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SUBSONIC/TRANSONIC STALL FLUTTER STUDY

FINAL REPORT

by

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UNITED TECHNOLOGIES CORPORATION
Pratt & Whitney Aircraft Group
Commercial Products Division

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16. Abstract
The objective of the Subsonic/Transonic Stall Flutter Program was to obtain detailed measurements of both the steady and unsteady flow field surrounding a rotor and the mechanical state of the rotor while it was operating in both steady and flutter modes to provide a basis for future analysis and for development of theories describing the flutter phenomenon. The program revealed that while all blades flutter at the same frequency, they do not flutter at the same amplitude, and their interblade phase angles are not equal. Such a pattern represents the superposition of a number of rotating nodal diameter patterns, each characterized by a different amplitude and different phase indexing, but each rotating at a speed that results in the same flutter frequency as seen in the rotor system. Review of the steady pressure contours indicated that flutter may alter the blade passage pressure distribution. The unsteady pressure amplitude contour maps reveal regions of high unsteady pressure amplitudes near the leading edge, lower amplitudes near the trailing edge, and nodes near the mid chord position. This pattern implies that the work input is concentrated near the leading edge, and that this is the region where design changes would have the greatest potential for preventing flutter. Review of the data shows that the location of the flutter boundary appears to correlate with blade incidence and loading parameters. Steady-state blade deformations were found to agree well with the NASTRAN predictions except that the blade uncambering slightly exceeded the predictions.

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FOREWORD

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SECTION 1.0

SUMMARY

The objective of the Subsonic/Transonic Stall Flutter Program was to obtain detailed measurements of both the steady and unsteady flow field surrounding a rotor and of the mechanical state of the rotor while operating in both steady and flutter modes. The data were obtained to provide a basis for future analysis and for development of theories describing the flutter phenomenon.

This objective was met using the Pratt & Whitney Aircraft TS22 research fan stage, which was extensively instrumented with high response rate instrumentation and a laser optical system. The stage was tested over a range of operating conditions both in and out of flutter.

A significant result of the program was a new conceptual understanding of the mode of flutter in the rotor system. Previously, fan flutter had been characterized by a single flutter frequency with all blades fluttering with similar amplitudes and equal interblade phase angles. The current program revealed that while all blades flutter at the same frequency, flutter amplitudes are not similar and interblade phase angles are not equal.

The steady pressure contours indicated that flutter may alter the blade passage pressure distribution.

The contour maps of unsteady pressure amplitude revealed regions of high amplitudes near the leading edge, lower amplitudes near the trailing edge, and nodes near the midchord position. This pattern implies that the work input is concentrated near the leading edge. Design changes in this region should, therefore, have potential for preventing flutter.

The data shows that the location of the flutter boundary correlates with blade incidence and loading parameters and is influenced by relative Mach number.

Steady-state blade deformations agreed well with the NASTRAN predictions except blade uncambering exceeded predictions slightly.

SECTION 2.0

INTRODUCTION

Flutter is an aerodynamically self-excited vibration in fan, compressor, and turbine blades. It can cause blades to fail and is of major concern.

The Subsonic/Transonic Stall Flutter Program, an experimental investigation, provided data for use in the formulation of analyses for predicting the onset of stall flutter in high-speed, axial-flow compressors.

The specific objective of the program was to obtain detailed measurements of both the steady and unsteady flow field surrounding a rotor and the mechanical state of the rotor while the rotor operated in the steady and flutter modes. This required testing and detailed performance mapping of a stage known to experience subsonic/transonic stall flutter. The Pratt & Whitney Aircraft TS22 stage met this requirement.

A substantial body of data was obtained. The testing and detailed mapping provided overall and blade element aerodynamic performance, information about the instantaneous flow field entering, passing through, and leaving the rotor, and information on the mechanical state of the rotor blades.

Performance and dynamic data were taken for 16 data points. These data have been used to evaluate the flutter boundaries and to determine details of the flow between blades in both the stable and flutter regimes. Blade stress and deflection data have been studied to evaluate analytical blade deflection prediction techniques for steady state operation and to determine mode structure during flutter.

