency and pressure ratio. A greater stall margin was measured for the rotor with small dampers at design speed, but at 70 and 90 percent of design speed the rotor with large dampers had somewhat greater flow range.

INTRODUCTION

The NASA Lewis Research Center is engaged in a research program on axial-flow fans and compressors for advanced airbreathing engines. The program is directed primarily towards providing the technology to permit reducing the size and weight of the fans and compressors while maintaining a high level of performance. In support of this program experimental studies are being conducted on improved blade shapes for high Mach number operation and the effect of blade aspect ratio, blade solidity, blade loading, area margin above choke, weight flow per unit annulus area, contraction ratio (velocity ratio), and blade spacing on efficiency and stall margin.

A series of rotors having blade-tip solidities of 1.1, 1.3, and 1.5 (refs. 1 to 3, respectively) was designed and tested at the Lewis Research Center to investigate the

effect of blade row solidity on efficiency and stall margin. The overall performance results indicated that the 1.3 solidity rotor (ref. 2), when compared to the other two rotors in this series, had considerably less stall margin. The 1.1 and 1.5 solidity rotors had stall margins of 13.0 and 10.0 percent, respectively, while the 1.3 solidity rotor had a stall margin of 3.5 percent. (Stall margin was based on the equivalent weight flow and pressure ratio at which peak efficiency occurred as compared to the values just prior to stall.) The part-span dampers on the 1.3 solidity rotor were considerably larger than those on the other two rotors. Because detailed flow measurements downstream of the 1.3 solidity rotor showed large losses, high deviation angle, and low efficiency in the damper region, it was suspected that the large dampers may have caused the rotor to stall prematurely.

The purpose of this investigation was to evaluate the effect of a smaller part-span damper on the performance of the 1.3 blade-tip solidity rotor reported in reference 2. The dampers in the reference 2 configuration had constant thickness of 0.125 inch, an aerodynamic chord of approximately 30 percent of the blade aerodynamic chord, and circular contours at the leading and trailing edge. These dampers were remachined to be similar to those with the 1.1 and 1.5 solidity rotors. These modified dampers have circular arc contours on the upper and lower surfaces. The maximum thickness was 0.063 inch, and the leading and trailing edge radii were reduced to 0.010 inch. The axial chord of the damper was essentially unchanged.

This report presents the aerodynamic design parameters along with the overall and blade element performance of the 1.3 blade-tip solidity rotor with the remachined part-span dampers. Overall and blade element performance data were obtained for six speeds from 50 to 100 percent of design speed. Comparisons of overall performance and radial distributions of selected flow and performance parameters are made to evaluate the effects of the two damper sizes.

TEST ROTOR

The design of the rotor used in this investigation is discussed in detail in reference 2, and a photograph of the rotor is shown in figure 1. A streamline analysis solution was used in the design of this rotor. A multiple circular arc blade shape was selected, and the blade elements were computed on conical surfaces approximating the stream surfaces passing through the blade. The rotor inlet tip diameter was 20 inches, and the inlet hub-tip radius ratio was 0.5. The design tip speed of the rotor was 1380 feet per second. All significant blade design parameters are listed in tables I to III. The symbols are defined in appendix A. The equations used for calculating the selected blade element and overall performance parameters are presented in appendix B. All abbreviations, along with the units presented in the tables, are defined in appendix C.

Part-span dampers were located at 46 percent of span from the outlet rotor tip to minimize blade vibration. The mean line of the damper formed a section of a conical surface with the cone angle set equal to the streamline angle. Both the original and modified damper sizes are shown in figure 2. The aerodynamic chord of the modified dampers (referred to in this report as rotor 3MOD1) is approximately 30 percent of the aerodynamic chord of the blade, and the damper thickness is 13 percent of the damper aerodynamic chord. The inner and outer surfaces of the modified dampers were formed by circular arc sections passing through the leading and trailing edges, and the maximum thickness points were located at midchord.

APPARATUS AND PROCEDURE

Test Compressor

The compressor shaft is supported by two hydrodynamic journal bearings which are located downstream of the compressor rotor. With this design arrangement, the rotor is overhung at the end of the rotating shaft (fig. 3(a)). With this arrangement it is unnecessary to disturb the compressor shaft assembly when removing or changing test rotors. The axial thrust of the rotor is absorbed by a tapered land thrust bearing. A carbon face seal is used to isolate the oil from the airstream. The nonrotating radial tip clearance of the rotor was set at a nominal 0.020 inch at ambient conditions. This resulted in a measured rotating radial tip clearance of approximately 0.012 inch at design speed. Proximity probes are used to detect shaft movements in the vertical and horizontal directions and to indicate the blade rotating radial clearance. Strain gages are mounted on several blades in order to observe the rotating blade stresses. The strain signals and the proximity probe voltage signals are monitored on oscilloscopes during all of the tests. Accelerometers were used to determine the horizontal and vertical components of force on the journal bearing housings. Their signals are also monitored during all of the tests.

Test Facility

A schematic diagram of the test facility is shown in figure 3(b). The drive system consists of a 3000-horsepower electric motor with a variable-frequency power supply. Motor speed may be controlled from 400 to 3600 rpm. The motor is coupled to a 5.52-gear-ratio speed increaser gear box that in turn drives the test rotor. The facility is sized for a maximum flow rate of approximately 100 pounds per second. The working fluid is atmospheric air. Air enters the test facility at an inlet located on the roof of

the building. The air then passes through a flow measuring station consisting of a thin-plate orifice, through inlet butterfly throttle valves, and into a plenum chamber. The air is then accelerated to the compressor section, through the test compressor, and into a double exit collector through a sleeve-type arrangement throttle valve. The air then passes through a water cooler and is exhausted back into the atmosphere. Either of two exhaust systems is used to reduce system losses. Normally, a low-level vacuum exhaust equal to approximately 18 inches of water, downstream of the collector valve, is used. A high-level vacuum exhaust equal to approximately 26 inches of mercury, downstream of the collector valve, is used when it is desirable to throttle the compressor inlet. For the present investigation, the upstream throttle valves remained fully opened, the collector sleeve valve was used to throttle the airflow, and the low-level vacuum system was used.

Instrumentation

Radial surveys of the flow were made at the inlet and outlet of the rotor. Photographs of the survey probes are shown in figure 4. Total pressure, total temperature, and flow angle were measured with the combination probe (fig. 4(a)), and the static pressure was measured with an 8° C-shaped wedge probe (fig. 4(b)). Each probe was positioned with null-balancing, stream-direction-sensitive control equipment that automatically alined the probe to the direction of flow. The material used for thermocouples was iron-constantan. The wedge static probes were calibrated in a low-speed air tunnel. Two combination probes and two static wedge probes were used both upstream and downstream of the rotor.

Inner and outer wall static pressure taps were located at the same axial station as the survey probes. The axial and circumferential locations of the probes, along with the inner and outer wall static taps, are shown in figure 5.

A calibrated flat plate orifice was used to determine the flow rate, and an electronic speed counter, in conjunction with a magnetic pickup, was used to measure rotative speed (rpm).

Test Procedure

The rotor data were taken over a range of weight flow from maximum flow to stall conditions at equivalent rotative speeds of 50, 60, 70, 80, 90, and 100 percent of design speed. (Design speed is 16 000 rpm.) The operating curve for each speed line was defined by six data points.

Stall points were established by increasing the back pressure on the rotor (closing the sleeve valve in the collector) until a stall pattern appeared in the signal from a hot-wire anemometer probe located approximately 8 inches upstream of the test rotor, near the outer casing diameter. Rotor stall was indicated by a drop in rotor outlet total pressure at midpassage which was recorded on a X, Y-plotter. The near stall data point was taken at a weight flow within 1 pound per second of the recorded stall condition.

At each selected flow, the radial distributions of flow conditions were surveyed simultaneously at measuring stations located approximately 1 inch upstream of the blade leading edge and 0.7 inch downstream of the blade trailing edge (see fig. 5). Measurements of total pressure, total temperature, and flow angle were recorded at radial positions of 5, 10, 30, 40, 42.5, 45, 47.5, 50, 70, 90, and 95 percent of the blade span from the rotor tip. Static pressure measurements were recorded only at 30, 40, 42.5, 45, 47.5, 50, 70, and 90 percent of the blade span from the rotor tip.

Performance Calculation Procedure

Because of the physical size of the C-shaped static pressure wedges, it was not possible to obtain static pressure measurements at 5, 10, and 95 percent of blade span. The static pressure at 95 percent span was obtained by assuming a linear variation in static pressure between the inner wall static pressure and the probe measurement at 90 percent span. A similar variation was assumed between the outer wall static pressure measurement and 30 percent span to obtain the static pressure at 5 and 10 percent span. The data, measured at stations upstream and downstream of the rotor, are translated to the blade leading and trailing edges along calculated streamlines in the following manner. Total temperature and total pressure are assumed constant along the streamlines. Static pressure is adjusted to account for area contraction and streamline curvature. The flow angle is adjusted by assuming constant angular momentum. The blade element data presented are the translated values.

Orifice weight flow, total pressure, static pressures, and temperatures were corrected to standard sea-level conditions based on the rotor inlet conditions. The equations used for calculating the selected blade element and overall performance parameters are presented in appendix B.

Data Accuracy and Reliability

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

Flow rate, lb/sec	±0.5
Rotative speed, rpm	30
Flow angle, deg	1
Temperature, ^{o}R	1
Rotor inlet total pressure, psi	±0.02
Rotor outlet total pressure, psi	±0.15
Rotor inlet static pressure, psi	±0.05
Rotor outlet static pressure, psi	±0.10

RESULTS AND DISCUSSION

The experimental results of the rotor with small blade dampers are presented in two sections entitled Overall Rotor Performance With Small Dampers and Blade Element Performance With Small Dampers. The blade element performance includes both radial distributions and variation with incidence angle. The data presented in these two sections are machine plotted. A few data points, falling beyond the range of the plotted parameters, were omitted.

The plotted data, along with several additional parameters not shown in the figures, are presented in tabular form. The overall performance is presented in tables IV to IX. The blade element data are presented in tables X to XV. The definitions and units used for the tabular data are presented in appendix C.

The experimental results from this rotor are then compared to the experimental results from the same rotor having large dampers and reported in reference 2. The effects of damper size are discussed in the section Performance Comparison of Two Damper Sizes.

Overall Rotor Performance With Small Dampers

The overall performance curves for the rotor with small dampers are shown in figure 6. The tests were conducted over a range of speeds which varied from 50 to 100 percent of design. The mass averaged values of total pressure ratio, total temperature ratio, and temperature rise efficiency are plotted as a function of equivalent weight flow. Peak efficiency for the rotor at the design tip speed of 1380 feet per second was 0.85 and occurred at an equivalent weight flow rate of 65.0 pounds per second. Design values of efficiency and weight flow were 0.83 and 65.3 pounds per second, respectively. Total pressure ratio and total temperature ratio at the equivalent weight flow corresponding to peak efficiency were 1.74 and 1.20, respectively, as compared to design values of 1.65 and 1.19. Stall margin at design speed, as defined in appendix B, was 10 percent

based on the equivalent weight flow rate and pressure ratio at which peak efficiency occurred as compared to the values just prior to stall.

Blade Element Performance With Small Dampers

Radial distributions. - The radial distributions of selected flow and performance parameters for the rotor with small dampers are shown in figure 7. The results are shown for three flow rates at design speed. The data shown represent the flow conditions near stall, peak efficiency, and choke. The design values are shown by solid symbols.

The experimental deviation angles were less than design with the exception of the tip region. These low experimental deviation angles resulted in the blade loading being higher than anticipated. This is indicated by the experimental diffusion factor distribution, which is higher than design values. However, the total loss parameter distribution shows the loss to be lower than design values with exceptions in the damper region even though the blade loading distribution is higher than design. These results indicate that the design losses for this rotor were overestimated across the entire blade span. No attempt was made to account for damper losses in the aerodynamic design of the rotor.

The total pressure ratio was greater than design across the entire blade span. The temperature rise efficiency was also greater than design values across the entire blade span with exceptions locally in the damper and hub regions. These higher experimental values correspond to the lower than anticipated losses.

Variation with incidence angle. - The variation of selected blade element performance parameters with incidence angle is presented in figure 8. The data are presented for 60, 80, and 100 percent of design speed at blade elements located at 5, 10, 30, 50, 70, 90, and 95 percent of blade span as measured from the rotor tip. Design values are shown by solid symbols. These blade element performance curves are presented primarily for future reference, to be compared with results for other blade forms. Only a few brief observations are made in this section.

At design speed, the suction surface incidence angle corresponding to minimum loss, as indicated by the total loss parameter, was within $\pm 2^{\circ}$ of the design incidence angle of 0° for the blade elements located at 30, 50, 70, 90, and 95 percent of blade span. The minimum loss incidence angles were not defined at the blade elements located at 5 and 10 percent of blade span. The maximum efficiency was coincident with the minimum loss operating point for the blade elements located at 30 to 95 percent of blade span. As noted previously, the losses were lower than design except in the regions of the damper and the hub.

The deviation angles at design flow were within $\pm 3^{\circ}$ of the design values for all elements with the exception of the region near the hub. At the 95 percent span location, the deviation angle was 8° lower than the design value.

Performance Comparison of Two Damper Sizes

The data presented for the small damper rotor were translated to the blade leading and trailing edges, as discussed previously in the section Performance Calculation Procedure. The large damper rotor (ref. 2) was tested in a different facility. The computerized data reduction program, at that time, translated the data to planes which were normal to the axis of rotation and intersecting the leading and trailing edges of the blade at the hub. In order to make a valid comparison in performance between the two damper sizes, the data in this section are presented at the measuring stations. The measuring stations, located approximately 1 inch upstream of the blade leading edge and 0.7 inch downstream of the blade trailing edge, were in identical locations for both dampers.

Effect of two damper sizes on overall performance. - A comparison of overall performance of the 1.3 blade tip solidity rotors with the two different part-span damper sizes, as discussed previously in the section Test Rotor, is shown in figure 9. The open symbols represent the data from the small dampers and are a duplication of the data presented in figure 6. The solid symbols represent the data results of the 1.3 solidity rotor with the large dampers as reported in reference 2.

The results indicate that the large-damper rotor has a greater flow range between 70 and 90 percent of equivalent design speed. However, this trend was reversed at 100 percent equivalent design speed. At design speed the stall margin, as defined in appendix B, increased from 3.5 percent for the large dampers to 10 percent for the small dampers. At design speed, the temperature rise efficiency for the small-damper rotor was from 0.5 to 1.0 point higher over the whole flow range of the rotor except for the near-choke condition. At design speed, the flow rate at which peak efficiency occurred increased from a value of 63.5 pounds per second with large dampers to 65.0 pounds per second with small dampers. No appreciable effect on total pressure ratio was noted.

Effect of damper size on blade element radial distributions. - A comparison of selected radial distributions of flow and performance parameters of the two rotors is presented in figure 10. The comparisons are made at design speed and design flow. The data are presented at the measuring stations, as discussed previously in this section. The open symbols represent the data for the rotor with small dampers at a flow rate of 65.0 pounds per second. The solid symbols represent the data for the large damper (ref. 2) at a flow rate of 65.3 pounds per second. The dashed lines represent the design values. (Design weight flow is 65.3 lb/sec.)

The differences in the flow and performance parameters, shown across the blade passage for the two damper sizes (fig. 10), are attributed to blockage effects. For both dampers, the meridional velocity distribution at the rotor inlet remained essentially constant. The small-damper rotor experienced a slight decrease in flow near the blade tip. However, a longer inlet fairing shroud was used with this rotor configuration, and the boundary layer may have influenced the flow in the tip region. The meridional velocity ratio distribution showed that, with small dampers, the outlet velocities across the entire blade span were lower with the exception of the damper region. With a reduction in blockage in the damper region there was an increase in flow around the small dampers which resulted in lower values of deviation angle and flow losses. With the reduction in blockage the small-damper rotor experienced a higher pressure ratio and a higher temperature rise efficiency in the damper region.

As discussed in the INTRODUCTION, the purpose of this report was to evaluate the effect of two damper sizes and determine whether the large damper was instrumental in causing the 1.3 solidity rotor (ref. 2) to stall prematurely. At design speed, a comparison of the total loss parameter with incidence angle in the damper regions of both rotors showed that the losses were similar and differed only in absolute value. These comparisons showed no evidence of stall occurring at any of the elements in the damper region. As discussed previously, the effect of damper size on rotor performance was small. However, the wake behind the large-damper rotor should have a considerable effect on stator performance. It is probable that the effects of damper size on stage performance would have been more pronounced.

SUMMARY OF RESULTS

This report presents the effect of part-span damper size on a 1.3 blade-tip solidity rotor. Overall and blade element performance data are presented for the 1.3 solidity rotor with small dampers. The rotor was previously tested with dampers which were twice as large. The overall performance and the radial distributions of selected flow and performance parameters for the two rotors are compared. The following principal results were obtained:

1. The rotor with small dampers experienced lower losses in the damper region. This resulted in locally higher temperature rise efficiency and total pressure ratio near the damper. At design speed, the temperature rise efficiency for the small-damper rotor was from 0.5 to 1.0 point higher over the whole flow range of the rotor, except for the near-choke condition. No appreciable effect on total pressure ratio was noted.

2. At design speed the stall margin for the rotor increased with small dampers. However, at 70 and 90 percent of design speed the rotor with large dampers had greater flow range.

3. The outlet meridional velocities across the entire blade span were lower for the rotor with small dampers. Differences in the outlet meridional velocity distribution are attributed to a blockage effect of the damper.

4. Peak efficiency for the small-damper rotor at the design speed of 1380 feet per second was 0.85 and occurred at an equivalent weight flow rate of 65.0 pounds per second. Design values of efficiency and weight flow were 0.83 and 65.3 pounds per second, respectively.

5. Total pressure ratio and total temperature ratio for the small damper at the equivalent weight flow corresponding to peak efficiency were 1.74 and 1.20, respectively, as compared to design values of 1.65 and 1.19.

Lewis Research Center,
National Aeronautics and Space Administration,
Cleveland, Ohio, February 3, 1972,
764-74.

APPENDIX A

SYMBOLS

A_{an}	annulus area at rotor leading edge
A_f	frontal area at rotor leading edge
a	distance from blade leading edge to maximum camber point, in.
C_p	specific heat at constant pressure, 0.24 Btu/(lb)(^oR)
c	chord length, in.
D	diffusion factor
g	acceleration due to gravity, 32.17 ft/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, 778.16 ft-lb/Btu
N	rotative speed, rpm
P	total pressure, psia
p	static pressure, psia
r	radius, in.
SM	stall margin, percent
T	total temperature, ^oR
U	wheel speed, ft/sec
V	air velocity, ft/sec
W	weight flow, lbm/sec
Z	axial distance referenced from rotor blade hub leading edge, in.
β	air angle, angle between air velocity and axial direction, deg
γ	ratio of specific heats, 1.40
δ	ratio of rotor inlet total pressure to standard pressure of 14.69 psia
δ^o	deviation angle, angle between exit air direction and blade mean camber line at trailing edge, deg

η efficiency

θ ratio of rotor inlet total temperature to standard temperature of 518.7° R

θ_c equivalent camber

κ_{mc} angle between blade mean camber line and axial direction, deg

κ_{ss} angle between blade suction surface camber line at leading edge and in axial direction, deg

σ solidity, ratio of chord to spacing

φ camber angle, deg

$\overline{\omega}$ 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

r radial direction

ref reference

TE blade trailing edge

Z axial direction

θ tangential direction

1 instrument plane upstream of rotor

2 instrument plane downstream of rotor

Superscript:

' relative to rotor

APPENDIX B

EQUATIONS FOR PERFORMANCE PARAMETERS

The performance parameters are defined as follows:

Suction surface incidence angle:

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

Mean incidence angle:

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

Deviation:

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

Diffusion factor:

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

Total loss coefficient:

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

Profile loss coefficient:

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

Total loss parameter:

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

Profile loss parameter:

$$\frac{(\bar{\omega} - \bar{\omega}_s)\cos(\beta'_{mc})_{TE}}{2\sigma} \tag{B8}$$

Adiabatic efficiency:

$$\eta_{ad} = \frac{\left[\frac{(P)_{TE}}{(P)_{LE}}\right]^{(\gamma-1)/\gamma} - 1}{\frac{(T)_{TE}}{(T)_{LE}} - 1} \tag{B9}$$

Momentum rise efficiency:

$$\eta_{mom} = \frac{\left[\frac{(P)_{TE}}{(P)_{LE}}\right]^{(\gamma-1)/\gamma} - 1}{\frac{(UV)_{TE} - (UV)_{LE}}{(T)_{LE} g J C_p}} \tag{B10}$$

Equivalent weight flow:

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

Equivalent rotative speed:

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

Stall margin:

$$SM = \left\{ \frac{\left[\frac{(P)_{TE}}{(P)_{LE}}\right]_{stall}}{\left[\frac{(P)_{TE}}{(P)_{LE}}\right]_{ref}} \times \frac{\left(\frac{W\sqrt{\theta}}{\delta}\right)_{ref}}{\left(\frac{W\sqrt{\theta}}{\delta}\right)_{stall}} - 1 \right\} 100 \tag{B13}$$

Weight flow per unit frontal area:

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

Weight flow per unit annulus area:

$$\frac{\frac{W\sqrt{\theta}}{\delta}}{A_{an}} \tag{B15}$$

Head rise coefficient:

$$\frac{gJC_pT_{LE}}{U_{tip}^2}\left[\left(\frac{P_{TE}}{P_{LE}}\right)^{(\gamma-1)/\gamma} - 1\right] \tag{B16}$$

Flow coefficient:

$$\left(\frac{V_Z}{U_{tip}}\right)_{LE} \tag{B17}$$

APPENDIX C

DEFINITIONS AND UNITS USED IN TABLES

ABS	absolute
AREA RATIO	ratio of actual flow area to critical area (where Mach number is 1)
BETAM	meridional air angle, deg
CONE ANGLE	angle between axial direction and conical surface representing blade element, deg
DELTA INC	difference between mean camber blade angle and suction surface blade angle at leading edge, deg
DEV	deviation angle (defined by eq. (B3)), deg
D-FACT	diffusion factor (defined by eq. (B4))
EFF	adiabatic efficiency (defined by eq. (B9))
IN	inlet (leading edge of blade)
INCIDENCE	incidence angle (suction surface defined by eq. (B1) and mean defined by eq. (B2))
KIC	angle between blade mean camber line at leading edge and in axial direction, deg
KOC	angle between blade mean camber line at trailing edge and in axial direction, deg
KTC	angle between blade mean camber line at transition point and in axial direction, 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)
PHISS	suction-surface camber ahead of assumed shock location, deg
PRESS	pressure, psia
PROF	profile

RADII	radius, in.
REL	relative to blade
RI	inlet radius (leading edge of blade), in.
RO	outlet radius (trailing edge of blade), in.
RP	radial position
RPM	rotative speed, rpm
SPEED	speed, ft/sec
SS	suction surface
STREAMLINE SLOPE	slope of streamline, deg
TANG	tangential
TEMP	temperature, ^{o}R
TI	thickness of blade at leading edge, in.
TM	thickness of blade at maximum thickness, in.
TO	thickness of blade at trailing edge, in.
TOT	total
VEL	velocity, ft/sec
X-FACTOR	ratio of suction surface camber ahead of assumed shock location of multiple circular arc blade section to that of double circular arc blade section
ZMC	axial distance to blade maximum thickness point from inlet, in.
ZOC	axial distance to blade trailing edge from inlet, in.
ZTG	axial distance to transition point from inlet, in.

REFERENCES

1. Janetzke, David C.; Ball, Calvin L.; and Hager, Roy D.: Performance of a 1380-Foot-per-Second Tip-Speed Axial-Flow Compressor Rotor With a Blade Tip Solidity of 1.1. NASA TM X-2449, 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. 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, 1971.

TABLE I. - DESIGN OVERALL PARAMETERS FOR ROTOR 3MOD1

TOTAL PRESSURE RATIO	1.650
TOTAL TEMPERATURE RATIO	1.186
EFFICIENCY	0.827
WT FLOW PER UNIT FRONTAL AREA	30.819
WT FLOW PER UNIT ANNULUS AREA	41.592
WT FLOW	65.261
RPM	16000.000
TIP SPEED	1375.599

TABLE II. - DESIGN BLADE ELEMENT PARAMETERS FOR ROTOR 3MOD1

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
TIP	9.852	9.818	0.	46.1	64.4	56.0	518.7	1.248	14.69	1.650
1	9.717	9.623	-0.	43.8	64.0	55.2	518.7	1.232	14.69	1.650
2	9.509	9.429	-0.	41.7	63.2	54.4	518.7	1.217	14.69	1.650
3	8.635	8.650	0.	39.0	59.8	50.2	518.7	1.189	14.69	1.650
4	8.177	8.261	0.	39.1	58.3	47.3	518.7	1.183	14.69	1.650
5	8.060	8.164	0.	39.2	57.9	46.4	518.7	1.182	14.69	1.650
6	7.943	8.067	0.	39.4	57.5	45.6	518.7	1.181	14.69	1.650
7	7.825	7.969	0.	39.5	57.1	44.7	518.7	1.181	14.69	1.650
8	7.706	7.872	0.	39.6	56.7	43.7	518.7	1.180	14.69	1.650
9	6.706	7.094	0.	40.5	53.7	35.1	518.7	1.172	14.69	1.650
10	5.562	6.315	0.	41.1	51.8	24.4	518.7	1.164	14.69	1.650
11	5.245	6.121	0.	41.3	51.7	21.5	518.7	1.162	14.69	1.650
HUB	5.014	5.926	-0.	41.3	51.2	18.5	518.7	1.159	14.69	1.650

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
TIP	658.4	784.5	1525.0	972.1	658.4	544.0	0.	565.2	1375.6	1370.9
1	661.9	776.5	1509.5	982.5	661.9	560.9	-0.	537.0	1356.7	1343.7
2	671.8	771.1	1488.0	988.4	671.8	575.7	-0.	513.0	1327.7	1316.5
3	700.3	773.9	1394.3	938.7	700.3	601.4	0.	487.1	1205.6	1207.8
4	706.4	784.4	1342.6	897.0	706.4	608.7	0.	494.7	1141.7	1153.5
5	707.0	787.8	1329.1	885.7	707.0	610.4	0.	498.1	1125.5	1139.9
6	707.3	791.7	1315.4	874.1	707.3	612.0	0.	502.2	1109.1	1126.3
7	707.3	795.5	1301.5	863.1	707.3	613.8	0.	506.0	1092.6	1112.7
8	706.9	799.4	1287.4	852.3	706.9	615.8	0.	509.8	1076.0	1099.1
9	687.3	836.8	1161.5	778.3	687.3	636.7	0.	543.0	936.4	990.5
10	610.6	882.6	987.9	729.9	610.6	664.8	0.	580.5	776.6	881.8
11	578.4	894.5	933.2	722.5	578.4	672.3	0.	590.0	732.3	854.6
HUB	563.4	908.1	898.7	719.1	563.4	682.0	-0.	599.5	700.1	827.4

	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	0.611	0.655	1.416	0.812	0.611	0.455	-8.64	-6.66	0.826	1.626
1	0.615	0.653	1.402	0.826	0.615	0.472	-7.79	-5.48	0.847	1.627
2	0.625	0.652	1.384	0.836	0.625	0.487	-6.46	-4.29	0.857	1.629
3	0.654	0.663	1.301	0.804	0.654	0.515	-0.71	0.83	0.859	1.630
4	0.660	0.675	1.254	0.772	0.660	0.524	2.41	3.63	0.862	1.621
5	0.660	0.678	1.241	0.763	0.660	0.526	3.23	4.37	0.863	1.611
6	0.661	0.682	1.229	0.753	0.661	0.527	4.06	5.12	0.865	1.598
7	0.661	0.686	1.216	0.744	0.661	0.529	4.92	5.89	0.868	1.587
8	0.660	0.690	1.203	0.736	0.660	0.532	5.81	6.69	0.871	1.577
9	0.640	0.728	1.082	0.677	0.640	0.554	14.20	14.13	0.926	1.497
10	0.564	0.776	0.913	0.641	0.564	0.584	26.27	24.64	1.089	1.266
11	0.533	0.788	0.859	0.637	0.533	0.593	30.00	27.90	1.162	1.199
HUB	0.518	0.803	0.826	0.636	0.518	0.603	32.78	31.26	1.210	1.158

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
TIP	0.	2.0	0.0	7.7	0.504	0.619	0.346	0.235	0.074	0.050
1	5.00	2.2	0.0	7.4	0.481	0.664	0.293	0.184	0.062	0.039
2	10.00	2.5	0.0	7.2	0.461	0.709	0.247	0.141	0.053	0.030
3	30.00	4.0	0.0	5.8	0.442	0.814	0.156	0.062	0.033	0.013
4	40.00	4.9	-0.0	5.7	0.447	0.840	0.138	0.054	0.029	0.011
5	42.50	5.0	0.0	5.9	0.449	0.844	0.136	0.056	0.029	0.012
6	45.00	5.1	0.0	6.1	0.452	0.847	0.135	0.060	0.028	0.013
7	47.50	5.2	0.0	6.2	0.454	0.851	0.133	0.062	0.028	0.013
8	50.00	5.3	0.0	6.3	0.455	0.855	0.130	0.064	0.028	0.013
9	70.00	6.2	0.0	7.2	0.451	0.892	0.110	0.074	0.023	0.015
10	90.00	7.1	0.0	9.6	0.389	0.938	0.080	0.078	0.015	0.015
11	95.00	7.3	0.0	10.8	0.358	0.951	0.068	0.068	0.012	0.012
HUB	100.00	7.5	0.0	12.6	0.335	0.966	0.050	0.050	0.009	0.009

TABLE III. - BLADE GEOMETRY FOR ROTOR 3MOD1

RP	PERCENT SPAN	RADII RI	RADII RO	BLADE ANGLES KIC	BLADE ANGLES KTC	BLADE ANGLES KOC	DELTA INC
TIP	0.	9.852	9.818	62.62	58.47	48.40	2.04
1	5.	9.717	9.623	61.87	57.49	47.76	2.22
2	10.	9.509	9.429	60.73	56.02	47.13	2.50
3	30.	8.635	8.650	55.80	50.31	44.39	4.05
4	40.	8.177	8.261	53.34	47.47	41.54	4.88
5	43.	8.060	8.164	52.82	46.74	40.55	4.99
6	45.	7.943	8.067	52.34	46.02	39.46	5.07
7	48.	7.825	7.969	51.82	45.27	38.43	5.18
8	50.	7.706	7.872	51.30	44.52	37.42	5.30
9	70.	6.706	7.094	47.31	37.69	27.70	6.24
10	90.	5.562	6.315	44.61	29.68	14.41	7.07
11	95.	5.245	6.121	44.25	27.40	10.20	7.31
HUB	100.	5.014	5.926	44.06	25.71	5.84	7.49

RP	BLADE THICKNESSES TI	BLADE THICKNESSES TM	BLADE THICKNESSES TO	AXIAL DIMENSIONS ZMC	AXIAL DIMENSIONS ZTC	AXIAL DIMENSIONS ZOC	CONE ANGLE
TIP	0.020	0.061	0.020	0.564	0.564	0.892	-2.183
1	0.020	0.064	0.020	0.564	0.564	0.925	-5.762
2	0.020	0.068	0.020	0.565	0.565	0.958	-4.790
3	0.020	0.085	0.020	0.555	0.555	1.103	0.813
4	0.020	0.093	0.020	0.545	0.545	1.177	4.095
5	0.020	0.095	0.020	0.554	0.554	1.194	4.952
6	0.020	0.098	0.020	0.568	0.568	1.211	5.822
7	0.020	0.100	0.020	0.578	0.578	1.228	6.698
8	0.020	0.102	0.020	0.586	0.586	1.246	7.579
9	0.020	0.120	0.020	0.648	0.648	1.387	15.598
10	0.020	0.143	0.020	0.689	0.689	1.486	26.870
11	0.020	0.149	0.020	0.688	0.688	1.488	30.482
HUB	0.020	0.154	0.020	0.685	0.685	1.485	31.549

RP	AERO CHORD	SETTING ANGLE	TOTAL CAMBER	SOLIDITY	X FACTOR	PHISS	AREA RATIO
TIP	1.716	58.24	14.22	1.305	0.561	6.19	1.075
1	1.737	57.23	14.12	1.344	0.603	6.60	1.075
2	1.733	55.86	13.60	1.369	0.671	7.21	1.073
3	1.750	50.40	11.41	1.515	0.962	9.57	1.065
4	1.763	47.40	11.79	1.605	1.000	10.57	1.060
5	1.767	46.67	12.26	1.629	1.000	10.59	1.058
6	1.771	45.95	12.88	1.655	1.000	10.53	1.056
7	1.775	45.20	13.39	1.682	1.000	10.53	1.055
8	1.780	44.44	13.88	1.710	1.000	10.56	1.053
9	1.837	37.60	19.61	1.992	1.000	10.81	1.039
10	1.936	29.61	30.20	2.439	1.000	11.10	1.050
11	1.963	27.33	34.05	2.584	1.000	11.31	1.064
HUB	1.949	25.35	38.22	2.665	1.000	11.49	1.076

TABLE IV. - OVERALL PERFORMANCE OF ROTOR 3MOD1 AT 50 PERCENT OF DESIGN SPEED

PARAMETER	READING				
	69	50	51	52	72
ROTOR TOTAL PRESSURE RATIO	1.111	1.144	1.153	1.161	1.162
ROTOR TOTAL TEMPERATURE RATIO	1.033	1.045	1.048	1.052	1.054
ROTOR TEMP. RISE EFFICIENCY	0.912	0.871	0.863	0.834	0.816
ROTOR MOMENTUM RISE EFFICIENCY	0.912	0.841	0.840	0.815	0.788
ROTOR HEAD RISE COEFFICIENT	0.199	0.255	0.271	0.284	0.292
FLOW COEFFICIENT	0.466	0.403	0.376	0.342	0.308
WT FLOW PER UNIT FRONTAL AREA	18.665	16.429	15.323	14.230	12.659
WT FLOW PER UNIT ANNULUS AREA	25.189	22.172	20.679	19.204	17.084
WT FLOW AT ORIFICE	39.524	34.791	32.448	30.133	26.806
WT FLOW AT ROTOR INLET	39.750	34.820	32.634	29.841	26.764
WT FLOW AT ROTOR OUTLET	38.813	32.948	30.691	28.046	25.040
RPM	8032.893	8052.836	8052.228	8044.969	7961.795
PERCENT OF DESIGN SPEED	50.206	50.330	50.326	50.281	49.761

TABLE V. - OVERALL PERFORMANCE OF ROTOR 3MOD1 AT 60 PERCENT OF DESIGN SPEED

PARAMETER	READING				
	44	45	46	47	48
ROTOR TOTAL PRESSURE RATIO	1.183	1.206	1.226	1.234	1.240
ROTOR TOTAL TEMPERATURE RATIO	1.056	1.062	1.070	1.074	1.079
ROTOR TEMP. RISE EFFICIENCY	0.878	0.887	0.863	0.839	0.804
ROTOR MOMENTUM RISE EFFICIENCY	0.848	0.854	0.834	0.814	0.781
ROTOR HEAD RISE COEFFICIENT	0.226	0.252	0.275	0.284	0.291
FLOW COEFFICIENT	0.450	0.422	0.381	0.354	0.321
WT FLOW PER UNIT FRONTAL AREA	21.119	20.032	18.217	17.407	15.573
WT FLOW PER UNIT ANNULUS AREA	28.501	27.034	24.585	23.492	21.016
WT FLOW AT ORIFICE	44.721	42.419	38.577	36.861	32.977
WT FLOW AT ROTOR INLET	45.150	42.632	38.814	36.293	33.133
WT FLOW AT ROTOR OUTLET	43.349	40.720	36.660	34.025	30.863
RPM	9590.746	9590.025	9583.830	9578.932	9587.116
PERCENT OF DESIGN SPEED	59.942	59.938	59.899	59.868	59.919

TABLE VI. - OVERALL PERFORMANCE OF ROTOR 3MOD1 AT 70 PERCENT OF DESIGN SPEED

PARAMETER	READING					
	80	60	39	40	41	43
ROTOR TOTAL PRESSURE RATIO	1.247	1.267	1.316	1.327	1.339	1.343
ROTOR TOTAL TEMPERATURE RATIO	1.072	1.078	1.093	1.097	1.103	1.108
ROTOR TEMP. RISE EFFICIENCY	0.899	0.893	0.881	0.867	0.845	0.814
ROTOR MOMENTUM RISE EFFICIENCY	0.858	0.863	0.847	0.841	0.829	0.795
ROTOR HEAD RISE COEFFICIENT	0.218	0.234	0.273	0.281	0.289	0.293
FLOW COEFFICIENT	0.469	0.450	0.411	0.394	0.370	0.339
WT FLOW PER UNIT FRONTAL AREA	25.169	24.216	22.575	21.760	20.606	19.118
WT FLOW PER UNIT ANNULUS AREA	33.967	32.681	30.467	29.366	27.809	25.800
WT FLOW AT ORIFICE	53.298	51.280	47.805	46.078	43.635	40.483
WT FLOW AT ROTOR INLET	53.536	51.685	47.921	46.135	43.712	40.446
WT FLOW AT ROTOR OUTLET	52.435	50.074	45.460	43.807	41.545	38.338
RPM	11234.126	11227.943	11239.422	11234.724	11254.563	11253.010
PERCENT OF DESIGN SPEED	70.213	70.175	70.246	70.217	70.341	70.331

TABLE VII. - OVERALL PERFORMANCE OF ROTOR 3MOD1 AT 80 PERCENT OF DESIGN SPEED

PARAMETER	READING					
	62	34	35	36	37	38
ROTOR TOTAL PRESSURE RATIO	1.373	1.436	1.459	1.470	1.470	1.465
ROTOR TOTAL TEMPERATURE RATIO	1.107	1.122	1.129	1.134	1.136	1.139
ROTOR TEMP. RISE EFFICIENCY	0.889	0.894	0.884	0.872	0.854	0.830
ROTOR MOMENTUM RISE EFFICIENCY	0.854	0.863	0.850	0.839	0.819	0.801
ROTOR HEAD RISE COEFFICIENT	0.244	0.279	0.292	0.298	0.299	0.296
FLOW COEFFICIENT	0.453	0.434	0.410	0.392	0.371	0.352
WT FLOW PER UNIT FRONTAL AREA	27.031	26.148	25.022	24.182	23.040	22.136
WT FLOW PER UNIT ANNULUS AREA	36.480	35.289	33.768	32.635	31.093	29.874
WT FLOW AT ORIFICE	57.241	55.372	52.986	51.207	48.789	46.875
WT FLOW AT ROTOR INLET	57.771	55.937	53.385	51.487	49.039	46.917
WT FLOW AT ROTOR OUTLET	55.665	53.143	50.528	48.415	45.924	43.977
RPM	12797.386	12823.710	12825.026	12841.223	12798.220	12816.232
PERCENT OF DESIGN SPEED	79.984	80.148	80.156	80.258	79.989	80.101

