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SUMMARY

A variable-pitch fan stage was tested over a range of blade-setting-angles, speeds, and flows. The stage was designed for a pressure ratio of 1.376 at a tip speed of 289.6 meters per second and a flow of 29.61 kilograms per second. To reduce the effects of tip clearance on this variable-pitch rotor, the casing above the rotor tip was recessed. During the test program several modifications were made to the stage. The overall performances of the design configuration and those of the various modifications are presented.

For the design configuration the measured performance was in good agreement with the design point. However, the stall margin was only 5 percent. The pressure ratio and flow at stall decreased as the blades were closed. An operating line corresponding to a fixed exit throat area approaches stall at the more opened angles. Calculated static-thrust values along the operating line ranged from less than 15 percent to more than 115 percent of that obtained at design blade angle, for blade setting angles from 25^{o} (closed) to -8^{o} (opened).

Operating the stage with casing treatment over the rotor tips increased the stall margin to 20.6 percent; however, the adiabatic efficiency decreased by 4 percentage points.

INTRODUCTION

A research program on axial-flow fans and compressors for advanced airbreathing engines is being conducted at the NASA Lewis Research Center. The intent of the program is to improve the performance and to reduce the weight, volume, and cost of fans and compressors.

As a part of this program experimental studies (refs. 1 to 7) were conducted on two variable-pitch fan stages suitable for use in engines for quiet, powered-lift aircraft (short takeoff and landing). For one of those fans the rotor blade setting angle was varied $\pm 3^{o}$ from the design setting angle. For the other it was varied from -7^{o} (opened) to 13^{o} (closed). The design pressure ratio for these fans was relatively low (1.15 and 1.20). The results of these investigations indicated that the various flight requirements for quiet, powered-lift aircraft can be achieved with variable-pitch fan engines.

The Lewis Research Center is studying various engine concepts for vertical-lift aircraft. Not only are the flight requirements more demanding than those for powered-lift aircraft, there is also a requirement that the thrust for each engine be varied to provide aircraft stability control during takeoffs and landings. One possible concept would be to use variable-pitch fans similar to the powered-lift aircraft fans. However, the aircraft stability requirement for relatively large changes in thrust will probably require that the rotor blades be operated over a much wider range in blade setting angle. Another concept being considered is the use of variable inlet guide vanes to vary the engine thrust.

A 1.38-pressure-ratio fan stage has been tested to evaluate the performance of a variable-pitch rotor fan stage designed for higher pressure ratio and operating over a wider range of rotor blade setting than those previously tested. The stage was designed and fabricated by the Hamilton Standard Division of United Technologies Corporation and was tested by Lewis in its single-stage compressor test facility. The fan was designed for a nominal tip speed of 289.6 meters per second and an airflow of 29.6 kilograms per second. During the test operations the rotor-blade angle was varied from -8° (opened) to 35° (closed) from the design setting.

This fan stage was modified several times during the investigation. For variable-pitch rotor blades, the blade tips must be contoured so that the tip clearance will be minimum at the radial axis of rotation and considerably greater at the leading and trailing edges. As discussed in reference 7, a method for reducing the tip clearance would be to reshape the casing above the rotor tip to match the blade-tip contour when the tip is in the feather position. The original fan was designed with this type of recessed contour above the rotor tip. Although the performance was close to design, the stall margin was small. In an effort to increase the stall margin, the rotor blade was recoined in the tip region to increase the inlet blade angle. To evaluate the effect of the casing contour on the performance, the recoined stage was also tested with a straight contour above the rotor tip. And, finally, the stage was tested with casing treatment over the rotor tips. The use of casing treatment had been an effective method for improving stall margin (ref. 8).

This report presents the overall performances of the fan stage for the original configuration and the three modifications. Data are presented over the stable operating range for speeds from 60 to 120 percent of design speed. For each configuration the rotor was tested with at least three setting angles. The stage performances with the original and recoined blades are compared. The effects of the casing contour and of casing treatment on performance with the recoined blades are also presented.

TEST STAGE

Aerodynamic Design

The flow path of the test stage, designated stage 57, is shown in figure 1. Basically the variable-pitch fan stage was designed for a pressure ratio of 1.376 at a tip speed of 289.6 meters per second and a flow of 29.61 kilograms per second. Photographs of the rotor and stator are presented in figure 2. There are 19 rotor blades with an aspect ratio of 1.26. The 38 stator blades have an aspect ratio of 1.70. The overall design parameters are presented in table I. Both the rotor and stator blade-geometry parameters for the original stage are presented in tables II to V. The values presented are based on design values supplied by Hamilton Standard and interpolated to the desired radial positions. The symbols and equations are defined in appendixes A and B. The abbreviations and units used for the tabular data are defined in appendix C.

To allow the variable-pitch rotor blades to turn through feather to a reverse flow setting, the tip contour must be basically a circular arc in the chordwise direction. Thus, the tip clearance with the straight cylindrical casing will be the least at the radial axis of blade rotation and greatest at the leading and trailing edges. The casing above the rotor was recessed in an attempt to reduce the effects of tip clearance (fig. 3). The sketch of figure 3 shows the blade tip in both the design and feather position, and the photograph shows the blade tip in the feather position only. The tip radius at the blade leading and trailing edges is equal to the nominal casing radius (25.4 cm). At the blade radial axis of rotation, the blade tip radius is greater. In an engine a split nacelle would have to be used to allow replacement of the fan rotor – a disadvantage.

The stage was tested with the rotor blades set at several angles. Listed below are the letter designations for each of the setting angles.

Designation	Setting angle, deg from design
A	0
B	4 (Closed)
C	-5 (Opened)
D	-8 (Opened)
E	15 (Closed)
F	25 (Closed)
G	35 (Closed)

Modifications

During this investigation, three major changes were made to the stage:

(1) Recoined blades - In an effort to improve the stall margin, the original blades were reshaped in the tip region by recoining them. The inlet blade metal angle was increased while the outlet angle was unchanged. The inlet blade angles are compared in figure 4. From a radius of about 23.6 centimeters to the tip, the inlet blade angle was progressively increased; at the tip the angle change was about 5.3^{o}. This stage with the recoined blades was designated stage 57M1.

(2) Straight casing insert - The stage was also tested with a straight insert to evaluate the effects of the recessed casing above the rotor tip. To test with the straight cylindrical insert, the rotor blade tips were remachined to the contour shown in figure 5. The recoined rotor with the straight insert was designated stage 57M3.

(3) Casing treatment - The casing treatment insert used in this study is shown in figure 6. The slots were alined with the axial planes but are skewed at a 60^{o} angle to the radial plane in the direction of rotation. There are two rows of 110 equally spaced slots. The rows are axially spaced as shown in the figure. The casing treatment was centered about the blade axis of rotation. The sketch of the blade shown represents the design setting angle. The recoined rotor was tested with the casing treatment insert. This configuration was designated stage 57M4.

APPARATUS AND PROCEDURE

Test Facility

The fan stage was tested in the Lewis single-stage compressor test facility (fig. 7), which is described in reference 9. Atmospheric air enters the test facility at an inlet located on the roof of the building and flows through the flow measuring orifice into the plenum chamber upstream of the test stage. The air then passes through the experimental fan stage into the collector and is exhausted to the facility exhaust system.

Instrumentation

The fan flow was determined from measurements on a calibrated thin-plate orifice that was 38.9 centimeters in diameter. The orifice temperature was determined from an average of two Chromel-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. 1 for axial locations). Photographs of the survey instrumentation are shown in figure 8. At stations 1 and 2 total pressure, total temperature, and flow angle were measured with the combination probe (fig. 8(a)), and the static pressure was measured with an 18° wedge probe (fig. 8(b)). At station 3 total pressure and total temperature were measured with a nine-element radial rake (fig. 8(c)), and the static pressure and flow angle were determined from the wedge probe. Each probe was positioned with a null-balancing, steam-direction-sensitive control system that automatically alined the probe to the direction of flow. The rakes were set straight ahead. The thermocouple material was Chromel-Constantan for both the combination probe and the rake.

Inner- and outer-wall static-pressure taps were located at approximately the same axial stations as the survey instrumentation. The circumferential locations of the survey instrumentation along with the inner- and outer-wall static-pressure taps are shown in figure 9. At the station 3 the rakes were circumferentially traversed one stator gap (9.5°) from the angles shown.

An electronic speeder 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 system are as follows:

Airflow, kg/sec	±0.3
Rotative speed, rpm	±30
Flow angle, deg	±1.0
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

For each configuration the stage survey data were taken over a range of speeds from 60 to 120 percent of design speed and a range of flows from maximum to near-stall conditions. Data were recorded at nine radial positions for each speed and weight flow. The performance for each configuration was obtained at three or more rotor-blade setting angles.

The combination probes at stations 1 and 2 and the wedge probes at all stations were traversed radially at the same time the nine-element rakes at station 3 were traversed circumferentially. The wedge probes at station 3 were set at midgap because preliminary studies showed that the static pressure across the stator gap was constant. The probes and rakes were set at their initial positions, and values of pressure, temperature, and flow angle were recorded. The instruments were then traversed to their next scheduled positions, and data were again recorded. When the rakes are at their last circumferential position, the probes are at their last radial position.

Calculation Procedure

Measured values of total pressure, static pressure, and total temperature were corrected for Mach number and streamline slope. These corrections were based on an average calibration for the type of instrument used. Orifice airflow, rotative speed, static and total pressures, and total temperatures were all corrected to standard-day conditions based on the rotor-inlet condition.

For the data reduction program the circumferential distributions of static pressure and flow angle downstream of the stator (station 3) were assumed to be constant for each radial position and equal to the measured midgap values. The nine circumferential values of total pressure and total temperature obtained at each radial position were averaged. The nine total temperatures were mass averaged to obtain the stator-outlet temperature; and the nine total pressures were converted to their enthalpy equivalents and then mass averaged. All blade-element data presented at the stator outlet are based on these average total pressures and total temperatures.

To obtain the overall performance, the radial values of total temperature were mass averaged, and the radial values of total pressure were converted to their enthalpy equivalent and then mass averaged as before.

The sea-level static thrust is a mass-averaged value and is composed of both the momentum thrust and the pressure thrust. The momentum thrust is a product of the flow rate and the outlet velocity. The pressure thrust consists of a product of the outlet area and the difference between outlet static pressure and inlet total pressure.

The flow at stall was obtained in the following manner: during operation at near stall, the collector valve was slowly closed in small increments. At each increment the airflow was recorded. The airflow obtained just before stall occurred is defined as the stall airflow. The pressure ratio at stall was obtained by extrapolating the total pressure obtained from the survey data to the stall airflow.

RESULTS AND DISCUSSION

The results from this investigation are presented in five main sections. The overall performance of the design configuration at the various rotor-blade setting angles is presented first. This is followed by discussions of stage overall performances of the stage with recoined blades, casing tip contour, and casing treatment. Finally, there is a brief comparison of the performances of the stage with the various modifications. All of the overall performance parameters for the various configurations and rotor blade setting angles are presented in tables VI to XXI.

Design Configuration Performance

Design setting angle. - The overall performances for the rotor and stage are presented in figures 10 and 11. Pressure ratio and adiabatic efficiency are presented at several flows for 60, 70, 80, 90, 100, 110, and 120 percent of design speeds. The solid symbols represent the design values. At design speed the rotor performance agrees quite well with the design values. A peak efficiency of 0.872 for the rotor occurred at a flow of 29.42 kilograms per second and a pressure ratio of 1.390. The rotor was designed for an efficiency of 0.904 at a flow of 29.61 kilograms per second and a pressure ratio of 1.396.

The peak stage efficiency at design speed is 0.844, and it occurs at an airflow of 29.42 kilograms per second and a pressure ratio of 1.368. The results in a stall margin of about 5 percent between the peak efficiency and stall conditions.

Although the measured performance of the stage agrees reasonably well with design values, the stall margin is probably inadequate for vertical-lift engine application. Blade-element data indicated that the rotor tip was operating at high incidence angles at the stall condition, thus it was desirable to recoin the blades.

Rotor-blade setting angles. - The overall performance of the stage is presented in figure 12 for three setting angles: -8° (opened), 15° and 25° (closed). The performance at design angle was presented in figure 11. As the blades are closed from -8° to 15° (fig. 12(a), fig. 11, and fig. 12(b)), the peak efficiency and flow range for each speed increases. Further closing to 25° (fig. 12(c)), however, results in a decrease of both peak efficiency and flow range.

Closing the blades results in lower stall weight flow and stall pressure ratio at all speeds. This is illustrated for design speed in figure 13 where the pressure ratio is presented as a function of airflow for all six blade setting angles. Based on the data presented, it appears the design flow and pressure ratio would be obtained at a blade setting angle of about -1°.

Since it is desirable to operate with a constant area nozzle in the actual engine, an operating line is shown in figure 13. The operating line was obtained from a constant throttle valve position in the test rig. At the more opened blade angles (negative angles), the operating line is limited by the stall conditions; at the more closed blade angles (positive), the operating line moves to a very low operating pressure and efficiency.

A primary purpose of variable-pitch fan stages is to provide thrust modulation at constant speed. The effect of blade setting angle on calculated static thrust at design speed is given in figure 14. For each angle at design speed the maximum static thrust and the static thrust for the assumed operating line are presented as a functions of blade setting angle. Thrust changes almost linearly with changes in blade setting angle. The maximum calculated thrust increases from 3700 to 8300 newtons (which correspond to 54 to 118 percent of the value at design angle) as the blade angle is opened from 25° to -8°.

At the most opened angle (-8°) the operating line thrust is approximately equal to the maximum value. However, as blades are closed down, the operating thrust decreases more rapidly than the maximum value. At an angle of 25° the operating line thrust is only 12 percent of the design angle thrust.

These data indicate that the variable-pitch fan concept may indeed be a viable method for obtaining the thrust modulation for vertical-lift engines.

Performance with Recoined Rotor Blades

The overall performance of the stage with the recoined rotor blades at the design angle (stage 57M1A) are presented in figures 15 and 16 for the rotor and stage. Data are presented over the stable operating range for speeds from 60 to 120 percent of design speed. For comparison, design-speed data and the stall line are also presented for the original configuration.

At design speed the rotor pressure ratio and efficiency are essentially the same for the recoined blade as for the original. The maximum flow occurs about 1 kilogram per second less than that for the original configuration (fig. 15).

The peak efficiency at design speed for stage 57M1A is higher than that for stage 57A. Since the rotor efficiencies were the same, this would indicate that the rotor match with the stator is slightly better with the recoined blades. The stall line for stage 57M1A was at a lower flow at all the speeds. The flow range is about the same for both configurations. The stall margin for the recoined blade configuration is 6 percent, based on conditions at stall and peak efficiency.

The effects of rotor-blade setting angles on the pressure ratio and static thrust for stage 57M1 are presented in figure 17 and 18 for design speed. The pressure ratio trends with blade angle (fig. 17) are similar to those for the original configuration. For the recoined blade configuration it appears that the rotor blades would have to be set at an angle of -2° to achieve design pressure ratio and flow. The assumed operating line is the same as that for stage 57. The maximum and operating line static thrust trends with blade angle (fig. 18) are also similar to those for the original stage.

Performance with Straight Casing Contour

The overall performances with the recoined rotor blades at the design angle and the straight casing contour (stage 57M3A) are presented in figures 19 and 20. Data are presented over the stable operating range for speeds from 60 to 120 percent of design speed. For comparison, design-speed data and the stall line are also presented for stage 57M1A (recoined blades and recessed tip contour).

At a given flow and speed the pressure ratio is lower for the straight casing (stage 57M3A) than for the recessed one (stage 57M1A). However, the stall line has moved to lower flows. At design speed the peak efficiency for stage 57M3A is 2 percentage points higher than for stage 57M1A. The stall margin for stage 57M3A is 13.6 percent based on conditions at stall and peak efficiency.

The effect of rotor-blade setting angle on the stage pressure ratio and static thrust for stage 57M3 is presented in figures 21 and 22. The assumed operating line is the same as that shown for the two previous configurations. For this configuration the blades were also tested at 35°. The data of figure 21 suggest that the design pressure ratio and flow would be achieved at a blade angle of -3°. The thrust trends with blade angle are the same as for the other two configurations. The difference between the maximum and the operating-line thrust are, however, greater at the more closed blade angles.

Performance with Tip Casing Treatment

The overall performances with the recoined rotor blades and the casing-treatment insert (stage 57M4A) are presented at the design angle in figures 23 and 24. Data are presented over the stable operating range for speeds from 60 to 120 percent of design speed. For comparison, design-speed data and the stall line stage 57M3A are also presented.

Casing treatment had two significant effects on design-speed performance: The stall line moved to significantly lower flows, and the peak adiabatic efficiency decreased more than 4 percentage points. The stall margin for stage 57M4A is 20.6 percent based on conditions at stall and peak efficiency.

The effect of rotor-blade setting angle on the stage pressure ratio and static thrust for stage 57M4 are presented in figures 25 and 26. The stall line and assumed operating line are presented in figure 25. For this stage there appears to be adequate stall margin at the opened blade angles. However, as previously indicated the casing treatment significantly lowers efficiency. The static-thrust trends (fig. 26) are the same with as without casing treatment.

Comparison of Performance with the Various Configurations

The effects of the various configuration changes on the stall line and operating line static thrust are summarized in figures 27 and 28. The design-speed data are presented on both figures.

The recoining of the rotor blades results in the stall line moving to lower flows (improved stall margin). (See data from stages 57M1 and 57.) However, the calculated static thrust decreased for all settting angles.

The recoined blades with the straight casing contour gave a slight decrease in static thrust. (See data from stages 57M3 and 57M1.) At the 0 and -5° setting angles, the stall line moved to lower flows; however, at the 15° setting angle, there was essentially no change in the stall point.

The final modification to this stage was to add casing treatment above the recoined blades (stage 57M4). This change resulted in a significant increase in the stall margin at the 0 and -5° setting angles and essentially no change in the stall point at the 15° setting angle. The static thrust was the same as that for stage 57M3.

At the 15° setting angle, there was essentially no change in the stall point between stages 57M1, 57M3, and 57M4. These three stages used the same recoined rotor blades, but had different tip configurations. It appears that the tip elements do not control stall at the 15° angle setting.

The results from this investigation indicate that this fan stage with variable-pitch rotor represents a viable concept for obtaining thrust modulation for the vertical-lift aircraft. However, the stall margin may have to be improved. A variable-exit nozzle may be required for the engine to achieve the total range of thrust modulation desired with adequate stall margin. At the high thrust angles (opened), the operating line is very close to the stall line. Inlet flow distortions are most likely to be encountered during takeoffs and landings and will further reduce stall margin. For adequate stall margin, casing treatment may be used with a compromise in the fan efficiency.

SUMMARY OF RESULTS

A variable-pitch fan stage has been tested over a range of blade-setting angles, speeds, and flows. The fan stage was designed for a pressure ratio of 1.376 at a tip speed of 289.6 meters per second and a flow of 29.61 kilograms per second. To reduce the effects of tip clearance on this variable-pitch rotor, the casing above the rotor tip was recessed. During the course of this test program, several modifications were made to the stage. These included recoining the rotor blades, the use of a straight tip casing insert, the casing treatment for the rotor. Each of the modifications resulted in changes in the overall performance, but the basic trends observed with setting angle, speed, and flow were the same for each configuration. This investigation yielded the following principal results:

1. Although the original stage's measured pressure ratio and efficiency were in good agreement with the design values, the stall margin was only 5 percent.

2. An operating line corresponding to a fixed-exit throttle-valve position is limited on the high end (more opened blade angles) by stall and on the low end (more closed angles) by very low operating pressures and efficiencies.

3. As the rotor blades were closed at a constant speed, the stage pressure ratio and flow decreased.

4. Calculated static thrust values along the operating line ranged from less than 15 percent to more than 115 percent of that obtained at design angle with variations in blade setting angle from 25° (closed) to -8° (opened).

5. The stall margin with the recoined blades and recessed casing increased to 6 percent; however, calculated thrust decreased slightly.

6. Operating the recoined rotor with the straight cylindrical casing increased stall margin to 13.6 percent; but calculated thrust decreased relative to that for the recessed casing.

7. The stall margin with the casing treatment increased to 20.6 percent and the calculated thrust was about the same as that for the straight casing. The adiabatic efficiency decreased more than 4 percentage points.

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APPENDIX A

SYMBOLS

A	area, m^2
A_{an}	annulus area at rotor leading edge, m^2
A_f	frontal area at rotor leading edge, m^2
C_p	specific heat at constant pressure, 1004 J/(kg)(K)
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
i_{ss}	suction-surface incidence angle, angle between inlet air direction and line tangent to blade suction surface at leading edge, deg
N	rotative speed, rpm
P	total pressure, N/cm^2
p	static pressure, N/cm^2
r	radius, cm
SM	stall margin
T	total temperature, K
U	wheel speed, m/sec
V	air velocity, m/sec
W	airflow, kg/sec
Z	axial distance referenced from rotor-blade hub leading edge, cm
α_c	cone angle, deg
α_s	slope of streamline, deg
β	air angle (angle between air velocity and axial direction), deg
β'_c	relative meridional air angle based on cone angle, arctan $(\tan \beta'_m \cos \alpha_c / \cos \alpha_s)$, deg
β'_m	relative meridional air angle, deg
γ	ratio of specific heats
δ	ratio of rotor-inlet total pressure to standard pressure of 10.13 N/cm^2

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

η efficiency

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

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

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

ρ density

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

tip blade tip

z axial direction

θ tangential direction

Superscript:

' relative to blade

APPENDIX B

EQUATIONS

Suction-surface incidence angle -

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

Mean incidence angle -

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

Deviation angle -

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

Diffusion factor -

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

Total-loss coefficient -

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

Profile-loss coefficient -

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

Total-loss parameter -

$$\frac{\bar{\omega} \cos (\beta_m')_{TE}}{2\sigma} \tag{B7}$$

Profile-loss parameter -

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

Adiabatic (temperature rise) efficiency -

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

Momentum-rise efficiency -

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

Equivalent airflow -

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

Equivalent rotative speed -

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

Airflow per unit annulus area -

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

Airflow per unit frontal area -

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

Head-rise coefficient -

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

Flow coefficient -

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

Stall margin -

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

Polytropic efficiency -

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

Static thrust -

$$\rho V_z^2 A_{TE} + (p_{TE} - P_{LE}) A_{TE} \tag{B19}$$

APPENDIX C

DEFINITIONS AND UNITS USED IN TABLES

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

PHISS	suction-surface camber ahead of assumed shock location, deg
PRESS	pressure, N/cm^2
PROF	profile
RADII	radius, cm
REL	relative to 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
TOTAL CAMBER	difference between inlet and outlet blade mean camber lines, deg
TURN RATE	ratio to turning on front section of blade to back section
VEL	velocity, m/sec
WHEEL SPEED	wheel speed, m/sec
ZI	axial distance to blade leading edge from inlet, cm
ZMC	axial distance to blade maximum thickness point from inlet, cm
ZO	axial distance to blade trailing edge from inlet, cm
ZTC	axial distance to transition point from inlet, cm

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TABLE I. - DESIGN OVERALL PARAMETERS FOR STAGE 57

ROTOR TOTAL PRESSURE RATIO	1.396
STAGE TOTAL PRESSURE RATIO	1.376
ROTOR TOTAL TEMPERATURE RATIO	1.111
STAGE TOTAL TEMPERATURE RATIO	1.111
ROTOR ADIABATIC EFFICIENCY	.904
STAGE ADIABATIC EFFICIENCY	.864
ROTOR POLYTROPIC EFFICIENCY	.908
STAGE POLYTROPIC EFFICIENCY	.870
ROTOR HEAD RISE COEFFICIENT	.345
STAGE HEAT RISE COEFFICIENT	.330
FLOW COEFFICIENT	.700
AIRFLOW PER UNIT FRONTAL AREA	146.070
AIRFLOW PER UNIT ANNULUS AREA	200.206
AIRFLOW	29.606
RPM	10886.000
TIP SPEED	289.555
HUB-TIP RADIUS RATIO	.52
ROTOR ASPECT RATIO	1.26
STATOR ASPECT RATIO	1.70
NUMBER OF ROTOR BLADES	19.0
NUMBER OF STATOR BLADES	38.0

TABLE II. - DESIGN BLADE-ELEMENT PARAMETERS FOR ROTOR 57

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
TIP	25.400	25.400	.0	35.2	54.7	46.4	288.1	1.116	10.13	1.390
1	24.840	24.853	.0	35.3	54.1	43.8	288.1	1.118	10.13	1.406
2	24.253	24.305	.0	35.5	53.5	41.5	288.1	1.119	10.13	1.417
3	23.657	23.758	.0	35.6	52.8	39.5	288.1	1.118	10.13	1.422
4	21.826	22.116	.0	36.5	50.7	33.4	288.1	1.116	10.13	1.428
5	19.338	19.926	.0	37.9	47.4	25.5	288.1	1.111	10.13	1.409
6	16.831	17.737	.0	39.8	43.5	15.8	288.1	1.105	10.13	1.382
7	14.950	16.095	.0	40.9	40.0	8.9	288.1	1.098	10.13	1.341
8	14.349	15.547	.0	42.0	38.8	7.1	288.1	1.095	10.13	1.309
9	13.763	15.000	.0	43.7	37.5	5.4	288.1	1.092	10.13	1.266
HUB	13.208	14.453	.0	45.8	36.3	3.5	288.1	1.089	10.13	1.218

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
TIP	205.2	201.8	354.9	239.3	205.2	165.0	.0	116.3	289.6	289.6
1	204.9	208.2	349.5	235.3	204.9	169.8	.0	120.4	283.2	283.3
2	204.6	213.2	344.0	231.6	204.6	173.6	.0	123.8	276.5	277.1
3	204.4	216.3	338.4	227.8	204.4	175.8	.0	126.0	269.7	270.8
4	203.5	224.0	321.5	215.6	203.5	180.0	.0	133.4	248.8	252.1
5	202.6	229.3	299.4	200.3	202.6	180.8	.0	140.9	220.4	227.2
6	202.4	235.6	278.9	188.1	202.4	181.0	.0	150.9	191.9	202.2
7	203.1	237.3	265.1	181.7	203.1	179.5	.0	155.2	170.4	183.5
8	203.6	232.7	261.2	174.3	203.6	173.0	.0	155.7	163.6	177.2
9	204.2	225.4	257.5	163.8	204.2	163.0	.0	155.7	156.9	171.0
HUB	204.9	216.9	254.2	151.5	204.9	151.2	.0	155.5	150.6	164.8

RP	ABS MACH NO IN	ABS MACH NO OUT	REL MACH NO IN	REL MACH NO OUT	MERID MACH NO IN	MERID MACH NO OUT	STREAMLINE SLOPE IN	STREAMLINE SLOPE OUT	MERID VEL R	PEAK SS MACH NO
TIP	.626	.580	1.083	.683	.626	.474	-.09	-.21	.804	1.325
1	.625	.599	1.067	.677	.625	.489	.20	.05	.829	1.337
2	.624	.614	1.050	.667	.624	.500	.53	.33	.848	1.350
3	.624	.624	1.032	.657	.624	.507	.91	.64	.860	1.364
4	.621	.649	.980	.624	.621	.521	1.78	1.68	.884	1.418
5	.618	.667	.913	.583	.618	.526	4.20	3.13	.892	1.423
6	.617	.689	.850	.550	.617	.529	6.35	4.58	.894	1.447
7	.619	.697	.809	.534	.619	.527	8.23	5.70	.884	1.470
8	.621	.683	.797	.512	.621	.508	8.86	6.05	.850	1.508
9	.623	.661	.786	.480	.623	.478	9.48	6.39	.798	1.563
HUB	.625	.635	.776	.444	.625	.443	10.08	6.72	.738	1.626

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
TIP	.00	-.0	-2.3	3.1	.490	.849	.104	.089	.036	.031
1	5.00	.2	-2.7	2.2	.492	.868	.094	.079	.032	.027
2	10.00	.3	-3.0	1.6	.493	.884	.084	.070	.029	.024
3	15.00	.5	-3.1	1.3	.491	.897	.076	.062	.026	.021
4	30.00	1.4	-3.0	2.1	.497	.922	.061	.046	.021	.015
5	50.00	2.5	-2.6	3.4	.499	.931	.058	.047	.018	.015
6	70.00	3.4	-3.8	6.0	.497	.919	.073	.064	.022	.019
7	85.00	4.1	-6.2	8.8	.483	.889	.101	.093	.028	.026
8	90.00	6.1	-5.6	10.4	.502	.838	.146	.135	.039	.037
9	95.00	9.0	-4.3	12.2	.535	.759	.213	.198	.057	.053
HUB	100.00	12.3	-2.7	13.9	.576	.656	.296	.274	.079	.073

TABLE III. - DESIGN BLADE-ELEMENT PARAMETERS FOR STATOR 57

RP	RADII IN	RADII OUT	ABS BETAM IN	ABS BETAM OUT	REL BETAM IN	REL BETAM OUT	TOTAL TEMP IN	TOTAL TEMP RATIO	TOTAL PRESS IN	TOTAL PRESS RATIO
TIP	25.400	25.400	32.3	-.6	32.3	-.6	321.6	1.000	14.07	.976
1	24.836	24.829	32.6	.5	32.6	.5	322.1	1.000	14.24	.978
2	24.326	24.336	32.9	1.2	32.9	1.2	322.3	1.000	14.36	.980
3	23.813	23.846	33.1	1.4	33.1	1.4	322.1	1.000	14.40	.982
4	22.273	22.392	34.1	1.0	34.1	1.0	321.6	1.000	14.47	.987
5	20.208	20.489	35.9	.2	35.9	.2	320.0	1.000	14.28	.993
6	18.118	18.621	38.7	-.7	38.7	-.7	318.5	1.000	14.00	.993
7	16.514	17.214	41.2	-1.0	41.2	-1.0	316.5	1.000	13.59	.979
8	15.960	16.710	43.1	-.6	43.1	-.6	315.6	1.000	13.27	.973
9	15.395	16.186	46.0	.1	46.0	.1	314.6	1.000	12.84	.967
HUB	14.795	15.545	49.9	1.7	49.9	1.7	313.6	1.000	12.32	.952

