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OVERALL AND BLADE ELEMENT PERFORMANCE OF A 1.20 PRESSURE RATIO FAN STAGE WITH ROTOR BLADES RESET -7°

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16. Abstract

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OVERALL AND BLADE ELEMENT PERFORMANCE OF A 1.20 PRESSURE RATIO FAN STAGE WITH ROTOR BLADES RESET -7^{o}

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Lewis Research Center

SUMMARY

A 51-centimeter-diameter model of a fan stage for short-haul aircraft was tested in a single-stage compressor research facility at Lewis. This stage was designed and built on contract by the Hamilton Standard Division of United Technologies Corporation. In the present study the rotor blades, which were adjustable through axial position, were set 7^{0} toward the axial direction (opened) from design setting angle. Surveys of the air flow conditions ahead of the rotor, between the rotor and stator, and behind the stator were made over the stable operating range of the stage. At the design speed of 213.3 meters per second and weight flow of 30.9 kilograms per second, the stage pressure ratio was 1.205 and the efficiency was 0.85. The design speed rotor peak efficiency of 0.90 occurred at a flow rate of 32.5 kilograms per second.

INTRODUCTION

NASA is currently evaluating short-haul aircraft for commercial application. These aircraft must have an efficient and reliable propulsion system satisfying the low-noise requirements for urban communities. The aircraft engines must be capable of a variety of operating conditions: take-off, cruise, approach, and thrust reversal on landing.

In support of this program the Lewis Research Center is investigating a variety of fan compressor inlet stages. These stages provide the potential for high bypass flows in aircraft engines. The Hamilton Standard Division of United Technologies Corporation has designed a fan stage under contract from which two stages were built with adjustable rotor blades: a 197-centimeter-diameter version for acoustic studies (ref. 1) and a 51-centimeter-diameter stage for aerodynamic studies. Overall performance for this

stage at three rotor blade setting angles was reported in reference 2. Results indicated that the overall performance changed with rotor blade setting angle. The overall and blade-element performances at design and design -5° rotor blade setting angles were presented in references 3 and 4, respectively. This report presents the overall and blade-element performance results for the stage with rotor blades set at design -7°. Data are presented over the stable operating range at 3 speeds: 80, 90, and 100 percent of design speed. The data in this report are presented in plotted and in tabular form. The symbols and equations are defined in appendixes A and B. The tests were conducted in the single-stage compressor test facility at Lewis.

APPARATUS AND PROCEDURE

Compressor Test Facility

The compressor stage was tested in the single-stage compressor facility, which is described in detail in reference 5 and shown schematically in figure 1. Atmospheric air enters the test facility at an inlet located on the roof of the building, passes through the flow measuring orifice and into the plenum chamber upstream of the test stage. The air then passes through the experimental compressor stage into the collector and is exhausted to the atmosphere. Weight flow is controlled by a sleeve valve located in the discharge collector.

The adjustable rotor blade test stage was designed and built by Hamilton Standard. A detailed description of the aerodynamic design was presented in reference 3. The design tables are presented herein (tables I to V) for convenience, and the flow path is shown in figure 2. The definitions and units used for the tabular data are presented in appendix C. Briefly, the fan stage was designed for a pressure ratio of 1.20, a rotor tip speed of 213.3 meters per second, and a weight flow per unit annulus area of 195.3 kilograms per second per square meter. For the present test the rotor blades were opened 7°, and this configuration is designated stage 55B-55. The design tables do not reflect the 7° reset.

Instrumentation

The compressor weight flow was determined from measurements on a calibrated thin-plate orifice. The orifice temperature was determined from an average of two Chromel-Constantan thermocouples. Orifice pressures were measured by calibrated transducers.

Radial surveys of the flow were made upstream of the rotor, between the rotor and stator, and downstream of the stator (see fig. 2 for axial location). Total pressure, total temperature, and flow angle were measured with the combination probe (fig. 3(a)), and the static pressure was measured with a 8^{o} C-shaped wedge probe (fig. 3(b)). Each probe was equipped with a null-balancing, control system. The thermocouple material was Chromel-Constantan. Two combination probes and two wedge static probes were used at each of the three measuring stations.

Inner and outer wall static-pressure taps were located at the same axial stations as the survey probes. The circumferential locations of both types of survey probes along with inner and outer wall static-pressure taps are shown in figure 4. An electronic speed counter, in conjunction with a magnetic pickup, was used to measure rotative speed (rpm). The estimated errors of the data, based on inherent accuracies of the instrumentation and recording systems, are as follows:

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

Test Procedure

The stage survey data were taken over a range of weight flow from maximum flow to the near-stall conditions. At 80, 90, and 100 percent of design speed, radial surveys were taken at five weight flows. Data were recorded at nine radial positions for each speed and weight flow.

At each radial position the two combination probes behind the stator were circumferentially traversed to nine different locations across the stator gap. The wedge probes were set at midgap because preliminary studies showed that the static pressure across the stator gap was constant. Values of total pressure, total temperature, and flow angle were recorded at each circumferential position. At the last circumferential position, values of pressure, temperature, and flow angle were also recorded at stations 1 and 2. All probes were then moved to the next radial position, and the circumferential traverse procedure repeated.

Stall was determined at each rotative speed by closing the sleeve valve in the collector until an abrupt drop in total-pressure ratio occurred. Survey data were obtained at a weight flow within 1/2 kilogram of actual stall weight flow.

Calculation Procedure

Measured total temperatures and total pressures were corrected for Mach number and streamline slope. These corrections were based on the instrument probe calibrations given in reference 6. The stream static pressure was corrected for Mach number and streamline slope based on an average calibration for the type of probe used.

Because of the physical construction of the C-shaped static-pressure wedges, it was not possible to obtain static-pressure measurements at 5, 10, and 95 percent of span from the rotor tip. The static pressure at 95 percent span was obtained by assuming a linear variation in static pressure between the values at the inner wall and the probe measurement at 90 percent span. A similar variation was assumed between the static-pressure measurements at the outer wall and the 15-percent span position to obtain the static pressure at 5 and 10 percent spans positions.

At each radial position averaged values of the nine circumferential measurements of total pressure, temperature, and flow angle downstream of the stator (station 3) were obtained. The nine values of total temperature were mass averaged to obtain the stage total-temperature rise. The nine values of total pressure were energy averaged. The measured values of pressure, temperature, and flow angle were used to calculate axial and tangential velocities at each circumferential position. The flow angles presented for each radial position are calculated based on the mass-average of the axial and tangential velocities. To obtain the overall performance, the radial values of total temperature were mass averaged, and the values of total pressure were energy averaged. At each measuring station the integrated weight flow was computed based on the radial survey data. The data, measured at the three measuring stations, have been translated to planes approximating the blade leading and trailing edges by the method presented in reference 7.

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

RESULTS AND DISCUSSION

The results from this investigation will be presented in three main sections. The overall performances for the rotor and the stage are given first. Radial distributions

of several performance parameters are then presented for the rotor and stator followed by the blade-element data. The data presented are computer plotted, and occasionally a data point will be omitted because it falls outside the range of the parameters shown in the figure. A brief discussion of the results is included.

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

Overall Performance

The overall performance for rotor 55B and stage 55B-55 are presented in figures 5 and 6, respectively. Data are presented for 80, 90, and 100 percent of design speed. At each speed line data were taken at five values of weight flow from choke to the near-stall conditions. Design-point values for the original design blade setting angle are shown as solid symbols in both figures for reference purposes and assessment of test results.

Rotor. - The peak efficiency for rotor 55B at design speed was 0.90 and occurred at a weight flow of 32.5 kilograms per second (203 (kg/sec)/m^2 annulus area). Corresponding values of total-pressure ratio and total-temperature ratio are 1.220 and 1.065, respectively. A peak rotor efficiency of 0.933 occurs at 80 percent of design speed.

Stage. - The peak efficiency for stage 55B-55 at design speed was 0.85 and occurred at a pressure ratio of 1.205 and a weight flow of 30.9 kilograms per second. Peak stage efficiency of 0.91 occurred at 80 percent of design speed.

Radial Distributions

The radial distributions of several parameters are presented at design speed in figure 7 for rotor 55B and in figure 8 for stator 55. In each figure data are presented for three weight flows: near maximum, peak efficiency, and near stall. Temperature-rise efficiency, temperature ratio, pressure ratio, mean incidence angle, meridional velocity ratio, deviation angle, total-loss parameter, total-loss coefficient, and diffusion factor are presented as functions of percent span from the blade tip. The design values for the original stage are shown as solid symbols and are included for reference only. A line is drawn through the data for the peak efficiency weight flow of 30.9 kilograms per second.

Rotor. - At design speed and a weight flow of 30.9 kilograms per second, the energy input was slightly greater than reference values at all span locations, and the pressure ratio is greater except at the 10 and 15 percent spans where reference and measured values are close or equal. At this weight flow the blading is operating at a high incidence angle and the total-pressure loss coefficients are high at all radial stations as compared with the reference values. At the near stall weight flow of 27.8 kilograns per second, high total-pressure loss coefficients and loading is measured from the rotor tip through 30 percent span.

Stator. - At design speed and stage peak efficiency flow (fig. 8) the stator losses are high from the blade tip to the 30 percent span, comparable to reference at 50 and 70 percent spans, and low from 85 percent span to the hub. Incidence angles across the span are higher than the reference values. Blade loading is greater than reference values at the blade tip region and lower in the hub region. With decreasing weight flow greater loading occurs across the blade span and losses decrease from the tip to 15 percent span and increase from 30 percent span to the hub.

Variations With Incidence Angle

The variations of blade-element performance parameters with incidence angle are shown in figure 9 for rotor 55B and in figure 10 for stator 55. The data are presented for 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 outlet blade tip. Referenced values are indicated by solid symbols.

Rotor. - The 7^{o} reset shifts the rotor incidence angle to higher positive values than reference for both 80 and 100 percent speeds. Design speed energy addition equalled or exceeded the referenced value over the entire incidence angle range. The total-pressure ratio also equalled or exceeded the reference values at all span locations except at the 5 and 10 percent spans where pressure ratio fell off at the maximum and minimum incidence angle. Minimum total-pressure loss coefficient occurs near or at minimum incidence angle at the 5, 10, and 30 percent spans. The total-pressure loss coefficients are low and indicate little change with incidence angle at the 50 and 70 percent span. At the hub (90 and 95 percent span) total-pressure loss coefficients are high at low incidence angle and decrease with increasing incidence angle.

Stator. - The stator performance with incidence angle is presented in figure 10 for 80 and 100 percent of design speeds. The highest total-pressure loss coefficients occurred at the 5 percent span at maximum flow for both speeds, and this loss coefficient decreased rapidly with increasing incidence angle at the 5, 10, and 30 percent spans.

At 90 and 95 percent spans total-pressure loss coefficients are lower than reference values over the incidence angle range.

SUMMARY OF RESULTS

This report presents the aerodynamic design, the overall performance, and blade-element performance of 51-centimeter-diameter fan stage suitable for application in short-haul aircraft. Radial surveys of the flow conditions at the rotor inlet, rotor outlet, and stator outlet were made over the stable operating flow range of the stage at equivalent rotative speeds from 80 to 100 percent of design speed. Weight flow and performance parameters were calculated across nine selected blade elements. The following principle results were obtained:

1. The stage design speed peak efficiency of 0.85 was obtained at a weight flow of 30.9 kilograms per second and a pressure ratio of 1.20. Peak design speed rotor efficiency of 0.90 occurs at 32.5 kilograms per second and at a pressure ratio of 1.220.

2. The energy input across the rotor span exceeds the reference values at design speed and weight flow. The total-pressure loss coefficient at this condition is larger than the reference values across the span.

3. Design speed stator total-pressure loss coefficients are high at low incidence angles at the 5, 10, and 30 percent spans and decrease rapidly with increasing incidence angle. Losses in the hub region are generally lower than the reference values.

Lewis Research Center,
National Aeronautics and Space Administration,
Cleveland, Ohio, October 2, 1975,
505-04.

APPENDIX A

SYMBOLS

A_{an}	annulus area at rotor leading edge
A_f	frontal area at rotor leading edge
C_p	specific heat at constant pressure
c	aerodynamic chord, cm
D	diffusion factor
i_{mc}	mean incidence angle, angle between inlet air direction and line tangent to blade mean camber line at leading edge, deg
N	rotative speed, rpm
P	total pressure, N/cm^2
p	static pressure, N/cm^2
r	radius, cm
t	total temperature, K
U	wheel speed, m/sec
V	air velocity, m/sec
W	weight flow, kg/sec
Z	axial distance references from rotor blade hub leading edge, cm
α_c	cone angle, deg
α_s	slope of streamline, deg
β	air angle, angle between air velocity and axial direction, deg
β'_c	relative meridional air angle based on cone angle, $\arctan(\tan\beta'_m \cos\alpha_c/\cos\alpha_s)$, deg
γ	ratio of specific heats
δ	ratio of rotor inlet total pressure to standard pressure of 10.13 N/m^2
δ^o	deviation angle, angle between exit air direction and tangent to blade mean camber line at trailing edge, deg
θ	ratio of rotor inlet total temperature to standard temperature of 288.2 K
η	efficiency

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

σ solidity, ratio of chord to spacing

$\overline{\omega}$ total loss coefficient

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

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

Subscripts:

ad adiabatic (temperature rise)

id ideal

LE blade leading edge

m meridional direction

mom momentum rise

p polytropic

TE blade trailing edge

z axial direction

θ tangential direction

1 instrumentation plane upstream of rotor

2 instrumentation plane between rotor and stator

3 instrumentation plane downstream of stator

Superscript:

' relative to blade

APPENDIX B

EQUATIONS

Performance parameters are defined as follows:

Mean incidence angle

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

Deviation angle

$$\delta^o = (\beta'_c)_{TE} - (\kappa_{mc})_{TE} \tag{B2}$$

Diffusion factor

$$D = 1 - \frac{V'_{TE}}{V'_{LE}} + \left| \frac{(rV_\theta)_{TE} - (rV_\theta)_{LE}}{(r_{TE} + r_{LE})\sigma(V'_{LE})} \right| \tag{B3}$$

Total loss coefficient

$$\overline{\omega} = \frac{(P'_{id})_{TE} - (P')_{TE}}{P'_{LE} - p_{LE}} \tag{B4}$$

Profile loss coefficient

$$\overline{\omega}_p = \overline{\omega} - \overline{\omega}_s \tag{B5}$$

Total loss parameter

$$\frac{\overline{\omega} \cos (\beta'_m)_{TE}}{2\sigma} \tag{B6}$$

Profile loss parameter

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

Adiabatic (temperature-rise) efficiency

$$\eta_{ad} = \frac{\left(\frac{P_{TE}}{P_{LE}}\right)^{(\gamma-1)/\gamma} - 1}{\frac{T_{TE}}{T_{LE}} - 1} \tag{B8}$$

Momentum-rise efficiency

$$\eta_{mom} = \frac{\left(\frac{P_{TE}}{P_{LE}}\right)^{(\gamma-1)/\gamma} - 1}{\frac{(UV_\theta)_{TE} - (UV_\theta)_{LE}}{T_{LE}C_p}} \tag{B9}$$

Equivalent weight flow

$$\frac{W\sqrt{\theta}}{\delta} \tag{B10}$$

Equivalent rotative speed

$$\frac{N}{\sqrt{\theta}} \tag{B11}$$

Weight flow per unit annulus area

$$\frac{\left(\frac{W\sqrt{\theta}}{\delta}\right)}{A_{an}} \tag{B12}$$

Weight flow per unit frontal area

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

Head-rise coefficient

$$\frac{C_p T_{LE}}{U_{tip}^2}\left[\left(\frac{P_{TE}}{P_{LE}}\right)^{(\gamma-1)/\gamma} - 1\right] \tag{B14}$$

Flow coefficient

$$\left(\frac{V_z}{U_{tip}}\right)_{LE} \tag{B15}$$

Polytropic efficiency

$$\eta_p = \frac{\ln\left(\frac{P_{TE}}{P_{LE}}\right)^{(\gamma-1)/\gamma}}{\ln\left(\frac{T_{TE}}{T_{LE}}\right)} \tag{B16}$$

APPENDIX C

DEFINITIONS AND UNITS USED IN TABLES

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

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

REFERENCES

1. Woodward, Richard P.; Glaser, Frederick W.; and Wasniak, Joseph A.: Noise Comparisons of Two 1.2-Pressure-Ratio Fans with 15 and 42 Rotor Blades. NASA TM X-2891, 1973.

2. Lewis, George W.; Moore, Royce D.; and Kovich, George: Performance of a 1.2-Pressure-Ratio STOL Fan Stage at Three Rotor Blade Setting Angles. NASA TM X-2837, 1973.

3. Lewis, George W., Jr.; and Tysl, Edward R.: Overall and Blade-Element Performance of a 1.20-Pressure-Ratio Fan Stage with Rotor Blades at Design Setting Angle. NASA TM X-3101, 1974.

4. Lewis, George W., Jr.; Osborn, Walter M.; and Moore, Royce D.: Overall and Blade-Element Performance of a 1.20-Pressure-Ratio Fan Stage with Rotor Blades Reset -5°. NASA TM X-3338, 1975. (E-8057)

5. Urasek, Donald C.; and Janetzke, David C.: Performance of Tandem-Bladed Transonic Compressor Rotor with Tip Speed of 1375 Feet per Second. NASA TM X-2484, 1972.

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

7. Ball, Calvin L.; Janetske, David C.; and Reid, Lonnie: Performance of 1380 Foot-Per-Second Tip-Speed Axial-Flow Compressor Rotor Blade with Tip Solidity of 1.5. NASA TM X-2379, 1972.

TABLE I. - DESIGN OVERALL PARAMETERS

FOR STAGE 55-55

ROTOR TOTAL PRESSURE RATIO	1.205
STAGE TOTAL PRESSURE RATIO	1.196
ROTOR TOTAL TEMPERATURE RATIO	1.058
STAGE TOTAL TEMPERATURE RATIO	1.058
ROTOR ADIABATIC EFFICIENCY	0.940
STAGE ADIABATIC EFFICIENCY	0.903
ROTOR POLYTROPIC EFFICIENCY	0.941
STAGE POLYTROPIC EFFICIENCY	0.906
ROTOR HEAD RISE COEFFICIENT	0.348
STAGE HEAD RISE COEFFICIENT	0.334
FLOW COEFFICIENT	0.861
WT FLOW PER UNIT FRONTAL AREA	153.970
WT FLOW PER UNIT ANNULUS AREA	195.295
WT FLOW	31.207
RPM	8020.000
TIP SPEED	213.323

TABLE II. - DESIGN BLADE-ELEMENT PARAMETERS FOR ROTOR 55

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
TIP	25.400	25.400	0.	27.6	48.4	38.1	288.2	1.063	10.14	1.213
1	24.730	24.714	0.	28.8	47.8	34.9	288.2	1.065	10.14	1.226
2	24.026	24.028	-0.	29.7	47.2	32.1	288.2	1.067	10.14	1.235
3	23.323	23.343	-0.	30.4	46.5	29.7	288.2	1.067	10.14	1.238
4	21.172	21.285	-0.	31.6	44.1	24.1	288.2	1.064	10.14	1.231
5	18.320	18.542	-0.	32.9	40.2	16.6	288.2	1.057	10.14	1.208
6	15.539	15.799	-0.	34.7	35.7	7.9	288.2	1.051	10.14	1.178
7	13.541	13.741	-0.	36.1	32.0	1.4	288.2	1.044	10.14	1.144
8	12.907	13.056	-0.	36.6	30.7	-0.7	288.2	1.042	10.14	1.130
9	12.288	12.370	-0.	37.1	29.4	-2.8	288.2	1.040	10.14	1.115
HUB	11.684	11.684	0.	37.6	28.1	-4.8	288.2	1.037	10.14	1.098

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
TIP	189.4	184.1	285.3	207.3	189.4	163.1	0.	85.3	213.3	213.3
1	188.1	190.0	280.2	203.0	188.1	166.5	0.	91.5	207.7	207.6
2	186.9	194.1	275.0	198.9	186.9	168.6	-0.	96.2	201.8	201.8
3	185.9	196.3	270.1	194.9	185.9	169.3	-0.	99.4	195.9	196.0
4	183.6	197.6	255.6	184.4	183.6	168.3	-0.	103.6	177.8	178.8
5	181.8	196.3	238.2	172.0	181.8	164.8	-0.	106.6	153.9	155.7
6	181.3	194.5	223.4	161.4	181.3	159.9	-0.	110.6	130.5	132.7
7	182.0	189.8	214.7	153.5	182.0	153.5	-0.	111.7	113.7	115.4
8	182.6	187.2	212.3	150.4	182.6	150.4	-0.	111.5	108.4	109.6
9	183.2	184.1	210.3	147.0	183.2	146.9	-0.	111.0	103.2	103.9
HUB	183.9	180.4	208.5	143.4	183.9	142.9	0.	110.2	98.1	98.1

	ABS MACH NO		REL MACH NO		MERID MACH NO		STREAMLINE SLOPE		MERID
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	VEL R
TIP	0.575	0.540	0.865	0.608	0.575	0.478	0.78	0.46	0.861
1	0.570	0.557	0.850	0.595	0.570	0.488	0.66	0.55	0.885
2	0.567	0.570	0.834	0.584	0.567	0.495	0.61	0.66	0.902
3	0.563	0.577	0.818	0.573	0.563	0.497	0.62	0.79	0.911
4	0.556	0.582	0.774	0.543	0.556	0.496	0.85	1.14	0.917
5	0.550	0.579	0.721	0.508	0.550	0.487	1.26	1.43	0.907
6	0.549	0.576	0.676	0.478	0.549	0.473	1.39	1.40	0.882
7	0.551	0.563	0.650	0.455	0.551	0.455	1.04	0.98	0.843
8	0.553	0.555	0.643	0.446	0.553	0.446	0.78	0.71	0.824
9	0.555	0.546	0.637	0.436	0.555	0.436	0.44	0.37	0.802
HUB	0.557	0.535	0.631	0.425	0.557	0.424	0.05	-0.03	0.777

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
TIP	0.	-2.0	6.1	0.441	0.903	0.051	0.051	0.023	0.023
1	5.00	-2.4	7.2	0.458	0.917	0.047	0.047	0.022	0.022
2	10.00	-2.9	8.0	0.470	0.928	0.043	0.043	0.020	0.020
3	15.00	-3.2	8.5	0.479	0.936	0.039	0.039	0.019	0.019
4	30.00	-3.6	10.5	0.493	0.958	0.027	0.027	0.013	0.013
5	50.00	-3.7	12.2	0.503	0.970	0.019	0.019	0.009	0.009
6	70.00	-3.9	12.6	0.512	0.949	0.032	0.032	0.015	0.015
7	85.00	-2.4	12.4	0.517	0.884	0.070	0.070	0.031	0.031
8	90.00	-1.7	12.3	0.520	0.844	0.090	0.090	0.039	0.039
9	95.00	-0.9	12.2	0.524	0.792	0.116	0.116	0.049	0.049
HUB	100.00	0.0	12.0	0.529	0.724	0.145	0.145	0.059	0.059

TABLE III. - DESIGN BLADE-ELEMENT PARAMETERS FOR STATOR 55

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
TIP	25.938	25.938	27.9	-0.	27.9	-0.	306.2	1.000	12.29	0.992
1	25.231	25.299	28.9	0.	28.9	0.	307.0	1.000	12.43	0.992
2	24.547	24.672	29.7	-0.	29.7	-0.	307.5	1.000	12.51	0.993
3	23.877	24.048	30.3	-0.	30.3	-0.	307.5	1.000	12.55	0.994
4	21.847	22.222	31.2	-0.	31.2	-0.	306.6	1.000	12.48	0.997
5	19.166	19.826	32.3	-0.	32.3	-0.	304.7	1.000	12.24	0.996
6	16.502	17.464	34.0	-0.	34.0	-0.	302.7	1.000	11.94	0.991
7	14.518	15.682	35.4	-0.	35.4	-0.	301.0	1.000	11.60	0.985
8	13.859	15.069	35.9	-0.	35.9	-0.	300.3	1.000	11.45	0.982
9	13.202	14.447	36.4	-0.	36.4	-0.	299.6	1.000	11.30	0.979
HUB	12.548	13.818	36.9	0.	36.9	0.	298.9	1.000	11.13	0.976

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
TIP	178.6	169.2	178.6	169.2	157.9	169.2	83.5	-0.	0.	0.
1	185.4	175.1	185.4	175.1	162.3	175.1	89.6	0.	0.	0.
2	190.0	178.9	190.0	178.9	165.1	178.9	94.1	-0.	0.	0.
3	192.7	180.8	192.7	180.8	166.5	180.8	97.2	-0.	0.	0.
4	194.8	179.9	194.8	179.9	166.7	179.9	100.9	-0.	0.	0.
5	193.0	172.7	193.0	172.7	163.1	172.7	103.1	-0.	0.	0.
6	189.3	160.6	189.3	160.6	156.9	160.6	105.9	-0.	0.	0.
7	182.6	143.7	182.6	143.7	148.9	143.7	105.8	-0.	0.	0.
8	179.3	135.4	179.3	135.4	145.3	135.4	105.0	-0.	0.	0.
9	175.3	125.7	175.3	125.7	141.2	125.7	104.0	-0.	0.	0.
HUB	170.9	114.6	170.9	114.6	136.6	114.6	102.6	0.	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		STREAMLINE SLOPE		MERID
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	VEL R
TIP	0.523	0.494	0.523	0.494	0.462	0.494	0.63	-0.10	1.071
1	0.543	0.511	0.543	0.511	0.475	0.511	0.86	0.05	1.079
2	0.557	0.523	0.557	0.523	0.484	0.523	1.10	0.22	1.084
3	0.566	0.528	0.566	0.528	0.488	0.528	1.34	0.39	1.086
4	0.573	0.526	0.573	0.526	0.490	0.526	2.08	0.95	1.079
5	0.569	0.506	0.569	0.506	0.481	0.506	3.13	1.72	1.058
6	0.559	0.471	0.559	0.471	0.464	0.471	4.25	2.42	1.024
7	0.540	0.420	0.540	0.420	0.440	0.420	5.10	2.77	0.965
8	0.530	0.396	0.530	0.396	0.430	0.396	5.35	2.76	0.932
9	0.519	0.367	0.519	0.367	0.418	0.367	5.58	2.68	0.890
HUB	0.505	0.334	0.505	0.334	0.404	0.334	5.80	2.54	0.839

	PERCENT	INCIDENCE	DEV	D-FACT	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN			TOT	PROF	TOT	PROF
TIP	0.	-12.5	16.0	0.380	0.049	0.049	0.034	0.034
1	5.00	-11.6	15.6	0.385	0.042	0.042	0.029	0.029
2	10.00	-10.9	15.3	0.386	0.036	0.036	0.024	0.024
3	15.00	-10.3	15.0	0.387	0.030	0.030	0.019	0.019
4	30.00	-9.8	14.0	0.382	0.017	0.017	0.010	0.010
5	50.00	-9.1	13.0	0.382	0.018	0.018	0.010	0.010
6	70.00	-7.8	11.7	0.400	0.046	0.046	0.021	0.021
7	85.00	-6.8	10.9	0.440	0.086	0.086	0.035	0.035
8	90.00	-6.4	10.7	0.464	0.103	0.103	0.040	0.040
9	95.00	-6.0	10.4	0.494	0.123	0.123	0.046	0.046
HUB	100.00	-5.6	10.1	0.533	0.147	0.147	0.052	0.052

TABLE IV. - BLADE GEOMETRY FOR ROTOR 55

RP	PERCENT SPAN	RADII RI	RADII RO	BLADE ANGLES KIC	BLADE ANGLES KTC	BLADE ANGLES KOC	DELTA INC	CONE ANGLE
TIP	0.	25.400	25.400	50.40	41.08	32.00	0.	0.057
1	5.	24.730	24.714	50.29	38.96	27.64	0.	-0.124
2	10.	24.026	24.028	50.05	37.05	24.05	-0.	0.057
3	15.	23.323	23.343	49.67	35.44	21.21	-0.	0.152
4	30.	21.172	21.285	47.72	30.64	13.56	-0.	0.892
5	50.	18.320	18.542	43.95	24.18	4.41	-0.	1.806
6	70.	15.539	15.799	39.62	17.42	-4.79	-0.	2.239
7	85.	13.541	13.741	34.40	11.69	-11.02	-0.	1.813
8	90.	12.907	13.056	32.39	9.69	-13.01	-0.	1.375
9	95.	12.288	12.370	30.27	7.66	-14.95	-0.	0.769
HUB	100.	11.684	11.684	28.06	5.61	-16.84	0.	0.057

RP	BLADE THICKNESSES TI	BLADE THICKNESSES TM	BLADE THICKNESSES TO	AXIAL DIMENSIONS ZI	AXIAL DIMENSIONS ZMC	AXIAL DIMENSIONS ZTC	AXIAL DIMENSIONS ZO
TIP	0.019	0.239	0.019	-0.636	2.690	2.690	6.522
1	0.025	0.264	0.025	-0.671	2.650	2.650	6.546
2	0.031	0.293	0.031	-0.685	2.639	2.639	6.588
3	0.036	0.326	0.036	-0.680	2.658	2.658	6.644
4	0.050	0.441	0.050	-0.659	2.648	2.648	6.597
5	0.063	0.591	0.063	-0.572	2.669	2.669	6.455
6	0.083	0.741	0.083	-0.371	2.753	2.753	6.284
7	0.091	0.839	0.091	-0.206	2.824	2.824	6.116
8	0.090	0.862	0.090	-0.142	2.852	2.852	6.057
9	0.088	0.881	0.088	-0.073	2.881	2.881	5.998
HUB	0.084	0.896	0.084	0.	2.912	2.912	5.938

RP	AERO CHORD	SETTING ANGLE	TOTAL CAMBER	SOLIDITY	X FACTOR
TIP	9.499	41.14	18.40	0.893	1.000
1	9.274	38.96	22.65	0.896	1.000
2	9.105	37.05	26.00	0.905	1.000
3	8.980	35.44	28.47	0.919	1.000
4	8.428	30.66	34.15	0.948	1.000
5	7.703	24.22	39.54	0.998	1.000
6	6.978	17.48	44.41	1.063	1.000
7	6.458	11.74	45.42	1.130	1.000
8	6.290	9.73	45.40	1.157	1.000
9	6.126	7.69	45.22	1.186	1.000
HUB	5.966	5.61	44.89	1.219	1.000