TABLE VIII. - OVERALL PERFORMANCE OF ROTOR 3MOD1 AT 90 PERCENT OF DESIGN SPEED

PARAMETER	READING					
	73	23	30	25	74	32
ROTOR TOTAL PRESSURE RATIO	1.482	1.529	1.609	1.620	1.643	1.639
ROTOR TOTAL TEMPERATURE RATIO	1.138	1.148	1.167	1.168	1.174	1.178
ROTOR TEMP. RISE EFFICIENCY	0.862	0.873	0.873	0.878	0.875	0.851
ROTOR MOMENTUM RISE EFFICIENCY	0.812	0.850	0.838	0.857	0.838	0.826
ROTOR HEAD RISE COEFFICIENT	0.243	0.259	0.294	0.297	0.310	0.307
FLOW COEFFICIENT	0.452	0.445	0.424	0.411	0.402	0.389
WT FLOW PER UNIT FRONTAL AREA	29.589	29.411	28.444	27.659	27.128	26.423
WT FLOW PER UNIT ANNULUS AREA	39.932	39.692	38.386	37.327	36.611	35.660
WT FLOW AT ORIFICE	62.657	62.281	60.232	58.570	57.447	55.954
WT FLOW AT ROTOR INLET	62.980	62.554	60.317	59.001	57.789	56.300
WT FLOW AT ROTOR OUTLET	60.473	60.439	57.312	56.720	54.491	52.663
RPM	14377.953	14479.105	14458.070	14471.413	14396.887	14427.684
PERCENT OF DESIGN SPEED	89.862	90.494	90.363	90.446	89.981	90.173

TABLE IX. - OVERALL PERFORMANCE OF ROTOR 3MOD1 AT 100 PERCENT OF DESIGN SPEED

PARAMETER	READING					
	67	19	20	75	22	68
ROTOR TOTAL PRESSURE RATIO	1.601	1.699	1.744	1.785	1.783	1.805
ROTOR TOTAL TEMPERATURE RATIO	1.178	1.195	1.203	1.213	1.213	1.221
ROTOR TEMP. RISE EFFICIENCY	0.811	0.840	0.847	0.845	0.843	0.831
ROTOR MOMENTUM RISE EFFICIENCY	0.777	0.811	0.818	0.812	0.813	0.807
ROTOR HEAD RISE COEFFICIENT	0.238	0.269	0.284	0.299	0.295	0.304
FLOW COEFFICIENT	0.437	0.433	0.428	0.416	0.397	0.395
WT FLOW PER UNIT FRONTAL AREA	31.121	31.015	30.716	30.059	29.395	28.925
WT FLOW PER UNIT ANNULUS AREA	42.000	41.857	41.453	40.567	39.670	39.036
WT FLOW AT ORIFICE	65.902	65.677	65.044	63.653	62.247	61.252
WT FLOW AT ROTOR INLET	66.224	65.966	65.421	63.845	62.037	61.630
WT FLOW AT ROTOR OUTLET	63.158	62.830	62.127	60.206	58.894	58.079
RPM	15977.646	16007.605	16002.400	15928.311	16010.169	15965.341
PERCENT OF DESIGN SPEED	99.860	100.048	100.015	99.552	100.064	99.783

TABLE X. - BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 50 PERCENT OF DESIGN SPEED

(a) Reading 69

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.6	20.9	63.0	52.9	519.5	1.034	14.59	1.107
2	9.508	9.429	-0.2	21.2	61.0	51.6	519.2	1.032	14.68	1.104
3	8.635	8.650	0.6	21.5	57.7	48.4	518.6	1.031	14.71	1.102
4	8.180	8.261	1.7	23.6	56.0	45.6	518.5	1.033	14.70	1.104
5	8.065	8.164	0.7	25.3	55.8	44.9	518.3	1.034	14.71	1.099
6	7.949	8.067	1.5	26.7	56.1	44.1	518.4	1.035	14.71	1.096
7	7.832	7.969	1.0	26.0	54.9	42.6	518.4	1.034	14.71	1.104
8	7.714	7.872	0.7	26.3	54.6	41.2	518.6	1.033	14.70	1.109
9	6.726	7.094	1.3	28.3	51.1	33.1	518.5	1.034	14.70	1.118
10	5.592	6.315	1.5	31.3	48.4	21.9	518.6	1.037	14.70	1.131
11	5.266	6.121	0.1	33.2	49.3	18.4	518.7	1.041	14.70	1.134

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	349.9	424.2	770.2	657.5	349.8	396.2	-3.5	151.3	682.6	676.0
2	371.3	430.2	765.1	646.1	371.3	401.0	-1.1	155.7	667.8	662.3
3	380.3	428.2	711.3	600.2	380.2	398.3	4.0	157.3	605.2	606.2
4	381.1	434.0	680.3	568.7	380.9	397.6	11.2	174.0	574.9	580.6
5	382.0	431.2	679.5	550.7	382.0	389.8	4.7	184.5	566.6	573.6
6	381.4	428.4	665.8	533.3	381.3	382.7	9.8	192.6	555.7	564.0
7	380.8	441.2	662.6	538.7	380.7	396.4	6.5	193.7	548.8	558.4
8	380.8	449.6	657.6	535.2	380.8	402.9	4.6	199.6	540.7	551.8
9	372.8	472.8	593.2	496.8	372.7	416.1	8.6	224.4	470.1	495.8
10	339.2	512.1	511.1	471.4	339.1	437.3	9.1	266.3	391.6	442.2
11	315.9	518.8	484.8	457.4	315.9	434.0	0.8	284.2	368.6	428.4

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.316	0.379	0.696	0.587	0.316	0.354	1.133	0.832
2	0.336	0.385	0.693	0.578	0.336	0.359	1.080	0.814
3	0.345	0.383	0.645	0.537	0.345	0.357	1.048	0.811
4	0.346	0.388	0.617	0.509	0.345	0.356	1.044	0.795
5	0.346	0.386	0.616	0.493	0.346	0.349	1.020	0.799
6	0.346	0.383	0.604	0.477	0.346	0.342	1.004	0.775
7	0.345	0.395	0.601	0.482	0.345	0.355	1.041	0.776
8	0.345	0.403	0.596	0.479	0.345	0.361	1.058	0.773
9	0.338	0.424	0.537	0.446	0.338	0.373	1.117	0.691
10	0.307	0.460	0.462	0.423	0.307	0.393	1.290	0.587
11	0.285	0.465	0.438	0.410	0.285	0.389	1.374	0.575

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	1.2	-1.0	5.2	0.221	0.875	0.051	0.051	0.011	0.011
2	10.00	0.3	-2.2	4.5	0.230	0.896	0.041	0.041	0.009	0.009
3	30.00	1.9	-2.2	4.0	0.227	0.921	0.033	0.033	0.007	0.007
4	40.00	2.6	-2.3	4.1	0.239	0.865	0.067	0.067	0.015	0.015
5	42.50	2.9	-2.1	4.4	0.271	0.807	0.097	0.097	0.021	0.021
6	45.00	2.7	-2.4	4.6	0.283	0.755	0.132	0.132	0.029	0.029
7	47.50	3.0	-2.2	4.1	0.272	0.841	0.084	0.084	0.018	0.018
8	50.00	3.2	-2.1	3.7	0.274	0.909	0.048	0.048	0.011	0.011
9	70.00	3.6	-2.7	5.2	0.256	0.959	0.027	0.027	0.006	0.006
10	90.00	3.7	-3.4	7.1	0.188	0.979	0.019	0.019	0.004	0.004
11	95.00	5.0	-2.4	7.8	0.178	0.901	0.113	0.113	0.021	0.021

TABLE X. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 50 PERCENT OF DESIGN SPEED

(b) Reading 50

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.7	35.7	66.2	52.0	519.1	1.053	14.61	1.156
2	9.508	9.429	-0.4	34.0	64.6	51.8	519.0	1.048	14.67	1.151
3	8.635	8.650	0.1	34.6	61.4	48.6	518.7	1.044	14.70	1.141
4	8.180	8.261	1.1	36.7	59.8	45.0	518.6	1.045	14.71	1.142
5	8.065	8.164	1.2	38.9	59.6	44.6	518.2	1.045	14.70	1.140
6	7.949	8.067	1.0	40.0	59.2	44.0	518.5	1.046	14.71	1.136
7	7.832	7.969	0.1	39.2	59.1	42.9	518.6	1.045	14.70	1.137
8	7.714	7.872	-0.1	38.7	58.8	41.4	518.6	1.044	14.71	1.140
9	6.726	7.094	-0.2	39.7	55.8	32.7	518.6	1.042	14.71	1.142
10	5.592	6.315	1.6	42.4	52.8	19.9	518.6	1.042	14.69	1.144
11	5.266	6.121	2.2	44.8	52.7	14.2	518.7	1.045	14.70	1.149

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	302.5	416.4	750.2	549.2	302.5	338.0	-3.9	243.2	682.6	676.0
2	318.3	411.1	742.1	550.8	318.3	340.9	-2.5	229.7	667.9	662.3
3	329.6	404.9	689.7	503.6	329.6	333.3	0.5	229.9	606.4	607.4
4	331.3	415.7	658.5	470.9	331.3	333.2	6.6	248.6	575.6	581.3
5	329.1	412.0	650.3	450.3	329.0	320.8	6.8	258.6	567.7	574.7
6	329.3	410.3	643.5	436.8	329.2	314.3	5.8	263.8	558.8	567.0
7	329.4	414.3	641.0	438.3	329.4	321.1	0.7	261.8	550.5	560.2
8	328.4	420.5	633.7	437.8	328.4	328.2	-0.3	262.9	541.5	552.6
9	321.9	440.5	572.9	402.6	321.9	338.9	-1.2	281.4	472.8	498.7
10	292.5	471.3	483.1	369.7	292.4	347.7	8.3	318.1	392.9	443.7
11	274.3	485.9	452.0	355.7	274.1	344.8	10.3	342.4	369.7	429.7

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.273	0.368	0.677	0.486	0.273	0.299	1.117	0.885
2	0.287	0.364	0.670	0.488	0.287	0.302	1.071	0.872
3	0.298	0.360	0.623	0.447	0.298	0.296	1.011	0.866
4	0.299	0.369	0.595	0.418	0.299	0.296	1.006	0.847
5	0.298	0.366	0.588	0.400	0.297	0.285	0.975	0.841
6	0.298	0.364	0.582	0.388	0.298	0.279	0.955	0.831
7	0.298	0.368	0.579	0.389	0.298	0.285	0.975	0.833
8	0.297	0.374	0.573	0.389	0.297	0.292	0.999	0.825
9	0.291	0.392	0.518	0.359	0.291	0.302	1.053	0.751
10	0.264	0.421	0.436	0.330	0.264	0.311	1.189	0.619
11	0.247	0.434	0.407	0.318	0.247	0.308	1.258	0.582

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	4.4	2.2	4.2	0.390	0.801	0.130	0.130	0.030	0.030
2	10.00	3.9	1.4	4.6	0.372	0.851	0.091	0.091	0.021	0.021
3	30.00	5.6	1.6	4.2	0.380	0.875	0.079	0.079	0.017	0.017
4	40.00	6.4	1.5	3.4	0.400	0.854	0.103	0.103	0.023	0.023
5	42.50	6.7	1.7	4.0	0.427	0.840	0.116	0.116	0.025	0.025
6	45.00	6.8	1.8	4.5	0.443	0.805	0.146	0.146	0.032	0.032
7	47.50	7.2	2.0	4.4	0.438	0.831	0.125	0.125	0.027	0.027
8	50.00	7.4	2.1	4.0	0.432	0.866	0.099	0.099	0.022	0.022
9	70.00	8.3	2.1	4.8	0.424	0.909	0.079	0.079	0.017	0.017
10	90.00	8.0	0.9	5.1	0.374	0.930	0.083	0.083	0.016	0.016
11	95.00	8.3	1.0	3.7	0.367	0.906	0.132	0.132	0.025	0.025

TABLE X. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 50 PERCENT OF DESIGN SPEED

(c) Reading 51

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.5	41.4	68.0	53.3	519.2	1.057	14.62	1.168
2	9.508	9.429	-0.3	38.8	65.8	52.3	518.9	1.053	14.69	1.162
3	8.635	8.650	-0.2	39.1	63.2	48.8	518.7	1.048	14.70	1.153
4	8.180	8.261	1.3	41.0	61.6	45.0	518.7	1.049	14.71	1.155
5	8.065	8.164	0.8	42.9	61.3	45.0	518.5	1.049	14.70	1.149
6	7.949	8.067	1.2	44.3	60.9	44.9	518.8	1.050	14.70	1.144
7	7.832	7.969	1.5	43.8	60.6	43.7	518.8	1.049	14.70	1.145
8	7.714	7.872	1.1	43.2	60.3	42.3	518.5	1.047	14.70	1.147
9	6.726	7.094	1.5	43.5	57.2	32.9	518.6	1.045	14.70	1.149
10	5.592	6.315	1.7	45.0	54.6	19.9	518.6	1.044	14.70	1.151
11	5.266	6.121	1.4	47.4	55.1	14.4	518.7	1.045	14.70	1.154

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	277.9	406.2	741.0	510.1	277.9	304.7	-2.5	268.7	684.4	677.8
2	300.2	404.7	733.6	515.9	300.2	315.3	-1.8	253.7	667.5	662.0
3	307.3	400.5	680.5	471.9	307.3	311.0	-0.9	252.4	606.3	607.3
4	307.6	411.6	646.0	439.5	307.6	310.8	6.8	269.8	574.8	580.5
5	307.0	405.5	639.7	419.7	307.0	297.0	4.5	276.1	565.8	572.7
6	306.7	401.3	631.0	405.2	306.6	287.2	6.4	280.3	557.9	566.2
7	306.0	405.5	623.0	404.7	305.9	292.7	7.8	280.7	550.6	560.2
8	306.2	410.2	617.7	404.5	306.2	298.9	5.7	280.8	542.2	553.3
9	299.4	430.6	553.0	372.5	299.3	312.6	7.8	296.2	472.8	498.7
10	273.3	460.5	471.9	346.3	273.1	325.6	8.1	325.7	392.9	443.7
11	253.8	473.1	443.8	330.3	253.7	320.0	6.3	348.5	370.4	430.6

	ABS MACH NO		REL MACH NO		MERID MACH NO			MERID PEAK SS
RP	IN	OUT	IN	OUT	IN	OUT		VEL R	MACH NO
1	0.250	0.358	0.668	0.450	0.250	0.269		1.097	0.914
2	0.271	0.358	0.662	0.456	0.271	0.279		1.050	0.890
3	0.277	0.355	0.614	0.418	0.277	0.276		1.012	0.890
4	0.278	0.365	0.583	0.389	0.278	0.275		1.011	0.866
5	0.277	0.359	0.578	0.372	0.277	0.263		0.967	0.861
6	0.277	0.355	0.569	0.359	0.277	0.254		0.937	0.847
7	0.276	0.359	0.562	0.358	0.276	0.259		0.957	0.838
8	0.276	0.364	0.558	0.359	0.276	0.265		0.976	0.833
9	0.270	0.383	0.499	0.331	0.270	0.278		1.044	0.749
10	0.246	0.411	0.425	0.309	0.246	0.290		1.192	0.632
11	0.228	0.422	0.400	0.295	0.228	0.285		1.261	0.605

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	6.2	4.0	5.5	0.447	0.794	0.148	0.148	0.033	0.033
2	10.00	5.2	2.7	5.2	0.423	0.828	0.117	0.117	0.026	0.026
3	30.00	7.4	3.3	4.4	0.430	0.874	0.088	0.088	0.019	0.019
4	40.00	8.2	3.3	3.4	0.447	0.857	0.114	0.114	0.025	0.025
5	42.50	8.5	3.5	4.4	0.475	0.820	0.145	0.145	0.031	0.031
6	45.00	8.5	3.5	5.4	0.490	0.791	0.174	0.174	0.037	0.037
7	47.50	8.7	3.5	5.2	0.482	0.806	0.163	0.163	0.035	0.035
8	50.00	8.9	3.6	4.9	0.477	0.845	0.128	0.128	0.028	0.028
9	70.00	9.8	3.5	5.1	0.461	0.902	0.095	0.095	0.020	0.020
10	90.00	9.9	2.8	5.2	0.413	0.934	0.084	0.084	0.016	0.016
11	95.00	10.8	3.4	3.8	0.417	0.922	0.117	0.117	0.022	0.022

TABLE X. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 50 PERCENT OF DESIGN SPEED

(d) Reading 52

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.2	49.0	69.7	55.4	519.1	1.065	14.62	1.172
2	9.508	9.429	-0.2	45.5	68.3	53.4	519.0	1.060	14.67	1.171
3	8.635	8.650	-0.0	44.3	65.3	49.4	518.7	1.052	14.70	1.162
4	8.180	8.261	1.0	46.0	63.9	46.0	518.8	1.053	14.70	1.161
5	8.065	8.164	0.9	47.5	63.6	45.9	518.5	1.053	14.71	1.157
6	7.949	8.067	1.1	48.7	63.3	45.3	518.4	1.053	14.70	1.154
7	7.832	7.969	0.9	48.9	63.0	44.5	518.4	1.052	14.71	1.152
8	7.714	7.872	1.0	48.6	62.6	43.0	518.7	1.052	14.71	1.154
9	6.726	7.094	0.1	47.0	59.8	32.4	518.6	1.048	14.70	1.158
10	5.592	6.315	1.6	47.3	56.7	20.1	518.6	1.045	14.71	1.156
11	5.266	6.121	1.4	49.7	57.2	14.0	518.7	1.046	14.69	1.160

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	253.2	395.4	728.2	457.7	253.2	259.6	-1.1	298.2	681.7	675.1
2	265.0	398.6	717.7	468.5	265.0	279.2	-0.8	284.5	666.2	660.7
3	278.8	396.0	667.4	435.7	278.8	283.5	-0.2	276.4	606.1	607.2
4	279.5	403.4	635.0	404.0	279.4	280.5	4.8	289.9	575.0	580.7
5	279.0	399.6	627.1	387.6	278.9	269.8	4.5	294.8	566.2	573.1
6	278.6	400.0	620.1	375.3	278.6	263.8	5.2	300.7	559.2	567.5
7	278.3	399.6	611.9	368.1	278.3	262.7	4.5	301.2	549.5	559.1
8	278.1	404.9	604.8	366.2	278.1	268.0	4.9	303.5	542.0	553.1
9	274.4	427.7	545.5	345.4	274.4	291.7	0.6	312.8	472.0	497.8
10	253.3	451.1	461.6	325.7	253.2	305.8	7.0	331.7	393.0	443.8
11	234.3	464.5	432.4	309.5	234.2	300.3	5.9	354.4	369.4	429.3

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.228	0.347	0.655	0.402	0.228	0.228	1.025	0.936
2	0.239	0.351	0.646	0.413	0.239	0.246	1.053	0.925
3	0.251	0.350	0.602	0.385	0.251	0.251	1.017	0.917
4	0.252	0.357	0.572	0.357	0.252	0.248	1.004	0.896
5	0.252	0.353	0.565	0.343	0.251	0.238	0.967	0.887
6	0.251	0.354	0.559	0.332	0.251	0.233	0.947	0.878
7	0.251	0.353	0.552	0.326	0.251	0.232	0.944	0.868
8	0.251	0.358	0.545	0.324	0.251	0.237	0.964	0.859
9	0.247	0.380	0.492	0.307	0.247	0.259	1.063	0.782
10	0.228	0.402	0.416	0.290	0.228	0.272	1.208	0.648
11	0.211	0.414	0.389	0.276	0.211	0.267	1.282	0.617

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	7.9	5.6	7.7	0.524	0.720	0.231	0.231	0.049	0.049
2	10.00	7.7	5.2	6.3	0.492	0.777	0.176	0.176	0.038	0.038
3	30.00	9.5	5.5	5.0	0.484	0.839	0.128	0.128	0.028	0.028
4	40.00	10.5	5.6	4.5	0.504	0.827	0.151	0.151	0.033	0.033
5	42.50	10.7	5.7	5.3	0.525	0.804	0.175	0.175	0.037	0.037
6	45.00	10.9	5.8	5.8	0.540	0.793	0.189	0.189	0.040	0.040
7	47.50	11.1	5.9	6.0	0.544	0.792	0.192	0.192	0.041	0.041
8	50.00	11.2	5.9	5.5	0.540	0.804	0.184	0.184	0.039	0.039
9	70.00	12.3	6.1	4.5	0.514	0.897	0.108	0.108	0.023	0.023
10	90.00	12.0	4.9	5.4	0.448	0.934	0.090	0.090	0.017	0.017
11	95.00	12.8	5.5	3.5	0.452	0.930	0.112	0.112	0.021	0.021

TABLE X. - Concluded. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 50 PERCENT OF DESIGN SPEED

(e) Reading 72

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.4	59.2	71.8	57.6	519.5	1.072	14.64	1.179
2	9.508	9.429	-0.5	55.7	70.5	56.4	519.2	1.066	14.69	1.170
3	8.635	8.650	0.0	50.3	67.9	50.2	518.7	1.055	14.70	1.165
4	8.180	8.261	1.2	51.3	66.5	47.4	518.6	1.054	14.70	1.160
5	8.065	8.164	1.2	52.1	66.2	47.1	518.7	1.054	14.70	1.158
6	7.949	8.067	1.1	52.6	65.9	46.7	518.8	1.054	14.70	1.156
7	7.832	7.969	1.0	53.2	65.5	46.0	518.6	1.053	14.70	1.153
8	7.714	7.872	1.1	53.1	65.3	44.0	518.6	1.053	14.70	1.155
9	6.726	7.094	1.3	48.5	61.1	31.4	518.3	1.047	14.70	1.160
10	5.592	6.315	1.2	48.7	58.9	19.9	518.5	1.044	14.70	1.159
11	5.266	6.121	1.4	49.8	59.2	14.7	518.6	1.047	14.69	1.164

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	222.9	402.5	713.7	384.0	222.9	206.0	-1.6	345.8	676.4	669.9
2	234.7	391.7	703.9	398.9	234.7	220.6	-2.1	323.6	661.5	656.0
3	244.1	392.6	649.3	391.7	244.1	251.0	0.0	302.0	601.7	602.7
4	244.8	393.9	614.9	363.2	244.8	246.0	5.0	307.5	569.0	574.7
5	245.6	392.4	608.4	353.9	245.5	241.1	5.1	309.6	561.8	568.7
6	245.3	390.9	601.4	346.0	245.2	237.4	4.7	310.5	553.9	562.1
7	246.0	390.5	593.9	336.1	246.0	233.7	4.5	312.9	545.0	554.5
8	245.4	397.7	586.5	331.7	245.4	238.8	4.6	318.0	537.3	548.3
9	249.9	418.5	516.4	325.0	249.8	277.5	5.5	313.4	457.5	482.6
10	231.5	444.3	448.6	312.1	231.5	293.5	5.0	333.6	389.3	439.6
11	215.3	457.0	420.6	305.1	215.2	295.2	5.3	348.9	366.7	426.2

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.200	0.352	0.641	0.336	0.200	0.180	0.924	0.965
2	0.211	0.344	0.633	0.350	0.211	0.193	0.940	0.955
3	0.220	0.346	0.584	0.346	0.220	0.221	1.028	0.944
4	0.220	0.348	0.554	0.321	0.220	0.217	1.005	0.918
5	0.221	0.347	0.548	0.313	0.221	0.213	0.982	0.910
6	0.221	0.345	0.541	0.305	0.221	0.210	0.968	0.900
7	0.222	0.345	0.535	0.297	0.221	0.206	0.950	0.889
8	0.221	0.351	0.528	0.293	0.221	0.211	0.973	0.881
9	0.225	0.372	0.465	0.288	0.225	0.246	1.111	0.760
10	0.208	0.396	0.404	0.278	0.208	0.261	1.268	0.660
11	0.194	0.407	0.378	0.272	0.194	0.263	1.372	0.627

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	10.0	7.8	9.8	0.642	0.672	0.307	0.307	0.061	0.061
2	10.00	9.8	7.3	9.3	0.602	0.691	0.277	0.277	0.056	0.056
3	30.00	12.1	8.1	5.8	0.550	0.805	0.172	0.172	0.036	0.036
4	40.00	13.2	8.3	5.8	0.563	0.808	0.181	0.181	0.038	0.038
5	42.50	13.3	8.3	6.5	0.573	0.796	0.195	0.195	0.041	0.041
6	45.00	13.5	8.5	7.2	0.580	0.785	0.210	0.210	0.044	0.044
7	47.50	13.6	8.5	7.5	0.590	0.779	0.220	0.220	0.046	0.046
8	50.00	13.9	8.6	6.5	0.592	0.788	0.216	0.216	0.046	0.046
9	70.00	13.6	7.4	3.5	0.524	0.916	0.098	0.098	0.021	0.021
10	90.00	14.2	7.1	5.1	0.464	0.968	0.046	0.046	0.009	0.009
11	95.00	14.8	7.5	4.1	0.445	0.952	0.081	0.081	0.015	0.015

TABLE XI. - BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 60 PERCENT OF DESIGN SPEED

(a) Reading 44

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-1.4	28.0	63.8	52.4	519.5	1.059	14.53	1.191
2	9.508	9.429	-1.0	27.1	61.8	51.1	519.3	1.058	14.67	1.182
3	8.635	8.650	-0.2	27.7	58.6	47.9	518.7	1.053	14.71	1.175
4	8.180	8.261	0.3	30.3	57.0	44.3	518.5	1.056	14.71	1.178
5	8.065	8.164	0.6	32.3	56.6	43.9	518.8	1.057	14.71	1.170
6	7.949	8.067	0.9	33.6	56.1	43.1	518.4	1.058	14.71	1.167
7	7.832	7.969	1.0	32.5	55.7	41.5	518.8	1.058	14.72	1.177
8	7.714	7.872	0.6	31.8	55.4	40.7	518.2	1.055	14.71	1.179
9	6.726	7.094	0.9	33.8	52.3	32.6	518.5	1.055	14.71	1.187
10	5.592	6.315	1.6	37.7	49.6	19.6	518.6	1.056	14.70	1.196
11	5.266	6.121	1.5	40.3	49.8	15.1	518.7	1.059	14.70	1.199

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	404.7	498.0	917.0	721.4	404.6	439.8	-9.6	233.6	813.3	805.4
2	431.0	506.4	912.3	718.9	431.0	451.0	-7.2	230.4	796.9	790.2
3	442.5	502.2	849.7	662.9	442.5	444.7	-1.9	233.2	723.5	724.8
4	444.2	513.7	815.3	620.3	444.2	443.6	2.2	259.1	685.8	692.6
5	442.4	506.7	802.9	594.7	442.4	428.5	4.4	270.4	674.5	682.8
6	442.5	506.5	793.3	578.2	442.4	422.1	6.7	280.0	665.3	675.1
7	442.5	519.8	784.4	584.6	442.5	438.1	7.3	279.6	655.1	666.6
8	441.4	523.0	776.9	586.0	441.3	444.5	4.8	275.6	644.2	657.4
9	429.9	546.4	703.6	538.8	429.8	453.9	6.6	304.2	563.6	594.5
10	389.0	590.3	599.7	495.8	388.9	466.9	10.9	361.2	467.5	527.9
11	364.1	600.7	564.1	474.5	364.0	458.1	9.5	388.5	440.4	511.9

	ABS MACH NO		REL MACH NO		MERID MACH NO				MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT			VEL R	MACH NO
1	0.367	0.441	0.832	0.639	0.367	0.390			1.087	1.018
2	0.392	0.450	0.829	0.638	0.392	0.401			1.046	0.999
3	0.403	0.447	0.773	0.590	0.403	0.396			1.005	0.998
4	0.404	0.457	0.742	0.552	0.404	0.395			0.999	0.983
5	0.403	0.450	0.731	0.528	0.403	0.381			0.969	0.968
6	0.403	0.450	0.722	0.514	0.403	0.375			0.954	0.953
7	0.403	0.462	0.714	0.520	0.403	0.390			0.990	0.941
8	0.402	0.466	0.707	0.522	0.402	0.396			1.007	0.936
9	0.391	0.488	0.640	0.481	0.391	0.405			1.056	0.851
10	0.353	0.529	0.544	0.444	0.353	0.418			1.201	0.712
11	0.330	0.538	0.511	0.425	0.330	0.410			1.259	0.679

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.0	-0.2	4.7	0.312	0.862	0.073	0.073	0.017	0.017
2	10.00	1.1	-1.4	4.0	0.307	0.853	0.076	0.076	0.017	0.017
3	30.00	2.8	-1.2	3.5	0.311	0.883	0.063	0.063	0.014	0.014
4	40.00	3.6	-1.3	2.8	0.338	0.858	0.085	0.085	0.019	0.019
5	42.50	3.7	-1.3	3.3	0.362	0.803	0.124	0.124	0.027	0.027
6	45.00	3.7	-1.4	3.6	0.376	0.775	0.147	0.147	0.032	0.032
7	47.50	3.8	-1.4	3.0	0.359	0.825	0.116	0.116	0.026	0.026
8	50.00	4.0	-1.3	3.2	0.349	0.880	0.077	0.077	0.017	0.017
9	70.00	4.9	-1.4	4.7	0.343	0.905	0.073	0.073	0.015	0.015
10	90.00	4.8	-2.3	4.9	0.301	0.931	0.073	0.073	0.014	0.014
11	95.00	5.4	-1.9	4.5	0.299	0.901	0.123	0.123	0.023	0.023

TABLE XI. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 60 PERCENT OF DESIGN SPEED

(b) Reading 45

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-1.6	33.7	65.6	52.7	519.3	1.069	14.53	1.225
2	9.508	9.429	-0.8	31.5	63.1	51.5	519.2	1.066	14.67	1.214
3	8.635	8.650	0.1	33.0	60.2	48.1	518.7	1.061	14.71	1.203
4	8.180	8.261	1.2	35.3	58.5	44.5	518.5	1.063	14.72	1.203
5	8.065	8.164	0.2	37.2	58.4	44.0	518.7	1.064	14.70	1.195
6	7.949	8.067	0.6	38.9	58.0	43.7	518.3	1.065	14.70	1.190
7	7.832	7.969	0.6	37.6	57.6	42.2	518.3	1.063	14.71	1.196
8	7.714	7.872	0.0	37.0	57.5	41.3	518.5	1.060	14.71	1.198
9	6.726	7.094	-0.2	38.5	54.6	32.4	518.6	1.059	14.71	1.204
10	5.592	6.315	1.5	41.3	51.5	19.7	518.6	1.060	14.71	1.205
11	5.266	6.121	1.5	44.0	51.8	13.7	518.7	1.062	14.70	1.217

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	372.5	487.4	902.0	669.6	372.4	405.4	-10.2	270.5	811.3	803.4
2	407.5	495.5	899.8	678.7	407.5	422.5	-5.6	258.9	796.6	790.0
3	414.5	490.8	834.1	616.2	414.5	411.7	0.5	267.1	724.3	725.6
4	414.1	500.7	792.8	572.8	414.0	408.4	8.4	289.6	684.5	691.3
5	414.1	496.2	789.5	550.1	414.1	395.5	1.6	299.7	673.8	682.1
6	414.0	492.9	780.3	530.7	414.0	383.8	4.5	309.3	666.0	675.9
7	413.0	501.4	770.9	536.5	412.9	397.2	4.2	306.0	655.2	666.6
8	411.4	504.8	764.7	536.2	411.4	403.0	0.0	304.1	644.6	657.8
9	401.3	531.0	692.5	492.4	401.3	415.8	-1.2	330.2	563.2	594.0
10	364.5	568.5	585.6	453.6	364.4	427.0	9.5	375.3	467.9	528.4
11	340.1	589.7	549.9	436.4	340.0	424.0	8.9	409.8	441.2	512.8

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.337	0.430	0.817	0.590	0.337	0.357	1.089	1.051
2	0.370	0.438	0.817	0.600	0.370	0.373	1.037	1.020
3	0.377	0.435	0.758	0.546	0.377	0.365	0.993	1.020
4	0.376	0.444	0.720	0.508	0.376	0.362	0.986	0.992
5	0.376	0.439	0.717	0.487	0.376	0.350	0.955	0.995
6	0.376	0.436	0.709	0.470	0.376	0.340	0.927	0.982
7	0.375	0.444	0.700	0.475	0.375	0.352	0.962	0.971
8	0.374	0.448	0.695	0.476	0.374	0.358	0.980	0.969
9	0.364	0.473	0.629	0.438	0.364	0.370	1.036	0.885
10	0.330	0.507	0.530	0.405	0.330	0.381	1.172	0.730
11	0.308	0.527	0.497	0.390	0.307	0.379	1.247	0.696

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	3.8	1.6	5.0	0.373	0.866	0.084	0.084	0.019	0.019
2	10.00	2.4	-0.1	4.4	0.353	0.869	0.078	0.078	0.018	0.018
3	30.00	4.4	0.4	3.7	0.367	0.889	0.070	0.070	0.016	0.016
4	40.00	5.1	0.3	3.0	0.389	0.865	0.095	0.095	0.021	0.021
5	42.50	5.5	0.5	3.5	0.420	0.815	0.133	0.133	0.029	0.029
6	45.00	5.6	0.5	4.2	0.439	0.788	0.157	0.157	0.034	0.034
7	47.50	5.7	0.5	3.8	0.421	0.837	0.121	0.121	0.027	0.027
8	50.00	6.1	0.8	3.8	0.416	0.886	0.082	0.082	0.018	0.018
9	70.00	7.1	0.9	4.5	0.412	0.930	0.059	0.059	0.012	0.012
10	90.00	6.8	-0.3	5.0	0.362	0.915	0.099	0.099	0.019	0.019
11	95.00	7.4	0.1	3.1	0.359	0.929	0.096	0.096	0.018	0.018

TABLE XI. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 60 PERCENT OF DESIGN SPEED

(c) Reading 46

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-1.7	42.1	67.5	53.2	519.2	1.083	14.57	1.248
2	9.508	9.429	-1.0	39.4	65.8	52.2	519.0	1.077	14.68	1.242
3	8.635	8.650	-0.2	39.5	62.7	48.8	518.7	1.069	14.71	1.227
4	8.180	8.261	1.1	42.3	61.1	45.0	518.5	1.071	14.71	1.227
5	8.065	8.164	1.1	44.3	60.8	44.6	518.6	1.071	14.71	1.221
6	7.949	8.067	0.8	45.5	60.6	44.7	518.6	1.071	14.71	1.213
7	7.832	7.969	-0.0	45.2	60.5	43.4	518.4	1.070	14.71	1.213
8	7.714	7.872	0.6	44.4	60.0	42.0	518.6	1.068	14.70	1.215
9	6.726	7.094	1.4	44.1	56.9	32.6	518.6	1.064	14.71	1.219
10	5.592	6.315	-0.1	45.6	54.9	19.4	518.6	1.062	14.70	1.221
11	5.266	6.121	1.7	48.1	54.5	13.9	518.6	1.064	14.70	1.225

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	341.9	485.2	891.7	600.6	341.7	360.1	-10.0	325.1	813.6	805.8
2	360.4	483.8	879.3	610.0	360.3	373.7	-6.0	307.3	796.0	789.4
3	373.8	478.1	815.7	559.5	373.8	368.7	-1.1	304.4	723.9	725.2
4	373.6	489.9	773.6	512.4	373.5	362.6	7.3	329.4	684.8	691.5
5	372.7	486.2	764.2	488.9	372.6	348.1	7.3	339.5	674.4	682.7
6	371.8	480.1	758.1	473.8	371.7	336.5	5.3	342.4	666.0	675.9
7	370.7	484.1	752.4	469.9	370.7	341.4	-0.1	343.2	654.6	666.0
8	368.9	488.6	738.2	469.8	368.9	349.0	3.9	342.0	643.3	656.5
9	361.0	513.2	660.6	438.0	360.9	368.8	8.9	356.9	562.3	593.0
10	329.5	548.8	572.3	406.8	329.5	383.7	-0.7	392.4	467.3	527.7
11	307.3	561.7	528.6	386.8	307.1	375.4	9.2	417.9	439.4	510.7

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.309	0.425	0.806	0.526	0.309	0.315	1.054	1.089
2	0.326	0.425	0.796	0.536	0.326	0.328	1.037	1.069
3	0.339	0.422	0.739	0.493	0.339	0.325	0.986	1.060
4	0.339	0.432	0.701	0.452	0.338	0.320	0.971	1.030
5	0.338	0.429	0.692	0.431	0.338	0.307	0.934	1.020
6	0.337	0.423	0.687	0.417	0.337	0.296	0.905	1.015
7	0.336	0.427	0.682	0.414	0.336	0.301	0.921	1.013
8	0.334	0.431	0.669	0.415	0.334	0.308	0.946	0.993
9	0.327	0.455	0.598	0.388	0.327	0.327	1.022	0.890
10	0.298	0.488	0.517	0.362	0.298	0.341	1.165	0.772
11	0.277	0.500	0.477	0.344	0.277	0.334	1.222	0.712

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	5.7	3.5	5.4	0.466	0.789	0.158	0.158	0.035	0.035
2	10.00	5.1	2.6	5.1	0.436	0.830	0.122	0.122	0.027	0.027
3	30.00	6.9	2.9	4.4	0.438	0.872	0.094	0.094	0.021	0.021
4	40.00	7.7	2.9	3.4	0.468	0.853	0.121	0.121	0.027	0.027
5	42.50	7.9	3.0	4.0	0.495	0.826	0.146	0.146	0.032	0.032
6	45.00	8.2	3.2	5.2	0.510	0.795	0.174	0.174	0.037	0.037
7	47.50	8.6	3.4	4.9	0.512	0.807	0.164	0.164	0.035	0.035
8	50.00	8.6	3.3	4.6	0.499	0.838	0.140	0.140	0.030	0.030
9	70.00	9.4	3.2	4.8	0.473	0.909	0.090	0.090	0.019	0.019
10	90.00	10.1	3.0	4.7	0.438	0.940	0.076	0.076	0.015	0.015
11	95.00	10.1	2.8	3.4	0.430	0.933	0.100	0.100	0.019	0.019