RP	ABS VEL IN	ABS VEL OUT	REL VEL IN	REL VEL OUT	MERID VEL IN	MERID VEL OUT	TANG VEL IN	TANG VEL OUT	WHEEL SPEED IN	WHEEL SPEED OUT
TIP	217.3	178.2	217.3	178.2	183.7	178.2	116.1	-1.7	.0	.0
1	223.5	185.3	223.5	185.3	188.3	185.3	120.5	1.8	.0	.0
2	227.9	190.1	227.9	190.1	191.4	190.0	123.7	3.8	.0	.0
3	230.4	192.7	230.4	192.7	193.1	192.6	125.7	4.6	.0	.0
4	236.1	197.5	236.1	197.5	195.4	197.5	132.5	3.3	.0	.0
5	236.9	195.5	236.9	195.5	191.8	195.5	139.0	.6	.0	.0
6	236.1	189.9	236.1	189.9	184.1	189.8	147.8	-2.5	.0	.0
7	229.9	173.2	229.9	173.2	173.1	173.1	151.4	-3.0	.0	.0
8	222.0	157.9	222.0	157.9	162.1	157.9	151.7	-1.8	.0	.0
9	210.9	136.4	210.9	136.4	146.5	136.4	151.8	.2	.0	.0
HUB	198.2	107.0	198.2	107.0	127.5	106.9	151.7	3.1	.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	STREAMLINE SLOPE IN	STREAMLINE SLOPE OUT	MERID VEL R	PEAK SS MACH NO
TIP	.628	.508	.628	.508	.531	.508	-.19	-.03	.970	1.068
1	.647	.529	.647	.529	.545	.529	-.05	.13	.984	1.109
2	.660	.544	.660	.544	.555	.543	.09	.28	.993	1.139
3	.668	.552	.668	.552	.560	.551	.26	.46	.997	1.159
4	.687	.567	.687	.567	.569	.567	.90	1.09	1.011	1.218
5	.692	.562	.692	.562	.560	.562	2.01	2.21	1.019	1.270
6	.691	.546	.691	.546	.539	.546	3.35	3.82	1.031	1.327
7	.673	.497	.673	.497	.507	.497	4.30	5.74	1.000	1.340
8	.649	.452	.649	.452	.474	.452	4.27	7.01	.974	1.335
9	.615	.389	.615	.389	.427	.389	4.03	8.67	.932	1.331
HUB	.576	.304	.576	.304	.371	.304	3.65	10.92	.838	1.336

RP	PERCENT SPAN	INCIDENCE MEAN	INCIDENCE SS	DEV	D-FACT	EFF	LOSS COEFF TOT	LOSS COEFF PROF	LOSS PARAM TOT	LOSS PARAM PROF
TIP	.00	-6.9	-12.9	9.7	.369	.000	.102	.102	.036	.036
1	5.00	-6.5	-12.5	10.9	.352	.000	.090	.090	.031	.031
2	10.00	-6.3	-12.2	11.6	.342	.000	.081	.081	.027	.027
3	15.00	-6.1	-12.0	11.9	.336	.000	.071	.071	.023	.023
4	30.00	-5.1	-11.1	11.8	.331	.000	.047	.047	.014	.014
5	50.00	-3.9	-9.8	11.6	.337	.000	.024	.024	.007	.007
6	70.00	-3.2	-9.0	12.0	.354	.000	.024	.024	.006	.006
7	85.00	-3.9	-9.6	13.9	.399	.000	.080	.080	.019	.019
8	90.00	-3.2	-8.9	15.3	.440	.000	.108	.108	.024	.024
9	95.00	-1.7	-7.4	17.3	.505	.000	.148	.148	.032	.032
HUB	100.00	.7	-4.9	20.4	.613	.000	.229	.229	.048	.048

TABLE IV. - BLADE GEOMETRY FOR ROTOR 57

RP	PERCENT SPAN	RADII RI	RO	BLADE ANGLES KIC	KTC	KOC	DELTA INC	CONE ANGLE
TIP	0.	25.400	25.400	54.70	48.96	43.29	2.32	.057
1	5.	24.840	24.853	53.95	47.77	41.59	2.83	.121
2	10.	24.253	24.305	53.16	46.52	39.88	3.29	.494
3	15.	23.657	23.758	52.32	45.23	38.14	3.65	.926
4	30.	21.826	22.116	49.35	40.34	31.33	4.33	2.412
5	50.	19.338	19.926	44.86	33.47	22.10	5.14	4.385
6	70.	16.831	17.737	40.11	24.97	9.84	7.18	6.189
7	85.	14.950	16.095	35.94	18.02	.13	10.29	7.494
8	90.	14.349	15.5[illegible]7	32.74	14.72	-3.27	11.72	7.879
9	95.	13.763	15.0[illegible]	28.62	10.89	-6.82	13.31	8.247
HUB	100.	13.208	14.453	24.19	6.93	-10.45	14.93	8.473

RP	BLADE THICKNESSES TI	TM	TO	AXIAL DIMENSIONS ZI	ZMC	ZTC	ZO
TIP	.015	.190	.017	1.646	4.248	4.248	7.162
1	.018	.211	.020	1.541	4.247	4.247	7.295
2	.021	.235	.023	1.431	4.250	4.250	7.437
3	.022	.264	.027	1.321	4.260	4.260	7.590
4	.030	.351	.037	.969	4.181	4.181	7.852
5	.040	.482	.050	.543	4.129	4.129	8.218
6	.054	.655	.064	.182	4.102	4.102	8.536
7	.069	.842	.085	.067	4.195	4.195	8.772
8	.082	.981	.098	.042	4.185	4.185	8.705
9	.100	1.159	.114	.020	4.149	4.149	8.553
HUB	.119	1.350	.132	-.000	4.103	4.103	8.355

RP	AERO CHORD	SETTING ANGLE	TOTAL CAMBER	SOLIDITY	TURN RATE	PHISS	CHOKE MARGIN
TIP	8.395	48.99	11.41	.999	1.000	8.19	.047
1	8.553	47.78	12.36	1.041	1.000	9.14	.046
2	8.719	46.53	13.28	1.086	1.000	10.04	.044
3	8.894	45.25	14.18	1.134	1.000	10.82	.042
4	9.030	40.38	18.01	1.243	1.000	13.31	.047
5	9.226	33.57	22.76	1.421	1.000	16.23	.057
6	9.273	25.14	30.28	1.622	1.000	21.66	.049
7	9.241	18.30	35.81	1.800	1.000	27.41	.008
8	9.049	15.01	36.02	1.831	1.000	29.00	-.022
9	8.786	11.18	35.44	1.847	1.000	30.40	-.059
HUB	8.513	7.22	34.64	1.861	1.000	31.66	-.099

TABLE V. - BLADE GEOMETRY FOR STATOR 57

RP	PERCENT SPAN	RADII RI	RO	BLADE ANGLES KIC	KTC	KOC	DELTA C	CONE ANGLE
TIP	0.	25.400	25.400	39.19	14.49	-10.21	96	.057
1	5.	24.836	24.829	39.14	14.40	-10.35	5.96	-.073
2	10.	24.326	24.336	39.12	14.33	-10.45	5.96	.102
3	15.	23.813	23.846	39.13	14.29	-10.54	5.95	.315
4	30.	22.273	22.392	39.24	14.21	-10.83	5.95	1.167
5	50.	20.208	20.489	39.81	14.19	-11.44	5.91	2.762
6	70.	18.118	18.621	41.86	14.57	-12.74	5.84	4.952
7	85.	16.514	17.214	44.91	15.03	-14.91	5.75	6.922
8	90.	15.960	16.710	46.18	15.15	-15.94	5.70	7.427
9	95.	15.395	16.186	47.57	15.25	-17.15	5.65	7.842
HUB	100.	14.795	15.545	49.10	15.34	-18.72	5.59	7.439

RP	BLADE THICKNESSES TI	TM	TO	AXIAL DIMENSIONS ZI	ZMC	ZTC	ZO
TIP	.031	.361	.031	27.775	30.525	30.525	33.603
1	.031	.361	.031	27.775	30.527	30.527	33.606
2	.031	.361	.031	27.775	30.528	30.528	33.607
3	.031	.361	.031	27.775	30.529	30.529	33.608
4	.031	.361	.031	27.773	30.525	30.525	33.605
5	.031	.361	.031	27.773	30.520	30.520	33.601
6	.031	.361	.031	27.791	30.509	30.509	33.593
7	.031	.361	.031	27.814	30.489	30.489	33.581
8	.031	.361	.031	27.821	30.481	30.481	33.578
9	.031	.361	.031	27.828	30.473	30.473	33.576
HUB	.031	.361	.031	27.836	30.464	30.464	33.575

RP	AERO CHORD	SETTING ANGLE	TOTAL CAMBER	SOLIDITY	TURN RATE	PHISS	CHOKE MARGIN
TIP	6.019	14.49	49.40	1.433	1.000	30.69	.108
1	6.019	14.40	49.49	1.466	1.000	30.72	.092
2	6.019	14.33	49.57	1.496	1.000	30.77	.081
3	6.019	14.30	49.67	1.528	1.000	30.82	.074
4	6.019	14.23	50.97	1.630	1.000	31.01	.065
5	6.019	14.25	51.24	1.789	1.000	31.58	.069
6	6.019	14.69	54.60	1.982	1.000	33.21	.077
7	6.019	15.21	59.82	2.159	1.000	35.72	.086
8	6.020	15.36	62.12	2.229	1.000	36.87	.131
9	6.020	15.49	64.72	2.306	1.000	38.19	.203
HUB	6.006	15.53	67.82	2.394	1.000	39.67	.293

TABLE VI. - OVERALL PERFORMANCE FOR STAGE 57A

(a) 120 Percent of design speed

READING NUMBER	0052	0051	0050	0049	0048
ROTOR TOTAL PRESSURE RATIO	1.590	1.563	1.518	1.466	1.450
STATOR TOTAL PRESSURE RATIO	0.975	0.984	0.977	0.968	0.957
ROTOR TOTAL TEMPERATURE RATIO	1.174	1.167	1.158	1.149	1.147
STATOR TOTAL TEMPERATURE RATIO	0.993	0.996	0.998	0.997	0.996
ROTOR ADIABATIC EFFICIENCY	0.814	0.815	0.804	0.774	0.763
ROTOR MOMENTUM-RISE EFFICIENCY	0.826	0.825	0.810	0.773	0.766
ROTOR HEAD-RISE COEFFICIENT	0.400	0.382	0.352	0.317	0.307
FLOW COEFFICIENT	0.589	0.609	0.635	0.642	0.643
AIRFLOW PER UNIT FRONTAL AREA	154.52	157.63	161.98	163.06	163.21
AIRFLOW PER UNIT ANNULUS AREA	211.80	216.06	222.02	223.50	223.71
AIRFLOW AT ORIFICE	31.32	31.95	32.83	33.05	33.08
AIRFLOW AT ROTOR INLET	30.92	31.54	32.31	32.50	32.53
AIRFLOW AT ROTOR OUTLET	30.58	31.38	32.71	33.17	33.34
AIRFLOW AT STATOR OUTLET	31.07	31.67	32.21	32.97	33.84
ROTATIVE SPEED	3050.3	3049.0	13065.3	13082.5	13080.9
PERCENT OF DESIGN SPEED	119.9	119.9	120.0	120.2	120.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.550	1.538	1.483	1.419	1.388
STAGE TOTAL TEMPERATURE RATIO	1.165	1.163	1.156	1.146	1.142
STAGE ADIABATIC EFFICIENCY	0.808	0.805	0.766	0.723	0.692

(b) 110 Percent of design speed

READING NUMBER	0076	0077	0078	0079	0080
ROTOR TOTAL PRESSURE RATIO	1.504	1.487	1.453	1.416	1.384
STATOR TOTAL PRESSURE RATIO	0.977	0.979	0.983	0.983	0.972
ROTOR TOTAL TEMPERATURE RATIO	1.144	1.139	1.133	1.127	1.122
STATOR TOTAL TEMPERATURE RATIO	0.996	0.998	1.000	0.999	0.998
ROTOR ADIABATIC EFFICIENCY	0.856	0.862	0.849	0.824	0.795
ROTOR MOMENTUM-RISE EFFICIENCY	0.868	0.871	0.857	0.834	0.806
ROTOR HEAD-RISE COEFFICIENT	0.402	0.389	0.363	0.335	0.310
FLOW COEFFICIENT	0.601	0.631	0.649	0.662	0.665
AIRFLOW PER UNIT FRONTAL AREA	148.49	153.19	155.82	157.76	158.58
AIRFLOW PER UNIT ANNULUS AREA	203.53	209.97	213.58	216.24	217.37
AIRFLOW AT ORIFICE	30.10	31.05	31.58	31.98	32.14
AIRFLOW AT ROTOR INLET	29.68	30.63	31.13	31.50	31.62
AIRFLOW AT ROTOR OUTLET	29.40	30.55	31.10	31.52	31.79
AIRFLOW AT STATOR OUTLET	29.51	30.47	31.10	31.74	32.78
ROTATIVE SPEED	11996.8	11994.4	11984.4	11993.3	12007.9
PERCENT OF DESIGN SPEED	110.2	110.2	110.1	110.2	110.3

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.469	1.455	1.429	1.391	1.346
STAGE TOTAL TEMPERATURE RATIO	1.139	1.137	1.132	1.126	1.120
STAGE ADIABATIC EFFICIENCY	0.833	0.825	0.810	0.787	0.740

(c) 100 Percent of design speed

READING NUMBER	0047	0046	0045	0044	0043
ROTOR TOTAL PRESSURE RATIO	1.402	1.390	1.373	1.359	1.338
STATOR TOTAL PRESSURE RATIO	0.981	0.984	0.982	0.979	0.974
ROTOR TOTAL TEMPERATURE RATIO	1.116	1.113	1.110	1.107	1.104
STATOR TOTAL TEMPERATURE RATIO	0.997	0.998	0.998	0.997	0.997
ROTOR ADIABATIC EFFICIENCY	0.870	0.872	0.865	0.855	0.837
ROTOR MOMENTUM-RISE EFFICIENCY	0.891	0.898	0.889	0.880	0.861
ROTOR HEAD-RISE COEFFICIENT	0.387	0.375	0.360	0.346	0.328
FLOW COEFFICIENT	0.601	0.636	0.665	0.682	0.693
AIRFLOW PER UNIT FRONTAL AREA	139.37	145.15	149.62	151.91	153.58
AIRFLOW PER UNIT ANNULUS AREA	191.03	198.95	205.08	208.22	210.51
AIRFLOW AT ORIFICE	28.25	29.42	30.33	30.79	31.13
AIRFLOW AT ROTOR INLET	27.85	28.99	29.88	30.35	30.66
AIRFLOW AT ROTOR OUTLET	27.82	28.92	29.79	30.30	30.66
AIRFLOW AT STATOR OUTLET	27.43	28.68	29.65	30.22	31.10
ROTATIVE SPEED	10942.6	10944.9	10942.2	10940.6	10938.6
PERCENT OF DESIGN SPEED	100.5	100.5	100.5	100.5	100.5

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.375	1.368	1.349	1.329	1.304
STAGE TOTAL TEMPERATURE RATIO	1.113	1.111	1.107	1.104	1.100
STAGE ADIABATIC EFFICIENCY	0.844	0.844	0.833	0.815	0.786

(d) 90 Percent of design speed

READING NUMBER	0055	0056	0058	0059	0066
ROTOR TOTAL PRESSURE RATIO	1.314	1.309	1.289	1.271	1.301
STATOR TOTAL PRESSURE RATIO	0.986	0.987	0.982	0.972	0.986
ROTOR TOTAL TEMPERATURE RATIO	1.093	1.090	1.085	1.082	1.087
STATOR TOTAL TEMPERATURE RATIO	0.998	0.999	0.998	0.997	0.999
ROTOR ADIABATIC EFFICIENCY	0.871	0.888	0.889	0.871	0.894
ROTOR MOMENTUM-RISE EFFICIENCY	0 890	0.901	0.912	0.899	0.911
ROTOR HEAD-RISE COEFFICIENT	0.374	0.364	0.341	0.321	0.354
FLOW COEFFICIENT	0.567	0.598	0.662	0.701	0.630
AIRFLOW PER UNIT FRONTAL AREA	123.19	129.05	139.03	144.99	134.42
AIRFLOW PER UNIT ANNULUS AREA	168.85	176.88	190.57	198.73	184.24
AIRFLOW AT ORIFICE	24.97	26.16	28.18	29.39	27.24
AIRFLOW AT ROTOR INLET	24.59	25.75	27.77	28.93	26.80
AIRFLOW AT ROTOR OUTLET	24.52	25.63	27.78	28.95	26.75
AIRFLOW AT STATOR OUTLET	24.33	25.50	27.56	29.01	26.59
ROTATIVE SPEED	9847.3	9891.0	9896.2	9899.4	9906.7
PERCENT OF DESIGN SPEED	90.5	90.9	90.9	90.9	91.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.295	1.292	1.266	1.236	1.283
STAGE TOTAL TEMPERATURE RATIO	1.091	1.089	1.082	1.078	1.086
STAGE ADIABATIC EFFICIENCY	0.846	0.853	0.845	0.801	0.856

TABLE VI. - Concluded. OVERALL PERFORMANCE FOR STAGE 57A

(e) 80 Percent of design speed

READING NUMBER	0061	0065	0064	0063	0062
ROTOR TOTAL PRESSURE RATIO	1.239	1.234	1.221	1.214	1.198
STATOR TOTAL PRESSURE RATIO	0.988	0.989	0.989	0.984	0.974
ROTOR TOTAL TEMPERATURE RATIO	1.072	1.069	1.066	1.064	1.061
STATOR TOTAL TEMPERATURE RATIO	0.998	0.999	0.999	0.998	0.997
ROTOR ADIABATIC EFFICIENCY	0.876	0.894	0.895	0.896	0.872
ROTOR MOMENTUM-RISE EFFICIENCY	0.890	0.909	0.914	0.916	0.903
ROTOR HEAD-RISE COEFFICIENT	0.362	0.355	0.335	0.324	0.301
FLOW COEFFICIENT	0.550	0.585	0.628	0.658	0.706
AIRFLOW PER UNIT FRONTAL AREA	108.94	114.95	121.94	126.59	133.39
AIRFLOW PER UNIT ANNULUS AREA	149.32	157.56	167.14	173.52	182.84
AIRFLOW AT ORIFICE	22.08	23.30	24.71	25.66	27.04
AIRFLOW AT ROTOR INLET	21.72	22.91	24.25	25.19	26.58
AIRFLOW AT ROTOR OUTLET	21.63	22.87	24.20	25.21	26.58
AIRFLOW AT STATOR OUTLET	21.35	22.59	24.01	24.96	26.54
ROTATIVE SPEED	8744.7	8743.7	8739.9	8746.9	8739.6
PERCENT OF DESIGN SPEED	80.3	80.3	80.3	80.4	80.3

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.224	1.220	1.207	1.195	1.167
STAGE TOTAL TEMPERATURE RATIO	1.070	1.068	1.064	1.062	1.058
STAGE ADIABATIC EFFICIENCY	0.848	0.858	0.859	0.843	0.782

(f) 70 Percent of design speed

READING NUMBER	0067	0071	0070	0069	0068
ROTOR TOTAL PRESSURE RATIO	1.178	1.172	1.164	1.154	1.144
STATOR TOTAL PRESSURE RATIO	0.990	0.992	0.991	0.986	0.980
ROTOR TOTAL TEMPERATURE RATIO	1.055	1.052	1.049	1.047	1.045
STATOR TOTAL TEMPERATURE RATIO	0.998	0.999	0.999	0.998	0.998
ROTOR ADIABATIC EFFICIENCY	0.869	0.889	0.898	0.898	0.881
ROTOR MOMENTUM-RISE EFFICIENCY	0.885	0.905	0.915	0.919	0.910
ROTOR HEAD-RISE COEFFICIENT	0.353	0.344	0.327	0.308	0.288
FLOW COEFFICIENT	0.531	0.572	0.616	0.661	0.703
AIRFLOW PER UNIT FRONTAL AREA	94.09	100.27	106.89	113.73	119.89
AIRFLOW PER UNIT ANNULUS AREA	128.97	137.43	146.51	155.89	164.33
AIRFLOW AT ORIFICE	19.07	20.32	21.67	23.05	24.30
AIRFLOW AT ROTOR INLET	18.75	19.96	21.29	22.60	23.85
AIRFLOW AT ROTOR OUTLET	18.59	19.83	21.14	22.52	23.79
AIRFLOW AT STATOR OUTLET	18.33	19.58	20.90	22.27	23.61
ROTATIVE SPEED	7656.4	7614.4	7623.6	7623.5	7641.1
PERCENT OF DESIGN SPEED	70.3	69.9	70.0	70.0	70.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.167	1.162	1.153	1.139	1.122
STAGE TOTAL TEMPERATURE RATIO	1.053	1.051	1.048	1.045	1.042
STAGE ADIABATIC EFFICIENCY	0.847	0.859	0.863	0.842	0.787

(g) 60 Percent of design speed

READING NUMBER	0072	0073	0074	0075
ROTOR TOTAL PRESSURE RATIO	1.128	1.122	1.112	1.103
STATOR TOTAL PRESSURE RATIO	0.993	0.993	0.990	0.986
ROTOR TOTAL TEMPERATURE RATIO	1.041	1.037	1.034	1.032
STATOR TOTAL TEMPERATURE RATIO	0.998	0.999	0.999	0.998
ROTOR ADIABATIC EFFICIENCY	0.854	0.896	0.903	0.888
ROTOR MOMENTUM-RISE EFFICIENCY	0.871	0.910	0.925	0.911
ROTOR HEAD-RISE COEFFICIENT	0.346	0.329	0.303	0.278
FLOW COEFFICIENT	0.506	0.579	0.648	0.699
AIRFLOW PER UNIT FRONTAL AREA	78.41	88.73	97.98	104.80
AIRFLOW PER UNIT ANNULUS AREA	107.47	121.62	134.30	143.65
AIRFLOW AT ORIFICE	15.89	17.98	19.86	21.24
AIRFLOW AT ROTOR INLET	15.60	17.64	19.49	20.85
AIRFLOW AT ROTOR OUTLET	15.43	17.51	19.42	20.74
AIRFLOW AT STATOR OUTLET	15.23	17.23	19.12	20.55
ROTATIVE SPEED	6557.8	6561.1	6546.0	6555.0
PERCENT OF DESIGN SPEED	60.2	60.3	60.1	60.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.119	1.114	1.101	1.087
STAGE TOTAL TEMPERATURE RATIO	1.039	1.036	1.033	1.030
STAGE ADIABATIC EFFICIENCY	0.837	0.861	0.848	0.795

TABLE VII. - OVERALL PERFORMANCE FOR STAGE 57B

(a) 120 Percent of design speed

READING NUMBER	0137	0136	0135	0134
ROTOR TOTAL PRESSURE RATIO	1.563	1.531	1.496	1.379
STATOR TOTAL PRESSURE RATIO	0.980	0.986	0.986	0.974
ROTOR TOTAL TEMPERATURE RATIO	1.164	1.155	1.148	1.129
STATOR TOTAL TEMPERATURE RATIO	0.993	0.998	0.999	0.997
ROTOR ADIABATIC EFFICIENCY	0.829	0.834	0.824	0.745
ROTOR MOMENTUM-RISE EFFICIENCY	0.852	0.841	0.839	0.759
ROTOR HEAD-RISE COEFFICIENT	0.381	0.359	0.336	0.260
FLOW COEFFICIENT	0.539	0.560	0.579	0.591
AIRFLOW PER UNIT FRONTAL AREA	145.91	149.32	152.65	154.86
AIRFLOW PER UNIT ANNULUS AREA	200.00	204.67	209.23	212.27
AIRFLOW AT ORIFICE	29.57	30.27	30.94	31.39
AIRFLOW AT ROTOR INLET	29.18	29.95	30.62	31.02
AIRFLOW AT ROTOR OUTLET	28.56	29.51	30.59	31.31
AIRFLOW AT STATOR OUTLET	29.09	29.91	30.59	31.60
ROTATIVE SPEED	13049.5	13054.9	13061.4	13072.4
PERCENT OF DESIGN SPEED	119.9	119.9	120.0	120.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.532	1.509	1.476	1.343
STAGE TOTAL TEMPERATURE RATIO	1.156	1.153	1.147	1.126
STAGE ADIABATIC EFFICIENCY	0.829	0.816	0.798	0.699

(b) 110 Percent of design speed

READING NUMBER	0124
ROTOR TOTAL PRESSURE RATIO	1.490
STATOR TOTAL PRESSURE RATIO	0.977
ROTOR TOTAL TEMPERATURE RATIO	1.139
STATOR TOTAL TEMPERATURE RATIO	0.995
ROTOR ADIABATIC EFFICIENCY	0.870
ROTOR MOMENTUM-RISE EFFICIENCY	0.892
ROTOR HEAD-RISE COEFFICIENT	0.391
FLOW COEFFICIENT	0.543
AIRFLOW PER UNIT FRONTAL AREA	138.55
AIRFLOW PER UNIT ANNULUS AREA	189.91
AIRFLOW AT ORIFICE	28.08
AIRFLOW AT ROTOR INLET	27.65
AIRFLOW AT ROTOR OUTLET	27.50
AIRFLOW AT STATOR OUTLET	27.39
ROTATIVE SPEED	11993.8
PERCENT OF DESIGN SPEED	110.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.455
STAGE TOTAL TEMPERATURE RATIO	1.133
STAGE ADIABATIC EFFICIENCY	0.850

(c) 100 Percent of design speed

READING NUMBER	0118	0123	0122	0121	0120	0119
ROTOR TOTAL PRESSURE RATIO	1.381	1.371	1.356	1.337	1.309	1.276
STATOR TOTAL PRESSURE RATIO	0.985	0.987	0.988	0.986	0.981	0.974
ROTOR TOTAL TEMPERATURE RATIO	1.109	1.105	1.102	1.098	1.094	1.089
STATOR TOTAL TEMPERATURE RATIO	0.998	0.999	0.999	0.998	0.998	0.997
ROTOR ADIABATIC EFFICIENCY	0.886	0.897	0.893	0.883	0.853	0.812
ROTOR MOMENTUM-RISE EFFICIENCY	0.902	0.912	0.911	0.904	0.878	0.840
ROTOR HEAD-RISE COEFFICIENT	0.369	0.361	0.346	0.328	0.302	0.270
FLOW COEFFICIENT	0.534	0.560	0.589	0.616	0.640	0.646
AIRFLOW PER UNIT FRONTAL AREA	127.23	131.73	136.60	140.91	144.81	146.14
AIRFLOW PER UNIT ANNULUS AREA	174.40	180.56	187.24	193.15	198.49	200.31
AIRFLOW AT ORIFICE	25.79	26.70	27.69	28.56	29.35	29.62
AIRFLOW AT ROTOR INLET	25.45	26.33	27.35	28.24	29.01	29.25
AIRFLOW AT ROTOR OUTLET	25.14	26.15	27.12	28.02	28.85	29.15
AIRFLOW AT STATOR OUTLET	25.15	26.13	27.14	27.99	28.82	29.52
ROTATIVE SPEED	10911.0	10872.1	10889.7	10889.8	10892.8	10910.6
PERCENT OF DESIGN SPEED	100.2	99.9	100.0	100.0	100.1	100.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.361	1.352	1.339	1.319	1.284	1.243
STAGE TOTAL TEMPERATURE RATIO	1.107	1.104	1.100	1.096	1.091	1.086
STAGE ADIABATIC EFFICIENCY	0.864	0.868	0.869	0.857	0.812	0.750

(d) 90 Percent of design speed

READING NUMBER	0138
ROTOR TOTAL PRESSURE RATIO	1.301
STATOR TOTAL PRESSURE RATIO	0.987
ROTOR TOTAL TEMPERATURE RATIO	1.088
STATOR TOTAL TEMPERATURE RATIO	0.997
ROTOR ADIABATIC EFFICIENCY	0.885
ROTOR MOMENTUM-RISE EFFICIENCY	0.905
ROTOR HEAD-RISE COEFFICIENT	0.361
FLOW COEFFICIENT	0.504
AIRFLOW PER UNIT FRONTAL AREA	111.65
AIRFLOW PER UNIT ANNULUS AREA	153.04
AIRFLOW AT ORIFICE	22.63
AIRFLOW AT ROTOR INLET	22.24
AIRFLOW AT ROTOR OUTLET	22.10
AIRFLOW AT STATOR OUTLET	21.94
ROTATIVE SPEED	9805.4
PERCENT OF DESIGN SPEED	90.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.284
STAGE TOTAL TEMPERATURE RATIO	1.085
STAGE ADIABATIC EFFICIENCY	0.866

TABLE VII. - Concluded. OVERALL PERFORMANCE FOR STAGE 57B

(e) 80 Percent of design speed

READING NUMBER	0139	0143	0142	0141
ROTOR TOTAL PRESSURE RATIO	1.229	1.222	1.206	1.192
STATOR TOTAL PRESSURE RATIO	0.991	0.992	0.991	0.987
ROTOR TOTAL TEMPERATURE RATIO	1.069	1.066	1.061	1.057
STATOR TOTAL TEMPERATURE RATIO	0.998	0.999	0.999	0.998
ROTOR ADIABATIC EFFICIENCY	0.879	0.898	0.906	0.897
ROTOR MOMENTUM-RISE EFFICIENCY	0.900	0.916	0.923	0.921
ROTOR HEAD-RISE COEFFICIENT	0.349	0.337	0.315	0.293
FLOW COEFFICIENT	0.485	0.522	0.568	0.609
AIRFLOW PER UNIT FRONTAL AREA	97.39	104.07	111.48	118.45
AIRFLOW PER UNIT ANNULUS AREA	133.49	142.65	152.80	162.36
AIRFLOW AT ORIFICE	19.74	21.09	22.60	24.01
AIRFLOW AT ROTOR INLET	19.41	20.76	22.26	23.63
AIRFLOW AT ROTOROOUTLET	19.18	20.53	22.04	23.49
AIRFLOW AT STATOR OUTLET	19.05	20.40	21.91	23.31
ROTATIVE SPEED	8715.3	8730.9	8713.8	8721.7
PERCENT OF DESIGN SPEED	80.1	80.2	80.0	80.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.217	1.212	1.196	1.177
STAGE TOTAL TEMPERATURE RATIO	1.067	1.064	1.059	1.055
STAGE ADIABATIC EFFICIENCY	0.861	0.878	0.883	0.865

(f) 70 Percent of design speed

READING NUMBER	0115
ROTOR TOTAL PRESSURE RATIO	1.172
STATOR TOTAL PRESSURE RATIO	0.992
ROTOR TOTAL TEMPERATURE RATIO	1.053
STATOR TOTAL TEMPERATURE RATIO	0.999
ROTOR ADIABATIC EFFICIENCY	0.876
ROTOR MOMENTUM-RISE EFFICIENCY	0.897
ROTOR HEAD-RISE COEFFICIENT	0.344
FLOW COEFFICIENT	0.477
AIRFLOW PER UNIT FRONTAL AREA	84.98
AIRFLOW PER UNIT ANNULUS AREA	116.48
AIRFLOW AT ORIFICE	17.22
AIRFLOW AT ROTOR INLET	16.93
AIRFLOW AT ROTOR OUTLET	16.73
AIRFLOW AT STATOR OUTLET	16.60
ROTATIVE SPEED	7613.3
PERCENT OF DESIGN SPEED	69.9

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.162
STAGE TOTAL TEMPERATURE RATIO	1.051
STAGE ADIABATIC EFFICIENCY	0.854