TABLE V. - BLADE GEOMETRY FOR STATOR 55

RP	PERCENT SPAN	RADII RI	RADII RO	BLADE ANGLES KIC	BLADE ANGLES KTC	BLADE ANGLES KOC	DELTA INC	CONE ANGLE
TIP	0.	25.938	25.938	40.40	17.86	-16.01	-0.	0.057
1	5.	25.231	25.299	40.47	18.05	-15.65	0.	0.378
2	10.	24.547	24.672	40.54	18.23	-15.31	-0.	0.693
3	15.	23.877	24.048	40.61	18.40	-14.98	-0.	0.952
4	30.	21.847	22.222	41.00	19.02	-14.04	-0.	2.087
5	50.	19.166	19.826	41.42	19.69	-13.02	-0.	3.692
6	70.	16.502	17.464	41.78	20.44	-11.73	-0.	5.406
7	85.	14.518	15.682	42.13	20.97	-10.93	-0.	6.564
8	90.	13.859	15.069	42.23	21.15	-10.66	-0.	6.832
9	95.	13.202	14.447	42.32	21.32	-10.38	-0.	7.039
HUB	100.	12.548	13.818	42.40	21.48	-10.10	0.	7.185

RP	BLADE THICKNESSES TI	BLADE THICKNESSES TM	BLADE THICKNESSES TO	AXIAL DIMENSIONS ZI	AXIAL DIMENSIONS ZMC	AXIAL DIMENSIONS ZTC	AXIAL DIMENSIONS ZO
TIP	0.188	0.953	0.087	21.634	25.502	25.502	31.982
1	0.188	0.953	0.087	21.628	25.489	25.489	31.967
2	0.188	0.953	0.087	21.631	25.486	25.486	31.961
3	0.188	0.953	0.087	21.642	25.490	25.490	31.963
4	0.188	0.953	0.087	21.650	25.473	25.473	31.937
5	0.188	0.953	0.087	21.662	25.453	25.453	31.899
6	0.188	0.953	0.087	21.673	25.426	25.426	31.844
7	0.188	0.953	0.087	21.681	25.404	25.404	31.800
8	0.188	0.953	0.087	21.684	25.398	25.398	31.787
9	0.188	0.953	0.087	21.686	25.392	25.392	31.775
HUB	0.188	0.953	0.087	21.689	25.387	25.387	31.764

RP	AERO CHORD	SETTING ANGLE	TOTAL CAMBER	SOLIDITY	X FACTOR
TIP	10.584	11.92	56.40	0.714	1.000
1	10.584	12.15	56.12	0.733	1.000
2	10.584	12.36	55.85	0.753	1.000
3	10.584	12.57	55.59	0.773	1.000
4	10.584	13.28	55.04	0.841	1.000
5	10.585	14.07	54.44	0.951	1.000
6	10.586	15.00	53.51	1.091	1.000
7	10.588	15.67	53.06	1.228	1.000
8	10.588	15.88	52.88	1.282	1.000
9	10.589	16.09	52.69	1.341	1.000
HUB	10.589	16.30	52.50	1.406	1.000

TABLE VI. - OVERALL PERFORMANCE FOR STAGE 55B-55

(a) 80 Percent of design speed

Parameter	Reading				
	1638	1639	1640	1641	1642
ROTOR TOTAL PRESSURE RATIO	1.132	1.132	1.135	1.137	1.133
STAGE TOTAL PRESSURE RATIO	1.106	1.118	1.125	1.128	1.123
ROTOR TOTAL TEMPERATURE RATIO	1.039	1.039	1.040	1.042	1.043
STAGE TOTAL TEMPERATURE RATIO	1.039	1.037	1.038	1.039	1.041
ROTOR TEMP. RISE EFFICIENCY	0.923	0.933	0.924	0.895	0.843
STAGE TEMP. RISE EFFICIENCY	0.748	0.881	0.909	0.890	0.826
ROTOR MOMENTUM RISE EFFICIENCY	0.875	0.893	0.880	0.858	0.786
ROTOR HEAD RISE COEFFICIENT	0.359	0.360	0.366	0.371	0.360
STAGE HEAD RISE COEFFICIENT	0.291	0.325	0.341	0.347	0.334
FLOW COEFFICIENT	1.201	1.037	0.888	0.798	0.697
WT FLOW PER UNIT FRONTAL AREA	161.89	146.87	130.90	119.46	106.16
WT FLOW PER UNIT ANNULUS AREA	205.34	186.29	166.04	151.52	134.66
WT FLOW AT ORIFICE	32.81	29.77	26.53	24.21	21.52
WT FLOW AT ROTOR INLET	33.36	30.23	26.94	24.70	22.00
WT FLOW AT ROTOR OUTLET	33.98	30.64	27.29	25.13	22.45
WT FLOW AT STATOR OUTLET	34.69	31.46	28.35	26.34	24.27
ROTATIVE SPEED	6411.0	6396.1	6411.9	6418.5	6417.7
PERCENT OF DESIGN SPEED	79.9	79.8	79.9	80.0	80.0

(b) 90 Percent of design speed

Parameter	Reading				
	1636	1637	1632	1633	1634
ROTOR TOTAL PRESSURE RATIO	1.149	1.169	1.176	1.175	1.173
STAGE TOTAL PRESSURE RATIO	1.129	1.153	1.161	1.163	1.160
ROTOR TOTAL TEMPERATURE RATIO	1.050	1.050	1.052	1.053	1.055
STAGE TOTAL TEMPERATURE RATIO	1.046	1.046	1.050	1.051	1.053
ROTOR TEMP. RISE EFFICIENCY	0.809	0.917	0.903	0.887	0.850
STAGE TEMP. RISE EFFICIENCY	0.769	0.897	0.866	0.860	0.813
ROTOR MOMENTUM RISE EFFICIENCY	0.761	0.879	0.879	0.856	0.812
ROTOR HEAD RISE COEFFICIENT	0.318	0.362	0.371	0.370	0.365
STAGE HEAD RISE COEFFICIENT	0.277	0.331	0.342	0.346	0.341
FLOW COEFFICIENT	1.144	1.000	0.899	0.820	0.741
WT FLOW PER UNIT FRONTAL AREA	162.90	155.09	144.50	133.96	123.69
WT FLOW PER UNIT ANNULUS AREA	206.63	196.73	183.29	169.92	156.90
WT FLOW AT ORIFICE	33.02	31.44	29.29	27.15	25.07
WT FLOW AT ROTOR INLET	34.68	31.91	29.78	27.74	25.61
WT FLOW AT ROTOR OUTLET	34.17	32.40	30.35	28.24	26.20
WT FLOW AT STATOR OUTLET	35.34	33.50	31.47	29.63	27.89
ROTATIVE SPEED	7224.5	7175.3	7224.9	7208.2	7221.5
PERCENT OF DESIGN SPEED	90.1	89.5	90.1	89.9	90.0

(c) 100 Percent of design speed

Parameter	Reading				
	1625	1626	1627	1628	1629
ROTOR TOTAL PRESSURE RATIO	1.209	1.220	1.221	1.219	1.213
STAGE TOTAL PRESSURE RATIO	1.188	1.201	1.205	1.203	1.196
ROTOR TOTAL TEMPERATURE RATIO	1.064	1.065	1.066	1.066	1.068
STAGE TOTAL TEMPERATURE RATIO	1.063	1.063	1.064	1.064	1.065
ROTOR TEMP. RISE EFFICIENCY	0.872	0.903	0.890	0.877	0.834
STAGE TEMP. RISE EFFICIENCY	0.803	0.851	0.852	0.842	0.805
ROTOR MOMENTUM RISE EFFICIENCY	0.837	0.864	0.855	0.835	0.783
ROTOR HEAD RISE COEFFICIENT	0.352	0.368	0.369	0.366	0.355
STAGE HEAD RISE COEFFICIENT	0.320	0.338	0.343	0.341	0.328
FLOW COEFFICIENT	1.010	0.938	0.865	0.808	0.747
WT FLOW PER UNIT FRONTAL AREA	166.81	160.15	152.18	145.04	136.98
WT FLOW PER UNIT ANNULUS AREA	211.58	203.13	193.03	183.97	173.75
WT FLOW AT ORIFICE	33.81	32.46	30.85	29.40	27.76
WT FLOW AT ROTOR INLET	34.42	33.00	31.34	29.85	28.19
WT FLOW AT ROTOR OUTLET	35.09	33.66	31.92	30.36	28.69
WT FLOW AT STATOR OUTLET	36.41	35.10	33.56	32.17	30.79
ROTATIVE SPEED	8039.1	8060.0	8072.1	8069.0	8080.2
PERCENT OF DESIGN SPEED	100.2	100.5	100.6	100.6	100.8

TABLE VII. - BLADE-ELEMENT DATA AT BLADE EDGES FOR ROTOR 55B

(a) 80 Percent of design speed; reading 1638

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.729	24.714	0.0	20.5	39.2	25.8	289.1	1.039	9.90	1.151
2	24.026	24.028	0.0	19.7	37.6	24.0	289.0	1.040	10.13	1.142
3	23.322	23.343	0.0	20.6	37.3	22.0	288.6	1.041	10.15	1.143
4	21.173	21.285	0.0	23.6	34.5	15.1	288.0	1.042	10.15	1.145
5	18.321	18.542	0.0	27.2	30.9	6.3	287.8	1.041	10.16	1.140
6	15.540	15.799	0.0	29.1	26.9	-1.2	287.8	1.037	10.15	1.126
7	13.541	13.741	0.0	30.6	23.8	-6.5	287.9	1.033	10.15	1.101
8	12.906	13.056	0.0	32.3	22.9	-8.2	287.9	1.030	10.14	1.068
9	12.289	12.370	0.0	33.2	22.5	-9.4	287.7	1.028	10.10	1.051

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	203.9	206.6	263.0	214.9	203.9	193.4	0.1	72.5	166.2	166.1
2	209.2	213.4	264.2	220.1	209.2	201.0	0.0	71.8	161.4	161.4
3	204.8	214.5	257.6	216.6	204.8	200.9	0.0	75.3	156.2	156.4
4	206.5	220.1	250.6	208.8	206.5	201.6	0.0	88.2	142.0	142.7
5	205.7	224.7	239.8	201.0	205.7	199.8	0.0	102.8	123.3	124.8
6	205.9	227.4	231.0	198.7	205.9	198.7	0.0	110.6	104.6	106.3
7	206.6	223.9	225.7	193.8	206.6	192.6	0.0	114.1	90.9	92.3
8	203.8	211.8	221.3	180.9	203.8	179.0	0.0	113.2	86.3	87.3
9	198.9	203.2	215.3	172.4	198.9	170.1	0.0	111.2	82.6	83.1

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.621	0.617	0.801	0.642	0.621	0.577	0.949	0.801
2	0.639	0.639	0.806	0.659	0.639	0.601	0.961	0.806
3	0.624	0.642	0.785	0.649	0.624	0.601	0.981	0.785
4	0.631	0.661	0.765	0.627	0.631	0.605	0.976	0.765
5	0.628	0.677	0.732	0.605	0.628	0.602	0.971	0.732
6	0.629	0.687	0.706	0.600	0.629	0.600	0.965	0.706
7	0.631	0.677	0.690	0.586	0.631	0.582	0.932	0.690
8	0.622	0.638	0.676	0.545	0.622	0.539	0.878	0.676
9	0.606	0.611	0.656	0.518	0.606	0.512	0.855	0.656

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	-4.1	5.2	0.337	1.045	-0.017	-0.017	-0.009	-0.009
2	10.00	-5.4	7.0	0.317	0.964	0.014	0.014	0.007	0.007
3	15.00	-5.3	7.8	0.318	0.954	0.019	0.019	0.009	0.009
4	30.00	-6.2	8.6	0.353	0.933	0.029	0.029	0.015	0.015
5	50.00	-6.0	9.1	0.378	0.926	0.034	0.034	0.017	0.017
6	70.00	-5.7	10.6	0.367	0.921	0.035	0.035	0.017	0.017
7	85.00	-3.7	11.6	0.366	0.841	0.065	0.065	0.029	0.029
8	90.00	-2.4	11.8	0.405	0.636	0.138	0.138	0.059	0.059
9	95.00	-0.7	12.6	0.418	0.504	0.187	0.187	0.078	0.078

TABLE VII. - Continued.

(b) 80 Percent of design speed; reading 1639

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.729	24.714	-0.0	23.7	43.3	28.8	289.0	1.042	9.96	1.149
2	24.026	24.028	0.0	23.2	41.7	26.2	288.9	1.041	10.13	1.146
3	23.322	23.343	-0.0	23.6	41.4	24.5	288.6	1.042	10.15	1.147
4	21.173	21.285	-0.0	26.5	38.6	17.9	287.9	1.041	10.15	1.142
5	18.321	18.542	0.0	29.8	34.7	9.0	287.9	1.038	10.15	1.130
6	15.540	15.799	0.0	31.8	30.5	0.3	287.9	1.035	10.15	1.124
7	13.541	13.741	-0.0	34.2	27.1	-7.2	287.9	1.034	10.15	1.112
8	12.906	13.056	0.0	36.0	26.1	-9.0	287.8	1.031	10.14	1.081
9	12.289	12.370	-0.0	36.9	25.6	-11.1	287.8	1.030	10.09	1.080

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	175.7	182.6	241.3	190.8	175.7	167.2	-0.0	73.3	165.4	165.3
2	180.0	189.8	241.3	194.4	180.0	174.4	0.0	74.8	160.7	160.7
3	177.1	191.4	236.2	192.7	177.1	175.4	-0.0	76.6	156.3	156.4
4	177.9	193.8	227.5	182.2	177.9	173.4	-0.0	86.5	141.8	142.6
5	176.7	194.9	215.0	171.2	176.7	169.1	0.0	97.0	122.3	123.8
6	176.8	199.2	205.2	169.3	176.8	169.3	0.0	104.9	104.1	105.8
7	178.1	201.4	200.0	167.8	178.1	166.5	-0.0	113.3	91.0	92.3
8	176.4	189.9	196.4	155.5	176.4	153.6	0.0	111.7	86.4	87.4
9	172.2	187.5	191.0	152.8	172.2	150.0	-0.0	112.6	82.6	83.1

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.530	0.540	0.728	0.564	0.530	0.495	0.952	0.728
2	0.544	0.563	0.729	0.577	0.544	0.517	0.969	0.729
3	0.535	0.568	0.713	0.572	0.535	0.521	0.990	0.713
4	0.538	0.577	0.688	0.542	0.538	0.516	0.975	0.688
5	0.534	0.581	0.650	0.510	0.534	0.504	0.957	0.650
6	0.535	0.596	0.620	0.506	0.535	0.506	0.957	0.620
7	0.539	0.603	0.605	0.503	0.539	0.499	0.935	0.605
8	0.533	0.567	0.594	0.465	0.533	0.459	0.871	0.632
9	0.520	0.560	0.577	0.456	0.520	0.448	0.871	0.662

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-0.0	8.2	0.379	0.971	0.013	0.013	0.007	0.007
2	10.00	-1.3	9.2	0.366	0.960	0.019	0.019	0.009	0.009
3	15.00	-1.2	10.3	0.361	0.956	0.022	0.022	0.011	0.011
4	30.00	-2.2	11.3	0.400	0.942	0.030	0.030	0.015	0.015
5	50.00	-2.3	11.9	0.431	0.928	0.038	0.038	0.019	0.019
6	70.00	-2.2	12.1	0.417	0.962	0.020	0.020	0.009	0.009
7	85.00	-0.4	10.9	0.413	0.907	0.048	0.048	0.021	0.021
8	90.00	0.7	11.0	0.455	0.717	0.141	0.141	0.060	0.060
9	95.00	2.3	10.8	0.449	0.729	0.138	0.138	0.057	0.057

TABLE VII. - Continued.

(c) 80 Percent of design speed; reading 1640

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.729	24.714	0.0	30.0	47.5	31.2	288.9	1.044	9.99	1.145
2	24.026	24.028	-0.0	28.3	45.9	28.1	288.9	1.044	10.13	1.147
3	23.322	23.343	-0.0	28.6	45.8	25.9	288.5	1.046	10.14	1.152
4	21.173	21.285	-0.0	30.8	43.0	19.2	288.0	1.043	10.14	1.149
5	18.321	18.542	-0.0	33.7	39.1	10.2	288.0	1.039	10.15	1.136
6	15.540	15.799	0.0	35.6	34.6	0.7	287.9	1.035	10.15	1.125
7	13.541	13.741	-0.0	37.8	31.0	-6.6	287.8	1.032	10.14	1.106
8	12.906	13.056	-0.0	39.2	30.0	-8.3	287.7	1.030	10.14	1.084
9	12.289	12.370	-0.0	40.2	29.3	-11.5	287.7	1.031	10.10	1.086

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	151.7	161.9	224.8	163.9	151.7	140.2	0.0	80.9	165.8	165.7
2	156.5	170.8	224.9	170.5	156.5	150.4	-0.0	81.1	161.4	161.4
3	152.5	173.5	218.7	169.3	152.5	152.4	-0.0	82.9	156.7	156.8
4	153.0	176.6	209.1	160.7	153.0	151.8	-0.0	90.3	142.5	143.2
5	151.3	176.3	194.9	149.0	151.3	146.7	-0.0	97.9	122.9	124.3
6	151.2	179.1	183.6	145.6	151.2	145.6	0.0	104.3	104.2	106.0
7	151.6	177.5	176.9	141.3	151.6	140.3	-0.0	108.7	91.1	92.5
8	150.0	169.1	173.2	132.5	150.0	131.1	-0.0	106.8	86.6	87.6
9	146.8	169.3	168.3	132.0	146.8	129.3	-0.0	109.3	82.4	83.0

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.454	0.475	0.673	0.481	0.454	0.412	0.924	0.827
2	0.469	0.503	0.674	0.502	0.469	0.443	0.961	0.789
3	0.457	0.511	0.656	0.499	0.457	0.449	0.999	0.775
4	0.459	0.522	0.628	0.475	0.459	0.449	0.992	0.718
5	0.454	0.522	0.585	0.442	0.454	0.435	0.969	0.666
6	0.453	0.532	0.551	0.432	0.453	0.432	0.963	0.623
7	0.455	0.528	0.531	0.420	0.455	0.417	0.926	0.658
8	0.450	0.502	0.520	0.393	0.450	0.389	0.874	0.645
9	0.440	0.503	0.505	0.392	0.440	0.384	0.881	0.654

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	4.3	10.5	0.472	0.896	0.058	0.058	0.028	0.028
2	10.00	2.8	11.1	0.441	0.901	0.056	0.056	0.027	0.027
3	15.00	3.1	11.7	0.432	0.900	0.061	0.061	0.030	0.030
4	30.00	2.2	12.7	0.460	0.942	0.036	0.036	0.018	0.018
5	50.00	2.1	13.1	0.488	0.961	0.024	0.024	0.012	0.012
6	70.00	2.0	12.5	0.476	0.970	0.019	0.019	0.009	0.009
7	85.00	3.6	11.4	0.475	0.907	0.058	0.058	0.026	0.026
8	90.00	4.6	11.7	0.503	0.769	0.141	0.141	0.060	0.060
9	95.00	6.1	10.4	0.491	0.782	0.141	0.141	0.058	0.058

TABLE VII. - Continued.

(d) 80 Percent of design speed; reading 1641

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.729	24.714	-0.0	35.9	50.8	31.9	288.8	1.050	10.01	1.149
2	24.026	24.028	-0.0	33.5	48.9	29.1	288.7	1.048	10.13	1.146
3	23.322	23.343	-0.0	33.2	48.7	26.6	288.5	1.049	10.14	1.151
4	21.173	21.285	-0.0	34.0	45.9	19.2	288.1	1.045	10.14	1.154
5	18.321	18.542	-0.0	36.5	41.9	10.1	288.0	1.040	10.15	1.141
6	15.540	15.799	-0.0	38.2	37.8	0.9	287.8	1.036	10.14	1.125
7	13.541	13.741	-0.0	40.0	34.1	-5.9	287.8	1.031	10.14	1.101
8	12.906	13.056	-0.0	41.0	33.0	-7.9	287.9	1.029	10.14	1.088
9	12.289	12.370	-0.0	42.2	32.3	-11.5	287.8	1.030	10.11	1.090

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	136.1	153.0	215.4	145.9	136.1	123.9	-0.0	89.8	167.0	166.9
2	141.1	159.3	214.8	152.1	141.1	132.8	-0.0	88.0	162.0	162.0
3	138.2	163.0	209.4	152.5	138.2	136.4	-0.0	89.2	157.2	157.4
4	138.0	168.7	198.3	148.2	138.0	140.0	-0.0	94.2	142.3	143.0
5	136.9	168.7	184.0	137.8	136.9	135.7	-0.0	100.3	123.0	124.4
6	134.7	168.5	170.5	132.4	134.7	132.4	-0.0	104.2	104.4	106.2
7	134.0	163.4	161.8	125.9	134.0	125.3	-0.0	105.0	90.7	92.0
8	133.1	158.6	158.7	120.8	133.1	119.6	-0.0	104.1	86.5	87.5
9	130.6	159.4	154.4	120.6	130.6	118.2	-0.0	107.0	82.4	83.0

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.406	0.447	0.643	0.426	0.406	0.362	0.911	0.867
2	0.422	0.467	0.642	0.445	0.422	0.389	0.942	0.828
3	0.413	0.478	0.625	0.447	0.413	0.400	0.987	0.809
4	0.413	0.497	0.593	0.437	0.413	0.412	1.014	0.748
5	0.409	0.498	0.550	0.407	0.409	0.401	0.991	0.691
6	0.403	0.499	0.509	0.392	0.403	0.392	0.983	0.643
7	0.400	0.484	0.483	0.373	0.400	0.371	0.935	0.637
8	0.398	0.470	0.474	0.358	0.398	0.354	0.898	0.641
9	0.390	0.472	0.461	0.357	0.390	0.350	0.905	0.646

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	7.5	11.3	0.555	0.813	0.127	0.127	0.060	0.060
2	10.00	5.9	12.1	0.518	0.823	0.117	0.117	0.056	0.056
3	15.00	6.0	12.4	0.504	0.839	0.112	0.112	0.055	0.055
4	30.00	5.1	12.7	0.504	0.924	0.054	0.054	0.027	0.027
5	50.00	5.0	12.9	0.526	0.959	0.029	0.029	0.015	0.015
6	70.00	5.2	12.7	0.513	0.952	0.036	0.036	0.017	0.017
7	85.00	6.7	12.1	0.511	0.897	0.073	0.073	0.032	0.032
8	90.00	7.6	12.1	0.524	0.824	0.123	0.123	0.053	0.053
9	95.00	9.0	10.5	0.512	0.827	0.130	0.130	0.054	0.054

TABLE VII. - Continued.

(e) 80 Percent of design speed; reading 1642

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.729	24.714	-0.0	50.7	54.9	31.2	288.7	1.057	10.05	1.141
2	24.026	24.028	0.0	45.9	53.1	28.9	288.7	1.053	10.13	1.132
3	23.322	23.343	-0.0	43.2	52.7	26.8	288.3	1.051	10.14	1.132
4	21.173	21.285	-0.0	37.2	49.7	19.3	288.1	1.047	10.14	1.152
5	18.321	18.542	0.0	39.4	45.9	9.3	288.0	1.042	10.14	1.143
6	15.540	15.799	-0.0	40.1	41.2	0.7	287.9	1.036	10.14	1.123
7	13.541	13.741	0.0	40.8	37.5	-5.6	287.9	1.031	10.14	1.102
8	12.906	13.056	-0.0	41.7	36.4	-8.0	287.9	1.030	10.14	1.094
9	12.289	12.370	0.0	42.8	35.5	-11.5	287.8	1.030	10.12	1.094

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	117.1	143.7	203.6	106.3	117.1	90.9	-0.0	111.2	166.5	166.4
2	121.3	146.6	202.0	116.6	121.3	102.1	0.0	105.2	161.5	161.5
3	119.6	149.0	197.2	121.8	119.6	108.7	-0.0	101.9	156.7	156.9
4	120.6	161.7	186.3	136.5	120.6	128.9	-0.0	97.7	142.1	142.8
5	119.6	164.2	171.8	128.6	119.6	127.0	0.0	104.1	123.3	124.8
6	119.0	162.2	158.2	124.2	119.0	124.1	-0.0	104.4	104.2	106.0
7	118.6	159.2	149.5	121.0	118.6	120.4	0.0	104.1	91.0	92.3
8	117.6	156.6	146.1	118.0	117.6	116.8	-0.0	104.3	86.8	87.8
9	115.6	156.8	142.1	117.4	115.6	115.0	0.0	106.6	82.6	83.1

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.348	0.417	0.605	0.309	0.348	0.264	0.776	0.901
2	0.361	0.427	0.601	0.340	0.361	0.297	0.841	0.863
3	0.356	0.435	0.586	0.356	0.356	0.317	0.909	0.841
4	0.359	0.475	0.555	0.401	0.359	0.378	1.069	0.776
5	0.356	0.484	0.511	0.379	0.356	0.374	1.061	0.715
6	0.354	0.479	0.471	0.367	0.354	0.367	1.043	0.653
7	0.353	0.471	0.445	0.358	0.353	0.356	1.015	0.640
8	0.350	0.463	0.435	0.349	0.350	0.346	0.994	0.639
9	0.344	0.464	0.423	0.347	0.344	0.340	0.995	0.639

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	11.6	10.6	0.783	0.679	0.268	0.268	0.128	0.128
2	10.00	10.0	11.8	0.711	0.684	0.251	0.251	0.121	0.121
3	15.00	10.0	12.6	0.664	0.705	0.238	0.238	0.115	0.115
4	30.00	9.0	12.7	0.545	0.875	0.104	0.104	0.052	0.052
5	50.00	8.9	12.1	0.557	0.936	0.054	0.054	0.027	0.027
6	70.00	8.6	12.5	0.528	0.942	0.050	0.050	0.023	0.023
7	85.00	10.1	12.5	0.501	0.905	0.079	0.079	0.035	0.035
8	90.00	11.0	12.0	0.503	0.859	0.119	0.119	0.051	0.051
9	95.00	12.3	10.4	0.491	0.857	0.126	0.126	0.052	0.052

TABLE VII. - Continued.

(f) 90 Percent of design speed; reading 1636

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.729	24.714	0.0	24.2	39.6	27.3	289.3	1.054	10.20	1.141
2	24.026	24.028	0.0	23.0	38.7	24.9	289.0	1.054	10.30	1.155
3	23.322	23.343	0.0	23.8	38.2	22.9	288.7	1.054	10.31	1.152
4	21.173	21.285	0.0	26.5	35.3	16.0	288.1	1.054	10.31	1.152
5	18.321	18.542	0.0	29.3	32.8	7.2	287.7	1.051	9.96	1.175
6	15.540	15.799	0.0	30.8	28.7	-0.3	287.7	1.046	9.97	1.154
7	13.541	13.741	0.0	33.2	25.4	-6.8	287.7	1.041	9.97	1.127
8	12.906	13.056	0.0	34.8	24.7	-8.6	287.6	1.038	9.95	1.091
9	12.289	12.370	0.0	35.7	24.3	-10.4	287.6	1.036	9.89	1.080

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	226.0	212.3	293.4	217.9	226.0	193.6	0.0	87.0	187.0	186.9
2	227.6	222.8	291.5	226.1	227.6	205.1	0.0	86.9	182.1	182.1
3	224.0	223.5	285.1	221.9	224.0	204.4	0.0	90.3	176.4	176.5
4	226.0	229.1	276.9	213.2	226.0	205.0	0.0	102.3	160.1	160.9
5	215.4	234.3	256.2	205.9	215.4	204.3	0.0	114.7	138.8	140.5
6	214.6	235.6	244.5	202.4	214.6	202.4	0.0	120.5	117.3	119.3
7	215.5	232.7	238.7	196.1	215.5	194.7	0.1	127.3	102.6	104.1
8	212.0	220.9	233.3	183.4	212.0	181.4	0.1	126.1	97.5	98.7
9	206.3	215.2	226.3	177.6	206.3	174.7	0.0	125.6	93.0	93.6

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.694	0.630	0.901	0.647	0.694	0.575	0.857	0.901
2	0.700	0.664	0.896	0.675	0.700	0.612	0.901	0.896
3	0.688	0.667	0.876	0.662	0.688	0.610	0.913	0.876
4	0.696	0.686	0.852	0.638	0.696	0.614	0.907	0.852
5	0.661	0.705	0.786	0.619	0.661	0.615	0.948	0.786
6	0.658	0.711	0.750	0.611	0.658	0.611	0.944	0.750
7	0.661	0.703	0.732	0.593	0.661	0.588	0.903	0.732
8	0.649	0.665	0.715	0.553	0.649	0.546	0.855	0.715
9	0.631	0.647	0.692	0.534	0.631	0.526	0.847	0.748

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-3.7	6.7	0.423	0.709	0.125	0.125	0.062	0.062
2	10.00	-4.4	7.9	0.389	0.787	0.092	0.092	0.046	0.046
3	15.00	-4.4	8.7	0.394	0.769	0.103	0.103	0.052	0.052
4	30.00	-5.4	9.4	0.425	0.763	0.111	0.111	0.056	0.056
5	50.00	-4.2	10.1	0.422	0.925	0.038	0.038	0.019	0.019
6	70.00	-4.0	11.4	0.406	0.906	0.046	0.046	0.022	0.022
7	85.00	-2.0	11.2	0.416	0.844	0.071	0.071	0.031	0.031
8	90.00	-0.7	11.4	0.449	0.668	0.145	0.145	0.062	0.062
9	95.00	1.0	11.6	0.450	0.621	0.165	0.165	0.068	0.068

TABLE VII. - Continued.

(g) 90 Percent of design speed; reading 1637

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.729	24.714	0.0	26.4	44.4	29.4	289.1	1.054	9.94	1.189
2	24.026	24.028	0.0	25.6	42.7	26.7	289.0	1.053	10.13	1.185
3	23.322	23.343	0.0	25.5	42.4	24.7	288.5	1.055	10.15	1.190
4	21.173	21.285	0.0	28.3	39.6	18.1	288.0	1.053	10.15	1.185
5	18.321	18.542	0.0	31.2	35.7	9.3	287.9	1.049	10.15	1.169
6	15.540	15.799	0.0	33.5	31.4	-0.1	287.7	1.046	10.15	1.156
7	13.541	13.741	0.0	35.7	27.8	-7.5	287.9	1.042	10.15	1.136
8	12.906	13.056	0.0	37.3	27.0	-9.1	287.8	1.039	10.14	1.103
9	12.289	12.370	0.0	38.3	26.6	-11.6	287.8	1.038	10.09	1.102

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	190.0	195.5	265.9	201.1	190.0	175.1	0.0	87.0	186.0	185.8
2	195.5	203.7	266.0	205.7	195.5	183.8	0.0	87.9	180.4	180.4
3	191.6	207.1	259.6	205.7	191.6	186.8	0.0	89.3	175.2	175.3
4	192.7	210.1	250.0	194.6	192.7	185.0	0.0	99.6	159.3	160.1
5	191.3	211.2	235.5	183.2	191.3	180.7	0.0	109.4	137.4	139.0
6	191.2	215.7	224.0	179.9	191.2	179.9	0.0	118.9	116.7	118.7
7	192.5	216.2	217.7	177.1	192.5	175.6	0.0	126.1	101.5	103.1
8	190.0	205.3	213.3	165.4	190.0	163.3	0.0	124.3	97.0	98.1
9	185.2	203.1	207.1	162.6	185.2	159.3	0.0	125.9	92.7	93.3

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.576	0.577	0.805	0.593	0.576	0.517	0.921	0.875
2	0.594	0.603	0.807	0.609	0.594	0.544	0.940	0.807
3	0.581	0.614	0.788	0.610	0.581	0.554	0.975	0.788
4	0.586	0.625	0.760	0.579	0.586	0.550	0.960	0.760
5	0.581	0.630	0.715	0.546	0.581	0.539	0.945	0.715
6	0.581	0.646	0.681	0.539	0.581	0.539	0.941	0.681
7	0.585	0.648	0.662	0.531	0.585	0.527	0.912	0.690
8	0.577	0.614	0.648	0.495	0.577	0.489	0.860	0.723
9	0.562	0.607	0.628	0.486	0.562	0.476	0.860	0.747

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	1.1	8.8	0.426	0.931	0.036	0.036	0.017	0.017
2	10.00	-0.4	9.7	0.409	0.929	0.036	0.036	0.018	0.018
3	15.00	-0.2	10.5	0.395	0.931	0.037	0.037	0.018	0.018
4	30.00	-1.2	11.5	0.432	0.937	0.035	0.035	0.018	0.018
5	50.00	-1.3	12.2	0.456	0.927	0.041	0.041	0.020	0.020
6	70.00	-1.2	11.7	0.449	0.928	0.041	0.041	0.019	0.019
7	85.00	0.4	10.6	0.444	0.890	0.060	0.060	0.027	0.027
8	90.00	1.6	10.9	0.478	0.740	0.136	0.136	0.058	0.058
9	95.00	3.3	10.4	0.472	0.735	0.145	0.145	0.060	0.060

TABLE VII. - Continued.