Sections 3.0, 4.0, and 5.0 of this report describe the program approach, the facility and equipment used, and the data acquisition and reduction procedures. The results of the program in terms of new understandings of the flutter phenomenon are presented in Section 6.0, discussed in Section 7.0, and summarized in Section 8.0. Recommendations for future work are given in Section 9.0, and References are identified in Section 10.0.

The full set of data obtained under the Contract is provided in the appendix. Rotor overall performance and blade element performance are presented in Appendix A. Rotor blade coordinate data, in Appendix B. The steady-state and dynamic data, organized by instrument type, are presented in Appendices C, D, and E.

SECTION 3.0

PROGRAM APPROACH

The TS22 test stage selected for this program had aerodynamic and structural characteristics representative of an advanced fan stage and had exhibited stall flutter at intermediate speeds during prior testing.

Performance data were obtained by means of an automatic data acquisition system coupled with a numerically controlled probe traverse system directly linked to a Sigma 8 computer. The instrumentation for measuring steady-state deflections and flutter characteristics of the rotor blades consisted of strain gages, an optical mirror system, and a speed signal. NASTRAN was used to calculate steady-state deflections.

Kulite pressure transducers were used to measure the pressure fluctuations on the case over the blade tips and on the airfoil surfaces. Traversing hot-film probes measured the time fluctuations of the local mass flow entering and leaving the test rotor. Two traversing probes were installed at each location to provide instrumentation backup. Hot-film anemometers located on the blade surfaces were intended to characterize the unsteady flow over the blades as laminar, turbulent, or separated and to determine the instantaneous location of shocks and separation.

The tests covered a range of flows at speeds from 55 to 85 percent of design. Overall performance and detailed blade element data for the rotor were calculated for all 16 data points. Detailed structural and dynamic data were calculated for six selected points. Steady-state rotor blade deflections, measured by the optical mirror system data were compared with the deflections calculated using NASTRAN. The unsteady mode shapes, deflection amplitudes, and phase relationships during flutter were determined from the case mounted Kulites, strain gages, and mirror data.

Stability calculations were made for several mode shapes. Pressure distributions over the blade tips were analyzed to determine shock locations and loading changes that occurred as speed and flow were changed. Real and imaginary components of unsteady pressure during flutter were determined as were phase relationships of unsteady pressures. Unsteady velocities into and out of the rotor were determined, and the relative amplitude and phase relationship of unsteady velocities on the blade surfaces were established. The reduced velocity parameter and incidence angle based on measured flow and metal angles were determined.

4.0 TEST FACILITY AND EQUIPMENT

4.1 TS22 FAN RIG DESCRIPTION

The TS22 fan rig combined moderate tip speed with a high pressure ratio, high flow rate per unit annulus area, and good efficiency. The 3.6 blade aspect ratio was aeroelastically aggressive even with a single partspan shroud. The stage, with its 81.8 cm (32.21 in.) rotor tip diameter, was large enough to permit good definition of the unsteady flows, blade deflections, and mode shapes during flutter.

The TS22 rig is schematically represented in Figure 1. Stage design parameters are listed in Table I, and rotor blade specifications, in Table II. Measured vector diagram data and additional performance data are given in Appendix A. Blade coordinates are given in Appendix B.

New rotor blades were obtained for this study in order to minimize the potential of fatigue failure, the original TS22 rotor having operated for many hours in the flutter region. The new blades were inspected and found to be within allowable tolerances. Blade leading and trailing edge angles were determined. The maximum, minimum, and average edge angles at fourteen span locations are compared with design values in Tables III and IV.

The second mode bending frequency of the isolated blades was considered to be representative of blade flutter frequencies. Therefore, the second mode frequency with clamped root and unrestrained shrouds was measured for each of the thirty-two rotor blades. The minimum measured frequency was 241 Hz; the maximum, 249 Hz. The blade positions in the rotor (Figure 2) were selected to minimize differences in frequency between adjacent blades and provide a smooth frequency variation around the rotor.