TABLE XI. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 60 PERCENT OF DESIGN SPEED

(d) Reading 47

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-1.5	49.0	69.1	54.9	519.3	1.090	14.60	1.251
2	9.508	9.429	-0.9	44.8	67.2	53.2	519.1	1.084	14.68	1.250
3	8.635	8.650	-0.3	44.3	64.5	49.1	518.6	1.074	14.71	1.236
4	8.180	8.261	1.2	46.2	63.0	45.8	518.5	1.074	14.71	1.232
5	8.065	8.164	1.1	47.9	62.7	45.7	518.6	1.074	14.70	1.227
6	7.949	8.067	1.2	49.0	62.5	45.4	518.6	1.075	14.70	1.222
7	7.832	7.969	1.2	49.3	62.1	44.5	518.4	1.074	14.71	1.219
8	7.714	7.872	1.2	48.8	61.8	42.6	518.6	1.074	14.70	1.223
9	6.726	7.094	1.6	46.6	58.6	32.3	518.6	1.068	14.71	1.229
10	5.592	6.315	1.7	47.6	56.0	19.4	518.5	1.064	14.70	1.229
11	5.266	6.121	1.8	49.9	56.2	14.0	518.7	1.065	14.70	1.231

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	312.0	475.2	875.7	542.3	311.9	311.9	-8.4	358.4	809.9	802.1
2	335.6	477.2	867.6	564.6	335.5	338.4	-5.1	336.5	795.1	788.5
3	344.5	473.7	800.5	518.2	344.5	339.2	-1.5	330.6	721.1	722.4
4	344.0	481.1	758.3	477.4	343.9	332.7	7.3	347.5	683.1	689.9
5	344.8	478.2	752.2	458.7	344.8	320.3	6.5	355.0	675.1	683.4
6	343.2	475.5	742.5	444.6	343.2	312.1	7.1	358.7	665.5	675.4
7	342.3	476.2	732.2	435.4	342.2	310.5	7.4	361.0	654.7	666.1
8	341.9	484.8	723.5	433.3	341.8	319.1	7.2	365.0	644.9	658.1
9	336.9	510.1	647.0	414.6	336.8	350.3	9.5	370.8	561.9	592.7
10	310.0	541.3	553.6	386.9	309.8	364.9	9.4	399.9	468.2	528.7
11	288.5	553.1	518.7	367.4	288.3	356.5	9.2	422.9	440.4	511.9

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.282	0.414	0.790	0.473	0.281	0.272	1.000	1.114
2	0.303	0.418	0.784	0.494	0.303	0.296	1.009	1.093
3	0.312	0.417	0.724	0.456	0.312	0.298	0.985	1.084
4	0.311	0.423	0.686	0.420	0.311	0.293	0.967	1.053
5	0.312	0.421	0.680	0.403	0.312	0.282	0.929	1.047
6	0.310	0.418	0.672	0.391	0.310	0.274	0.910	1.036
7	0.310	0.419	0.662	0.383	0.310	0.273	0.907	1.023
8	0.309	0.427	0.654	0.381	0.309	0.281	0.933	1.013
9	0.305	0.451	0.585	0.367	0.304	0.310	1.040	0.906
10	0.280	0.481	0.500	0.344	0.280	0.324	1.178	0.766
11	0.260	0.491	0.468	0.326	0.260	0.317	1.236	0.727

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	7.3	5.1	7.1	0.536	0.729	0.225	0.225	0.048	0.048
2	10.00	6.6	4.1	6.0	0.492	0.786	0.169	0.169	0.037	0.037
3	30.00	8.7	4.7	4.7	0.490	0.845	0.125	0.125	0.027	0.027
4	40.00	9.6	4.8	4.3	0.511	0.834	0.147	0.147	0.032	0.032
5	42.50	9.9	4.9	5.1	0.533	0.810	0.171	0.171	0.037	0.037
6	45.00	10.1	5.0	5.9	0.545	0.788	0.196	0.196	0.042	0.042
7	47.50	10.2	5.1	6.0	0.550	0.788	0.198	0.198	0.042	0.042
8	50.00	10.4	5.1	5.1	0.547	0.803	0.188	0.188	0.041	0.041
9	70.00	11.2	4.9	4.5	0.503	0.897	0.112	0.112	0.024	0.024
10	90.00	11.2	4.1	4.7	0.455	0.944	0.078	0.078	0.015	0.015
11	95.00	11.8	4.5	3.5	0.458	0.936	0.102	0.102	0.019	0.019

TABLE XI. - Concluded. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 60 PERCENT OF DESIGN SPEED

(e) Reading 48

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-1.2	59.7	71.7	57.9	519.5	1.102	14.59	1.265
2	9.508	9.429	-0.9	54.6	69.8	55.8	519.1	1.097	14.68	1.253
3	8.635	8.650	-0.8	48.4	66.9	49.5	518.7	1.080	14.71	1.245
4	8.180	8.261	0.9	50.3	65.4	47.1	518.6	1.078	14.70	1.236
5	8.065	8.164	0.8	51.4	65.1	46.8	518.4	1.078	14.71	1.231
6	7.949	8.067	0.9	52.7	64.8	46.2	518.6	1.078	14.70	1.228
7	7.832	7.969	1.0	53.7	64.5	45.3	518.3	1.078	14.69	1.226
8	7.714	7.872	1.1	53.4	64.1	43.5	518.7	1.078	14.71	1.228
9	6.726	7.094	1.3	48.8	60.8	32.3	518.5	1.070	14.70	1.237
10	5.592	6.315	1.7	49.2	57.9	19.6	518.6	1.066	14.71	1.233
11	5.266	6.121	1.7	51.4	58.2	13.5	518.6	1.067	14.70	1.237

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	271.2	482.5	861.7	458.0	271.2	243.5	-5.6	416.5	812.3	804.4
2	293.6	473.0	851.4	487.3	293.6	274.2	-4.4	385.4	794.8	788.2
3	310.2	475.0	790.2	484.9	310.1	315.2	-4.2	355.4	722.6	723.9
4	310.7	474.6	747.5	445.5	310.6	303.2	4.8	365.1	684.7	691.5
5	310.7	472.3	738.3	430.1	310.7	294.6	4.4	369.1	674.2	682.4
6	310.2	473.1	729.7	414.2	310.1	286.7	4.8	376.3	665.3	675.2
7	310.4	474.6	720.2	399.6	310.3	280.9	5.3	382.5	655.3	666.8
8	310.7	480.7	710.7	395.4	310.6	286.7	5.8	385.8	645.0	658.2
9	311.2	508.0	637.0	395.9	311.1	334.8	6.9	382.1	562.7	593.5
10	288.8	534.7	543.0	370.9	288.7	349.4	8.6	404.7	468.5	529.1
11	268.9	550.1	509.3	353.0	268.7	343.2	8.2	429.8	440.8	512.4

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.244	0.419	0.776	0.397	0.244	0.211	0.898	1.162
2	0.265	0.411	0.768	0.424	0.265	0.238	0.934	1.139
3	0.280	0.416	0.713	0.425	0.280	0.276	1.016	1.127
4	0.281	0.416	0.675	0.391	0.280	0.266	0.976	1.093
5	0.281	0.415	0.667	0.378	0.281	0.259	0.948	1.082
6	0.280	0.415	0.659	0.363	0.280	0.252	0.925	1.071
7	0.280	0.417	0.650	0.351	0.280	0.247	0.905	1.058
8	0.280	0.422	0.642	0.347	0.280	0.252	0.923	1.044
9	0.281	0.449	0.575	0.350	0.281	0.296	1.076	0.934
10	0.260	0.474	0.490	0.329	0.260	0.310	1.210	0.783
11	0.242	0.488	0.459	0.313	0.242	0.305	1.277	0.744

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	9.9	7.6	10.1	0.650	0.680	0.303	0.303	0.060	0.060
2	10.00	9.2	6.7	8.6	0.594	0.685	0.290	0.290	0.060	0.060
3	30.00	11.1	7.0	5.1	0.537	0.803	0.176	0.176	0.038	0.038
4	40.00	12.1	7.2	5.6	0.555	0.799	0.192	0.192	0.041	0.041
5	42.50	12.2	7.3	6.2	0.570	0.788	0.205	0.205	0.043	0.043
6	45.00	12.4	7.4	6.7	0.587	0.776	0.222	0.222	0.046	0.046
7	47.50	12.6	7.4	6.9	0.602	0.773	0.229	0.229	0.048	0.048
8	50.00	12.7	7.4	6.1	0.602	0.777	0.230	0.230	0.049	0.049
9	70.00	13.3	7.1	4.4	0.530	0.891	0.126	0.126	0.027	0.027
10	90.00	13.1	6.1	4.8	0.476	0.938	0.091	0.091	0.018	0.018
11	95.00	13.8	6.5	3.0	0.480	0.939	0.103	0.103	0.019	0.019

TABLE XII. - BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 70 PERCENT OF DESIGN SPEED

(a) Reading 80

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.4	23.7	62.3	52.5	519.3	1.079	14.51	1.265
2	9.508	9.429	-1.0	25.4	60.6	51.0	518.9	1.073	14.67	1.243
3	8.635	8.650	0.5	27.2	57.2	47.2	518.7	1.069	14.71	1.246
4	8.180	8.261	0.8	30.0	55.6	44.5	518.7	1.074	14.71	1.238
5	8.065	8.164	0.5	31.7	55.4	44.0	518.6	1.076	14.71	1.230
6	7.949	8.067	1.1	32.7	54.8	43.4	518.6	1.077	14.72	1.224
7	7.832	7.969	0.6	31.9	54.5	41.7	518.4	1.075	14.71	1.232
8	7.714	7.872	1.3	30.3	53.7	39.8	518.9	1.072	14.71	1.235
9	6.726	7.094	0.5	31.4	50.7	31.2	518.7	1.070	14.71	1.249
10	5.592	6.315	1.5	34.3	48.1	20.9	518.1	1.073	14.71	1.266
11	5.266	6.121	0.9	32.5	48.4	21.6	518.3	1.075	14.70	1.263

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	501.4	591.2	1080.3	889.9	501.4	541.2	-3.3	237.9	953.6	944.4
2	528.3	596.2	1076.5	855.9	528.2	538.7	-9.6	255.5	928.4	920.6
3	542.3	598.6	1002.1	783.5	542.3	532.4	4.4	273.7	847.1	848.6
4	543.3	599.2	962.3	727.6	543.3	518.9	7.6	299.7	801.9	809.8
5	541.6	593.4	953.8	702.0	541.5	504.9	4.7	311.8	789.8	799.5
6	542.7	593.2	942.0	686.5	542.6	498.9	10.7	320.8	780.8	792.4
7	541.9	606.7	933.7	689.9	541.9	514.9	6.1	320.8	766.5	779.9
8	547.1	630.7	923.8	708.6	546.9	544.4	12.3	318.6	756.8	772.3
9	535.7	671.5	846.6	670.2	535.7	573.5	4.5	349.4	660.1	696.2
10	482.0	704.7	720.9	623.2	481.8	582.1	12.8	397.2	549.0	619.9
11	451.7	689.5	680.5	625.5	451.6	581.7	7.3	370.1	516.4	600.2

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.458	0.523	0.987	0.788	0.458	0.479	1.079	1.158
2	0.484	0.530	0.986	0.760	0.484	0.479	1.020	1.147
3	0.498	0.533	0.920	0.698	0.498	0.474	0.982	1.143
4	0.499	0.532	0.883	0.646	0.499	0.461	0.955	1.128
5	0.497	0.526	0.875	0.623	0.497	0.448	0.932	1.124
6	0.498	0.526	0.865	0.609	0.498	0.442	0.919	1.102
7	0.497	0.539	0.857	0.613	0.497	0.458	0.950	1.095
8	0.502	0.563	0.848	0.632	0.502	0.486	0.995	1.072
9	0.491	0.602	0.777	0.601	0.491	0.514	1.070	0.989
10	0.440	0.634	0.658	0.560	0.440	0.523	1.208	0.827
11	0.412	0.618	0.620	0.561	0.411	0.522	1.288	0.794

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	0.6	-1.6	4.8	0.259	0.877	0.067	0.066	0.015	0.015
2	10.00	-0.0	-2.5	3.8	0.294	0.877	0.062	0.061	0.014	0.014
3	30.00	1.4	-2.6	2.8	0.307	0.938	0.033	0.033	0.007	0.007
4	40.00	2.2	-2.6	3.0	0.339	0.844	0.094	0.094	0.021	0.021
5	42.50	2.5	-2.5	3.4	0.363	0.799	0.126	0.126	0.028	0.028
6	45.00	2.4	-2.7	3.9	0.372	0.771	0.147	0.147	0.032	0.032
7	47.50	2.6	-2.6	3.2	0.362	0.820	0.115	0.115	0.026	0.026
8	50.00	2.3	-3.0	2.3	0.331	0.870	0.081	0.081	0.018	0.018
9	70.00	3.3	-3.0	3.3	0.313	0.936	0.045	0.045	0.010	0.010
10	90.00	3.3	-3.8	6.2	0.252	0.954	0.046	0.046	0.009	0.009
11	95.00	4.0	-3.3	10.9	0.192	0.915	0.095	0.095	0.017	0.017

TABLE XII. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 70 PERCENT OF DESIGN SPEED

(b) Reading 60

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-1.1	31.4	63.5	51.4	519.7	1.088	14.50	1.296
2	9.508	9.429	-1.7	29.7	61.7	51.2	519.2	1.083	14.67	1.273
3	8.635	8.650	0.3	30.7	58.2	47.6	518.5	1.076	14.72	1.263
4	8.180	8.261	0.8	32.0	56.6	45.0	518.4	1.080	14.71	1.254
5	8.065	8.164	1.3	32.4	56.1	45.2	518.6	1.081	14.72	1.242
6	7.949	8.067	0.6	33.7	55.9	44.5	518.6	1.082	14.72	1.235
7	7.832	7.969	0.7	33.3	55.6	42.9	518.5	1.079	14.72	1.250
8	7.714	7.872	1.3	32.8	55.0	41.6	518.5	1.075	14.72	1.256
9	6.726	7.094	1.2	33.8	52.0	33.7	518.5	1.074	14.71	1.268
10	5.592	6.315	0.5	36.3	49.9	22.3	518.7	1.077	14.71	1.277
11	5.266	6.121	0.9	39.0	50.3	17.3	518.8	1.083	14.70	1.294

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	479.7	594.2	1075.0	812.0	479.6	507.1	-9.0	309.6	953.1	943.9
2	510.1	585.6	1074.7	812.1	509.9	508.6	-15.1	290.2	931.0	923.2
3	522.7	584.1	992.5	744.8	522.7	502.5	2.4	297.8	846.1	847.5
4	523.8	586.4	950.5	704.0	523.7	497.4	7.7	310.7	801.0	808.9
5	523.9	577.3	938.3	691.	523.8	487.4	11.9	309.3	790.4	800.1
6	524.1	576.8	934.4	67[illegible].1	524.1	479.7	5.7	320.2	779.3	790.8
7	521.2	589.6	922.7	672.7	521.2	492.9	6.6	323.6	768.0	781.4
8	521.1	598.0	907.4	672.7	521.0	502.8	12.3	323.8	755.3	770.7
9	506.1	625.6	822.6	625.2	506.0	520.0	10.3	347.8	658.9	694.9
10	457.2	670.2	710.5	584.3	457.2	540.5	3.8	396.3	547.6	618.4
11	423.4	687.9	662.6	559.8	423.4	534.3	6.4	433.2	516.1	599.9

	ABS MACH NO		REL MACH NO		MERID MACH NO			
RP	IN	OUT	IN	OUT	IN	OUT	MERID PEAK SS VEL R	MACH NO
1	0.437	0.524	0.980	0.716	0.437	0.447	1.057	1.189
2	0.467	0.517	0.983	0.717	0.466	0.449	0.998	1.179
3	0.479	0.518	0.909	0.660	0.479	0.445	0.961	1.161
4	0.480	0.519	0.871	0.623	0.480	0.440	0.950	1.141
5	0.480	0.510	0.860	0.611	0.480	0.431	0.931	1.124
6	0.480	0.510	0.856	0.594	0.480	0.424	0.915	1.123
7	0.478	0.522	0.845	0.596	0.477	0.437	0.946	1.112
8	0.477	0.531	0.831	0.597	0.477	0.447	0.965	1.088
9	0.463	0.557	0.753	0.557	0.463	0.463	1.028	0.992
10	0.417	0.599	0.647	0.522	0.417	0.483	1.182	0.856
11	0.385	0.614	0.602	0.500	0.385	0.477	1.262	0.810

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	1.7	-0.5	3.6	0.354	0.874	0.076	0.074	0.018	0.017
2	10.00	1.0	-1.5	4.1	0.348	0.862	0.079	0.077	0.018	0.018
3	30.00	2.4	-1.6	3.2	0.348	0.906	0.056	0.056	0.012	0.012
4	40.00	3.2	-1.7	3.5	0.359	0.836	0.108	0.108	0.024	0.024
5	42.50	3.2	-1.8	4.6	0.361	0.790	0.143	0.143	0.031	0.031
6	45.00	3.5	-1.6	5.0	0.383	0.762	0.163	0.163	0.035	0.035
7	47.50	3.7	-1.5	4.4	0.374	0.831	0.116	0.116	0.025	0.025
8	50.00	3.6	-1.7	4.2	0.360	0.898	0.069	0.069	0.015	0.015
9	70.00	4.5	-1.7	5.8	0.346	0.944	0.044	0.044	0.009	0.009
10	90.00	5.2	-1.9	7.6	0.298	0.942	0.061	0.061	0.012	0.012
11	95.00	5.9	-1.4	6.7	0.289	0.925	0.097	0.097	0.018	0.018

TABLE XII. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 70 PERCENT OF DESIGN SPEED

(c) Reading 39

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-1.5	40.5	65.6	52.1	519.7	1.109	14.52	1.355
2	9.508	9.429	-1.7	37.0	63.9	51.8	519.4	1.102	14.66	1.338
3	8.635	8.650	-0.1	37.8	60.6	48.0	518.7	1.092	14.71	1.319
4	8.180	8.261	0.4	40.1	59.1	44.7	518.4	1.094	14.72	1.314
5	8.065	8.164	0.1	42.2	58.9	44.2	518.5	1.094	14.71	1.304
6	7.949	8.067	-0.1	43.0	58.6	44.3	518.4	1.095	14.72	1.290
7	7.832	7.969	0.5	42.4	58.1	42.9	518.6	1.093	14.71	1.296
8	7.714	7.872	0.8	41.6	57.7	41.5	518.3	1.090	14.72	1.303
9	6.726	7.094	1.6	42.2	54.6	32.4	518.5	1.087	14.72	1.305
10	5.592	6.315	1.2	44.3	52.4	19.6	518.5	1.084	14.71	1.304
11	5.266	6.121	0.8	46.6	52.8	13.6	518.6	1.088	14.70	1.320

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	436.5	579.8	1057.3	717.9	436.4	441.1	-11.1	376.4	951.9	942.7
2	464.5	572.6	1054.3	739.5	464.3	457.5	-13.6	344.3	933.0	925.3
3	477.6	569.5	972.8	672.0	477.6	449.9	-0.5	349.2	847.0	848.5
4	477.9	579.1	931.5	623.2	477.9	443.0	3.7	373.0	803.3	811.2
5	477.1	575.3	923.6	595.1	477.1	426.5	0.5	386.1	791.3	801.0
6	476.1	566.9	914.6	579.5	476.1	414.6	-1.0	386.6	779.9	791.5
7	474.9	574.4	899.1	579.3	474.9	424.4	4.6	387.1	768.0	781.5
8	473.9	582.7	886.9	581.6	473.8	435.8	6.7	386.7	756.4	771.9
9	458.9	609.0	792.7	534.0	458.7	450.9	13.0	409.4	659.5	695.6
10	416.4	649.6	681.6	493.8	416.3	465.1	8.8	453.5	548.6	619.5
11	387.6	671.7	641.1	474.8	387.6	461.4	5.5	488.1	516.2	600.0

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.397	0.505	0.961	0.625	0.397	0.384	1.011	1.237
2	0.423	0.500	0.961	0.646	0.423	0.400	0.985	1.226
3	0.436	0.500	0.888	0.590	0.436	0.395	0.942	1.208
4	0.436	0.509	0.850	0.548	0.436	0.389	0.927	1.190
5	0.435	0.505	0.843	0.522	0.435	0.374	0.894	1.185
6	0.435	0.497	0.835	0.508	0.435	0.364	0.871	1.175
7	0.433	0.505	0.821	0.509	0.433	0.373	0.894	1.152
8	0.433	0.513	0.809	0.512	0.432	0.384	0.920	1.136
9	0.418	0.538	0.723	0.472	0.418	0.399	0.983	1.018
10	0.378	0.577	0.619	0.439	0.378	0.413	1.117	0.871
11	0.352	0.597	0.581	0.422	0.351	0.410	1.190	0.833

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	3.8	1.6	4.3	0.457	0.830	0.127	0.125	0.029	0.029
2	10.00	3.2	0.7	4.6	0.422	0.851	0.105	0.103	0.024	0.023
3	30.00	4.8	0.7	3.6	0.428	0.900	0.073	0.072	0.016	0.016
4	40.00	5.8	0.9	3.1	0.455	0.868	0.104	0.104	0.023	0.023
5	42.50	6.0	1.0	3.6	0.485	0.833	0.134	0.134	0.029	0.029
6	45.00	6.2	1.1	4.8	0.495	0.797	0.166	0.166	0.036	0.036
7	47.50	6.2	1.0	4.4	0 483	0.829	0.142	0.142	0.031	0.031
8	50.00	6.3	1.0	4.0	0.471	0.878	0.100	0.100	0.022	0.022
9	70.00	7.2	0.9	4.5	0.455	0.908	0.089	0.089	0.019	0.019
10	90.00	7.6	0.5	4.9	0.418	0.934	0.082	0.082	0.016	0.016
11	95.00	8.4	1.1	3.1	0.416	0.941	0.085	0.085	0.016	0.016

TABLE XII. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 70 PERCENT OF DESIGN SPEED

(d) Reading 40

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.8	42.1	66.8	52.5	519.8	1.114	14.51	1.371
2	9.508	9.429	-1.1	39.5	64.7	51.7	519.3	1.108	14.68	1.354
3	8.635	8.650	-0.3	39.9	61.7	48.9	518.5	1.096	14.71	1.324
4	8.180	8.261	0.2	43.1	60.4	44.8	518.5	1.099	14.71	1.327
5	8.065	8.164	0.9	44.5	59.9	44.5	518.4	1.100	14.71	1.315
6	7.949	8.067	0.2	45.9	59.7	44.6	518.5	1.099	14.71	1.301
7	7.832	7.969	0.1	45.6	59.4	43.2	518.5	1.097	14.71	1.305
8	7.714	7.872	0.6	44.7	59.0	41.8	518.6	1.095	14.71	1.311
9	6.726	7.094	0.2	43.9	56.3	32.5	518.5	1.090	14.71	1.316
10	5.592	6.315	1.8	45.8	53.3	19.3	518.5	1.086	14.71	1.315
11	5.266	6.121	1.8	48.6	53.7	13.3	518.6	1.089	14.70	1.324

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	411.6	576.8	1043.8	703.0	411.5	428.1	-5.8	386.5	953.4	944.1
2	445.5	572.5	1041.0	712.9	445.4	441.5	-8.8	364.5	932.1	924.3
3	455.8	557.3	962.5	650.2	455.8	427.7	-2.1	357.4	845.6	847.1
4	455.4	575.6	921.2	591.8	455.4	420.0	1.7	393.5	802.4	810.4
5	454.4	570.4	905.2	571.0	454.3	407.0	7.5	399.7	790.3	800.0
6	452.9	562.2	898.9	549.7	452.9	391.2	1.9	403.8	778.4	790.0
7	452.4	568.9	890.0	546.3	452.4	398.1	0.7	406.4	767.1	780.5
8	452.0	577.2	877.9	550.7	451.9	410.5	4.7	405.7	757.3	772.8
9	439.4	603.7	791.6	515.8	439.4	435.0	1.2	418.6	659.6	695.7
10	399.2	644.1	668.0	476.1	399.0	449.3	12.3	461.5	548.1	619.0
11	371.6	662.7	627.3	450.2	371.4	438.1	11.4	497.2	516.9	600.8

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.373	0.501	0.947	0.611	0.373	0.372	1.040	1.257
2	0.405	0.499	0.947	0.621	0.405	0.385	0.991	1.235
3	0.415	0.488	0.877	0.569	0.415	0.375	0.938	1.228
4	0.415	0.504	0.839	0.519	0.415	0.368	0.922	1.211
5	0.414	0.499	0.825	0.500	0.414	0.356	0.896	1.188
6	0.413	0.492	0.819	0.481	0.413	0.342	0.864	1.185
7	0.412	0.499	0.811	0.479	0.412	0.349	0.880	1.176
8	0.412	0.507	0.800	0.483	0.412	0.360	0.908	1.159
9	0.400	0.533	0.720	0.455	0.400	0.384	0.990	1.057
10	0.362	0.572	0.606	0.422	0.362	0.399	1.126	0.873
11	0.337	0.588	0.568	0.400	0.336	0.389	1.180	0.832

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	5.0	2.8	4.7	0.466	0.827	0.137	0.134	0.031	0.030
2	10.00	4.0	1.5	4.6	0.446	0.837	0.124	0.122	0.028	0.028
3	30.00	5.9	1.9	4.5	0.448	0.865	0.104	0.104	0.023	0.023
4	40.00	7.0	2.1	3.2	0.491	0.850	0.126	0.126	0.028	0.028
5	42.50	7.0	2.0	4.0	0.503	0.816	0.160	0.160	0.035	0.035
6	45.00	7.3	2.3	5.1	0.525	0.785	0.188	0.188	0.040	0.040
7	47.50	7.5	2.4	4.7	0.523	0.810	0.167	0.167	0.036	0.036
8	50.00	7.6	2.3	4.3	0.508	0.844	0.137	0.137	0.030	0.030
9	70.00	8.8	2.6	4.6	0.484	0.910	0.090	0.090	0.019	0.019
10	90.00	8.6	1.5	4.6	0.434	0.946	0.071	0.071	0.014	0.014
11	95.00	9.3	2.0	2.8	0.444	0.934	0.101	0.101	0.019	0.019

TABLE XII. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 70 PERCENT OF DESIGN SPEED

(e) Reading 41

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.9	45.6	67.7	53.6	519.8	1.123	14.55	1.375
2	9.508	9.429	-1.1	43.2	66.3	52.4	519.3	1.115	14.66	1.369
3	8.635	8.650	0.3	43.5	63.1	48.9	518.7	1.103	14.71	1.341
4	8.180	8.261	-0.3	46.3	62.2	45.5	518.6	1.104	14.71	1.338
5	8.065	8.164	0.5	48.1	61.7	45.1	518.4	1.104	14.71	1.327
6	7.949	8.067	0.8	49.3	61.3	44.8	518.6	1.104	14.71	1.317
7	7.832	7.969	-0.1	50.1	61.2	43.9	519.0	1.104	14.71	1.315
8	7.714	7.872	0.6	48.8	60.7	42.2	518.1	1.102	14.71	1.319
9	6.726	7.094	1.4	46.3	57.6	32.2	518.6	1.094	14.71	1.327
10	5.592	6.315	1.7	47.4	54.9	19.5	518.5	1.090	14.71	1.325
11	5.266	6.121	1.5	49.6	55.3	13.9	518.5	1.091	14.71	1.331

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	392.8	567.4	1035.9	669.0	392.7	397.3	-6.1	405.1	952.4	943.2
2	412.9	568.3	1028.2	678.4	412.8	414.3	-7.6	389.1	934.1	926.4
3	428.2	559.3	947.5	616.2	428.1	405.4	2.5	385.2	847.8	849.2
4	426.2	570.5	913.2	562.1	426.2	394.0	-2.1	412.6	805.5	813.5
5	424.1	566.7	894.9	536.2	424.1	378.5	3.9	421.8	791.9	801.6
6	423.5	563.2	882.1	517.8	423.4	367.6	6.1	426.7	779.9	791.5
7	423.5	565.4	879.0	504.0	423.5	362.9	-0.4	433.6	769.8	783.3
8	421.7	571.8	862.5	509.2	421.7	376.9	4.5	430.0	756.9	772.4
9	413.1	600.8	770.2	490.6	412.9	415.0	9.8	434.5	660.0	696.1
10	379.1	636.6	658.5	457.5	378.9	431.2	11.5	468.3	550.0	621.1
11	352.7	652.0	618.6	434.9	352.6	422.2	9.2	496.9	517.5	601.5

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.356	0.491	0.939	0.578	0.356	0.344	1.012	1.277
2	0.375	0.493	0.933	0.589	0.375	0.360	1.004	1.271
3	0.389	0.488	0.862	0.538	0.389	0.354	0.947	1.248
4	0.388	0.498	0.830	0.491	0.388	0.344	0.924	1.250
5	0.386	0.495	0.814	0.468	0.386	0.331	0.893	1.224
6	0.385	0.492	0.802	0.452	0.385	0.321	0.868	1.204
7	0.385	0.493	0.799	0.440	0.385	0.317	0.857	1.207
8	0.383	0.500	0.784	0.445	0.383	0.330	0.894	1.184
9	0.375	0.529	0.700	0.432	0.375	0.365	1.005	1.058
10	0.344	0.564	0.597	0.405	0.343	0.382	1.138	0.892
11	0.319	0.578	0.560	0.385	0.319	0.374	1.197	0.851

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	5.9	3.7	5.8	0.501	0.776	0.190	0.187	0.042	0.041
2	10.00	5.7	3.2	5.2	0.481	0.813	0.152	0.150	0.034	0.033
3	30.00	7.3	3.3	4.5	0.483	0.847	0.129	0.128	0.028	0.028
4	40.00	8.8	3.9	3.9	0.527	0.832	0.150	0.150	0.033	0.033
5	42.50	8.8	3.9	4.5	0.545	0.807	0.179	0.178	0.039	0.039
6	45.00	8.9	3.8	5.3	0.558	0.783	0.205	0.205	0.044	0.044
7	47.50	9.3	4.1	5.5	0.575	0.780	0.208	0.208	0.045	0.045
8	50.00	9.3	4.0	4.8	0.555	0.805	0.188	0.188	0.041	0.041
9	70.00	10.1	3.9	4.4	0.505	0.894	0.116	0.116	0.025	0.025
10	90.00	10.1	3.0	4.8	0.457	0.933	0.093	0.093	0.018	0.018
11	95.00	10.9	3.6	3.4	0.461	0.934	0.104	0.104	0.020	0.020

TABLE XII. - Concluded. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 70 PERCENT OF DESIGN SPEED

(f) Reading 43

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-1.3	53.8	70.1	56.1	519.8	1.135	14.56	1.375
2	9.508	9.429	-1.2	49.0	68.2	54.0	519.3	1.128	14.68	1.366
3	8.635	8.650	0.2	48.2	65.4	49.2	518.8	1.111	14.71	1.349
4	8.180	8.261	1.0	50.1	64.2	46.5	518.5	1.108	14.72	1.338
5	8.065	8.164	0.2	51.4	64.0	46.2	518.2	1.108	14.70	1.330
6	7.949	8.067	1.1	52.6	63.6	46.1	518.6	1.108	14.71	1.322
7	7.832	7.969	1.0	53.3	63.3	44.8	518.3	1.108	14.70	1.320
8	7.714	7.872	0.8	53.0	62.9	42.6	518.4	1.107	14.71	1.326
9	6.726	7.094	1.3	48.5	59.6	31.6	518.4	1.097	14.71	1.341
10	5.592	6.315	-0.1	48.8	57.2	19.5	518.5	1.091	14.70	1.329
11	5.266	6.121	1.9	51.4	56.9	13.0	518.6	1.092	14.70	1.338

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	349.3	561.4	1024.3	593.8	349.2	331.4	-7.9	453.1	955.0	945.8
2	377.1	559.3	1014.6	623.4	377.0	366.6	-7.6	422.4	934.4	926.6
3	386.9	559.4	931.1	571.5	386.9	373.1	1.2	416.8	848.1	849.6
4	385.4	562.2	885.0	523.9	385.3	360.6	6.7	431.3	803.4	811.4
5	384.9	560.0	879.1	503.9	384.9	349.1	1.3	437.9	791.6	801.4
6	384.6	556.2	863.9	487.3	384.6	338.1	7.5	441.7	781.1	792.7
7	384.1	560.3	853.5	472.2	384.1	334.9	6.4	449.2	768.6	782.1
8	383.9	571.0	843.8	467.1	383.9	343.7	5.4	456.0	756.8	772.3
9	383.2	602.4	756.0	468.6	383.1	399.1	8.8	451.2	660.5	696.7
10	354.8	628.8	654.0	439.1	354.7	414.0	-0.6	473.3	548.8	619.7
11	329.5	649.2	603.7	415.6	329.3	404.9	11.1	507.4	517.2	601.1

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS
RP	IN	OUT	IN	OUT	IN	OUT	VEL R MACH NO
1	0.316	0.482	0.926	0.510	0.316	0.285	0.949 1.335
2	0.341	0.482	0.919	0.538	0.341	0.316	0.973 1.311
3	0.351	0.487	0.844	0.497	0.351	0.325	0.964 1.291
4	0.349	0.490	0.802	0.456	0.349	0.314	0.936 1.265
5	0.349	0.488	0.797	0.439	0.349	0.304	0.907 1.264
6	0.349	0.484	0.783	0.424	0.349	0.294	0.879 1.238
7	0.348	0.488	0.774	0.411	0.348	0.292	0.872 1.226
8	0.348	0.498	0.765	0.407	0.348	0.300	0.895 1.214
9	0.347	0.530	0.685	0.412	0.347	0.351	1.042 1.084
10	0.321	0.556	0.592	0.388	0.321	0.366	1.167 0.932
11	0.298	0.575	0.546	0.368	0.298	0.358	1.230 0.861

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	8.3	6.1	8.3	0.587	0.708	0.270	0.265	0.056	0.055
2	10.00	7.5	5.0	6.8	0.540	0.730	0.242	0.239	0.052	0.051
3	30.00	9.6	5.6	4.8	0.534	0.806	0.178	0.177	0.038	0.038
4	40.00	10.8	5.9	4.9	0.558	0.800	0.195	0.195	0.042	0.042
5	42.50	11.2	6.2	5.6	0.580	0.787	0.208	0.208	0.044	0.044
6	45.00	11.2	6.1	6.6	0.589	0.769	0.233	0.233	0.049	0.049
7	47.50	11.4	6.2	6.4	0.602	0.768	0.237	0.237	0.050	0.050
8	50.00	11.6	6.3	5.2	0.604	0.781	0.227	0.227	0.049	0.049
9	70.00	12.1	5.8	3.7	0.531	0.902	0.113	0.113	0.024	0.024
10	90.00	12.4	5.3	4.7	0.486	0.929	0.102	0.102	0.020	0.020
11	95.00	12.6	5.3	2.5	0.483	0.941	0.100	0.100	0.019	0.019

TABLE XIII. - BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 80 PERCENT OF DESIGN SPEED

(a) Reading 62

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	1.0	33.5	62.4	51.8	520.5	1.123	14.44	1.405
2	9.508	9.429	1.0	32.8	60.6	51.1	520.1	1.114	14.63	1.396
3	8.635	8.650	0.1	33.0	57.7	47.6	518.4	1.105	14.73	1.377
4	8.180	8.261	0.3	36.1	56.2	44.8	518.2	1.110	14.72	1.354
5	8.065	8.164	0.9	37.2	55.6	44.6	517.8	1.111	14.73	1.336
6	7.949	8.067	0.8	38.1	55.3	44.1	518.6	1.111	14.73	1.327
7	7.832	7.969	0.7	37.5	55.0	42.6	518.3	1.107	14.73	1.342
8	7.714	7.872	0.4	35.5	54.7	41.7	518.0	1.102	14.73	1.353
9	6.726	7.094	1.1	36.3	51.6	33.6	518.4	1.099	14.73	1.367
10	5.592	6.315	1.1	39.1	49.5	21.5	518.4	1.102	14.72	1.376
11	5.266	6.121	0.4	41.1	50.5	16.9	518.6	1.110	14.70	1.405

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	561.5	667.0	1213.9	899.9	561.5	556.4	9.3	367.8	1085.6	1075.1
2	592.9	664.2	1206.2	890.0	592.8	558.6	10.7	359.4	1061.2	1052.3
3	608.3	661.0	1139.9	821.7	608.3	554.3	0.9	360.0	964.9	966.6
4	608.9	663.0	1095.6	755.1	608.9	535.6	3.1	390.7	913.9	923.0
5	609.8	655.0	1079.4	732.9	609.7	521.6	9.4	396.2	900.1	911.2
6	609.0	653.0	1069.0	715.6	608.9	514.2	8.4	402.5	887.1	900.2
7	608.0	666.0	1060.0	717.8	608.0	528.6	7.1	405.1	875.4	890.8
8	606.0	672.1	1049.0	733.8	605.9	547.5	4.5	389.8	860.7	878.4
9	587.0	703.5	944.9	680.8	586.9	567.3	10.9	416.1	751.4	792.5
10	524.0	752.3	807.3	627.3	523.9	583.5	10.2	474.8	624.4	705.1
11	482.5	771.3	758.4	607.1	482.5	580.8	3.3	507.5	588.4	683.9

	ABS MACH NO		REL MACH NO		MERID MACH NO			MERID PEAK SS
RP	IN	OUT	IN	OUT	IN	OUT		VEL R MACH NO
1	0.515	0.582	1.114	0.785	0.515	0.485		0.991 1.318
2	0.546	0.582	1.111	0.780	0.546	0.489		0.942 1.300
3	0.562	0.582	1.053	0.724	0.562	0.488		0.911 1.366
4	0.563	0.583	1.013	0.664	0.563	0.471		0.880 1.387
5	0.564	0.575	0.998	0.644	0.564	0.458		0.855 1.288
6	0.563	0.573	0.988	0.628	0.562	0.451		0.844 1.275
7	0.562	0.586	0.979	0.632	0.562	0.465		0.869 1.268
8	0.560	0.594	0.969	0.648	0.560	0.484		0.904 1.259
9	0.541	0.624	0.871	0.604	0.541	0.503		0.967 1.135
10	0.480	0.670	0.740	0.559	0.480	0.520		1.114 0.967
11	0.441	0.686	0.693	0.540	0.441	0.517		1.204 0.937