(h) 90 Percent of design speed; reading 1632

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.729	24.714	0.0	30.7	47.2	30.9	289.2	1.058	9.96	1.189
2	24.026	24.028	-0.0	28.7	45.5	28.0	289.1	1.058	10.14	1.189
3	23.322	23.343	-0.0	28.3	45.2	25.9	288.7	1.058	10.14	1.195
4	21.173	21.285	0.0	30.8	42.4	18.7	287.9	1.057	10.14	1.196
5	18.321	18.542	0.0	34.3	38.8	9.4	287.8	1.052	10.16	1.180
6	15.540	15.799	-0.0	36.2	34.4	0.1	287.8	1.046	10.15	1.160
7	13.541	13.741	-0.0	38.2	30.9	-7.1	287.7	1.042	10.15	1.135
8	12.906	13.056	-0.0	39.8	30.0	-9.2	287.7	1.040	10.14	1.111
9	12.289	12.370	0.0	40.9	29.2	-12.6	287.6	1.040	10.10	1.113

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	173.3	182.7	255.1	183.0	173.3	157.1	0.0	93.2	187.3	187.2
2	178.9	192.1	255.2	190.9	178.9	168.5	-0.0	92.3	182.0	182.0
3	175.5	196.1	249.0	192.0	175.5	172.7	-0.0	92.9	176.7	176.8
4	175.7	200.5	237.9	181.8	175.7	172.2	0.0	102.8	160.3	161.2
5	172.7	200.7	221.6	168.1	172.7	165.8	0.0	113.1	138.9	140.6
6	171.5	201.7	207.8	162.8	171.5	162.8	-0.0	119.1	117.5	119.4
7	171.1	199.4	199.4	157.8	171.1	156.6	-0.0	123.4	102.4	103.9
8	169.2	191.2	195.4	148.7	169.2	146.8	-0.0	122.5	97.6	98.7
9	165.6	191.7	189.7	148.4	165.6	144.8	0.0	125.6	92.5	93.1

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.522	0.536	0.769	0.537	0.522	0.461	0.906	0.934
2	0.540	0.565	0.770	0.562	0.540	0.496	0.942	0.888
3	0.530	0.578	0.751	0.566	0.530	0.509	0.984	0.869
4	0.531	0.593	0.719	0.538	0.531	0.509	0.980	0.802
5	0.521	0.595	0.669	0.499	0.521	0.492	0.960	0.754
6	0.518	0.600	0.627	0.485	0.518	0.485	0.950	0.704
7	0.517	0.594	0.602	0.471	0.517	0.467	0.915	0.721
8	0.511	0.569	0.589	0.443	0.511	0.437	0.868	0.731
9	0.499	0.570	0.572	0.442	0.499	0.431	0.874	0.738

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	3.9	10.2	0.487	0.875	0.073	0.073	0.035	0.035
2	10.00	2.5	11.0	0.452	0.881	0.069	0.069	0.034	0.034
3	15.00	2.5	11.7	0.432	0.896	0.064	0.064	0.031	0.031
4	30.00	1.7	12.2	0.464	0.928	0.046	0.046	0.023	0.023
5	50.00	1.9	12.3	0.499	0.931	0.046	0.046	0.023	0.023
6	70.00	1.8	11.9	0.488	0.936	0.043	0.043	0.020	0.020
7	85.00	3.5	10.9	0.484	0.875	0.081	0.081	0.035	0.035
8	90.00	4.6	10.8	0.511	0.762	0.151	0.151	0.064	0.064
9	95.00	5.9	9.3	0.498	0.771	0.155	0.155	0.064	0.064

TABLE VII. - Continued.

(i) 90 Percent of design speed; reading 1633

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.729	24.714	0.0	35.5	49.7	31.7	289.0	1.062	9.99	1.184
2	24.026	24.028	0.0	33.4	48.1	28.8	288.9	1.060	10.13	1.184
3	23.322	23.343	0.0	32.4	47.7	26.3	288.5	1.060	10.14	1.192
4	21.173	21.285	0.0	33.3	45.0	19.3	287.9	1.057	10.15	1.196
5	18.321	18.542	-0.0	36.7	41.2	9.5	288.0	1.052	10.15	1.181
6	15.540	15.799	0.0	38.3	37.1	0.3	287.9	1.046	10.14	1.161
7	13.541	13.741	0.0	40.1	33.5	-6.4	287.8	1.040	10.14	1.129
8	12.906	13.056	0.0	41.4	32.6	-8.9	287.7	1.039	10.14	1.116
9	12.289	12.370	0.0	42.5	31.9	-12.6	287.6	1.039	10.11	1.120

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	158.1	171.7	244.3	164.4	158.1	139.8	0.0	99.7	186.2	186.1
2	162.4	179.5	243.3	171.0	162.4	149.9	0.0	98.8	181.2	181.2
3	160.1	184.9	238.0	174.1	160.1	156.1	0.0	99.1	176.1	176.3
4	160.2	191.0	226.5	169.1	160.2	159.5	0.0	105.0	160.1	160.9
5	157.8	191.2	209.8	155.5	157.8	153.3	-0.0	114.2	138.2	139.9
6	155.7	191.7	195.1	150.5	155.7	150.5	0.0	118.7	117.7	119.6
7	154.1	185.6	184.8	142.9	154.1	142.1	0.0	119.5	102.1	103.6
8	152.2	181.6	180.7	137.9	152.2	136.3	0.0	120.0	97.4	98.6
9	148.9	182.6	175.4	137.9	148.9	134.5	0.0	123.5	92.7	93.4

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.474	0.501	0.733	0.480	0.474	0.408	0.885	0.958
2	0.488	0.526	0.731	0.501	0.488	0.439	0.923	0.920
3	0.481	0.543	0.715	0.511	0.481	0.458	0.975	0.900
4	0.482	0.563	0.681	0.498	0.482	0.470	0.996	0.837
5	0.474	0.565	0.630	0.460	0.474	0.453	0.972	0.774
6	0.468	0.569	0.586	0.447	0.468	0.447	0.967	0.724
7	0.463	0.551	0.555	0.424	0.463	0.422	0.922	0.720
8	0.457	0.539	0.542	0.409	0.457	0.404	0.896	0.726
9	0.447	0.542	0.526	0.409	0.447	0.399	0.904	0.730

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	6.4	11.1	0.555	0.799	0.134	0.134	0.064	0.064
2	10.00	5.1	11.8	0.521	0.824	0.115	0.115	0.056	0.056
3	15.00	5.1	12.1	0.495	0.852	0.101	0.101	0.049	0.049
4	30.00	4.3	12.8	0.499	0.912	0.063	0.063	0.031	0.031
5	50.00	4.3	12.4	0.533	0.943	0.042	0.042	0.021	0.021
6	70.00	4.4	12.1	0.517	0.950	0.037	0.037	0.017	0.017
7	85.00	6.1	11.7	0.515	0.874	0.090	0.090	0.040	0.040
8	90.00	7.2	11.1	0.525	0.814	0.135	0.135	0.058	0.058
9	95.00	8.6	9.3	0.512	0.833	0.128	0.128	0.053	0.053

TABLE VII. - Continued.

(j) 90 Percent of design speed; reading 1634

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.729	24.714	0.0	44.8	52.8	31.5	288.9	1.067	10.01	1.182
2	24.026	24.028	0.0	40.5	51.3	29.6	288.8	1.064	10.13	1.175
3	23.322	23.343	0.0	38.2	50.6	26.9	288.4	1.064	10.14	1.180
4	21.173	21.285	0.0	36.1	47.9	19.1	288.1	1.060	10.14	1.196
5	18.321	18.542	0.0	38.5	44.1	9.3	287.9	1.054	10.15	1.184
6	15.540	15.799	0.0	39.6	39.7	0.6	287.8	1.046	10.14	1.159
7	13.541	13.741	0.0	41.1	36.2	-6.2	287.9	1.040	10.14	1.129
8	12.906	13.056	0.0	42.1	35.1	-8.6	287.8	1.039	10.13	1.119
9	12.289	12.370	0.0	43.2	34.3	-12.3	287.7	1.039	10.11	1.122

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	141.6	164.0	234.5	136.4	141.6	116.3	0.0	115.5	186.9	186.8
2	146.2	168.6	233.7	147.4	146.2	128.1	0.0	109.5	182.4	182.4
3	145.0	174.0	228.6	153.3	145.0	136.7	0.0	107.5	176.8	176.9
4	144.4	184.4	215.2	157.7	144.4	149.0	0.0	108.7	159.6	160.4
5	143.0	186.6	199.0	148.0	143.0	146.0	0.0	116.1	138.4	140.1
6	141.2	184.8	183.6	142.3	141.2	142.3	0.0	117.8	117.4	119.3
7	140.1	180.6	173.6	136.9	140.1	136.1	0.0	118.8	102.4	103.9
8	138.7	177.2	169.6	133.1	138.7	131.5	0.0	118.7	97.6	98.7
9	136.4	178.3	165.0	133.1	136.4	130.0	0.0	122.0	92.9	93.6

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.423	0.476	0.700	0.396	0.423	0.338	0.822	0.994
2	0.437	0.491	0.699	0.429	0.437	0.373	0.877	0.960
3	0.434	0.508	0.684	0.448	0.434	0.399	0.943	0.933
4	0.432	0.542	0.644	0.463	0.432	0.438	1.032	0.860
5	0.428	0.550	0.596	0.436	0.428	0.431	1.021	0.795
6	0.423	0.547	0.549	0.421	0.423	0.421	1.008	0.733
7	0.419	0.535	0.519	0.406	0.419	0.403	0.971	0.723
8	0.415	0.525	0.507	0.394	0.415	0.390	0.948	0.723
9	0.408	0.529	0.493	0.395	0.408	0.386	0.953	0.725

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	9.6	10.8	0.693	0.732	0.206	0.206	0.098	0.098
2	10.00	8.2	12.6	0.628	0.731	0.200	0.200	0.096	0.096
3	15.00	8.0	12.7	0.585	0.756	0.188	0.188	0.091	0.091
4	30.00	7.1	12.6	0.534	0.878	0.099	0.099	0.049	0.049
5	50.00	7.1	12.2	0.551	0.921	0.066	0.066	0.033	0.033
6	70.00	7.1	12.4	0.529	0.933	0.056	0.056	0.026	0.026
7	85.00	8.8	11.8	0.516	0.877	0.099	0.099	0.043	0.043
8	90.00	9.7	11.4	0.520	0.836	0.133	0.133	0.057	0.057
9	95.00	11.0	9.6	0.506	0.865	0.114	0.114	0.047	0.047

TABLE VII. - Continued.

(k) 100 Percent of design speed; reading 1625

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.729	24.714	-0.0	28.3	44.0	29.5	289.3	1.070	9.89	1.216
2	24.026	24.028	0.0	25.8	42.4	26.4	289.0	1.069	10.13	1.228
3	23.322	23.343	0.0	26.4	42.1	24.3	288.6	1.071	10.15	1.230
4	21.173	21.285	-0.0	28.8	39.1	17.1	288.0	1.069	10.15	1.234
5	18.321	18.542	-0.0	31.5	35.3	8.6	287.8	1.063	10.16	1.215
6	15.540	15.799	-0.0	33.7	31.2	-0.3	287.8	1.058	10.16	1.197
7	13.541	13.741	-0.0	36.6	28.0	-7.6	287.8	1.051	10.15	1.161
8	12.906	13.056	0.0	38.0	27.2	-9.3	287.7	1.048	10.14	1.127
9	12.289	12.370	0.0	38.6	26.7	-11.5	287.6	1.048	10.10	1.128

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	215.6	213.7	299.6	216.4	215.6	188.3	-0.0	101.2	208.0	207.9
2	221.0	228.9	299.4	230.0	221.0	206.1	0.0	99.7	201.9	201.9
3	217.1	231.7	292.8	227.8	217.1	207.6	0.0	102.9	196.5	196.7
4	219.4	238.4	282.6	218.6	219.4	208.9	-0.0	114.8	178.2	179.1
5	218.0	239.5	267.1	206.6	218.0	204.3	-0.0	125.1	154.2	156.1
6	215.9	241.9	252.5	201.2	215.9	201.2	-0.0	134.2	131.0	133.2
7	214.8	236.2	243.2	191.2	214.8	189.6	-0.0	140.9	114.0	115.7
8	211.2	225.5	237.4	180.1	211.2	177.7	0.0	138.8	108.5	109.8
9	206.0	224.6	230.6	179.2	206.0	175.5	0.0	140.1	103.6	104.3

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.659	0.629	0.916	0.637	0.659	0.554	0.873	0.974
2	0.678	0.679	0.918	0.682	0.678	0.611	0.932	0.918
3	0.665	0.688	0.897	0.676	0.665	0.616	0.956	0.897
4	0.673	0.711	0.868	0.652	0.673	0.623	0.952	0.868
5	0.669	0.717	0.820	0.619	0.669	0.612	0.937	0.820
6	0.662	0.727	0.774	0.605	0.662	0.605	0.932	0.774
7	0.659	0.711	0.746	0.576	0.659	0.571	0.882	0.786
8	0.646	0.677	0.727	0.541	0.646	0.533	0.842	0.817
9	0.629	0.674	0.705	0.538	0.629	0.527	0.852	0.842

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	0.7	8.9	0.466	0.818	0.099	0.099	0.048	0.048
2	10.00	-0.6	9.3	0.416	0.872	0.069	0.069	0.034	0.034
3	15.00	-0.5	10.1	0.413	0.859	0.079	0.079	0.039	0.039
4	30.00	-1.6	10.6	0.441	0.901	0.057	0.057	0.029	0.029
5	50.00	-1.7	11.5	0.462	0.908	0.053	0.053	0.026	0.026
6	70.00	-1.4	11.5	0.455	0.908	0.054	0.054	0.025	0.025
7	85.00	0.6	10.4	0.472	0.851	0.082	0.082	0.036	0.036
8	90.00	1.8	10.7	0.496	0.727	0.145	0.145	0.062	0.062
9	95.00	3.4	10.4	0.480	0.723	0.156	0.156	0.064	0.064

TABLE VII. - Continued.

(ℓ) 100 Percent of design speed; reading 1626

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.729	24.714	0.0	30.6	46.2	30.3	289.2	1.072	9.89	1.243
2	24.026	24.028	0.0	28.4	44.5	27.7	289.0	1.072	10.13	1.238
3	23.322	23.343	0.0	28.6	44.1	25.2	288.6	1.073	10.15	1.244
4	21.173	21.285	-0.0	30.9	41.2	18.2	288.0	1.069	10.16	1.246
5	18.321	18.542	-0.0	34.0	37.4	9.2	287.8	1.064	10.16	1.221
6	15.540	15.799	0.0	35.8	33.1	-0.4	287.7	1.057	10.15	1.202
7	13.541	13.741	0.0	38.1	29.7	-7.4	287.8	1.052	10.15	1.164
8	12.906	13.056	-0.0	39.6	28.9	-9.5	287.8	1.049	10.14	1.136
9	12.289	12.370	0.0	40.3	28.4	-12.0	287.7	1.049	10.09	1.138

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	200.3	206.1	289.2	205.5	200.3	177.4	0.0	104.8	208.7	208.5
2	206.3	216.2	289.0	214.7	206.3	190.2	0.0	102.8	202.4	202.5
3	202.9	220.5	282.4	214.0	202.9	193.6	0.0	105.5	196.5	196.7
4	204.4	226.2	271.6	204.3	204.4	194.1	-0.0	116.1	178.8	179.8
5	202.6	226.1	255.1	189.8	202.6	187.4	-0.0	126.5	154.9	156.8
6	200.5	229.9	239.5	186.5	200.5	186.5	0.0	134.5	130.9	133.1
7	200.3	225.4	230.7	178.8	200.3	177.4	0.0	139.0	114.4	116.1
8	197.5	216.6	225.5	169.2	197.5	166.8	-0.0	138.1	108.9	110.2
9	192.6	216.0	218.8	168.5	192.6	164.8	0.0	139.7	104.0	104.7

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.609	0.605	0.879	0.603	0.609	0.521	0.886	1.030
2	0.629	0.637	0.881	0.633	0.629	0.560	0.922	0.973
3	0.618	0.651	0.860	0.632	0.618	0.572	0.954	0.950
4	0.624	0.671	0.829	0.606	0.624	0.576	0.950	0.869
5	0.618	0.673	0.778	0.565	0.618	0.558	0.925	0.815
6	0.611	0.688	0.730	0.558	0.611	0.558	0.930	0.768
7	0.611	0.675	0.703	0.536	0.611	0.531	0.885	0.806
8	0.601	0.647	0.687	0.506	0.601	0.499	0.845	0.822
9	0.585	0.646	0.665	0.504	0.585	0.493	0.856	0.838

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	2.9	9.7	0.492	0.889	0.066	0.066	0.032	0.032
2	10.00	1.4	10.6	0.454	0.873	0.075	0.075	0.037	0.037
3	15.00	1.4	11.0	0.446	0.884	0.071	0.071	0.035	0.035
4	30.00	0.5	11.6	0.474	0.932	0.042	0.042	0.021	0.021
5	50.00	0.4	12.0	0.506	0.924	0.048	0.048	0.024	0.024
6	70.00	0.5	11.4	0.488	0.943	0.036	0.036	0.017	0.017
7	85.00	2.3	10.6	0.493	0.859	0.086	0.086	0.038	0.038
8	90.00	3.5	10.5	0.516	0.760	0.143	0.143	0.061	0.061
9	95.00	5.1	10.0	0.500	0.776	0.139	0.139	0.057	0.057

TABLE VII. - Continued.

(m) 100 Percent of design speed; reading 1627

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.729	24.714	0.0	34.4	48.7	31.7	289.1	1.076	9.92	1.240
2	24.026	24.028	-0.0	32.0	46.9	29.0	289.0	1.074	10.13	1.233
3	23.322	23.343	-0.0	31.3	46.4	26.4	288.7	1.074	10.15	1.242
4	21.173	21.285	0.0	33.0	43.5	18.9	287.9	1.071	10.15	1.251
5	18.321	18.542	0.0	36.0	39.7	9.5	287.8	1.065	10.16	1.226
6	15.540	15.799	0.0	37.4	35.3	-0.2	287.8	1.058	10.15	1.205
7	13.541	13.741	-0.0	39.6	31.6	-7.2	287.8	1.052	10.15	1.162
8	12.906	13.056	0.0	40.9	30.8	-9.3	288.0	1.049	10.14	1.141
9	12.289	12.370	0.0	41.6	30.1	-12.5	287.8	1.049	10.10	1.147

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	184.0	194.7	278.7	188.8	184.0	160.6	0.0	110.0	209.3	209.2
2	189.9	202.9	277.8	196.6	189.9	172.0	-0.0	107.6	202.8	202.8
3	187.5	209.0	272.1	199.3	187.5	178.5	-0.0	108.6	197.1	197.3
4	188.7	216.8	260.3	192.2	188.7	181.8	0.0	118.0	179.3	180.2
5	186.9	216.8	242.7	177.7	186.9	175.3	0.0	127.5	154.9	156.8
6	185.3	220.4	227.0	175.0	185.3	175.0	0.0	133.9	131.2	133.4
7	185.7	214.7	218.1	166.7	185.7	165.4	-0.0	136.9	114.4	116.1
8	183.4	208.7	213.5	160.0	183.4	157.8	0.0	136.5	109.3	110.6
9	179.1	209.7	207.0	160.7	179.1	156.9	0.0	139.1	103.7	104.4

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.556	0.568	0.843	0.551	0.556	0.469	0.873	1.071
2	0.576	0.595	0.842	0.576	0.576	0.504	0.906	1.020
3	0.568	0.614	0.824	0.586	0.568	0.524	0.952	0.996
4	0.573	0.640	0.790	0.568	0.573	0.537	0.964	0.923
5	0.567	0.643	0.736	0.527	0.567	0.520	0.938	0.857
6	0.562	0.657	0.688	0.522	0.562	0.521	0.945	0.800
7	0.563	0.640	0.661	0.497	0.563	0.493	0.891	0.811
8	0.555	0.622	0.647	0.477	0.555	0.470	0.861	0.822
9	0.542	0.625	0.626	0.479	0.542	0.468	0.876	0.828

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	5.4	11.1	0.543	0.835	0.108	0.108	0.051	0.051
2	10.00	3.8	11.9	0.506	0.837	0.104	0.104	0.050	0.050
3	15.00	3.8	12.2	0.485	0.864	0.090	0.090	0.044	0.044
4	30.00	2.8	12.3	0.501	0.925	0.052	0.052	0.026	0.026
5	50.00	2.7	12.3	0.533	0.923	0.054	0.054	0.027	0.027
6	70.00	2.7	11.6	0.509	0.939	0.043	0.043	0.020	0.020
7	85.00	4.2	10.8	0.515	0.845	0.104	0.104	0.046	0.046
8	90.00	5.4	10.7	0.529	0.786	0.141	0.141	0.060	0.060
9	95.00	6.8	9.5	0.508	0.808	0.135	0.135	0.055	0.055

TABLE VII. - Continued.

(n) 100 Percent of design speed; reading 1628

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	24.729	24.714	0.0	39.4	50.7	32.1	289.0	1.078	9.95	1.235
2	24.026	24.028	0.0	35.1	48.8	29.7	288.9	1.076	10.13	1.229
3	23.322	23.343	0.0	34.8	48.5	26.8	288.6	1.075	10.15	1.236
4	21.173	21.285	0.0	34.5	45.6	19.7	288.0	1.072	10.15	1.248
5	18.321	18.542	0.0	37.6	41.6	9.8	287.9	1.065	10.15	1.225
6	15.540	15.799	0.0	38.4	37.1	0.3	287.8	1.058	10.15	1.205
7	13.541	13.741	0.0	40.5	33.4	-6.7	287.8	1.051	10.15	1.162
8	12.906	13.056	0.0	41.4	32.3	-8.8	287.7	1.048	10.14	1.143
9	12.289	12.370	0.0	42.3	31.6	-12.4	287.7	1.049	10.11	1.151

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	171.1	186.6	270.0	170.3	171.1	144.3	0.0	118.4	208.9	208.8
2	177.4	194.9	269.5	183.4	177.4	159.4	0.0	112.1	202.9	202.9
3	174.7	200.2	263.5	184.1	174.7	164.3	0.0	114.3	197.2	197.4
4	175.4	209.3	250.8	183.3	175.4	172.6	0.0	118.5	179.3	180.2
5	174.2	209.5	232.9	168.4	174.2	166.0	0.0	127.8	154.6	156.5
6	173.4	213.3	217.5	167.1	173.4	167.1	0.0	132.6	131.2	133.4
7	173.9	207.7	208.3	158.9	173.9	157.8	0.0	134.9	114.8	116.5
8	172.1	202.0	203.6	153.4	172.1	151.6	0.0	133.6	108.8	110.1
9	168.4	204.3	197.8	154.6	168.4	151.0	0.0	137.6	103.8	104.5

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.515	0.543	0.813	0.495	0.515	0.420	0.843	1.093
2	0.535	0.569	0.813	0.536	0.535	0.465	0.899	1.046
3	0.527	0.586	0.795	0.539	0.527	0.481	0.941	1.022
4	0.530	0.616	0.758	0.540	0.530	0.508	0.984	0.949
5	0.526	0.620	0.703	0.498	0.526	0.491	0.953	0.874
6	0.524	0.634	0.657	0.497	0.524	0.497	0.963	0.812
7	0.525	0.618	0.629	0.473	0.525	0.470	0.908	0.814
8	0.520	0.601	0.615	0.456	0.520	0.451	0.881	0.816
9	0.508	0.608	0.597	0.460	0.508	0.449	0.896	0.822

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	7.4	11.4	0.614	0.798	0.143	0.143	0.067	0.067
2	10.00	5.8	12.6	0.549	0.801	0.137	0.137	0.066	0.066
3	15.00	5.8	12.6	0.537	0.828	0.122	0.122	0.059	0.059
4	30.00	4.9	13.1	0.519	0.902	0.073	0.073	0.036	0.036
5	50.00	4.6	12.6	0.553	0.926	0.056	0.056	0.028	0.028
6	70.00	4.5	12.0	0.521	0.947	0.040	0.040	0.019	0.019
7	85.00	6.0	11.3	0.526	0.860	0.101	0.101	0.044	0.044
8	90.00	6.9	11.2	0.532	0.803	0.140	0.140	0.060	0.060
9	95.00	8.4	9.6	0.513	0.831	0.129	0.129	0.053	0.053

TABLE VII. - Concluded.

(o) 100 Percent of design speed; reading 1629

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	24.729	24.714	0.0	48.1	52.9	32.3	289.0	1.085	9.98	1.213
2	24.026	24.028	0.0	42.3	51.2	29.2	288.9	1.080	10.12	1.209
3	23.322	23.343	0.0	39.6	50.8	27.0	288.5	1.079	10.15	1.212
4	21.173	21.285	-0.0	36.4	47.8	19.0	288.0	1.074	10.15	1.244
5	18.321	18.542	0.0	38.6	43.8	9.3	287.9	1.066	10.14	1.229
6	15.540	15.799	0.0	39.3	39.2	0.1	287.8	1.058	10.15	1.204
7	13.541	13.741	0.0	40.6	35.3	-6.4	287.8	1.051	10.14	1.165
8	12.906	13.056	-0.0	41.9	34.3	-8.9	287.7	1.049	10.14	1.148
9	12.289	12.370	0.0	42.6	33.4	-12.0	287.7	1.049	10.12	1.151

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	157.9	179.1	261.9	141.6	157.9	119.7	0.0	133.2	209.0	208.9
2	163.2	187.0	260.5	158.2	163.2	138.2	0.0	125.9	203.0	203.1
3	160.9	191.5	254.5	165.5	160.9	147.5	0.0	122.2	197.2	197.3
4	162.1	206.7	241.5	176.1	162.1	166.5	-0.0	122.5	179.0	180.0
5	161.6	208.9	224.0	165.4	161.6	163.2	0.0	130.3	155.1	157.0
6	161.1	210.4	207.9	162.9	161.1	162.9	0.0	133.3	131.5	133.7
7	161.8	205.4	198.3	156.9	161.8	155.9	0.0	133.8	114.6	116.3
8	160.4	200.5	194.1	150.9	160.4	149.1	-0.0	134.0	109.3	110.6
9	158.1	201.9	189.4	151.9	158.1	148.6	0.0	136.6	104.2	104.9

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS
RP	IN	OUT	IN	OUT	IN	OUT	VEL R MACH NO
1	0.474	0.518	0.786	0.410	0.474	0.346	0.758 1.118
2	0.490	0.543	0.783	0.460	0.490	0.402	0.847 1.073
3	0.484	0.558	0.765	0.482	0.484	0.430	0.916 1.047
4	0.488	0.608	0.727	0.518	0.488	0.489	1.027 0.970
5	0.486	0.617	0.674	0.488	0.486	0.482	1.010 0.893
6	0.485	0.625	0.625	0.484	0.485	0.484	1.011 0.823
7	0.487	0.611	0.597	0.467	0.487	0.464	0.964 0.812
8	0.483	0.596	0.584	0.449	0.483	0.443	0.930 0.816
9	0.475	0.600	0.569	0.452	0.475	0.442	0.940 0.820

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	9.6	11.7	0.743	0.666	0.265	0.265	0.125	0.125
2	10.00	8.2	12.1	0.660	0.697	0.229	0.229	0.111	0.111
3	15.00	8.1	12.8	0.611	0.714	0.223	0.223	0.108	0.108
4	30.00	7.1	12.5	0.539	0.871	0.104	0.104	0.052	0.052
5	50.00	6.9	12.1	0.555	0.916	0.069	0.069	0.034	0.034
6	70.00	6.6	11.9	0.520	0.944	0.046	0.046	0.022	0.022
7	85.00	7.9	11.6	0.509	0.877	0.097	0.097	0.042	0.042
8	90.00	8.9	11.1	0.523	0.818	0.143	0.143	0.061	0.061
9	95.00	10.1	9.9	0.503	0.834	0.137	0.137	0.056	0.056

TABLE VIII. - BLADE-ELEMENT DATA AT BLADE EDGES FOR STATOR 55

(a) 80 Percent of design speed; reading 1638

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	25.230	25.298	20.7	-6.2	20.7	-6.2	300.5	0.997	11.40	0.945
2	24.547	24.671	19.7	-5.4	19.7	-5.4	300.5	0.998	11.57	0.959
3	23.876	24.049	20.5	-5.0	20.5	-5.0	300.4	0.999	11.60	0.972
4	21.847	22.222	23.3	-4.6	23.3	-4.6	300.2	0.999	11.63	0.980
5	19.164	19.827	26.7	-3.6	26.7	-3.6	299.6	1.001	11.58	0.988
6	16.502	17.465	28.6	-3.4	28.6	-3.4	298.5	1.004	11.43	0.992
7	14.519	15.682	30.2	-3.5	30.2	-3.5	297.5	1.003	11.18	0.986
8	13.858	15.070	31.8	-5.0	31.8	-5.0	296.4	1.003	10.83	0.986
9	13.200	14.448	32.6	-6.5	32.6	-6.5	295.8	1.003	10.61	0.985

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	201.0	191.6	201.0	191.6	188.0	190.4	71.0	-20.6	0.	0.
2	208.6	203.7	208.6	203.7	196.4	202.8	70.2	-19.2	0.	0.
3	210.5	209.3	210.5	209.3	197.2	208.5	73.6	-18.3	0.	0.
4	217.2	215.8	217.2	215.8	199.4	215.1	86.0	-17.2	0.	0.
5	221.1	224.2	221.1	224.2	197.4	223.8	99.5	-14.1	0.	0.
6	221.2	231.8	221.2	231.8	194.2	231.4	105.8	-13.8	0.	0.
7	214.9	233.6	214.9	233.6	185.8	233.1	108.0	-14.2	0.	0.
8	202.5	222.7	202.5	222.7	172.2	221.9	106.6	-19.4	0.	0.
9	193.4	214.2	193.4	214.2	163.0	212.8	104.2	-24.3	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.599	0.570	0.599	0.570	0.560	0.566	1.013	0.599
2	0.623	0.608	0.623	0.608	0.587	0.606	1.033	0.623
3	0.629	0.626	0.629	0.626	0.590	0.624	1.057	0.629
4	0.651	0.647	0.651	0.647	0.598	0.645	1.079	0.651
5	0.665	0.675	0.665	0.675	0.594	0.673	1.133	0.665
6	0.666	0.700	0.666	0.700	0.585	0.699	1.192	0.666
7	0.647	0.707	0.647	0.707	0.559	0.706	1.255	0.647
8	0.608	0.673	0.608	0.673	0.517	0.670	1.289	0.608
9	0.580	0.646	0.580	0.646	0.488	0.642	1.306	0.580

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	-19.8	9.5	0.358	0.	0.256	0.256	0.174	0.174
2	10.00	-20.9	9.9	0.307	0.	0.177	0.177	0.117	0.117
3	15.00	-20.1	10.0	0.288	0.	0.121	0.121	0.078	0.078
4	30.00	-17.7	9.5	0.287	0.	0.082	0.082	0.049	0.049
5	50.00	-14.7	9.4	0.252	0.	0.045	0.045	0.024	0.024
6	70.00	-13.2	8.3	0.194	0.	0.030	0.030	0.014	0.014
7	85.00	-12.0	7.5	0.138	0.	0.057	0.057	0.023	0.023
8	90.00	-10.5	5.7	0.136	0.	0.063	0.063	0.024	0.024
9	95.00	-9.8	3.9	0.133	0.	0.072	0.072	0.027	0.027

TABLE VIII. - Continued.