4.2 TEST STAND DESCRIPTION

The tests were conducted in the X-204 test stand at Pratt & Whitney Aircraft's Willgoos Turbine Laboratory in East Hartford, Connecticut. This stand, shown in Figure 3, consisted of a test section with inlet air and exhaust systems, a drive motor, a computerized supervisory control system with numerous safety devices, a computerized data acquisition system, and a variety of test supporting systems.

The airflow entered the rig through a calibrated orifice and a large-diameter plenum chamber. A wire mesh screen and an "egg crate" structure upstream of the plenum provided a uniform inlet pressure profile to the compressor. Airflow was exhausted into a toroidal collector through a back-pressure valve to the exhaust blowers.

The compressor drive was a variable-speed electric motor connected to the test compressor through a speed-increasing gearbox. Electric power for the drive motor was provided from the laboratory powerhouse by four variable-speed, variable-frequency generators driven by a 6000-hp steam turbine.

4.3 INSTRUMENTATION AND DATA ACQUISITION SYSTEM

Instrumentation provided full documentation of both steady-state and nonsteady aerodynamics and for rotor structural behavior in and out of flutter. The location of instrumentation is shown in Figures 4 and 5. Table V lists the instrumentation and readout systems.

A fully computerized steady-state data acquisition was used during testing. Data were transmitted to a computer located at the control room and then to an automatic data reduction computer which performed a preliminary data reduction and returned the results to the control room. These preliminary data were used to direct the test program. Positioning and readout of all the traverse probes at the rotor inlet, rotor exit, and stator exit were controlled by the rig automatic traverse system.

The steady-state data acquisition system for the stand recorded 232 channels of rig data: 131 pressure channels, 78 temperature channels, and 23 miscellaneous millivolt channels. This system worked in conjunction with a high-response-rate system that recorded the data from the Kulite pressure transducers, hot films, and strain gages.

Unsteady data recording systems for the Kulites, hot films and strain gages recorded a common 1:1 speed signal, common time code, and a common strain gage signal. Before start of testing, a common sine wave and a white noise signal were recorded on all system channels in order to determine frequency and phase response.

Data from the blade mirror system were recorded on still photographs, movie film, and video tape.

4.3.1 Steady-State Aerodynamic Instrumentation

Wedge probes measured total pressure, static pressure, and air angle. Combination probes measured total pressure, static pressure, air angle, and total temperature. Wall taps were used for measuring wall static pressures, and total pressure rakes were used for measuring stator exit total pressures.

Pressures for steady-state operation were measured by a system of scanning valves and 24 pressure transducers with various pressure ranges. Pressure readings were distributed among the transducers to maximize measurement accuracy. Forty close coupled transducers were used to monitor surge. The temperatures were measured in millivolts as differentials from a reference temperature and recorded by the automatic data acquisition system.

4.3.1.1 Pressure

The pressures sensed by the probes, fixed rakes, and static taps were measured by transducers and recorded in millivolts by the automatic data acquisition system. Pressures from sensors upstream of the rotor trailing edge were measured by means of 10.3 N/cm^2 (15 $lbf/in.^2$) full-scale transducers. Pressures from the trailing edge of the rotor and all downstream locations were measured using 34.6 N/cm^2 (50 $lbf/in.^2$) full-scale transducers. The accuracy of the pressure measurements was ±0.1 percent of full-scale value.

4.3.1.2 Temperature

All temperatures were measured with Chromel-Alumel, type-K thermocouples connected to reference junctions attached to uniform temperature reference blocks located in the test cell. The temperatures of these reference blocks were monitored relative to ice-point cells located in the data system room. The resulting data were recorded in millivolts by the automatic data-acquisition system.

Temperature elements were calibrated for Mach numbers over their full operating range. The thermocouple leads were calibrated for each temperature element. Overall rms temperature accuracy was estimated to be ±0.56K (1.0^{o}R).