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	0.7	-1.5	4.0	0.368	0.831	0.115	0.099	0.027	0.023
2	10.00	-0.1	-2.6	4.0	0.367	0.880	0.078	0.064	0.018	0.015
3	30.00	1.9	-2.1	3.2	0.383	0.912	0.058	0.042	0.013	0.009
4	40.00	2.9	-2.0	3.3	0.422	0.822	0.127	0.112	0.028	0.025
5	42.50	2.7	-2.3	4.1	0.432	0.780	0.160	0.154	0.035	0.034
6	45.00	2.9	-2.2	4.6	0.443	0.762	0.175	0.170	0.038	0.037
7	47.50	3.1	-2.1	4.1	0.436	0.822	0.130	0.126	0.028	0.028
8	50.00	3.3	-2.0	4.3	0.409	0.885	0.083	0.079	0.018	0.017
9	70.00	4.1	-2.1	5.7	0.390	0.939	0.051	0.051	0.011	0.011
10	90.00	4.8	-2.3	6.8	0.348	0.938	0.070	0.070	0.013	0.013
11	95.00	6.1	-1.2	6.3	0.338	0.926	0.099	0.099	0.018	0.018

TABLE XIII. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 80 PERCENT OF DESIGN SPEED

(b) Reading 34

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	0.3	39.8	64.0	51.8	521.3	1.146	14.44	1.500
2	9.508	9.429	0.2	38.3	61.1	51.5	521.1	1.132	14.64	1.469
3	8.635	8.650	0.1	38.2	59.0	47.1	518.2	1.123	14.73	1.450
4	8.180	8.261	0.7	41.0	57.5	43.6	517.9	1.125	14.73	1.438
5	8.065	8.164	0.3	42.3	57.2	43.2	518.4	1.126	14.72	1.423
6	7.949	8.067	0.4	42.6	56.8	43.1	517.7	1.126	14.72	1.407
7	7.832	7.969	0.5	41.4	56.5	41.7	517.8	1.123	14.72	1.419
8	7.714	7.872	0.5	41.0	56.2	40.8	518.1	1.119	14.73	1.422
9	6.726	7.094	1.0	42.0	53.1	33.0	517.9	1.111	14.72	1.405
10	5.592	6.315	1.6	45.0	50.8	19.3	518.1	1.108	14.72	1.405
11	5.266	6.121	0.3	47.3	51.9	13.7	518.3	1.113	14.71	1.426

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	529.1	665.1	1206.1	827.1	529.1	511.0	2.8	425.7	1086.6	1076.0
2	585.5	656.3	1211.1	826.8	585.5	514.9	2.5	406.9	1062.7	1053.9
3	579.7	661.3	1125.9	763.0	579.7	519.8	0.6	408.8	965.7	967.4
4	578.8	671.7	1076.1	700.6	578.8	507.3	7.2	440.3	914.5	923.5
5	580.5	669.1	1072.0	678.9	580.5	495.0	2.6	450.2	903.8	914.9
6	578.7	660.7	1057.5	665.6	578.7	486.0	4.0	447.6	889.1	902.3
7	576.4	670.4	1045.2	673.4	576.3	502.5	4.8	443.7	876.7	892.0
8	576.5	674.5	1035.4	672.7	576.5	509.0	4.6	442.6	864.6	882.4
9	557.0	689.2	928.2	610.9	556.9	512.3	10.2	461.1	752.8	794.0
10	499.8	740.0	789.8	554.2	499.6	523.0	14.0	523.5	625.7	706.7
11	461.7	761.4	747.4	531.2	461.7	516.1	2.1	559.9	589.9	685.6

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.484	0.573	1.103	0.713	0.484	0.440	0.966	1.365
2	0.538	0.569	1.113	0.717	0.538	0.446	0.879	1.321
3	0.534	0.578	1.037	0.666	0.534	0.454	0.897	1.402
4	0.533	0.587	0.992	0.612	0.533	0.443	0.877	1.330
5	0.535	0.584	0.988	0.592	0.535	0.432	0.853	1.330
6	0.533	0.577	0.975	0.581	0.533	0.424	0.840	1.311
7	0.531	0.586	0.963	0.589	0.531	0.440	0.872	1.299
8	0.531	0.591	0.954	0.590	0.531	0.446	0.883	1.288
9	0.512	0.608	0.854	0.539	0.512	0.452	0.920	1.158
10	0.457	0.657	0.723	0.492	0.457	0.464	1.047	0.976
11	0.421	0.676	0.681	0.471	0.421	0.458	1.118	0.954

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.2	-0.0	4.1	0.444	0.843	0.126	0.106	0.029	0.024
2	10.00	0.4	-2.1	4.3	0.439	0.879	0.089	0.073	0.020	0.017
3	30.00	3.2	-0.8	2.7	0.442	0.910	0.069	0.051	0.016	0.011
4	40.00	4.1	-0.8	2.1	0.475	0.875	0.103	0.095	0.023	0.021
5	42.50	4.3	-0.7	2.6	0.496	0.840	0.133	0.125	0.030	0.028
6	45.00	4.4	-0.7	3.6	0.498	0.816	0.155	0.149	0.034	0.033
7	47.50	4.6	-0.5	3.3	0.482	0.858	0.120	0.115	0.027	0.025
8	50.00	4.8	-0.5	3.4	0.475	0.892	0.090	0.086	0.020	0.019
9	70.00	5.6	-0.6	5.1	0.467	0.922	0.074	0.074	0.016	0.016
10	90.00	6.0	-1.1	4.6	0.439	0.941	0.072	0.072	0.014	0.014
11	95.00	7.5	0.2	3.2	0.445	0.943	0.080	0.080	0.015	0.015

TABLE XIII. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 80 PERCENT OF DESIGN SPEED

(c) Reading 35

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.4	45.1	65.4	52.2	522.4	1.150	14.44	1.534
2	9.508	9.429	-0.1	41.8	63.2	51.8	521.8	1.142	14.66	1.500
3	8.635	8.650	-0.1	41.5	60.5	47.4	518.0	1.131	14.72	1.477
4	8.180	8.261	-0.0	44.5	59.1	43.7	517.8	1.134	14.73	1.467
5	8.065	8.164	0.7	46.1	58.6	43.6	519.0	1.136	14.72	1.449
6	7.949	8.067	0.1	46.8	58.4	44.0	517.7	1.134	14.72	1.427
7	7.832	7.969	0.3	45.3	58.1	42.8	517.7	1.130	14.72	1.432
8	7.714	7.872	0.3	44.7	57.8	41.8	517.8	1.126	14.72	1.436
9	6.726	7.094	0.8	45.1	54.8	32.9	517.6	1.117	14.72	1.427
10	5.592	6.315	0.6	47.4	52.8	19.2	517.8	1.113	14.72	1.422
11	5.266	6.121	2.1	49.3	52.7	13.8	517.9	1.116	14.70	1.439

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	498.9	664.7	1197.7	765.2	498.9	469.5	-3.7	470.5	1085.2	1074.7
2	536.3	653.5	1191.0	787.3	536.3	487.3	-0.7	435.5	1062.7	1053.8
3	546.5	654.9	1110.0	724.4	546.5	490.4	-0.6	434.1	965.6	967.3
4	547.4	668.1	1065.9	659.5	547.4	476.9	-0.1	467.9	914.5	923.5
5	548.0	662.9	1051.1	634.2	548.0	459.5	7.0	477.9	903.9	915.0
6	546.0	649.3	1043.1	618.2	546.0	444.6	0.7	473.2	889.6	902.8
7	544.1	654.3	1028.9	627.5	544.1	460.1	3.2	465.2	876.5	891.8
8	543.1	658.8	1018.4	628.7	543.1	468.5	3.3	463.2	864.7	882.4
9	526.0	682.3	912.9	573.5	525.9	481.4	7.6	483.5	753.8	795.1
10	472.2	727.5	780.4	521.6	472.2	492.5	5.0	535.5	626.3	707.3
11	437.7	746.9	721.5	501.4	437.4	487.0	15.9	566.2	589.7	685.5

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.454	0.571	1.091	0.657	0.454	0.403	0.941	1.406
2	0.490	0.563	1.089	0.678	0.490	0.420	0.909	1.380
3	0.502	0.570	1.020	0.630	0.502	0.427	0.897	1.447
4	0.503	0.581	0.980	0.574	0.503	0.415	0.871	1.369
5	0.503	0.575	0.965	0.550	0.503	0.399	0.838	1.345
6	0.502	0.564	0.959	0.537	0.502	0.386	0.814	1.343
7	0.500	0.570	0.945	0.546	0.500	0.401	0.846	1.326
8	0.499	0.575	0.935	0.549	0.499	0.409	0.863	1.316
9	0.482	0.599	0.837	0.504	0.482	0.423	0.915	1.186
10	0.431	0.643	0.713	0.461	0.431	0.436	1.043	1.012
11	0.399	0.661	0.657	0.444	0.398	0.431	1.114	0.939

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	3.6	1.4	4.4	0.508	0.865	0.114	0.090	0.026	0.020
2	10.00	2.6	0.1	4.6	0.472	0.864	0.109	0.088	0.025	0.020
3	30.00	4.7	0.7	3.0	0.477	0.902	0.081	0.059	0.018	0.013
4	40.00	5.7	0.8	2.1	0.519	0.865	0.120	0.109	0.027	0.025
5	42.50	5.7	0.7	3.0	0.535	0.824	0.161	0.153	0.036	0.034
6	45.00	6.0	1.0	4.5	0.545	0.800	0.182	0.174	0.039	0.038
7	47.50	6.2	1.0	4.4	0.525	0.833	0.152	0.146	0.033	0.032
8	50.00	6.4	1.1	4.4	0.516	0.867	0.120	0.115	0.026	0.025
9	70.00	7.3	1.1	5.0	0.506	0.910	0.092	0.092	0.019	0.019
10	90.00	8.0	0.9	4.5	0.480	0.938	0.080	0.080	0.016	0.016
11	95.00	8.3	1.0	3.2	0.464	0.942	0.090	0.090	0.017	0.017

TABLE XIII. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 80 PERCENT OF DESIGN SPEED

(d) Reading 36

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	0.1	48.1	66.4	52.6	523.1	1.161	14.45	1.549
2	9.508	9.429	0.3	44.6	64.3	51.8	522.3	1.148	14.66	1.521
3	8.635	8.650	0.4	43.8	61.4	47.7	518.1	1.136	14.72	1.489
4	8.180	8.261	0.6	46.9	60.2	44.2	517.6	1.139	14.72	1.477
5	8.065	8.164	0.4	48.6	59.9	44.4	517.7	1.140	14.72	1.455
6	7.949	8.067	0.4	49.9	59.6	44.2	517.5	1.138	14.73	1.443
7	7.832	7.969	0.2	49.1	59.4	43.9	517.6	1.134	14.71	1.434
8	7.714	7.872	0.5	48.3	59.0	42.7	517.5	1.130	14.72	1.436
9	6.726	7.094	0.5	46.9	56.2	32.9	517.6	1.121	14.72	1.439
10	5.592	6.315	1.5	48.8	53.6	19.6	517.6	1.114	14.71	1.429
11	5.266	6.121	1.9	50.9	53.9	13.2	517.8	1.117	14.71	1.448

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	475.8	665.9	1186.6	732.0	475.8	444.4	1.0	495.9	1088.1	1077.5
2	509.9	656.8	1177.8	756.7	509.9	467.7	3.1	461.1	1064.8	1055.9
3	524.1	651.4	1096.6	699.0	524.1	470.2	3.3	450.9	966.5	968.2
4	522.4	663.2	1050.3	631.9	522.3	452.8	5.1	484.6	916.3	925.4
5	521.9	654.3	1040.0	605.6	521.9	432.6	4.0	490.9	903.5	914.6
6	520.0	650.1	1028.9	584.0	520.0	418.4	4.0	497.6	891.7	905.0
7	518.7	645.3	1019.5	586.5	518.7	422.4	1.7	487.8	879.4	894.8
8	516.6	648.2	1003.4	587.4	516.6	431.5	4.5	483.8	864.7	882.4
9	501.0	678.7	901.6	551.6	501.0	463.4	4.4	495.9	753.9	795.1
10	453.0	717.7	763.9	501.8	452.8	472.9	11.7	539.9	626.9	708.0
11	420.6	741.5	712.9	480.6	420.4	467.8	13.9	575.4	589.7	685.5

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.432	0.569	1.078	0.625	0.432	0.380	0.934	1.431
2	0.465	0.564	1.074	0.650	0.465	0.402	0.917	1.409
3	0.481	0.565	1.005	0.606	0.481	0.408	0.897	1.475
4	0.479	0.575	0.963	0.548	0.479	0.393	0.867	1.383
5	0.479	0.567	0.954	0.525	0.479	0.375	0.829	1.373
6	0.477	0.564	0.943	0.506	0.477	0.363	0.805	1.361
7	0.476	0.560	0.935	0.509	0.476	0.367	0.814	1.354
8	0.474	0.564	0.920	0.511	0.474	0.375	0.835	1.333
9	0.459	0.595	0.825	0.483	0.459	0.406	0.925	1.209
10	0.413	0.634	0.697	0.443	0.413	0.418	1.044	1.011
11	0.383	0.655	0.648	0.425	0.382	0.413	1.113	0.954

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	4.6	2.4	4.8	0.537	0.829	0.153	0.127	0.035	0.029
2	10.00	3.7	1.2	4.7	0.499	0.863	0.116	0.093	0.026	0.021
3	30.00	5.6	1.6	3.3	0.497	0.884	0.101	0.077	0.022	0.017
4	40.00	6.8	1.9	2.7	0.541	0.847	0.143	0.132	0.032	0.030
5	42.50	7.0	2.0	3.8	0.562	0.810	0.180	0.171	0.040	0.037
6	45.00	7.2	2.2	4.7	0.578	0.799	0.192	0.184	0.042	0.040
7	47.50	7.5	2.3	5.5	0.568	0.807	0.183	0.176	0.039	0.038
8	50.00	7.6	2.3	5.3	0.556	0.835	0.156	0.151	0.034	0.033
9	70.00	8.8	2.5	5.0	0.529	0.907	0.100	0.100	0.021	0.021
10	90.00	8.9	1.8	4.8	0.494	0.941	0.081	0.081	0.016	0.016
11	95.00	9.5	2.2	2.7	0.490	0.953	0.074	0.074	0.014	0.014

TABLE XIII. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 80 PERCENT OF DESIGN SPEED

(e) Reading 37

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	0.2	51.7	67.4	53.9	524.0	1.165	14.49	1.542
2	9.508	9.429	0.2	47.5	65.8	52.4	522.6	1.150	14.66	1.526
3	8.635	8.650	0.4	46.2	62.8	48.6	518.0	1.138	14.72	1.484
4	8.180	8.261	0.7	49.2	61.6	45.4	517.6	1.141	14.72	1.469
5	8.065	8.164	0.6	51.1	61.4	45.2	517.5	1.141	14.72	1.453
6	7.949	8.067	0.4	52.3	61.2	45.2	517.5	1.141	14.70	1.438
7	7.832	7.969	0.8	52.6	60.8	44.7	517.5	1.139	14.72	1.431
8	7.714	7.872	0.6	52.1	60.5	43.0	517.4	1.137	14.72	1.433
9	6.726	7.094	0.5	48.3	57.7	32.6	517.5	1.123	14.71	1.443
10	5.592	6.315	1.1	49.4	55.0	19.5	517.5	1.117	14.71	1.434
11	5.266	6.121	1.7	51.5	55.2	13.3	517.6	1.119	14.70	1.451

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	452.4	658.8	1175.3	692.2	452.4	408.2	1.8	517.0	1086.6	1076.1
2	476.0	652.5	1162.8	722.9	476.0	441.0	1.6	480.9	1062.5	1053.7
3	492.9	641.1	1079.6	670.6	492.9	443.4	3.8	463.0	964.4	966.0
4	490.3	650.0	1032.3	605.2	490.2	424.6	5.9	492.2	914.3	923.4
5	488.4	646.0	1020.1	576.3	488.3	405.8	5.0	502.6	900.6	911.7
6	486.1	639.8	1008.2	555.3	486.1	391.4	3.6	506.2	887.0	900.1
7	484.8	638.1	994.3	545.0	484.8	387.7	6.5	506.9	874.6	889.9
8	482.9	644.7	981.7	540.7	482.8	395.7	5.1	508.9	859.9	877.5
9	472.1	675.1	882.9	533.0	472.1	448.8	4.5	504.3	750.6	791.7
10	432.2	713.3	752.8	492.5	432.1	464.3	8.5	541.6	625.0	705.8
11	401.1	736.1	702.2	471.3	400.9	458.7	11.9	575.7	588.5	684.0

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.410	0.561	1.065	0.589	0.410	0.347	0.902	1.458
2	0.433	0.560	1.057	0.620	0.433	0.378	0.927	1.451
3	0.451	0.555	0.987	0.581	0.451	0.384	0.900	1.420
4	0.448	0.563	0.944	0.524	0.448	0.368	0.866	1.404
5	0.447	0.559	0.933	0.499	0.447	0.351	0.831	1.393
6	0.444	0.554	0.922	0.480	0.444	0.339	0.805	1.380
7	0.443	0.552	0.909	0.472	0.443	0.336	0.800	1.362
8	0.441	0.559	0.897	0.469	0.441	0.343	0.819	1.349
9	0.431	0.591	0.806	0.466	0.431	0.393	0.951	1.222
10	0.394	0.629	0.686	0.434	0.393	0.409	1.075	1.027
11	0.364	0.650	0.638	0.416	0.364	0.405	1.144	0.968

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	5.6	3.4	6.1	0.573	0.797	0.188	0.159	0.041	0.035
2	10.00	5.2	2.7	5.3	0.528	0.853	0.129	0.102	0.029	0.023
3	30.00	7.0	3.0	4.2	0.519	0.863	0.123	0.107	0.027	0.023
4	40.00	8.3	3.4	3.9	0.561	0.825	0.170	0.159	0.037	0.035
5	42.50	8.5	3.5	4.7	0.586	0.798	0.200	0.190	0.043	0.041
6	45.00	8.8	3.7	5.7	0.601	0.778	0.222	0.214	0.047	0.045
7	47.50	8.9	3.7	6.2	0.603	0.776	0.226	0.220	0.048	0.047
8	50.00	9.1	3.8	5.5	0.601	0.791	0.212	0.208	0.045	0.044
9	70.00	10.2	4.0	4.8	0.542	0.898	0.115	0.115	0.024	0.024
10	90.00	10.2	3.2	4.7	0.500	0.931	0.098	0.098	0.019	0.019
11	95.00	10.8	3.5	2.8	0.496	0.942	0.096	0.096	0.018	0.018

TABLE XIII. - Concluded. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 80 PERCENT OF DESIGN SPEED

(f) Reading 38

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	0.5	55.9	68.9	55.4	524.5	1.171	14.49	1.534
2	9.508	9.429	0.5	49.4	67.2	53.4	523.3	1.156	14.67	1.511
3	8.635	8.650	0.9	48.0	64.1	49.5	518.0	1.143	14.71	1.475
4	8.180	8.261	0.9	51.2	63.0	46.5	517.5	1.142	14.71	1.459
5	8.065	8.164	0.1	52.7	62.9	46.3	517.4	1.143	14.72	1.448
6	7.949	8.067	0.8	53.9	62.5	46.0	517.3	1.144	14.72	1.440
7	7.832	7.969	0.7	54.7	62.2	45.3	517.3	1.143	14.71	1.430
8	7.714	7.872	0.7	54.4	61.9	43.5	517.2	1.141	14.71	1.433
9	6.726	7.094	-0.2	49.0	59.0	32.9	517.3	1.125	14.71	1.448
10	5.592	6.315	1.5	49.9	56.0	19.6	517.4	1.116	14.72	1.438
11	5.266	6.121	1.4	52.0	56.3	13.2	517.5	1.119	14.70	1.453

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	416.8	656.0	1159.4	646.2	416.8	367.3	3.7	543.5	1085.6	1075.1
2	445.1	643.3	1147.3	702.2	445.0	418.3	4.1	488.7	1061.6	1052.8
3	466.6	634.3	1066.2	652.3	466.5	424.1	7.1	471.8	965.8	967.5
4	461.7	641.3	1017.5	583.8	461.7	402.1	7.0	499.6	913.8	922.8
5	460.6	639.0	1012.2	560.4	460.6	387.1	1.1	508.4	902.5	913.5
6	459.9	637.9	996.9	540.1	459.9	375.5	6.3	515.7	890.8	904.0
7	458.2	636.5	983.1	522.9	458.2	368.0	5.8	519.4	875.6	890.9
8	456.8	644.0	971.0	517.7	456.8	375.3	5.3	523.3	862.2	879.8
9	452.9	673.7	880.3	527.0	452.9	442.3	-1.5	508.1	753.3	794.6
10	415.9	711.4	742.8	486.5	415.8	458.4	10.6	544.1	626.1	707.0
11	386.8	734.5	696.7	464.0	386.7	451.8	9.5	579.1	589.0	684.6

	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	0.556	1.047	0.548	0.377	0.312	0.881	1.502
2	0.403	0.549	1.040	0.600	0.403	0.357	0.940	1.488
3	0.426	0.548	0.973	0.563	0.426	0.366	0.909	1.441
4	0.421	0.554	0.929	0.505	0.421	0.348	0.871	1.425
5	0.420	0.552	0.924	0.484	0.420	0.335	0.840	1.429
6	0.420	0.551	0.910	0.467	0.420	0.324	0.816	1.405
7	0.418	0.550	0.897	0.452	0.418	0.318	0.803	1.388
8	0.417	0.557	0.886	0.448	0.417	0.325	0.822	1.375
9	0.413	0.589	0.803	0.461	0.413	0.387	0.977	1.255
10	0.378	0.627	0.676	0.429	0.378	0.404	1.102	1.035
11	0.351	0.648	0.632	0.410	0.351	0.399	1.169	0.984

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	7.1	4.9	7.6	0.615	0.760	0.232	0.199	0.049	0.042
2	10.00	6.5	4.0	6.3	0.542	0.804	0.179	0.149	0.039	0.032
3	30.00	8.3	4.2	5.1	0.532	0.823	0.166	0.148	0.036	0.032
4	40.00	9.6	4.8	4.9	0.578	0.801	0.199	0.187	0.043	0.040
5	42.50	10.1	5.1	5.7	0.601	0.781	0.220	0.208	0.047	0.044
6	45.00	10.1	5.1	6.5	0.614	0.764	0.243	0.234	0.051	0.049
7	47.50	10.3	5.1	6.8	0.625	0.754	0.258	0.251	0.054	0.053
8	50.00	10.6	5.3	6.0	0.625	0.768	0.245	0.240	0.052	0.051
9	70.00	11.6	5.3	5.0	0.550	0.890	0.127	0.126	0.027	0.027
10	90.00	11.2	4.1	4.8	0.502	0.938	0.090	0.090	0.017	0.017
11	95.00	11.9	4.6	2.6	0.504	0.947	0.088	0.088	0.017	0.017

TABLE XIV. - BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 90 PERCENT OF DESIGN SPEED

(a) Reading 73

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.8	36.3	62.6	53.3	519.7	1.164	14.40	1.511
2	9.508	9.429	0.4	34.0	60.6	52.4	519.4	1.149	14.63	1.500
3	8.635	8.650	-0.2	34.9	57.5	47.5	518.6	1.136	14.73	1.494
4	8.180	8.261	0.4	39.3	55.7	46.4	518.4	1.139	14.73	1.421
5	8.065	8.164	0.4	40.6	55.3	45.8	518.5	1.140	14.72	1.416
6	7.949	8.067	0.4	41.0	55.0	45.1	518.6	1.141	14.73	1.414
7	7.832	7.969	0.6	40.0	54.5	43.0	518.6	1.141	14.73	1.441
8	7.714	7.872	0.4	38.8	54.2	41.3	518.4	1.136	14.73	1.465
9	6.726	7.094	0.6	38.6	51.1	33.1	518.5	1.126	14.73	1.484
10	5.592	6.315	1.5	40.8	49.2	22.0	518.5	1.129	14.72	1.495
11	5.266	6.121	0.8	43.7	50.1	16.2	518.5	1.139	14.70	1.528

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	635.9	721.0	1382.7	972.9	635.9	581.3	-9.3	426.6	1218.6	1206.8
2	669.5	723.2	1363.2	981.4	669.4	599.3	4.4	404.8	1191.8	1181.9
3	691.2	739.3	1287.6	898.0	691.2	606.3	-2.8	423.0	1083.6	1085.4
4	697.6	717.3	1236.8	804.5	697.6	555.0	5.3	454.4	1026.7	1036.8
5	697.3	715.5	1225.6	779.3	697.3	543.1	4.4	465.8	1012.3	1024.7
6	696.8	717.3	1214.1	766.6	696.8	541.3	4.5	470.7	998.7	1013.5
7	695.8	737.0	1198.4	772.1	695.8	564.8	7.0	473.4	982.7	999.9
8	694.6	753.2	1187.9	782.0	694.6	587.2	4.5	471.7	968.2	988.0
9	673.8	784.0	1073.0	732.0	673.7	613.1	7.4	488.6	842.6	888.7
10	593.5	826.8	907.7	674.6	593.3	625.6	15.3	540.6	702.2	792.9
11	545.2	852.4	850.7	641.9	545.1	616.4	7.6	588.7	660.7	768.0

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.588	0.621	1.280	0.837	0.588	0.500	0.914	1.464
2	0.622	0.627	1.267	0.851	0.622	0.520	0.895	1.432
3	0.644	0.647	1.201	0.786	0.644	0.530	0.877	1.463
4	0.651	0.625	1.154	0.701	0.651	0.484	0.796	1.451
5	0.651	0.623	1.144	0.679	0.651	0.473	0.779	1.445
6	0.650	0.625	1.133	0.667	0.650	0.471	0.777	1.436
7	0.649	0.643	1.118	0.674	0.649	0.493	0.812	1.423
8	0.648	0.660	1.108	0.685	0.648	0.515	0.845	1.420
9	0.627	0.693	0.998	0.647	0.627	0.542	0.910	1.284
10	0.547	0.734	0.837	0.599	0.547	0.555	1.054	1.084
11	0.501	0.755	0.781	0.569	0.500	0.546	1.131	1.047

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	0.9	-1.4	5.5	0.413	0.763	0.176	0.120	0.039	0.027
2	10.00	-0.1	-2.6	5.2	0.387	0.822	0.125	0.076	0.028	0.017
3	30.00	1.7	-2.3	3.1	0.412	0.890	0.078	0.032	0.017	0.007
4	40.00	2.3	-2.6	4.8	0.463	0.761	0.176	0.139	0.038	0.030
5	42.50	2.4	-2.5	5.2	0.480	0.746	0.191	0.155	0.041	0.033
6	45.00	2.6	-2.5	5.6	0.485	0.737	0.202	0.169	0.043	0.036
7	47.50	2.6	-2.6	4.5	0.472	0.782	0.170	0.141	0.037	0.031
8	50.00	2.8	-2.5	3.9	0.458	0.848	0.119	0.091	0.026	0.020
9	70.00	3.6	-2.6	5.2	0.433	0.948	0.044	0.038	0.009	0.008
10	90.00	4.4	-2.6	7.2	0.383	0.940	0.069	0.069	0.013	0.013
11	95.00	5.8	-1.5	5.6	0.388	0.926	0.101	0.101	0.019	0.019

TABLE XIV. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 90 PERCENT OF DESIGN SPEED

(b) Reading 23

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	0.2	38.9	62.9	53.7	520.1	1.177	14.37	1.586
2	9.508	9.429	0.1	36.7	61.1	52.6	519.7	1.165	14.61	1.571
3	8.635	8.650	1.1	36.6	57.6	47.6	518.6	1.150	14.73	1.560
4	8.180	8.261	0.7	40.4	56.1	45.4	518.6	1.152	14.73	1.506
5	8.065	8.164	0.7	41.2	55.7	44.8	518.6	1.153	14.75	1.493
6	7.949	8.067	0.6	41.4	55.3	44.4	518.4	1.152	14.74	1.482
7	7.832	7.969	0.8	40.5	54.9	43.0	518.2	1.148	14.74	1.496
8	7.714	7.872	0.7	39.7	54.6	41.7	518.2	1.143	14.74	1.508
9	6.726	7.094	0.6	39.7	51.7	35.1	518.2	1.130	14.73	1.490
10	5.592	6.315	1.7	43.4	49.5	20.9	518.4	1.134	14.73	1.513
11	5.266	6.121	1.9	46.3	49.9	15.5	518.6	1.139	14.72	1.528

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	625.5	720.7	1375.2	946.9	625.5	561.0	2.5	452.5	1227.2	1215.3
2	661.3	723.6	1369.9	955.0	661.3	580.2	1.2	432.3	1200.9	1190.9
3	684.9	740.6	1276.3	881.0	684.8	594.3	13.2	441.9	1090.3	1092.1
4	689.9	734.6	1235.7	797.5	689.8	559.8	8.3	475.6	1033.4	1043.7
5	690.7	733.3	1224.6	777.6	690.7	551.5	7.9	483.4	1019.1	1031.6
6	690.6	731.5	1213.8	767.4	690.6	548.5	7.7	484.0	1005.9	1020.8
7	687.9	742.1	1197.3	771.4	687.8	564.5	10.1	481.7	990.2	1007.5
8	685.4	750.5	1183.5	773.5	685.3	577.6	8.8	479.2	973.8	993.7
9	664.7	760.7	1073.5	715.4	664.7	585.5	7.2	485.6	850.1	896.6
10	590.0	827.4	907.7	644.0	589.8	601.5	17.0	568.2	707.0	798.4
11	544.6	845.7	845.4	605.9	544.3	584.0	18.4	611.7	665.3	773.3

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.578	0.616	1.271	0.810	0.578	0.480	0.897	1.467
2	0.614	0.623	1.271	0.822	0.614	0.499	0.877	1.455
3	0.638	0.644	1.189	0.766	0.638	0.517	0.868	1.455
4	0.643	0.638	1.152	0.692	0.643	0.486	0.812	1.462
5	0.644	0.636	1.142	0.674	0.644	0.478	0.798	1.455
6	0.644	0.635	1.132	0.666	0.644	0.476	0.794	1.447
7	0.641	0.646	1.116	0.671	0.641	0.491	0.821	1.437
8	0.639	0.656	1.103	0.676	0.639	0.505	0.843	1.431
9	0.618	0.669	0.998	0.630	0.618	0.515	0.881	1.305
10	0.544	0.733	0.837	0.570	0.544	0.533	1.020	1.093
11	0.500	0.748	0.776	0.536	0.500	0.517	1.073	1.034

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	1.2	-1.0	5.9	0.433	0.796	0.164	0.108	0.036	0.024
2	10.00	0.5	-2.0	5.4	0.417	0.837	0.124	0.071	0.027	0.016
3	30.00	1.8	-2.3	3.2	0.421	0.905	0.073	0.031	0.016	0.007
4	40.00	2.7	-2.2	3.9	0.473	0.817	0.148	0.109	0.032	0.024
5	42.50	2.8	-2.2	4.3	0.485	0.792	0.170	0.134	0.037	0.029
6	45.00	2.9	-2.2	4.9	0.487	0.781	0.180	0.146	0.039	0.032
7	47.50	3.0	-2.1	4.5	0.474	0.822	0.147	0.116	0.032	0.025
8	50.00	3.2	-2.1	4.2	0.464	0.873	0.104	0.076	0.023	0.017
9	70.00	4.2	-2.0	7.2	0.448	0.926	0.065	0.058	0.013	0.012
10	90.00	4.7	-2.4	6.2	0.423	0.937	0.075	0.075	0.014	0.014
11	95.00	5.5	-1.8	4.9	0.430	0.925	0.105	0.105	0.020	0.020

TABLE XIV. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 90 PERCENT OF DESIGN SPEED

(c) Reading 30

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	0.1	46.7	64.2	53.2	520.2	1.204	14.35	1.701
2	9.508	9.429	0.1	44.0	62.8	52.2	520.1	1.189	14.53	1.682
3	8.635	8.650	0.5	43.0	59.0	46.9	518.5	1.172	14.74	1.644
4	8.180	8.261	0.0	46.1	57.7	43.7	518.3	1.173	14.76	1.610
5	8.065	8.164	0.8	47.0	57.1	43.0	518.4	1.174	14.75	1.594
6	7.949	8.067	0.2	47.3	57.0	42.7	517.9	1.172	14.75	1.579
7	7.832	7.969	0.4	46.5	56.5	41.6	518.3	1.168	14.75	1.582
8	7.714	7.872	0.5	45.8	56.2	40.3	518.3	1.163	14.75	1.590
9	6.726	7.094	0.3	45.3	53.3	33.3	518.2	1.146	14.75	1.551
10	5.592	6.315	1.6	47.9	51.0	19.5	518.3	1.141	14.75	1.546
11	5.266	6.121	0.1	50.2	52.1	13.9	518.4	1.146	14.74	1.567

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	591.0	738.2	1359.0	844.9	591.0	506.6	1.2	536.9	1225.0	1213.2
2	615.9	733.5	1347.7	861.4	615.9	527.8	1.4	509.3	1200.1	1190.2
3	651.8	746.5	1265.9	798.8	651.8	545.8	5.5	509.3	1090.7	1092.5
4	653.7	754.0	1221.9	723.0	653.7	522.8	0.1	543.3	1032.4	1042.6
5	652.1	752.2	1199.7	701.3	652.0	512.6	9.5	550.5	1016.6	1029.1
6	650.0	747.5	1192.6	690.6	650.0	507.3	2.8	548.9	1002.7	1017.5
7	649.4	751.5	1177.9	691.7	649.4	517.0	5.1	545.5	987.8	1005.1
8	648.2	760.1	1164.7	694.1	648.2	529.8	6.0	545.1	973.7	993.6
9	629.0	763.1	1053.7	642.5	629.0	537.1	2.9	542.1	848.3	894.7
10	559.7	814.3	888.4	578.8	559.4	545.7	15.9	604.4	706.0	797.3
11	517.2	833.3	841.2	549.3	517.2	533.3	0.9	640.4	664.3	772.1

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.544	0.625	1.251	0.715	0.544	0.429	0.857	1.493
2	0.569	0.625	1.244	0.734	0.569	0.450	0.857	1.487
3	0.605	0.643	1.175	0.688	0.605	0.470	0.837	1.492
4	0.607	0.650	1.135	0.623	0.607	0.450	0.800	1.504
5	0.605	0.648	1.114	0.604	0.605	0.441	0.786	1.483
6	0.604	0.644	1.107	0.595	0.604	0.437	0.780	1.486
7	0.603	0.649	1.093	0.597	0.603	0.446	0.796	1.476
8	0.602	0.658	1.081	0.601	0.601	0.459	0.817	1.470
9	0.582	0.667	0.976	0.561	0.582	0.469	0.854	1.331
10	0.515	0.717	0.817	0.510	0.514	0.481	0.975	1.109
11	0.474	0.734	0.770	0.484	0.474	0.470	1.031	1.084

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.4	0.2	5.4	0.524	0.803	0.180	0.123	0.040	0.027
2	10.00	2.1	-0.4	5.1	0.498	0.846	0.135	0.080	0.030	0.018
3	30.00	3.2	-0.8	2.5	0.500	0.887	0.099	0.053	0.022	0.012
4	40.00	4.3	-0.6	2.1	0.547	0.842	0.145	0.102	0.033	0.023
5	42.50	4.2	-0.8	2.5	0.555	0.821	0.168	0.131	0.038	0.029
6	45.00	4.6	-0.5	3.2	0.560	0.811	0.178	0.140	0.039	0.031
7	47.50	4.6	-0.5	3.2	0.550	0.832	0.158	0.124	0.035	0.028
8	50.00	4.8	-0.5	2.8	0.541	0.870	0.122	0.090	0.027	0.020
9	70.00	5.9	-0.4	5.4	0.522	0.914	0.086	0.078	0.018	0.016
10	90.00	6.2	-0.9	4.7	0.493	0.940	0.078	0.078	0.015	0.015
11	95.00	7.7	0.4	3.3	0.505	0.936	0.094	0.094	0.018	0.018

TABLE XIV. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 90 PERCENT OF DESIGN SPEED

(d) Reading 25

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	0.1	47.8	64.9	53.3	520.4	1.207	14.39	1.721
2	9.508	9.429	1.2	44.5	62.9	52.3	520.3	1.193	14.60	1.695
3	8.635	8.650	1.1	43.6	59.7	47.4	518.5	1.173	14.73	1.657
4	8.180	8.261	0.7	46.5	58.5	44.2	518.4	1.176	14.74	1.630
5	8.065	8.164	0.9	47.7	58.1	43.7	518.4	1.177	14.74	1.607
6	7.949	8.067	1.0	48.4	57.7	43.4	518.2	1.174	14.74	1.587
7	7.832	7.969	0.6	47.9	57.6	42.4	518.3	1.170	14.74	1.587
8	7.714	7.872	1.0	47.1	57.1	41.0	518.2	1.164	14.74	1.594
9	6.726	7.094	1.0	45.7	54.2	34.5	518.1	1.145	14.73	1.555
10	5.592	6.315	1.5	48.0	51.9	20.5	518.2	1.143	14.73	1.552
11	5.266	6.121	0.9	50.3	52.7	14.0	518.4	1.147	14.71	1.588

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	574.8	739.7	1353.2	831.5	574.7	497.3	1.0	547.7	1226.0	1214.1
2	607.4	733.7	1334.6	855.3	607.2	523.0	12.9	514.6	1201.3	1191.3
3	629.5	739.3	1249.3	791.3	629.4	535.2	11.8	510.1	1091.0	1092.8
4	630.8	750.1	1206.2	720.0	630.7	516.3	7.5	544.2	1035.7	1046.0
5	628.6	746.3	1188.6	694.2	628.6	502.3	9.8	551.9	1018.6	1031.1
6	626.9	740.1	1174.3	676.1	626.8	491.0	10.6	553.8	1003.6	1018.5
7	624.1	742.7	1163.2	673.9	624.0	497.8	6.4	551.1	988.1	1005.4
8	622.6	750.3	1146.4	676.7	622.5	510.9	10.6	549.5	973.3	993.2
9	605.8	750.0	1034.6	635.5	605.7	524.0	10.8	536.5	849.6	896.0
10	542.2	802.6	878.7	573.5	542.0	537.1	14.4	596.4	706.1	797.4
11	499.8	832.1	825.1	547.1	499.7	531.0	8.1	640.6	664.6	772.5