(b) 80 Percent of design speed; reading 1639

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	25.230	25.298	23.8	-5.8	23.8	-5.8	301.0	0.996	11.44	0.968
2	24.547	24.671	23.2	-5.1	23.2	-5.1	300.9	0.997	11.61	0.975
3	23.876	24.049	23.5	-4.8	23.5	-4.8	300.6	0.998	11.64	0.982
4	21.847	22.222	26.1	-4.8	26.1	-4.8	299.7	0.999	11.59	0.993
5	19.164	19.827	29.3	-4.4	29.3	-4.4	299.0	0.999	11.47	0.999
6	16.502	17.465	31.2	-3.7	31.2	-3.7	298.0	1.000	11.41	0.994
7	14.519	15.682	33.6	-3.4	33.6	-3.4	297.6	0.999	11.29	0.988
8	13.858	15.070	35.3	-4.5	35.3	-4.5	296.8	1.000	10.96	0.998
9	13.200	14.448	36.2	-5.5	36.2	-5.5	296.5	1.000	10.89	0.991

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	178.2	164.7	178.2	164.7	163.1	163.9	71.8	-16.8	0.	0.
2	186.0	174.6	186.0	174.6	170.9	173.9	73.3	-15.5	0.	0.
3	188.1	178.5	188.1	178.5	172.6	177.9	74.9	-14.8	0.	0.
4	191.3	184.6	191.3	184.6	171.8	183.9	84.3	-15.3	0.	0.
5	192.0	187.5	192.0	187.5	167.4	186.9	93.9	-14.3	0.	0.
6	194.1	190.4	194.1	190.4	166.1	190.0	100.4	-12.2	0.	0.
7	193.7	191.7	193.7	191.7	161.3	191.4	107.2	-11.2	0.	0.
8	181.8	184.6	181.8	184.6	148.3	184.0	105.2	-14.5	0.	0.
9	178.6	178.4	178.6	178.4	144.1	177.6	105.5	-17.1	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.526	0.486	0.526	0.486	0.482	0.483	1.005	0.526
2	0.551	0.516	0.551	0.516	0.506	0.514	1.017	0.551
3	0.558	0.528	0.558	0.528	0.512	0.527	1.031	0.558
4	0.569	0.548	0.569	0.548	0.511	0.546	1.071	0.569
5	0.572	0.558	0.572	0.558	0.499	0.556	1.116	0.572
6	0.579	0.568	0.579	0.568	0.496	0.566	1.144	0.579
7	0.579	0.573	0.579	0.573	0.482	0.572	1.187	0.579
8	0.542	0.550	0.542	0.550	0.442	0.549	1.240	0.542
9	0.532	0.531	0.532	0.531	0.429	0.529	1.232	0.532

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-16.7	9.8	0.414	0.	0.186	0.186	0.126	0.126
2	10.00	-17.3	10.2	0.378	0.	0.137	0.137	0.090	0.090
3	15.00	-17.1	10.2	0.359	0.	0.093	0.093	0.060	0.060
4	30.00	-14.9	9.3	0.343	0.	0.033	0.033	0.020	0.020
5	50.00	-12.2	8.6	0.316	0.	0.006	0.006	0.003	0.003
6	70.00	-10.7	8.1	0.279	0.	0.032	0.032	0.014	0.014
7	85.00	-8.6	7.6	0.251	0.	0.061	0.061	0.025	0.025
8	90.00	-7.0	6.2	0.234	0.	0.011	0.011	0.004	0.004
9	95.00	-6.2	4.9	0.249	0.	0.053	0.053	0.020	0.020

TABLE VIII. - Continued.

(c) 80 Percent of design speed; reading 1640

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	25.230	25.298	30.0	-3.8	30.0	-3.8	301.6	0.998	11.44	0.986
2	24.547	24.671	28.3	-3.6	28.3	-3.6	301.8	0.997	11.62	0.984
3	23.876	24.049	28.4	-3.7	28.4	-3.7	301.6	0.996	11.68	0.984
4	21.847	22.222	30.3	-3.8	30.3	-3.8	300.4	0.998	11.66	0.993
5	19.164	19.827	33.1	-3.4	33.1	-3.4	299.1	0.999	11.53	0.998
6	16.502	17.465	34.9	-2.3	34.9	-2.3	298.0	0.999	11.42	0.993
7	14.519	15.682	37.0	-2.7	37.0	-2.7	297.1	1.000	11.21	0.993
8	13.858	15.070	38.4	-3.8	38.4	-3.8	296.5	1.000	10.99	0.999
9	13.200	14.448	39.4	-5.9	39.4	-5.9	296.5	0.999	10.97	0.993

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	158.3	147.0	158.3	147.0	137.0	146.7	79.2	-9.7	0.	0.
2	167.6	153.8	167.6	153.8	147.6	153.5	79.4	-9.6	0.	0.
3	170.6	156.1	170.6	156.1	150.1	155.8	81.1	-10.0	0.	0.
4	174.3	162.5	174.3	162.5	150.5	162.1	88.0	-10.7	0.	0.
5	173.5	162.6	173.5	162.6	145.4	162.3	94.7	-9.7	0.	0.
6	174.5	160.6	174.5	160.6	143.1	160.5	99.8	-6.4	0.	0.
7	170.9	157.9	170.9	157.9	136.4	157.7	102.9	-7.6	0.	0.
8	162.0	150.7	162.0	150.7	127.0	150.3	100.6	-9.9	0.	0.
9	161.3	146.2	161.3	146.2	124.6	145.5	102.4	-15.0	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.464	0.431	0.464	0.431	0.402	0.430	1.071	0.464
2	0.493	0.451	0.493	0.451	0.434	0.450	1.040	0.493
3	0.502	0.459	0.502	0.459	0.442	0.458	1.038	0.502
4	0.515	0.479	0.515	0.479	0.444	0.478	1.077	0.515
5	0.514	0.480	0.514	0.480	0.430	0.479	1.116	0.514
6	0.517	0.475	0.517	0.475	0.424	0.474	1.121	0.517
7	0.507	0.467	0.507	0.467	0.405	0.466	1.156	0.507
8	0.480	0.445	0.480	0.445	0.376	0.444	1.184	0.480
9	0.478	0.432	0.478	0.432	0.369	0.429	1.167	0.478

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-10.4	11.9	0.454	0.	0.105	0.105	0.071	0.071
2	10.00	-12.3	11.7	0.434	0.	0.106	0.106	0.070	0.070
3	15.00	-12.2	11.3	0.429	0.	0.101	0.101	0.065	0.065
4	30.00	-10.7	10.3	0.403	0.	0.039	0.039	0.023	0.023
5	50.00	-8.4	9.6	0.375	0.	0.011	0.011	0.006	0.006
6	70.00	-6.9	9.4	0.352	0.	0.043	0.043	0.020	0.020
7	85.00	-5.2	8.2	0.330	0.	0.041	0.041	0.017	0.017
8	90.00	-3.9	6.9	0.327	0.	0.008	0.008	0.003	0.003
9	95.00	-3.0	4.5	0.356	0.	0.052	0.052	0.019	0.019

TABLE VIII. - Continued.

(d) 80 Percent of design speed; reading 1641

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	25.230	25.298	36.0	-2.2	36.0	-2.2	303.3	0.997	11.51	0.987
2	24.547	24.671	33.4	-2.1	33.4	-2.1	302.7	0.997	11.61	0.989
3	23.876	24.049	33.0	-2.5	33.0	-2.5	302.6	0.997	11.67	0.988
4	21.847	22.222	33.5	-2.7	33.5	-2.7	301.1	0.998	11.70	0.993
5	19.164	19.827	35.8	-2.5	35.8	-2.5	299.5	0.998	11.58	0.995
6	16.502	17.465	37.4	-1.0	37.4	-1.0	298.1	0.998	11.41	0.993
7	14.519	15.682	39.2	-2.7	39.2	-2.7	296.8	1.000	11.16	0.993
8	13.858	15.070	40.2	-5.3	40.2	-5.3	296.4	1.001	11.02	0.995
9	13.200	14.448	41.3	-7.2	41.3	-7.2	296.5	1.000	11.02	0.991

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	149.7	135.6	149.7	135.6	121.1	135.5	87.9	-5.2	0.	0.
2	156.3	142.1	156.3	142.1	130.5	142.0	86.1	-5.2	0.	0.
3	160.2	144.8	160.2	144.8	134.4	144.6	87.2	-6.4	0.	0.
4	166.4	151.2	166.4	151.2	138.8	151.0	91.8	-7.2	0.	0.
5	165.9	149.7	165.9	149.7	134.5	149.6	97.1	-6.5	0.	0.
6	164.0	143.6	164.0	143.6	130.2	143.6	99.7	-2.6	0.	0.
7	157.3	136.9	157.3	136.9	122.0	136.7	99.4	-6.5	0.	0.
8	151.9	130.8	151.9	130.8	116.0	130.2	98.1	-12.2	0.	0.
9	151.8	127.9	151.8	127.9	114.0	126.9	100.3	-15.9	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.437	0.395	0.437	0.395	0.354	0.395	1.118	0.437
2	0.458	0.415	0.458	0.415	0.382	0.415	1.089	0.458
3	0.470	0.423	0.470	0.423	0.394	0.423	1.076	0.470
4	0.490	0.444	0.490	0.444	0.408	0.443	1.088	0.490
5	0.489	0.440	0.489	0.440	0.397	0.440	1.112	0.489
6	0.485	0.423	0.485	0.423	0.385	0.423	1.103	0.485
7	0.465	0.403	0.465	0.403	0.361	0.402	1.121	0.465
8	0.449	0.384	0.449	0.384	0.343	0.383	1.122	0.449
9	0.449	0.376	0.449	0.376	0.337	0.373	1.113	0.449

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-4.5	13.4	0.518	0.	0.105	0.105	0.072	0.072
2	10.00	-7.1	13.2	0.478	0.	0.084	0.084	0.056	0.056
3	15.00	-7.6	12.5	0.473	0.	0.083	0.083	0.053	0.053
4	30.00	-7.5	11.3	0.443	0.	0.046	0.046	0.027	0.027
5	50.00	-5.6	10.5	0.421	0.	0.034	0.034	0.018	0.018
6	70.00	-4.4	10.7	0.402	0.	0.050	0.050	0.023	0.023
7	85.00	-3.0	8.2	0.395	0.	0.051	0.051	0.021	0.021
8	90.00	-2.1	5.3	0.413	0.	0.038	0.038	0.015	0.015
9	95.00	-1.1	3.3	0.434	0.	0.066	0.066	0.024	0.024

TABLE VIII. - Continued.

(e) 80 Percent of design speed; reading 1642

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	25.230	25.298	50.8	1.1	50.8	1.1	305.0	0.995	11.47	0.990
2	24.547	24.671	45.8	1.1	45.8	1.1	303.9	0.996	11.47	0.993
3	23.876	24.049	42.9	-0.1	42.9	-0.1	303.1	0.997	11.47	0.995
4	21.847	22.222	36.7	-1.1	36.7	-1.1	301.6	0.997	11.67	0.988
5	19.164	19.827	38.7	-1.0	38.7	-1.0	300.0	0.997	11.60	0.992
6	16.502	17.465	39.3	0.1	39.3	0.1	298.2	0.998	11.39	0.990
7	14.519	15.682	40.0	-2.2	40.0	-2.2	296.8	1.001	11.17	0.990
8	13.858	15.070	40.9	-4.9	40.9	-4.9	296.6	1.002	11.09	0.993
9	13.200	14.448	42.0	-8.6	42.0	-8.6	296.5	1.001	11.06	0.991

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	140.6	123.2	140.6	123.2	88.9	123.2	109.0	2.3	0.	0.
2	143.7	126.5	143.7	126.5	100.3	126.4	103.0	2.4	0.	0.
3	146.3	128.7	146.3	128.7	107.2	128.7	99.6	-0.2	0.	0.
4	159.4	137.4	159.4	137.4	127.8	137.4	95.2	-2.7	0.	0.
5	161.2	138.9	161.2	138.9	125.8	138.9	100.7	-2.4	0.	0.
6	157.9	132.4	157.9	132.4	122.2	132.4	100.0	0.2	0.	0.
7	153.2	124.3	153.2	124.3	117.3	124.2	98.5	-4.9	0.	0.
8	150.0	121.3	150.0	121.3	113.3	120.9	98.2	-10.4	0.	0.
9	149.3	117.5	149.3	117.5	111.0	116.2	99.9	-17.6	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.408	0.357	0.408	0.357	0.258	0.357	1.385	0.590
2	0.418	0.367	0.418	0.367	0.292	0.367	1.261	0.529
3	0.427	0.375	0.427	0.375	0.313	0.375	1.201	0.489
4	0.468	0.402	0.468	0.402	0.375	0.402	1.075	0.468
5	0.475	0.407	0.475	0.407	0.371	0.407	1.104	0.475
6	0.466	0.389	0.466	0.389	0.360	0.389	1.084	0.466
7	0.452	0.364	0.452	0.364	0.346	0.364	1.059	0.452
8	0.443	0.356	0.443	0.356	0.335	0.354	1.066	0.443
9	0.441	0.344	0.441	0.344	0.328	0.341	1.047	0.441

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	10.3	16.7	0.640	0.	0.095	0.095	0.065	0.065
2	10.00	5.2	16.4	0.584	0.	0.062	0.062	0.041	0.041
3	15.00	2.3	14.9	0.560	0.	0.045	0.045	0.029	0.029
4	30.00	-4.3	12.9	0.500	0.	0.085	0.085	0.051	0.051
5	50.00	-2.8	12.0	0.469	0.	0.057	0.057	0.030	0.030
6	70.00	-2.5	11.8	0.443	0.	0.074	0.074	0.034	0.034
7	85.00	-2.2	8.7	0.454	0.	0.077	0.077	0.031	0.031
8	90.00	-1.4	5.8	0.464	0.	0.057	0.057	0.022	0.022
9	95.00	-0.4	1.8	0.497	0.	0.071	0.071	0.026	0.026

TABLE VIII. - Continued.

(f) 90 Percent of design speed; reading 1636

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	25.230	25.298	24.4	-5.5	24.4	-5.5	304.9	0.991	11.64	0.951
2	24.547	24.671	23.0	-5.0	23.0	-5.0	304.4	0.993	11.90	0.957
3	23.876	24.049	23.8	-4.6	23.8	-4.6	304.2	0.993	11.87	0.971
4	21.847	22.222	26.2	-4.0	26.2	-4.0	303.7	0.994	11.87	0.985
5	19.164	19.827	28.8	-3.5	28.8	-3.5	302.4	0.997	11.71	0.995
6	16.502	17.465	30.3	-3.0	30.3	-3.0	300.9	0.999	11.50	0.996
7	14.519	15.682	32.7	-3.6	32.7	-3.6	299.5	1.002	11.23	0.989
8	13.858	15.070	34.3	-5.0	34.3	-5.0	298.5	1.004	10.86	0.993
9	13.200	14.448	35.2	-6.4	35.2	-6.4	297.9	1.005	10.68	0.991

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	206.5	195.3	206.5	195.3	188.1	194.4	85.2	-18.9	0.	0.
2	217.5	206.4	217.5	206.4	200.2	205.6	85.1	-18.0	0.	0.
3	219.0	210.8	219.0	210.8	200.5	210.2	88.2	-16.8	0.	0.
4	225.7	220.4	225.7	220.4	202.6	219.9	99.6	-15.4	0.	0.
5	230.1	226.1	230.1	226.1	201.6	225.7	110.9	-13.9	0.	0.
6	228.8	230.9	228.8	230.9	197.5	230.6	115.3	-12.2	0.	0.
7	222.7	231.7	222.7	231.7	187.3	231.3	120.5	-14.6	0.	0.
8	210.7	221.2	210.7	221.2	174.0	220.3	118.8	-19.4	0.	0.
9	204.2	213.8	204.2	213.8	166.8	212.4	117.7	-23.7	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.612	0.579	0.612	0.579	0.557	0.576	1.033	0.612
2	0.647	0.614	0.647	0.614	0.596	0.612	1.027	0.647
3	0.653	0.628	0.653	0.628	0.597	0.626	1.048	0.653
4	0.675	0.660	0.675	0.660	0.606	0.658	1.086	0.675
5	0.691	0.679	0.691	0.679	0.605	0.678	1.120	0.691
6	0.688	0.696	0.688	0.696	0.594	0.695	1.167	0.688
7	0.670	0.699	0.670	0.699	0.564	0.698	1.234	0.670
8	0.632	0.665	0.632	0.665	0.522	0.662	1.266	0.632
9	0.612	0.641	0.612	0.641	0.500	0.637	1.273	0.612

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-16.1	10.1	0.398	0.	0.222	0.222	0.151	0.151
2	10.00	-17.5	10.3	0.365	0.	0.173	0.173	0.115	0.115
3	15.00	-16.9	10.4	0.347	0.	0.115	0.115	0.074	0.074
4	30.00	-14.8	10.0	0.324	0.	0.059	0.059	0.035	0.035
5	50.00	-12.6	9.5	0.299	0.	0.020	0.020	0.010	0.010
6	70.00	-11.5	8.7	0.240	0.	0.015	0.015	0.007	0.007
7	85.00	-9.5	7.3	0.199	0.	0.042	0.042	0.017	0.017
8	90.00	-8.0	5.7	0.198	0.	0.032	0.032	0.012	0.012
9	95.00	-7.2	4.1	0.203	0.	0.039	0.039	0.014	0.014

TABLE VIII. - Continued.

(g) 90 Percent of design speed; reading 1637

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	25.230	25.298	26.6	-4.8	26.6	-4.8	304.9	0.994	11.82	0.967
2	24.547	24.671	25.6	-4.5	25.6	-4.5	304.4	0.994	12.00	0.973
3	23.876	24.049	25.4	-4.3	25.4	-4.3	304.3	0.994	12.07	0.977
4	21.847	22.222	27.9	-4.3	27.9	-4.3	303.3	0.997	12.02	0.992
5	19.164	19.827	30.6	-3.9	30.6	-3.9	302.0	0.998	11.87	0.998
6	16.502	17.465	32.9	-2.8	32.9	-2.8	300.9	0.999	11.74	0.993
7	14.519	15.682	35.1	-3.1	35.1	-3.1	299.8	1.001	11.52	0.989
8	13.858	15.070	36.7	-4.1	36.7	-4.1	298.8	1.003	11.19	1.000
9	13.200	14.448	37.7	-5.6	37.7	-5.6	298.8	1.002	11.12	0.992

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	190.7	174.8	190.7	174.8	170.5	174.2	85.2	-14.5	0.	0.
2	199.4	184.4	199.4	184.4	179.8	183.8	86.1	-14.6	0.	0.
3	203.3	188.2	203.3	188.2	183.6	187.6	87.3	-14.1	0.	0.
4	207.2	196.2	207.2	196.2	183.0	195.6	97.1	-14.7	0.	0.
5	207.7	198.9	207.7	198.9	178.7	198.5	105.8	-13.4	0.	0.
6	209.7	201.3	209.7	201.3	176.1	201.1	113.8	-9.8	0.	0.
7	207.4	201.6	207.4	201.6	169.6	201.3	119.3	-10.9	0.	0.
8	196.1	194.8	196.1	194.8	157.2	194.3	117.1	-14.0	0.	0.
9	192.9	188.5	192.9	188.5	152.5	187.6	118.0	-18.3	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.562	0.514	0.562	0.514	0.502	0.512	1.022	0.562
2	0.589	0.544	0.589	0.544	0.532	0.542	1.022	0.589
3	0.602	0.556	0.602	0.556	0.544	0.555	1.022	0.602
4	0.616	0.582	0.616	0.582	0.544	0.580	1.069	0.616
5	0.619	0.591	0.619	0.591	0.532	0.590	1.111	0.619
6	0.626	0.600	0.626	0.600	0.526	0.599	1.142	0.626
7	0.620	0.601	0.620	0.601	0.507	0.600	1.187	0.620
8	0.585	0.580	0.585	0.580	0.469	0.578	1.236	0.585
9	0.575	0.560	0.575	0.560	0.455	0.557	1.230	0.575

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-13.9	10.9	0.439	0.	0.169	0.169	0.115	0.115
2	10.00	-15.0	10.8	0.410	0.	0.128	0.128	0.085	0.085
3	15.00	-15.2	10.7	0.396	0.	0.105	0.105	0.068	0.068
4	30.00	-13.1	9.7	0.372	0.	0.035	0.035	0.021	0.021
5	50.00	-10.8	9.2	0.340	0.	0.011	0.011	0.006	0.006
6	70.00	-8.9	9.0	0.304	0.	0.029	0.029	0.013	0.013
7	85.00	-7.1	7.9	0.275	0.	0.048	0.048	0.019	0.019
8	90.00	-5.6	6.6	0.259	0.	0.001	0.001	0.000	0.000
9	95.00	-4.7	4.8	0.278	0.	0.040	0.040	0.015	0.015

TABLE VIII. - Continued.

(h) 90 Percent of design speed; reading 1632

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	25.230	25.298	30.8	-3.8	30.8	-3.8	306.0	0.997	11.83	0.980
2	24.547	24.671	28.7	-2.1	28.7	-2.1	305.8	0.998	12.06	0.977
3	23.876	24.049	28.1	-3.7	28.1	-3.7	305.5	0.997	12.12	0.980
4	21.847	22.222	30.4	-3.6	30.4	-3.6	304.2	0.998	12.13	0.990
5	19.164	19.827	33.7	-2.8	33.7	-2.8	302.8	0.999	11.99	0.994
6	16.502	17.465	35.5	-1.8	35.5	-1.8	301.1	0.999	11.77	0.992
7	14.519	15.682	37.6	-2.2	37.6	-2.2	299.8	1.000	11.52	0.992
8	13.858	15.070	39.2	-3.5	39.2	-3.5	299.1	1.001	11.26	0.997
9	13.200	14.448	40.3	-5.9	40.3	-5.9	299.2	0.999	11.25	0.987

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	178.4	164.2	178.4	164.2	153.2	163.8	91.3	-11.0	0.	0.
2	188.2	171.0	188.2	171.0	165.1	170.9	90.4	-6.2	0.	0.
3	192.7	174.9	192.7	174.9	169.9	174.5	90.9	-11.2	0.	0.
4	197.7	181.7	197.7	181.7	170.5	181.3	100.1	-11.3	0.	0.
5	197.2	182.0	197.2	182.0	164.0	181.8	109.4	-9.0	0.	0.
6	196.1	179.3	196.1	179.3	159.6	179.2	114.0	-5.6	0.	0.
7	191.4	175.6	191.4	175.6	151.7	175.5	116.8	-6.9	0.	0.
8	182.8	167.5	182.8	167.5	141.7	167.2	115.4	-10.2	0.	0.
9	182.1	161.6	182.1	161.6	139.0	160.7	117.7	-16.7	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.522	0.479	0.522	0.479	0.449	0.478	1.069	0.522
2	0.553	0.501	0.553	0.501	0.485	0.500	1.035	0.553
3	0.567	0.513	0.567	0.513	0.500	0.512	1.027	0.567
4	0.584	0.535	0.584	0.535	0.504	0.534	1.064	0.584
5	0.584	0.537	0.584	0.537	0.486	0.536	1.108	0.584
6	0.583	0.530	0.583	0.530	0.474	0.530	1.123	0.583
7	0.569	0.519	0.569	0.519	0.451	0.519	1.157	0.569
8	0.542	0.495	0.542	0.495	0.421	0.494	1.180	0.542
9	0.540	0.477	0.540	0.477	0.412	0.474	1.157	0.540

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	-9.7	11.8	0.471	0.	0.120	0.120	0.082	0.082
2	10.00	-11.8	13.2	0.431	0.	0.123	0.123	0.082	0.082
3	15.00	-12.5	11.3	0.434	0.	0.100	0.100	0.064	0.064
4	30.00	-10.6	10.5	0.414	0.	0.050	0.050	0.030	0.030
5	50.00	-7.7	10.2	0.388	0.	0.031	0.031	0.016	0.016
6	70.00	-6.3	10.0	0.358	0.	0.037	0.037	0.017	0.017
7	85.00	-4.6	8.7	0.337	0.	0.040	0.040	0.016	0.016
8	90.00	-3.1	7.2	0.342	0.	0.019	0.019	0.007	0.007
9	95.00	-2.1	4.5	0.378	0.	0.072	0.072	0.027	0.027

TABLE VIII. - Continued.

(i) 90 Percent of design speed; reading 1633

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	25.230	25.298	35.6	-2.4	35.6	-2.4	306.9	0.997	11.83	0.986
2	24.547	24.671	33.3	-2.3	33.3	-2.3	306.2	0.998	11.99	0.984
3	23.876	24.049	32.2	-2.5	32.2	-2.5	305.9	0.998	12.09	0.984
4	21.847	22.222	32.9	-2.8	32.9	-2.8	304.5	0.998	12.13	0.992
5	19.164	19.827	36.1	-2.2	36.1	-2.2	302.9	0.999	11.99	0.994
6	16.502	17.465	37.6	-0.9	37.6	-0.9	301.1	0.999	11.78	0.990
7	14.519	15.682	39.4	-2.3	39.4	-2.3	299.4	1.002	11.45	0.991
8	13.858	15.070	40.6	-4.3	40.6	-4.3	299.0	1.001	11.32	0.992
9	13.200	14.448	41.8	-6.8	41.8	-6.8	298.9	1.000	11.32	0.985

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	167.9	151.9	167.9	151.9	136.5	151.8	97.6	-6.5	0.	0.
2	175.9	158.9	175.9	158.9	147.0	158.8	96.7	-6.2	0.	0.
3	181.6	162.7	181.6	162.7	153.6	162.5	96.8	-7.2	0.	0.
4	188.2	170.4	188.2	170.4	158.0	170.2	102.3	-8.3	0.	0.
5	187.7	169.9	187.7	169.9	151.8	169.8	110.5	-6.4	0.	0.
6	186.4	163.7	186.4	163.7	147.7	163.7	113.7	-2.5	0.	0.
7	178.3	154.6	178.3	154.6	137.9	154.5	113.1	-6.2	0.	0.
8	173.6	149.2	173.6	149.2	131.7	148.8	113.0	-11.1	0.	0.
9	173.5	144.8	173.5	144.8	129.3	143.8	115.7	-17.2	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.489	0.442	0.489	0.442	0.398	0.441	1.112	0.489
2	0.515	0.463	0.515	0.463	0.430	0.463	1.080	0.515
3	0.532	0.475	0.532	0.475	0.450	0.474	1.058	0.532
4	0.554	0.500	0.554	0.500	0.465	0.499	1.078	0.554
5	0.554	0.499	0.554	0.499	0.448	0.499	1.119	0.554
6	0.552	0.482	0.552	0.482	0.437	0.482	1.108	0.552
7	0.528	0.454	0.528	0.454	0.408	0.454	1.120	0.528
8	0.514	0.438	0.514	0.438	0.390	0.437	1.130	0.514
9	0.514	0.425	0.514	0.425	0.383	0.422	1.112	0.514

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-4.9	13.2	0.518	0.	0.095	0.095	0.065	0.065
2	10.00	-7.2	13.1	0.485	0.	0.095	0.095	0.063	0.063
3	15.00	-8.4	12.4	0.474	0.	0.091	0.091	0.059	0.059
4	30.00	-8.1	11.2	0.441	0.	0.044	0.044	0.026	0.026
5	50.00	-5.4	10.9	0.417	0.	0.031	0.031	0.016	0.016
6	70.00	-4.3	10.9	0.399	0.	0.054	0.054	0.025	0.025
7	85.00	-2.9	8.6	0.396	0.	0.051	0.051	0.021	0.021
8	90.00	-1.7	6.4	0.409	0.	0.050	0.050	0.019	0.019
9	95.00	-0.6	3.6	0.442	0.	0.090	0.090	0.033	0.033

TABLE VIII. - Continued.