4.3.1.3 Rotor System

Compressor speed was measured using an impulse-type pickup, which counted gear teeth passing in an interval of time. The data were recorded through a frequency-to-DC converter. Accuracy was ±1 rpm.

4.3.1.4 Airflow

Airflow was measured with an orifice calibrated to International Standards Organization/DIS 5167 Standards. Total pressure was measured using a 10.3 N/cm^2 (15.0 $lbf/in.^2$) full-scale transducer. Orifice pressure drop was measured using 3.4 N/cm^2 (5.0 $lbf/in.^2$) full-scale differential transducers. Orifice temperature was measured by the standard temperature measurement system. Accuracy of the airflow measurement was within one percent.

4.3.2 Structural Instrumentation

Blade deflections were measured by a mirror system consisting of a laser light source, a beam splitter, reflecting mirrors and a screen and were recorded by a video and camera system. Steady state and unsteady deflections were recorded using the techniques described in reference 1 and 4.

One strain gage was placed on each blade to measure unsteady stresses and to detect the onset of flutter. Signals from these gages were transmitted through a slipring and recorded on magnetic tape.

4.3.2.1 Optical Mirror System

It was necessary to accurately measure rotor blade deflections both in and out of flutter. During stable operation these deflections were due to centrifugal and aerodynamic forces. When in flutter vibrational mode shapes had to be determined. A patented system (reference 4) of optical mirrors and reflected laser light was used to measure rotor blade surface angle changes from which blade deflections were determined.

The optical mirror system consisted of an array of mirrors installed on the blades, a laser light source, and a readout and recording system, shown schematically in Figure 6. The laser light was split into a number of beams, each directed to the radial location of one of the mirrors. As the instrumented blade rotated through the beams, the mirrors reflected the beams back to the readout system to separate points that had been selected to avoid pattern interference during flutter.

Twenty mirrors were installed on one blade to provide full coverage of the blade in the region above the midspan shroud and along the leading edge below the shroud. Additional mirrors were mounted on other blades. The complete array of mirrors is shown on Figure 7. Circumferential locations of instrumented blades are shown in Figure 5.

The mirrors were made from silicon wafers 0.244 cm (0.10 in.) square, 0.024 cm (0.0095 in.) thick, sputtered with a 1000-angstrom thick coating of aluminum and over-coated with 2280-angstrom protective coating of silicon dioxide. The mirrors were attached to the blades with epoxy cement. Additional details of the mirror system and mounting techniques are given in reference 1.

The laser light and mirror system for measuring the instantaneous blade surface positions used a 604.5 cm (238.0 in.) optical path directly upstream of the test stage inlet. This path length was sufficiently large to provide adequate light spot deflections for accurate data readout.

Two windows were installed in the inlet section walls of the test facility: one to provide laser light entry; the other to provide a screen for receiving the reflected light beams. The entry port was a 35 cm (12 in.) diameter clear glass window. The exit port was a 50.8 cm x 175 cm (20 in. x 69 in.) semicircular piece of frosted 3.81 cm (1.5 in.) thick Lexan, located 604.5 cm (238.0 in.) upstream of the rotor. The output window was centered about the horizontal plane.

Inside the plenum chamber, the slipring cable container was braced near the rotor at the 12, 3, 6, and 9 o'clock positions. The light was directed to avoid these blockages. The interior of the inlet was frosted in selected locations to prevent secondary reflections from interfering with the laser beam signal.

Two lasers were used simultaneously: a 0.5-watt Hughes provided the reference beam and a 3-watt Spectraphysics provided illumination for the mirrors.

Edmund Scientific variable beam splitters were adjusted to ensure an approximately equal intensity of all the light beams. Each splitter was mounted on a five axis adjustment system to facilitate accurate aiming of the light beams. Glass shims 0.3175 cm (0.125 in.) thick were added to each splitter to block second order images.

The optical data were recorded with a movie camera operating in the streak mode, a Hasselblad still camera, and a television camera. The cameras were placed to receive the maximum scattered light when the beams were on the output window. The cameras were located 9.14 m (30 ft) from the screen. An oscilloscope beneath the output window was photographed simultaneously with the light spots to correlate the time code and rotor speed signals with the mirror deflections. All cameras were rigidly mounted to eliminate blurring due to camera vibrations.