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.528	0.625	1.243	0.703	0.528	0.420	0.865	1.508
2	0.560	0.624	1.230	0.727	0.560	0.445	0.861	1.480
3	0.583	0.636	1.157	0.681	0.583	0.460	0.850	1.503
4	0.584	0.645	1.117	0.619	0.584	0.444	0.819	1.519
5	0.582	0.641	1.101	0.597	0.582	0.432	0.799	1.508
6	0.580	0.636	1.087	0.581	0.580	0.422	0.783	1.500
7	0.578	0.640	1.077	0.581	0.578	0.429	0.798	1.500
8	0.576	0.649	1.061	0.585	0.576	0.442	0.821	1.491
9	0.560	0.655	0.956	0.555	0.560	0.457	0.865	1.331
10	0.498	0.706	0.807	0.504	0.498	0.472	0.991	1.122
11	0.457	0.732	0.755	0.482	0.457	0.467	1.063	1.080

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	3.1	0.9	5.5	0.535	0.812	0.175	0.116	0.039	0.026
2	10.00	2.3	-0.2	5.2	0.496	0.845	0.139	0.087	0.031	0.019
3	30.00	3.9	-0.1	3.0	0.498	0.899	0.091	0.044	0.020	0.010
4	40.00	5.1	0.2	2.6	0.542	0.852	0.141	0.097	0.031	0.022
5	42.50	5.2	0.2	3.1	0.557	0.822	0.172	0.132	0.038	0.029
6	45.00	5.3	0.3	3.9	0.565	0.810	0.185	0.148	0.041	0.032
7	47.50	5.7	0.5	3.9	0.561	0.831	0.164	0.128	0.036	0.028
8	50.00	5.7	0.4	3.5	0.549	0.867	0.129	0.096	0.028	0.021
9	70.00	6.7	0.4	6.6	0.517	0.927	0.075	0.069	0.016	0.014
10	90.00	7.2	0.1	5.8	0.492	0.937	0.084	0.084	0.016	0.016
11	95.00	8.3	1.0	3.4	0.497	0.961	0.061	0.061	0.011	0.011

TABLE XIV. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 90 PERCENT OF DESIGN SPEED

(e) Reading 74

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	0.6	49.6	65.1	53.5	519.8	1.223	14.47	1.744
2	9.508	9.429	0.9	49.1	63.7	52.0	520.0	1.204	14.58	1.727
3	8.635	8.650	0.7	47.4	60.5	47.2	518.4	1.179	14.73	1.679
4	8.180	8.261	0.7	49.7	59.1	43.9	518.0	1.180	14.73	1.649
5	8.065	8.164	0.1	50.8	58.9	43.6	517.8	1.179	14.74	1.628
6	7.949	8.067	-0.1	51.3	58.6	43.1	518.5	1.178	14.74	1.613
7	7.832	7.969	-0.4	50.0	58.4	42.1	517.4	1.172	14.74	1.609
8	7.714	7.872	0.0	49.1	57.9	40.5	519.2	1.168	14.74	1.621
9	6.726	7.094	0.3	48.1	55.2	33.2	518.2	1.150	14.73	1.581
10	5.592	6.315	1.1	49.3	52.8	19.7	518.3	1.145	14.72	1.571
11	5.266	6.121	0.1	50.3	53.0	15.2	518.8	1.151	14.73	1.596

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	564.9	738.9	1341.1	805.0	564.8	478.7	5.5	562.8	1221.8	1210.0
2	585.6	743.4	1323.5	791.6	585.5	486.8	9.1	561.9	1196.0	1186.1
3	608.4	740.4	1237.1	737.8	608.3	501.2	7.4	545.0	1084.6	1086.4
4	611.1	749.5	1189.4	673.5	611.0	485.2	7.6	571.2	1028.1	1038.2
5	610.1	745.0	1181.9	650.5	610.1	471.2	0.8	577.0	1013.0	1025.5
6	609.6	741.6	1170.0	634.6	609.6	463.5	-1.2	578.9	997.5	1012.3
7	606.1	742.2	1157.9	643.0	606.1	477.0	-3.9	568.6	982.7	999.9
8	608.1	752.4	1144.7	648.1	608.1	492.5	0.4	568.8	970.2	990.1
9	585.9	754.4	1026.1	602.4	585.9	503.9	3.0	561.5	845.4	891.6
10	524.4	799.8	868.0	554.5	524.3	522.0	10.2	605.9	702.0	792.7
11	498.5	815.4	827.5	539.6	498.5	520.7	1.1	627.5	661.6	769.0

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.519	0.620	1.232	0.676	0.519	0.402	0.848	1.505
2	0.539	0.630	1.218	0.671	0.539	0.412	0.831	1.496
3	0.562	0.635	1.143	0.633	0.562	0.430	0.824	1.520
4	0.565	0.644	1.100	0.578	0.565	0.417	0.794	1.528
5	0.564	0.640	1.093	0.559	0.564	0.405	0.772	1.532
6	0.563	0.637	1.081	0.545	0.563	0.398	0.760	1.525
7	0.560	0.640	1.071	0.554	0.560	0.411	0.787	1.527
8	0.561	0.649	1.057	0.559	0.561	0.425	0.810	1.515
9	0.540	0.657	0.946	0.525	0.540	0.439	0.860	1.351
10	0.481	0.702	0.796	0.487	0.481	0.458	0.996	1.132
11	0.456	0.715	0.756	0.473	0.456	0.456	1.045	1.088

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	3.3	1.1	5.7	0.554	0.770	0.227	0.171	0.050	0.038
2	10.00	3.1	0.6	4.9	0.554	0.828	0.163	0.109	0.037	0.025
3	30.00	4.7	0.7	2.8	0.547	0.892	0.101	0.054	0.023	0.012
4	40.00	5.7	0.8	2.3	0.582	0.853	0.145	0.102	0.033	0.023
5	42.50	6.0	1.1	3.0	0.600	0.833	0.165	0.122	0.037	0.027
6	45.00	6.2	1.1	3.6	0.608	0.824	0.175	0.135	0.039	0.030
7	47.50	6.5	1.4	3.6	0.593	0.848	0.150	0.111	0.033	0.024
8	50.00	6.5	1.2	3.1	0.581	0.881	0.118	0.082	0.026	0.018
9	70.00	7.7	1.5	5.4	0.553	0.934	0.070	0.063	0.015	0.013
10	90.00	8.1	1.0	4.9	0.511	0.949	0.071	0.071	0.014	0.014
11	95.00	8.6	1.3	4.6	0.505	0.950	0.078	0.078	0.015	0.015

TABLE XIV. - Concluded. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 90 PERCENT OF DESIGN SPEED

(f) Reading 32

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	0.8	56.0	66.4	56.2	520.8	1.230	14.41	1.723
2	9.508	9.429	1.3	50.1	64.7	53.1	521.0	1.211	14.62	1.716
3	8.635	8.650	1.0	47.8	61.4	47.4	518.9	1.183	14.74	1.681
4	8.180	8.261	0.5	49.8	60.1	44.1	518.0	1.185	14.74	1.653
5	8.065	8.164	0.4	51.3	59.8	43.3	517.5	1.184	14.73	1.637
6	7.949	8.067	0.3	52.2	59.5	43.0	517.5	1.182	14.73	1.619
7	7.832	7.969	0.3	51.2	59.2	42.1	518.2	1.178	14.73	1.616
8	7.714	7.872	-0.2	50.3	59.0	40.8	518.1	1.173	14.73	1.622
9	6.726	7.094	0.5	48.9	55.8	33.9	517.8	1.153	14.72	1.574
10	5.592	6.315	1.4	50.7	53.5	19.3	518.0	1.147	14.73	1.568
11	5.266	6.121	1.6	52.8	53.9	12.9	518.2	1.152	14.72	1.596

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	530.9	729.1	1328.1	731.9	530.8	407.5	7.0	604.6	1224.4	1212.5
2	560.5	731.6	1310.3	781.8	560.4	469.0	12.7	561.6	1197.1	1187.2
3	586.3	740.5	1226.4	735.4	586.2	497.7	10.5	548.3	1087.8	1089.7
4	588.7	748.4	1181.7	672.5	588.6	482.7	5.3	572.0	1030.0	1040.2
5	587.5	750.2	1168.7	643.9	587.5	468.7	4.6	585.7	1014.8	1027.3
6	586.2	744.3	1154.0	624.8	586.2	456.7	5.4	587.7	999.3	1014.2
7	585.4	745.6	1143.1	629.6	585.4	467.5	3.5	580.8	985.3	1002.6
8	585.6	751.9	1136.5	634.1	585.6	480.3	-1.5	578.5	972.5	992.4
9	572.2	747.8	1018.0	592.2	572.1	491.6	5.3	563.4	847.3	893.7
10	512.0	798.1	860.2	535.7	511.8	505.6	12.3	617.5	703.6	794.6
11	474.1	824.0	804.3	510.6	474.0	497.7	13.3	656.7	663.2	770.8

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS
RP	IN	OUT	IN	OUT	IN	OUT	VEL R MACH NO
1	0.486	0.609	1.215	0.611	0.486	0.340	0.768 1.536
2	0.514	0.616	1.202	0.659	0.514	0.395	0.837 1.514
3	0.540	0.634	1.130	0.630	0.540	0.426	0.849 1.541
4	0.543	0.641	1.090	0.576	0.543	0.414	0.820 1.557
5	0.542	0.643	1.078	0.552	0.542	0.402	0.798 1.554
6	0.541	0.639	1.065	0.536	0.541	0.392	0.779 1.545
7	0.540	0.640	1.054	0.541	0.540	0.402	0.799 1.543
8	0.540	0.648	1.048	0.546	0.540	0.414	0.820 1.548
9	0.527	0.650	0.938	0.515	0.527	0.428	0.859 1.360
10	0.469	0.700	0.788	0.470	0.469	0.443	0.988 1.139
11	0.433	0.723	0.734	0.448	0.433	0.437	1.050 1.080

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	4.7	2.4	8.4	0.615	0.730	0.275	0.214	0.057	0.044
2	10.00	4.0	1.5	6.0	0.556	0.791	0.205	0.151	0.045	0.033
3	30.00	5.6	1.6	3.0	0.545	0.876	0.119	0.070	0.027	0.016
4	40.00	6.7	1.9	2.6	0.581	0.836	0.166	0.119	0.037	0.027
5	42.50	6.9	2.0	2.7	0.603	0.820	0.184	0.139	0.041	0.031
6	45.00	7.1	2.0	3.5	0.612	0.811	0.195	0.153	0.043	0.034
7	47.50	7.3	2.1	3.6	0.601	0.827	0.178	0.138	0.039	0.030
8	50.00	7.6	2.3	3.3	0.593	0.855	0.149	0.108	0.033	0.024
9	70.00	8.3	2.1	6.0	0.560	0.905	0.104	0.097	0.022	0.020
10	90.00	8.7	1.7	4.6	0.531	0.933	0.094	0.094	0.018	0.018
11	95.00	9.5	2.2	2.4	0.532	0.943	0.094	0.094	0.018	0.018

TABLE XV. - BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 100 PERCENT OF DESIGN SPEED

(a) Reading 67

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.1	39.9	62.9	56.3	519.8	1.211	14.36	1.605
2	9.508	9.429	-0.7	38.7	61.1	54.1	519.4	1.195	14.64	1.620
3	8.635	8.650	0.6	37.9	57.8	48.6	518.5	1.178	14.73	1.635
4	8.180	8.261	0.7	43.3	56.1	48.6	518.4	1.180	14.73	1.521
5	8.065	8.164	0.8	44.5	55.7	48.5	519.1	1.182	14.73	1.498
6	7.949	8.067	1.1	45.0	55.2	47.6	517.9	1.182	14.73	1.494
7	7.832	7.969	0.8	43.4	54.9	44.9	518.1	1.180	14.74	1.533
8	7.714	7.872	0.8	42.2	54.5	42.6	518.3	1.177	14.73	1.568
9	6.726	7.094	0.8	40.3	51.5	34.7	518.6	1.161	14.73	1.607
10	5.592	6.315	1.4	42.5	49.5	23.9	518.6	1.160	14.73	1.618
11	5.266	6.121	0.7	45.4	51.9	17.5	518.6	1.172	14.70	1.678

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	694.9	748.3	1523.5	1035.6	694.9	574.1	-0.7	480.0	1355.0	1341.9
2	736.6	771.4	1524.7	1028.5	736.5	602.4	-8.6	481.8	1326.5	1315.4
3	751.7	797.8	1411.0	952.1	751.7	629.4	8.4	490.3	1202.5	1204.6
4	758.0	761.5	1360.6	838.2	757.9	554.3	9.7	522.2	1139.6	1150.9
5	761.4	756.0	1350.0	813.7	761.3	539.3	10.5	529.8	1125.4	1139.2
6	761.3	759.0	1332.9	796.2	761.1	536.5	14.5	536.8	1108.6	1125.1
7	760.0	788.3	1321.8	807.5	759.9	572.4	10.9	542.0	1092.5	1111.6
8	758.8	811.6	1307.1	817.2	758.7	601.6	11.2	544.7	1075.6	1097.6
9	738.7	842.5	1186.5	782.0	738.6	642.9	9.7	544.5	938.3	989.7
10	652.3	877.2	1003.6	707.4	652.1	646.6	16.4	592.9	779.2	880.0
11	570.3	914.8	924.3	674.0	570.2	642.9	6.7	650.8	734.2	853.4

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.647	0.632	1.419	0.875	0.647	0.485	0.826	1.605
2	0.690	0.658	1.428	0.878	0.690	0.514	0.818	1.604
3	0.706	0.689	1.326	0.822	0.706	0.544	0.837	1.585
4	0.713	0.655	1.280	0.720	0.713	0.476	0.731	1.573
5	0.716	0.648	1.269	0.698	0.716	0.462	0.708	1.562
6	0.717	0.652	1.255	0.684	0.717	0.461	0.705	1.543
7	0.715	0.680	1.244	0.696	0.715	0.493	0.753	1.538
8	0.714	0.703	1.230	0.708	0.714	0.521	0.793	1.526
9	0.693	0.738	1.113	0.685	0.693	0.563	0.870	1.441
10	0.605	0.772	0.931	0.622	0.605	0.569	0.991	1.216
11	0.525	0.805	0.851	0.593	0.525	0.565	1.127	1.193

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	1.1	-1.1	8.6	0.437	0.685	0.254	0.148	0.052	0.030
2	10.00	0.5	-2.0	7.0	0.442	0.756	0.188	0.080	0.040	0.017
3	30.00	2.0	-2.0	4.2	0.438	0.845	0.123	0.036	0.027	0.008
4	40.00	2.8	-2.1	7.0	0.502	0.707	0.238	0.161	0.049	0.033
5	42.50	2.8	-2.2	7.9	0.516	0.671	0.271	0.198	0.055	0.040
6	45.00	2.8	-2.3	8.1	0.522	0.667	0.277	0.210	0.056	0.043
7	47.50	3.0	-2.2	6.4	0.510	0.720	0.237	0.173	0.050	0.036
8	50.00	3.1	-2.2	5.1	0.495	0.776	0.191	0.130	0.041	0.028
9	70.00	4.0	-2.2	6.8	0.457	0.902	0.091	0.060	0.019	0.012
10	90.00	4.7	-2.4	9.1	0.420	0.919	0.098	0.097	0.018	0.018
11	95.00	7.5	0.2	6.9	0.416	0.926	0.109	0.109	0.020	0.020

TABLE XV. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 100 PERCENT OF DESIGN SPEED

(b) Reading 19

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.7	47.6	63.4	57.9	520.1	1.235	14.36	1.697
2	9.508	9.429	-0.1	42.7	61.3	54.9	519.6	1.217	14.65	1.709
3	8.635	8.650	0.6	41.7	58.1	47.8	518.6	1.200	14.73	1.751
4	8.180	8.261	1.3	45.2	56.3	45.7	518.6	1.202	14.73	1.688
5	8.065	8.164	1.0	46.3	56.0	45.4	518.6	1.203	14.73	1.663
6	7.949	8.067	1.0	46.8	55.6	44.9	518.4	1.202	14.73	1.647
7	7.832	7.969	0.9	46.3	55.2	43.2	518.3	1.198	14.73	1.663
8	7.714	7.872	0.8	45.5	54.9	41.4	518.3	1.193	14.73	1.686
9	6.726	7.094	0.6	43.8	51.8	33.4	518.3	1.175	14.73	1.687
10	5.592	6.315	1.2	46.3	50.0	22.2	518.5	1.168	14.72	1.665
11	5.266	6.121	1.1	49.3	50.7	15.8	518.7	1.174	14.70	1.693

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	684.8	741.0	1527.1	940.4	684.8	500.0	-8.4	546.9	1356.5	1343.4
2	728.3	764.1	1516.1	977.0	728.3	561.6	-1.3	518.0	1328.5	1317.4
3	745.0	810.7	1410.3	901.8	745.0	605.4	8.1	539.2	1205.5	1207.6
4	750.9	805.0	1353.0	812.6	750.7	567.1	16.5	571.4	1142.1	1153.4
5	752.3	801.0	1344.4	788.3	752.2	553.3	12.6	579.2	1126.8	1140.7
6	752.9	798.3	1331.0	771.7	752.8	546.3	12.9	582.1	1110.6	1127.1
7	751.8	811.1	1317.4	769.1	751.7	560.2	12.3	586.5	1094.2	1113.3
8	751.5	827.3	1306.2	772.5	751.5	579.6	10.6	590.4	1079.0	1101.1
9	734.1	848.5	1186.3	732.9	734.1	612.0	7.8	587.8	939.7	991.1
10	644.4	878.3	1002.5	655.8	644.3	607.3	13.1	634.6	781.2	882.2
11	591.7	906.6	934.9	614.4	591.6	591.2	11.3	687.4	735.3	854.7

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.637	0.619	1.421	0.786	0.637	0.418	0.730	1.623
2	0.681	0.645	1.419	0.825	0.681	0.474	0.771	1.600
3	0.699	0.694	1.324	0.772	0.699	0.518	0.813	1.593
4	0.705	0.688	1.271	0.695	0.705	0.485	0.755	1.570
5	0.707	0.684	1.263	0.673	0.707	0.473	0.736	1.567
6	0.708	0.682	1.251	0.659	0.707	0.467	0.726	1.553
7	0.707	0.695	1.238	0.659	0.706	0.480	0.745	1.543
8	0.706	0.712	1.228	0.665	0.706	0.499	0.771	1.537
9	0.688	0.739	1.112	0.638	0.688	0.533	0.834	1.450
10	0.598	0.770	0.930	0.575	0.597	0.532	0.943	1.231
11	0.546	0.796	0.862	0.539	0.545	0.519	0.999	1.174

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	1.6	-0.6	10.1	0.519	0.695	0.267	0.156	0.053	0.031
2	10.00	0.6	-1.9	7.8	0.480	0.762	0.201	0.095	0.042	0.020
3	30.00	2.3	-1.7	3.4	0.485	0.869	0.114	0.026	0.025	0.006
4	40.00	2.9	-2.0	4.2	0.528	0.798	0.185	0.110	0.040	0.024
5	42.50	3.1	-1.9	4.8	0.544	0.770	0.212	0.138	0.046	0.030
6	45.00	3.1	-1.9	5.4	0.550	0.759	0.223	0.154	0.048	0.033
7	47.50	3.3	-1.9	4.8	0.547	0.790	0.195	0.130	0.042	0.028
8	50.00	3.5	-1.8	3.9	0.540	0.833	0.155	0.093	0.034	0.020
9	70.00	4.3	-2.0	5.5	0.508	0.921	0.079	0.046	0.017	0.010
10	90.00	5.3	-1.8	7.4	0.481	0.933	0.085	0.084	0.016	0.016
11	95.00	6.4	-1.0	5.2	0.494	0.932	0.100	0.100	0.019	0.019

TABLE XV. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 100 PERCENT OF DESIGN SPEED

(c) Reading 20

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.4	51.2	63.9	57.9	520.0	1.255	14.33	1.761
2	9.508	9.429	0.3	45.4	61.8	54.7	519.5	1.231	14.62	1.774
3	8.635	8.650	1.1	43.8	58.4	47.4	518.7	1.210	14.73	1.805
4	8.180	8.261	1.3	46.8	56.7	44.9	518.6	1.212	14.74	1.750
5	8.065	8.164	1.4	47.9	56.3	44.6	518.5	1.212	14.74	1.724
6	7.949	8.067	0.9	48.5	56.1	43.9	518.4	1.210	14.74	1.714
7	7.832	7.969	0.8	48.1	55.7	42.6	518.4	1.206	14.74	1.715
8	7.714	7.872	0.6	47.5	55.3	41.0	518.4	1.201	14.74	1.725
9	6.726	7.094	0.0	45.6	52.4	32.7	518.2	1.180	14.74	1.719
10	5.592	6.315	-0.2	47.7	50.4	21.7	518.5	1.170	14.73	1.680
11	5.266	6.121	1.1	50.7	50.8	14.7	518.7	1.177	14.71	1.723

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	667.4	755.5	1515.9	891.3	667.4	473.5	-4.1	588.6	1356.9	1343.8
2	709.2	772.2	1501.7	939.5	709.2	542.4	4.0	549.6	1327.7	1316.7
3	734.2	817.3	1400.1	871.7	734.1	589.6	13.8	566.1	1206.1	1208.2
4	738.7	817.1	1346.1	789.9	738.6	559.2	17.0	595.8	1142.4	1153.7
5	739.5	813.2	1332.9	765.9	739.3	545.4	17.9	603.2	1127.0	1140.9
6	739.2	813.6	1325.1	748.2	739.1	539.5	11.1	609.0	1110.8	1127.3
7	739.0	818.9	1310.4	742.4	738.9	546.5	10.9	609.8	1093.2	1112.3
8	739.3	829.4	1299.3	743.0	739.2	560.6	8.3	611.2	1076.8	1098.9
9	721.9	850.4	1184.1	707.7	721.9	595.2	0.2	607.4	938.7	990.1
10	647.9	874.9	1016.2	634.1	647.9	588.9	-2.0	647.0	780.9	881.9
11	589.3	909.0	933.1	595.9	589.2	576.3	11.7	703.0	735.3	854.6

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.620	0.626	1.407	0.739	0.620	0.393	0.709	1.627
2	0.662	0.649	1.402	0.789	0.662	0.456	0.765	1.601
3	0.688	0.697	1.312	0.743	0.688	0.503	0.803	1.591
4	0.693	0.696	1.263	0.673	0.693	0.477	0.757	1.577
5	0.694	0.693	1.250	0.652	0.693	0.465	0.738	1.567
6	0.693	0.694	1.243	0.638	0.693	0.460	0.730	1.564
7	0.693	0.700	1.229	0.635	0.693	0.467	0.740	1.551
8	0.694	0.712	1.219	0.638	0.694	0.481	0.758	1.544
9	0.676	0.739	1.109	0.615	0.676	0.517	0.825	1.470
10	0.601	0.766	0.943	0.555	0.601	0.516	0.909	1.261
11	0.543	0.797	0.860	0.522	0.543	0.505	0.978	1.174

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.1	-0.1	10.1	0.557	0.688	0.294	0.183	0.058	0.036
2	10.00	1.2	-1.3	7.6	0.506	0.770	0.206	0.103	0.043	0.022
3	30.00	2.6	-1.5	3.1	0.508	0.873	0.117	0.031	0.026	0.007
4	40.00	3.3	-1.5	3.4	0.548	0.817	0.175	0.100	0.039	0.022
5	42.50	3.4	-1.6	4.0	0.561	0.792	0.201	0.129	0.044	0.028
6	45.00	3.7	-1.4	4.4	0.573	0.791	0.203	0.133	0.044	0.029
7	47.50	3.8	-1.4	4.1	0.571	0.809	0.186	0.121	0.041	0.026
8	50.00	3.9	-1.4	3.5	0.565	0.839	0.156	0.093	0.034	0.021
9	70.00	4.9	-1.3	4.9	0.534	0.930	0.072	0.037	0.015	0.008
10	90.00	5.6	-1.4	7.0	0.515	0.939	0.076	0.074	0.014	0.014
11	95.00	6.5	-0.9	4.2	0.516	0.952	0.072	0.072	0.014	0.014

TABLE XV. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 100 PERCENT OF DESIGN SPEED

(d) Reading 75

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	-0.4	51.1	64.3	56.3	520.0	1.268	14.37	1.856
2	9.508	9.429	-0.7	49.6	62.7	53.5	519.4	1.249	14.64	1.857
3	8.635	8.650	0.6	47.5	59.3	47.0	518.4	1.221	14.72	1.848
4	8.180	8.261	0.5	50.6	57.7	44.8	518.7	1.221	14.74	1.785
5	8.065	8.164	1.0	51.5	57.2	44.1	519.0	1.221	14.74	1.766
6	7.949	8.067	0.9	52.0	56.9	43.8	518.1	1.218	14.74	1.746
7	7.832	7.969	0.7	51.6	56.7	42.6	518.8	1.215	14.73	1.744
8	7.714	7.872	0.7	50.3	56.3	40.8	518.4	1.210	14.72	1.755
9	6.726	7.094	0.9	47.9	53.2	32.5	518.5	1.183	14.73	1.731
10	5.592	6.315	1.0	48.8	51.5	20.8	518.4	1.177	14.73	1.706
11	5.266	6.121	0.5	50.4	53.9	15.3	518.5	1.186	14.70	1.756

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	652.4	778.2	1505.1	880.8	652.4	488.3	-4.3	605.9	1352.0	1339.0
2	687.9	799.7	1497.3	871.9	687.9	518.3	-8.8	609.0	1321.2	1310.2
3	709.0	821.9	1387.4	814.2	709.0	554.9	7.5	606.4	1200.1	1202.2
4	713.9	818.6	1336.9	731.6	713.9	519.6	6.1	632.6	1136.5	1147.7
5	714.1	819.9	1319.2	710.2	714.0	510.3	12.7	641.8	1122.0	1135.8
6	712.3	814.0	1305.7	693.5	712.3	500.9	10.6	641.7	1104.9	1121.3
7	711.2	817.9	1293.5	690.8	711.1	508.3	8.9	640.8	1089.4	1108.5
8	710.4	828.7	1279.7	699.9	710.4	529.8	8.2	637.2	1072.6	1094.6
9	691.5	842.8	1153.6	669.9	691.4	564.9	11.0	625.5	934.4	985.6
10	610.3	874.9	979.3	616.3	610.2	576.2	10.8	658.4	776.6	877.1
11	529.6	900.6	899.5	595.6	529.5	574.5	4.5	693.5	731.5	850.3

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.605	0.643	1.395	0.728	0.605	0.404	0.748	1.630
2	0.641	0.669	1.394	0.729	0.641	0.433	0.753	1.622
3	0.663	0.698	1.297	0.692	0.663	0.471	0.783	1.606
4	0.667	0.695	1.250	0.621	0.667	0.441	0.728	1.599
5	0.667	0.696	1.233	0.603	0.667	0.433	0.715	1.582
6	0.666	0.692	1.221	0.590	0.666	0.426	0.703	1.573
7	0.665	0.696	1.209	0.588	0.664	0.433	0.715	1.566
8	0.664	0.708	1.196	0.598	0.664	0.453	0.746	1.558
9	0.645	0.730	1.076	0.580	0.645	0.489	0.817	1.474
10	0.564	0.763	0.905	0.538	0.564	0.503	0.944	1.264
11	0.486	0.785	0.825	0.519	0.486	0.501	1.085	1.215

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	2.5	0.3	8.6	0.565	0.721	0.277	0.168	0.057	0.035
2	10.00	2.0	-0.5	6.4	0.568	0.777	0.212	0.106	0.046	0.023
3	30.00	3.5	-0.6	2.6	0.556	0.867	0.128	0.041	0.029	0.009
4	40.00	4.3	-0.5	3.2	0.599	0.816	0.184	0.105	0.041	0.023
5	42.50	4.4	-0.6	3.5	0.609	0.800	0.203	0.131	0.045	0.029
6	45.00	4.5	-0.5	4.3	0.616	0.793	0.210	0.141	0.046	0.031
7	47.50	4.7	-0.4	4.1	0.613	0.803	0.201	0.136	0.044	0.030
8	50.00	4.9	-0.4	3.3	0.598	0.832	0.171	0.110	0.038	0.024
9	70.00	5.7	-0.6	4.6	0.557	0.927	0.079	0.047	0.017	0.010
10	90.00	6.7	-0.4	6.0	0.515	0.931	0.095	0.094	0.018	0.018
11	95.00	9.5	2.2	4.7	0.497	0.938	0.104	0.103	0.019	0.019

TABLE XV. - Continued. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 100 PERCENT OF DESIGN SPEED

(e) Reading 22

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	1.9	58.5	65.6	59.5	537.5	1.230	14.32	1.838
2	9.508	9.429	0.5	51.3	64.0	55.7	522.1	1.246	14.60	1.825
3	8.635	8.650	1.7	47.3	60.4	47.3	517.6	1.225	14.72	1.856
4	8.180	8.261	1.0	49.0	58.8	44.6	517.1	1.225	14.74	1.808
5	8.065	8.164	1.3	50.6	58.5	44.3	517.4	1.226	14.73	1.780
6	7.949	8.067	1.1	51.5	58.3	44.2	516.1	1.224	14.74	1.751
7	7.832	7.969	1.0	51.5	58.0	43.1	516.4	1.220	14.74	1.746
8	7.714	7.872	1.2	51.5	57.7	41.0	516.9	1.218	14.74	1.754
9	6.726	7.094	0.4	47.9	54.8	33.9	516.6	1.188	14.75	1.721
10	5.592	6.315	0.7	49.5	52.7	20.0	516.0	1.179	14.74	1.725
11	5.266	6.121	-0.1	51.7	53.4	13.6	516.5	1.183	14.73	1.765

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	608.3	774.1	1471.4	796.6	608.0	404.2	19.7	660.1	1359.7	1346.5
2	643.6	774.0	1468.0	859.5	643.5	483.9	5.9	604.1	1325.3	1314.3
3	674.5	820.7	1363.2	820.9	674.2	556.5	19.7	603.2	1204.6	1206.6
4	683.2	823.4	1320.5	757.8	683.1	539.7	12.4	621.8	1142.5	1153.8
5	682.5	819.9	1304.8	726.7	682.4	520.0	15.5	633.9	1127.7	1141.5
6	677.0	811.0	1288.7	703.6	676.9	504.4	12.4	635.0	1109.0	1125.5
7	676.1	814.7	1275.3	695.2	676.0	507.4	12.2	637.5	1093.6	1112.7
8	673.5	831.1	1259.9	685.5	673.4	517.2	13.6	650.6	1078.4	1100.5
9	661.5	833.1	1147.0	672.5	661.5	558.3	4.7	618.3	941.7	993.2
10	590.5	886.0	974.3	612.2	590.5	575.4	6.9	673.8	781.9	883.0
11	546.8	914.7	917.8	583.2	546.8	566.7	-1.0	718.0	736.1	855.6

	ABS MACH NO		REL MACH NO		MERID MACH NO			
RP	IN	OUT	IN	OUT	IN	OUT	MERID VEL R	PEAK SS MACH NO
1	0.551	0.639	1.334	0.657	0.551	0.334	0.665	1.614
2	0.595	0.644	1.356	0.715	0.595	0.403	0.752	1.631
3	0.628	0.697	1.270	0.697	0.628	0.472	0.825	1.619
4	0.637	0.699	1.232	0.644	0.637	0.458	0.790	1.621
5	0.636	0.695	1.217	0.616	0.636	0.441	0.762	1.610
6	0.632	0.689	1.203	0.598	0.632	0.428	0.745	1.604
7	0.631	0.693	1.190	0.592	0.631	0.432	0.751	1.596
8	0.628	0.709	1.174	0.585	0.628	0.441	0.768	1.587
9	0.616	0.721	1.068	0.582	0.616	0.483	0.844	1.524
10	0.546	0.776	0.901	0.536	0.546	0.504	0.974	1.277
11	0.503	0.802	0.844	0.511	0.503	0.497	1.036	1.229

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	3.8	1.6	11.7	0.620	0.826	0.165	0.070	0.031	0.013
2	10.00	3.3	0.8	8.6	0.563	0.763	0.229	0.127	0.047	0.026
3	30.00	4.6	0.5	2.9	0.539	0.860	0.140	0.054	0.031	0.012
4	40.00	5.5	0.6	3.0	0.571	0.818	0.188	0.107	0.042	0.024
5	42.50	5.6	0.6	3.7	0.589	0.791	0.219	0.143	0.048	0.031
6	45.00	5.9	0.8	4.7	0.601	0.776	0.236	0.163	0.051	0.035
7	47.50	6.1	0.9	4.7	0.602	0.784	0.228	0.159	0.049	0.035
8	50.00	6.3	1.0	3.5	0.605	0.799	0.214	0.149	0.047	0.033
9	70.00	7.3	1.1	6.0	0.552	0.892	0.120	0.081	0.025	0.017
10	90.00	7.9	0.9	5.2	0.521	0.941	0.083	0.081	0.016	0.016
11	95.00	9.0	1.7	3.1	0.528	0.961	0.062	0.062	0.012	0.012

TABLE XV. - Concluded. BLADE ELEMENT DATA AT BLADE EDGES FOR ROTOR 3MOD1

AT 100 PERCENT OF DESIGN SPEED

(f) Reading 68

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	9.717	9.623	0.7	56.1	65.8	56.9	519.6	1.294	14.41	1.890
2	9.508	9.429	0.5	53.0	64.1	54.6	519.2	1.265	14.63	1.875
3	8.635	8.650	1.2	49.1	60.7	47.5	518.9	1.230	14.72	1.867
4	8.180	8.261	0.1	52.0	59.5	45.4	518.5	1.226	14.73	1.801
5	8.065	8.164	0.5	53.6	59.0	44.7	518.7	1.226	14.74	1.784
6	7.949	8.067	0.6	54.2	58.7	44.2	518.2	1.225	14.73	1.764
7	7.832	7.969	1.0	53.6	58.3	42.7	519.0	1.222	14.73	1.767
8	7.714	7.872	0.9	52.8	57.9	40.5	518.1	1.217	14.74	1.782
9	6.726	7.094	0.3	49.0	54.9	32.8	518.4	1.188	14.73	1.748
10	5.592	6.315	0.7	49.5	52.9	20.4	518.5	1.182	14.73	1.731
11	5.266	6.121	0.6	51.2	54.1	14.9	518.5	1.189	14.70	1.772

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	605.8	795.9	1478.5	813.7	605.8	443.9	7.0	660.6	1355.7	1342.5
2	640.5	798.2	1465.7	829.0	640.5	480.2	5.9	637.6	1324.3	1313.3
3	667.0	820.7	1364.1	794.6	666.9	536.9	14.4	620.7	1204.4	1206.5
4	670.3	814.9	1320.7	714.0	670.3	501.7	0.9	642.2	1138.9	1150.2
5	671.1	818.0	1304.0	682.4	671.0	485.3	6.3	658.4	1124.4	1138.2
6	670.0	814.0	1287.9	664.1	669.9	476.1	6.9	660.2	1106.9	1123.3
7	667.9	820.8	1269.3	662.5	667.8	486.9	11.7	660.9	1091.1	1110.2
8	668.2	835.2	1255.7	663.9	668.1	505.2	10.7	665.1	1073.9	1095.9
9	655.9	839.2	1140.6	654.8	655.9	550.7	3.3	633.3	936.4	987.6
10	584.3	877.7	968.4	608.1	584.3	569.9	6.7	667.5	779.0	879.7
11	528.2	901.1	899.9	583.7	528.2	564.1	5.1	702.7	733.8	852.9

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.559	0.652	1.364	0.667	0.559	0.364	0.733	1.650
2	0.593	0.663	1.358	0.688	0.593	0.399	0.750	1.635
3	0.620	0.694	1.268	0.672	0.620	0.454	0.805	1.629
4	0.623	0.690	1.228	0.605	0.623	0.425	0.748	1.641
5	0.624	0.693	1.213	0.578	0.624	0.411	0.723	1.626
6	0.623	0.690	1.198	0.563	0.623	0.403	0.711	1.612
7	0.621	0.696	1.180	0.562	0.621	0.413	0.729	1.597
8	0.622	0.712	1.168	0.566	0.622	0.431	0.756	1.588
9	0.609	0.725	1.059	0.566	0.609	0.476	0.840	1.524
10	0.538	0.764	0.892	0.530	0.538	0.496	0.975	1.271
11	0.484	0.785	0.825	0.508	0.484	0.491	1.068	1.219

	PERCENT	INCIDENCE		DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN	SS				TOT	PROF	TOT	PROF
1	5.00	4.0	1.8	9.2	0.613	0.678	0.343	0.235	0.070	0.048
2	10.00	3.4	0.9	7.5	0.591	0.743	0.260	0.157	0.055	0.033
3	30.00	4.9	0.9	3.1	0.564	0.850	0.152	0.064	0.034	0.014
4	40.00	6.1	1.2	3.8	0.611	0.810	0.197	0.113	0.043	0.025
5	42.50	6.2	1.2	4.1	0.631	0.794	0.216	0.137	0.047	0.030
6	45.00	6.2	1.2	4.7	0.639	0.782	0.231	0.158	0.050	0.034
7	47.50	6.4	1.2	4.2	0.631	0.794	0.221	0.154	0.048	0.034
8	50.00	6.5	1.2	3.0	0.625	0.826	0.187	0.123	0.042	0.027
9	70.00	7.4	1.2	4.9	0.568	0.920	0.090	0.053	0.019	0.011
10	90.00	8.1	1.1	5.7	0.521	0.934	0.094	0.093	0.018	0.018
11	95.00	9.7	2.4	4.4	0.513	0.940	0.100	0.100	0.019	0.019

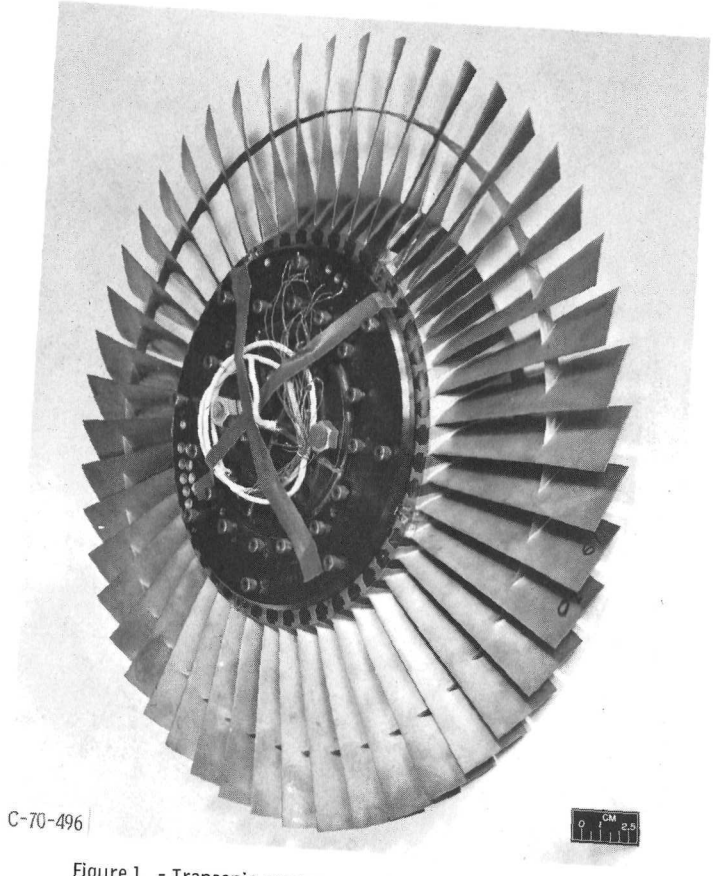
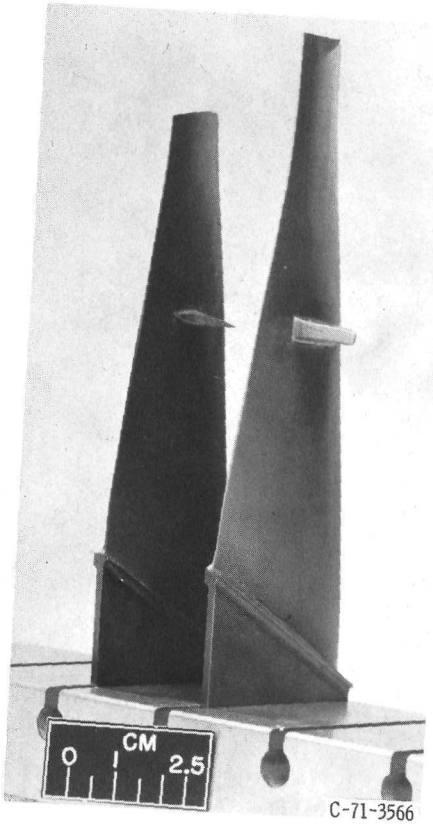


Figure 1. - Transonic compressor rotor with solidity of 1.3.