(j) 90 Percent of design speed; reading 1634

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	25.230	25.298	44.9	-0.3	44.9	-0.3	308.3	0.997	11.84	0.987
2	24.547	24.671	40.4	-0.3	40.4	-0.3	307.4	0.998	11.90	0.989
3	23.876	24.049	38.0	-1.0	38.0	-1.0	306.9	0.997	11.97	0.989
4	21.847	22.222	35.7	-1.3	35.7	-1.3	305.3	0.998	12.13	0.990
5	19.164	19.827	37.9	-1.3	37.9	-1.3	303.4	0.997	12.02	0.991
6	16.502	17.465	38.9	0.0	38.9	0.0	301.1	0.998	11.75	0.987
7	14.519	15.682	40.4	-2.4	40.4	-2.4	299.5	1.001	11.45	0.987
8	13.858	15.070	41.3	-4.8	41.3	-4.8	299.0	1.002	11.34	0.989
9	13.200	14.448	42.4	-6.9	42.4	-6.9	298.8	1.014	11.34	0.986

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	160.4	141.4	160.4	141.4	113.7	141.4	113.2	-0.7	0.	0.
2	165.3	146.6	165.3	146.6	125.8	146.6	107.2	-0.8	0.	0.
3	170.8	150.1	170.8	150.1	134.7	150.1	105.1	-2.6	0.	0.
4	181.7	160.1	181.7	160.1	147.6	160.0	105.9	-3.7	0.	0.
5	183.1	159.5	183.1	159.5	144.5	159.4	112.3	-3.7	0.	0.
6	179.6	151.3	179.6	151.3	139.8	151.3	112.8	0.1	0.	0.
7	173.5	142.1	173.5	142.1	132.2	142.0	112.4	-5.9	0.	0.
8	169.4	137.5	169.4	137.5	127.2	137.0	111.8	-11.6	0.	0.
9	169.5	135.3	169.5	135.3	125.1	134.3	114.3	-16.3	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.466	0.409	0.466	0.409	0.330	0.409	1.243	0.574
2	0.481	0.425	0.481	0.425	0.366	0.425	1.166	0.481
3	0.498	0.436	0.498	0.436	0.393	0.436	1.115	0.498
4	0.533	0.467	0.533	0.467	0.433	0.467	1.084	0.533
5	0.539	0.467	0.539	0.467	0.426	0.467	1.103	0.539
6	0.531	0.444	0.531	0.444	0.413	0.444	1.082	0.531
7	0.513	0.417	0.513	0.417	0.391	0.416	1.074	0.513
8	0.501	0.403	0.501	0.403	0.376	0.401	1.077	0.501
9	0.501	0.394	0.501	0.394	0.370	0.391	1.074	0.505

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	4.4	15.4	0.603	0.	0.096	0.096	0.065	0.065
2	10.00	-0.1	15.0	0.546	0.	0.074	0.074	0.049	0.049
3	15.00	-2.6	14.0	0.528	0.	0.069	0.069	0.045	0.045
4	30.00	-5.3	12.7	0.475	0.	0.059	0.059	0.035	0.035
5	50.00	-3.6	11.7	0.457	0.	0.049	0.049	0.026	0.026
6	70.00	-2.9	11.8	0.437	0.	0.076	0.076	0.035	0.035
7	85.00	-1.8	8.6	0.449	0.	0.076	0.076	0.031	0.031
8	90.00	-1.0	5.8	0.463	0.	0.068	0.068	0.026	0.026
9	95.00	0.0	3.5	0.479	0.	0.092	0.092	0.034	0.034

TABLE VIII. - Continued.

(k) 100 Percent of design speed; reading 1625

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	25.230	25.298	28.4	-5.3	28.4	-5.3	309.6	0.997	12.03	0.967
2	24.547	24.671	25.9	-4.8	25.9	-4.8	309.1	0.997	12.44	0.960
3	23.876	24.049	26.3	-4.5	26.3	-4.5	309.0	0.997	12.49	0.969
4	21.847	22.222	28.5	-4.3	28.5	-4.3	307.8	0.999	12.53	0.984
5	19.164	19.827	31.0	-3.7	31.0	-3.7	305.9	1.002	12.34	0.998
6	16.502	17.465	33.2	-2.5	33.2	-2.5	304.5	1.001	12.16	0.990
7	14.519	15.682	36.2	-2.9	36.2	-2.9	302.5	1.002	11.79	0.991
8	13.858	15.070	37.5	-4.2	37.5	-4.2	301.5	1.003	11.43	1.003
9	13.200	14.448	38.2	-6.1	38.2	-6.1	301.5	1.002	11.39	0.990

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	208.1	192.5	208.1	192.5	183.0	191.7	99.1	-17.9	0.	0.
2	223.4	203.8	223.4	203.8	201.0	203.1	97.6	-16.9	0.	0.
3	226.9	208.7	226.9	208.7	203.4	208.1	100.6	-16.4	0.	0.
4	234.6	220.1	234.6	220.1	206.2	219.5	111.9	-16.3	0.	0.
5	234.9	225.1	234.9	225.1	201.3	224.6	121.0	-14.5	0.	0.
6	234.4	223.8	234.4	223.8	196.0	223.6	128.5	-9.7	0.	0.
7	225.7	219.7	225.7	219.7	182.1	219.4	133.4	-11.0	0.	0.
8	214.7	212.3	214.7	212.3	170.2	211.7	130.8	-15.6	0.	0.
9	212.6	205.0	212.6	205.0	167.1	203.8	131.3	-21.9	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO			MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT		VEL R	MACH NO
1	0.612	0.564	0.612	0.564	0.538	0.561		1.048	0.612
2	0.661	0.599	0.661	0.599	0.595	0.597		1.010	0.661
3	0.672	0.615	0.672	0.615	0.603	0.613		1.023	0.672
4	0.699	0.652	0.699	0.652	0.614	0.650		1.065	0.699
5	0.702	0.669	0.702	0.669	0.602	0.668		1.115	0.702
6	0.702	0.667	0.702	0.667	0.587	0.667		1.141	0.702
7	0.676	0.656	0.676	0.656	0.546	0.655		1.205	0.676
8	0.642	0.633	0.642	0.633	0.509	0.631		1.244	0.642
9	0.635	0.610	0.635	0.610	0.499	0.607		1.220	0.635

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	-12.0	10.3	0.458	0.	0.148	0.148	0.101	0.101
2	10.00	-14.6	10.5	0.428	0.	0.158	0.158	0.105	0.105
3	15.00	-14.3	10.5	0.413	0.	0.119	0.119	0.077	0.077
4	30.00	-12.5	9.8	0.384	0.	0.057	0.057	0.034	0.034
5	50.00	-10.4	9.3	0.341	0.	0.009	0.009	0.005	0.005
6	70.00	-8.6	9.2	0.309	0.	0.035	0.035	0.016	0.016
7	85.00	-6.0	8.1	0.279	0.	0.033	0.033	0.013	0.013
8	90.00	-4.8	6.5	0.268	0.	-0.011	-0.011	-0.004	-0.004
9	95.00	-4.2	4.3	0.296	0.	0.041	0.041	0.015	0.015

TABLE VIII. - Continued.

(ℓ) 100 Percent of design speed; reading 1626

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
1	25.230	25.298	30.7	-4.3	30.7	-4.3	310.1	0.997	12.30	0.973
2	24.547	24.671	28.4	-4.0	28.4	-4.0	309.9	0.996	12.55	0.971
3	23.876	24.049	28.5	-3.9	28.5	-3.9	309.7	0.996	12.63	0.974
4	21.847	22.222	30.5	-3.7	30.5	-3.7	308.0	0.999	12.65	0.987
5	19.164	19.827	33.5	-3.1	33.5	-3.1	306.1	1.000	12.41	0.995
6	16.502	17.465	35.3	-1.7	35.3	-1.7	304.2	1.001	12.21	0.988
7	14.519	15.682	37.6	-2.5	37.6	-2.5	302.7	1.002	11.82	0.994
8	13.858	15.070	39.1	-3.9	39.1	-3.9	301.8	1.002	11.52	0.997
9	13.200	14.448	39.8	-6.5	39.8	-6.5	301.7	1.001	11.49	0.987

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
1	200.9	183.6	200.9	183.6	172.7	183.1	102.7	-13.7	0.	0.
2	211.4	191.7	211.4	191.7	185.9	191.2	100.6	-13.4	0.	0.
3	216.1	195.4	216.1	195.4	189.9	194.9	103.1	-13.3	0.	0.
4	222.6	205.3	222.6	205.3	191.8	204.9	113.1	-13.4	0.	0.
5	221.8	206.3	221.8	206.3	185.0	206.0	122.4	-11.3	0.	0.
6	223.0	204.7	223.0	204.7	182.0	204.6	128.8	-6.1	0.	0.
7	215.7	202.0	215.7	202.0	170.9	201.8	131.6	-8.7	0.	0.
8	206.3	192.8	206.3	192.8	160.1	192.4	130.1	-13.1	0.	0.
9	204.6	186.2	204.6	186.2	157.3	185.0	130.9	-21.1	0.	0.

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	MERID PEAK SS VEL R	MERID PEAK SS MACH NO
1	0.588	0.535	0.588	0.535	0.506	0.534	1.060	0.588
2	0.622	0.561	0.622	0.561	0.547	0.560	1.029	0.622
3	0.637	0.573	0.637	0.573	0.560	0.572	1.026	0.637
4	0.660	0.605	0.660	0.605	0.568	0.604	1.068	0.660
5	0.659	0.610	0.659	0.610	0.550	0.609	1.114	0.659
6	0.665	0.606	0.665	0.606	0.543	0.606	1.124	0.665
7	0.643	0.599	0.643	0.599	0.510	0.599	1.181	0.643
8	0.614	0.571	0.614	0.571	0.477	0.570	1.201	0.614
9	0.609	0.551	0.609	0.551	0.468	0.547	1.177	0.609

RP	PERCENT SPAN	INCIDENCE MEAN	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
1	5.00	-9.7	11.4	0.481	0.	0.131	0.131	0.089	0.089
2	10.00	-12.1	11.3	0.451	0.	0.127	0.127	0.084	0.084
3	15.00	-12.1	11.1	0.444	0.	0.108	0.108	0.070	0.070
4	30.00	-10.5	10.3	0.413	0.	0.052	0.052	0.031	0.031
5	50.00	-7.9	9.9	0.382	0.	0.019	0.019	0.010	0.010
6	70.00	-6.5	10.0	0.352	0.	0.045	0.045	0.021	0.021
7	85.00	-4.6	8.5	0.319	0.	0.026	0.026	0.011	0.011
8	90.00	-3.2	6.8	0.327	0.	0.013	0.013	0.005	0.005
9	95.00	-2.6	3.9	0.358	0.	0.057	0.057	0.021	0.021

TABLE VIII. - Continued.

(m) 100 Percent design speed; reading 1627

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	25.230	25.298	34.5	-3.2	34.5	-3.2	311.1	0.997	12.31	0.980
2	24.547	24.671	32.0	-3.1	32.0	-3.1	310.2	0.997	12.49	0.979
3	23.876	24.049	31.2	-3.3	31.2	-3.3	310.0	0.997	12.61	0.979
4	21.847	22.222	32.6	-3.1	32.6	-3.1	308.5	0.999	12.70	0.986
5	19.164	19.827	35.5	-2.6	35.5	-2.6	306.5	0.999	12.45	0.995
6	16.502	17.465	36.8	-1.1	36.8	-1.1	304.5	0.999	12.23	0.987
7	14.519	15.682	39.1	-2.5	39.1	-2.5	302.7	1.001	11.79	0.992
8	13.858	15.070	40.3	-4.1	40.3	-4.1	302.1	1.003	11.57	0.997
9	13.200	14.448	41.0	-6.8	41.0	-6.8	302.0	1.000	11.58	0.983

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	190.0	172.2	190.0	172.2	156.5	171.9	107.7	-9.5	0.	0.
2	198.6	178.7	198.6	178.7	168.4	178.5	105.4	-9.7	0.	0.
3	205.0	183.4	205.0	183.4	175.4	183.1	106.2	-10.4	0.	0.
4	213.4	192.5	213.4	192.5	179.8	192.2	114.9	-10.4	0.	0.
5	212.6	193.7	212.6	193.7	173.1	193.5	123.4	-8.7	0.	0.
6	213.8	189.7	213.8	189.7	171.1	189.7	128.2	-3.5	0.	0.
7	205.7	184.2	205.7	184.2	159.7	184.1	129.6	-8.0	0.	0.
8	198.9	178.4	198.9	178.4	151.8	177.9	128.6	-12.7	0.	0.
9	198.7	171.0	198.7	171.0	150.0	169.8	130.4	-20.2	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.554	0.500	0.554	0.500	0.456	0.499	1.098	0.554
2	0.581	0.521	0.581	0.521	0.493	0.520	1.060	0.581
3	0.602	0.535	0.602	0.535	0.515	0.534	1.044	0.602
4	0.630	0.564	0.630	0.564	0.530	0.564	1.069	0.630
5	0.629	0.570	0.629	0.570	0.512	0.569	1.118	0.629
6	0.635	0.559	0.635	0.559	0.508	0.559	1.109	0.635
7	0.611	0.543	0.611	0.543	0.475	0.543	1.152	0.611
8	0.591	0.525	0.591	0.525	0.451	0.524	1.173	0.591
9	0.590	0.503	0.590	0.503	0.445	0.500	1.132	0.590

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	-5.9	12.5	0.514	0.	0.107	0.107	0.073	0.073
2	10.00	-8.5	12.2	0.484	0.	0.105	0.105	0.069	0.069
3	15.00	-9.4	11.7	0.472	0.	0.095	0.095	0.061	0.061
4	30.00	-8.4	10.9	0.444	0.	0.061	0.061	0.036	0.036
5	50.00	-6.0	10.5	0.411	0.	0.021	0.021	0.011	0.011
6	70.00	-5.0	10.7	0.387	0.	0.056	0.056	0.026	0.026
7	85.00	-3.2	8.5	0.367	0.	0.036	0.036	0.015	0.015
8	90.00	-2.0	6.6	0.371	0.	0.016	0.016	0.006	0.006
9	95.00	-1.4	3.6	0.413	0.	0.082	0.082	0.030	0.030

TABLE VIII. - Continued.

(n) 100 Percent of design speed, reading 1628

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	25.230	25.298	39.5	-1.6	39.5	-1.6	311.6	0.998	12.29	0.983
2	24.547	24.671	35.1	-1.8	35.1	-1.8	310.8	0.998	12.45	0.981
3	23.876	24.049	34.7	-2.5	34.7	-2.5	310.3	0.997	12.54	0.981
4	21.847	22.222	34.1	-2.4	34.1	-2.4	308.9	0.998	12.67	0.987
5	19.164	19.827	37.0	-2.0	37.0	-2.0	306.5	0.998	12.44	0.995
6	16.502	17.465	37.8	-0.6	37.8	-0.6	304.4	0.999	12.23	0.985
7	14.519	15.682	39.9	-2.4	39.9	-2.4	302.5	1.001	11.80	0.988
8	13.858	15.070	40.8	-4.2	40.8	-4.2	301.7	1.002	11.59	0.993
9	13.200	14.448	41.7	-7.2	41.7	-7.2	301.9	1.001	11.63	0.981

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	182.3	163.3	182.3	163.3	140.7	163.2	115.9	-4.6	0.	0.
2	190.8	169.3	190.8	169.3	156.1	169.2	109.8	-5.3	0.	0.
3	196.4	173.1	196.4	173.1	161.5	172.9	111.8	-7.7	0.	0.
4	206.1	183.6	206.1	183.6	170.7	183.4	115.4	-7.7	0.	0.
5	205.4	183.5	205.4	183.5	164.0	183.4	123.7	-6.5	0.	0.
6	207.0	179.0	207.0	179.0	163.5	179.0	127.0	-1.9	0.	0.
7	199.0	170.8	199.0	170.8	152.6	170.6	127.7	-7.3	0.	0.
8	192.7	164.8	192.7	164.8	146.0	164.3	125.8	-12.1	0.	0.
9	193.6	159.5	193.6	159.5	144.5	158.2	128.9	-20.1	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.530	0.472	0.530	0.472	0.409	0.472	1.160	0.530
2	0.557	0.491	0.557	0.491	0.455	0.491	1.084	0.557
3	0.574	0.503	0.574	0.503	0.472	0.503	1.071	0.574
4	0.606	0.536	0.606	0.536	0.502	0.536	1.075	0.606
5	0.607	0.538	0.607	0.538	0.484	0.538	1.118	0.607
6	0.614	0.526	0.614	0.526	0.485	0.526	1.095	0.614
7	0.590	0.502	0.590	0.502	0.453	0.501	1.118	0.590
8	0.571	0.484	0.571	0.484	0.433	0.482	1.126	0.571
9	0.574	0.468	0.574	0.468	0.428	0.464	1.095	0.574

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	-1.0	14.0	0.555	0.	0.098	0.098	0.067	0.067
2	10.00	-5.4	13.5	0.513	0.	0.100	0.100	0.067	0.067
3	15.00	-5.9	12.4	0.511	0.	0.095	0.095	0.061	0.061
4	30.00	-6.9	11.6	0.462	0.	0.058	0.058	0.034	0.034
5	50.00	-4.4	11.0	0.435	0.	0.024	0.024	0.013	0.013
6	70.00	-4.0	11.1	0.413	0.	0.068	0.068	0.031	0.031
7	85.00	-2.3	8.5	0.409	0.	0.057	0.057	0.023	0.023
8	90.00	-1.5	6.5	0.414	0.	0.036	0.036	0.014	0.014
9	95.00	-0.7	3.2	0.454	0.	0.095	0.095	0.035	0.035

TABLE VIII. - Concluded.

(o) 100 Percent of design speed; reading 1629

	RADII		ABS BETAM		REL BETAM		TOTAL TEMP		TOTAL PRESS	
RP	IN	OUT	IN	OUT	IN	OUT	IN	RATIO	IN	RATIO
1	25.230	25.298	48.2	-0.6	48.2	-0.6	313.6	0.994	12.11	0.989
2	24.547	24.671	42.3	-0.2	42.3	-0.2	312.0	0.996	12.24	0.987
3	23.876	24.049	39.5	-1.1	39.5	-1.1	311.4	0.996	12.30	0.989
4	21.847	22.222	35.9	-1.3	35.9	-1.3	309.3	0.998	12.62	0.983
5	19.164	19.827	38.0	-1.3	38.0	-1.3	307.0	0.997	12.46	0.990
6	16.502	17.465	38.7	-0.3	38.7	-0.3	304.5	0.997	12.22	0.979
7	14.519	15.682	40.0	-2.5	40.0	-2.5	302.4	1.001	11.82	0.981
8	13.858	15.070	41.3	-5.0	41.3	-5.0	301.8	1.001	11.64	0.987
9	13.200	14.448	42.0	-8.4	42.0	-8.4	301.8	1.001	11.65	0.980

	ABS VEL		REL VEL		MERID VEL		TANG VEL		WHEEL SPEED	
RP	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT
1	175.2	153.5	175.2	153.5	116.9	153.5	130.5	-1.5	0.	0.
2	183.1	158.6	183.1	158.6	135.4	158.6	123.3	-0.7	0.	0.
3	187.9	162.7	187.9	162.7	145.0	162.6	119.5	-3.2	0.	0.
4	203.4	175.7	203.4	175.7	164.6	175.6	119.4	-4.1	0.	0.
5	204.7	177.7	204.7	177.7	161.3	177.6	126.1	-4.2	0.	0.
6	204.2	170.4	204.2	170.4	159.4	170.4	127.6	-0.8	0.	0.
7	196.9	161.5	196.9	161.5	150.8	161.3	126.6	-7.0	0.	0.
8	191.2	156.3	191.2	156.3	143.6	155.7	126.3	-13.5	0.	0.
9	191.4	151.5	191.4	151.5	142.3	149.9	128.0	-22.1	0.	0.

	ABS MACH NO		REL MACH NO		MERID MACH NO		MERID PEAK SS	
RP	IN	OUT	IN	OUT	IN	OUT	VEL R	MACH NO
1	0.506	0.442	0.506	0.442	0.338	0.442	1.313	0.685
2	0.532	0.458	0.532	0.458	0.393	0.458	1.171	0.596
3	0.547	0.471	0.547	0.471	0.422	0.471	1.121	0.547
4	0.597	0.512	0.597	0.512	0.483	0.512	1.067	0.597
5	0.604	0.520	0.604	0.520	0.476	0.520	1.101	0.604
6	0.605	0.500	0.605	0.500	0.472	0.500	1.069	0.605
7	0.584	0.473	0.584	0.473	0.447	0.473	1.070	0.584
8	0.566	0.458	0.566	0.458	0.425	0.456	1.084	0.566
9	0.567	0.443	0.567	0.443	0.421	0.439	1.053	0.567

	PERCENT	INCIDENCE	DEV	D-FACT	EFF	LOSS COEFF		LOSS PARAM	
RP	SPAN	MEAN				TOT	PROF	TOT	PROF
1	5.00	7.7	15.1	0.637	0.	0.069	0.069	0.047	0.047
2	10.00	1.8	15.1	0.582	0.	0.076	0.076	0.051	0.051
3	15.00	-1.1	13.8	0.555	0.	0.062	0.062	0.040	0.040
4	30.00	-5.1	12.7	0.494	0.	0.079	0.079	0.047	0.047
5	50.00	-3.4	11.7	0.461	0.	0.047	0.047	0.025	0.025
6	70.00	-3.2	11.5	0.445	0.	0.097	0.097	0.045	0.045
7	85.00	-2.2	8.5	0.447	0.	0.090	0.090	0.037	0.037
8	90.00	-1.0	5.7	0.458	0.	0.066	0.066	0.026	0.026
9	95.00	-0.4	2.0	0.492	0.	0.103	0.103	0.038	0.038

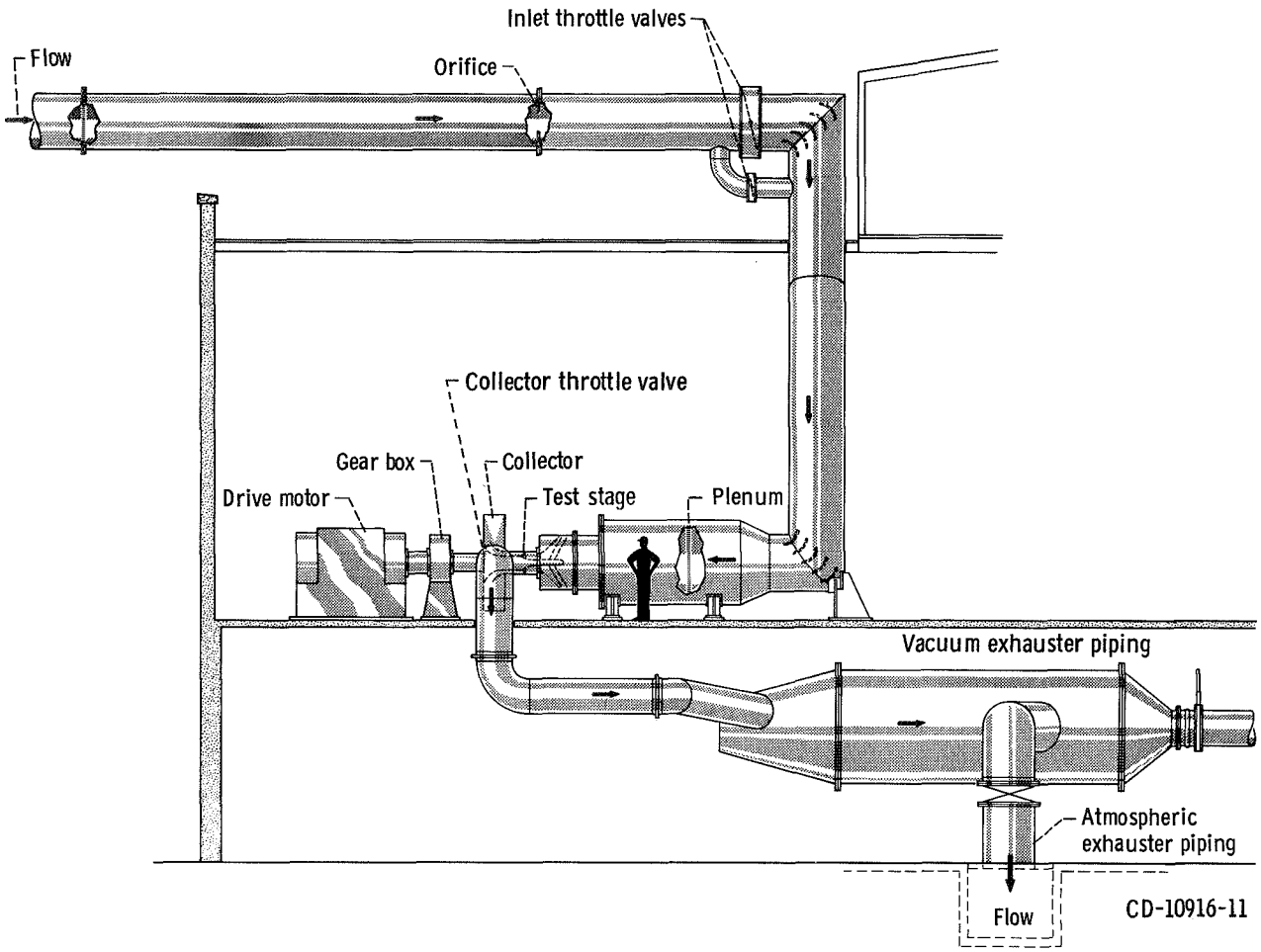
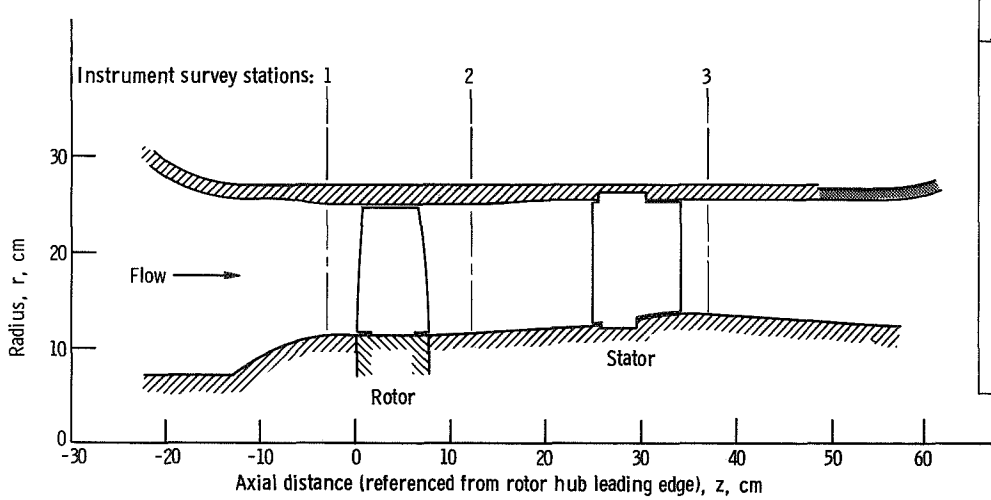
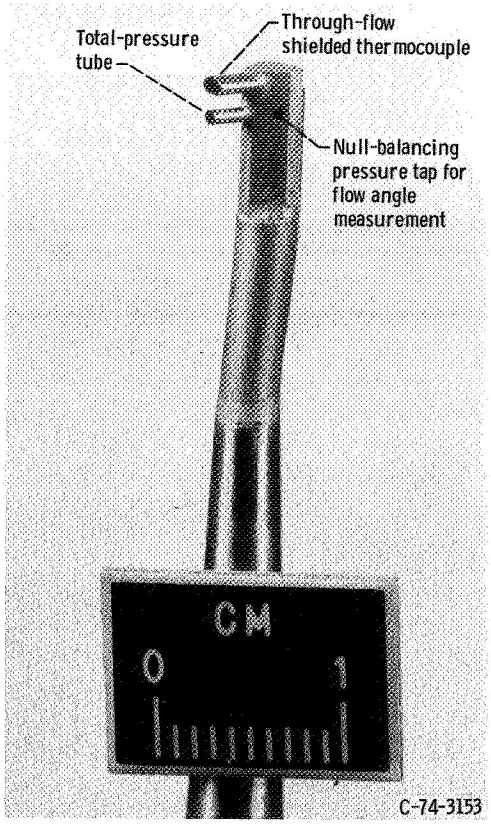


Figure 1. - Single-stage compressor facility.

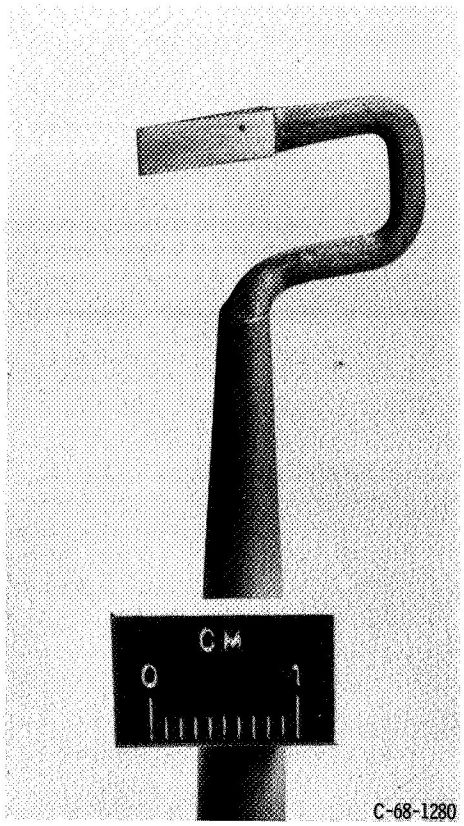


Axial location, z, cm	Hub	Tip
	Radius, r, cm	
-15	7.8	26.0
-10	10.4	26.0
-5	11.5	25.7
0	11.55	25.4
5	11.55	25.4
10	11.60	25.4
15	11.85	25.6
20	12.25	25.85
25	12.55	25.94
30	13.10	
35	13.90	
40	13.40	
45	13.00	
50	12.50	

Figure 2. - Fan stage 55 flow path.



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



(b) Static-pressure probe; 8^0 C-shaped wedge.

Figure 3. - Survey probes.

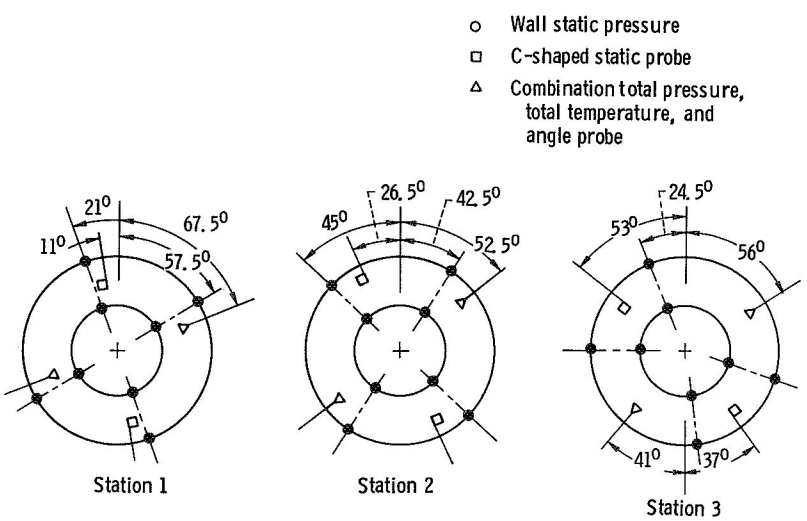


Figure 4. - Circumferential location of survey instrumentation at each station looking downstream.