The accuracy of the laser optical system was limited by the resolution of the film. The negative film was Kodak 2484, chosen on the basis of the relative spectral sensitivity, grain size, and contrast. Two copy films for the movies were used: Kodak Hi Con 7362 and Kodak black and white fine grain positive 7302. The former provided the best results, producing more contrast and a much finer grain. The optimum processing speed for the negative was 6.1 m/min (20 ft/min). For the copy, a speed of 10.7 m/min (35 ft/min) was used. Both were processed in Kodak D96. The 2484 film had an ASA number of 800, and the print machine speed and print exposure times were selected to produce a print base density of two. These machine speeds and print exposure values were determined with the actual film and the illumination conditions existing at the time. Uneven copy-process illumination was detected with image processing laboratory equipment and corrected during processing. Still pictures were taken on Kodak Tri-X film.

4.3.2.2 Strain Gage Instrumentation

To ensure safety and measure the response of all blades in flutter, one Micro-Measurements type WDDY-125AD-350 strain gage was installed on each rotor blade immediately above the shroud at the midchord location since this location was sensitive to the second coupled mode expected in flutter.

The frequency response of the strain gage data was limited by the bandwidth of the data recording system. The accuracy of any given strain gage was statistically determined to be approximately ± 5 percent, representing one standard deviation for typical data.

4.3.3 Unsteady Aerodynamic Instrumentation

The instrumentation for measuring unsteady aerodynamic effects included: 1) Kulites on the case over the rotor blade tips, 2) an array of Kulite high response pressure transducers on the rotor blades, 3) traversing hot-film probes at the inlet and exit locations of the rotor, and 4) an array of hot-film anemometers on the rotor blades.

The fan-case Kulites and the hot-film probe outputs were recorded on two Sangamo III wide band group I FM tape recorders having a capacity to 40 kHz center frequencies and 40 kHz output filters. In addition to the data signals, 60:1 and 1:1 speed signals were recorded along with 1 kHz IRIG B Format Time Code Signal.

Data from all blade-mounted Kulites were recorded on a constant bandwidth frequency-division multiplex system, which provided a frequency response of 2 kHz with a resolution of 690 N/m^2 (14.4 lbf/ft^2) and an error no greater than $\pm$ 1 dB. Each of the 12 tracks on the system recorded six data signals plus a time code signal. One data channel on each track was used to record a reference strain-gage signal for phase determination. The hot-film anemometer data were also recorded on this multiplex system.

4.3.3.1 Case Mounted Kulites

Ten high response Kulite pressure transducers, Kulite Model XCQL-8B-808 mounted over the blade tips (Figure 8), were used to measure unsteady pressures over the blade tips during stable and during flutter type operation. Specifications for these units are given in Table VI.

4.3.3.2 Blade Mounted Kulites

Thirty-two Kulite, high-response pressure transducers were distributed over the pressure and suction surfaces of four blades (Figure 9) instrumented in pairs such that the instrumentation ocations on the suction surface of one blade matched those on the pressure urface of the adjacent blade across the flow channel. Kulite Model LQL5-080-5S transducers were used on the blades. Transducers specifications are shown in Table VI. The data from these transducers provided detailed mapping of he pressure fluctuations during flutter.

Signals from the rotating Kulite transducers were amplified before passing through the slipring to the recording device. An amplifier package was used which rotated with the rotor assembly.

The rotating Kulite pressure transducers were calibrated both before and after mounting on the blade surfaces. The accuracy of the calibration facility was 0.1 percent full scale over a range of zero to 345 N/cm^2 (500 lbf/in.^{2}).

4.3.3.3 Hot Film Anemometers

Traversing hot-film probes, located at the inlet and exit of the rotor, measured fluctuations in inlet and exit flow during stable and flutter operation. Hot-film anemometers were located on the rotor blades to characterize the flow over the blade surfaces in and out of flutter and during transition from stable flow to flutter.