(g) 60 Percent of design speed

READING NUMBER	0144	0145	0146	0147
ROTOR TOTAL PRESSURE RATIO	1.124	1.116		1.089
STATOR TOTAL PRESSURE RATIO	0.995	0.995	0.993	0.985
ROTOR TOTAL TEMPERATURE RATIO	1.039	1.035	1.031	1.028
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.999	0.999
ROTOR ADIABATIC EFFICIENCY	0.876	0.902	0.905	0.879
ROTOR MOMENTUM-RISE EFFICIENCY	0.901	0.925	0.925	0.900
ROTOR HEAD-RISE COEFFICIENT	0.332	0.310	0.276	0.238
FLOW COEFFICIENT	0.469	0.526	0.594	0.670
AIRFLOW PER UNIT FRONTAL AREA	73.10	81.44	90.89	101.19
AIRFLOW PER UNIT ANNULUS AREA	100.19	111.63	124.57	138.70
AIRFLOW AT ORIFICE	14.82	16.51	18.42	20.51
AIRFLOW AT ROTOR INLET	14.55	16.24	18.12	20.18
AIRFLOW AT ROTOR OUTLET	14.32	16.01	17.88	19.90
AIRFLOW AT STATOR OUTLET	14.25	15.87	17.71	19.77
ROTATIVE SPEED	6581.7	6590.3	6588.9	6585.6
PERCENT OF DESIGN SPEED	60.5	60.5	60.5	60.5

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.118	1.111	1.096	1.073
STAGE TOTAL TEMPERATURE RATIO	1.038	1.034	1.030	1.026
STAGE ADIABATIC EFFICIENCY	0.864	0.883	0.871	0.766

TABLE VIII. - OVERALL PERFORMANCE FOR STAGE 57C

(a) 120 Percent design speed

READING NUMBER	0161
ROTOR TOTAL PRESSURE RATIO	1.609
STATOR TOTAL PRESSURE RATIO	0.958
ROTOR TOTAL TEMPERATURE RATIO	1.187
STATOR TOTAL TEMPERATURE RATIO	0.990
ROTOR ADIABATIC EFFICIENCY	0.780
ROTOR MOMENTUM-RISE EFFICIENCY	0.792
ROTOR HEAD-RISE COEFFICIENT	0.415
FLOW COEFFICIENT	0.639
AIRFLOW PER UNIT FRONTAL AREA	160.62
AIRFLOW PER UNIT ANNULUS AREA	220.16
AIRFLOW AT ORIFICE	32.56
AIRFLOW AT ROTOR INLET	32.38
AIRFLOW AT ROTOR OUTLET	32.73
AIRFLOW AT STATOR OUTLET	32.43
ROTATIVE SPEED	13044.4
PERCENT OF DESIGN SPEED	119.8
COMPRESSOR PERFORMANCE	
STAGE TOTAL PRESSURE RATIO	1.541
STAGE TOTAL TEMPERATURE RATIO	1.175
STAGE ADIABATIC EFFICIENCY	0.753

(b) 110 Percent design speed

READING NUMBER	0158
ROTOR TOTAL PRESSURE RATIO	1.521
STATOR TOTAL PRESSURE RATIO	0.975
ROTOR TOTAL TEMPERATURE RATIO	1.156
STATOR TOTAL TEMPERATURE RATIO	0.994
ROTOR ADIABATIC EFFICIENCY	0.815
ROTOR MOMENTUM-RISE EFFICIENCY	0.833
ROTOR HEAD-RISE COEFFICIENT	0.421
FLOW COEFFICIENT	0.676
AIRFLOW PER UNIT FRONTAL AREA	158.51
AIRFLOW PER UNIT ANNULUS AREA	217.27
AIRFLOW AT ORIFICE	32.13
AIRFLOW AT ROTOR INLET	31.82
AIRFLOW AT ROTOR OUTLET	31.57
AIRFLOW AT STATOR OUTLET	31.81
ROTATIVE SPEED	11961.0
PERCENT OF DESIGN SPEED	109.9
COMPRESSOR PERFORMANCE	
STAGE TOTAL PRESSURE RATIO	1.483
STAGE TOTAL TEMPERATURE RATIO	1.149
STAGE ADIABATIC EFFICIENCY	0.798

(c) 100 Percent design speed

READING NUMBER	0150	0154	0153	0162	0151
ROTOR TOTAL PRESSURE RATIO	1.431	1.428	1.423	1.412	1.400
STATOR TOTAL PRESSURE RATIO	0.976	0.975	0.975	0.975	0.947
ROTOR TOTAL TEMPERATURE RATIO	1.127	1.125	1.124	1.121	1.119
STATOR TOTAL TEMPERATURE RATIO	0.996	0.997	0.997	0.997	0.996
ROTOR ADIABATIC EFFICIENCY	0.847	0.857	0.857	0.853	0.847
ROTOR MOMENTUM-RISE EFFICIENCY	0.874	0.874	0.883	0.879	0.872
ROTOR HEAD-RISE COEFFICIENT	0.419	0.417	0.412	0.402	0.390
FLOW COEFFICIENT	0.691	0.706	0.727	0.743	0.761
AIRFLOW PER UNIT FRONTAL AREA	151.99	153.72	156.62	158.56	160.69
AIRFLOW PER UNIT ANNULUS AREA	208.32	210.70	214.68	217.34	220.26
AIRFLOW AT ORIFICE	30.81	31.16	31.75	32.14	32.57
AIRFLOW AT ROTOR INLET	30.54	30.89	31.44	31.83	32.27
AIRFLOW AT ROTOR OUTLET	30.46	30.75	31.46	31.81	32.21
AIRFLOW AT STATOR OUTLET	30.22	30.51	31.21	31.87	33.27
ROTATIVE SPEED	10902.4	10880.2	10880.9	10873.7	10883.6
PERCENT OF DESIGN SPEED	100.2	99.9	100.0	99.9	100.0
COMPRESSOR PERFORMANCE					
STAGE TOTAL PRESSURE RATIO	1.397	1.392	1.387	1.377	1.326
STAGE TOTAL TEMPERATURE RATIO	1.123	1.122	1.121	1.118	1.115
STAGE ADIABATIC EFFICIENCY	0.813	0.811	0.812	0.809	0.732

(d) 90 Percent design speed

READING NUMBER	0160
ROTOR TOTAL PRESSURE RATIO	1.338
STATOR TOTAL PRESSURE RATIO	0.981
ROTOR TOTAL TEMPERATURE RATIO	1.102
STATOR TOTAL TEMPERATURE RATIO	0.997
ROTOR ADIABATIC EFFICIENCY	0.853
ROTOR MOMENTUM-RISE EFFICIENCY	0.882
ROTOR HEAD-RISE COEFFICIENT	0.399
FLOW COEFFICIENT	0.681
AIRFLOW PER UNIT FRONTAL AREA	141.04
AIRFLOW PER UNIT ANNULUS AREA	193.32
AIRFLOW AT ORIFICE	28.59
AIRFLOW AT ROTOR INLET	28.37
AIRFLOW AT ROTOR OUTLET	28.19
AIRFLOW AT STATOR OUTLET	27.93
ROTATIVE SPEED	9908.8
PERCENT OF DESIGN SPEED	91.0
COMPRESSOR PERFORMANCE	
STAGE TOTAL PRESSURE RATIO	1.313
STAGE TOTAL TEMPERATURE RATIO	1.098
STAGE ADIABATIC EFFICIENCY	0.822

TABLE VIII. - Concluded. OVERALL PERFORMANCE FOR STAGE 57C

(e) 80 Percent design speed

READING NUMBER	0174	0173	0172	0171
ROTOR TOTAL PRESSURE RATIO	1.255	1.250	1.244	1.235
STATOR TOTAL PRESSURE RATIO	0.987	0.985	0.981	0.973
ROTOR TOTAL TEMPERATURE RATIO	1.072	1.069	1.067	1.065
STATOR TOTAL TEMPERATURE RATIO	0.998	0.998	0.998	0.997
ROTOR ADIABATIC EFFICIENCY	0.933	0.953	0.963	0.959
ROTOR MOMENTUM-RISE EFFICIENCY	0.911	0.928	0.937	0.945
ROTOR HEAD-RISE COEFFICIENT	0.391	0.383	0.374	0.360
FLOW COEFFICIENT	0.644	0.686	0.720	0.764
AIRFLOW PER UNIT FRONTAL AREA	124.66	131.18	135.88	141.80
AIRFLOW PER UNIT ANNULUS AREA	170.87	179.80	186.25	194.36
AIRFLOW AT ORIFICE	25.27	26.59	27.54	28.74
AIRFLOW AT ROTOR INLET	24.63	25.87	26.83	28.02
AIRFLOW AT ROTOR OUTLET	24.83	26.04	27.07	28.29
AIRFLOW AT STATOR OUTLET	24.56	25.79	26.80	28.39
ROTATIVE SPEED	8686.1	8677.9	8681.0	8670.9
PERCENT OF DESIGN SPEED	79.8	79.7	79.7	79.7

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.240	1.232	1.221	1.201
STAGE TOTAL TEMPERATURE RATIO	1.070	1.067	1.065	1.061
STAGE ADIABATIC EFFICIENCY	0.906	0.914	0.907	0.878

(f) 70 Percent design speed

READING NUMBER	0170
ROTOR TOTAL PRESSURE RATIO	1.189
STATOR TOTAL PRESSURE RATIO	0.989
ROTOR TOTAL TEMPERATURE RATIO	1.054
STATOR TOTAL TEMPERATURE RATIO	0.999
ROTOR ADIABATIC EFFICIENCY	0.938
ROTOR MOMENTUM-RISE EFFICIENCY	0.904
ROTOR HEAD-RISE COEFFICIENT	0.380
FLOW COEFFICIENT	0.620
AIRFLOW PER UNIT FRONTAL AREA	108.19
AIRFLOW PER UNIT ANNULUS AREA	148.30
AIRFLOW AT ORIFICE	21.93
AIRFLOW AT ROTOR INLET	21.32
AIRFLOW AT ROTOR OUTLET	21.44
AIRFLOW AT STATOR OUTLET	21.11
ROTATIVE SPEED	7577.0
PERCENT OF DESIGN SPEED	69.6

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.176
STAGE TOTAL TEMPERATURE RATIO	1.053
STAGE ADIABATIC EFFICIENCY	0.902

(g) Percent design speed

READING NUMBER	0166	0167	0168	0169
ROTOR TOTAL PRESSURE RATIO	1.136	1.138	1.132	1.125
STATOR TOTAL PRESSURE RATIO	0.992	0.992	0.990	0.985
ROTOR TOTAL TEMPERATURE RATIO	1.040	1.039	1.036	1.034
STATOR TOTAL TEMPERATURE RATIO	0.998	0.999	0.999	0.998
ROTOR ADIABATIC EFFICIENCY	0.916	0.958	0.994	1.003
ROTOR MOMENTUM-RISE EFFICIENCY	0.872	0.912	0.940	0.944
ROTOR HEAD-RISE COEFFICIENT	0.368	0.370	0.355	0.335
FLOW COEFFICIENT	0.567	0.619	0.690	0.749
AIRFLOW PER UNIT FRONTAL AREA	87.78	95.37	104.65	112.38
AIRFLOW PER UNIT ANNULUS AREA	120.32	130.72	143.44	154.04
AIRFLOW AT ORIFICE	17.79	19.33	21.21	22.78
AIRFLOW AT ROTOR INLET	17.32	18.78	20.64	22.16
AIRFLOW AT ROTOR OUTLET	17.43	18.88	20.72	22.24
AIRFLOW AT STATOR OUTLET	17.11	18.52	20.36	22.03
ROTATIVE SPEED	6556.7	6576.8	6564.8	6567.4
PERCENT OF DESIGN SPEED	60.2	60.4	60.3	60.3

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.126	1.129	1.120	1.108
STAGE TOTAL TEMPERATURE RATIO	1.039	1.038	1.035	1.032
STAGE ADIABATIC EFFICIENCY	0.898	0.919	0.938	0.921

TABLE IX. - OVERALL PERFORMANCE FOR STAGE 57D

(a) 120 Percent of design speed

READING NUMBER	0275	0273	0274
ROTOR TOTAL PRESSURE RATIO	1.596	1.569	1.569
STATOR TOTAL PRESSURE RATIO	0.952	0.883	0.938
ROTOR TOTAL TEMPERATURE RATIO	1.184	1.180	1.180
STATOR TOTAL TEMPERATURE RATIO	0.996	0.995	0.997
ROTOR ADIABATIC EFFICIENCY	0.775	0.762	0.762
ROTOR MOMENTUM-RISE EFFICIENCY	0.766	0.747	0.748
ROTOR HEAD-RISE COEFFICIENT	0.409	0.389	0.390
FLOW COEFFICIENT	0.700	0.701	0.702
AIRFLOW PER UNIT FRONTAL AREA	169.91	170.36	170.48
AIRFLOW PER UNIT ANNULUS AREA	232.90	233.50	233.67
AIRFLOW AT ORIFICE	34.44	34.53	34.55
AIRFLOW AT ROTOR INLET	33.78	33.86	33.86
AIRFLOW AT ROTOR OUTLET	35.03	35.42	35.32
AIRFLOW AT STATOR OUTLET	34.60	34.38	35.08
ROTATIVE SPEED	13009.5	13061.0	13045.7
PERCENT OF DESIGN SPEED	119.5	120.0	119.8

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.520	1.384	1.472
STAGE TOTAL TEMPERATURE RATIO	1.180	1.174	1.176
STAGE ADIABATIC EFFICIENCY	0.705	0.558	0.663

(b) 110 Percent of design speed

READING NUMBER	0271
ROTOR TOTAL PRESSURE RATIO	1.546
STATOR TOTAL PRESSURE RATIO	0.967
ROTOR TOTAL TEMPERATURE RATIO	1.165
STATOR TOTAL TEMPERATURE RATIO	0.994
ROTOR ADIABATIC EFFICIENCY	0.804
ROTOR MOMENTUM-RISE EFFICIENCY	0.824
ROTOR HEAD-RISE COEFFICIENT	0.443
FLOW COEFFICIENT	0.706
AIRFLOW PER UNIT FRONTAL AREA	162.96
AIRFLOW PER UNIT ANNULUS AREA	223.36
AIRFLOW AT ORIFICE	33.03
AIRFLOW AT ROTOR INLET	32.57
AIRFLOW AT ROTOR OUTLET	32.73
AIRFLOW AT STATOR OUTLET	32.76
ROTATIVE SPEED	11947.2
PERCENT OF DESIGN SPEED	109.7

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.496
STAGE TOTAL TEMPERATURE RATIO	1.158
STAGE ADIABATIC EFFICIENCY	0.772

(c) 100 Percent of design speed

READING NUMBER	0265	0270	0269	0267	0266
ROTOR TOTAL PRESSURE RATIO	1.457	1.459	1.457	1.449	1.444
STATOR TOTAL PRESSURE RATIO	0.971	0.969	0.968	0.968	0.917
ROTOR TOTAL TEMPERATURE RATIO	1.136	1.136	1.135	1.132	1.131
STATOR TOTAL TEMPERATURE RATIO	0.996	0.996	0.996	0.996	0.995
ROTOR ADIABATIC EFFICIENCY	0.836	0.840	0.844	0.845	0.843
ROTOR MOMENTUM-RISE EFFICIENCY	0.863	0.865	0.867	0.870	0.873
ROTOR HEAD-RISE COEFFICIENT	0.445	0.445	0.444	0.436	0.432
FLOW COEFFICIENT	0.728	0.736	0.749	0.772	0.783
AIRFLOW PER UNIT FRONTAL AREA	157.54	158.67	160.22	163.06	164.39
AIRFLOW PER UNIT ANNULUS AREA	215.93	217.48	219.61	223.51	225.33
AIRFLOW AT ORIFICE	31.93	32.16	32.48	33.05	33.32
AIRFLOW AT ROTOR INLET	31.49	31.71	32.01	32.53	32.78
AIRFLOW AT ROTOR OUTLET	31.55	31.84	32.13	32.72	33.04
AIRFLOW AT STATOR OUTLET	31.40	31.56	31.86	32.97	33.42
ROTATIVE SPEED	10896.6	10911.2	10901.6	10899.9	10898.2
PERCENT OF DESIGN SPEED	100.1	100.2	100.1	100.1	100.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.415	1.414	1.411	1.403	1.325
STAGE TOTAL TEMPERATURE RATIO	1.131	1.131	1.130	1.128	1.125
STAGE ADIABATIC EFFICIENCY	0.795	0.793	0.792	0.793	0.667

TABLE IX. - Concluded. OVERALL PERFORMANCE FOR STAGE 57D

(d) 90 Percent of design speed

READING NUMBER	0287
ROTOR TOTAL PRESSURE RATIO	1.352
STATOR TOTAL PRESSURE RATIO	0.976
ROTOR TOTAL TEMPERATURE RATIO	1.106
STATOR TOTAL TEMPERATURE RATIO	0.996
ROTOR ADIABATIC EFFICIENCY	0.846
ROTOR MOMENTUM-RISE EFFICIENCY	0.886
ROTOR HEAD-RISE COEFFICIENT	0.423
FLOW COEFFICIENT	0.736
AIRFLOW PER UNIT FRONTAL AREA	148.65
AIRFLOW PER UNIT ANNULUS AREA	203.74
AIRFLOW AT ORIFICE	30.13
AIRFLOW AT ROTOR INLET	29.72
AIRFLOW AT ROTOR OUTLET	29.81
AIRFLOW AT STATOR OUTLET	29.54
ROTATIVE SPEED	9818.8
PERCENT OF DESIGN SPEED	90.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.319
STAGE TOTAL TEMPERATURE RATIO	1.102
STAGE ADIABATIC EFFICIENCY	0.807

(e) 80 Percent of design speed

READING NUMBER	0280	0279	0278	0277	0294
ROTOR TOTAL PRESSURE RATIO	1.268	1.265	1.261	1.258	1.257
STATOR TOTAL PRESSURE RATIO	0.983	0.980	0.975	0.970	0.918
ROTOR TOTAL TEMPERATURE RATIO	1.083	1.081	1.080	1.079	1.079
STATOR TOTAL TEMPERATURE RATIO	0.997	0.997	0.997	0.996	0.995
ROTOR ADIABATIC EFFICIENCY	0.849	0.854	0.854	0.858	0.854
ROTOR MOMENTUM-RISE EFFICIENCY	0.888	0.898	0.904	0.910	0.914
ROTOR HEAD-RISE COEFFICIENT	0.407	0.404	0.397	0.394	0.390
FLOW COEFFICIENT	0.709	0.742	0.777	0.801	0.810
AIRFLOW PER UNIT FRONTAL AREA	133.29	137.78	142.51	145.50	146.63
AIRFLOW PER UNIT ANNULUS AREA	182.70	188.86	195.34	199.43	200.98
AIRFLOW AT ORIFICE	27.02	27.93	28.89	29.49	29.72
AIRFLOW AT ROTOR INLET	26.67	27.53	28.49	29.05	29.32
AIRFLOW AT ROTOR OUTLET	26.70	27.53	28.47	29.07	29.34
AIRFLOW AT STATOR OUTLET	26.41	27.20	28.31	29.42	30.09
ROTATIVE SPEED	8734.1	8725.3	8731.5	8717.6	8738.3
PERCENT OF DESIGN SPEED	80.2	80.2	80.2	80.1	80.3

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.246	1.240	1.230	1.220	1.154
STAGE TOTAL TEMPERATURE RATIO	1.080	1.078	1.077	1.075	1.074
STAGE ADIABATIC EFFICIENCY	0.816	0.809	0.793	0.780	0.565

(f) 70 Percent of design speed

READING NUMBER	0281
ROTOR TOTAL PRESSURE RATIO	1.196
STATOR TOTAL PRESSURE RATIO	0.986
ROTOR TOTAL TEMPERATURE RATIO	1.063
STATOR TOTAL TEMPERATURE RATIO	0.997
ROTOR ADIABATIC EFFICIENCY	0.838
ROTOR MOMENTUM-RISE EFFICIENCY	0.863
ROTOR HEAD-RISE COEFFICIENT	0.393
FLOW COEFFICIENT	0.652
AIRFLOW PER UNIT FRONTAL AREA	111.87
AIRFLOW PER UNIT ANNULUS AREA	153.33
AIRFLOW AT ORIFICE	22.67
AIRFLOW AT ROTOR INLET	22.34
AIRFLOW AT ROTOR OUTLET	22.34
AIRFLOW AT STATOR OUTLET	21.96
ROTATIVE SPEED	7621.7
PERCENT OF DESIGN SPEED	70.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.180
STAGE TOTAL TEMPERATURE RATIO	1.060
STAGE ADIABATIC EFFICIENCY	0.808

(g) 60 Percent of design speed

READING NUMBER	0282	0285	0284	0283	0290
ROTOR TOTAL PRESSURE RATIO	1.140	1.143	1.140	1.134	1.122
STATOR TOTAL PRESSURE RATIO	0.990	0.989	0.987	0.982	0.962
ROTOR TOTAL TEMPERATURE RATIO	1.046	1.045	1.044	1.042	1.039
STATOR TOTAL TEMPERATURE RATIO	0.998	0.998	0.998	0.998	0.997
ROTOR ADIABATIC EFFICIENCY	0.829	0.867	0.875	0.878	0.850
ROTOR MOMENTUM-RISE EFFICIENCY	0.848	0.894	0.912	0.927	0.923
ROTOR HEAD-RISE COEFFICIENT	0.380	0.388	0.380	0.364	0.335
FLOW COEFFICIENT	0.615	0.671	0.732	0.801	0.891
AIRFLOW PER UNIT FRONTAL AREA	93.49	100.96	108.78	117.59	127.40
AIRFLOW PER UNIT ANNULUS AREA	128.15	138.38	149.10	161.18	174.63
AIRFLOW AT ORIFICE	18.95	20.46	22.05	23.83	25.82
AIRFLOW AT ROTOR INLET	18.59	20.09	21.69	23.38	25.39
AIRFLOW AT ROTOR OUTLET	18.60	20.14	21.64	23.37	25.36
AIRFLOW AT STATOR OUTLET	18.26	19.61	21.24	23.05	25.46
ROTATIVE SPEED	6547.2	6540.4	6548.4	6546.7	6519.3
PERCENT OF DESIGN SPEED	60.1	60.1	60.2	60.1	59.9

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.128	1.130	1.126	1.113	1.080
STAGE TOTAL TEMPERATURE RATIO	1.044	1.043	1.042	1.039	1.036
STAGE ADIABATIC EFFICIENCY	0.805	0.820	0.823	0.794	0.614

TABLE X. - OVERALL PERFORMANCE FOR STAGE 57F

(a) 120 Percent of design speed

READING NUMBER	0213	0212	0211	0210	0209
ROTOR TOTAL PRESSURE RATIO	1.514	1.483	1.436	1.373	1.227
STATOR TOTAL PRESSURE RATIO	0.973	0.979	0.986	0.991	0.976
ROTOR TOTAL TEMPERATURE RATIO	1.144	1.137	1.130	1.119	1.094
STATOR TOTAL TEMPERATURE RATIO	0.996	0.998	0.998	1.000	0.997
ROTOR ADIABATIC EFFICIENCY	0.872	0.870	0.837	0.798	0.640
ROTOR MOMENTUM-RISE EFFICIENCY	0.896	0.887	0.862	0.810	0.553
ROTOR HEAD-RISE COEFFICIENT	0.346	0.326	0.297	0.255	0.159
FLOW COEFFICIENT	0.406	0.421	0.435	0.445	0.451
AIRFLOW PER UNIT FRONTAL AREA	118.01	121.52	124.49	126.65	127.92
AIRFLOW PER UNIT ANNULUS AREA	161.75	166.57	170.64	173.59	175.34
AIRFLOW AT ORIFICE	23.92	24.63	25.23	25.67	25.93
AIRFLOW AT ROTOR INLET	23.58	24.26	24.90	25.36	25.61
AIRFLOW AT ROTOR OUTLET	23.20	23.87	24.47	24.97	25.57
AIRFLOW AT STATOR OUTLET	23.19	24.00	24.70	25.25	25.22
ROTATIVE SPEED	13040.6	13039.8	13040.3	13048.2	13042.6
PERCENT OF DESIGN SPEED	119.8	119.8	119.8	119.9	119.8

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.474	1.452	1.416	1.360	1.198
STAGE TOTAL TEMPERATURE RATIO	1.139	1.135	1.128	1.119	1.091
STAGE ADIABATIC EFFICIENCY	0.840	0.836	0.819	0.773	0.584

(b) 110 Percent of design speed

READING NUMBER	0214
ROTOR TOTAL PRESSURE RATIO	1.431
STATOR TOTAL PRESSURE RATIO	0.977
ROTOR TOTAL TEMPERATURE RATIO	1.120
STATOR TOTAL TEMPERATURE RATIO	0.998
ROTOR ADIABATIC EFFICIENCY	0.903
ROTOR MOMENTUM-RISE EFFICIENCY	0.925
ROTOR HEAD-RISE COEFFICIENT	0.348
FLOW COEFFICIENT	0.387
AIRFLOW PER UNIT FRONTAL AREA	105.11
AIRFLOW PER UNIT ANNULUS AREA	144.07
AIRFLOW AT ORIFICE	21.30
AIRFLOW AT ROTOR INLET	20.98
AIRFLOW AT ROTOR OUTLET	20.55
AIRFLOW AT STATOR OUTLET	20.62
ROTATIVE SPEED	11918.9
PERCENT OF DESIGN SPEED	109.5

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.399
STAGE TOTAL TEMPERATURE RATIO	1.117
STAGE ADIABATIC EFFICIENCY	0.859

(c) 100 Percent of design speed

READING NUMBER	0220	0219	0218	0217	0216	0215
ROTOR TOTAL PRESSURE RATIO	1.348	1.330	1.308	1.289	1.236	1.175
STATOR TOTAL PRESSURE RATIO	0.981	0.986	0.990	0.990	0.990	0.981
ROTOR TOTAL TEMPERATURE RATIO	1.099	1.094	1.089	1.083	1.074	1.065
STATOR TOTAL TEMPERATURE RATIO	0.998	0.998	0.999	0.999	0.999	0.997
ROTOR ADIABATIC EFFICIENCY	0.897	0.903	0.900	0.900	0.842	0.726
ROTOR MOMENTUM-RISE EFFICIENCY	0.921	0.932	0.928	0.928	0.859	0.748
ROTOR HEAD-RISE COEFFICIENT	0.339	0.320	0.300	0.281	0.231	0.172
FLOW COEFFICIENT	0.370	0.402	0.429	0.452	0.481	0.490
AIRFLOW PER UNIT FRONTAL AREA	93.18	100.19	105.87	110.78	116.83	119.07
AIRFLOW PER UNIT ANNULUS AREA	127.73	137.33	145.12	151.84	160.13	163.20
AIRFLOW AT ORIFICE	18.89	20.31	21.46	22.45	23.68	24.13
AIRFLOW AT ROTOR INLET	18.60	20.02	21.19	22.15	23.36	23.79
AIRFLOW AT ROTOR OUTLET	18.19	19.78	20.83	21.92	23.04	23.65
AIRFLOW AT STATOR OUTLET	18.34	19.74	20.87	21.79	23.04	23.44
ROTATIVE SPEED	10881.5	10885.0	10880.8	10881.9	10888.3	10929.4
PERCENT OF DESIGN SPEED	100.0	100.0	100.0	100.0	100.0	100.4

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.324	1.311	1.295	1.276	1.224	1.152
STAGE TOTAL TEMPERATURE RATIO	1.097	1.092	1.087	1.082	1.073	1.062
STAGE ADIABATIC EFFICIENCY	0.858	0.875	0.880	0.878	0.819	0.665

TABLE X. - Concluded. OVERALL PERFORMANCE FOR STAGE 57E

(d) 80 Percent of design speed

READING NUMBER	0226	0225	0224	0223	0222
ROTOR TOTAL PRESSURE RATIO	1.205	1.189	1.170	1.146	1.106
STATOR TOTAL PRESSURE RATIO	0.991	0.993	0.993	0.992	0.984
ROTOR TOTAL TEMPERATURE RATIO	1.061	1.056	1.051	1.045	1.038
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.999	0.999	0.998
ROTOR ADIABATIC EFFICIENCY	0.899	0.903	0.906	0.877	0.775
ROTOR MOMENTUM-RISE EFFICIENCY	0.928	0.940	0.937	0.907	0.802
ROTOR HEAD-RISE COEFFICIENT	0.312	0.289	0.260	0.223	0.164
FLOW COEFFICIENT	0.365	0.403	0.445	0.486	0.520
AIRFLOW PER UNIT FRONTAL AREA	74.99	82.06	89.94	97.33	103.25
AIRFLOW PER UNIT ANNULUS AREA	102.78	112.47	123.28	133.41	141.53
AIRFLOW AT ORIFICE	15.20	16.63	18.23	19.73	20.93
AIRFLOW AT ROTOR INLET	14.98	16.43	17.98	19.46	20.62
AIRFLOW AT ROTOR OUTLET	14.69	16.18	17.75	19.14	20.28
AIRFLOW AT STATOR OUTLET	14.73	16.10	17.57	19.03	20.21
ROTATIVE SPEED	8714.2	8709.4	8717.5	8717.0	8705.2
PERCENT OF DESIGN SPEED	80.0	80.0	80.1	80.1	80.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.194	1.181	1.162	1.137	1.088
STAGE TOTAL TEMPERATURE RATIO	1.060	1.055	1.049	1.044	1.036
STAGE ADIABATIC EFFICIENCY	0.868	0.883	0.890	0.854	0.682

(e) 70 Percent of design speed

READING NUMBER	0227
ROTOR TOTAL PRESSURE RATIO	1.152
STATOR TOTAL PRESSURE RATIO	0.992
ROTOR TOTAL TEMPERATURE RATIO	1.046
STATOR TOTAL TEMPERATURE RATIO	0.999
ROTOR ADIABATIC EFFICIENCY	0.900
ROTOR MOMENTUM-RISE EFFICIENCY	0.933
ROTOR HEAD-RISE COEFFICIENT	0.306
FLOW COEFFICIENT	0.360
AIRFLOW PER UNIT FRONTAL AREA	65.08
AIRFLOW PER UNIT ANNULUS AREA	89.20
AIRFLOW AT ORIFICE	13.19
AIRFLOW AT ROTOR INLET	13.00
AIRFLOW AT ROTOR OUTLET	12.85
AIRFLOW AT STATOR OUTLET	12.74
ROTATIVE SPEED	7599.9
PERCENT OF DESIGN SPEED	69.8

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.143
STAGE TOTAL TEMPERATURE RATIO	1.045
STAGE ADIABATIC EFFICIENCY	0.863

(f) 60 Percent of design speed

READING NUMBER	0231	0230	0229	0228
ROTOR TOTAL PRESSURE RATIO	1.111	1.094	1.078	1.052
STATOR TOTAL PRESSURE RATIO	0.994	0.996	0.994	0.987
ROTOR TOTAL TEMPERATURE RATIO	1.034	1.029	1.024	1.019
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.999	0.999
ROTOR ADIABATIC EFFICIENCY	0.896	0.911	0.894	0.770
ROTOR MOMENTUM-RISE EFFICIENCY	0.926	0.940	0.920	0.807
ROTOR HEAD-RISE COEFFICIENT	0.302	0.256	0.212	0.142
FLOW COEFFICIENT	0.352	0.424	0.487	0.543
AIRFLOW PER UNIT FRONTAL AREA	55.26	66.03	74.99	83.25
AIRFLOW PER UNIT ANNULUS AREA	75.74	90.51	102.78	114.10
AIRFLOW AT ORIFICE	11.20	13.38	15.20	16.87
AIRFLOW AT ROTOR INLET	11.04	13.19	15.02	16.63
AIRFLOW AT ROTOR OUTLET	10.92	13.08	14.87	16.44
AIRFLOW AT STATOR OUTLET	10.85	12.85	14.63	16.24
ROTATIVE SPEED	6553.4	6558.1	6553.6	6552.8
PERCENT OF DESIGN SPEED	60.2	60.2	60.2	60.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.105	1.090	1.072	1.038
STAGE TOTAL TEMPERATURE RATIO	1.034	1.028	1.024	1.018
STAGE ADIABATIC EFFICIENCY	0.863	0.896	0.852	0.596