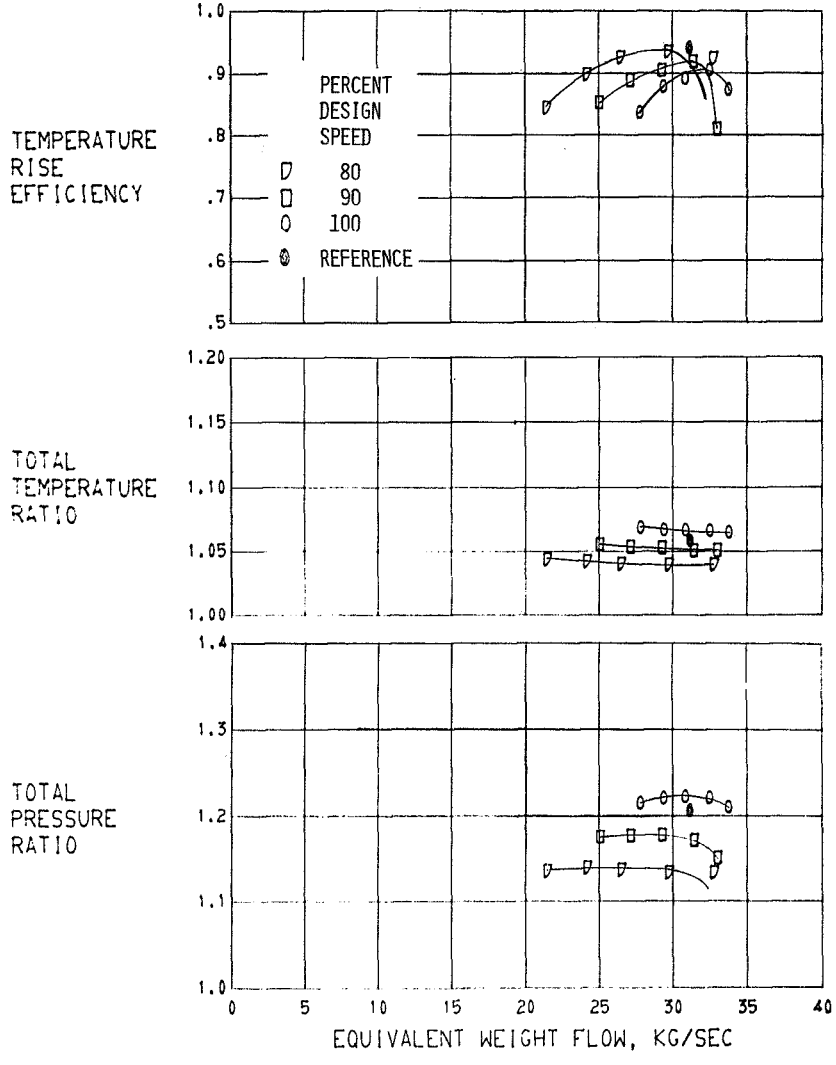


FIGURE 5. - OVERALL PERFORMANCE FOR ROTOR 55B.

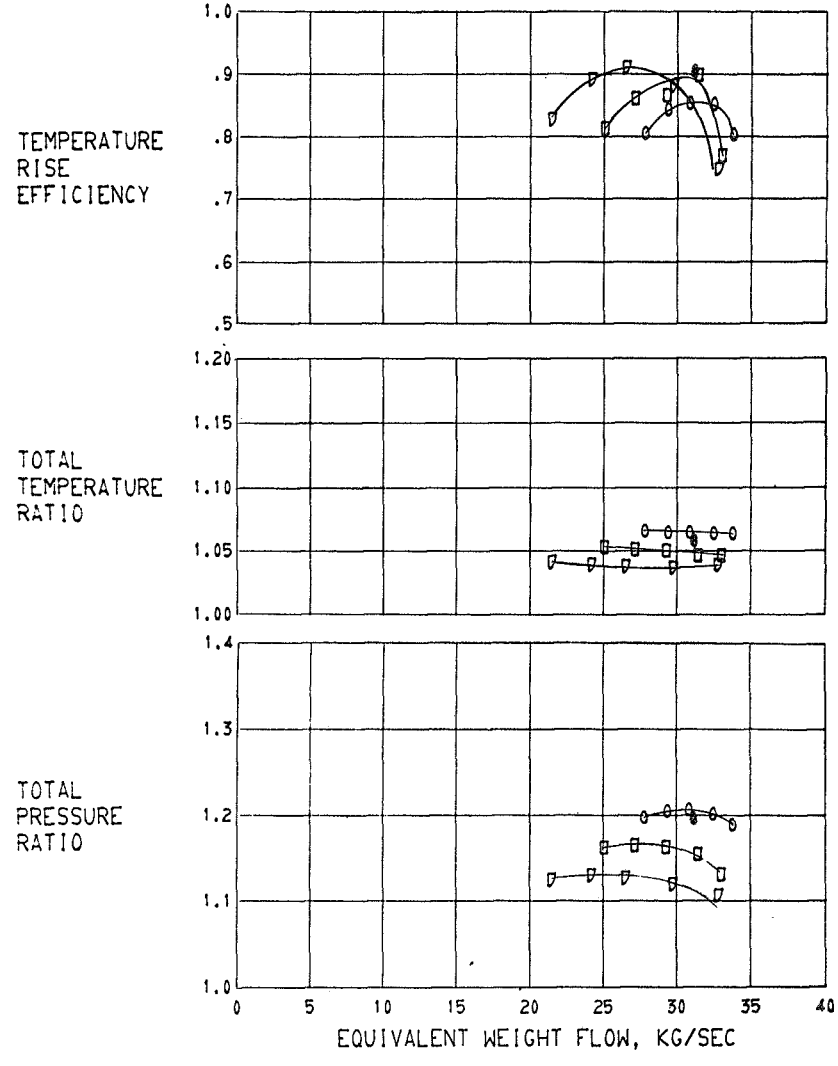
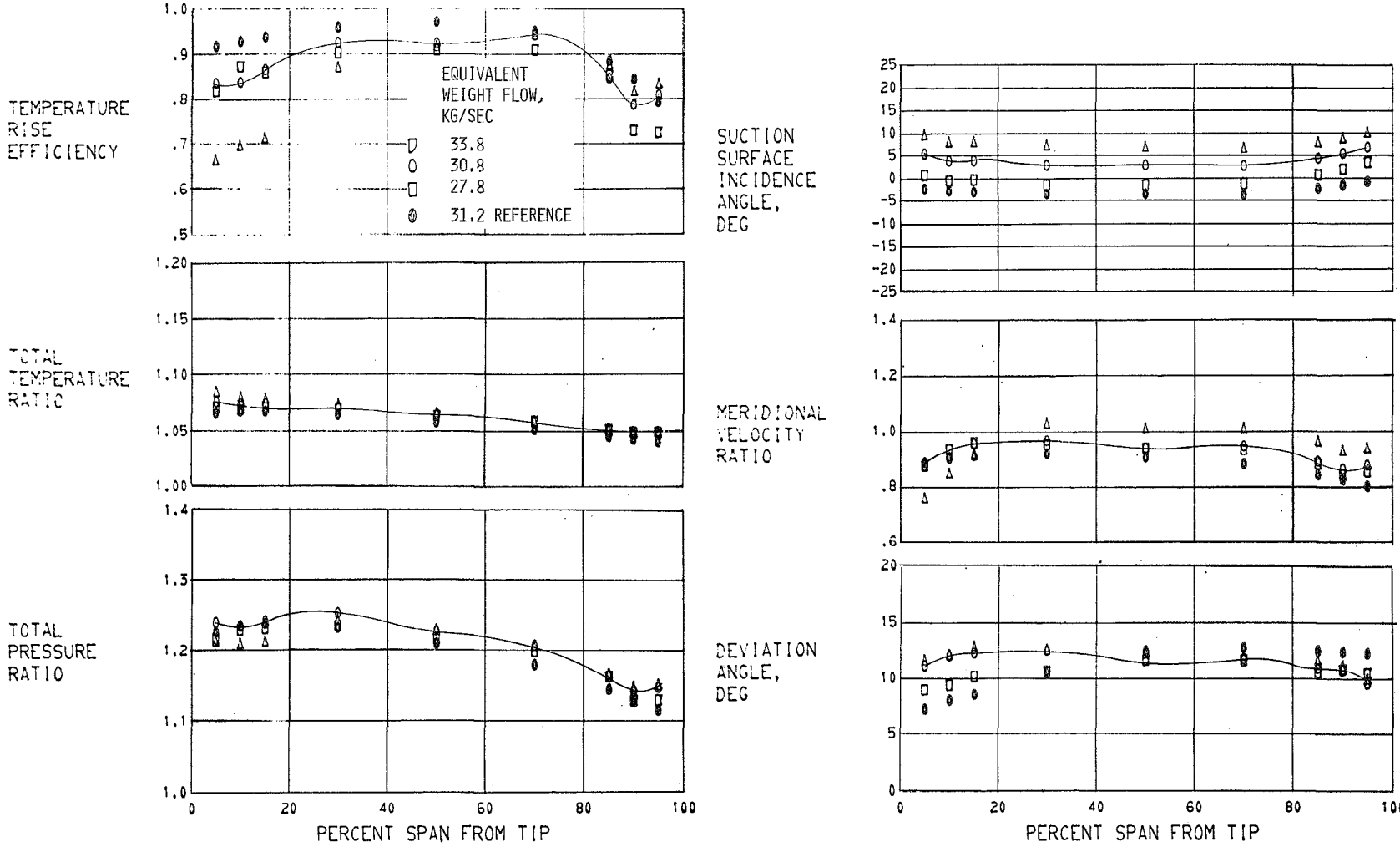


FIGURE 6. - OVERALL PERFORMANCE FOR STAGE 55B-55.


TEMPERATURE RISE EFFICIENCY
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
EQUIVALENT WEIGHT FLOW, KG/SEC
33.8
30.8
27.8
31.2 REFERENCE
SUCTION SURFACE INCIDENCE ANGLE, DEG
MERIDIONAL VELOCITY RATIO
DEVIATION ANGLE, DEG
PERCENT SPAN FROM TIP
PERCENT SPAN FROM TIP

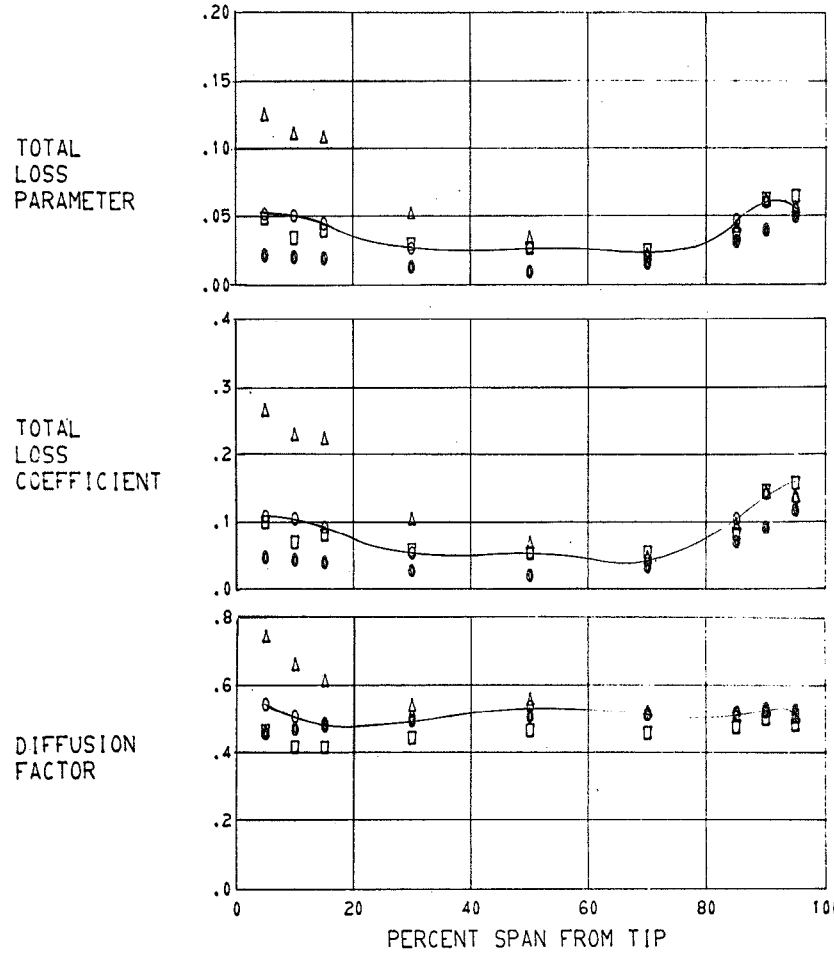


FIGURE 7. - RADIAL DISTRIBUTION OF PERFORMANCE FOR ROTOR 55B, 100 PERCENT OF DESIGN SPEED.

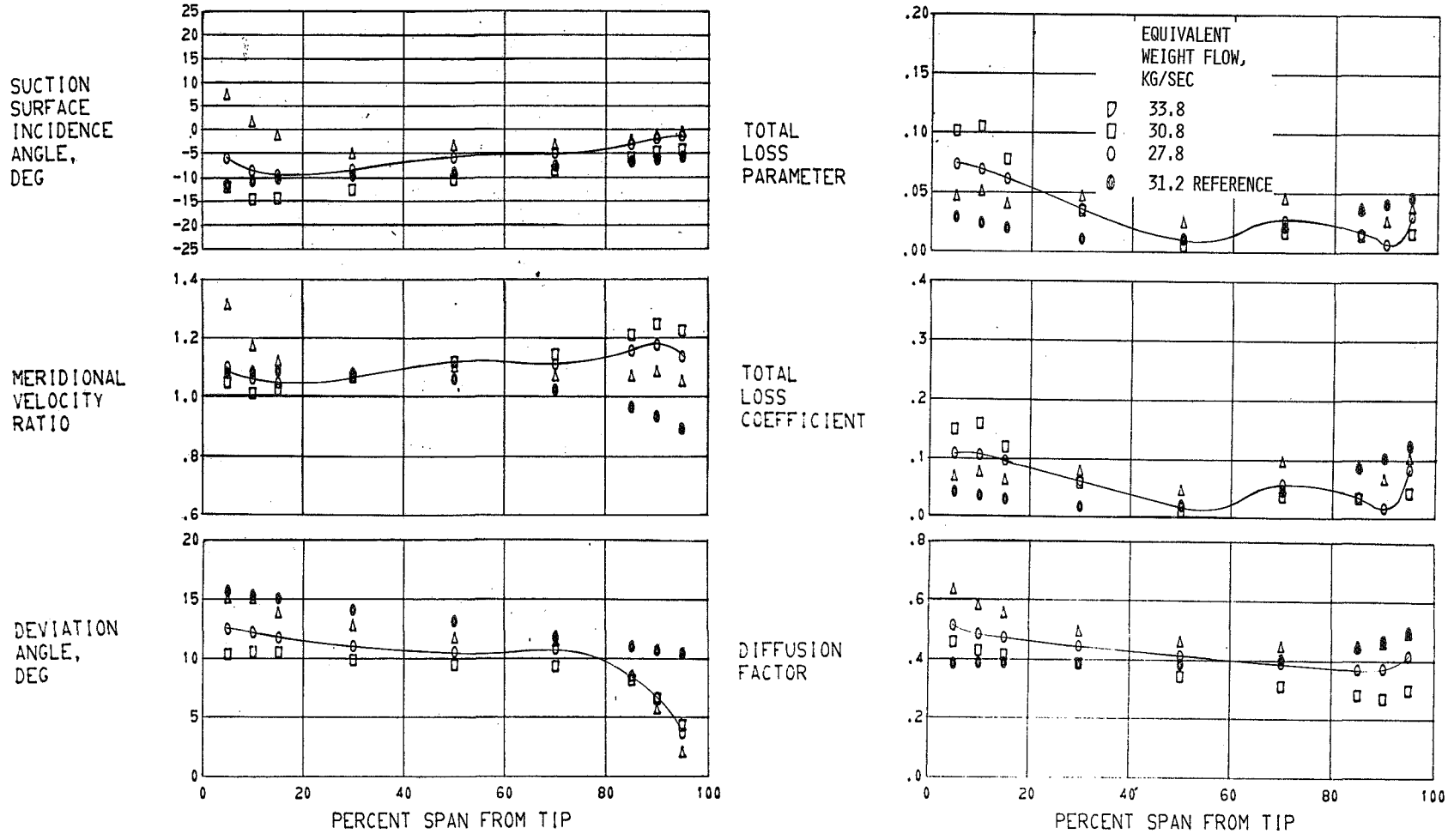
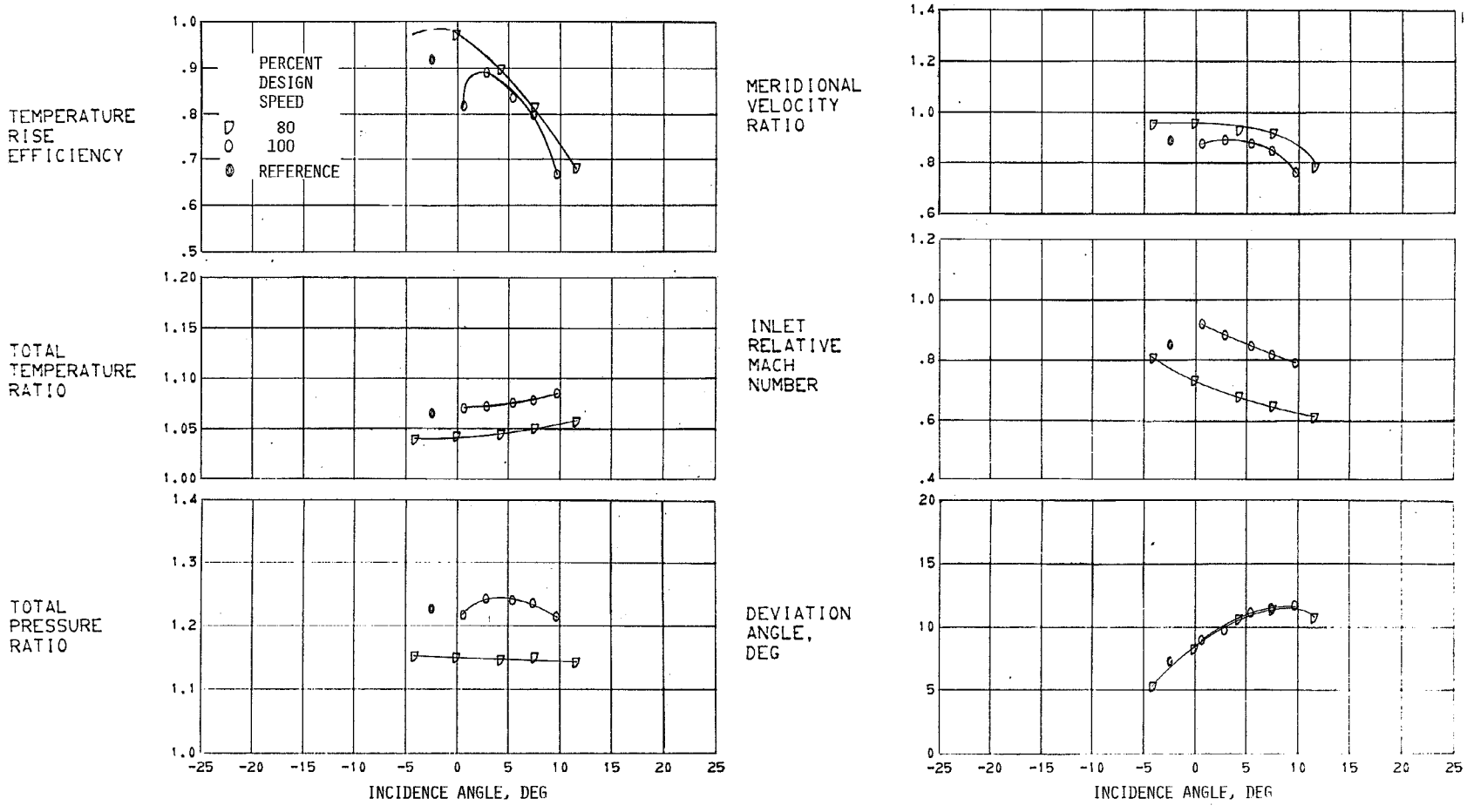
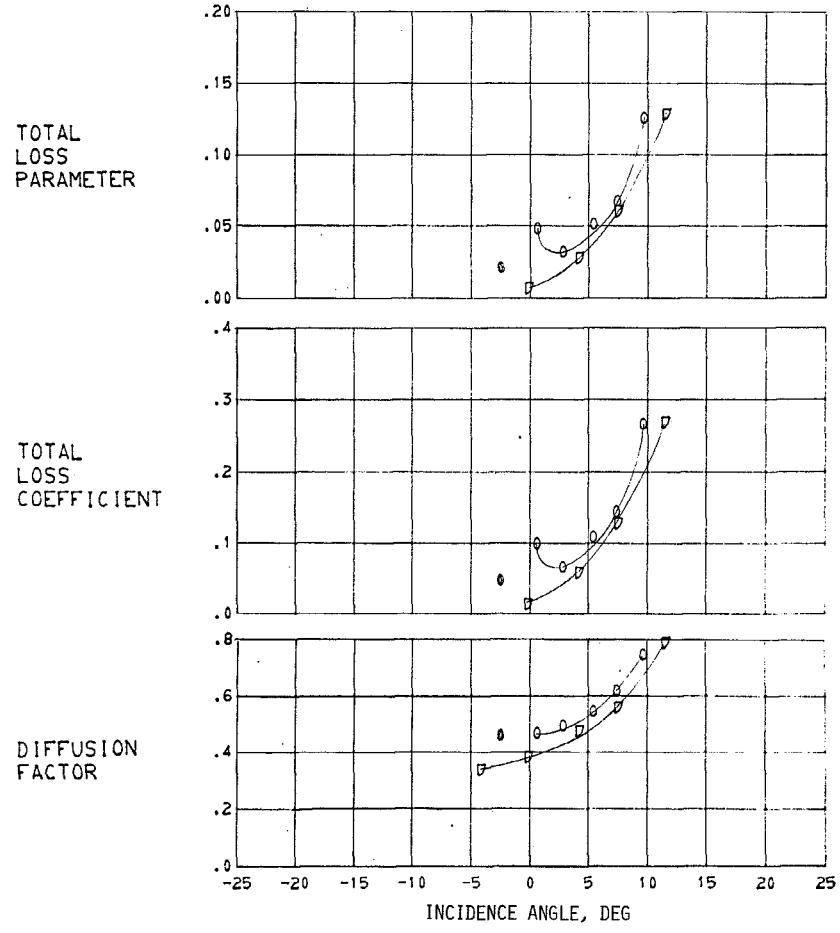


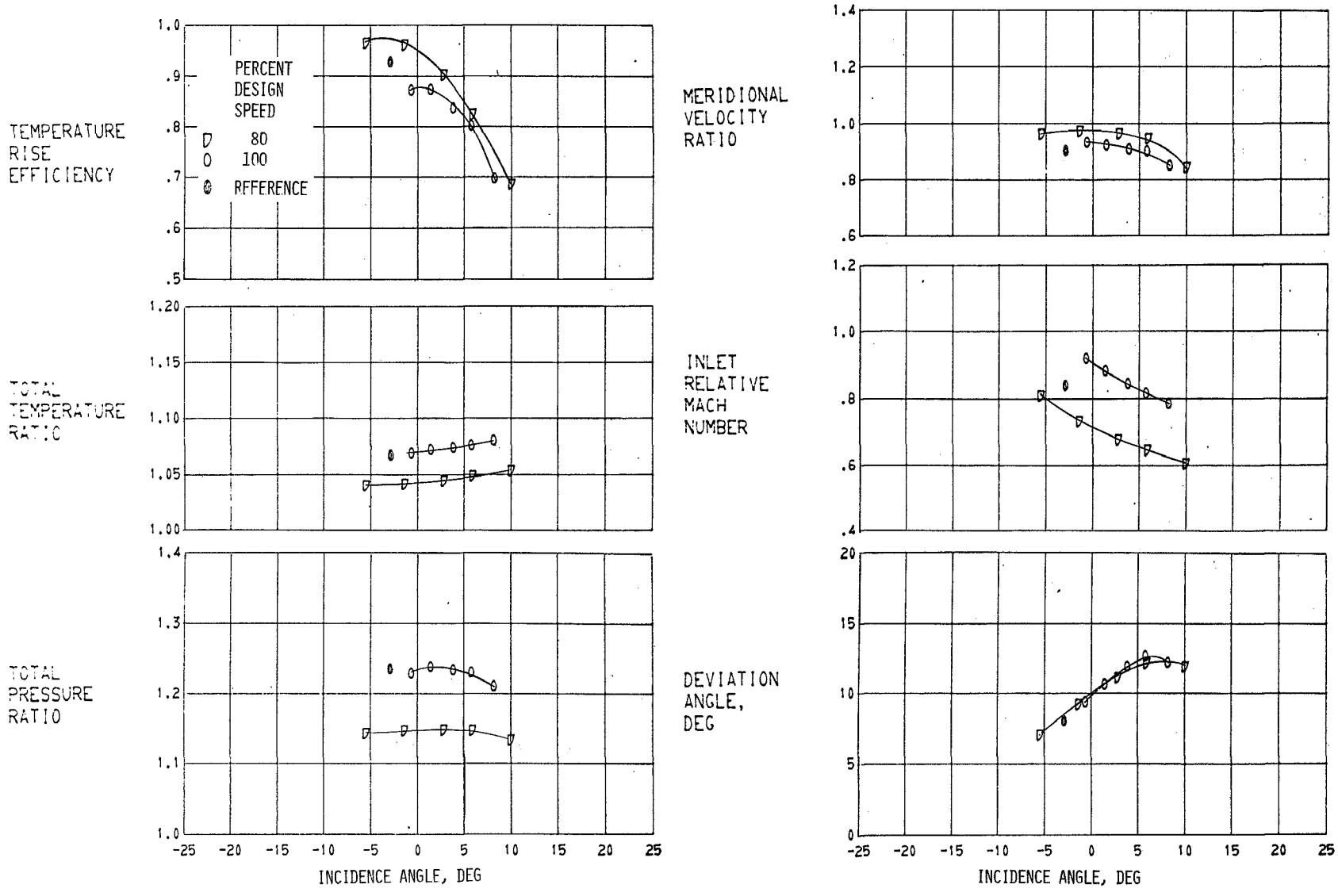
FIGURE 8. - RADIAL DISTRIBUTION OF PERFORMANCE FOR STATOR 55, 100 PERCENT OF DESIGN SPEED.

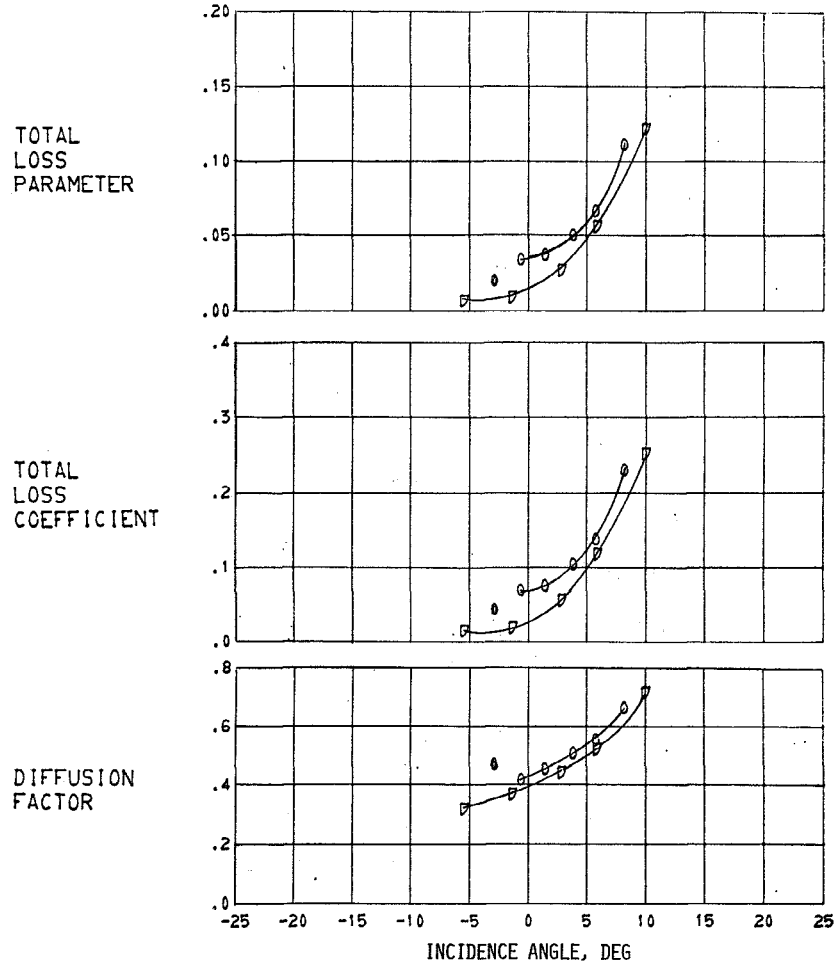

TEMPERATURE RISE EFFICIENCY
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
PERCENT DESIGN SPEED
80
100
REFERENCE
INCIDENCE ANGLE, DEG
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
INCIDENCE ANGLE, DEG



(A) 5.0 PERCENT.