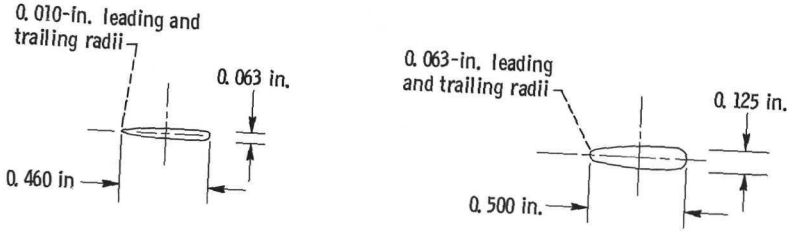
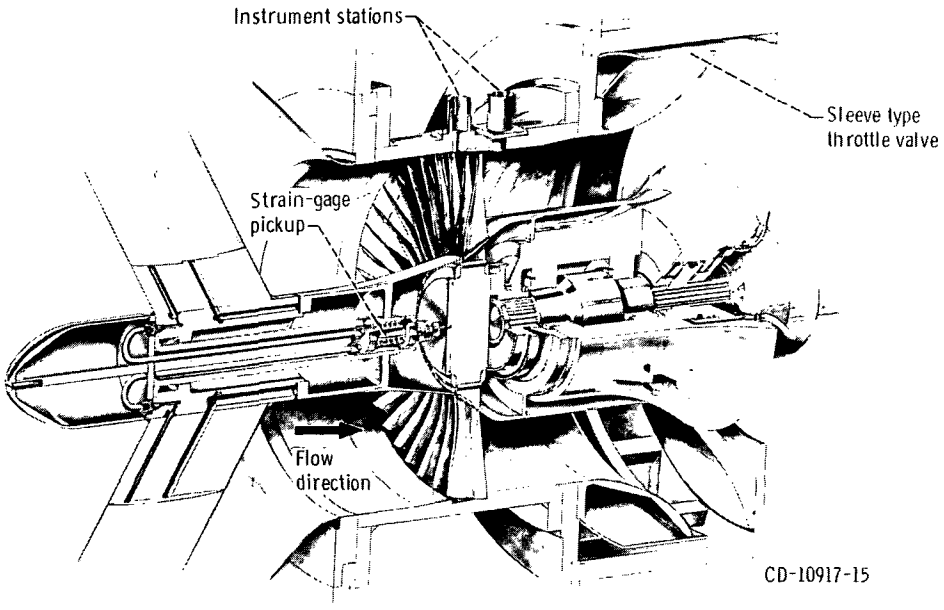
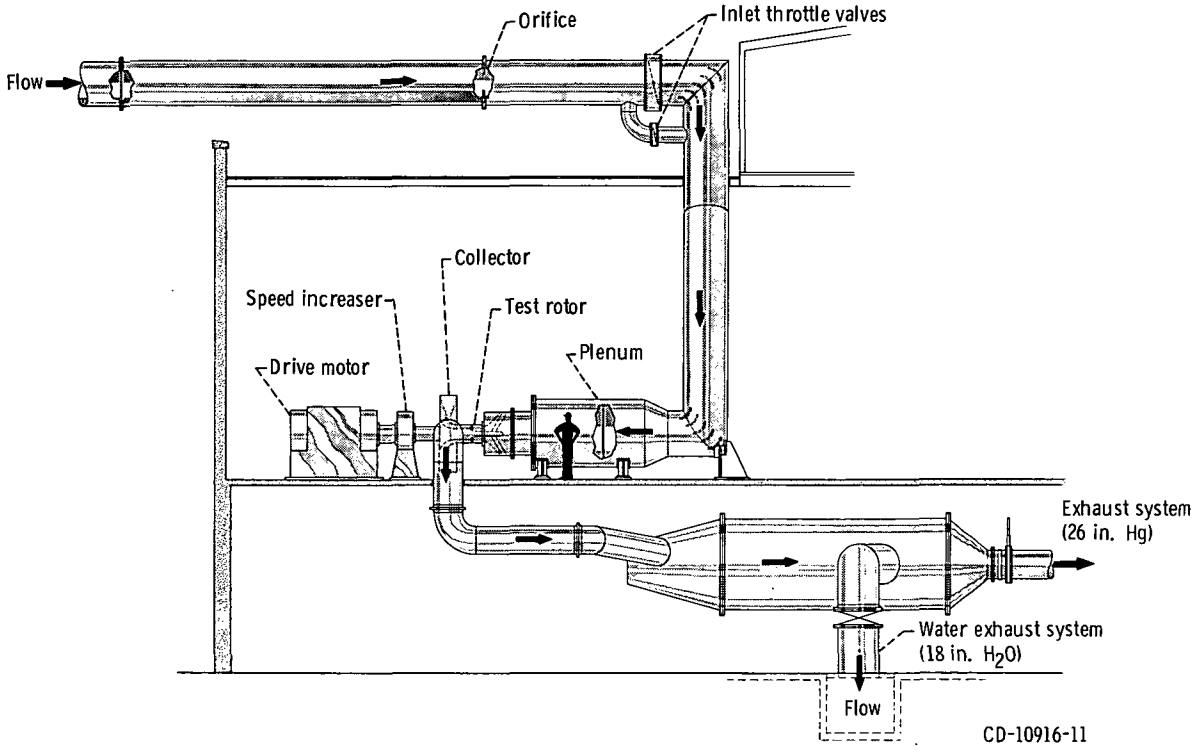


Figure 2. - Scale model of two blade damper sizes tested.

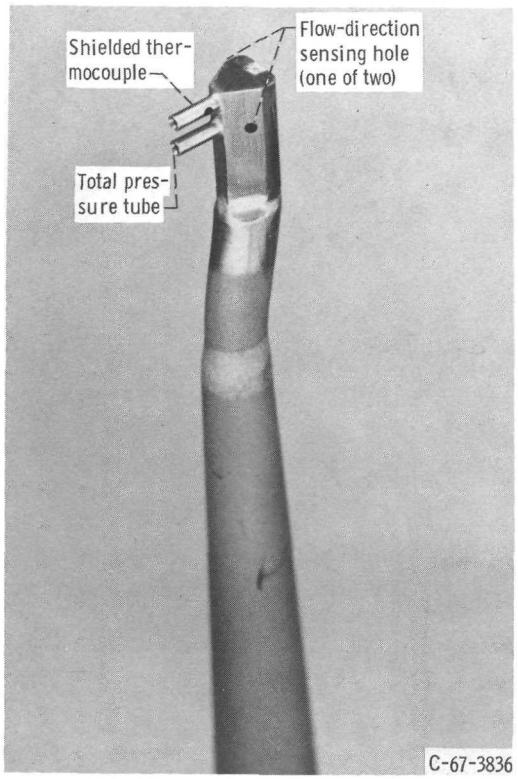


(a) Cross section of research compressor in test section.

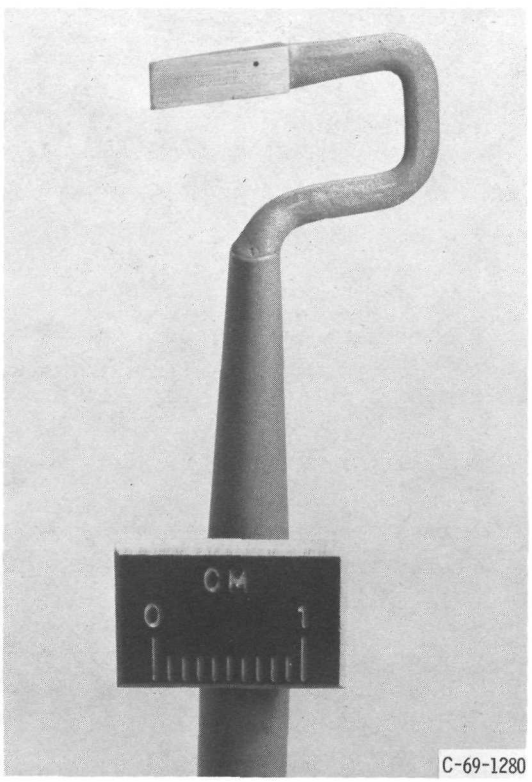


(b) Schematic of test facility.

Figure 3. - Research compressor and test facility.



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



(b) 8° wedge type combination pressure and flow angle probe.

Figure 4. - Survey probes.

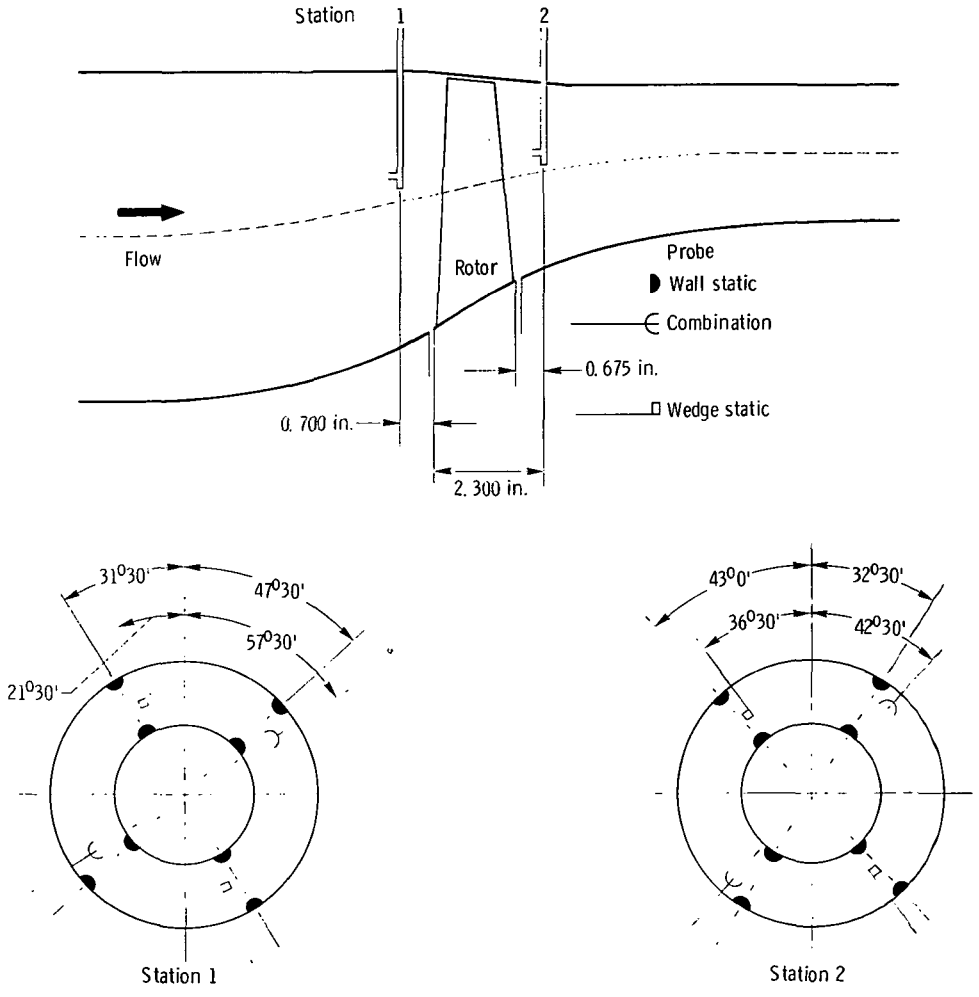


Figure 5. - Circumferential and axial location of instruments at each station (facing downstream).

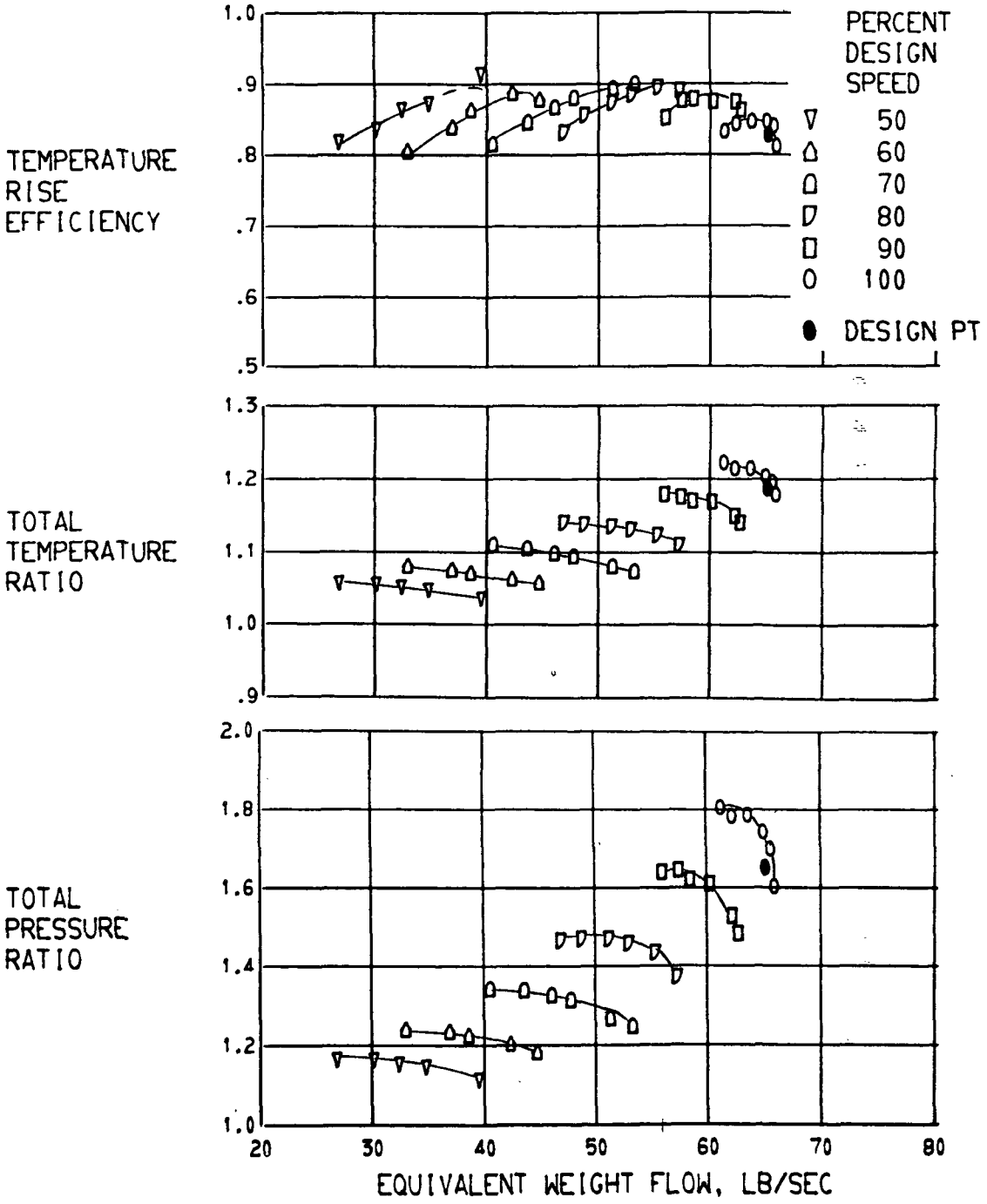


FIGURE 6. - OVERALL PERFORMANCE FOR ROTOR 3MOD1.

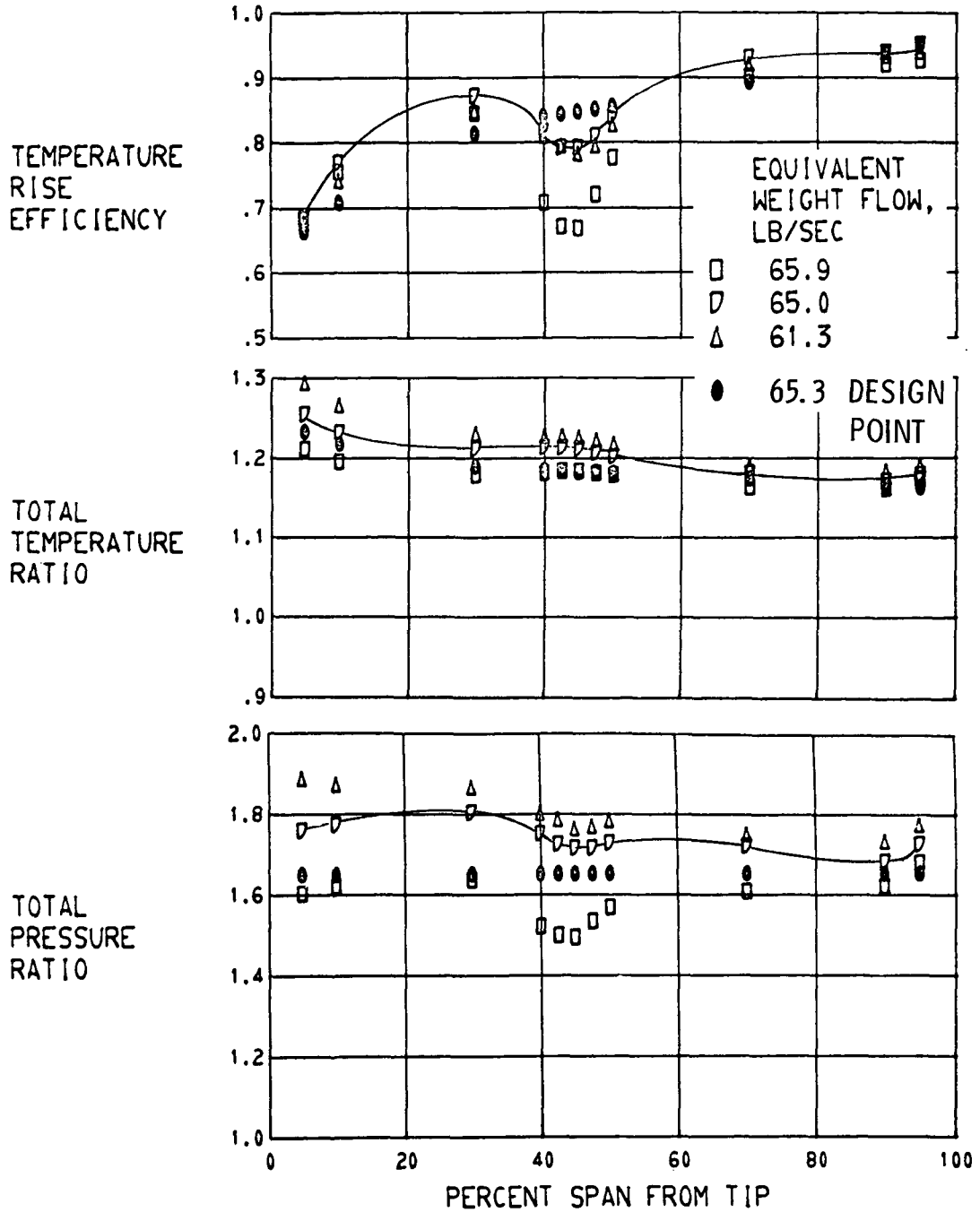


FIGURE 7. -RADIAL DISTRIBUTION OF PERFORMANCE FOR ROTOR 3 MOD 1. 100 PERCENT DESIGN SPEED.

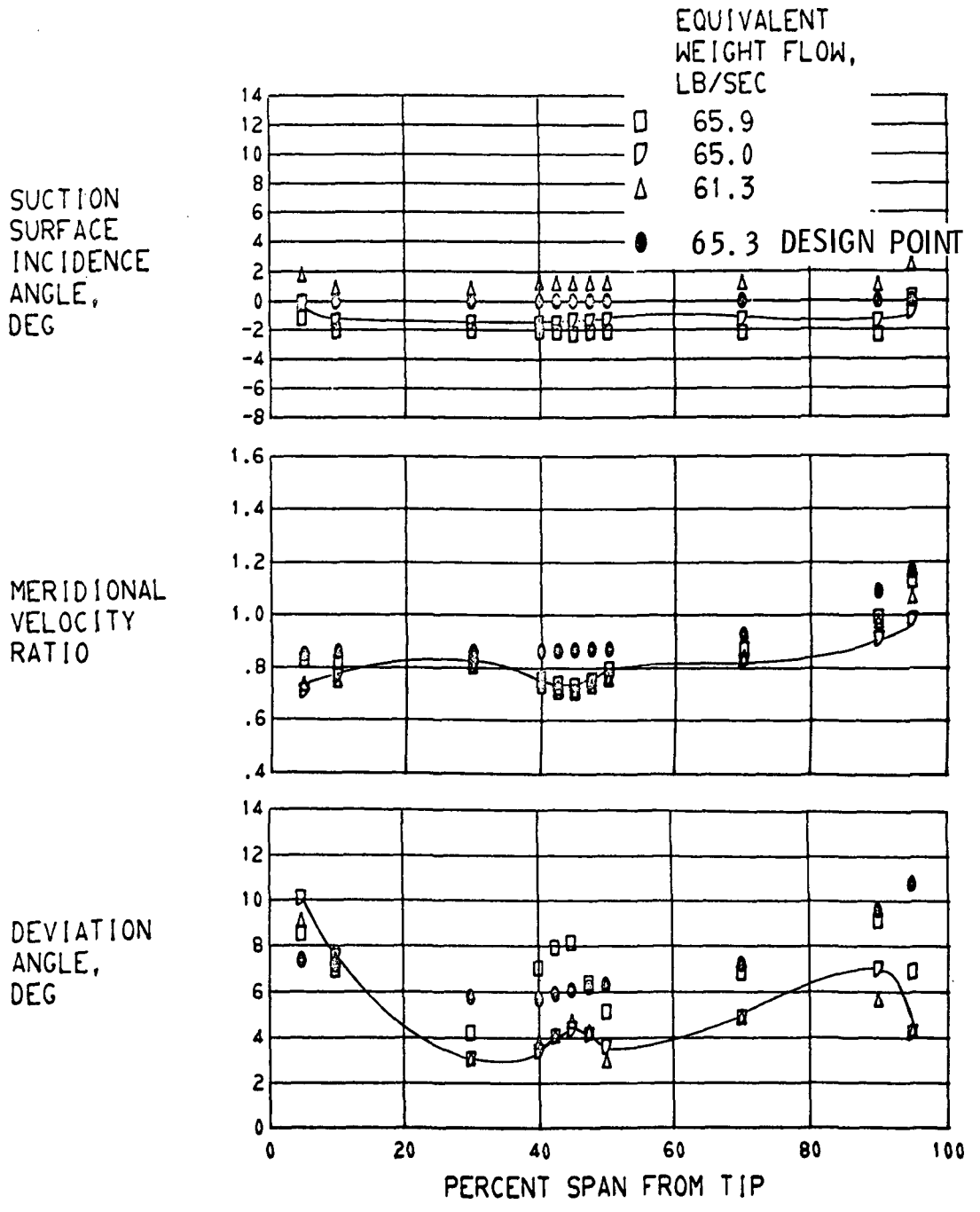


FIGURE 7. -CONTINUED. RADIAL DISTRIBUTION OF PERFORMANCE FOR ROTOR 3 MOD 1. 100 PERCENT DESIGN SPEED.

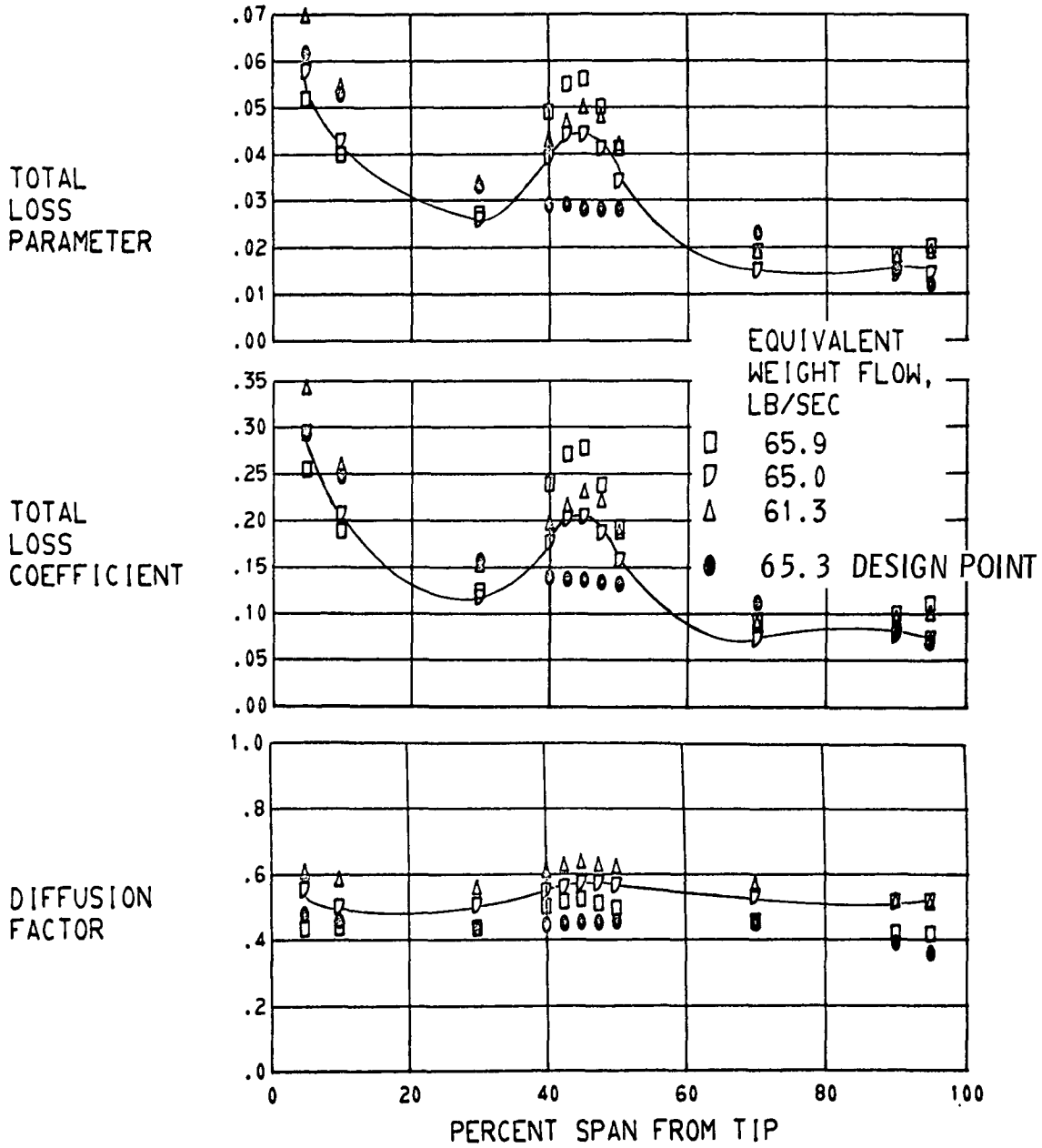
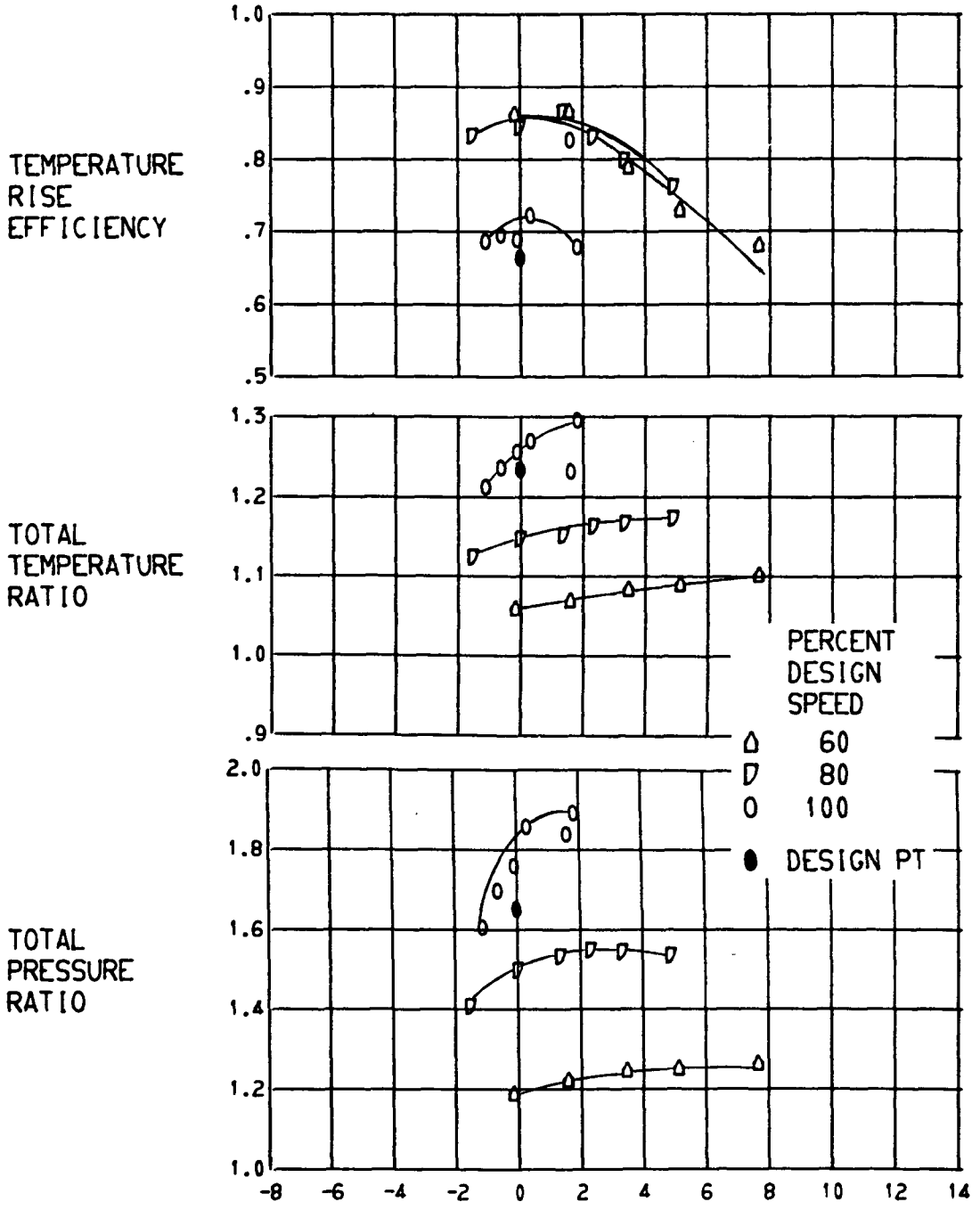
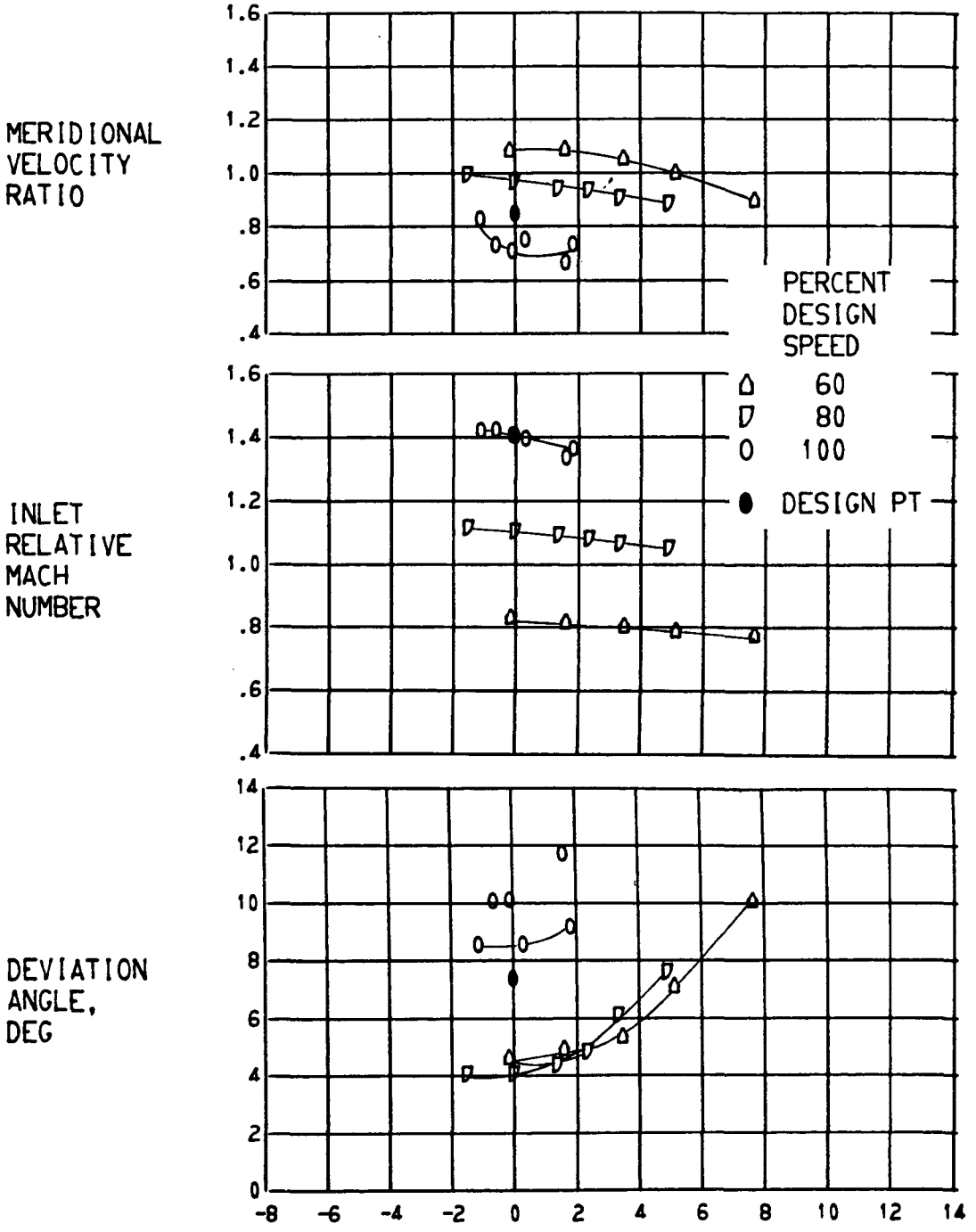


FIGURE 7. -CONCLUDED. RADIAL DISTRIBUTION OF PERFORMANCE FOR ROTOR 3 MOD 1. 100 PERCENT DESIGN SPEED.