TABLE XI. - OVERALL PERFORMANCE FOR STAGE 57F

(a) 120 Percent of design speed

READING NUMBER	0323
ROTOR TOTAL PRESSURE RATIO	1.385
STATOR TOTAL PRESSURE RATIO	0.984
ROTOR TOTAL TEMPERATURE RATIO	1.118
STATOR TOTAL TEMPERATURE RATIO	0.998
ROTOR ADIABATIC EFFICIENCY	0.826
ROTOR MOMENTUM-RISE EFFICIENCY	0.844
ROTOR HEAD-RISE COEFFICIENT	0.262
FLOW COEFFICIENT	0.288
AIRFLOW PER UNIT FRONTAL AREA	88.07
AIRFLOW PER UNIT ANNULUS AREA	120.71
AIRFLOW AT ORIFICE	17.85
AIRFLOW AT ROTOR INLET	17.49
AIRFLOW AT ROTOR OUTLET	17.30
AIRFLOW AT STATOR OUTLET	16.93
ROTATIVE SPEED	13062.9
PERCENT OF DESIGN SPEED	120.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.363
STAGE TOTAL TEMPERATURE RATIO	1.116
STAGE ADIABATIC EFFICIENCY	0.797

(b) 110 Percent of design speed

READING NUMBER	0325
ROTOR TOTAL PRESSURE RATIO	1.324
STATOR TOTAL PRESSURE RATIO	0.984
ROTOR TOTAL TEMPERATURE RATIO	1.097
STATOR TOTAL TEMPERATURE RATIO	0.998
ROTOR ADIABATIC EFFICIENCY	0.864
ROTOR MOMENTUM-RISE EFFICIENCY	0.878
ROTOR HEAD-RISE COEFFICIENT	0.260
FLOW COEFFICIENT	0.291
AIRFLOW PER UNIT FRONTAL AREA	82.28
AIRFLOW PER UNIT ANNULUS AREA	112.78
AIRFLOW AT ORIFICE	16.68
AIRFLOW AT ROTOR INLET	16.34
AIRFLOW AT ROTOR OUTLET	16.06
AIRFLOW AT STATOR OUTLET	15.97
ROTATIVE SPEED	12006.5
PERCENT OF DESIGN SPEED	110.3

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.303
STAGE TOTAL TEMPERATURE RATIO	1.095
STAGE ADIABATIC EFFICIENCY	0.826

(c) 100 Percent of design speed

READING NUMBER	0305	0310	0309	0308	0307	0306
ROTOR TOTAL PRESSURE RATIO	1.274	1.261	1.249	1.217	1.156	1.082
STATOR TOTAL PRESSURE RATIO	0.985	0.988	0.991	0.992	0.988	0.980
ROTOR TOTAL TEMPERATURE RATIO	1.081	1.078	1.077	1.070	1.058	1.046
STATOR TOTAL TEMPERATURE RATIO	0.999	0.998	0.998	0.999	1.000	0.996
ROTOR ADIABATIC EFFICIENCY	0.886	0.875	0.857	0.823	0.726	0.500
ROTOR MOMENTUM-RISE EFFICIENCY	0.898	0.893	0.881	0.836	0.732	0.516
ROTOR HEAD-RISE COEFFICIENT	0.266	0.255	0.244	0.213	0.154	0.082
FLOW COEFFICIENT	0.281	0.295	0.304	0.316	0.329	0.339
AIRFLOW PER UNIT FRONTAL AREA	72.78	76.21	78.21	81.06	84.41	86.39
AIRFLOW PER UNIT ANNULUS AREA	99.76	104.45	107.20	111.11	115.70	118.41
AIRFLOW AT ORIFICE	14.75	15.45	15.85	16.43	17.11	17.51
AIRFLOW AT ROTOR INLET	14.46	15.13	15.54	16.10	16.75	17.17
AIRFLOW AT ROTOR OUTLET	14.20	14.93	15.31	15.74	16.54	17.39
AIRFLOW AT STATOR OUTLET	14.10	14.94	15.44	15.81	16.33	17.00
ROTATIVE SPEED	10903.0	10890.1	10892.0	10889.8	10901.9	10887.9
PERCENT OF DESIGN SPEED	100.2	100.0	100.1	100.0	100.1	100.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.254	1.246	1.238	1.207	1.142	1.061
STAGE TOTAL TEMPERATURE RATIO	1.080	1.077	1.074	1.069	1.059	1.042
STAGE ADIABATIC EFFICIENCY	0.840	0.847	0.844	0.804	0.660	0.406

(d) 90 Percent of design speed

READING NUMBER	0326
ROTOR TOTAL PRESSURE RATIO	1.203
STATOR TOTAL PRESSURE RATIO	0.991
ROTOR TOTAL TEMPERATURE RATIO	1.062
STATOR TOTAL TEMPERATURE RATIO	0.999
ROTOR ADIABATIC EFFICIENCY	0.879
ROTOR MOMENTUM-RISE EFFICIENCY	0.899
ROTOR HEAD-RISE COEFFICIENT	0.251
FLOW COEFFICIENT	0.283
AIRFLOW PER UNIT FRONTAL AREA	65.47
AIRFLOW PER UNIT ANNULUS AREA	89.73
AIRFLOW AT ORIFICE	13.27
AIRFLOW AT ROTOR INLET	13.01
AIRFLOW AT ROTOR OUTLET	12.73
AIRFLOW AT STATOR OUTLET	12.79
ROTATIVE SPEED	9697.0
PERCENT OF DESIGN SPEED	89.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.192
STAGE TOTAL TEMPERATURE RATIO	1.061
STAGE ADIABATIC EFFICIENCY	0.851

TABLE XI. - Concluded. OVERALL PERFORMANCE FOR STAGE 57F

(e) 80 Percent of design speed

READING NUMBER	0311	0316	0315	0314	0313	0312
ROTOR TOTAL PRESSURE RATIO	1.167	1.158	1.142	1.127	1.091	1.045
STATOR TOTAL PRESSURE RATIO	0.992	0.994	0.996	0.996	0.993	0.984
ROTOR TOTAL TEMPERATURE RATIO	1.051	1.049	1.044	1.042	1.034	1.025
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	1.001	1.000	1.000	0.999
ROTOR ADIABATIC EFFICIENCY	0.883	0.878	0.883	0.832	0.732	0.495
ROTOR MOMENTUM-RISE EFFICIENCY	0.906	0.907	0.882	0.850	0.738	0.503
ROTOR HEAD-RISE COEFFICIENT	0.255	0.243	0.219	0.196	0.140	0.070
FLOW COEFFICIENT	0.276	0.292	0.313	0.324	0.345	0.363
AIRFLOW PER UNIT FRONTAL AREA	57.75	60.84	64.92	67.14	71.46	74.68
AIRFLOW PER UNIT ANNULUS AREA	79.16	83.39	88.99	92.03	97.95	102.37
AIRFLOW AT ORIFICE	11.71	12.33	13.16	13.61	14.48	15.14
AIRFLOW AT ROTOR INLET	11.50	12.11	12.93	13.37	14.20	14.85
AIRFLOW AT ROTOR OUTLET	11.26	11.87	12.68	13.09	14.01	14.79
AIRFLOW AT STATOR OUTLET	11.24	11.95	12.73	12.95	13.85	14.72
ROTATIVE SPEED	8724.1	8698.9	8704.4	8713.5	8718.4	8699.6
PERCENT OF DESIGN SPEED	80.1	79.9	80.0	80.0	80.1	79.9

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.158	1.151	1.138	1.122	1.083	1.028
STAGE TOTAL TEMPERATURE RATIO	1.050	1.048	1.045	1.042	1.035	1.024
STAGE ADIABATIC EFFICIENCY	0.857	0.864	0.828	0.801	0.663	0.322

(f) 70 Percent of design speed

READING NUMBER	0317
ROTOR TOTAL PRESSURE RATIO	1.123
STATOR TOTAL PRESSURE RATIO	0.995
ROTOR TOTAL TEMPERATURE RATIO	1.038
STATOR TOTAL TEMPERATURE RATIO	0.999
ROTOR ADIABATIC EFFICIENCY	0.881
ROTOR MOMENTUM-RISE EFFICIENCY	0.907
ROTOR HEAD-RISE COEFFICIENT	0.246
FLOW COEFFICIENT	0.279
AIRFLOW PER UNIT FRONTAL AREA	51.08
AIRFLOW PER UNIT ANNULUS AREA	70.01
AIRFLOW AT ORIFICE	10.35
AIRFLOW AT ROTOR INLET	10.17
AIRFLOW AT ROTOR OUTLET	9.94
AIRFLOW AT STATOR OUTLET	9.96
ROTATIVE SPEED	7616.7
PERCENT OF DESIGN SPEED	70.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.117
STAGE TOTAL TEMPERATURE RATIO	1.037
STAGE ADIABATIC EFFICIENCY	0.864

(g) 60 Percent of design speed

READING NUMBER	0318	0322	0321	0320
ROTOR TOTAL PRESSURE RATIO	1.090	1.077	1.049	1.021
STATOR TOTAL PRESSURE RATIO	0.996	0.998	0.996	0.989
ROTOR TOTAL TEMPERATURE RATIO	1.029	1.025	1.019	1.013
STATOR TOTAL TEMPERATURE RATIO	1.000	1.000	1.000	0.999
ROTOR ADIABATIC EFFICIENCY	0.870	0.858	0.736	0.441
ROTOR MOMENTUM-RISE EFFICIENCY	0.908	0.886	0.744	0.451
ROTOR HEAD-RISE COEFFICIENT	0.249	0.211	0.133	0.056
FLOW COEFFICIENT	0.274	0.311	0.354	0.382
AIRFLOW PER UNIT FRONTAL AREA	42.75	48.96	55.70	59.92
AIRFLOW PER UNIT ANNULUS AREA	58.60	67.11	76.35	82.13
AIRFLOW AT ORIFICE	8.66	9.92	11.29	12.14
AIRFLOW AT ROTOR INLET	8.56	9.74	11.08	11.93
AIRFLOW AT ROTOR OUTLET	8.39	9.61	10.96	11.95
AIRFLOW AT STATOR OUTLET	8.38	9.52	10.88	11.68
ROTATIVE SPEED	6486.0	6538.4	6550.1	6554.7
PERCENT OF DESIGN SPEED	59.6	60.1	60.2	60.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.086	1.075	1.045	1.009
STAGE TOTAL TEMPERATURE RATIO	1.029	1.025	1.018	1.012
STAGE ADIABATIC EFFICIENCY	0.828	0.846	0.688	0.220

TABLE XII. - OVERALL PERFORMANCE OF STAGE 57M1A

(a) 120 Percent of design speed

READING NUMBER	0343	0344	0345	0346	0347
ROTOR TOTAL PRESSURE RATIO	1.589	1.558	1.510	1.455	1.415
STATOR TOTAL PRESSURE RATIO	0.976	0.987	0.983	0.979	0.940
ROTOR TOTAL TEMPERATURE RATIO	1.174	1.165	1.155	1.147	1.143
STATOR TOTAL TEMPERATURE RATIO	0.993	0.998	1.001	1.000	0.996
ROTOR ADIABATIC EFFICIENCY	0.812	0.816	0.807	0.767	0.731
ROTOR MOMENTUM-RISE EFFICIENCY	0.840	0.838	0.816	0.776	0.738
ROTOR HEAD-RISE COEFFICIENT	0.397	0.377	0.347	0.312	0.286
FLOW COEFFICIENT	0.580	0.600	0.627	0.632	0.631
AIRFLOW PER UNIT FRONTAL AREA	152.08	154.74	159.10	159.59	159.51
AIRFLOW PER UNIT ANNULUS AREA	208.45	212.10	218.08	218.74	218.64
AIRFLOW AT ORIFICE	30.82	31.36	32.25	32.35	32.33
AIRFLOW AT ROTOR INLET	30.66	31.27	32.04	32.16	32.17
AIRFLOW AT ROTOR OUTLET	30.34	30.86	32.16	32.46	32.58
AIRFLOW AT STATOR OUTLET	30.63	31.11	31.72	32.17	32.94
ROTATIVE SPEED	13089.4	13071.9	13042.5	13036.6	13052.4
PERCENT OF DESIGN SPEED	120.2	120.1	119.8	119.8	119.9
COMPRESSOR PERFORMANCE					
STAGE TOTAL PRESSURE RATIO	1.551	1.537	1.483	1.424	1.330
STAGE TOTAL TEMPERATURE RATIO	1.166	1.164	1.156	1.147	1.138
STAGE ADIABATIC EFFICIENCY	0.803	0.799	0.765	0.722	0.613

(b) 110 Percent of design speed

READING NUMBER	0337	0338	0339	0340	0341
ROTOR TOTAL PRESSURE RATIO	1.507	1.495	1.453	1.395	1.358
STATOR TOTAL PRESSURE RATIO	0.978	0.981	0.989	0.986	0.956
ROTOR TOTAL TEMPERATURE RATIO	1.147	1.142	1.135	1.126	1.121
STATOR TOTAL TEMPERATURE RATIO	0.995	0.997	1.000	0.999	0.997
ROTOR ADIABATIC EFFICIENCY	0.848	0.854	0.834	0.794	0.754
ROTOR MOMENTUM-RISE EFFICIENCY	0.876	0.883	0.860	0.816	0.776
ROTOR HEAD-RISE COEFFICIENT	0.404	0.394	0.361	0.317	0.289
FLOW COEFFICIENT	0.584	0.612	0.636	0.653	0.655
AIRFLOW PER UNIT FRONTAL AREA	144.48	149.29	152.78	155.38	155.38
AIRFLOW PER UNIT ANNULUS AREA	198.04	204.63	209.40	212.98	212.97
AIRFLOW AT ORIFICE	29.28	30.26	30.97	31.49	31.49
AIRFLOW AT ROTOR INLET	29.14	30.08	30.85	31.34	31.38
AIRFLOW AT ROTOR OUTLET	28.66	29.76	30.50	31.11	31.26
AIRFLOW AT STATOR OUTLET	28.70	29.67	30.53	31.33	32.30
ROTATIVE SPEED	12024.0	12020.9	12038.9	12035.0	12042.7
PERCENT OF DESIGN SPEED	110.5	110.4	110.6	110.6	110.6
COMPRESSOR PERFORMANCE					
STAGE TOTAL PRESSURE RATIO	1.475	1.467	1.437	1.375	1.298
STAGE TOTAL TEMPERATURE RATIO	1.141	1.139	1.135	1.125	1.118
STAGE ADIABATIC EFFICIENCY	0.831	0.830	0.810	0.762	0.656

(c) 100 Percent of design speed

READING NUMBER	0331	0332	0333	0334	0335
ROTOR TOTAL PRESSURE RATIO	1.402	1.389	1.368	1.332	1.300
STATOR TOTAL PRESSURE RATIO	0.987	0.989	0.991	0.989	0.985
ROTOR TOTAL TEMPERATURE RATIO	1.117	1.112	1.109	1.104	1.099
STATOR TOTAL TEMPERATURE RATIO	0.998	0.999	0.999	0.998	0.998
ROTOR ADIABATIC EFFICIENCY	0.871	0.878	0.860	0.825	0.786
ROTOR MOMENTUM-RISE EFFICIENCY	0.901	0.909	0.893	0.860	0.822
ROTOR HEAD-RISE COEFFICIENT	0.389	0.378	0.358	0.325	0.295
FLOW COEFFICIENT	0.585	0.618	0.648	0.675	0.682
AIRFLOW PER UNIT FRONTAL AREA	135.05	140.32	144.97	149.02	150.03
AIRFLOW PER UNIT ANNULUS AREA	185.11	192.34	198.71	204.26	205.64
AIRFLOW AT ORIFICE	27.37	28.44	29.38	30.20	30.41
AIRFLOW AT ROTOR INLET	27.25	28.32	29.27	30.08	30.28
AIRFLOW AT ROTOR OUTLET	26.98	28.13	28.93	29.75	29.99
AIRFLOW AT STATOR OUTLET	26.91	28.09	29.11	30.07	31.34
ROTATIVE SPEED	10910.3	10891.5	10898.4	10896.7	10897.1
PERCENT OF DESIGN SPEED	100.2	100.1	100.1	100.1	100.1
COMPRESSOR PERFORMANCE					
STAGE TOTAL PRESSURE RATIO	1.384	1.374	1.355	1.317	1.280
STAGE TOTAL TEMPERATURE RATIO	1.114	1.111	1.107	1.102	1.096
STAGE ADIABATIC EFFICIENCY	0.851	0.856	0.846	0.806	0.758

(d) 90 Percent of design speed

READING NUMBER	0352	0351	0350	0349	0348
ROTOR TOTAL PRESSURE RATIO	1.307	1.294	1.280	1.258	1.246
STATOR TOTAL PRESSURE RATIO	0.990	0.994	0.991	0.983	0.979
ROTOR TOTAL TEMPERATURE RATIO	1.091	1.087	1.084	1.080	1.079
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.998	0.997	0.997
ROTOR ADIABATIC EFFICIENCY	0.875	0.880	0.870	0.849	0.824
ROTOR MOMENTUM-RISE EFFICIENCY	0.904	0.905	0.905	0.889	0.870
ROTOR HEAD-RISE COEFFICIENT	0.371	0.355	0.337	0.313	0.298
FLOW COEFFICIENT	0.568	0.603	0.645	0.688	0.706
AIRFLOW PER UNIT FRONTAL AREA	121.63	127.57	134.35	140.56	143.12
AIRFLOW PER UNIT ANNULUS AREA	166.72	174.85	184.15	192.66	196.17
AIRFLOW AT ORIFICE	24.65	25.86	27.23	28.49	29.01
AIRFLOW AT ROTOR INLET	24.49	25.70	27.08	28.35	28.89
AIRFLOW AT ROTOR OUTLET	24.38	25.47	26.89	28.20	28.66
AIRFLOW AT STATOR OUTLET	24.16	25.46	26.81	28.25	29.33
ROTATIVE SPEED	9785.1	9795.7	9811.1	9795.3	9802.5
PERCENT OF DESIGN SPEED	89.9	90.0	90.1	90.0	90.0
COMPRESSOR PERFORMANCE					
STAGE TOTAL PRESSURE RATIO	1.295	1.286	1.269	1.237	1.220
STAGE TOTAL TEMPERATURE RATIO	1.089	1.086	1.082	1.077	1.075
STAGE ADIABATIC EFFICIENCY	0.857	0.866	0.858	0.816	0.779

TABLE XII. - Concluded. OVERALL PERFORMANCE OF STAGE 57M1A

(e) 80 Percent of design speed

READING NUMBER	0353	0354	0355	0356
ROTOR TOTAL PRESSURE RATIO	1.235	1.222	1.206	1.184
STATOR TOTAL PRESSURE RATIO	0.993	0.995	0.993	0.984
ROTOR TOTAL TEMPERATURE RATIO	1.071	1.067	1.064	1.060
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.998	0.997
ROTOR ADIABATIC EFFICIENCY	0.872	0.875	0.864	0.828
ROTOR MOMENTUM-RISE EFFICIENCY	0.898	0.907	0.897	0.872
ROTOR HEAD-RISE COEFFICIENT	0.360	0.339	0.315	0.282
FLOW COEFFICIENT	0.548	0.599	0.642	0.703
AIRFLOW PER UNIT FRONTAL AREA	107.29	115.62	122.36	131.18
AIRFLOW PER UNIT ANNULUS AREA	147.06	158.48	167.71	179.81
AIRFLOW AT ORIFICE	21.75	23.44	24.80	26.59
AIRFLOW AT ROTOR INLET	21.58	23.30	24.63	26.44
AIRFLOW AT ROTOR OUTLET	21.46	23.17	24.46	26.22
AIRFLOW AT STATOR OUTLET	21.23	22.98	24.33	26.32
ROTATIVE SPEED	8699.4	8716.2	8715.5	8716.2
PERCENT OF DESIGN SPEED	79.9	80.1	80.1	80.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.227	1.215	1.198	1.164
STAGE TOTAL TEMPERATURE RATIO	1.070	1.066	1.062	1.057
STAGE ADIABATIC EFFICIENCY	0.859	0.868	0.855	0.782

(f) 70 Percent of design speed

READING NUMBER	0357	0358	0359	0360
ROTOR TOTAL PRESSURE RATIO	1.179	1.169	1.152	1.134
STATOR TOTAL PRESSURE RATIO	0.995	0.997	0.995	0.988
ROTOR TOTAL TEMPERATURE RATIO	1.056	1.052	1.048	1.045
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.998	0.997
ROTOR ADIABATIC EFFICIENCY	0.862	0.871	0.858	0.813
ROTOR MOMENTUM-RISE EFFICIENCY	0.886	0.899	0.889	0.853
ROTOR HEAD-RISE COEFFICIENT	0.352	0.332	0.300	0.264
FLOW COEFFICIENT	0.524	0.580	0.641	0.702
AIRFLOW PER UNIT FRONTAL AREA	92.47	100.96	110.02	118.79
AIRFLOW PER UNIT ANNULUS AREA	126.75	138.39	150.80	162.83
AIRFLOW AT ORIFICE	18.74	20.46	22.30	24.08
AIRFLOW AT ROTOR INLET	18.62	20.35	22.16	23.93
AIRFLOW AT ROTOR OUTLET	18.50	20.20	21.97	23.65
AIRFLOW AT STATOR OUTLET	18.26	20.00	21.80	23.66
ROTATIVE SPEED	7688.3	7689.1	7681.9	7684.4
PERCENT OF DESIGN SPEED	70.6	70.6	70.6	70.6

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.173	1.165	1.146	1.121
STAGE TOTAL TEMPERATURE RATIO	1.054	1.051	1.046	1.042
STAGE ADIABATIC EFFICIENCY	0.858	0.873	0.857	0.782

(g) 60 Percent of design speed

READING NUMBER	0361	0362	0363
ROTOR TOTAL PRESSURE RATIO	1.123	1.109	1.090
STATOR TOTAL PRESSURE RATIO	0.998	0.999	0.993
ROTOR TOTAL TEMPERATURE RATIO	1.040	1.035	1.031
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.998
ROTOR ADIABATIC EFFICIENCY	0.848	0.849	0.794
ROTOR MOMENTUM-RISE EFFICIENCY	0.871	0.876	0.834
ROTOR HEAD-RISE COEFFICIENT	0.337	0.296	0.245
FLOW COEFFICIENT	0.517	0.611	0.705
AIRFLOW PER UNIT FRONTAL AREA	78.54	91.83	104.31
AIRFLOW PER UNIT ANNULUS AREA	107.66	125.87	142.98
AIRFLOW AT ORIFICE	15.92	18.61	21.14
AIRFLOW AT ROTOR INLET	15.83	18.47	21.00
AIRFLOW AT ROTOR OUTLET	15.69	18.29	20.77
AIRFLOW AT STATOR OUTLET	15.45	18.10	20.68
ROTATIVE SPEED	6532.2	6540.6	6552.5
PERCENT OF DESIGN SPEED	60.0	60.1	60.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.121	1.108	1.093
STAGE TOTAL TEMPERATURE RATIO	1.039	1.034	1.030
STAGE ADIABATIC EFFICIENCY	0.856	0.870	0.772

TABLE XIII. - OVERALL PERFORMANCE OF STAGE 57M1C

(a) 120 Percent of design speed

READING NUMBER	0423	0424	0425	0426	0427
ROTOR TOTAL PRESSURE RATIO	1.610	1.598	1.587	1.541	1.504
STATOR TOTAL PRESSURE RATIO	0.960	0.967	0.966	0.964	0.925
ROTOR TOTAL TEMPERATURE RATIO	1.185	1.181	1.177	1.167	1.162
STATOR TOTAL TEMPERATURE RATIO	0.991	0.993	0.995	0.999	0.997
ROTOR ADIABATIC EFFICIENCY	0.790	0.791	0.797	0.786	0.765
ROTOR MOMENTUM-RISE EFFICIENCY	0.813	0.812	0.811	0.785	0.760
ROTOR HEAD-RISE COEFFICIENT	0.415	0.409	0.399	0.369	0.345
FLOW COEFFICIENT	0.630	0.650	0.672	0.688	0.689
AIRFLOW PER UNIT FRONTAL AREA	157.82	160.93	163.91	166.27	166.51
AIRFLOW PER UNIT ANNULUS AREA	216.32	220.58	224.66	227.90	228.23
AIRFLOW AT ORIFICE	31.99	32.62	33.22	33.70	33.75
AIRFLOW AT ROTOR INLET	32.11	32.62	33.20	33.57	33.61
AIRFLOW AT ROTOR OUTLET	32.37	32.75	33.83	34.35	34.52
AIRFLOW AT STATOR OUTLET	31.83	32.35	33.02	33.44	34.14
ROTATIVE SPEED	13048.2	13013.5	13044.5	13049.0	13062.1
PERCENT OF DESIGN SPEED	119.9	119.5	119.8	119.9	120.0
COMPRESSOR PERFORMANCE					
STAGE TOTAL PRESSURE RATIO	1.545	1.545	1.534	1.486	1.392
STAGE TOTAL TEMPERATURE RATIO	1.174	1.173	1.172	1.166	1.159
STAGE ADIABATIC EFFICIENCY	0.762	0.764	0.757	0.722	0.624

(b) 110 Percent of design speed

READING NUMBER	0422
ROTOR TOTAL PRESSURE RATIO	1.523
STATOR TOTAL PRESSURE RATIO	0.974
ROTOR TOTAL TEMPERATURE RATIO	1.155
STATOR TOTAL TEMPERATURE RATIO	0.995
ROTOR ADIABATIC EFFICIENCY	0.825
ROTOR MOMENTUM-RISE EFFICIENCY	0.850
ROTOR HEAD-RISE COEFFICIENT	0.420
FLOW COEFFICIENT	0.655
AIRFLOW PER UNIT FRONTAL AREA	154.16
AIRFLOW PER UNIT ANNULUS AREA	211.30
AIRFLOW AT ORIFICE	31.25
AIRFLOW AT ROTOR INLET	31.29
AIRFLOW AT ROTOR OUTLET	31.03
AIRFLOW AT STATOR OUTLET	30.94
ROTATIVE SPEED	11993.2
PERCENT OF DESIGN SPEED	110.2
COMPRESSOR PERFORMANCE	
STAGE TOTAL PRESSURE RATIO	1.484
STAGE TOTAL TEMPERATURE RATIO	1.149
STAGE ADIABATIC EFFICIENCY	0.803

(c) 100 Percent of design speed

READING NUMBER	0417	0416	0415	0414	0421
ROTOR TOTAL PRESSURE RATIO	1.432	1.431	1.420	1.391	1.387
STATOR TOTAL PRESSURE RATIO	0.978	0.979	0.977	0.970	0.940
ROTOR TOTAL TEMPERATURE RATIO	1.126	1.125	1.122	1.117	1.116
STATOR TOTAL TEMPERATURE RATIO	0.997	0.998	0.998	0.997	0.997
ROTOR ADIABATIC EFFICIENCY	0.858	0.865	0.868	0.849	0.847
ROTOR MOMENTUM-RISE EFFICIENCY	0.888	0.892	0.900	0.882	0.876
ROTOR HEAD-RISE COEFFICIENT	0.420	0.415	0.406	0.380	0.376
FLOW COEFFICIENT	0.668	0.697	0.728	0.754	0.753
AIRFLOW PER UNIT FRONTAL AREA	147.16	151.63	155.52	158.71	158.67
AIRFLOW PER UNIT ANNULUS AREA	201.71	207.83	213.17	217.54	217.48
AIRFLOW AT ORIFICE	29.83	30.73	31.52	32.17	32.16
AIRFLOW AT ROTOR INLET	29.87	30.74	31.53	32.15	32.14
AIRFLOW AT ROTOR OUTLET	29.74	30.55	31.56	32.08	31.99
AIRFLOW AT STATOR OUTLET	29.42	30.36	31.30	33.22	32.92
ROTATIVE SPEED	10894.8	10935.2	10922.7	10912.5	10915.7
PERCENT OF DESIGN SPEED	100.1	100.5	100.3	100.2	100.3
COMPRESSOR PERFORMANCE					
STAGE TOTAL PRESSURE RATIO	1.401	1.401	1.387	1.350	1.304
STAGE TOTAL TEMPERATURE RATIO	1.123	1.122	1.119	1.113	1.112
STAGE ADIABATIC EFFICIENCY	0.825	0.826	0.824	0.789	0.702

(d) 90 Percent of design speed

READING NUMBER	0428
ROTOR TOTAL PRESSURE RATIO	1.331
STATOR TOTAL PRESSURE RATIO	0.984
ROTOR TOTAL TEMPERATURE RATIO	1.099
STATOR TOTAL TEMPERATURE RATIO	0.998
ROTOR ADIABATIC EFFICIENCY	0.862
ROTOR MOMENTUM-RISE EFFICIENCY	0.888
ROTOR HEAD-RISE COEFFICIENT	0.396
FLOW COEFFICIENT	0.648
AIRFLOW PER UNIT FRONTAL AREA	134.20
AIRFLOW PER UNIT ANNULUS AREA	183.94
AIRFLOW AT ORIFICE	27.20
AIRFLOW AT ROTOR INLET	27.21
AIRFLOW AT ROTOR OUTLET	27.05
AIRFLOW AT STATOR OUTLET	26.75
ROTATIVE SPEED	9829.7
PERCENT OF DESIGN SPEED	90.3
COMPRESSOR PERFORMANCE	
STAGE TOTAL PRESSURE RATIO	1.309
STAGE TOTAL TEMPERATURE RATIO	1.096
STAGE ADIABATIC EFFICIENCY	0.833