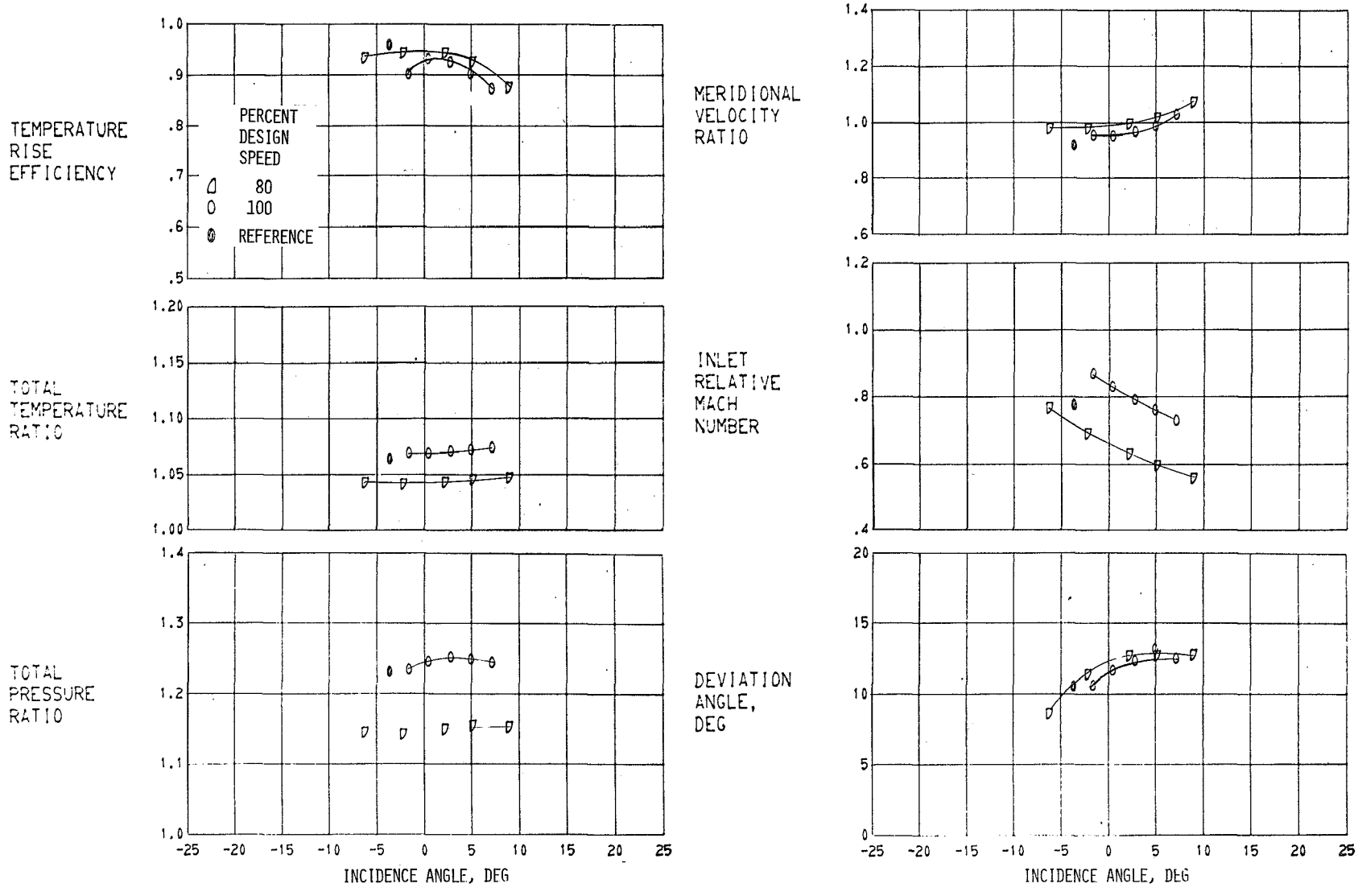
FIGURE 9. - BLADE-ELEMENT PERFORMANCE FOR ROTOR 55B.

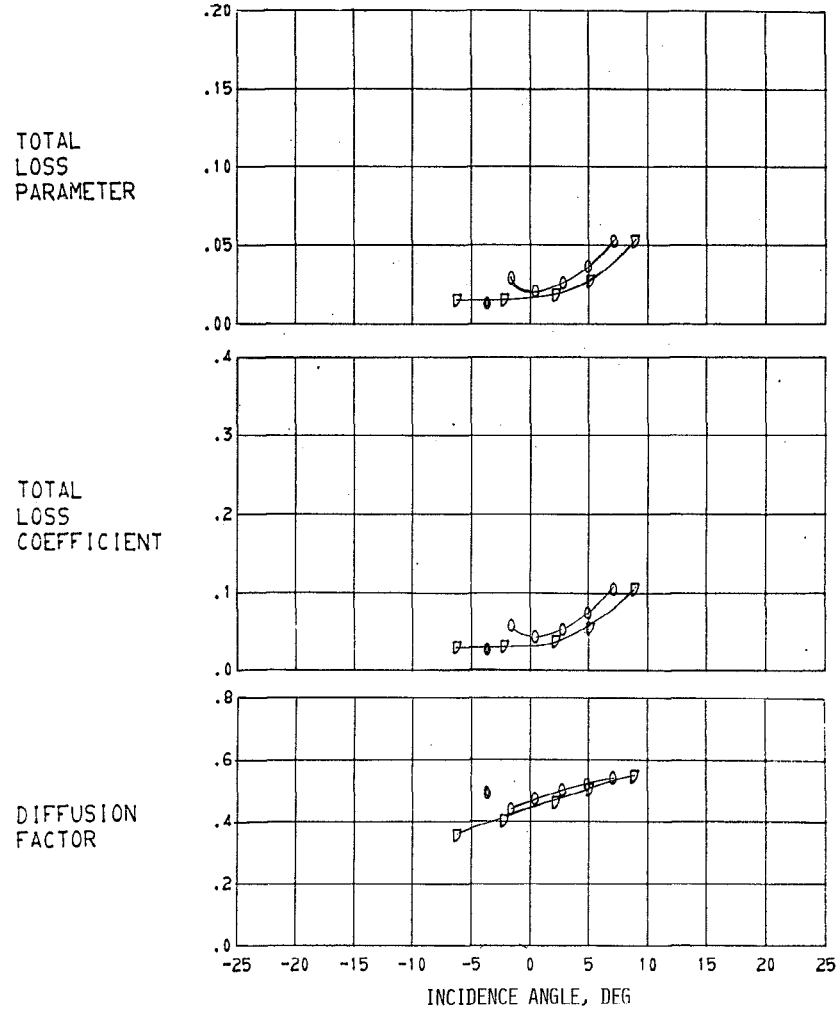

TEMPERATURE RISE EFFICIENCY
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
PERCENT DESIGN SPEED
80
100
RFFERENCE
1.0
.9
.8
.7
.6
.5
1.20
1.15
1.10
1.05
1.00
1.4
1.3
1.2
1.1
1.0
-25 -20 -15 -10 -5 0 5 10 15 20 25
INCIDENCE ANGLE, DEG
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
1.4
1.2
1.0
.8
.6
.4
20
15
10
5
0
-25 -20 -15 -10 -5 0 5 10 15 20 25
INCIDENCE ANGLE, DEG



(B) 10.0 PERCENT SPAN.

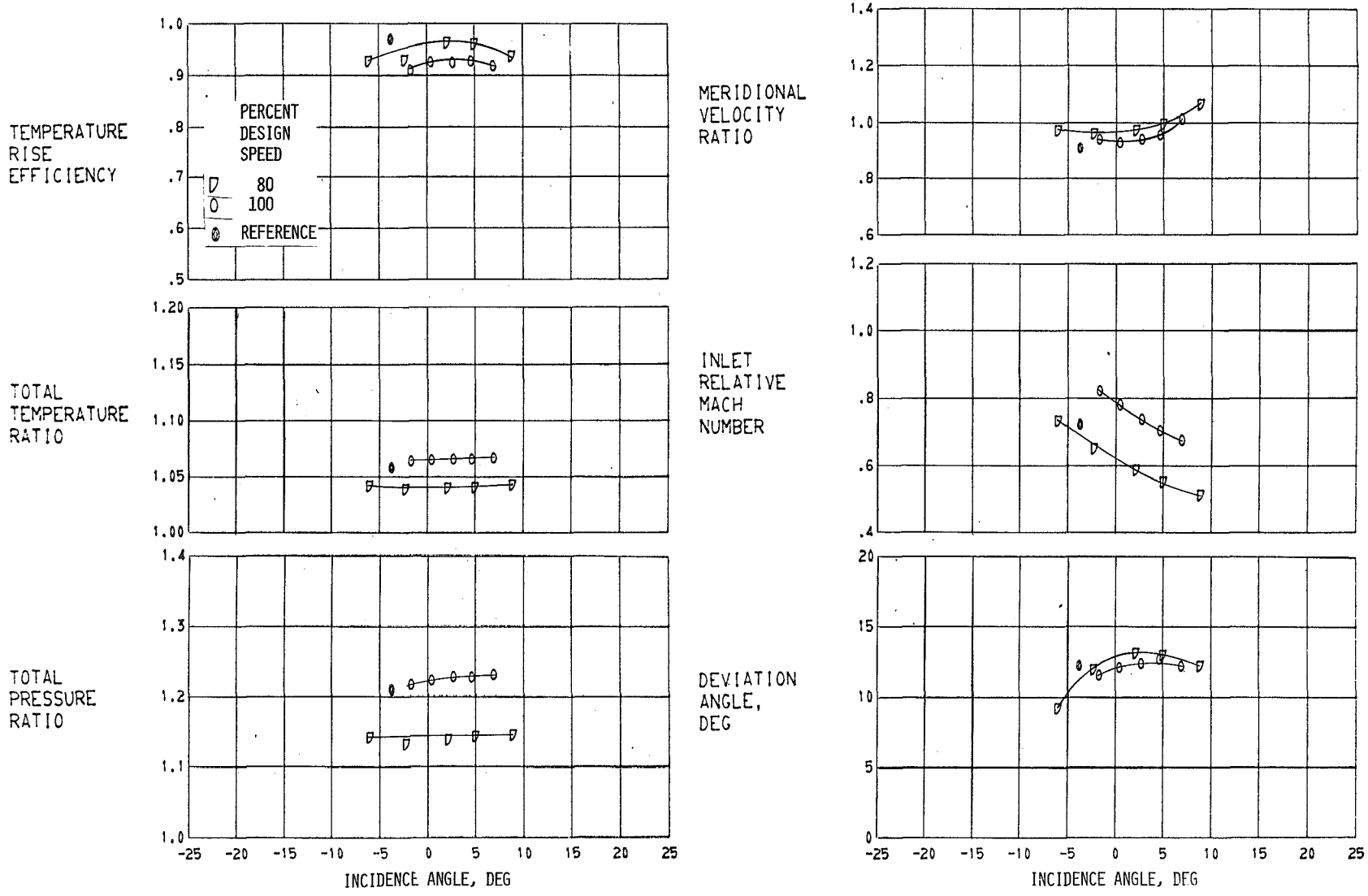
FIGURE 9. - CONTINUED. BLADE-ELEMENT PERFORMANCE FOR ROTOR 55B.

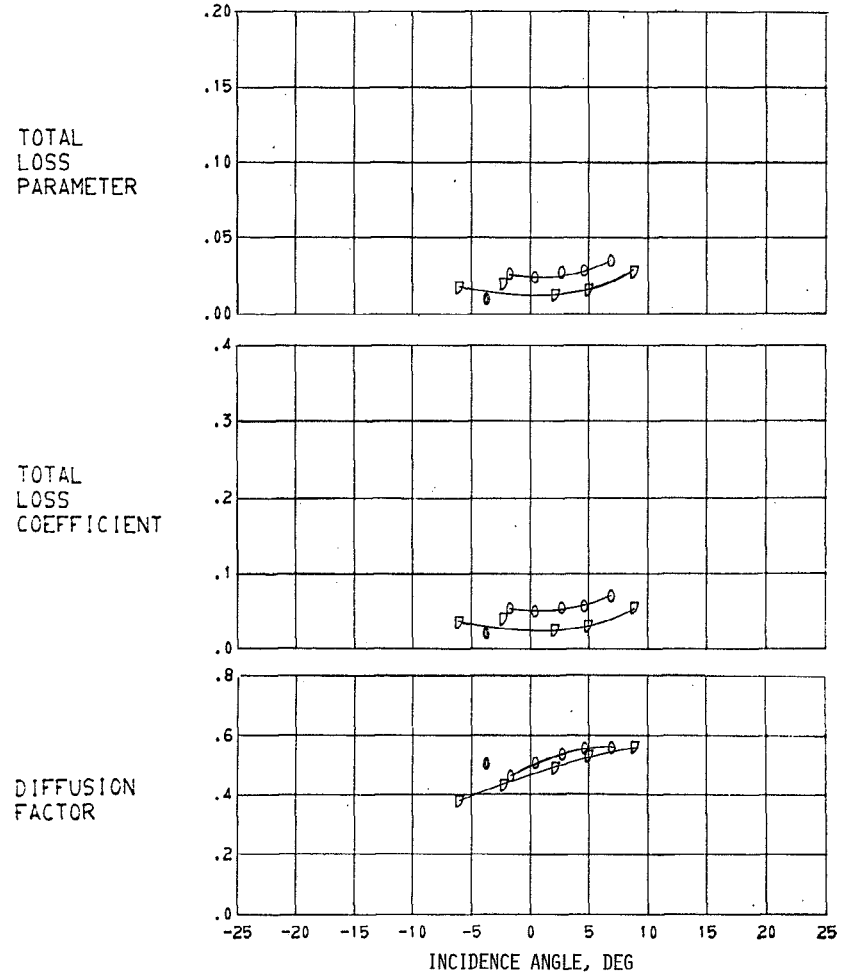

TEMPERATURE RISE EFFICIENCY
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
PERCENT DESIGN SPEED
80
100
REFERENCE
1.0
.9
.8
.7
.6
.5
1.20
1.15
1.10
1.05
1.00
1.4
1.3
1.2
1.1
1.0
-25 -20 -15 -10 -5 0 5 10 15 20 25
INCIDENCE ANGLE, DEG
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
1.4
1.2
1.0
.8
.6
1.2
1.0
.8
.6
.4
20
15
10
5
0
-25 -20 -15 -10 -5 0 5 10 15 20 25
INCIDENCE ANGLE, DEG



(C) 30.0 PERCENT SPAN.

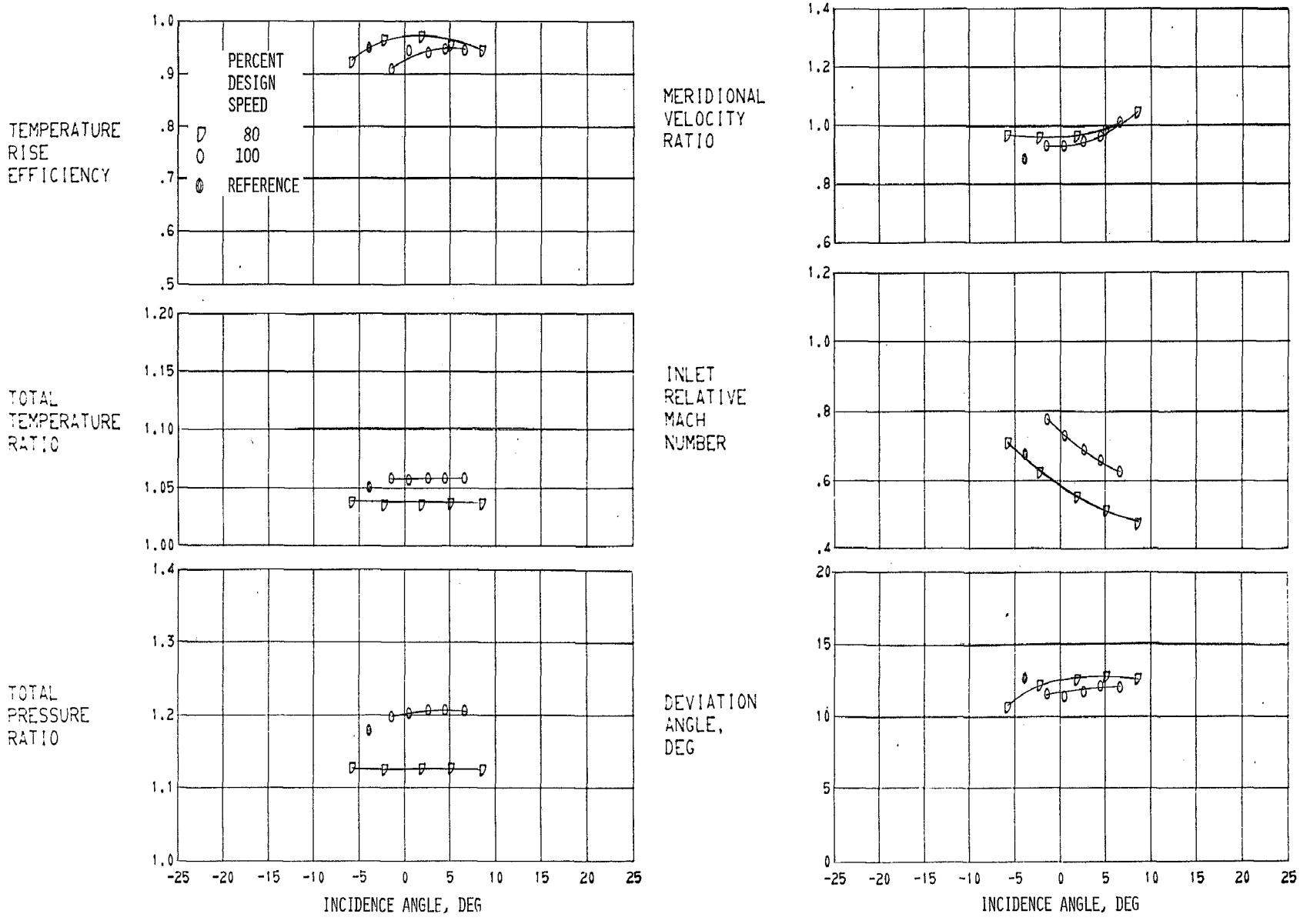
FIGURE 9. - CONTINUED. BLADE-ELEMENT PERFORMANCE FOR ROTOR 55R.

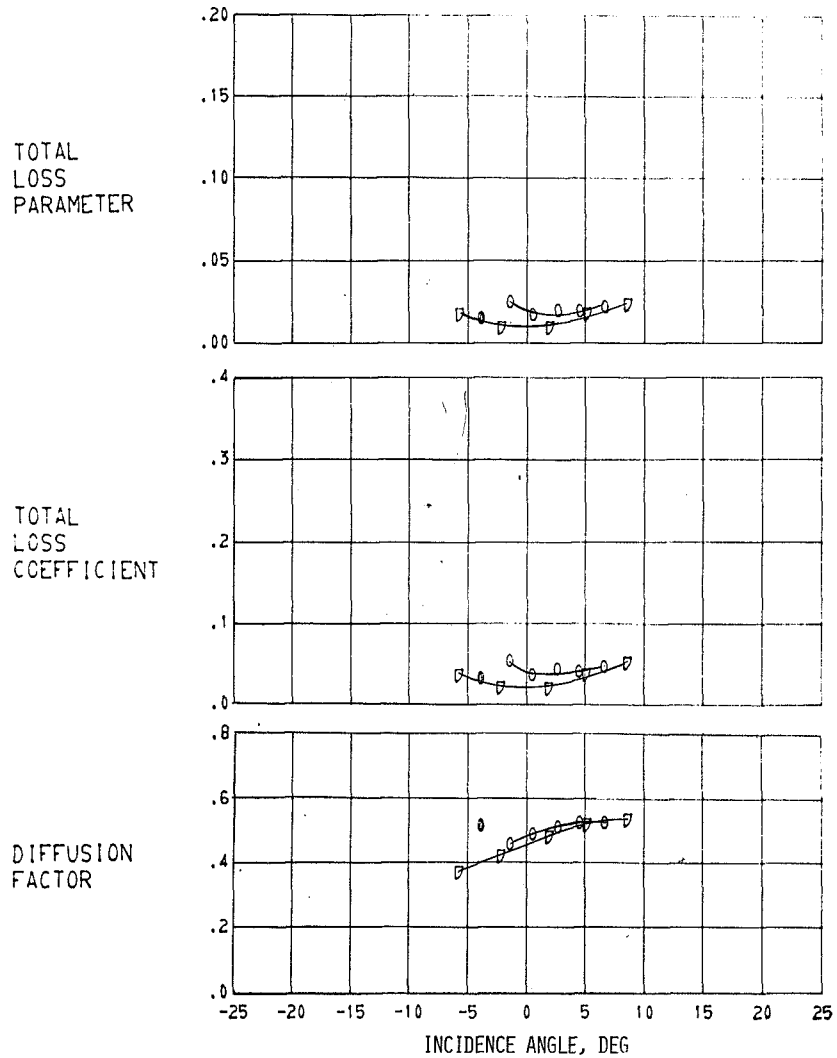

TEMPERATURE RISE EFFICIENCY
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
PERCENT DESIGN SPEED
80
100
REFERENCE
1.0
.9
.8
.7
.6
.5
1.20
1.15
1.10
1.05
1.00
1.4
1.3
1.2
1.1
1.0
-25 -20 -15 -10 -5 0 5 10 15 20 25
INCIDENCE ANGLE, DEG
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
1.4
1.2
1.0
.8
.6
.4
20
15
10
5
0
-25 -20 -15 -10 -5 0 5 10 15 20 25
INCIDENCE ANGLE, DEG



(D) 50.0 PERCENT SPAN.

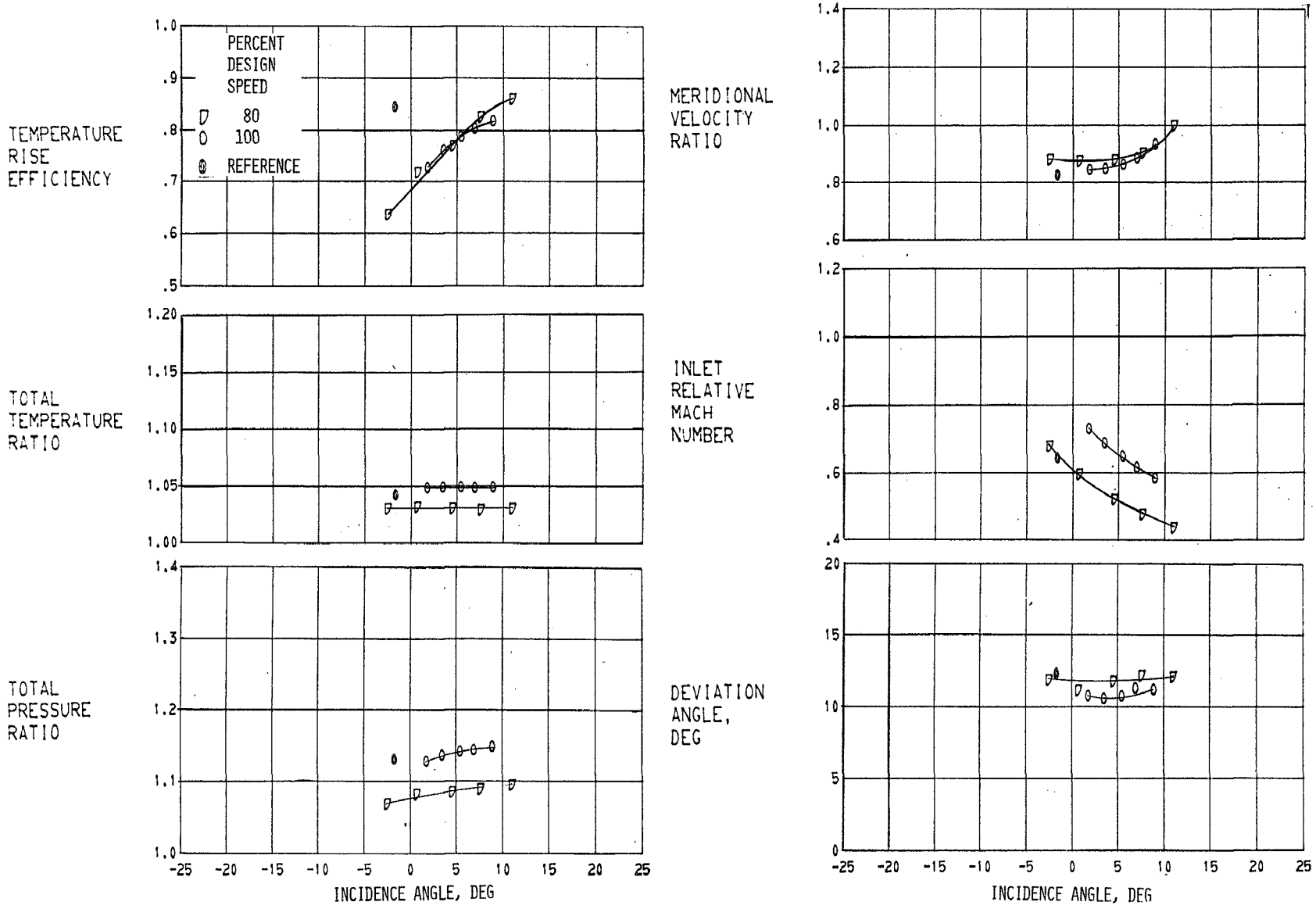
FIGURE 9. - CONTINUED. BLADE-ELEMENT PERFORMANCE FOR ROTOR 55B.

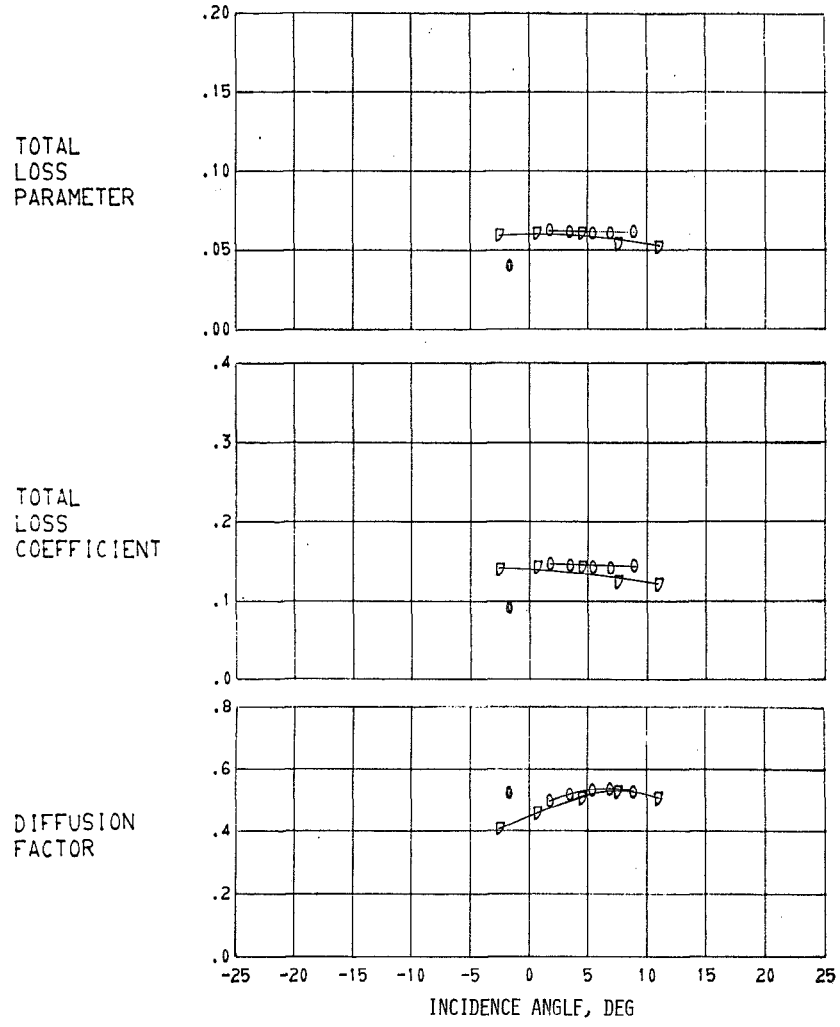

TEMPERATURE RISE EFFICIENCY
PERCENT DESIGN SPEED
80
100
REFERENCE
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
INCIDENCE ANGLE, DEG
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
INCIDENCE ANGLE, DEG



(E) 70.0 PERCENT SPAN.

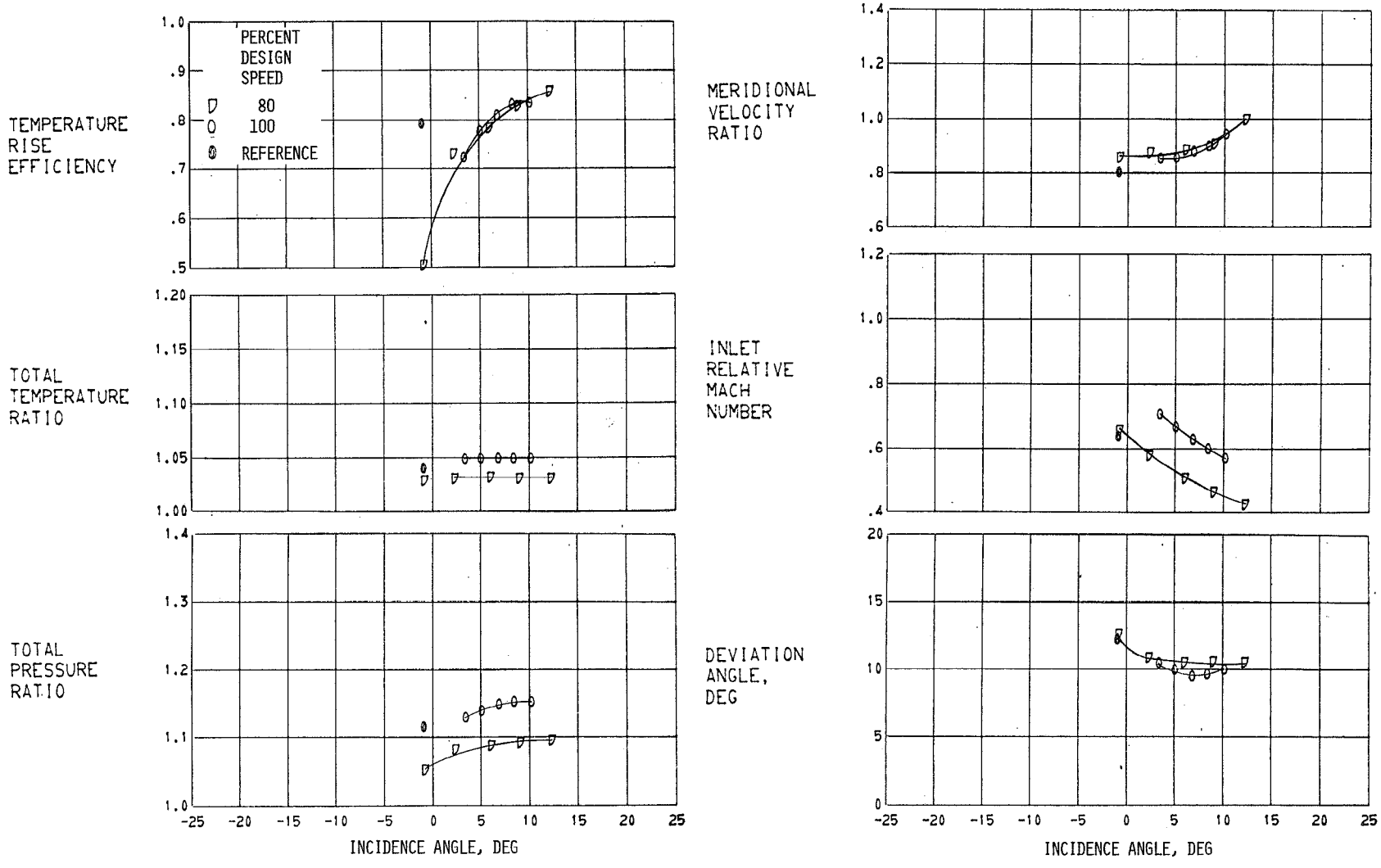
FIGURE 9. - CONTINUED. BLADE-ELEMENT PERFORMANCE FOR ROTOR 55B.