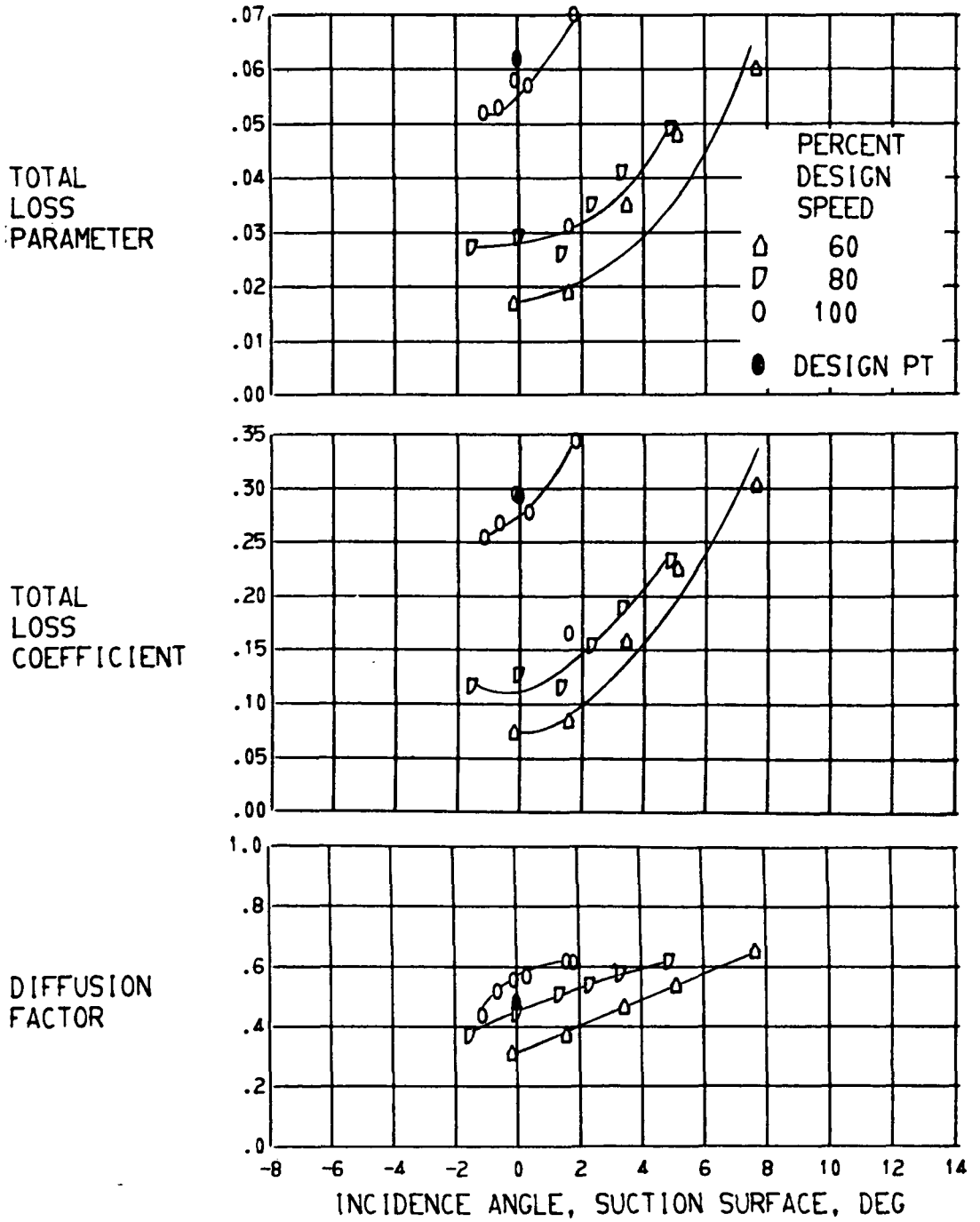
(A) 5.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



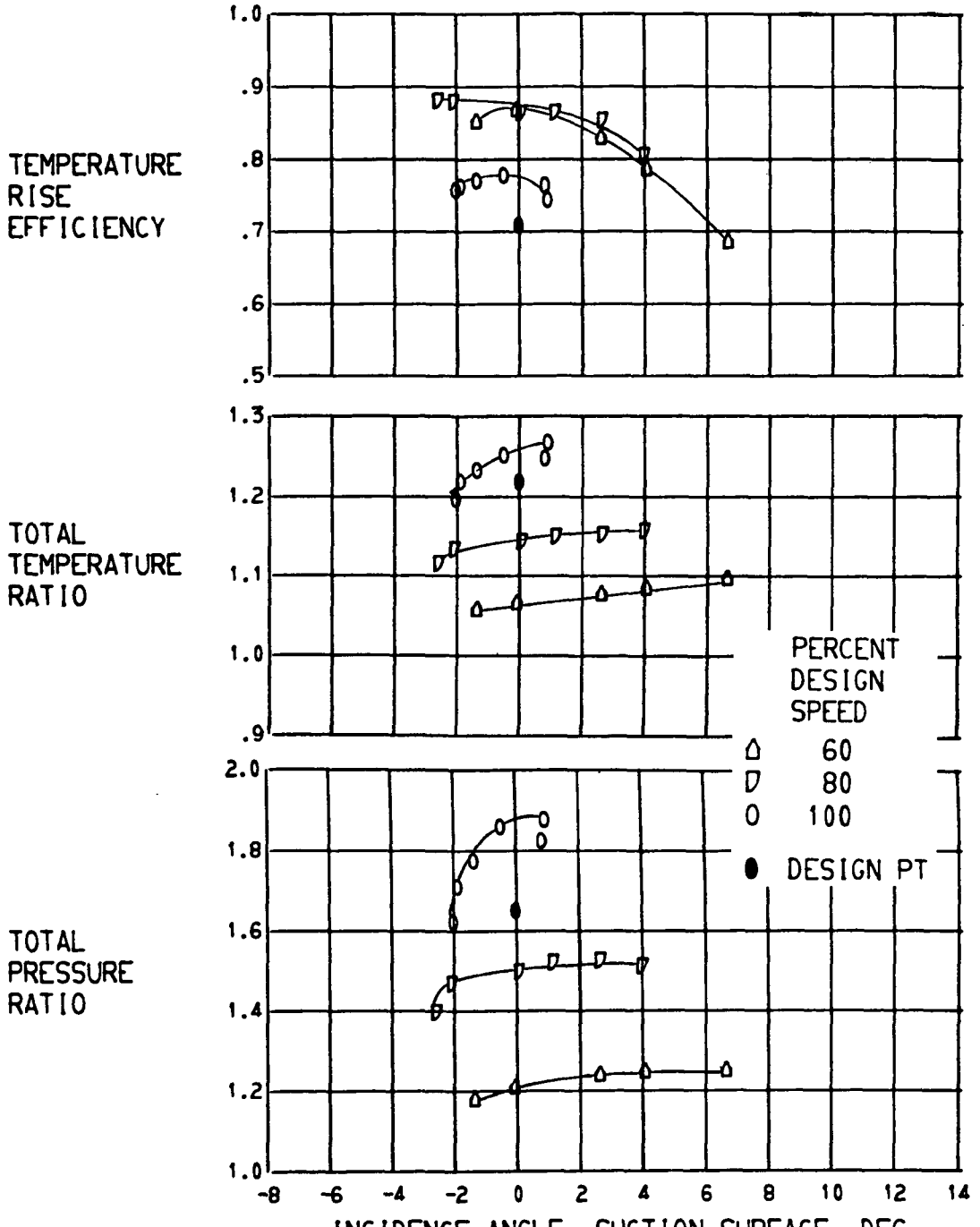
(A) CONTINUED. 5.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



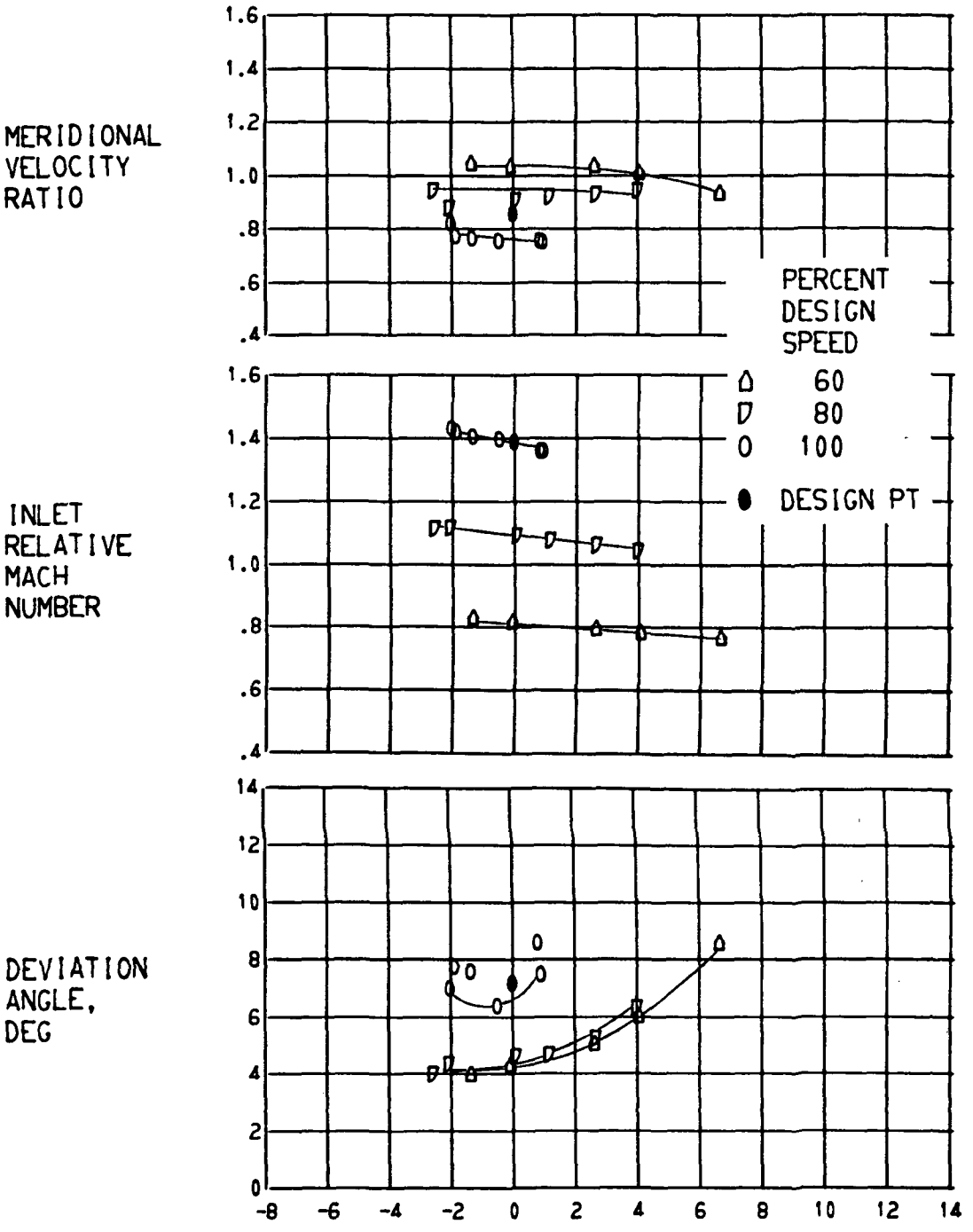
(A) CONCLUDED. 5.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



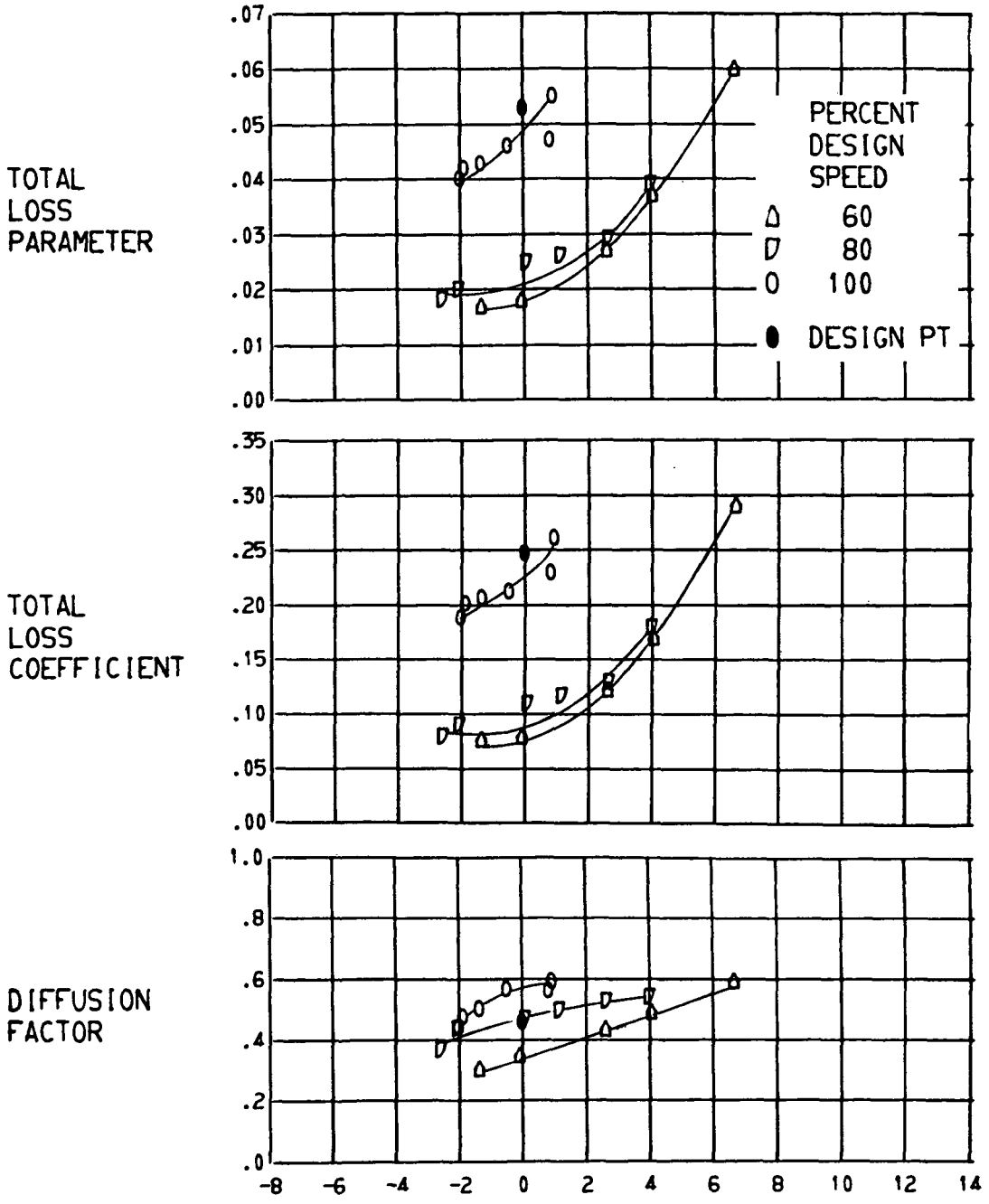
(B) 10.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



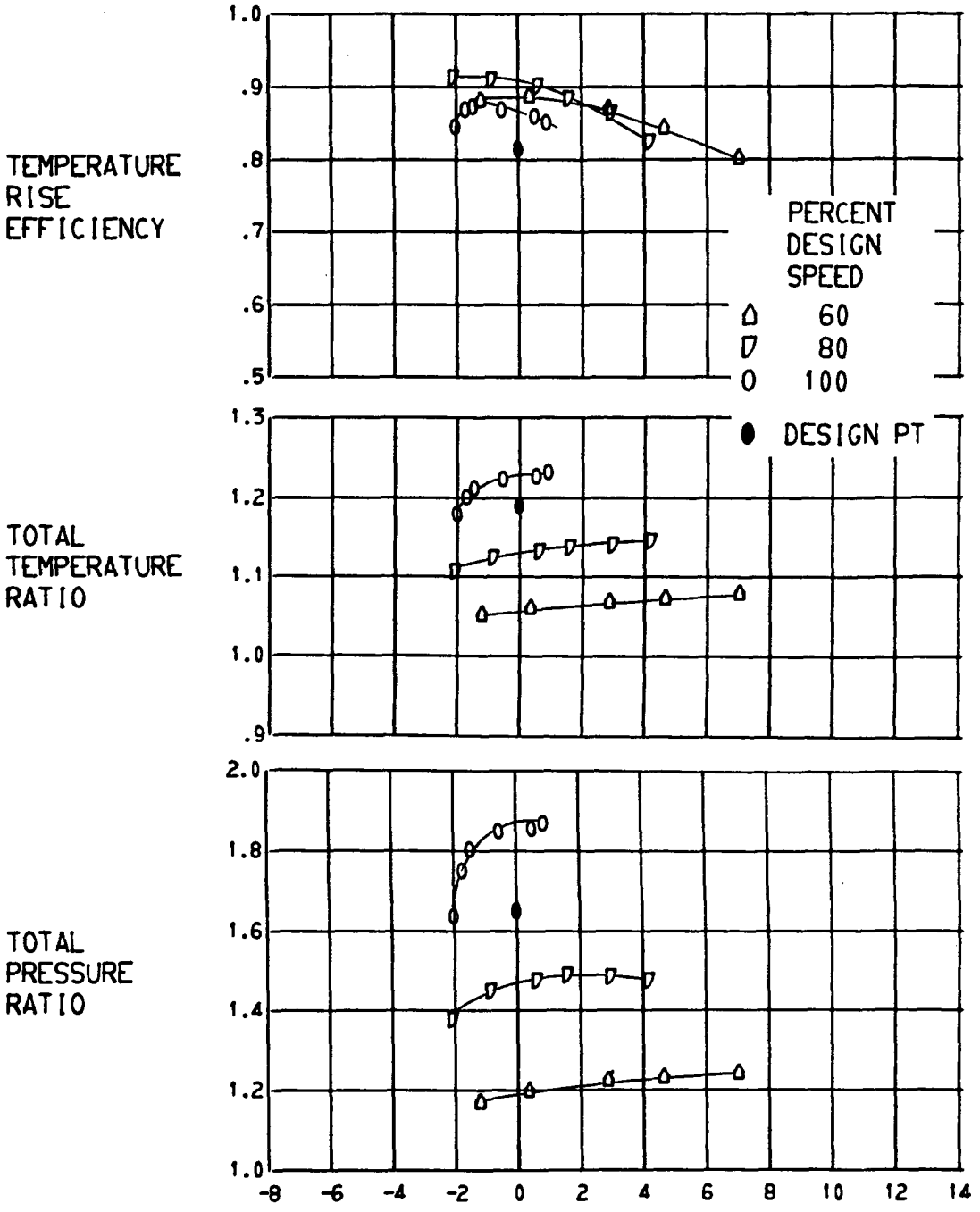
(B) CONTINUED. 10.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



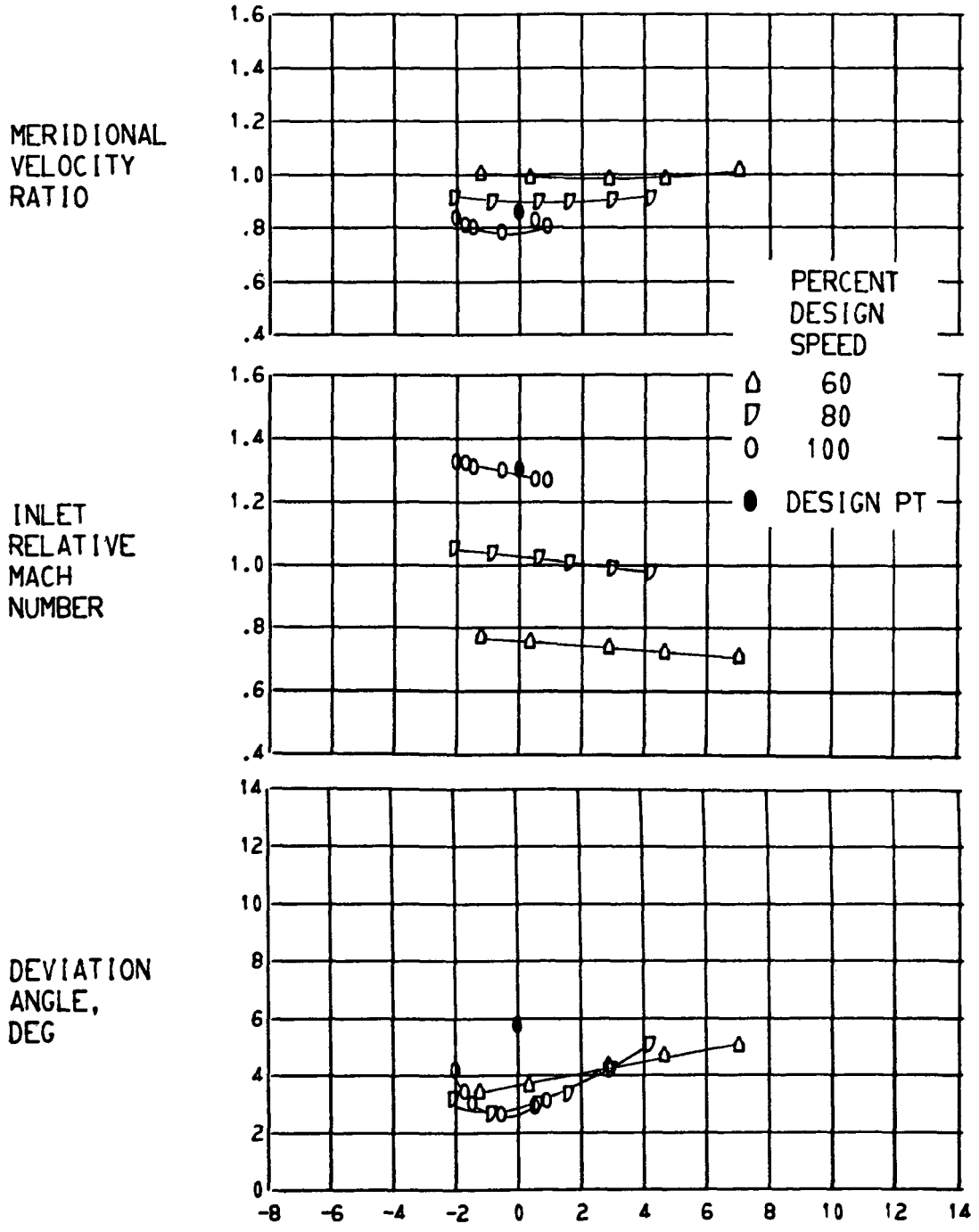
(B) CONCLUDED. 10.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



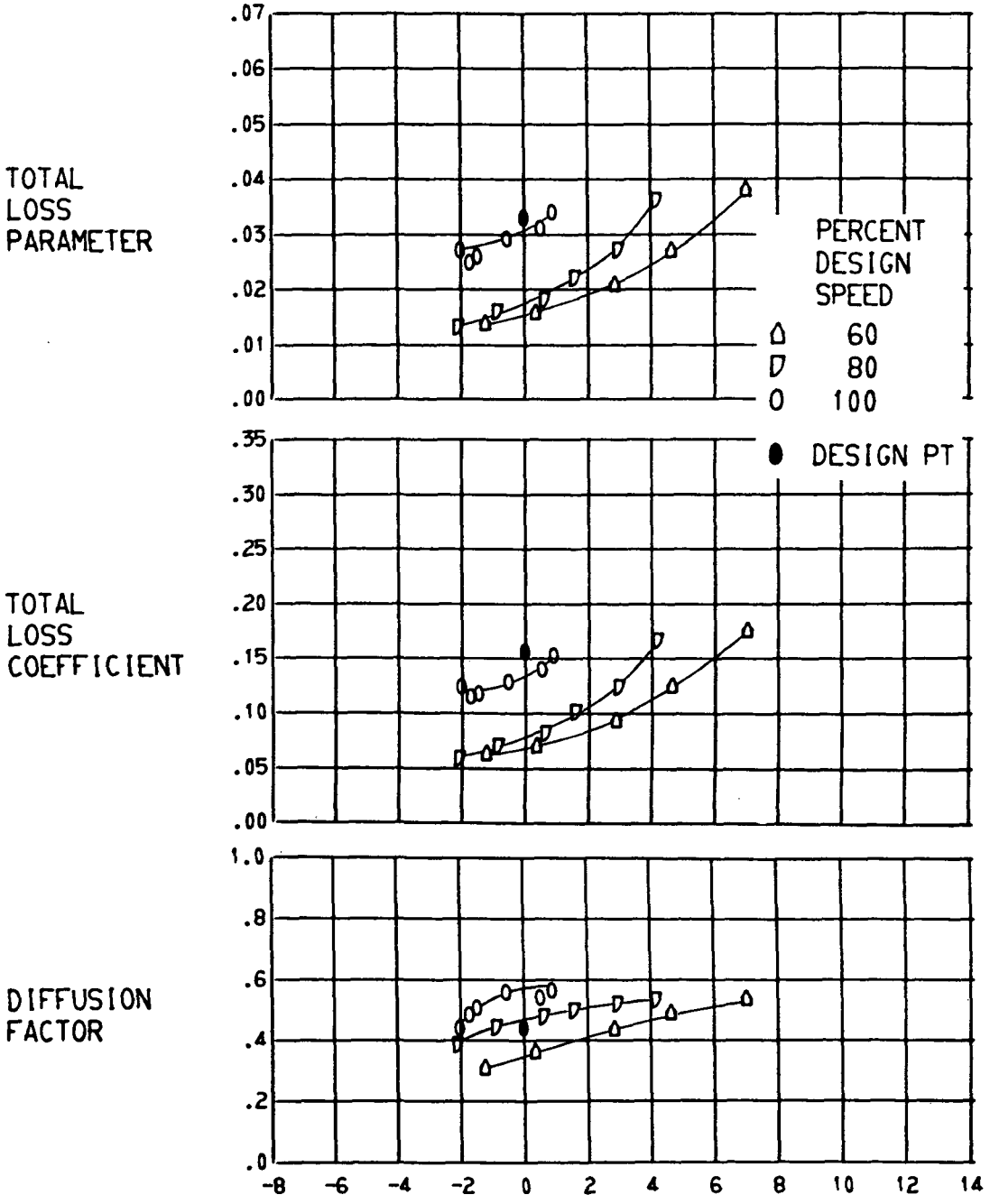
(C) 30.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



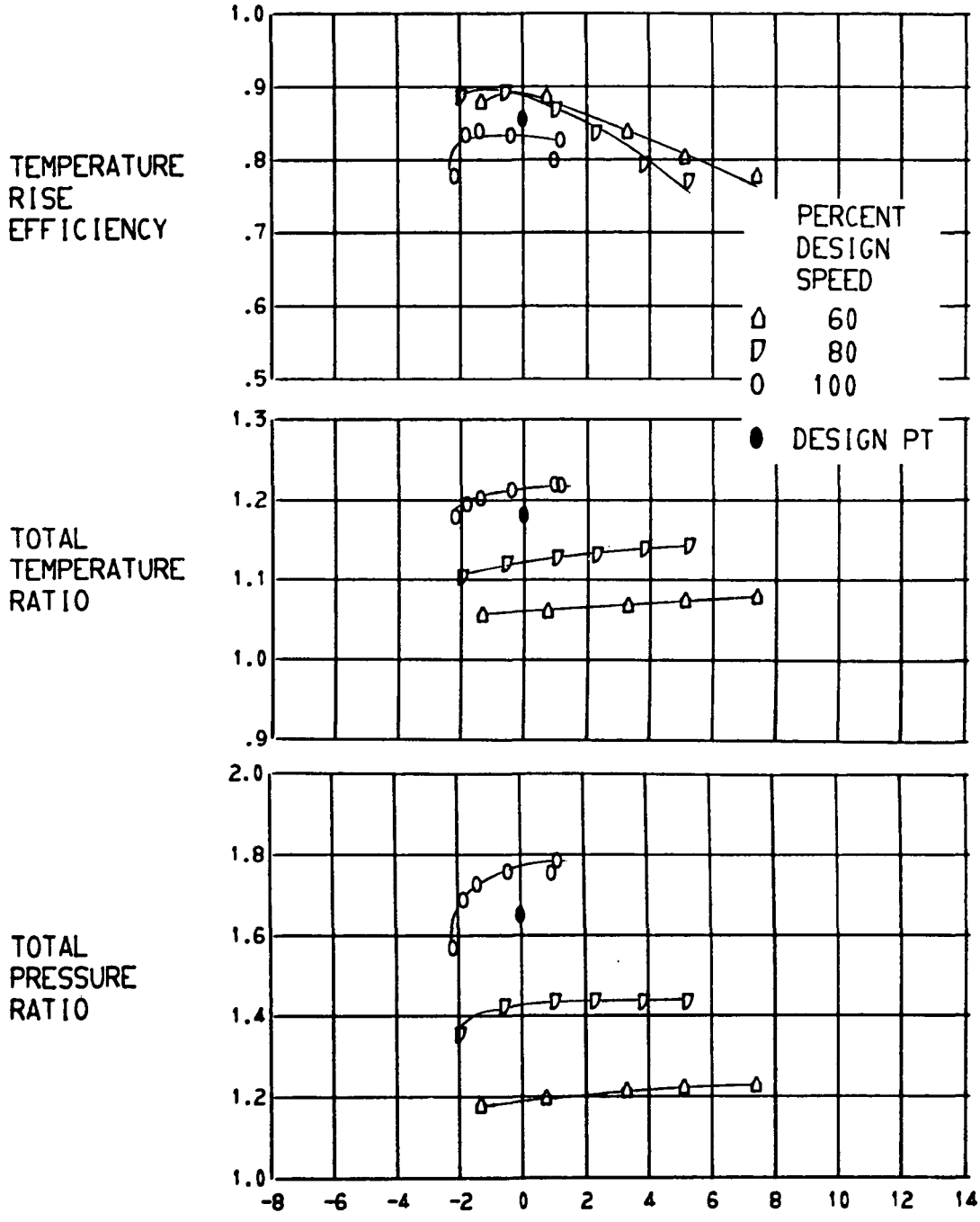
(C) CONTINUED. 30.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



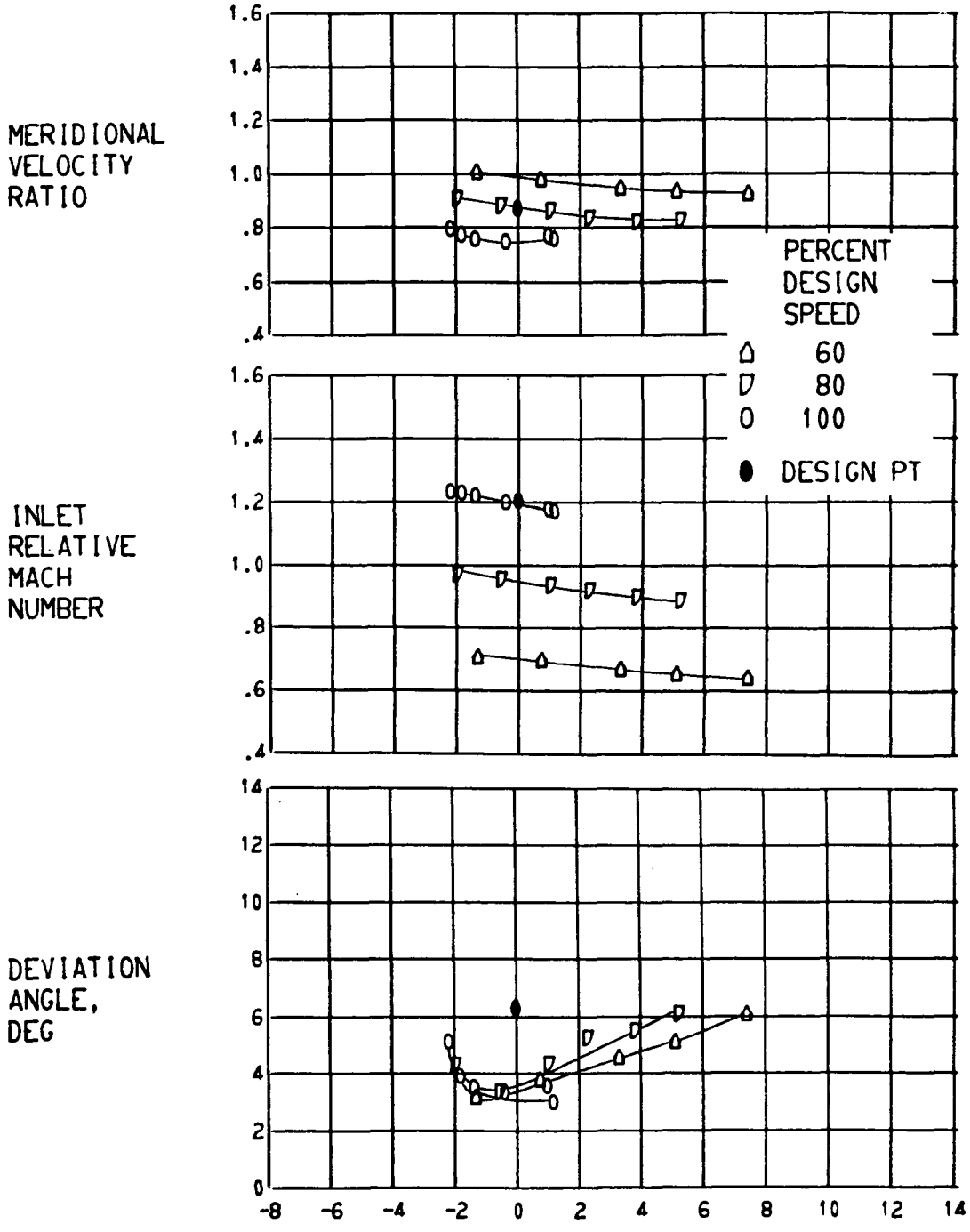
(C) CONCLUDED. 30.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



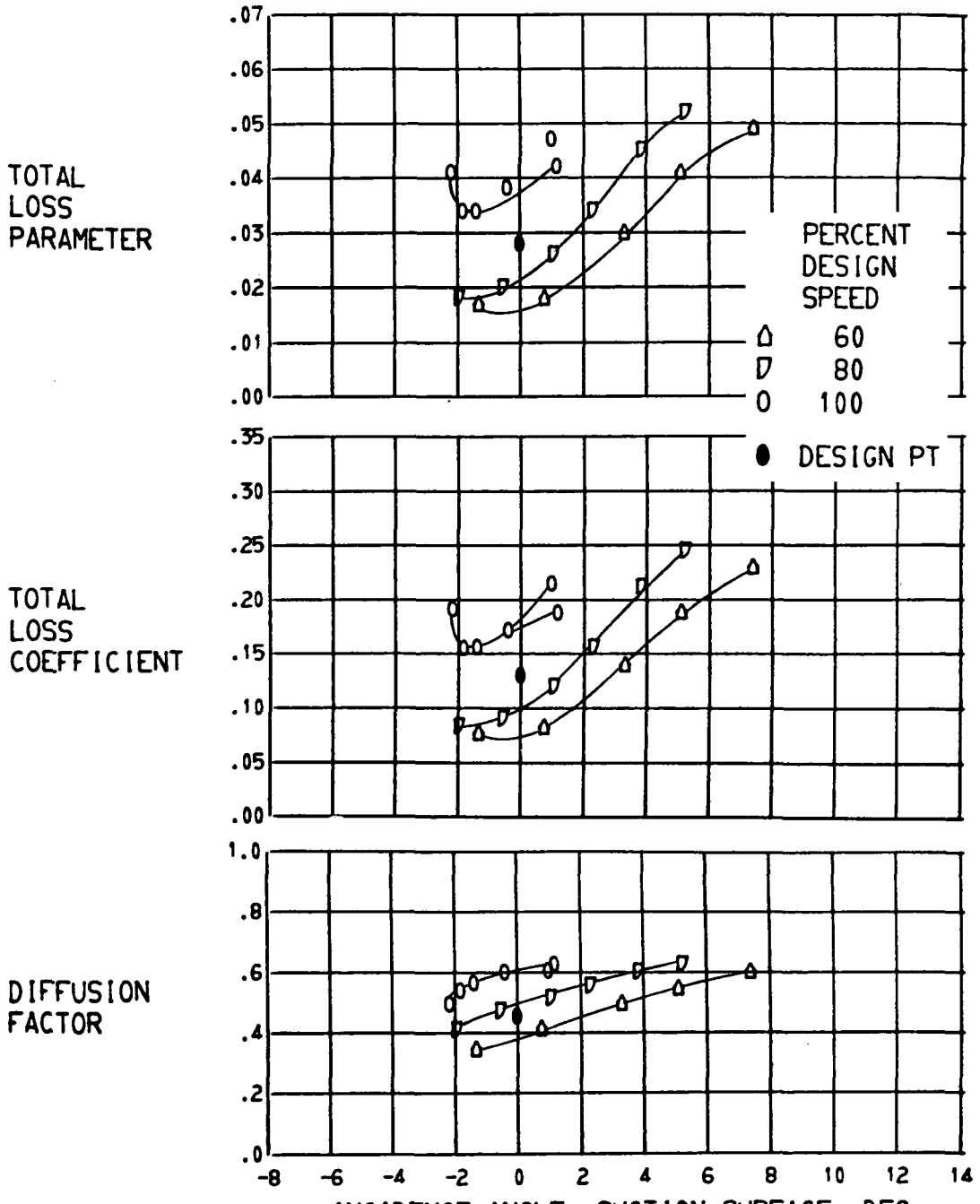
(D) 50.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



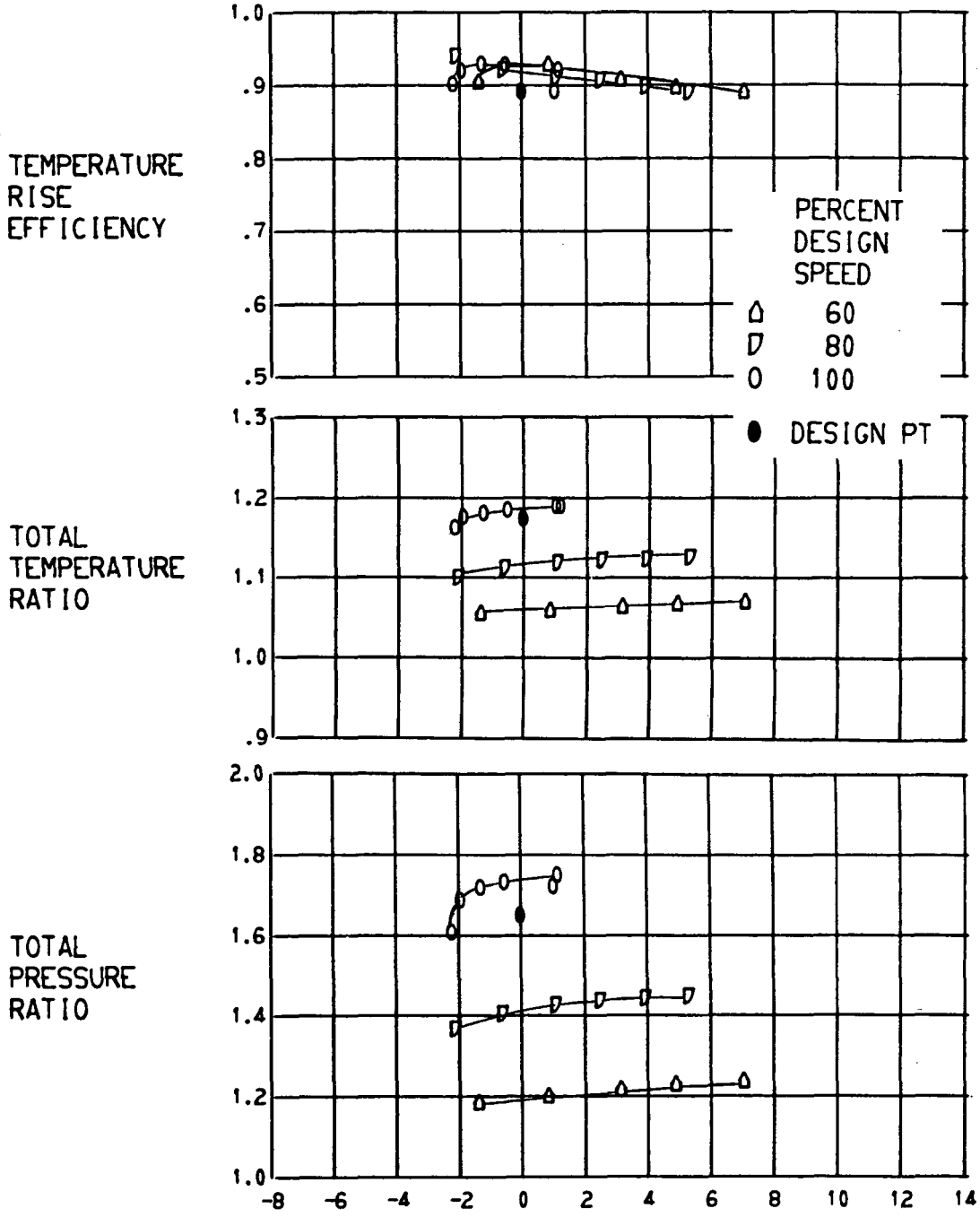
(D) CONTINUED. 50.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