TABLE XIII. - Concluded. OVERALL PERFORMANCE OF STAGE 57M1C

(e) 80 Percent of design speed

READING NUMBER	0429	0430	0431	0432	0433
ROTOR TOTAL PRESSURE RATIO	1.250	1.252	1.245	1.238	1.227
STATOR TOTAL PRESSURE RATIO	0.986	0.988	0.986	0.983	0.972
ROTOR TOTAL TEMPERATURE RATIO	1.077	1.076	1.073	1.071	1.069
STATOR TOTAL TEMPERATURE RATIO	0.997	0.998	0.998	0.998	0.997
ROTOR ADIABATIC EFFICIENCY	0.853	0.872	0.883	0.881	0.873
ROTOR MOMENTUM-RISE EFFICIENCY	0.879	0.900	0.911	0.925	0.922
ROTOR HEAD-RISE COEFFICIENT	0.386	0.386	0.375	0.362	0.346
FLOW COEFFICIENT	0.597	0.638	0.684	0.723	0.768
AIRFLOW PER UNIT FRONTAL AREA	114.18	120.54	127.22	133.06	139.24
AIRFLOW PER UNIT ANNULUS AREA	156.50	165.22	174.38	182.39	190.86
AIRFLOW AT ORIFICE	23.14	24.43	25.79	26.97	28.22
AIRFLOW AT ROTOR INLET	23.11	24.46	25.82	27.01	28.22
AIRFLOW AT ROTOR OUTLET	23.08	24.31	25.59	26.86	28.05
AIRFLOW AT STATOR OUTLET	22.63	24.02	25.30	26.60	28.15
ROTATIVE SPEED	8663.8	8696.2	8687.9	8721.2	8716.8
PERCENT OF DESIGN SPEED	79.6	79.9	79.8	80.1	80.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.233	1.237	1.227	1.217	1.193
STAGE TOTAL TEMPERATURE RATIO	1.074	1.074	1.071	1.069	1.066
STAGE ADIABATIC EFFICIENCY	0.831	0.845	0.843	0.831	0.786

(f) 70 Percent of design speed

READING NUMBER	0434
ROTOR TOTAL PRESSURE RATIO	1.189
STATOR TOTAL PRESSURE RATIO	0.989
ROTOR TOTAL TEMPERATURE RATIO	1.059
STATOR TOTAL TEMPERATURE RATIO	0.998
ROTOR ADIABATIC EFFICIENCY	0.857
ROTOR MOMENTUM-RISE EFFICIENCY	0.878
ROTOR HEAD-RISE COEFFICIENT	0.378
FLOW COEFFICIENT	0.580
AIRFLOW PER UNIT FRONTAL AREA	99.91
AIRFLOW PER UNIT ANNULUS AREA	136.94
AIRFLOW AT ORIFICE	20.25
AIRFLOW AT ROTOR INLET	20.24
AIRFLOW AT ROTOR OUTLET	20.16
AIRFLOW AT STATOR OUTLET	19.78
ROTATIVE SPEED	7631.2
PERCENT OF DESIGN SPEED	70.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.177
STAGE TOTAL TEMPERATURE RATIO	1.057
STAGE ADIABATIC EFFICIENCY	0.833

(g) 60 Percent of design speed

READING NUMBER	0435	0436	0437	0438	0439
ROTOR TOTAL PRESSURE RATIO	1.136	1.134	1.131	1.124	1.117
STATOR TOTAL PRESSURE RATIO	0.993	0.993	0.991	0.989	0.983
ROTOR TOTAL TEMPERATURE RATIO	1.044	1.042	1.040	1.038	1.036
STATOR TOTAL TEMPERATURE RATIO	0.998	0.999	0.999	0.998	0.998
ROTOR ADIABATIC EFFICIENCY	0.848	0.875	0.892	0.898	0.890
ROTOR MOMENTUM-RISE EFFICIENCY	0.865	0.903	0.930	0.924	0.929
ROTOR HEAD-RISE COEFFICIENT	0.366	0.367	0.355	0.335	0.318
FLOW COEFFICIENT	0.558	0.604	0.666	0.723	0.770
AIRFLOW PER UNIT FRONTAL AREA	84.38	89.70	98.66	106.29	111.98
AIRFLOW PER UNIT ANNULUS AREA	115.66	122.94	135.23	145.69	153.49
AIRFLOW AT ORIFICE	17.10	18.18	20.00	21.54	22.70
AIRFLOW AT ROTOR INLET	17.07	18.20	19.96	21.49	22.64
AIRFLOW AT ROTOR OUTLET	16.91	18.04	19.84	21.24	22.41
AIRFLOW AT STATOR OUTLET	16.69	17.71	19.45	21.06	22.24
ROTATIVE SPEED	6568.5	6511.8	6548.0	6560.7	6551.6
PERCENT OF DESIGN SPEED	60.3	59.8	60.2	60.3	60.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.127	1.125	1.121	1.111	1.099
STAGE TOTAL TEMPERATURE RATIO	1.042	1.041	1.039	1.036	1.034
STAGE ADIABATIC EFFICIENCY	0.831	0.848	0.859	0.847	0.802

TABLE XIV. - OVERALL PERFORMANCE OF STAGE 57M1E

(a) 110 Percent of design speed

READING NUMBER	0397
ROTOR TOTAL PRESSURE RATIO	1.431
STATOR TOTAL PRESSURE RATIO	0.980
ROTOR TOTAL TEMPERATURE RATIO	1.118
STATOR TOTAL TEMPERATURE RATIO	0.998
ROTOR ADIABATIC EFFICIENCY	0.912
ROTOR MOMENTUM-RISE EFFICIENCY	0.935
ROTOR HEAD-RISE COEFFICIENT	0.345
FLOW COEFFICIENT	0.375
AIRFLOW PER UNIT FRONTAL AREA	101.37
AIRFLOW PER UNIT ANNULUS AREA	138.94
AIRFLOW AT ORIFICE	20.55
AIRFLOW AT ROTOR INLET	20.46
AIRFLOW AT ROTOR OUTLET	19.97
AIRFLOW AT STATOR OUTLET	19.81
ROTATIVE SPEED	11968.7
PERCENT OF DESIGN SPEED	109.9

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.402
STAGE TOTAL TEMPERATURE RATIO	1.116
STAGE ADIABATIC EFFICIENCY	0.872

(b) 100 Percent of design speed

READING NUMBER	0392	0393	0394	0395	0396
ROTOR TOTAL PRESSURE RATIO	1.342	1.313	1.282	1.220	1.157
STATOR TOTAL PRESSURE RATIO	0.984	0.990	0.993	0.993	0.979
ROTOR TOTAL TEMPERATURE RATIO	1.096	1.088	1.081	1.072	1.061
STATOR TOTAL TEMPERATURE RATIO	0.998	0.999	0.999	1.000	0.998
ROTOR ADIABATIC EFFICIENCY	0.912	0.914	0.902	0.813	0.696
ROTOR MOMENTUM-RISE EFFICIENCY	0.935	0.935	0.923	0.831	0.718
ROTOR HEAD-RISE COEFFICIENT	0.332	0.302	0.273	0.215	0.155
FLOW COEFFICIENT	0.366	0.406	0.439	0.463	0.470
AIRFLOW PER UNIT FRONTAL AREA	91.16	100.21	107.31	112.22	113.79
AIRFLOW PER UNIT ANNULUS AREA	124.96	137.36	147.09	153.82	155.97
AIRFLOW AT ORIFICE	18.48	20.31	21.75	22.75	23.06
AIRFLOW AT ROTOR INLET	18.42	20.25	21.69	22.67	22.97
AIRFLOW AT ROTOR OUTLET	17.99	19.87	21.25	22.27	22.91
AIRFLOW AT STATOR OUTLET	18.03	19.86	21.28	22.28	22.57
ROTATIVE SPEED	10893.8	10919.0	10916.4	10910.5	10933.6
PERCENT OF DESIGN SPEED	100.1	100.2	100.3	100.2	100.4

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.321	1.299	1.273	1.211	1.133
STAGE TOTAL TEMPERATURE RATIO	1.094	1.088	1.081	1.071	1.059
STAGE ADIABATIC EFFICIENCY	0.877	0.887	0.886	0.789	0.621

(c) 90 Percent of design speed

READING NUMBER	0398
ROTOR TOTAL PRESSURE RATIO	1.262
STATOR TOTAL PRESSURE RATIO	0.988
ROTOR TOTAL TEMPERATURE RATIO	1.076
STATOR TOTAL TEMPERATURE RATIO	0.999
ROTOR ADIABATIC EFFICIENCY	0.906
ROTOR MOMENTUM-RISE EFFICIENCY	0.939
ROTOR HEAD-RISE COEFFICIENT	0.316
FLOW COEFFICIENT	0.362
AIRFLOW PER UNIT FRONTAL AREA	81.91
AIRFLOW PER UNIT ANNULUS AREA	112.27
AIRFLOW AT ORIFICE	16.60
AIRFLOW AT ROTOR INLET	16.57
AIRFLOW AT ROTOR OUTLET	16.29
AIRFLOW AT STATOR OUTLET	16.13
ROTATIVE SPEED	9792.9
PERCENT OF DESIGN SPEED	90.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.247
STAGE TOTAL TEMPERATURE RATIO	1.075
STAGE ADIABATIC EFFICIENCY	0.874

TABLE XIV. - Concluded. OVERALL PERFORMANCE OF STAGE 57M1E

(d) 80 Percent of design speed

READING NUMBER	0399	0401	0402	0403	0404
ROTOR TOTAL PRESSURE RATIO	1.201	1.183	1.164	1.136	1.098
STATOR TOTAL PRESSURE RATIO	0.992	0.995	0.995	0.994	0.984
ROTOR TOTAL TEMPERATURE RATIO	1.060	1.054	1.049	1.043	1.036
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.999	0.999	0.998
ROTOR ADIABATIC EFFICIENCY	0.901	0.914	0.915	0.867	0.751
ROTOR MOMENTUM-RISE EFFICIENCY	0.934	0.946	0.944	0.902	0.780
ROTOR HEAD-RISE COEFFICIENT	0.310	0.282	0.254	0.210	0.152
FLOW COEFFICIENT	0.348	0.389	0.430	0.473	0.502
AIRFLOW PER UNIT FRONTAL AREA	70.50	78.43	85.71	93.46	98.94
AIRFLOW PER UNIT ANNULUS AREA	96.64	107.50	117.48	128.10	135.62
AIRFLOW AT ORIFICE	14.29	15.90	17.37	18.94	20.05
AIRFLOW AT ROTOR INLET	14.24	15.84	17.34	18.89	19.99
AIRFLOW AT ROTOR OUTLET	13.94	15.55	17.06	18.58	19.73
AIRFLOW AT STATOR OUTLET	13.91	15.48	16.89	18.43	19.58
ROTATIVE SPEED	8663.1	8674.7	8658.8	8663.9	8705.0
PERCENT OF DESIGN SPEED	79.6	79.7	79.5	79.6	80.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.191	1.177	1.159	1.128	1.081
STAGE TOTAL TEMPERATURE RATIO	1.058	1.053	1.047	1.041	1.034
STAGE ADIABATIC EFFICIENCY	0.877	0.896	0.906	0.853	0.668

(e) 70 Percent of design speed

READING NUMBER	0405
ROTOR TOTAL PRESSURE RATIO	1.151
STATOR TOTAL PRESSURE RATIO	0.993
ROTOR TOTAL TEMPERATURE RATIO	1.046
STATOR TOTAL TEMPERATURE RATIO	0.999
ROTOR ADIABATIC EFFICIENCY	0.898
ROTOR MOMENTUM-RISE EFFICIENCY	0.935
ROTOR HEAD-RISE COEFFICIENT	0.303
FLOW COEFFICIENT	0.342
AIRFLOW PER UNIT FRONTAL AREA	61.28
AIRFLOW PER UNIT ANNULUS AREA	83.99
AIRFLOW AT ORIFICE	12.42
AIRFLOW AT ROTOR INLET	12.40
AIRFLOW AT ROTOR OUTLET	12.18
AIRFLOW AT STATOR OUTLET	12.12
ROTATIVE SPEED	7614.8
PERCENT OF DESIGN SPEED	70.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.143
STAGE TOTAL TEMPERATURE RATIO	1.045
STAGE ADIABATIC EFFICIENCY	0.876

(f) 60 Percent of design speed

READING NUMBER	0406	0407	0408	0409	0410
ROTOR TOTAL PRESSURE RATIO	1.109	1.098	1.084	1.068	1.047
STATOR TOTAL PRESSURE RATIO	0.995	0.996	0.996	0.993	0.986
ROTOR TOTAL TEMPERATURE RATIO	1.033	1.029	1.025	1.022	1.018
STATOR TOTAL TEMPERATURE RATIO	0.999	1.000	0.999	0.999	0.999
ROTOR ADIABATIC EFFICIENCY	0.898	0.919	0.917	0.871	0.740
ROTOR MOMENTUM-RISE EFFICIENCY	0.934	0.948	0.944	0.896	0.769
ROTOR HEAD-RISE COEFFICIENT	0.296	0.264	0.228	0.186	0.127
FLOW COEFFICIENT	0.339	0.387	0.445	0.487	0.526
AIRFLOW PER UNIT FRONTAL AREA	52.56	59.94	68.24	74.17	80.07
AIRFLOW PER UNIT ANNULUS AREA	72.04	82.16	93.54	101.66	109.75
AIRFLOW AT ORIFICE	10.65	12.15	13.83	15.03	16.23
AIRFLOW AT ROTOR INLET	10.61	12.09	13.80	14.99	16.16
AIRFLOW AT ROTOR OUTLET	10.48	11.96	13.61	14.78	15.98
AIRFLOW AT STATOR OUTLET	10.39	11.77	13.37	14.52	15.79
ROTATIVE SPEED	6549.7	6567.7	6553.5	6544.5	6561.2
PERCENT OF DESIGN SPEED	60.2	60.3	60.2	60.1	60.3

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.103	1.094	1.080	1.061	1.032
STAGE TOTAL TEMPERATURE RATIO	1.033	1.029	1.025	1.021	1.016
STAGE ADIABATIC EFFICIENCY	0.872	0.893	0.897	0.810	0.559

TABLE XV. - OVERALL PERFORMANCE OF STAGE 57M3A

(a) 120 Percent of design speed

READING NUMBER	0912	0917	0916	0915	0913
ROTOR TOTAL PRESSURE RATIO	1.621	1.578	1.513	1.466	1.397
STATOR TOTAL PRESSURE RATIO	0.974	0.984	0.992	0.985	0.934
ROTOR TOTAL TEMPERATURE RATIO	1.173	1.164	1.155	1.148	1.137
STATOR TOTAL TEMPERATURE RATIO	0.995	0.998	1.000	0.998	0.993
ROTOR ADIABATIC EFFICIENCY	0.857	0.851	0.811	0.782	0.729
ROTOR MOMENTUM-RISE EFFICIENCY	0.909	0.862	0.784	0.729	0.652
ROTOR HEAD-RISE COEFFICIENT	0.417	0.388	0.347	0.317	0.273
FLOW COEFFICIENT	0.557	0.592	0.607	0.611	0.613
AIRFLOW PER UNIT FRONTAL AREA	148.39	154.11	156.52	157.61	157.88
AIRFLOW PER UNIT ANNULUS AREA	203.39	211.24	214.54	216.03	216.40
AIRFLOW AT ORIFICE	30.08	31.24	31.72	31.94	32.00
AIRFLOW AT ROTOR INLET	29.83	31.03	31.49	31.60	31.67
AIRFLOW AT ROTOR OUTLET	28.32	30.54	31.65	32.51	33.21
AIRFLOW AT STATOR OUTLET	30.04	31.32	31.54	31.81	32.50
ROTATIVE SPEED	13053.2	13076.4	13078.4	13071.2	13070.8
PERCENT OF DESIGN SPEED	119.9	120.1	120.1	120.1	120.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.578	1.553	1.501	1.444	1.305
STAGE TOTAL TEMPERATURE RATIO	1.167	1.161	1.154	1.145	1.130
STAGE ADIABATIC EFFICIENCY	0.835	0.831	0.797	0.764	0.610

(b) 110 Percent of design speed

READING NUMBER	0907	0911	0910	0909	0908
ROTOR TOTAL PRESSURE RATIO	1.515	1.496	1.461	1.401	1.346
STATOR TOTAL PRESSURE RATIO	0.977	0.980	0.984	0.987	0.960
ROTOR TOTAL TEMPERATURE RATIO	1.141	1.137	1.132	1.125	1.117
STATOR TOTAL TEMPERATURE RATIO	0.998	0.998	0.999	0.997	0.993
ROTOR ADIABATIC EFFICIENCY	0.895	0.892	0.869	0.811	0.761
ROTOR MOMENTUM-RISE EFFICIENCY	0.943	0.919	0.871	0.772	0.699
ROTOR HEAD-RISE COEFFICIENT	0.410	0.395	0.369	0.324	0.282
FLOW COEFFICIENT	0.558	0.600	0.621	0.635	0.638
AIRFLOW PER UNIT FRONTAL AREA	140.11	147.31	150.69	152.99	153.61
AIRFLOW PER UNIT ANNULUS AREA	192.04	201.92	206.55	209.69	210.55
AIRFLOW AT ORIFICE	28.40	29.86	30.54	31.01	31.14
AIRFLOW AT ROTOR INLET	28.18	29.63	30.30	30.71	30.80
AIRFLOW AT ROTOR OUTLET	26.97	29.02	30.32	31.48	32.50
AIRFLOW AT STATOR OUTLET	27.90	29.30	30.03	30.84	31.84
ROTATIVE SPEED	11982.3	11992.7	11981.7	11983.7	11989.5
PERCENT OF DESIGN SPEED	110.1	110.2	110.1	110.1	110.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.481	1.467	1.438	1.383	1.293
STAGE TOTAL TEMPERATURE RATIO	1.138	1.135	1.130	1.121	1.109
STAGE ADIABATIC EFFICIENCY	0.859	0.859	0.840	0.802	0.697

(c) 100 Percent of design speed

READING NUMBER	0902	0906	0905	0904	0903
ROTOR TOTAL PRESSURE RATIO	1.403	1.393	1.369	1.338	1.299
STATOR TOTAL PRESSURE RATIO	0.984	0.985	0.987	0.981	0.970
ROTOR TOTAL TEMPERATURE RATIO	1.113	1.110	1.105	1.102	1.097
STATOR TOTAL TEMPERATURE RATIO	0.999	0.998	0.997	0.996	0.994
ROTOR ADIABATIC EFFICIENCY	0.898	0.904	0.892	0.854	0.801
ROTOR MOMENTUM-RISE EFFICIENCY	0.932	0.937	0.888	0.817	0.750
ROTOR HEAD-RISE COEFFICIENT	0.389	0.393	0.358	0.328	0.293
FLOW COEFFICIENT	0.545	0.595	0.624	0.654	0.664
AIRFLOW PER UNIT FRONTAL AREA	128.43	135.20	141.77	146.80	148.45
AIRFLOW PER UNIT ANNULUS AREA	176.03	185.31	194.33	201.21	203.48
AIRFLOW AT ORIFICE	26.03	27.40	28.74	29.75	30.09
AIRFLOW AT ROTOR INLET	25.83	27.23	28.52	29.49	29.78
AIRFLOW AT ROTOR OUTLET	24.93	26.90	28.85	30.50	31.44
AIRFLOW AT STATOR OUTLET	25.39	26.83	28.25	29.25	30.04
ROTATIVE SPEED	10906.3	10718.2	10888.8	10921.4	10921.2
PERCENT OF DESIGN SPEED	100.2	98.5	100.0	100.3	100.3

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.381	1.372	1.351	1.313	1.261
STAGE TOTAL TEMPERATURE RATIO	1.112	1.108	1.102	1.097	1.090
STAGE ADIABATIC EFFICIENCY	0.862	0.875	0.878	0.832	0.757

(d) 90 Percent of design speed

READING NUMBER	0935	0939	0938	0937	0936
ROTOR TOTAL PRESSURE RATIO	1.314	1.301	1.286	1.263	1.244
STATOR TOTAL PRESSURE RATIO	0.986	0.989	0.987	0.979	0.967
ROTOR TOTAL TEMPERATURE RATIO	1.092	1.086	1.083	1.079	1.077
STATOR TOTAL TEMPERATURE RATIO	0.998	0.999	0.997	0.995	0.994
ROTOR ADIABATIC EFFICIENCY	0.886	0.902	0.895	0.873	0.840
ROTOR MOMENTUM-RISE EFFICIENCY	0.907	0.900	0.873	0.833	0.794
ROTOR HEAD-RISE COEFFICIENT	0.376	0.359	0.342	0.316	0.294
FLOW COEFFICIENT	0.518	0.572	0.610	0.658	0.687
AIRFLOW PER UNIT FRONTAL AREA	113.46	123.13	129.36	136.87	141.29
AIRFLOW PER UNIT ANNULUS AREA	155.52	168.77	177.31	187.60	193.66
AIRFLOW AT ORIFICE	23.00	24.96	26.22	27.74	28.64
AIRFLOW AT ROTOR INLET	22.78	24.74	26.01	27.50	28.37
AIRFLOW AT ROTOR OUTLET	22.16	24.81	26.65	28.96	30.27
AIRFLOW AT STATOR OUTLET	22.38	24.29	25.59	27.06	28.19
ROTATIVE SPEED	9818.7	9828.8	9827.8	9819.6	9817.4
PERCENT OF DESIGN SPEED	90.2	90.3	90.3	90.2	90.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.296	1.286	1.270	1.237	1.202
STAGE TOTAL TEMPERATURE RATIO	1.090	1.085	1.080	1.074	1.070
STAGE ADIABATIC EFFICIENCY	0.859	0.878	0.881	0.849	0.775

TABLE XV. - Concluded. OVERALL PERFORMANCE OF STAGE 57M3A

(e) 80 Percent of design speed

READING NUMBER	0918	0923	0921	0920	0919
ROTOR TOTAL PRESSURE RATIO	1.238	1.235	1.214	1.199	1.186
STATOR TOTAL PRESSURE RATIO	0.990	0.991	0.988	0.983	0.974
ROTOR TOTAL TEMPERATURE RATIO	1.071	1.069	1.064	1.061	1.059
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.997	0.996	0.994
ROTOR ADIABATIC EFFICIENCY	0.887	0.894	0.894	0.868	0.842
ROTOR MOMENTUM-RISE EFFICIENCY	0.902	0.898	0.861	0.824	0.796
ROTOR HEAD-RISE COEFFICIENT	0.366	0.359	0.329	0.306	0.287
FLOW COEFFICIENT	0.502	0.529	0.609	0.649	0.687
AIRFLOW PER UNIT FRONTAL AREA	99.44	104.26	117.31	123.65	129.11
AIRFLOW PER UNIT ANNULUS AREA	136.30	142.90	160.80	169.48	176.97
AIRFLOW AT ORIFICE	20.16	21.13	23.78	25.06	26.17
AIRFLOW AT ROTOR INLET	19.96	20.94	23.55	24.81	25.90
AIRFLOW AT ROTOR OUTLET	19.43	20.76	24.59	26.43	28.02
AIRFLOW AT STATOR OUTLET	19.60	20.47	23.06	24.29	25.41
ROTATIVE SPEED	8677.8	8698.3	8690.8	8693.0	8683.8
PERCENT OF DESIGN SPEED	79.7	79.9	79.8	79.9	79.8
COMPRESSOR PERFORMANCE					
STAGE TOTAL PRESSURE RATIO	1.225	1.223	1.200	1.179	1.155
STAGE TOTAL TEMPERATURE RATIO	1.070	1.068	1.061	1.057	1.053
STAGE ADIABATIC EFFICIENCY	0.859	0.867	0.885	0.849	0.793

(f) 70 Percent of design speed

READING NUMBER	0924	0928	0927	0926	0925
ROTOR TOTAL PRESSURE RATIO	1.180	1.175	1.169	1.154	1.139
STATOR TOTAL PRESSURE RATIO	0.991	0.992	0.991	0.989	0.980
ROTOR TOTAL TEMPERATURE RATIO	1.055	1.053	1.051	1.048	1.045
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.998	0.997	0.995
ROTOR ADIABATIC EFFICIENCY	0.885	0.898	0.899	0.879	0.838
ROTOR MOMENTUM-RISE EFFICIENCY	0.899	0.895	0.875	0.832	0.788
ROTOR HEAD-RISE COEFFICIENT	0.359	0.348	0.337	0.307	0.277
FLOW COEFFICIENT	0.488	0.530	0.569	0.624	0.684
AIRFLOW PER UNIT FRONTAL AREA	86.24	93.03	99.00	107.58	116.18
AIRFLOW PER UNIT ANNULUS AREA	118.21	127.51	135.70	147.46	159.24
AIRFLOW AT ORIFICE	17.48	18.86	20.07	21.81	23.55
AIRFLOW AT ROTOR INLET	17.32	18.68	19.89	21.59	23.29
AIRFLOW AT ROTOR OUTLET	16.92	18.84	20.54	23.07	25.54
AIRFLOW AT STATOR OUTLET	16.94	18.20	19.36	21.02	22.72
ROTATIVE SPEED	7620.8	7640.0	7633.4	7644.1	7633.9
PERCENT OF DESIGN SPEED	70.0	70.2	70.1	70.2	70.1
COMPRESSOR PERFORMANCE					
STAGE TOTAL PRESSURE RATIO	1.169	1.166	1.159	1.141	1.116
STAGE TOTAL TEMPERATURE RATIO	1.053	1.052	1.049	1.044	1.040
STAGE ADIABATIC EFFICIENCY	0.855	0.870	0.886	0.872	0.796

(g) 60 Percent of design speed

READING NUMBER	0929	0933	0932	0931	0930
ROTOR TOTAL PRESSURE RATIO	1.130	1.125	1.119	1.109	1.098
STATOR TOTAL PRESSURE RATIO	0.993	0.994	0.993	0.990	0.984
ROTOR TOTAL TEMPERATURE RATIO	1.040	1.038	1.037	1.034	1.033
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.998	0.997	0.996
ROTOR ADIABATIC EFFICIENCY	0.886	0.896	0.892	0.873	0.831
ROTOR MOMENTUM-RISE EFFICIENCY	0.896	0.886	0.861	0.825	0.781
ROTOR HEAD-RISE COEFFICIENT	0.353	0.342	0.322	0.296	0.267
FLOW COEFFICIENT	0.475	0.526	0.574	0.631	0.690
AIRFLOW PER UNIT FRONTAL AREA	73.08	80.01	87.09	94.78	102.91
AIRFLOW PER UNIT ANNULUS AREA	100.17	109.67	119.38	129.91	141.05
AIRFLOW AT ORIFICE	14.81	16.22	17.65	19.21	20.86
AIRFLOW AT ROTOR INLET	14.67	16.09	17.49	19.00	20.62
AIRFLOW AT ROTOR OUTLET	14.41	16.32	18.39	20.68	23.02
AIRFLOW AT STATOR OUTLET	14.35	15.62	16.98	18.46	20.03
ROTATIVE SPEED	6548.1	6533.6	6549.8	6538.3	6551.7
PERCENT OF DESIGN SPEED	60.2	60.0	60.2	60.1	60.2
COMPRESSOR PERFORMANCE					
STAGE TOTAL PRESSURE RATIO	1.122	1.119	1.111	1.098	1.080
STAGE TOTAL TEMPERATURE RATIO	1.039	1.037	1.034	1.031	1.028
STAGE ADIABATIC EFFICIENCY	0.850	0.874	0.889	0.869	0.787

TABLE XVI. - OVERALL PERFORMANCE OF STAGE 57M3C

(a) 120 Percent of design speed

READING NUMBER	0948	0949	0952	0951
ROTOR TOTAL PRESSURE RATIO	1.633	1.590	1.496	1.497
STATOR TOTAL PRESSURE RATIO	0.967	0.977	0.883	0.937
ROTOR TOTAL TEMPERATURE RATIO	1.187	1.175	1.161	1.160
STATOR TOTAL TEMPERATURE RATIO	0.991	0.998	0.994	0.994
ROTOR ADIABATIC EFFICIENCY	0.806	0.811	0.759	0.761
ROTOR MOMENTUM-RISE EFFICIENCY	0.802	0.767	0.671	0.671
ROTOR HEAD-RISE COEFFICIENT	0.426	0.399	0.338	0.339
FLOW COEFFICIENT	0.626	0.658	0.669	0.669
AIRFLOW PER UNIT FRONTAL AREA	158.44	163.27	165.66	165.73
AIRFLOW PER UNIT ANNULUS AREA	217.17	223.79	227.06	227.16
AIRFLOW AT ORIFICE	32.11	33.09	33.58	33.59
AIRFLOW AT ROTOR INLET	32.05	32.89	33.19	33.18
AIRFLOW AT ROTOR OUTLET	31.86	33.47	34.80	34.76
AIRFLOW AT STATOR OUTLET	32.44	33.13	33.28	34.14
ROTATIVE SPEED	13085.1	13074.4	13086.2	13083.7
PERCENT OF DESIGN SPEED	120.2	120.1	120.2	120.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.578	1.554	1.321	1.402
STAGE TOTAL TEMPERATURE RATIO	1.176	1.172	1.153	1.153
STAGE ADIABATIC EFFICIENCY	0.790	0.779	0.539	0.661

(b) 110 Percent of design speed

READING NUMBER	0947
ROTOR TOTAL PRESSURE RATIO	1.545
STATOR TOTAL PRESSURE RATIO	0.974
ROTOR TOTAL TEMPERATURE RATIO	1.155
STATOR TOTAL TEMPERATURE RATIO	0.995
ROTOR ADIABATIC EFFICIENCY	0.856
ROTOR MOMENTUM-RISE EFFICIENCY	0.857
ROTOR HEAD-RISE COEFFICIENT	0.437
FLOW COEFFICIENT	0.644
AIRFLOW PER UNIT FRONTAL AREA	153.69
AIRFLOW PER UNIT ANNULUS AREA	210.67
AIRFLOW AT ORIFICE	31.15
AIRFLOW AT ROTOR INLET	30.93
AIRFLOW AT ROTOR OUTLET	30.53
AIRFLOW AT STATOR OUTLET	30.97
ROTATIVE SPEED	11963.1
PERCENT OF DESIGN SPEED	109.9

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.505
STAGE TOTAL TEMPERATURE RATIO	1.149
STAGE ADIABATIC EFFICIENCY	0.830

(c) 100 Percent of design speed

READING NUMBER	0946	0945	0944	0943	0942
ROTOR TOTAL PRESSURE RATIO	1.434	1.428	1.413	1.378	1.374
STATOR TOTAL PRESSURE RATIO	0.980	0.980	0.976	0.969	0.934
ROTOR TOTAL TEMPERATURE RATIO	1.125	1.123	1.120	1.114	1.114
STATOR TOTAL TEMPERATURE RATIO	0.997	0.996	0.995	0.994	0.994
ROTOR ADIABATIC EFFICIENCY	0.869	0.873	0.867	0.838	0.834
ROTOR MOMENTUM-RISE EFFICIENCY	0.867	0.863	0.840	0.783	0.781
ROTOR HEAD-RISE COEFFICIENT	0.420	0.414	0.400	0.370	0.368
FLOW COEFFICIENT	0.645	0.687	0.722	0.738	0.739
AIRFLOW PER UNIT FRONTAL AREA	144.86	151.03	155.80	157.94	157.94
AIRFLOW PER UNIT ANNULUS AREA	198.56	207.01	213.56	216.48	216.48
AIRFLOW AT ORIFICE	29.36	30.61	31.58	32.01	32.01
AIRFLOW AT ROTOR INLET	29.19	30.41	31.34	31.70	31.70
AIRFLOW AT ROTOR OUTLET	29.06	30.65	32.05	32.78	32.81
AIRFLOW AT STATOR OUTLET	28.82	30.09	31.23	32.79	32.68
ROTATIVE SPEED	10900.8	10900.9	10903.5	10877.6	10858.8
PERCENT OF DESIGN SPEED	100.1	100.1	100.2	99.9	99.7