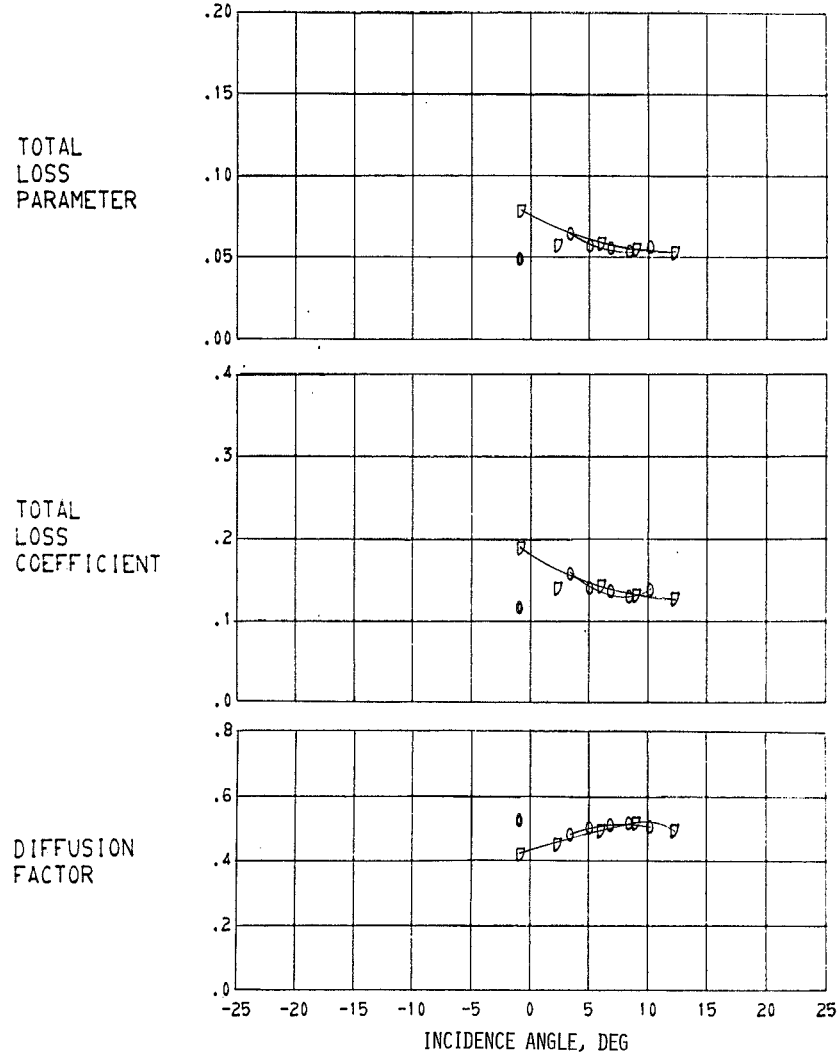

TEMPERATURE RISE EFFICIENCY
PERCENT DESIGN SPEED
80
100
REFERENCE
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
INCIDENCE ANGLE, DEG
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
INCIDENCE ANGLE, DEG



(F) 90.0 PERCENT SPAN.

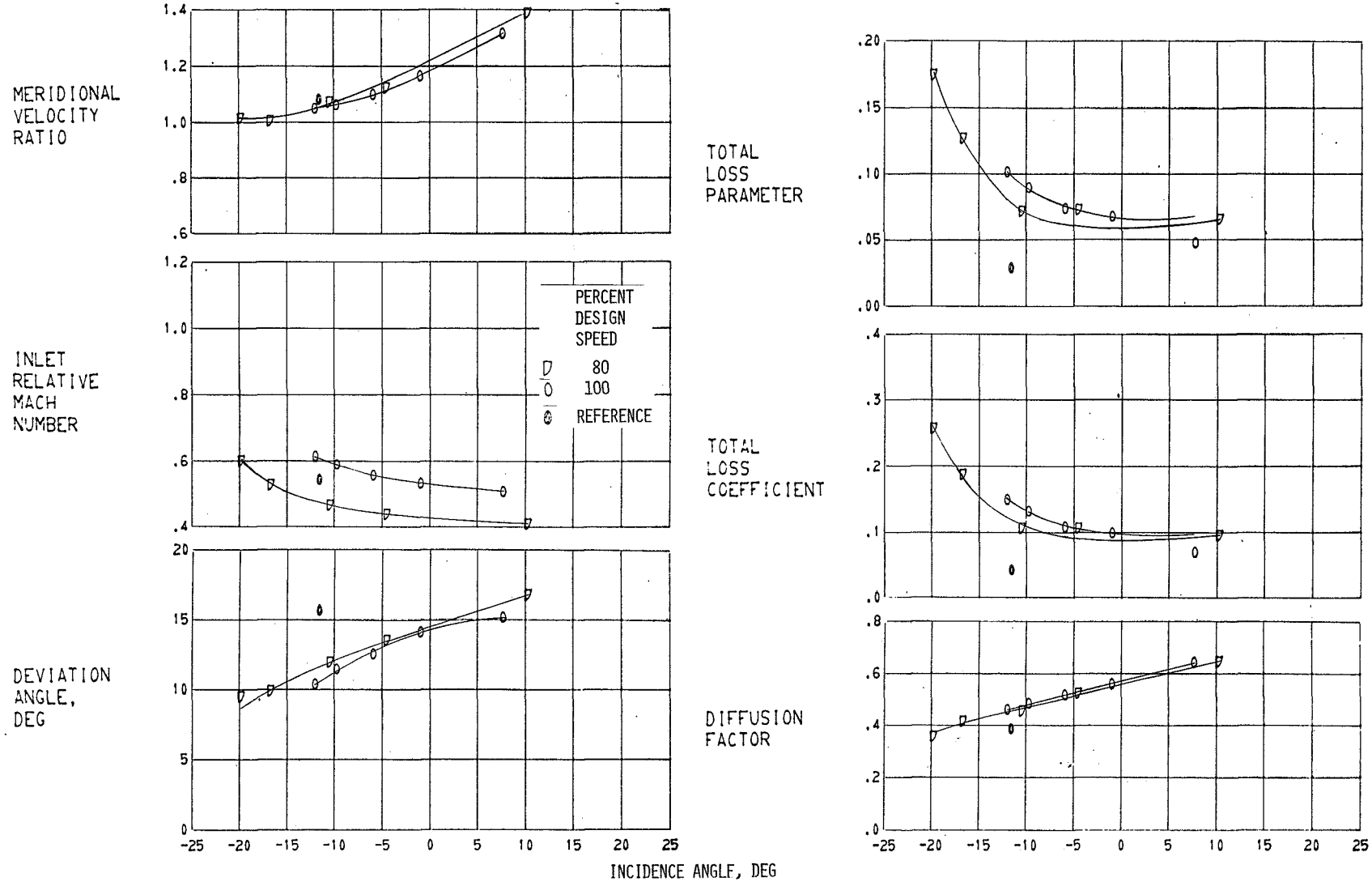
FIGURE 9. - CONTINUED. BLADE-ELEMENT PERFORMANCE FOR ROTOR 55B.


TEMPERATURE RISE EFFICIENCY
PERCENT DESIGN SPEED
80
100
REFERENCE
TOTAL TEMPERATURE RATIO
TOTAL PRESSURE RATIO
INCIDENCE ANGLE, DEG
MERIDIONAL VELOCITY RATIO
INLET RELATIVE MACH NUMBER
DEVIATION ANGLE, DEG
INCIDENCE ANGLE, DEG



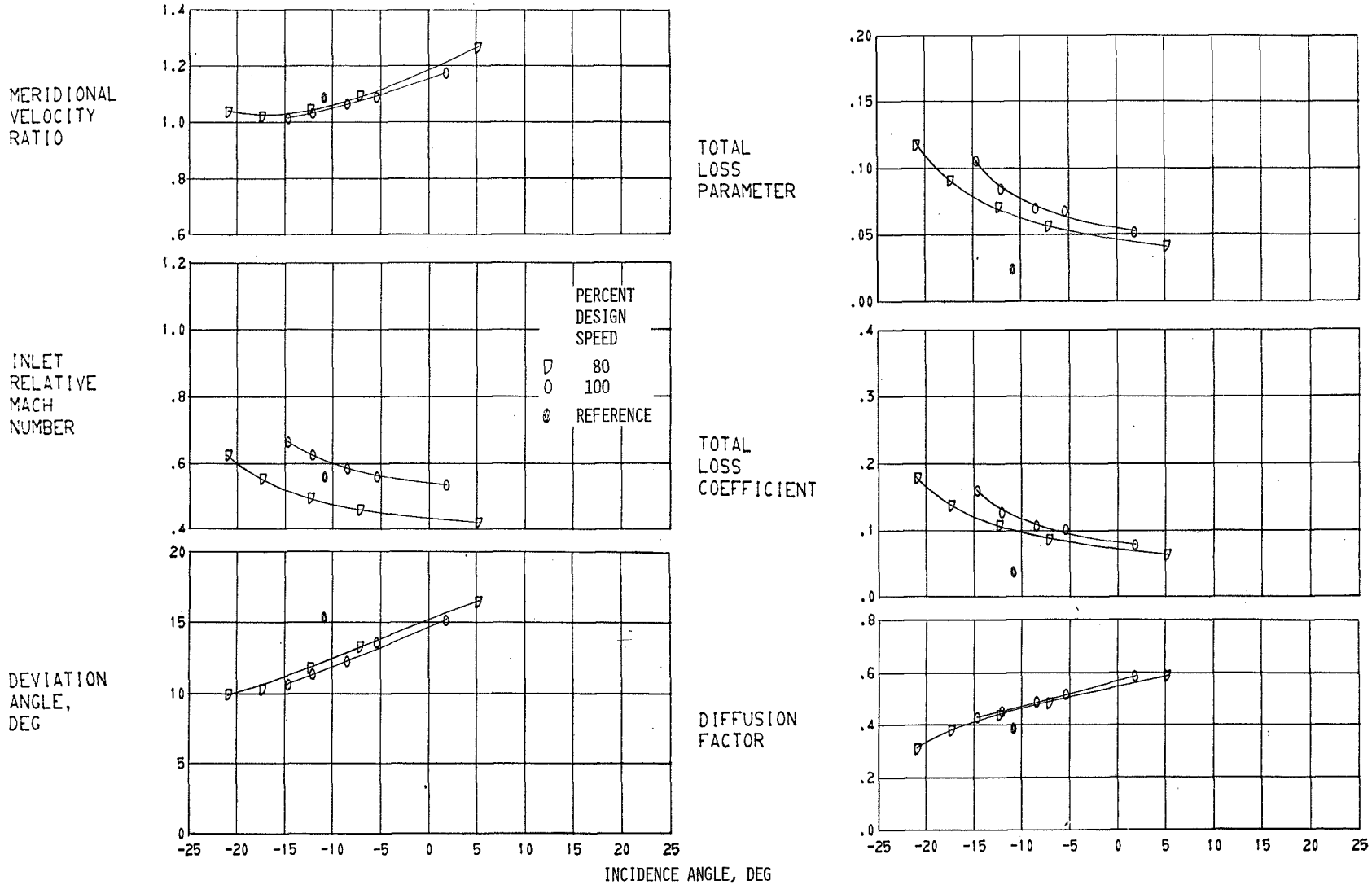
(G) 95.0 PERCENT SPAN.

FIGURE 9. - CONCLUDED. BLADE-ELEMENT PERFORMANCE FOR ROTOR 55B.



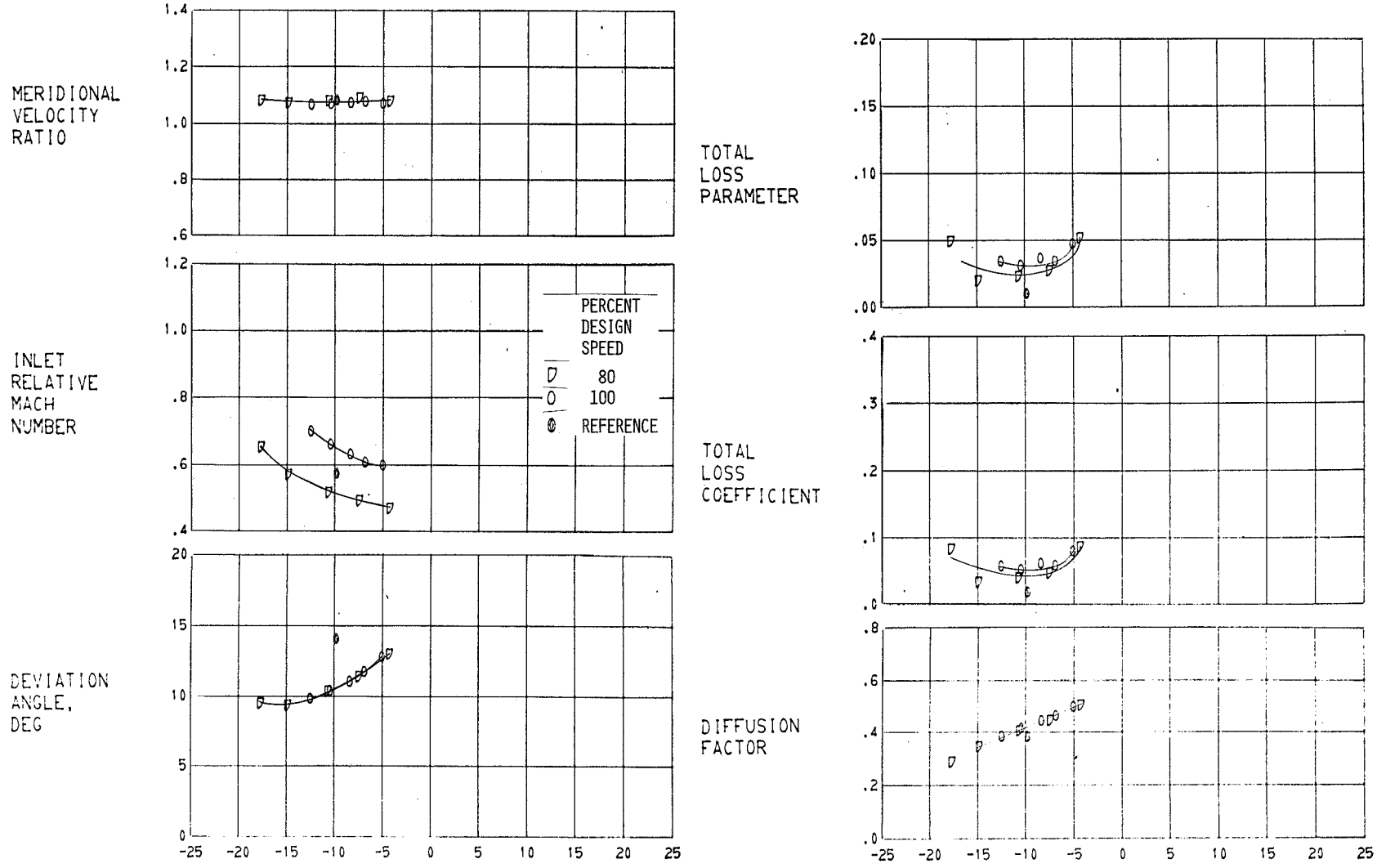
(A) 5.0 PERCENT SPAN.

FIGURE 10. - BLADE-ELEMENT PERFORMANCE FOR STATOR 55.



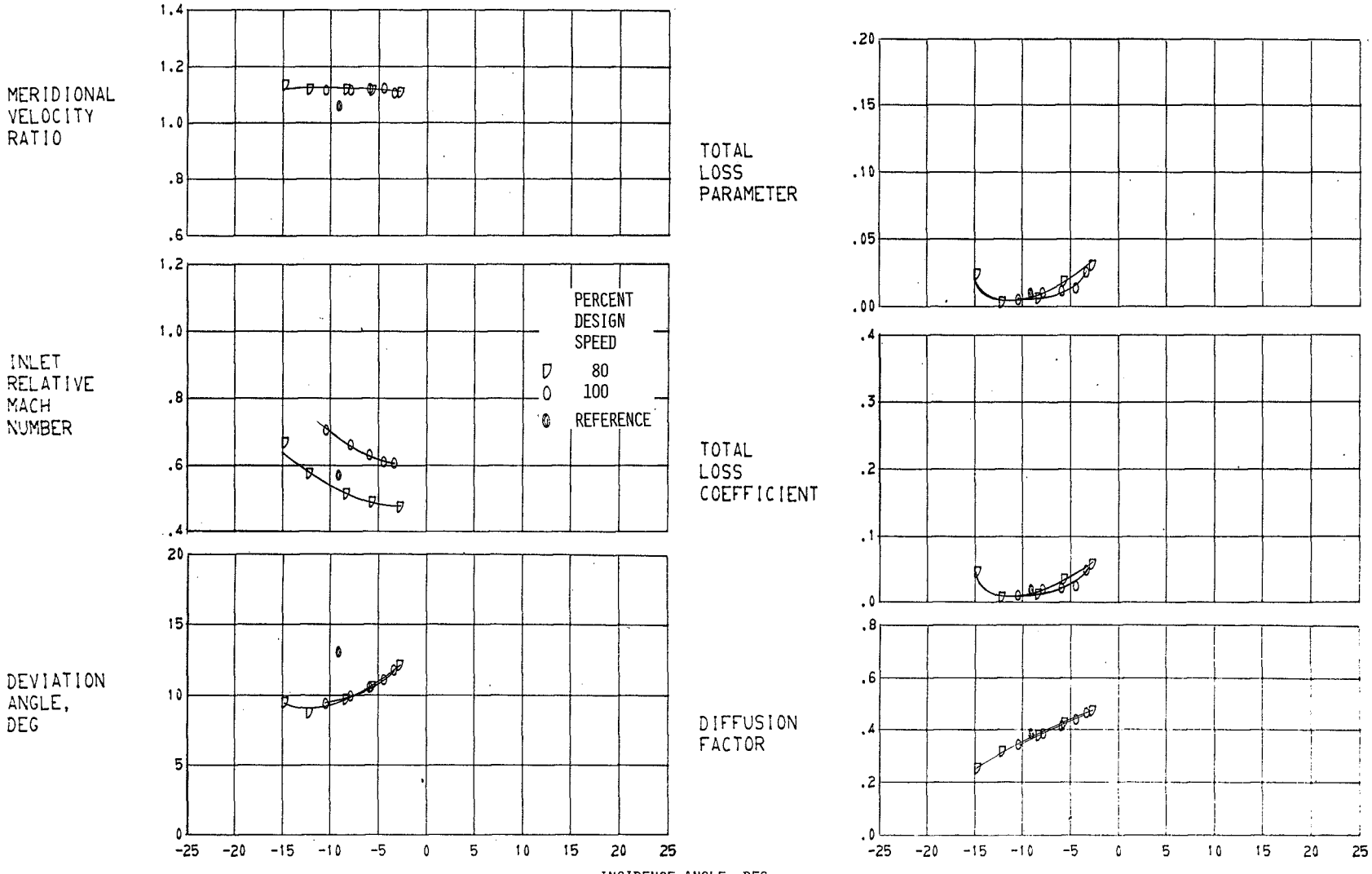
(B) 10.0 PERCENT SPAN.

FIGURE 10. - CONTINUED. BLADE-ELEMENT PERFORMANCE FOR STATOR 55.



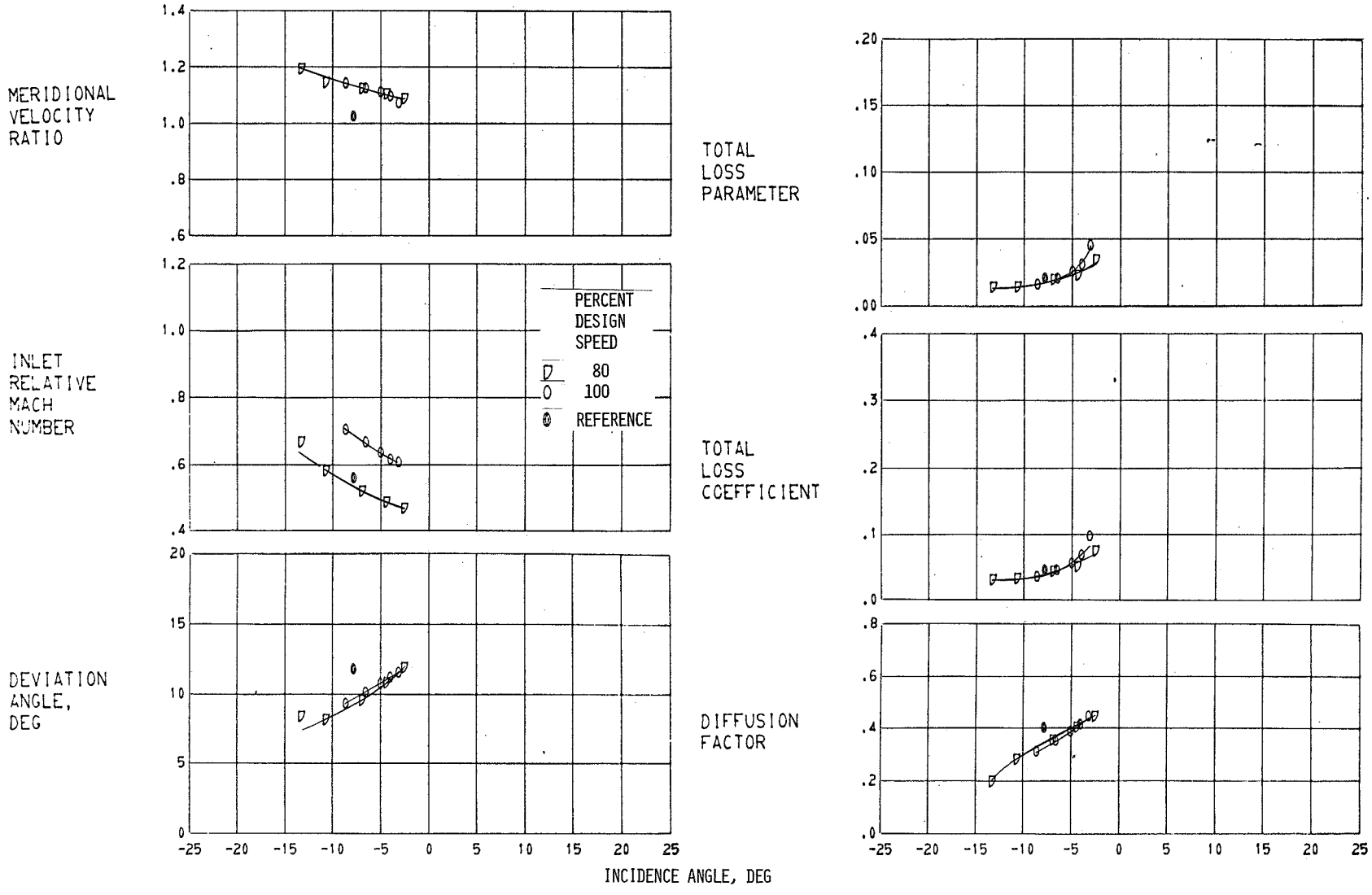
(C) 30.0 PERCENT SPAN.

FIGURE 10. - CONTINUED. BLADE-ELEMENT PERFORMANCE FOR STATOR 55.



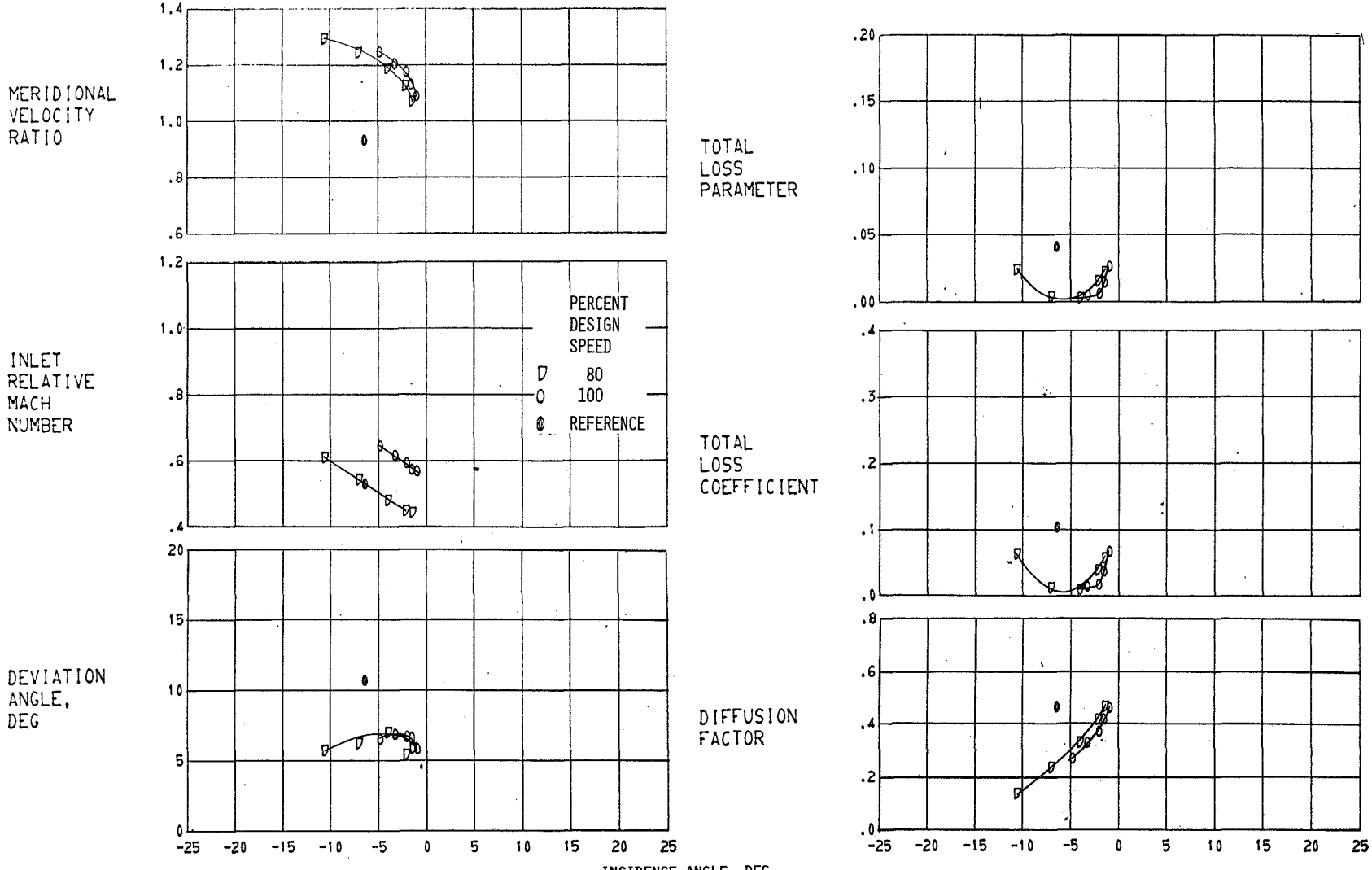
(D) 50.0 PERCENT SPAN.

FIGURE 10. - CONTINUED. BLADE-ELEMENT PERFORMANCE FOR STATOR 55.



(E) 70.0 PERCENT SPAN.

FIGURE 10. - CONTINUED. BLADE-ELEMENT PERFORMANCE FOR STATOR 55.



(F) 90.0 PERCENT SPAN.

FIGURE 10. - CONTINUED. BLADE-ELEMENT PERFORMANCE FOR STATOR 55.

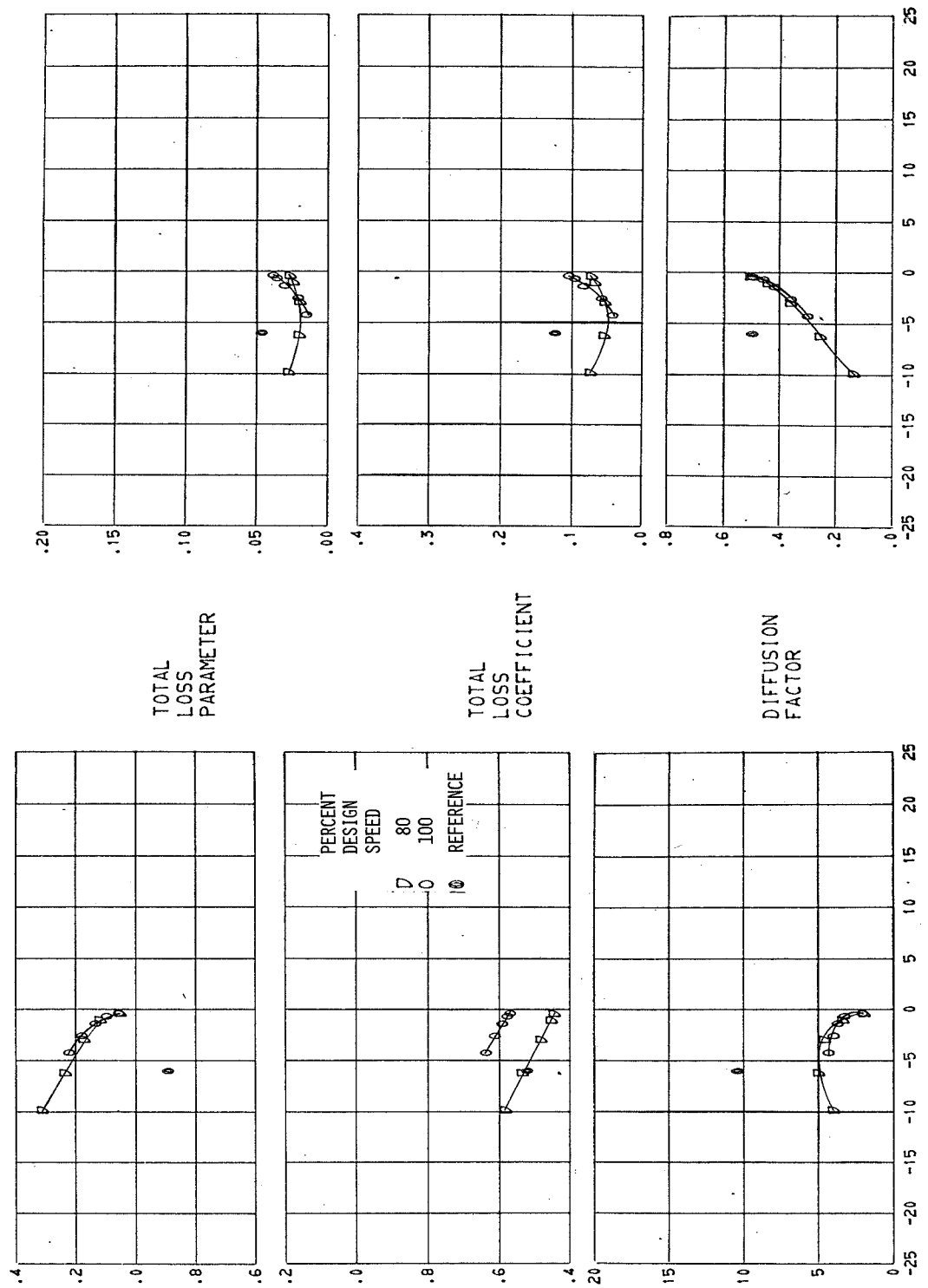


FIGURE 10. - CONCLUDED. BLADE-ELEMENT PERFORMANCE FOR STATOR 55.

(G) 95.0 PERCENT SPAN.

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