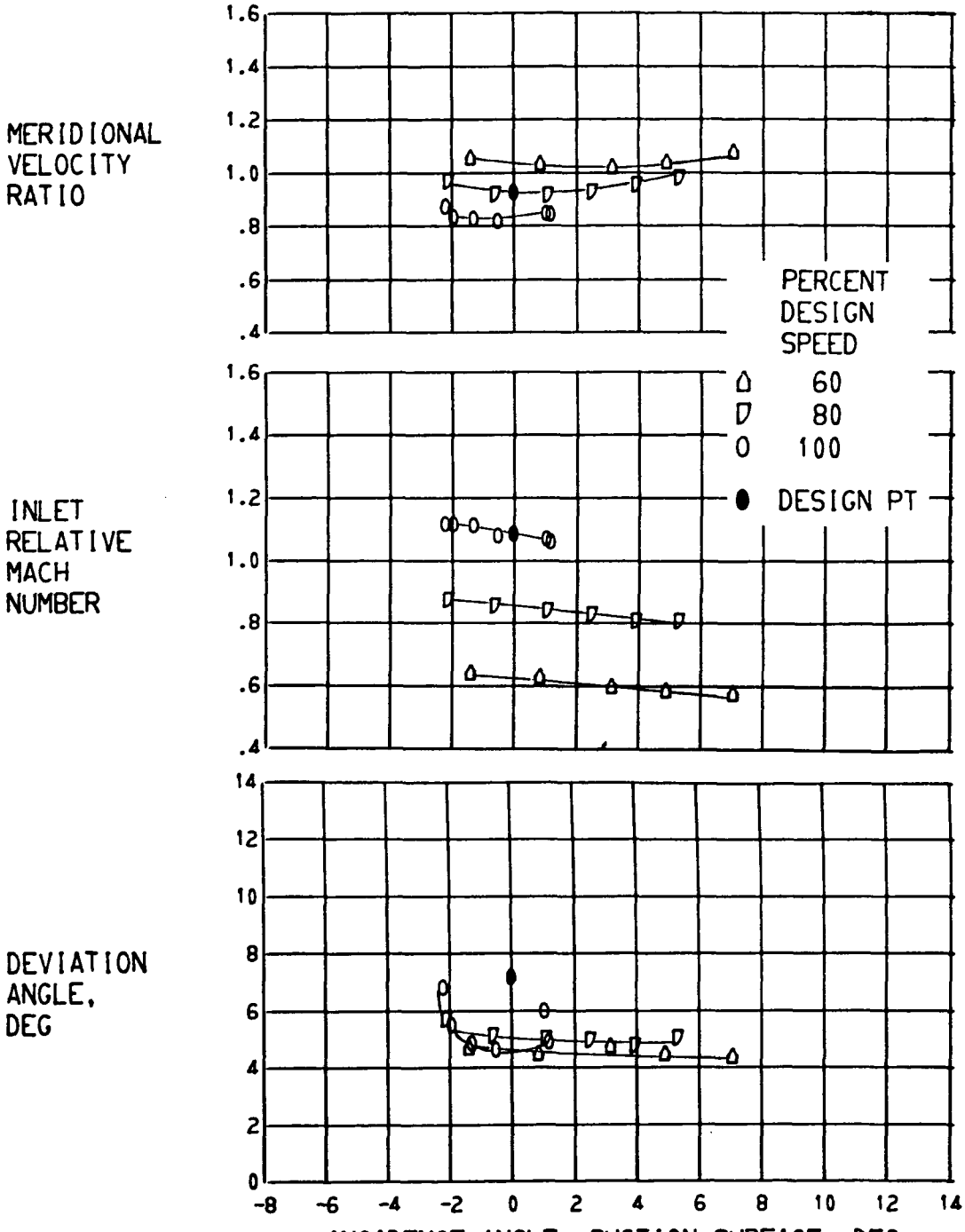
(D) CONCLUDED. 50.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



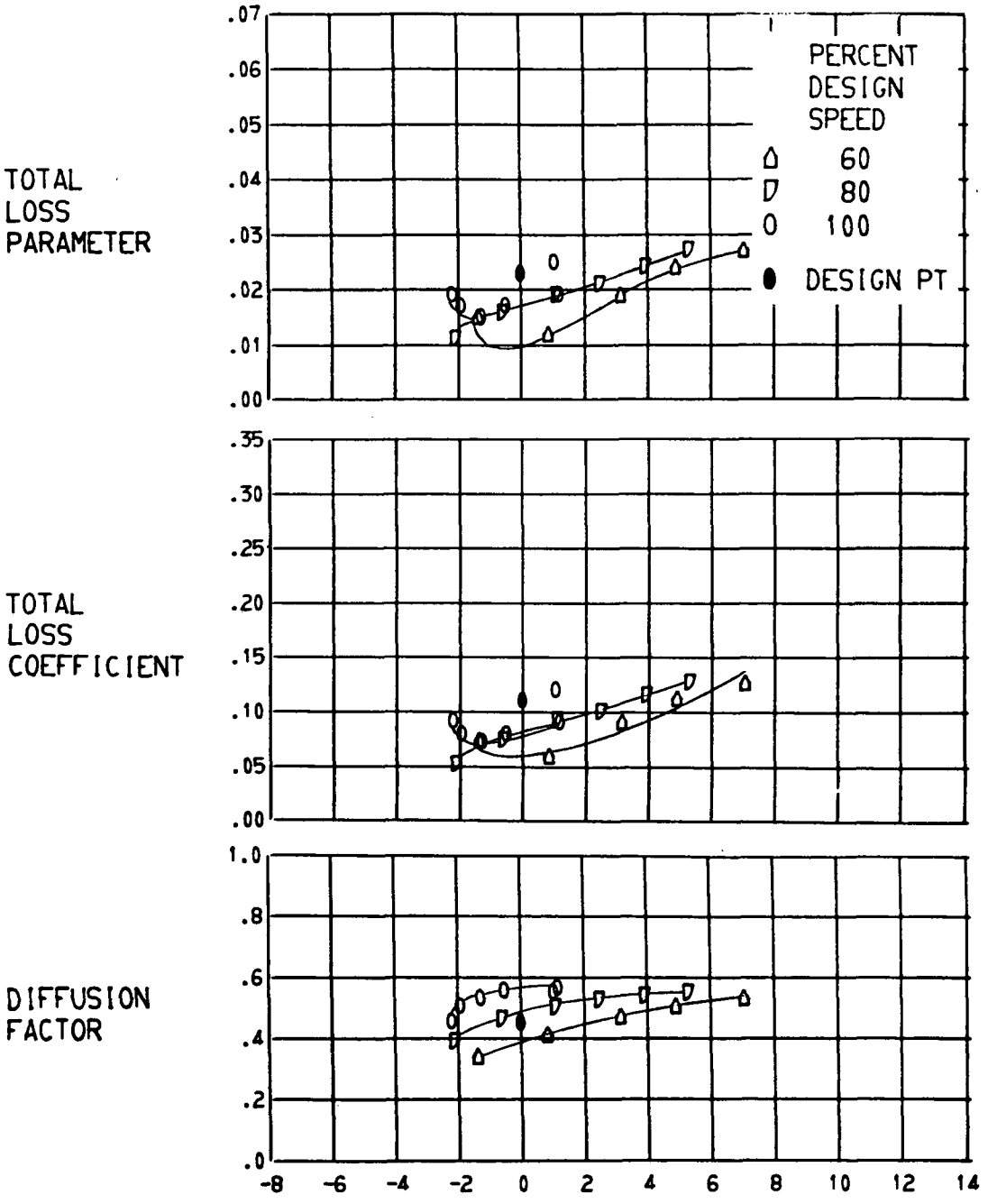
(E) 70.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



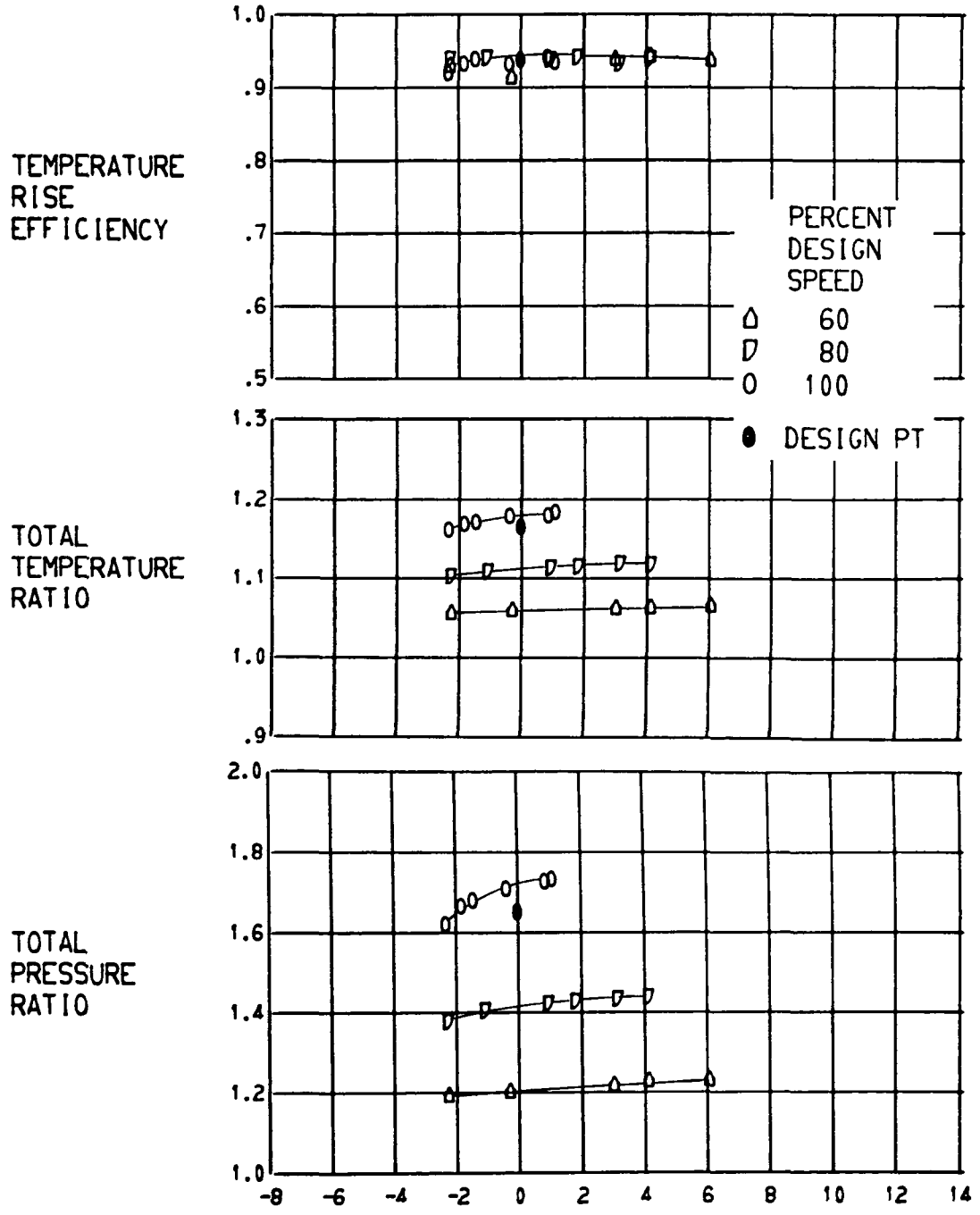
(E) CONTINUED. 70.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



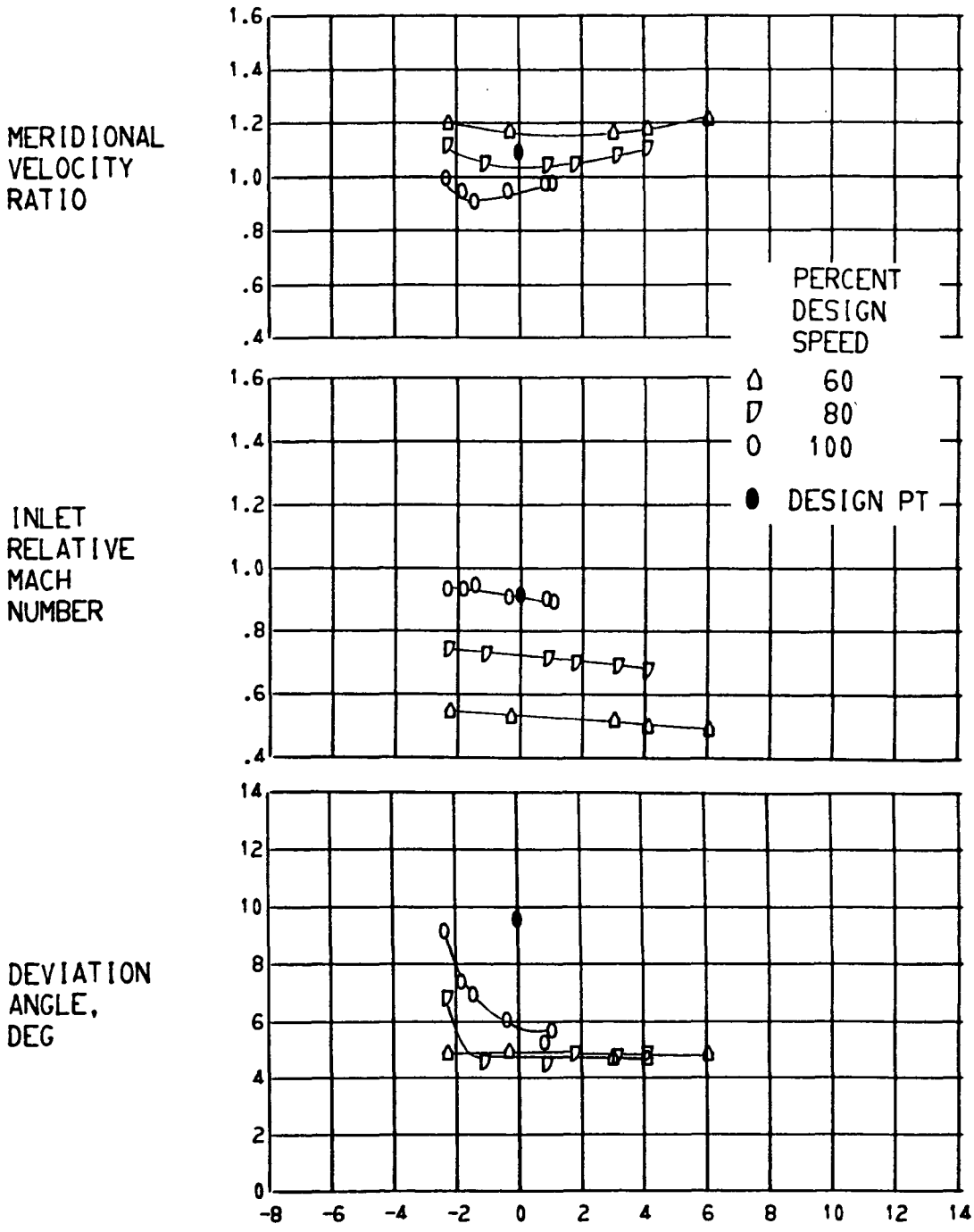
(E) CONCLUDED. 70.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



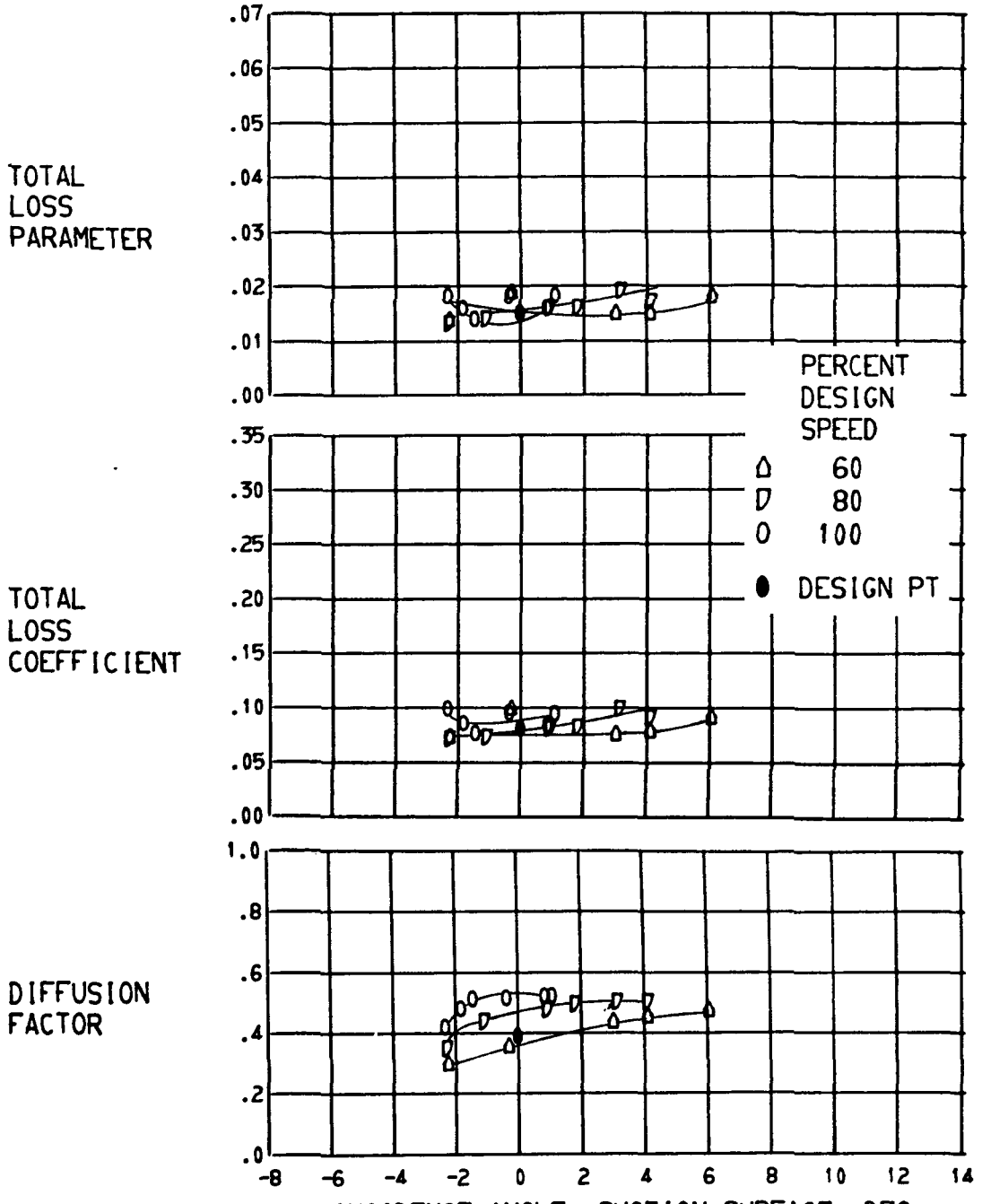
(F) 90.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



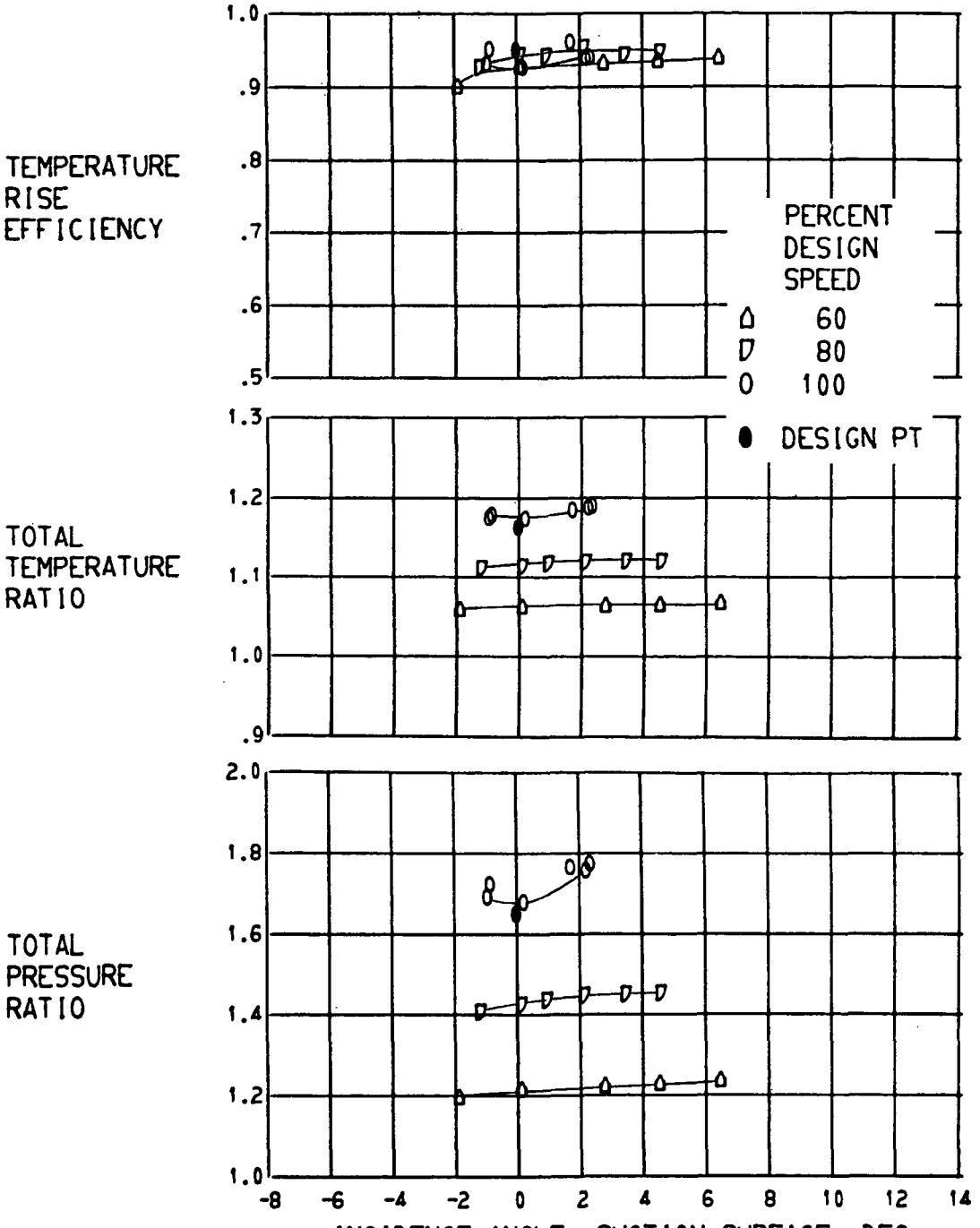
(F) CONTINUED. 90.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



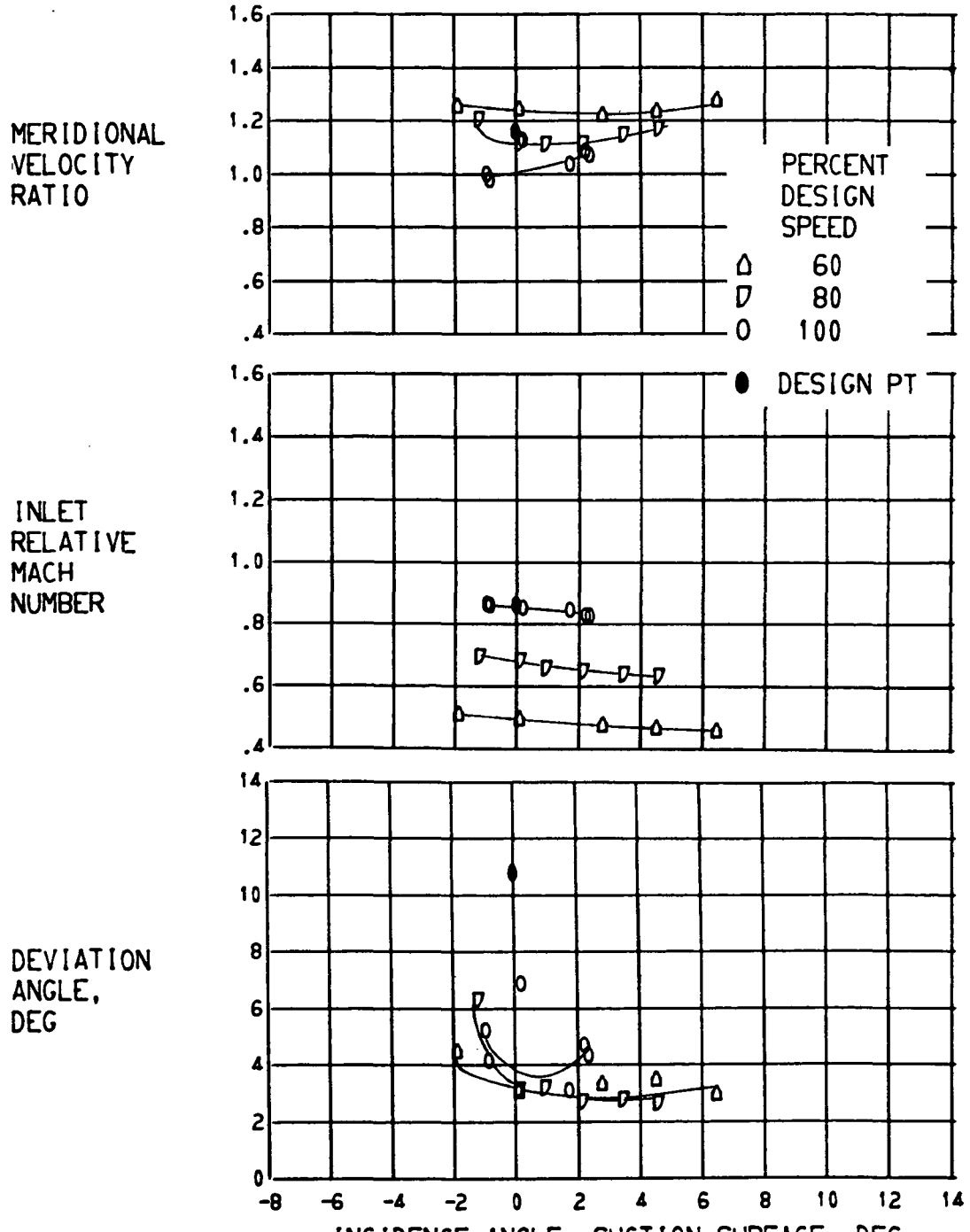
(F) CONCLUDED. 90.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



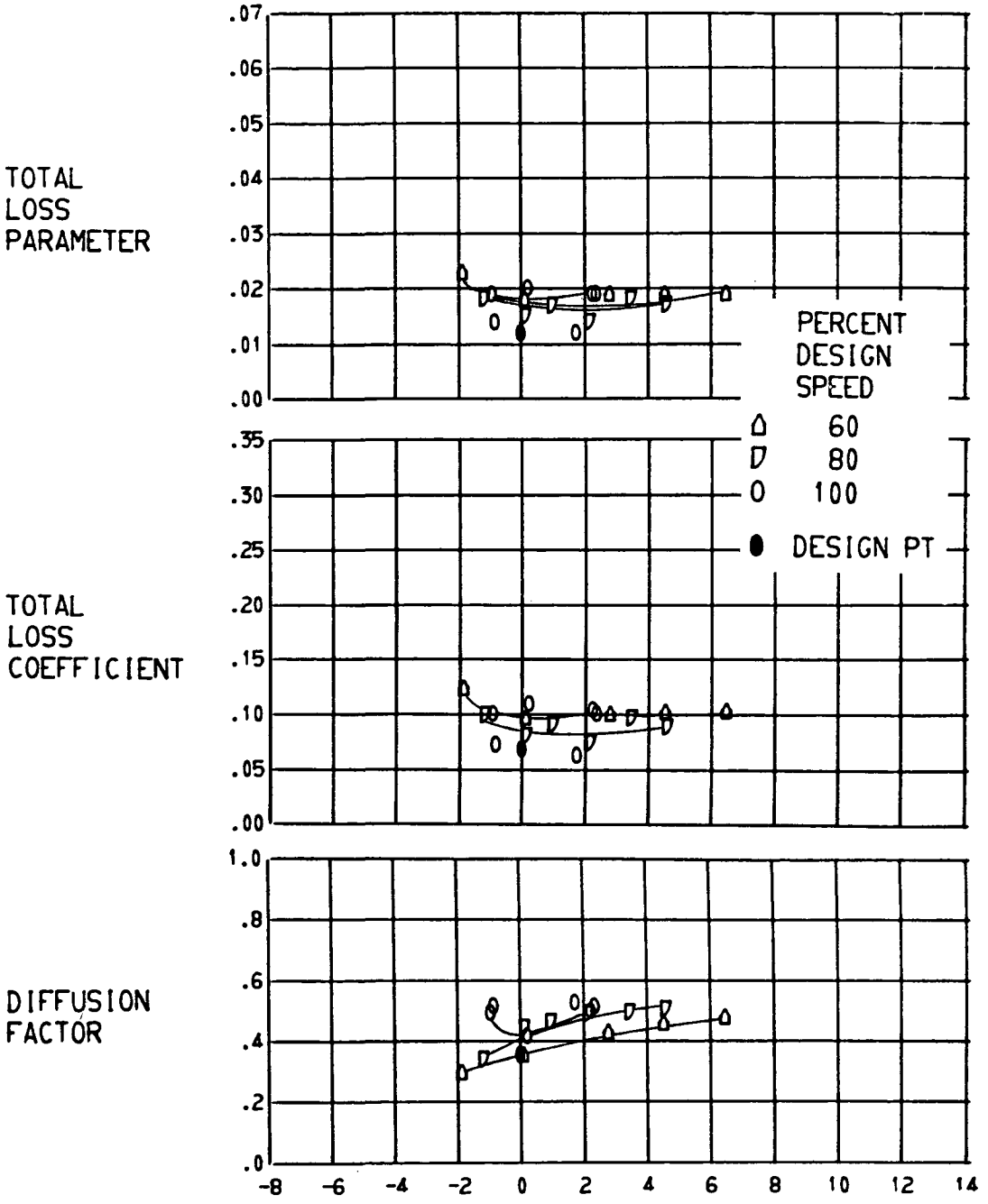
(G) 95.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



(G) CONTINUED. 95.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.



(G) CONCLUDED. 95.0 PERCENT SPAN.

FIGURE 8. - BLADE ELEMENT PERFORMANCE FOR ROTOR 3MOD1.

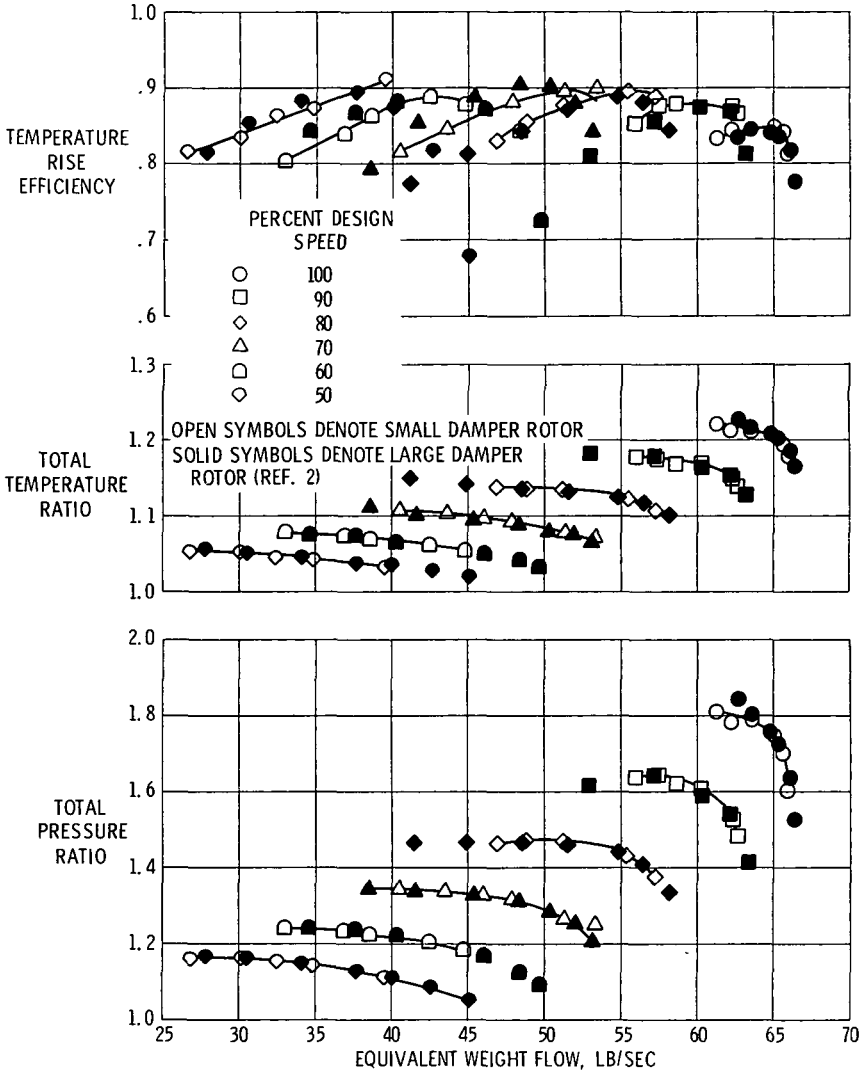


FIGURE 9. - COMPARISON OF PERFORMANCE OF 1.3 SOLIDITY ROTORS WITH TWO SIZES OF BLADE VIBRATION DAMPER.

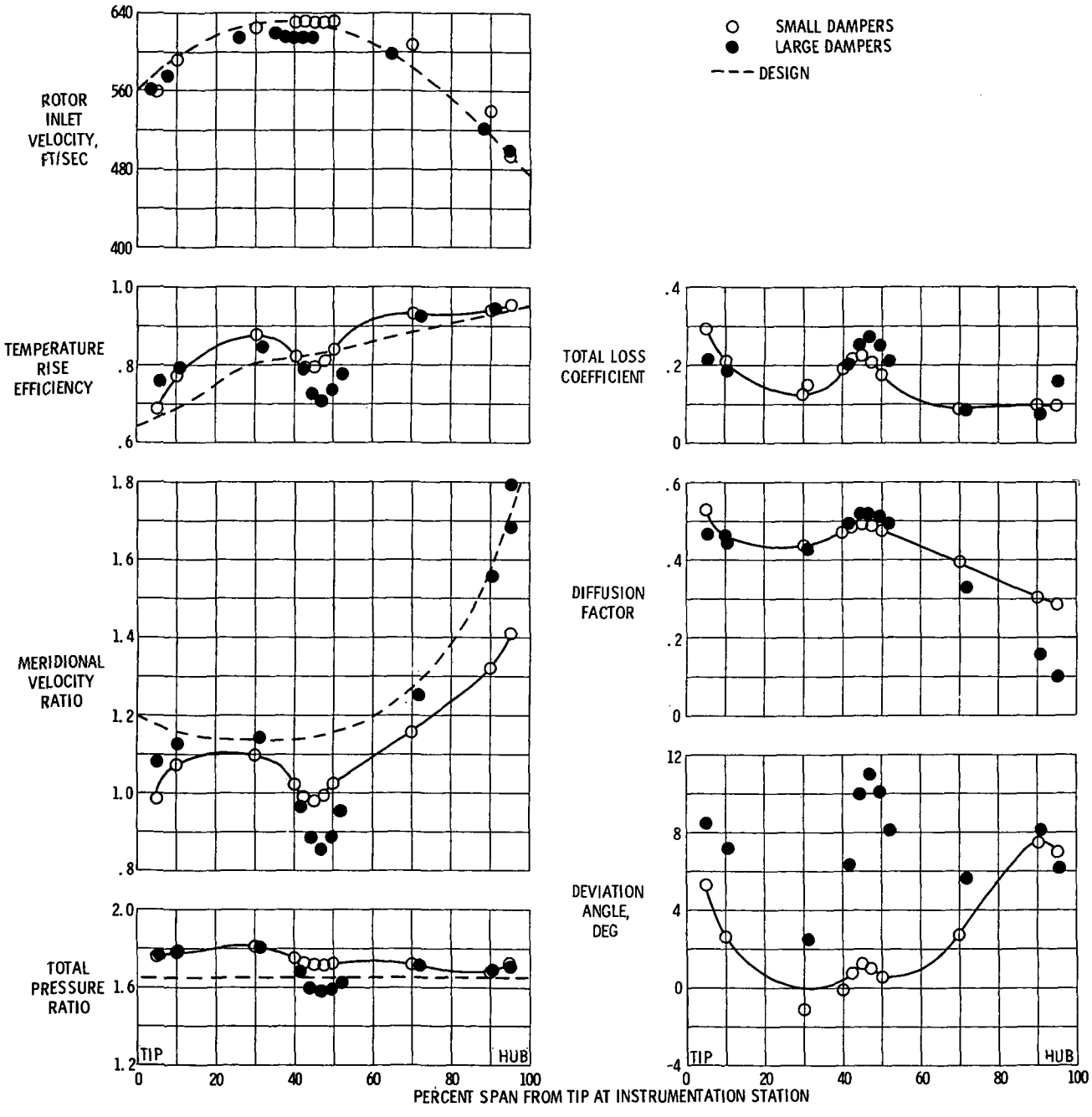


FIGURE 10. - EFFECT OF DAMPER SIZE ON RADIAL VARIATION OF FLOW AND PERFORMANCE PARAMETERS AS MEASURED AT INSTRUMENT STATIONS.

"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.

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 conference proceedings, 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