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.406	1.399	1.379	1.335	1.283
STAGE TOTAL TEMPERATURE RATIO	1.121	1.119	1.115	1.108	1.107
STAGE ADIABATIC EFFICIENCY	0.842	0.848	0.841	0.798	0.691

(d) 90 Percent of design speed

READING NUMBER	0953
ROTOR TOTAL PRESSURE RATIO	1.333
STATOR TOTAL PRESSURE RATIO	0.985
ROTOR TOTAL TEMPERATURE RATIO	1.099
STATOR TOTAL TEMPERATURE RATIO	0.997
ROTOR ADIABATIC EFFICIENCY	0.863
ROTOR MOMENTUM-RISE EFFICIENCY	0.842
ROTOR HEAD-RISE COEFFICIENT	0.401
FLOW COEFFICIENT	0.611
AIRFLOW PER UNIT FRONTAL AREA	129.21
AIRFLOW PER UNIT ANNULUS AREA	177.11
AIRFLOW AT ORIFICE	26.19
AIRFLOW AT ROTOR INLET	26.01
AIRFLOW AT ROTOR OUTLET	26.44
AIRFLOW AT STATOR OUTLET	25.70
ROTATIVE SPEED	9807.9
PERCENT OF DESIGN SPEED	90.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.313
STAGE TOTAL TEMPERATURE RATIO	1.096
STAGE ADIABATIC EFFICIENCY	0.842

TABLE XVI. - Concluded. OVERALL PERFORMANCE OF STAGE 57M3C

(e) 80 Percent of design speed

READING NUMBER	0958	0957	0956	0955	0954
ROTOR TOTAL PRESSURE RATIO	1.254	1.249	1.239	1.230	1.224
STATOR TOTAL PRESSURE RATIO	0.988	0.986	0.983	0.975	0.969
ROTOR TOTAL TEMPERATURE RATIO	1.078	1.076	1.073	1.071	1.071
STATOR TOTAL TEMPERATURE RATIO	0.997	0.996	0.995	0.994	0.993
ROTOR ADIABATIC EFFICIENCY	0.861	0.868	0.865	0.852	0.840
ROTOR MOMENTUM-RISE EFFICIENCY	0.835	0.835	0.823	0.807	0.794
ROTOR HEAD-RISE COEFFICIENT	0.388	0.380	0.366	0.350	0.341
FLOW COEFFICIENT	0.599	0.654	0.699	0.739	0.756
AIRFLOW PER UNIT FRONTAL AREA	115.71	124.32	130.76	136.61	138.96
AIRFLOW PER UNIT ANNULUS AREA	158.61	170.40	179.22	187.25	190.48
AIRFLOW AT ORIFICE	23.45	25.20	26.50	27.69	28.17
AIRFLOW AT ROTOR INLET	23.27	24.98	26.29	27.47	27.94
AIRFLOW AT ROTOR OUTLET	23.80	26.08	27.74	29.28	29.87
AIRFLOW AT STATOR OUTLET	22.90	24.48	25.81	27.02	27.60
ROTATIVE SPEED	8713.1	8712.3	8708.7	8725.8	8730.2
PERCENT OF DESIGN SPEED	80.0	80.0	80.0	80.2	80.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.239	1.232	1.218	1.198	1.186
STAGE TOTAL TEMPERATURE RATIO	1.074	1.071	1.068	1.065	1.063
STAGE ADIABATIC EFFICIENCY	0.849	0.859	0.858	0.819	0.786

(f) 70 Percent of design speed

READING NUMBER	0960
ROTOR TOTAL PRESSURE RATIO	1.190
STATOR TOTAL PRESSURE RATIO	0.991
ROTOR TOTAL TEMPERATURE RATIO	1.059
STATOR TOTAL TEMPERATURE RATIO	0.998
ROTOR ADIABATIC EFFICIENCY	0.862
ROTOR MOMENTUM-RISE EFFICIENCY	0.831
ROTOR HEAD-RISE COEFFICIENT	0.376
FLOW COEFFICIENT	0.600
AIRFLOW PER UNIT FRONTAL AREA	104.00
AIRFLOW PER UNIT ANNULUS AREA	142.55
AIRFLOW AT ORIFICE	21.08
AIRFLOW AT ROTOR INLET	20.92
AIRFLOW AT ROTOR OUTLET	21.67
AIRFLOW AT STATOR OUTLET	20.42
ROTATIVE SPEED	7667.2
PERCENT OF DESIGN SPEED	70.4

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.179
STAGE TOTAL TEMPERATURE RATIO	1.057
STAGE ADIABATIC EFFICIENCY	0.848

(g) 60 Percent of design speed

READING NUMBER	0965	0964	0963	0962	0961
ROTOR TOTAL PRESSURE RATIO	1.132	1.135	1.133	1.124	1.115
STATOR TOTAL PRESSURE RATIO	0.985	0.993	0.992	0.988	0.982
ROTOR TOTAL TEMPERATURE RATIO	1.047	1.043	1.042	1.040	1.038
STATOR TOTAL TEMPERATURE RATIO	0.999	0.998	0.998	0.996	0.995
ROTOR ADIABATIC EFFICIENCY	0.771	0.852	0.864	0.855	0.827
ROTOR MOMENTUM-RISE EFFICIENCY	0.749	0.819	0.828	0.810	0.776
ROTOR HEAD-RISE COEFFICIENT	0.367	0.373	0.366	0.340	0.317
FLOW COEFFICIENT	0.428	0.552	0.609	0.700	0.757
AIRFLOW PER UNIT FRONTAL AREA	65.10	83.34	91.22	103.31	110.51
AIRFLOW PER UNIT ANNULUS AREA	89.23	114.23	125.03	141.60	151.48
AIRFLOW AT ORIFICE	13.20	16.89	18.49	20.94	22.40
AIRFLOW AT ROTOR INLET	13.12	16.73	18.33	20.76	22.16
AIRFLOW AT ROTOR OUTLET	13.31	17.25	19.46	22.68	24.66
AIRFLOW AT STATOR OUTLET	13.46	16.43	17.83	20.17	21.56
ROTATIVE SPEED	6496.2	6497.6	6505.8	6518.5	6499.7
PERCENT OF DESIGN SPEED	59.7	59.7	59.8	59.9	59.7

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.115	1.127	1.124	1.111	1.095
STAGE TOTAL TEMPERATURE RATIO	1.045	1.041	1.040	1.035	1.033
STAGE ADIABATIC EFFICIENCY	0.697	0.839	0.859	0.857	0.798

TABLE XVII. - OVERALL PERFORMANCE OF STAGE 57M3E

(a) 110 Percent of design speed

READING NUMBER	0973
ROTOR TOTAL PRESSURE RATIO	1.422
STATOR TOTAL PRESSURE RATIO	0.981
ROTOR TOTAL TEMPERATURE RATIO	1.111
STATOR TOTAL TEMPERATURE RATIO	1.003
ROTOR ADIABATIC EFFICIENCY	0.955
ROTOR MOMENTUM-RISE EFFICIENCY	1.184
ROTOR HEAD-RISE COEFFICIENT	0.335
FLOW COEFFICIENT	0.366
AIRFLOW PER UNIT FRONTAL AREA	100.09
AIRFLOW PER UNIT ANNULUS AREA	137.20
AIRFLOW AT ORIFICE	20.29
AIRFLOW AT ROTOR INLET	20 06
AIRFLOW AT ROTOR OUTLET	15.98
AIRFLOW AT STATOR OUTLET	19.79
ROTATIVE SPEED	11986.5
PERCENT OF DESIGN SPEED	110.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.396
STAGE TOTAL TEMPERATURE RATIO	1.115
STAGE ADIABATIC EFFICIENCY	0.873

(b) 100 Percent of design speed

READING NUMBER	0972	0971	0970	0969	0968
ROTOR TOTAL PRESSURE RATIO	1.335	1.302	1.259	1.196	1.152
STATOR TOTAL PRESSURE RATIO	0.986	0.991	0.992	0.987	0.979
ROTOR TOTAL TEMPERATURE RATIO	1.091	1.083	1.076	1.068	1.063
STATOR TOTAL TEMPERATURE RATIO	1.003	1.001	1.000	0.998	0.994
ROTOR ADIABATIC EFFICIENCY	0.948	0.938	0.895	0.773	0.659
ROTOR MOMENTUM-RISE EFFICIENCY	1.166	1.068	0.940	0.733	0.603
ROTOR HEAD-RISE COEFFICIENT	0.324	0.293	0.253	0.194	0.151
FLOW COEFFICIENT	0.355	0.397	0.436	0.453	0.456
AIRFLOW PER UNIT FRONTAL AREA	89.23	98.77	107.29	110.73	111.74
AIRFLOW PER UNIT ANNULUS AREA	122.31	135.38	147.06	151.77	153.16
AIRFLOW AT ORIFICE	18.09	20.02	21.75	22.44	22.65
AIRFLOW AT ROTOR INLET	17.92	19.81	21.49	22.18	22.37
AIRFLOW AT ROTOR OUTLET	14.32	17.17	20.27	23.09	24.65
AIRFLOW AT STATOR OUTLET	17.70	19.41	21.06	21.62	21.89
ROTATIVE SPEED	10879.8	10885.2	10882.9	10883.1	10913.4
PERCENT OF DESIGN SPEED	99.9	100.0	100.0	100.0	100.3

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.317	1.291	1.249	1.180	1.128
STAGE TOTAL TEMPERATURE RATIO	1.094	1.085	1.076	1.065	1.056
STAGE ADIABATIC EFFICIENCY	0.875	0.891	0.867	0.740	0.618

(c) 90 Percent of design speed

READING NUMBER	0974
ROTOR TOTAL PRESSURE RATIO	1.267
STATOR TOTAL PRESSURE RATIO	0.987
ROTOR TOTAL TEMPERATURE RATIO	1.073
STATOR TOTAL TEMPERATURE RATIO	1.002
ROTOR ADIABATIC EFFICIENCY	0.952
ROTOR MOMENTUM-RISE EFFICIENCY	1.169
ROTOR HEAD-RISE COEFFICIENT	0.321
FLOW COEFFICIENT	0.340
AIRFLOW PER UNIT FRONTAL AREA	77.69
AIRFLOW PER UNIT ANNULUS AREA	106.49
AIRFLOW AT ORIFICE	15.75
AIRFLOW AT ROTOR INLET	15.62
AIRFLOW AT ROTOR OUTLET	12.46
AIRFLOW AT STATOR OUTLET	15.46
ROTATIVE SPEED	9784.4
PERCENT OF DESIGN SPEED	89.9

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.250
STAGE TOTAL TEMPERATURE RATIO	1.076
STAGE ADIABATIC EFFICIENCY	0.866

TABLE XVII. - Concluded. OVERALL PERFORMANCE OF STAGE 57M3E

(d) 80 Percent of design speed

READING NUMBER	0980	0983	0982	0979	0981
ROTOR TOTAL PRESSURE RATIO	1.204	1.181	1.160	1.127	1.097
STATOR TOTAL PRESSURE RATIO	0.990	0.993	0.994	0.991	0.984
ROTOR TOTAL TEMPERATURE RATIO	1.057	1.052	1.047	1.042	1.038
STATOR TOTAL TEMPERATURE RATIO	1.002	1.000	0.999	0.997	0.996
ROTOR ADIABATIC EFFICIENCY	0.947	0.944	0.919	0.827	0.704
ROTOR MOMENTUM-RISE EFFICIENCY	1.156	1.051	0.948	0.797	0.641
ROTOR HEAD-RISE COEFFICIENT	0.310	0.277	0.244	0.196	0.151
FLOW COEFFICIENT	0.335	0.385	0.429	0.468	0.489
AIRFLOW PER UNIT FRONTAL AREA	68.75	78.33	86.65	93.73	97.59
AIRFLOW PER UNIT ANNULUS AREA	94.23	107.37	118.77	128.47	133.76
AIRFLOW AT ORIFICE	13.93	15.88	17.56	19.00	19.78
AIRFLOW AT ROTOR INLET	13.82	15.71	17.38	18.80	19.55
AIRFLOW AT ROTOR OUTLET	10.96	13.86	16.69	19.73	21.71
AIRFLOW AT STATOR OUTLET	13.64	15.29	16.89	18.27	18.93
ROTATIVE SPEED	8712.2	8705.6	8719.8	8702.9	8714.3
PERCENT OF DESIGN SPEED	80.0	80.0	80.1	79.9	80.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.192	1.174	1.153	1.117	1.080
STAGE TOTAL TEMPERATURE RATIO	1.059	1.052	1.046	1.039	1.034
STAGE ADIABATIC EFFICIENCY	0.868	0.899	0.898	0.816	0.658

(e) 70 Percent of design speed

READING NUMBER	0984
ROTOR TOTAL PRESSURE RATIO	1.150
STATOR TOTAL PRESSURE RATIO	0.994
ROTOR TOTAL TEMPERATURE RATIO	1.043
STATOR TOTAL TEMPERATURE RATIO	1.001
ROTOR ADIABATIC EFFICIENCY	0.946
ROTOR MOMENTUM-RISE EFFICIENCY	1.147
ROTOR HEAD-RISE COEFFICIENT	0.299
FLOW COEFFICIENT	0.334
AIRFLOW PER UNIT FRONTAL AREA	60.36
AIRFLOW PER UNIT ANNULUS AREA	82.74
AIRFLOW AT ORIFICE	12.23
AIRFLOW AT ROTOR INLET	12.12
AIRFLOW AT ROTOR OUTLET	9.70
AIRFLOW AT STATOR OUTLET	11.97
ROTATIVE SPEED	7614.3
PERCENT OF DESIGN SPEED	69.9

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.142
STAGE TOTAL TEMPERATURE RATIO	1.044
STAGE ADIABATIC EFFICIENCY	0.873

(f) 60 Percent of design speed

READING NUMBER	0989	0988	0987	0986	0985
ROTOR TOTAL PRESSURE RATIO	1.094	1.081	1.062	1.047	1.107
STATOR TOTAL PRESSURE RATIO	0.996	0.996	0.992	0.987	0.995
ROTOR TOTAL TEMPERATURE RATIO	1.028	1.025	1.022	1.020	1.031
STATOR TOTAL TEMPERATURE RATIO	1.000	0.999	0.998	0.997	1.001
ROTOR ADIABATIC EFFICIENCY	0.931	0.906	0.795	0.663	0.943
ROTOR MOMENTUM-RISE EFFICIENCY	1.001	0.886	0.738	0.617	1.133
ROTOR HEAD-RISE COEFFICIENT	0.258	0.223	0.169	0.129	0.294
FLOW COEFFICIENT	0.384	0.437	0.486	0.513	0.330
AIRFLOW PER UNIT FRONTAL AREA	59.35	67.07	74.46	78.28	51.23
AIRFLOW PER UNIT ANNULUS AREA	81.35	91.93	102.06	107.29	70.22
AIRFLOW AT ORIFICE	12.03	13.59	15.09	15.87	10.38
AIRFLOW AT ROTOR INLET	11.93	13.48	14.92	15.69	10.32
AIRFLOW AT ROTOR OUTLET	10.99	13.59	16.59	18.31	8.27
AIRFLOW AT STATOR OUTLET	11.52	13.05	14.37	15.14	10.17
ROTATIVE SPEED	6518.7	6513.8	6517.1	6519.8	6519.5
PERCENT OF DESIGN SPEED	59.9	59.8	59.9	59.9	59.9

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.090	1.077	1.053	1.033	1.102
STAGE TOTAL TEMPERATURE RATIO	1.028	1.024	1.019	1.016	1.032
STAGE ADIABATIC EFFICIENCY	0.896	0.894	0.761	0.568	0.873

TABLE XVIII. - OVERALL PERFORMANCE OF STAGE 57M3G

(a) 100 Percent of design speed

READING NUMBER	0999	1000	0997
ROTOR TOTAL PRESSURE RATIO	1.169	1.116	1.048
STATOR TOTAL PRESSURE RATIO	0.977	0.972	0.974
ROTOR TOTAL TEMPERATURE RATIO	1.069	1.057	1.048
STATOR TOTAL TEMPERATURE RATIO	0.997	1.000	0.997
ROTOR ADIABATIC EFFICIENCY	0.665	0.565	0.278
ROTOR MOMENTUM-RISE EFFICIENCY	0.876	0.616	0.258
ROTOR HEAD-RISE COEFFICIENT	0.168	0.117	0.049
FLOW COEFFICIENT	0.176	0.184	0.191
AIRFLOW PER UNIT FRONTAL AREA	45.35	47.44	49.23
AIRFLOW PER UNIT ANNULUS AREA	62.16	65.02	67.49
AIRFLOW AT ORIFICE	9.19	9.61	9.98
AIRFLOW AT ROTOR INLET	9.13	9.54	9.91
AIRFLOW AT ROTOR OUTLET	4.50	8.97	10.79
AIRFLOW AT STATOR OUTLET	8.99	9.31	9.80
ROTATIVE SPEED	10889.3	10875.8	10887.8
PERCENT OF DESIGN SPEED	100.0	99.9	100.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.142	1.085	1.021
STAGE TOTAL TEMPERATURE RATIO	1.066	1.057	1.045
STAGE ADIABATIC EFFICIENCY	0.589	0.417	0.132

(b) 80 Percent of design speed

READING NUMBER	1003	1001
ROTOR TOTAL PRESSURE RATIO	1.093	1.029
STATOR TOTAL PRESSURE RATIO	0.983	0.983
ROTOR TOTAL TEMPERATURE RATIO	1.038	1.030
STATOR TOTAL TEMPERATURE RATIO	1.001	0.998
ROTOR ADIABATIC EFFICIENCY	0.678	0.274
ROTOR MOMENTUM-RISE EFFICIENCY	0.790	0.248
ROTOR HEAD-RISE COEFFICIENT	0.143	0.046
FLOW COEFFICIENT	0.185	0.201
AIRFLOW PER UNIT FRONTAL AREA	38.47	41.67
AIRFLOW PER UNIT ANNULUS AREA	52.74	57.12
AIRFLOW AT ORIFICE	7.80	8.45
AIRFLOW AT ROTOR INLET	7.74	8.39
AIRFLOW AT ROTOR OUTLET	6.74	9.26
AIRFLOW AT STATOR OUTLET	7.63	8.32
ROTATIVE SPEED	8719.9	8716.5
PERCENT OF DESIGN SPEED	80.1	80.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.074	1.012
STAGE TOTAL TEMPERATURE RATIO	1.039	1.028
STAGE ADIABATIC EFFICIENCY	0.532	0.119

(c) 60 Percent of design speed

READING NUMBER	0994	0993	0992
ROTOR TOTAL PRESSURE RATIO	1.069	1.050	1.014
STATOR TOTAL PRESSURE RATIO	0.992	0.991	0.990
ROTOR TOTAL TEMPERATURE RATIO	1.022	1.020	1.016
STATOR TOTAL TEMPERATURE RATIO	1.002	1.001	0.999
ROTOR ADIABATIC EFFICIENCY	0.862	0.697	0.249
ROTOR MOMENTUM-RISE EFFICIENCY	1.122	0.769	0.216
ROTOR HEAD-RISE COEFFICIENT	0.189	0.138	0.039
FLOW COEFFICIENT	0.174	0.191	0.212
AIRFLOW PER UNIT FRONTAL AREA	27.24	29.74	33.03
AIRFLOW PER UNIT ANNULUS AREA	37.34	40.77	45.27
AIRFLOW AT ORIFICE	5.52	6.03	6.69
AIRFLOW AT ROTOR INLET	5.47	5.98	6.63
AIRFLOW AT ROTOR OUTLET	3.60	5.02	7.47
AIRFLOW AT STATOR OUTLET	5.40	5.93	6.74
ROTATIVE SPEED	6538.9	6520.4	6512.7
PERCENT OF DESIGN SPEED	60.1	59.9	59.8

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.060	1.040	1.004
STAGE TOTAL TEMPERATURE RATIO	1.025	1.021	1.015
STAGE ADIABATIC EFFICIENCY	0.683	0.527	0.069

TABLE XIX. - OVERALL PERFORMANCE OF STAGE 57M4A

(a) 120 Percent of design speed

READING NUMBER	1006	1007	1008	1009	1010
ROTOR TOTAL PRESSURE RATIO	1.668	1.662	1.586	1.470	1.403
STATOR TOTAL PRESSURE RATIO	0.953	0.966	0.980	0.988	0.937
ROTOR TOTAL TEMPERATURE RATIO	1.200	1.192	1.175	1.152	1.140
STATOR TOTAL TEMPERATURE RATIO	0.994	0.995	0.998	1.000	0.995
ROTOR ADIABATIC EFFICIENCY	0.788	0.813	0.804	0.765	0.727
ROTOR MOMENTUM-RISE EFFICIENCY	0.862	0.884	0.870	0.803	0.757
ROTOR HEAD-RISE COEFFICIENT	0.456	0.452	0.400	0.321	0.276
FLOW COEFFICIENT	0.476	0.532	0.597	0.607	0.609
AIRFLOW PER UNIT FRONTAL AREA	132.94	143.94	154.88	157.15	157.68
AIRFLOW PER UNIT ANNULUS AREA	182.22	197.29	212.28	215.40	216.13
AIRFLOW AT ORIFICE	26.95	29.17	31.39	31.85	31.96
AIRFLOW AT ROTOR INLET	26.61	28.82	31.10	31.48	31.58
AIRFLOW AT ROTOR OUTLET	26.30	28.33	31.48	31.45	31.87
AIRFLOW AT STATOR OUTLET	26.34	29.03	32.37	32.13	32.49
ROTATIVE SPEED	13026.7	12993.5	13016.2	13073.7	13098.1
PERCENT OF DESIGN SPEED	119.7	119.4	119.6	120.1	120.3

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.589	1.606	1.555	1.452	1.314
STAGE TOTAL TEMPERATURE RATIO	1.192	1.186	1.172	1.153	1.134
STAGE ADIABATIC EFFICIENCY	0.736	0.781	0.780	0.737	0.606

(b) 110 Percent of design speed

READING NUMBER	1011
ROTOR TOTAL PRESSURE RATIO	1.533
STATOR TOTAL PRESSURE RATIO	0.970
ROTOR TOTAL TEMPERATURE RATIO	1.162
STATOR TOTAL TEMPERATURE RATIO	0.996
ROTOR ADIABATIC EFFICIENCY	0.801
ROTOR MOMENTUM-RISE EFFICIENCY	0.868
ROTOR HEAD-RISE COEFFICIENT	0.431
FLOW COEFFICIENT	0.470
AIRFLOW PER UNIT FRONTAL AREA	123.69
AIRFLOW PER UNIT ANNULUS AREA	169.54
AIRFLOW AT ORIFICE	25.07
AIRFLOW AT ROTOR INLET	24.72
AIRFLOW AT ROTOR OUTLET	24.33
AIRFLOW AT STATOR OUTLET	24.71
ROTATIVE SPEED	11968.3
PERCENT OF DESIGN SPEED	109.9

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.488
STAGE TOTAL TEMPERATURE RATIO	1.157
STAGE ADIABATIC EFFICIENCY	0.764

(c) 100 Percent of design speed

READING NUMBER	1012	1013	1014	1015	1016
ROTOR TOTAL PRESSURE RATIO	1.423	1.410	1.394	1.360	1.307
STATOR TOTAL PRESSURE RATIO		0.983	0.985	0.986	0.976
ROTOR TOTAL TEMPERATURE RATIO	1.129	1.121	1.116	1.109	1.100
STATOR TOTAL TEMPERATURE RATIO	0.996	0.998	0.998	0.997	0.995
ROTOR ADIABATIC EFFICIENCY	0.824	0.850	0.857	0.840	0.799
ROTOR MOMENTUM-RISE EFFICIENCY	0.877	0.906	0.916	0.905	0.854
ROTOR HEAD-RISE COEFFICIENT	0.413	0.398	0.383	0.352	0.301
FLOW COEFFICIENT	0.473	0.528	0.573	0.617	0.654
AIRFLOW PER UNIT FRONTAL AREA	115.48	125.71	133.94	141.02	146.94
AIRFLOW PER UNIT ANNULUS AREA	158.29	172.31	183.59	193.30	201.41
AIRFLOW AT ORIFICE	23.41	25.48	27.15	28.58	29.78
AIRFLOW AT ROTOR INLET	23.04	25.18	26.82	28.27	29.46
AIRFLOW AT ROTOR OUTLET	22.80	24.88	26.68	28.11	29.27
AIRFLOW AT STATOR OUTLET	22.99	24.95	26.66	28.16	29.58
ROTATIVE SPEED	10890.8	10903.5	10896.3	10881.7	10898.0
PERCENT OF DESIGN SPEED	100.0	100.2		100.0	100.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.388	1.386	1.373	1.341	1.275
STAGE TOTAL TEMPERATURE RATIO	1.125	1.119	1.114	1.106	1.094
STAGE ADIABATIC EFFICIENCY	0.789	0.825	0.834	0.826	0.763

(d) 90 Percent of design speed

READING NUMBER	1028
ROTOR TOTAL PRESSURE RATIO	1.348
STATOR TOTAL PRESSURE RATIO	0.982
ROTOR TOTAL TEMPERATURE RATIO	1.108
STATOR TOTAL TEMPERATURE RATIO	0.997
ROTOR ADIABATIC EFFICIENCY	0.824
ROTOR MOMENTUM-RISE EFFICIENCY	0.890
ROTOR HEAD-RISE COEFFICIENT	0.403
FLOW COEFFICIENT	0.461
AIRFLOW PER UNIT FRONTAL AREA	104.97
AIRFLOW PER UNIT ANNULUS AREA	143.88
AIRFLOW AT ORIFICE	21.28
AIRFLOW AT ROTOR INLET	20.96
AIRFLOW AT ROTOR OUTLET	20.77
AIRFLOW AT STATOR OUTLET	20.89
ROTATIVE SPEED	10012.0
PERCENT OF DESIGN SPEED	92.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.324
STAGE TOTAL TEMPERATURE RATIO	1.105
STAGE ADIABATIC EFFICIENCY	0.792

TABLE XIX. - Concluded. OVERALL PERFORMANCE OF STAGE 57M4A

(e) 80 Percent of design speed

READING NUMBER	1017	1018	1019	1020	1021
ROTOR TOTAL PRESSURE RATIO	1.257	1.240	1.227	1.212	1.189
STATOR TOTAL PRESSURE RATIO	0.986	0.992	0.992	0.989	0.979
ROTOR TOTAL TEMPERATURE RATIO	1.081	1.073	1.067	1.063	1.058
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.999	0.998	0.997
ROTOR ADIABATIC EFFICIENCY	0.830	0.872	0.894	0.896	0.878
ROTOR MOMENTUM-RISE EFFICIENCY	0.890	0.911	0.926	0.924	0.908
ROTOR HEAD-RISE COEFFICIENT	0.393	0.366	0.347	0.323	0.289
FLOW COEFFICIENT	0.446	0.512	0.562	0.611	0.669
AIRFLOW PER UNIT FRONTAL AREA	90.38	101.94	110.34	118.09	127.32
AIRFLOW PER UNIT ANNULUS AREA	123.88	139.72	151.25	161.86	174.52
AIRFLOW AT ORIFICE	18.32	20.66	22.37	23.93	25.81
AIRFLOW AT ROTOR INLET	18.00	20.38	22.07	23.66	25.48
AIRFLOW AT ROTOR OUTLET	17.84	20.17	21.95	23.56	25.33
AIRFLOW AT STATOR OUTLET	18.00	20.23	21.86	23.43	25.10
ROTATIVE SPEED	8723.5	8719.6	8709.9	8719.3	8725.2
PERCENT OF DESIGN SPEED	80.1	80.1	80.0	80.1	80.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.239	1.230	1.217	1.198	1.164
STAGE TOTAL TEMPERATURE RATIO	1.080	1.072	1.066	1.061	1.055
STAGE ADIABATIC EFFICIENCY	0.791	0.847	0.872	0.868	0.805

(f) 70 Percent of design speed

READING NUMBER	1022
ROTOR TOTAL PRESSURE RATIO	1.193
STATOR TOTAL PRESSURE RATIO	0.991
ROTOR TOTAL TEMPERATURE RATIO	1.062
STATOR TOTAL TEMPERATURE RATIO	0.999
ROTOR ADIABATIC EFFICIENCY	0.837
ROTOR MOMENTUM-RISE EFFICIENCY	0.898
ROTOR HEAD-RISE COEFFICIENT	0.379
FLOW COEFFICIENT	0.448
AIRFLOW PER UNIT FRONTAL AREA	80.85
AIRFLOW PER UNIT ANNULUS AREA	110.83
AIRFLOW AT ORIFICE	16.39
AIRFLOW AT ROTOR INLET	16.14
AIRFLOW AT ROTOR OUTLET	15.99
AIRFLOW AT STATOR OUTLET	16.16
ROTATIVE SPEED	7704.2
PERCENT OF DESIGN SPEED	70.8

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.183
STAGE TOTAL TEMPERATURE RATIO	1.061
STAGE ADIABATIC EFFICIENCY	0.810

(g) 60 Percent of design speed

READING NUMBER	1023	1024	1025	1026
ROTOR TOTAL PRESSURE RATIO	1.137	1.126	1.116	1.106
STATOR TOTAL PRESSURE RATIO	0.994	0.995	0.994	0.989
ROTOR TOTAL TEMPERATURE RATIO	1.045	1.039	1.035	1.032
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.999	0.998
ROTOR ADIABATIC EFFICIENCY	0.835	0.884	0.903	0.905
ROTOR MOMENTUM-RISE EFFICIENCY	0.896	0.919	0.926	0.927
ROTOR HEAD-RISE COEFFICIENT	0.372	0.344	0.314	0.287
FLOW COEFFICIENT	0.439	0.514	0.577	0.642
AIRFLOW PER UNIT FRONTAL AREA	68.08	78.65	87.60	96.78
AIRFLOW PER UNIT ANNULUS AREA	93.31	107.80	120.07	132.65
AIRFLOW AT ORIFICE	13.80	15.94	17.76	19.62
AIRFLOW AT ROTOR INLET	13.60	15.75	17.54	19.34
AIRFLOW AT ROTOR OUTLET	13.43	15.59	17.34	19.20
AIRFLOW AT STATOR OUTLET	13.65	15.53	17.22	18.92
ROTATIVE SPEED	6553.9	6528.5	6539.1	6557.2
PERCENT OF DESIGN SPEED	60.2	60.0	60.1	60.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.130	1.120	1.109	1.094
STAGE TOTAL TEMPERATURE RATIO	1.044	1.038	1.034	1.031
STAGE ADIABATIC EFFICIENCY	0.805	0.856	0.878	0.844

TABLE XX. - OVERALL PERFORMANCE OF STAGE 57M4C

(a) 120 Percent of design speed

READING NUMBER	1037	1056	1040	1039	1038
ROTOR TOTAL PRESSURE RATIO	1.701	1.644	1.549	1.489	1.484
STATOR TOTAL PRESSURE RATIO	0.954	0.970	0.978	0.951	0.903
ROTOR TOTAL TEMPERATURE RATIO	1.212	1.193	1.174	1.164	1.163
STATOR TOTAL TEMPERATURE RATIO	0.991	0.999	1.001	0.994	0.993
ROTOR ADIABATIC EFFICIENCY	0.774	0.791	0.767	0.736	0.732
ROTOR MOMENTUM-RISE EFFICIENCY	0.844	0.851	0.808	0.769	0.764
ROTOR HEAD-RISE COEFFICIENT	0.479	0.441	0.380	0.340	0.336
FLOW COEFFICIENT	0.578	0.638	0.658	0.662	0.662
AIRFLOW PER UNIT FRONTAL AREA	151.78	160.62	163.67	164.42	164.56
AIRFLOW PER UNIT ANNULUS AREA	208.05	220.16	224.34	225.37	225.56
AIRFLOW AT ORIFICE	30.76	32.56	33.17	33.33	33.35
AIRFLOW AT ROTOR INLET	30.47	32.26	32.77	32.90	32.91
AIRFLOW AT ROTOR OUTLET	29.99	32.25	33.07	33.36	33.30
AIRFLOW AT STATOR OUTLET	30.74	32.85	33.30	34.03	33.19
ROTATIVE SPEED	13017.3	13002.8	12974.4	12999.8	13001.9
PERCENT OF DESIGN SPEED	119.6	119.4	119.2	119.4	119.4

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.623	1.596	1.514	1.417	1.341
STAGE TOTAL TEMPERATURE RATIO	1.201	1.191	1.175	1.157	1.155
STAGE ADIABATIC EFFICIENCY	0.737	0.747	0.721	0.666	0.564

(b) 110 Percent of design speed

READING NUMBER	1036
ROTOR TOTAL PRESSURE RATIO	1.567
STATOR TOTAL PRESSURE RATIO	0.970
ROTOR TOTAL TEMPERATURE RATIO	1.174
STATOR TOTAL TEMPERATURE RATIO	0.994
ROTOR ADIABATIC EFFICIENCY	0.788
ROTOR MOMENTUM-RISE EFFICIENCY	0.855
ROTOR HEAD-RISE COEFFICIENT	0.459
FLOW COEFFICIENT	0.566
AIRFLOW PER UNIT FRONTAL AREA	141.58
AIRFLOW PER UNIT ANNULUS AREA	194.06
AIRFLOW AT ORIFICE	28.70
AIRFLOW AT ROTOR INLET	28.43
AIRFLOW AT ROTOR OUTLET	28.23
AIRFLOW AT STATOR OUTLET	28.61
ROTATIVE SPEED	11979.2
PERCENT OF DESIGN SPEED	110.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.521
STAGE TOTAL TEMPERATURE RATIO	1.167
STAGE ADIABATIC EFFICIENCY	0.762

(c) 100 Percent of design speed

READING NUMBER	1031	1035	1034	1033	1032
ROTOR TOTAL PRESSURE RATIO	1.441	1.444	1.433	1.403	1.369
STATOR TOTAL PRESSURE RATIO	0.976	0.981	0.981	0.977	0.957
ROTOR TOTAL TEMPERATURE RATIO	1.137	1.133	1.129	1.124	1.118
STATOR TOTAL TEMPERATURE RATIO	0.996	0.997	0.997	0.995	0.993
ROTOR ADIABATIC EFFICIENCY	0.802	0.832	0.839	0.816	0.797
ROTOR MOMENTUM-RISE EFFICIENCY	0.848	0.882	0.896	0.882	0.861
ROTOR HEAD-RISE COEFFICIENT	0.430	0.430	0.419	0.392	0.361
FLOW COEFFICIENT	0.543	0.603	0.656	0.707	0.724
AIRFLOW PER UNIT FRONTAL AREA	128.34	138.70	147.03	154.36	156.61
AIRFLOW PER UNIT ANNULUS AREA	175.92	190.12	201.53	211.57	214.66
AIRFLOW AT ORIFICE	26.01	28.11	29.80	31.29	31.74
AIRFLOW AT ROTOR INLET	25.76	27.88	29.54	30.98	31.41
AIRFLOW AT ROTOR OUTLET	25.52	27.64	29.42	30.94	31.40
AIRFLOW AT STATOR OUTLET	25.72	27.73	29.43	31.04	32.75
ROTATIVE SPEED	10906.0	10930.1	10926.6	10917.4	10910.4
PERCENT OF DESIGN SPEED	100.2	100.4	100.4	100.3	100.2

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.406	1.416	1.406	1.371	1.310
STAGE TOTAL TEMPERATURE RATIO	1.132	1.129	1.126	1.119	1.110
STAGE ADIABATIC EFFICIENCY	0.775	0.808	0.813	0.792	0.727

(d) 90 Percent of design speed

READING NUMBER	1042
ROTOR TOTAL PRESSURE RATIO	1.350
STATOR TOTAL PRESSURE RATIO	0.982
ROTOR TOTAL TEMPERATURE RATIO	1.109
STATOR TOTAL TEMPERATURE RATIO	0.997
ROTOR ADIABATIC EFFICIENCY	0.823
ROTOR MOMENTUM-RISE EFFICIENCY	0.871
ROTOR HEAD-RISE COEFFICIENT	0.422
FLOW COEFFICIENT	0.539
AIRFLOW PER UNIT FRONTAL AREA	117.44
AIRFLOW PER UNIT ANNULUS AREA	160.97
AIRFLOW AT ORIFICE	23.80
AIRFLOW AT ROTOR INLET	23.50
AIRFLOW AT ROTOR OUTLET	23.39
AIRFLOW AT STATOR OUTLET	23.46
ROTATIVE SPEED	9804.8
PERCENT OF DESIGN SPEED	90.1

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.326
STAGE TOTAL TEMPERATURE RATIO	1.105
STAGE ADIABATIC EFFICIENCY	0.797

TABLE XX. - Concluded. OVERALL PERFORMANCE OF STAGE 57M4C

(e) 80 Percent of design speed

READING NUMBER	1044	1048	1047	1046	1045
ROTOR TOTAL PRESSURE RATIO	1.269	1.258	1.249	1.236	1.219
STATOR TOTAL PRESSURE RATIO	0.986	0.990	0.987	0.983	0.973
ROTOR TOTAL TEMPERATURE RATIO	1.085	1.078	1.074	1.070	1.067
STATOR TOTAL TEMPERATURE RATIO	0.998	0.999	0.998	0.997	0.997
ROTOR ADIABATIC EFFICIENCY	0.831	0.869	0.887	0.885	0.875
ROTOR MOMENTUM-RISE EFFICIENCY	0.877	0.898	0.915	0.918	0.903
ROTOR HEAD-RISE COEFFICIENT	0.413	0.393	0.379	0.360	0.335
FLOW COEFFICIENT	0.527	0.593	0.644	0.699	0.746
AIRFLOW PER UNIT FRONTAL AREA	104.07	115.15	123.01	130.96	137.61
AIRFLOW PER UNIT ANNULUS AREA	142.65	157.83	168.61	179.50	188.62
AIRFLOW AT ORIFICE	21.09	23.34	24.93	26.54	27.89
AIRFLOW AT ROTOR INLET	20.82	23.08	24.69	26.29	27.62
AIRFLOW AT ROTOR OUTLET	20.71	22.91	24.65	26.26	27.46
AIRFLOW AT STATOR OUTLET	20.79	22.81	24.31	25.98	27.37
ROTATIVE SPEED	8693.2	8711.1	8713.6	8706.1	8711.5
PERCENT OF DESIGN SPEED	79.9	80.0	80.0	80.0	80.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.251	1.245	1.233	1.215	1.186
STAGE TOTAL TEMPERATURE RATIO	1.082	1.077	1.072	1.067	1.063
STAGE ADIABATIC EFFICIENCY	0.804	0.841	0.857	0.855	0.793

(f) 70 Percent of design speed

READING NUMBER	1049
ROTOR TOTAL PRESSURE RATIO	1.200
STATOR TOTAL PRESSURE RATIO	0.988
ROTOR TOTAL TEMPERATURE RATIO	1.065
STATOR TOTAL TEMPERATURE RATIO	0.998
ROTOR ADIABATIC EFFICIENCY	0.818
ROTOR MOMENTUM-RISE EFFICIENCY	0.868
ROTOR HEAD-RISE COEFFICIENT	0.404
FLOW COEFFICIENT	0.500
AIRFLOW PER UNIT FRONTAL AREA	88.05
AIRFLOW PER UNIT ANNULUS AREA	120.69
AIRFLOW AT ORIFICE	17.85
AIRFLOW AT ROTOR INLET	17.64
AIRFLOW AT ROTOR OUTLET	17.54
AIRFLOW AT STATOR OUTLET	17.58
ROTATIVE SPEED	7604.6
PERCENT OF DESIGN SPEED	69.9

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.186
STAGE TOTAL TEMPERATURE RATIO	1.063
STAGE ADIABATIC EFFICIENCY	0.790

(g) 60 Percent of design speed

READING NUMBER	1050	1051	1052	1054	1055
ROTOR TOTAL PRESSURE RATIO	1.146	1.141	1.136	1.129	1.118
STATOR TOTAL PRESSURE RATIO	0.993	0.993	0.993	0.992	0.985
ROTOR TOTAL TEMPERATURE RATIO	1.048	1.045	1.042	1.039	1.036
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.999	0.999	0.998
ROTOR ADIABATIC EFFICIENCY	0.836	0.862	0.885	0.903	0.906
ROTOR MOMENTUM-RISE EFFICIENCY	0.884	0.901	0.913	0.918	0.915
ROTOR HEAD-RISE COEFFICIENT	0.395	0.382	0.369	0.348	0.318
FLOW COEFFICIENT	0.508	0.553	0.599	0.658	0.736
AIRFLOW PER UNIT FRONTAL AREA	77.99	84.17	90.35	98.67	108.83
AIRFLOW PER UNIT ANNULUS AREA	106.90	115.37	123.84	135.24	149.17
AIRFLOW AT ORIFICE	15.81	17.06	18.31	20.00	22.06
AIRFLOW AT ROTOR INLET	15.64	16.92	18.16	19.79	21.82
AIRFLOW AT ROTOR OUTLET	15.48	16.75	18.02	19.59	21.60
AIRFLOW AT STATOR OUTLET	15.54	16.60	17.73	19.35	21.31
ROTATIVE SPEED	6567.4	6556.6	6551.9	6559.7	6565.2
PERCENT OF DESIGN SPEED	60.3	60.2	60.2	60.3	60.3

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.138	1.134	1.128	1.120	1.101
STAGE TOTAL TEMPERATURE RATIO	1.047	1.044	1.041	1.038	1.034
STAGE ADIABATIC EFFICIENCY	0.808	0.834	0.850	0.872	0.823

TABLE XXI. - OVERALL PERFORMANCE OF STAGE 57M4E

(a) 110 Percent of design speed

READING NUMBER	1059
ROTOR TOTAL PRESSURE RATIO	1.427
STATOR TOTAL PRESSURE RATIO	0.979
ROTOR TOTAL TEMPERATURE RATIO	1.122
STATOR TOTAL TEMPERATURE RATIO	1.000
ROTOR ADIABATIC EFFICIENCY	0.878
ROTOR MOMENTUM-RISE EFFICIENCY	0.950
ROTOR HEAD-RISE COEFFICIENT	0.336
FLOW COEFFICIENT	0.367
AIRFLOW PER UNIT FRONTAL AREA	101.80
AIRFLOW PER UNIT ANNULUS AREA	139.53
AIRFLOW AT ORIFICE	20.63
AIRFLOW AT ROTOR INLET	20.28
AIRFLOW AT ROTOR OUTLET	19.80
AIRFLOW AT STATOR OUTLET	19.90
ROTATIVE SPEED	12093.9
PERCENT OF DESIGN SPEED	111.1
COMPRESSOR PERFORMANCE	
STAGE TOTAL PRESSURE RATIO	1.397
STAGE TOTAL TEMPERATURE RATIO	1.122
STAGE ADIABATIC EFFICIENCY	0.823

(b) 100 Percent of design speed

READING NUMBER	1060	1061	1062	1063	1064
ROTOR TOTAL PRESSURE RATIO	1.349	1.314	1.271	1.197	1.156
STATOR TOTAL PRESSURE RATIO	0.980	0.989	0.994	0.989	0.976
ROTOR TOTAL TEMPERATURE RATIO	1.101	1.092	1.081	1.067	1.059
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.999	0.998	0.997
ROTOR ADIABATIC EFFICIENCY	0.879	0.881	0.875	0.788	0.715
ROTOR MOMENTUM-RISE EFFICIENCY	0.955	0.946	0.928	0.821	0.753
ROTOR HEAD-RISE COEFFICIENT	0.337	0.306	0.265	0.194	0.155
FLOW COEFFICIENT	0.344	0.379	0.420	0.453	0.460
AIRFLOW PER UNIT FRONTAL AREA	87.48	95.21	103.90	111.19	112.23
AIRFLOW PER UNIT ANNULUS AREA	119.90	130.50	142.42	152.41	153.83
AIRFLOW AT ORIFICE	17.73	19.30	21.06	22.54	22.75
AIRFLOW AT ROTOR INLET	17.45	19.03	20.76	22.23	22.47
AIRFLOW AT ROTOR OUTLET	17.08	18.64	20.40	21.96	22.40
AIRFLOW AT STATOR OUTLET	17.19	18.76	20.54	21.82	21.96
ROTATIVE SPEED	10923.2	10896.4	10872.9	10904.5	10873.2
PERCENT OF DESIGN SPEED	100.3	100.1	99.9	100.2	99.9
COMPRESSOR PERFORMANCE					
STAGE TOTAL PRESSURE RATIO	1.322	1.300	1.263	1.184	1.128
STAGE TOTAL TEMPERATURE RATIO	1.101	1.091	1.080	1.065	1.056
STAGE ADIABATIC EFFICIENCY	0.824	0.852	0.863	0.758	0.629

(c) 90 Percent of design speed

READING NUMBER	1065
ROTOR TOTAL PRESSURE RATIO	1.258
STATOR TOTAL PRESSURE RATIO	0.987
ROTOR TOTAL TEMPERATURE RATIO	1.076
STATOR TOTAL TEMPERATURE RATIO	0.999
ROTOR ADIABATIC EFFICIENCY	0.890
ROTOR MOMENTUM-RISE EFFICIENCY	0.955
ROTOR HEAD-RISE COEFFICIENT	0.320
FLOW COEFFICIENT	0.342
AIRFLOW PER UNIT FRONTAL AREA	77.63
AIRFLOW PER UNIT ANNULUS AREA	106.40
AIRFLOW AT ORIFICE	15.73
AIRFLOW AT ROTOR INLET	15.49
AIRFLOW AT ROTOR OUTLET	15.23
AIRFLOW AT STATOR OUTLET	15.26
ROTATIVE SPEED	9653.8
PERCENT OF DESIGN SPEED	88.7
COMPRESSOR PERFORMANCE	
STAGE TOTAL PRESSURE RATIO	1.242
STAGE TOTAL TEMPERATURE RATIO	1.075
STAGE ADIABATIC EFFICIENCY	0.851

TABLE XXI. - Concluded. OVERALL PERFORMANCE OF STAGE 57M4E

(d) 80 Percent of design speed

READING NUMBER	1066	1067	1068	1069	1070
ROTOR TOTAL PRESSURE RATIO	1.206	1.185	1.161	1.130	1.101
STATOR TOTAL PRESSURE RATIO	0.990	0.995	0.995	0.992	0.984
ROTOR TOTAL TEMPERATURE RATIO	1.062	1.055	1.048	1.041	1.036
STATOR TOTAL TEMPERATURE RATIO	0.999	0.999	0.999	0.999	0.998
ROTOR ADIABATIC EFFICIENCY	0.883	0.900	0.904	0.868	0.781
ROTOR MOMENTUM-RISE EFFICIENCY	0.956	0.947	0.937	0.883	0.796
ROTOR HEAD-RISE COEFFICIENT	0.314	0.282	0.247	0.200	0.156
FLOW COEFFICIENT	0.332	0.371	0.416	0.464	0.489
AIRFLOW PER UNIT FRONTAL AREA	68.50	76.05	84.32	93.08	97.54
AIRFLOW PER UNIT ANNULUS AREA	93.90	104.23	115.57	127.59	133.69
AIRFLOW AT ORIFICE	13.88	15.41	17.09	18.87	19.77
AIRFLOW AT ROTOR INLET	13.70	15.22	16.90	18.65	19.54
AIRFLOW AT ROTOR OUTLET	13.42	14.87	16.61	18.35	19.28
AIRFLOW AT STATOR OUTLET	13.52	15.01	16.55	18.17	19.01
ROTATIVE SPEED	8717.0	8713.4	8708.8	8705.2	8711.4
PERCENT OF DESIGN SPEED	80.1	80.0	80.0	80.0	80.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.194	1.179	1.156	1.121	1.083
STAGE TOTAL TEMPERATURE RATIO	1.061	1.054	1.047	1.040	1.034
STAGE ADIABATIC EFFICIENCY	0.849	0.884	0.895	0.832	0.685

(e) 70 Percent of design speed

READING NUMBER	1071
ROTOR TOTAL PRESSURE RATIO	1.154
STATOR TOTAL PRESSURE RATIO	0.994
ROTOR TOTAL TEMPERATURE RATIO	1.047
STATOR TOTAL TEMPERATURE RATIO	1.000
ROTOR ADIABATIC EFFICIENCY	0.882
ROTOR MOMENTUM-RISE EFFICIENCY	0.951
ROTOR HEAD-RISE COEFFICIENT	0.305
FLOW COEFFICIENT	0.327
AIRFLOW PER UNIT FRONTAL AREA	59.41
AIRFLOW PER UNIT ANNULUS AREA	81.43
AIRFLOW AT ORIFICE	12.04
AIRFLOW AT ROTOR INLET	11.92
AIRFLOW AT ROTOR OUTLET	11.58
AIRFLOW AT STATOR OUTLET	11.81
ROTATIVE SPEED	7653.3
PERCENT OF DESIGN SPEED	70.3

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.146
STAGE TOTAL TEMPERATURE RATIO	1.047
STAGE ADIABATIC EFFICIENCY	0.850

(f) 60 Percent of design speed

READING NUMBER	1072	1074	1075	1077	1076
ROTOR TOTAL PRESSURE RATIO	1.111	1.098	1.075	1.048	1.061
STATOR TOTAL PRESSURE RATIO	0.995	0.997	0.996	0.986	0.991
ROTOR TOTAL TEMPERATURE RATIO	1.035	1.030	1.023	1.017	1.020
STATOR TOTAL TEMPERATURE RATIO	1.000	1.000	1.000	0.999	0.999
ROTOR ADIABATIC EFFICIENCY	0.881	0.897	0.903	0.773	0.854
ROTOR MOMENTUM-RISE EFFICIENCY	0.952	0.948	0.913	0.771	0.857
ROTOR HEAD-RISE COEFFICIENT	0.303	0.266	0.205	0.131	0.167
FLOW COEFFICIENT	0.321	0.366	0.451	0.514	0.488
AIRFLOW PER UNIT FRONTAL AREA	50.09	56.99	69.37	78.43	74.76
AIRFLOW PER UNIT ANNULUS AREA	68.66	78.12	95.09	107.51	102.47
AIRFLOW AT ORIFICE	10.15	11.55	14.06	15.90	15.15
AIRFLOW AT ROTOR INLET	10.04	11.43	13.93	15.74	15.02
AIRFLOW AT ROTOR OUTLET	9.80	11.17	13.62	15.49	14.78
AIRFLOW AT STATOR OUTLET	9.95	11.25	13.51	15.21	14.50
ROTATIVE SPEED	6537.3	6541.6	6538.7	6526.4	6533.7
PERCENT OF DESIGN SPEED	60.1	60.1	60.1	60.0	60.0

COMPRESSOR PERFORMANCE

STAGE TOTAL PRESSURE RATIO	1.105	1.095	1.071	1.034	1.052
STAGE TOTAL TEMPERATURE RATIO	1.034	1.030	1.023	1.016	1.019
STAGE ADIABATIC EFFICIENCY	0.847	0.884	0.869	0.579	0.751

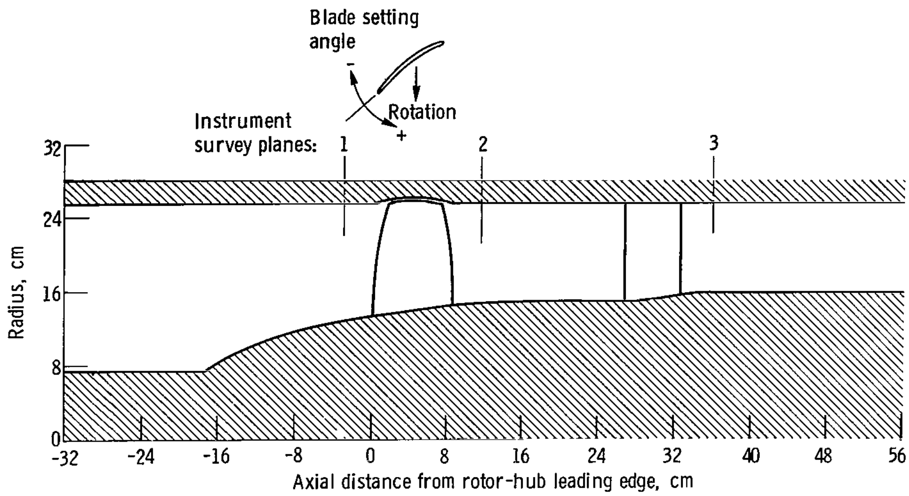
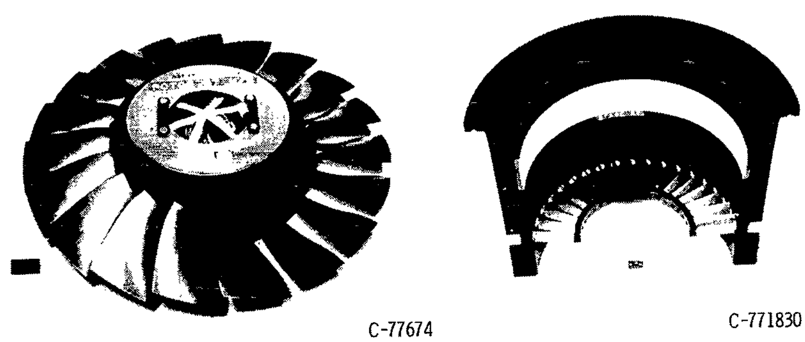


Figure 1. - Flow path for stage 57.



(a) Rotor 57.

(b) Stator 57.

Figure 2. - Stage 57.

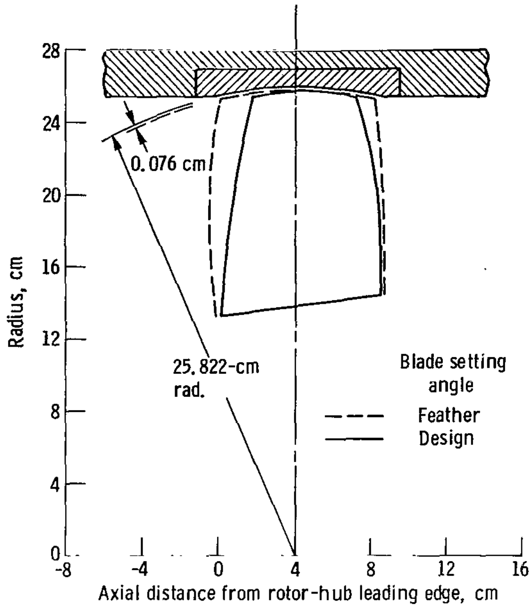


Figure 3. - Recessed casing contour (stage 57).

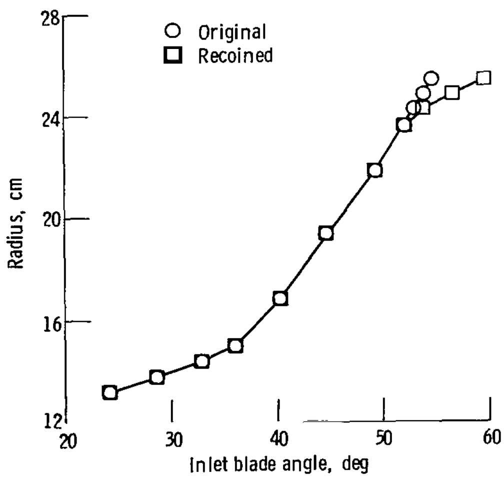


Figure 4. - Inlet blade angle for original and recoined rotor blade (stages 57 and 57M1).

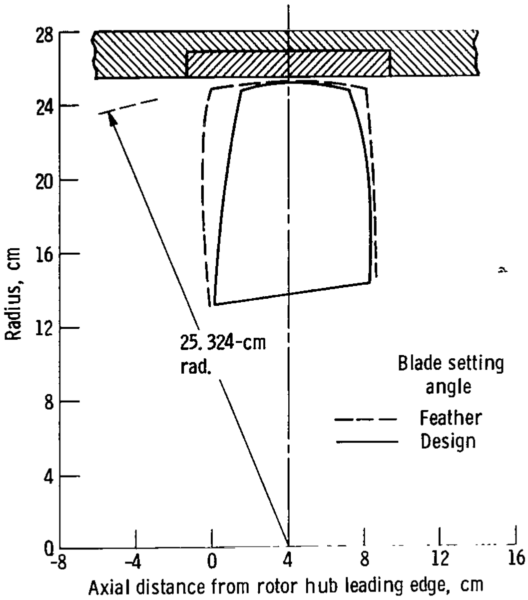


Figure 5. - Straight casing and rotor contour (stage 75M3).

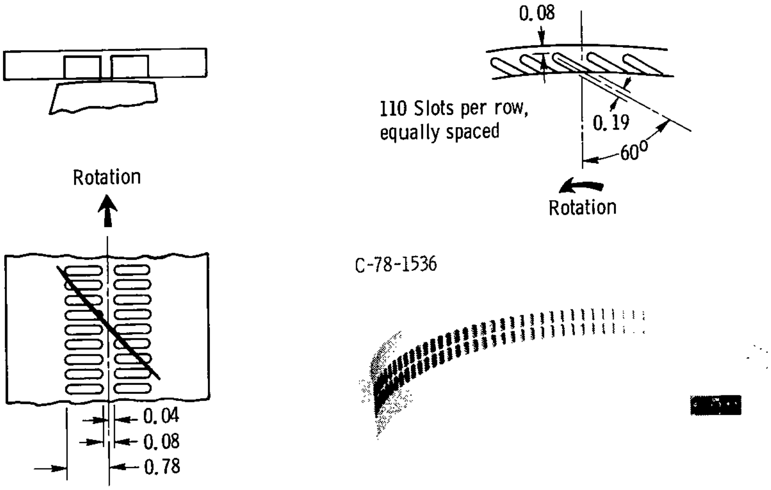


Figure 6. - Casing treatment insert (stage 57M4).

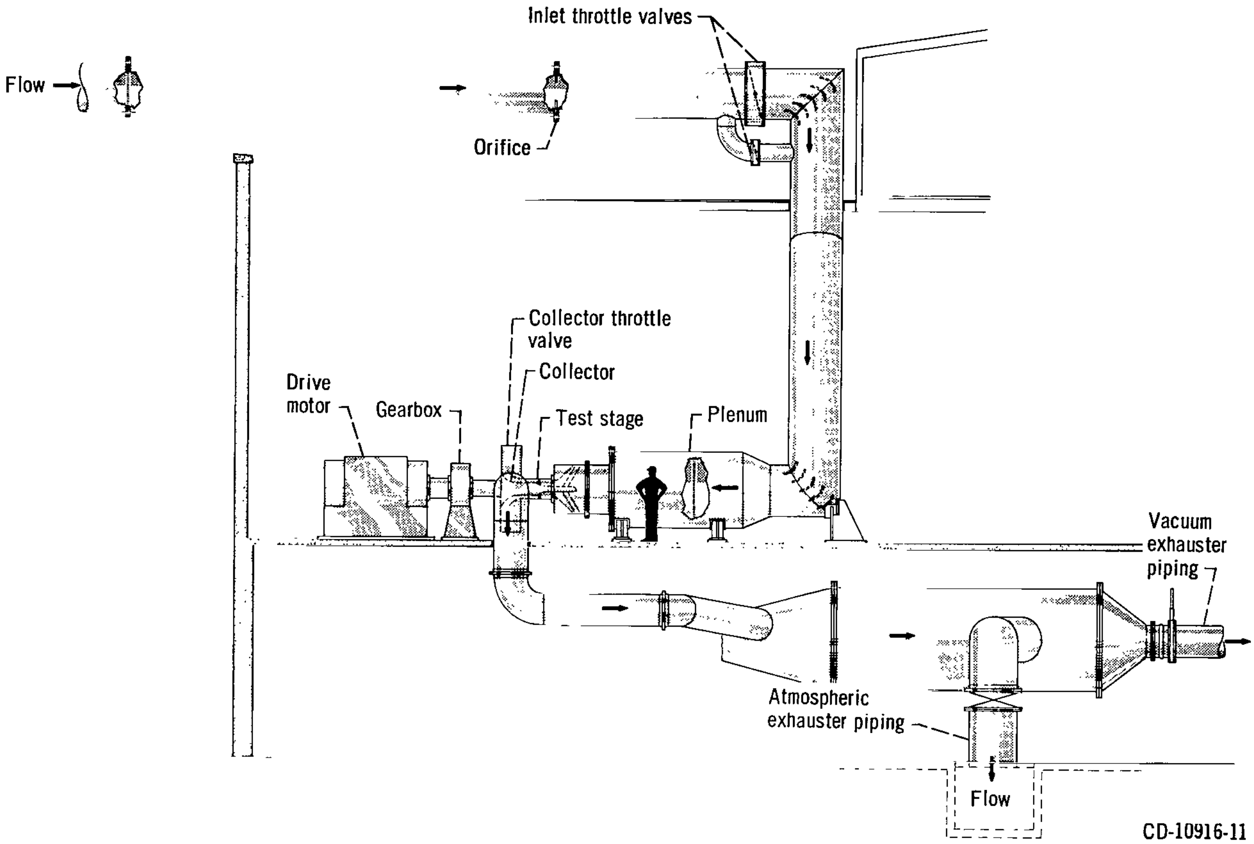
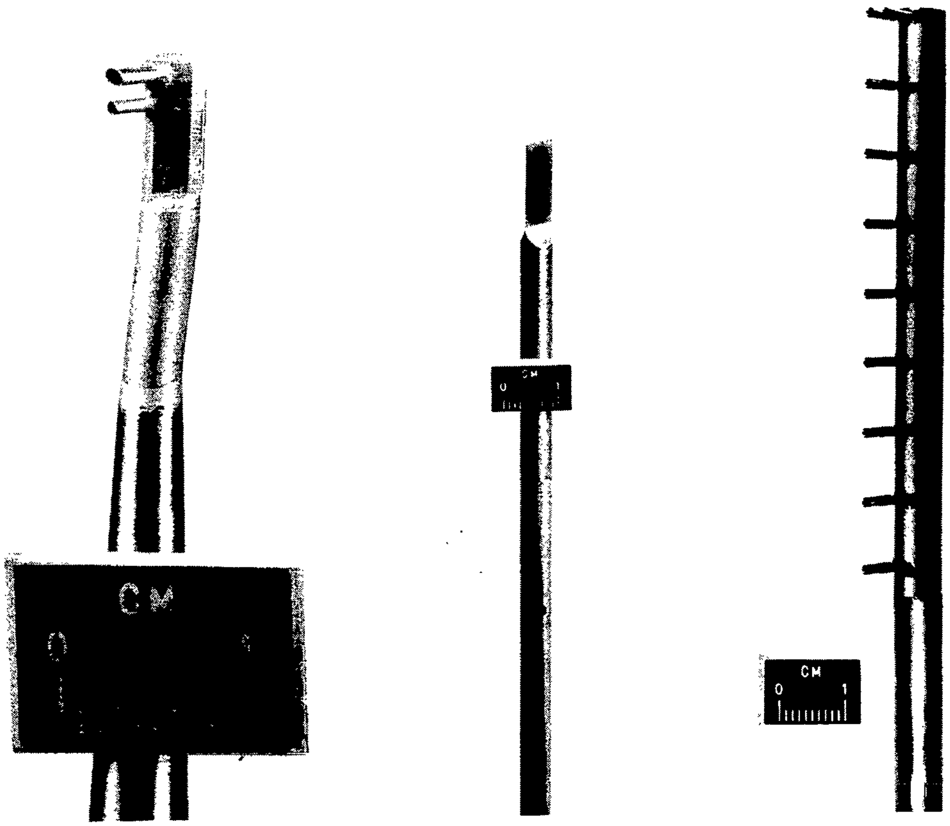


Figure 7. - Compressor test facility.



(a) Combination probe.

(b) 18^0 Static wedge probe.

(c) Nine-element total-pressure and total-temperature rake.

Figure 8. - Survey instrumentation.

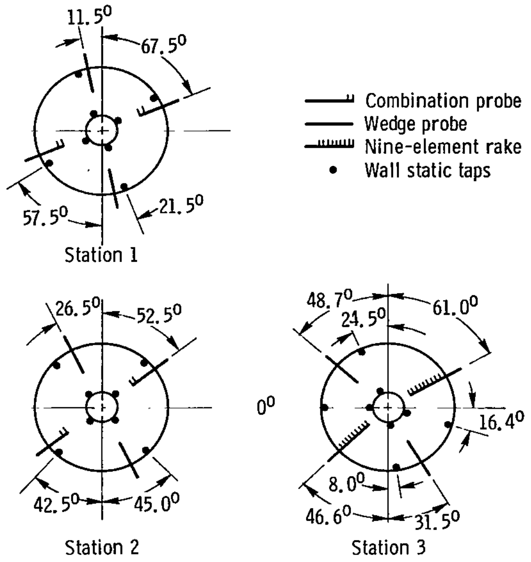


Figure 9. - Circumferential location of instrumentation (looking downstream).

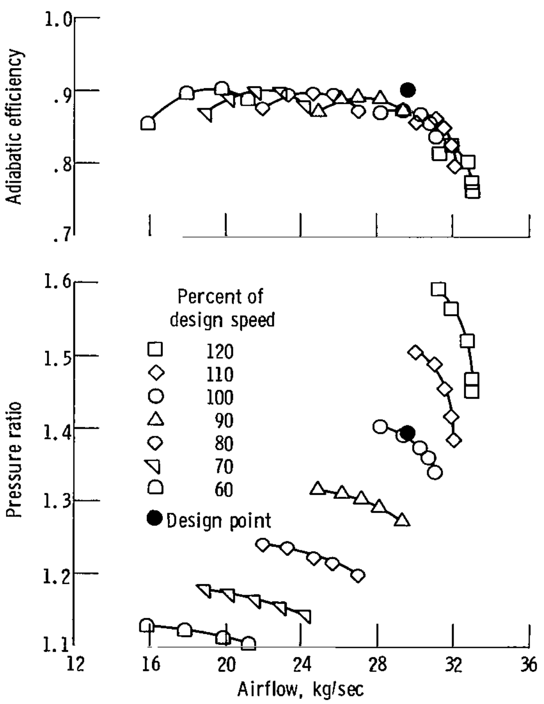


Figure 10. - Overall performance for rotor 57A. Design rotor-blade setting angle.

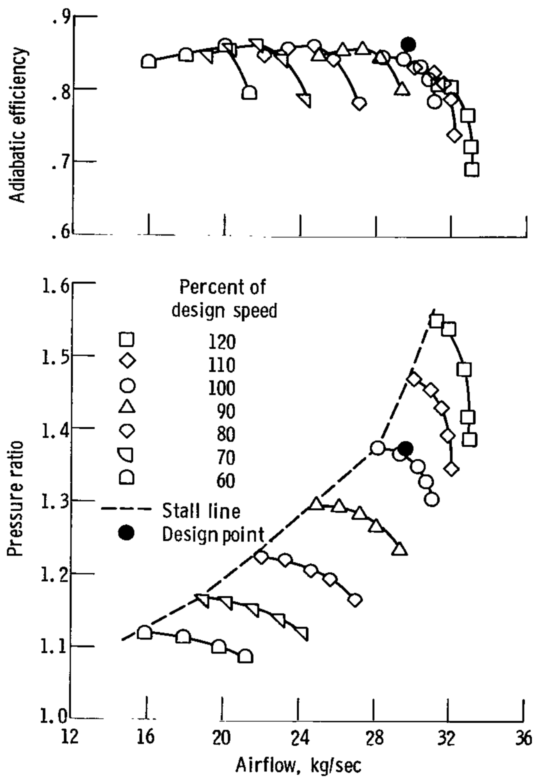
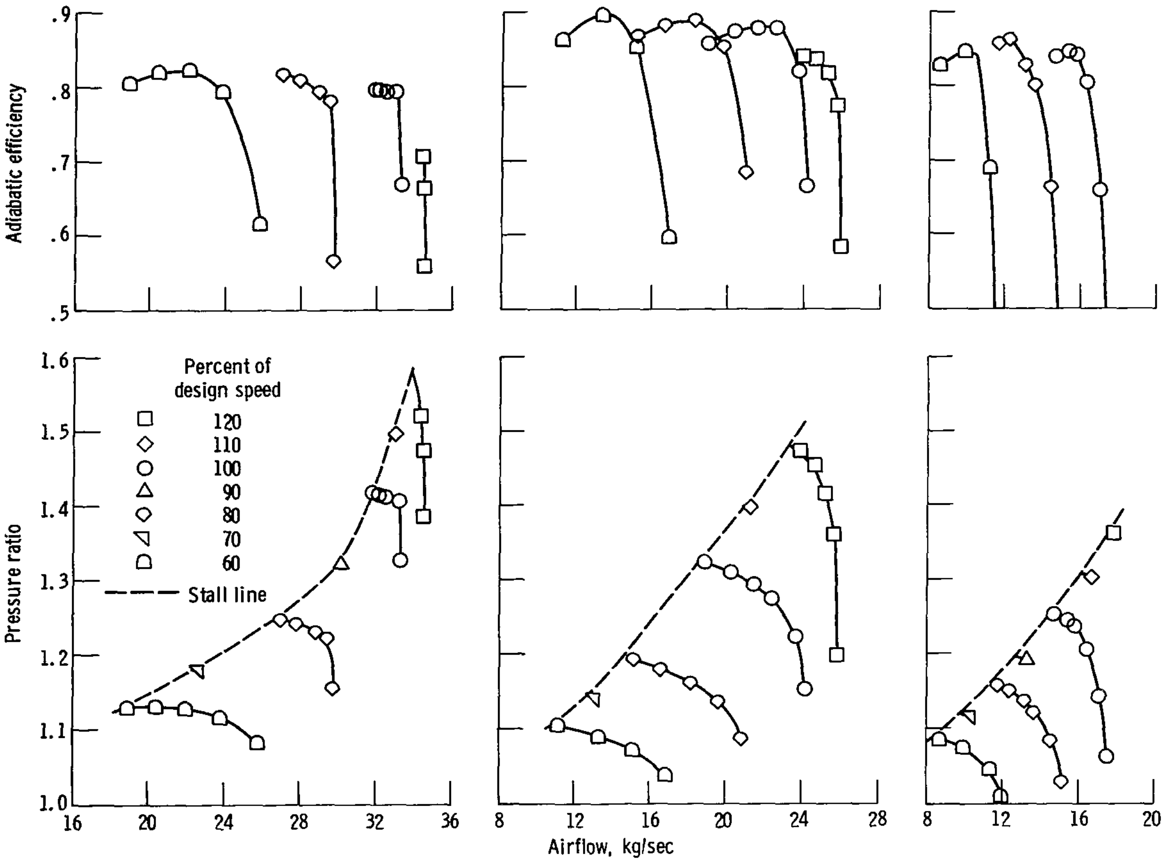


Figure 11. - Overall performance for stage 57A. Design rotor blade setting angle.



(a) Stage 57D; rotor-blade setting angle, -8° opened.

(b) Stage 57E; rotor-blade setting angle, 15° closed.

(c) Stage 57F; rotor-blade setting angle, 25° closed.

Figure 12. - Effect of blade setting angle on overall stage performance.

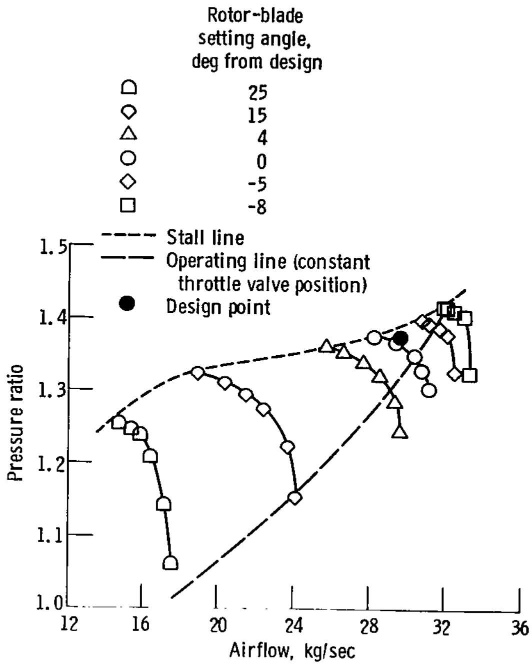


Figure 13. - Effect of rotor-blade setting angle on stage pressure ratio and stall line of stage 57 operating at design speed.

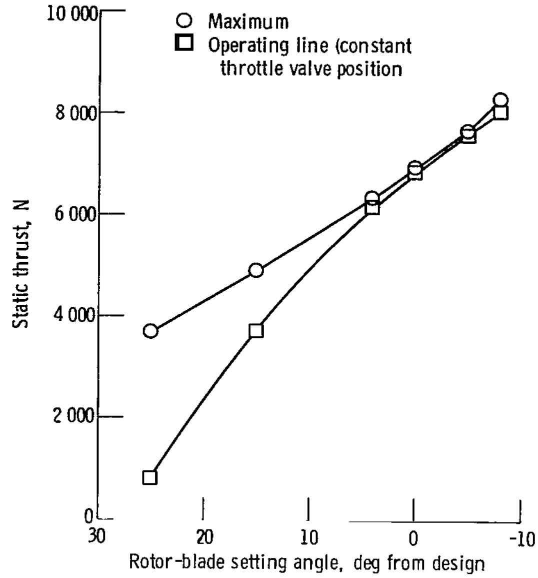


Figure 14. - Effect of rotor-blade setting angle on calculated static thrust. Stage 57; design speed.

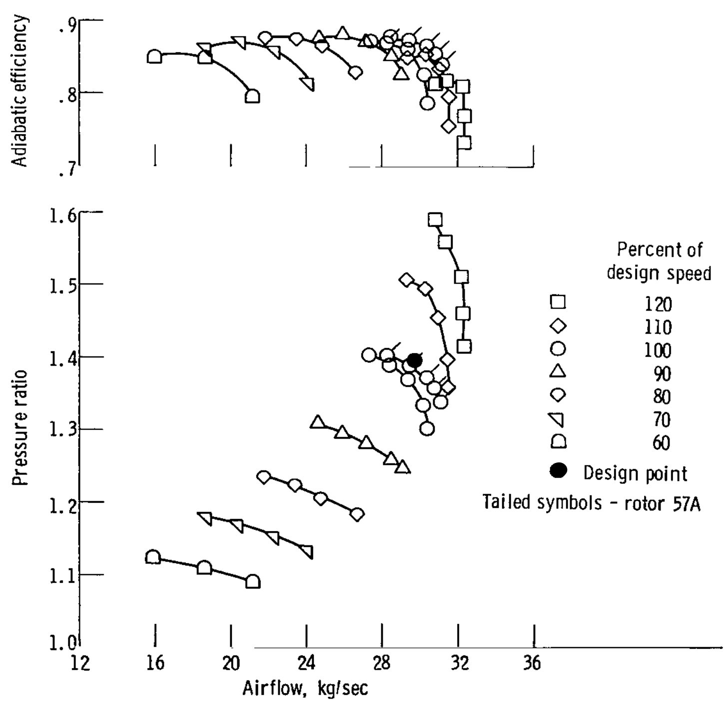


Figure 15. - Overall performance of rotor 57M1A (recoined blade; design rotor-blade setting angle).

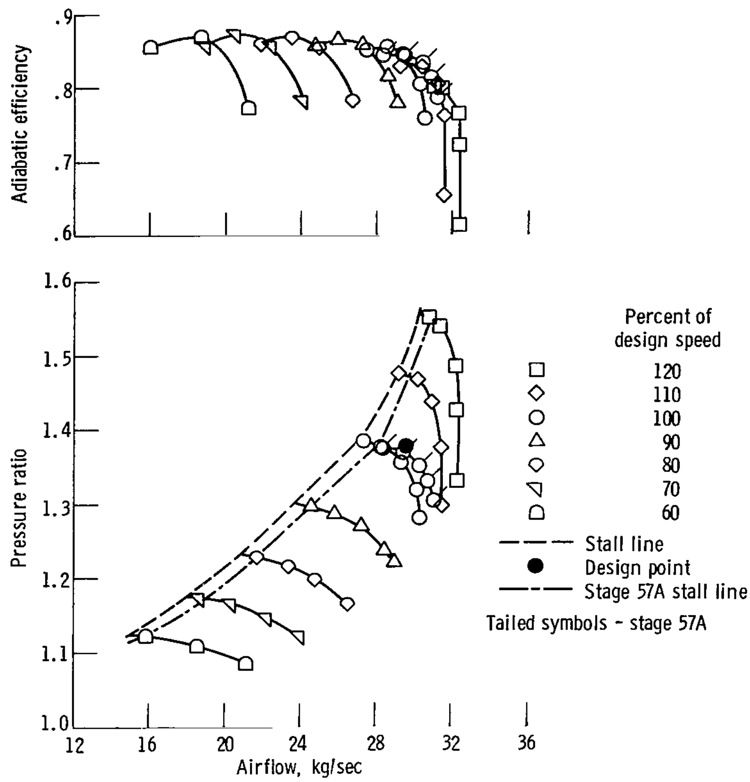


Figure 16. - Overall performance of stage 57M1A (recoined blade; design rotor-blade setting angle).

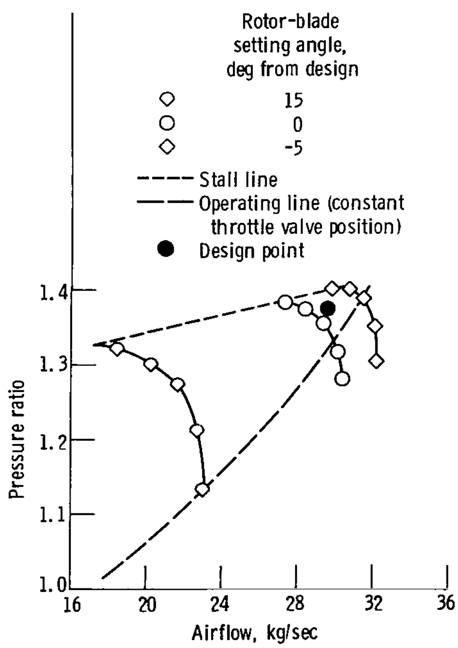


Figure 17. - Effect of rotor-blade setting angle on stage pressure ratio and stall line of stage 57M1 operating at design speed.

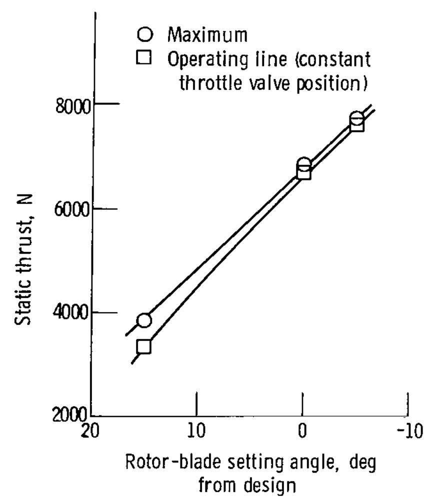


Figure 18. - Effect of rotor-blade setting angle on calculated static thrust. Stage 57M1; design speed.

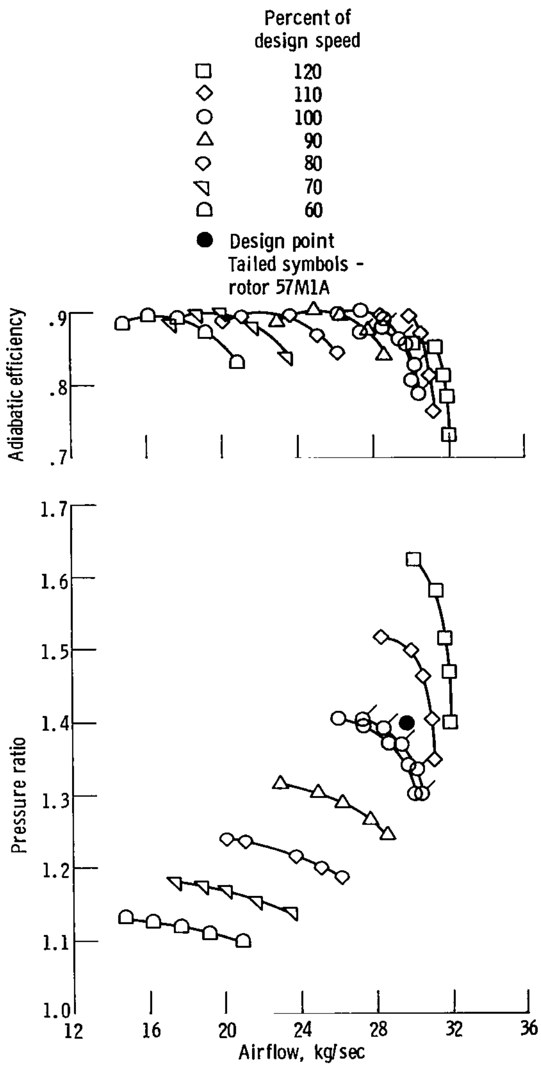


Figure 19. - Overall performance of rotor 57M3A (recoined rotor with straight casing; design rotor-blade setting angle).

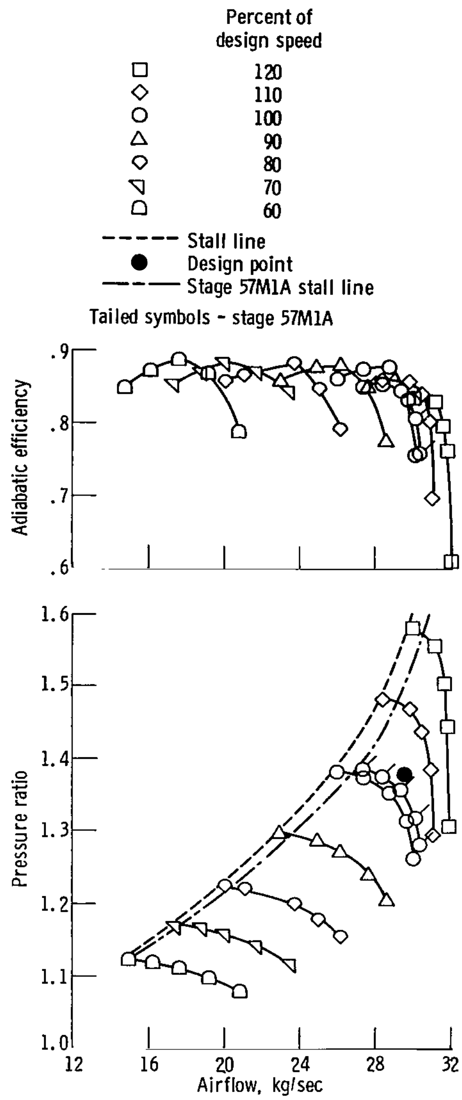


Figure 20. - Overall performance of stage 57M3A (recoined rotor with straight casing; design rotor-blade setting angle).

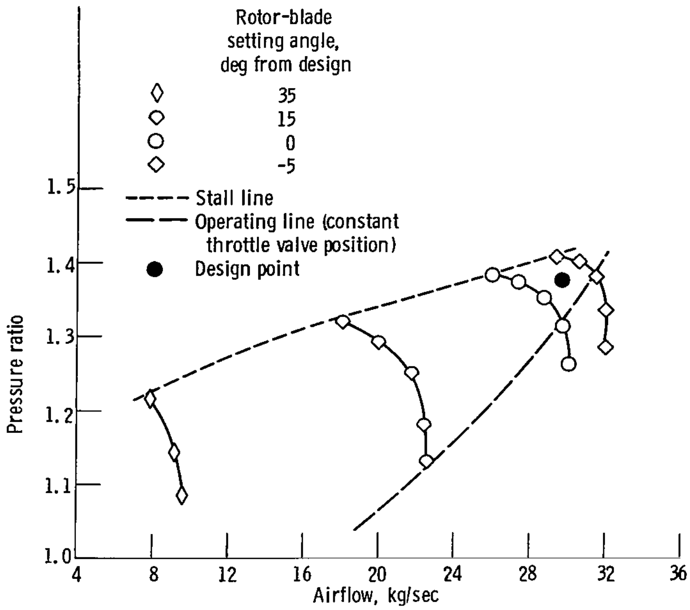


Figure 21. - Effect of rotor-blade setting angle on stage pressure ratio and stall line of stage 57M3 operating at design speed.

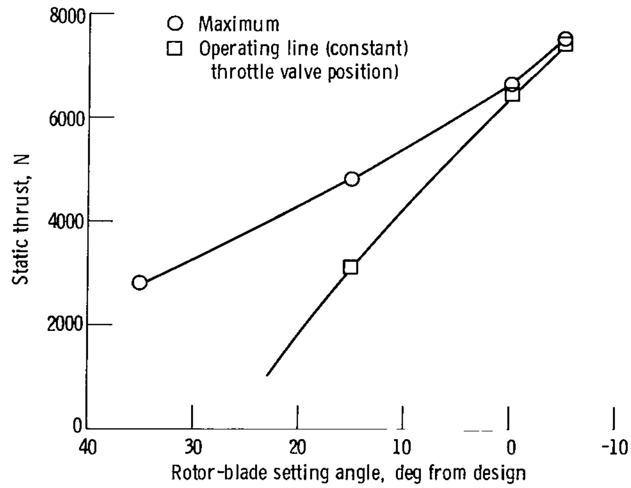


Figure 22. - Effect of rotor-blade setting angle on calculated static thrust. Stage 57M3; design angle.

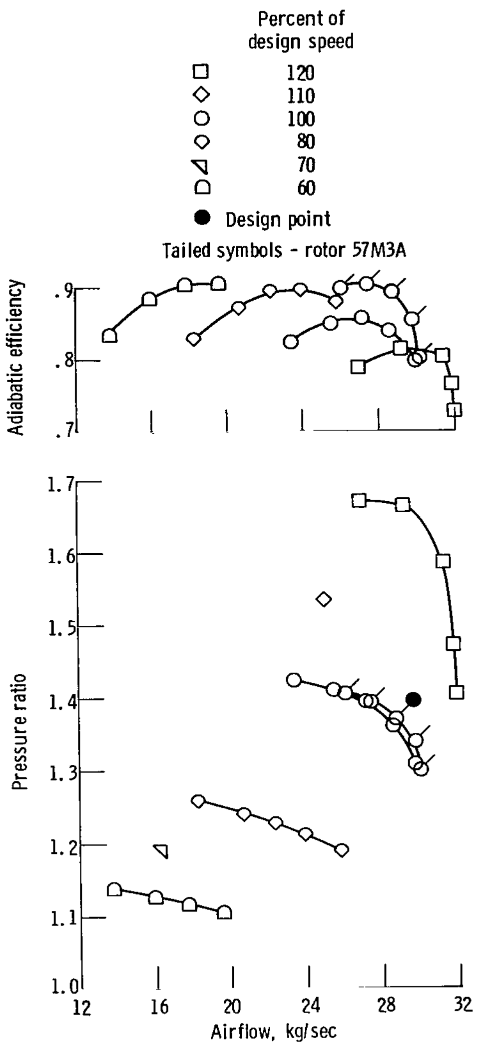


Figure 23. - Overall performance of rotor 57M4A (recoined rotor with casing treatment; design rotor-blade setting angle).

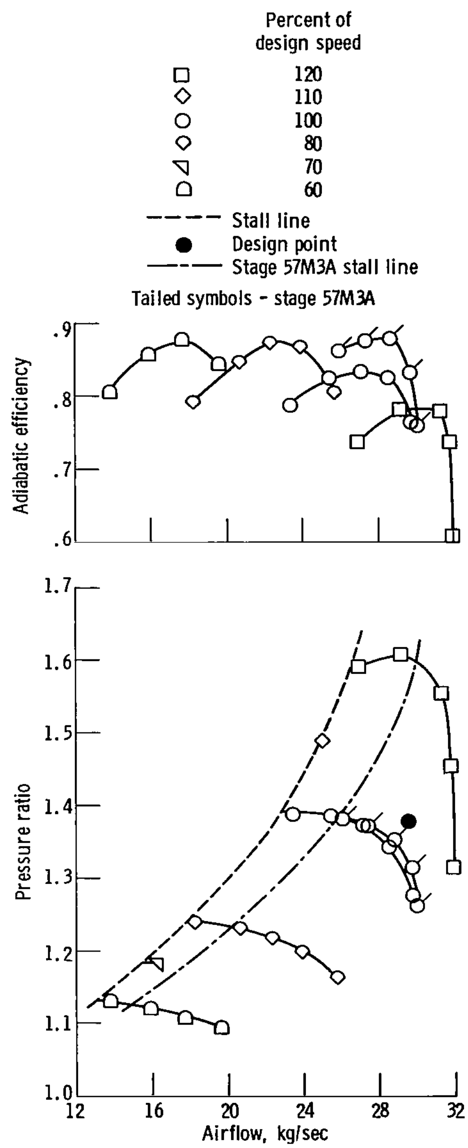


Figure 24. - Overall performance of stage 57M4A (recoined rotor with casing treatment; design rotor blade setting angle.

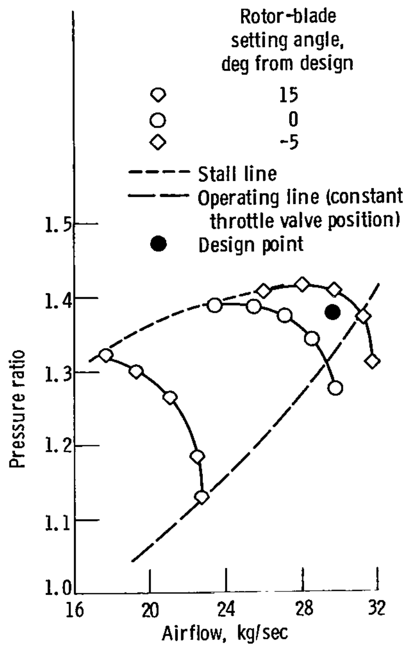


Figure 25. - Effect of rotor-blade setting angle on stage pressure ratio and stall line of stage 57M4 operating at design speed.

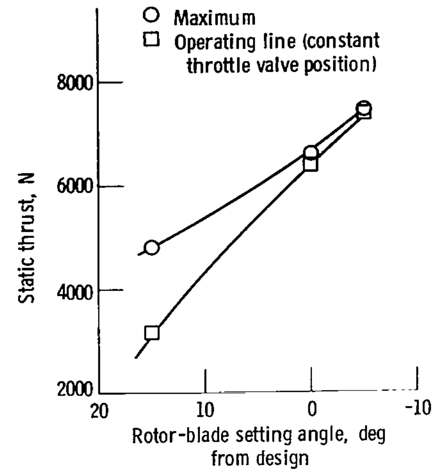


Figure 26. - Effect of rotor-blade setting angle on calculated static thrust. Stage 57M4, design speed.

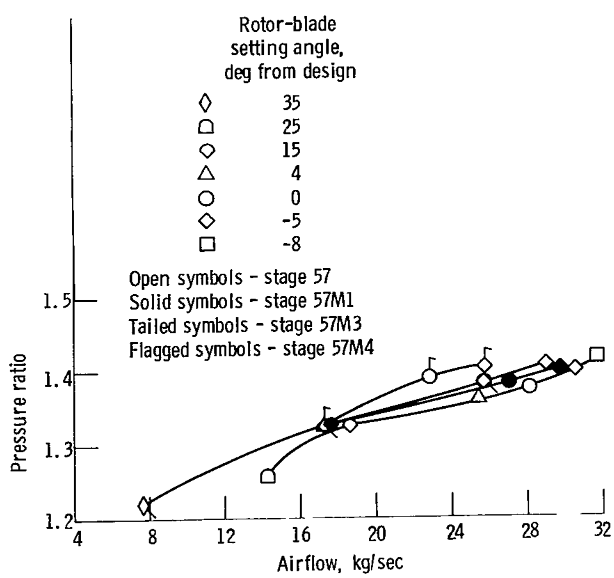


Figure 27. - Effect of configuration and setting angle changes on stall line. Design speed.

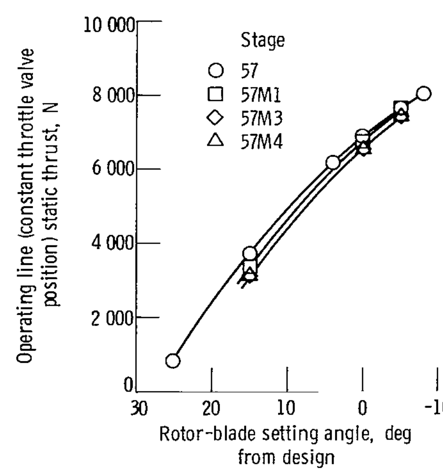


Figure 28. - Effect of configuration changes on static thrust. Design speed.

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15. Supplementary Notes

16. Abstract

The overall performance of a variable-pitch fan stage tested over a range of blade setting angles, speeds, and flows is presented. The fan was designed for a tip speed of 289.6 m/sec and a flow of 29.6 kg/sec. The measured performance agreed reasonably well with the design point. However, stall margin was only 5 percent. Static thrust values along an operating line ranged from less than 15 to over 115 percent of that at design angle as the blade setting angle was varied from 25° (closed) to -8° (opened). The use of casing treatment increased the stall margin to 20.6 percent but decreased efficiency by 4 percentage points.

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