Two hot-film probes were located forward of the rotor, and two behind the rotor. The sensors were oriented with their length tangent to the case and perpendicular to the rig axis.

Thermo-Systems Model 1210-60 cylindrical hot films were chosen for the probes based on their ability to operate in a high velocity gas stream. These sensors were constructed of a 0.0154 cm (0.006 in.) diameter by 0.203 cm (0.080 in.) long quartz substrate with a platinum sensor deposited on its surface. Specifications for the transducers are presented in Table VI. The hot-film probes were calibrated at ten different flow velocities.

The frequency response of the probes and the associated data acquisition system was 40 kHz with a resolution of 1.0 percent of the mean flow velocity. The dynamic accuracy of the probes was 1 dB for axial Mach numbers below 0.4. The accuracy at higher Mach numbers was less because of a loss in sensor linearity caused by flow compressibility.

Twenty hot-film sensors were installed on four blades above the shroud at positions corresponding to those of the blade-mounted Kulite pressure transducers, Figure 10. A majority of sensors were installed on the suction surfaces of two blades to provide data of flow separation. A few were also placed on the pressure surface.

The sensors were Micro-Measurements Type EGT50. The film with its polyimide backing was mounted on a 0.041 cm (0.016 in.) Kapton film substrate to minimize heat transfer to the blades. The grid was oriented in the direction of flow with the leadwires routed off the trailing edge to avoid an additional turbulence source.

The sensors were calibrated to identify strain induced errors, but their nonlinear response and the difficulty in simulating the test situation in the laboratory made calibration to obtain quantitative data unrealistic. Therefore, their function was limited to qualitative characterization of the flutter. However, comparing the flutter response from one data point to another gave useful data on suction surface nonsteady flow characteristics. These sensors and associated data acquisition system provided a frequency response to 2 kHz.

SECTION 5.0

TEST AND ANALYSIS PROCEDURES

5.1 TEST PROCEDURES

The test program was conducted in two phases: an initial shakedown test phase and a performance test phase. The objectives of the shakedown test were to check rig operation, instrumentation, and data recording and reduction systems; to verify the existence of stall flutter; and to compare performance with that of the original TS22 stage. During the performance test phase, overall aerodynamic perfor[illegible]s obtained over a range of flows at rotor speeds between 54 and 85 percent [illegible]ign. High response aerodynamic and structural data were obtained at all operating points, and surge points were determined at several speeds between 63 and 85 percent of design.

5.1.1 Shakedown Tests

During the shakedown test the rig was operated at speeds to 70 percent along a wide-open-discharge throttle line to make sure that the rig was free of vibration and that all steady-state and dynamic instrumentation were operating properly. A transient into flutter was made at 70 percent speed. A full data point was taken with both steady-state and dynamic instrumentation at 70 percent speed and wide open discharge. At 63 percent speed a transient into flutter was made, and two additional data points were taken: one with wide-open-discharge; the other in flutter. These shakedown tests are listed on Table VII.

The full data points consisted of:

- A two-minute record of all dynamic instrumentation-strain gages, Hot films, and Kulites
- A two-second high-speed motion picture of optical laser/mirror data for all blade mirrors
- Still photographs of mirror data
- TV records of all mirror images
- A two-minute record at each spanwise location of a seven-position radial traverse made ahead of and behind the rotor with hot-film probes
- Steady-state data including rotor speed, total pressures, total temperatures, flows, static pressures, and flow angles for the rotor and stator inlets and discharges.

The aerodynamic data obtained during the shakedown tests were reduced to validate the instrumentation and data reduction systems and to compare performance with the performance observed during previous tests of the TS22 stage. The dynamic data were studied to validate accuracy before the performance phase of the test program.

5.1.2 Performance Tests

The performance testing phase of the program involved mapping the extent of the flutter boundary by taking data at operating conditions both in and out of flutter. The initial portion of this phase repeated some of the shakedown testing. Test data was taken over a range of speeds from 54 to 85 percent of design. The test points are listed in Table VII. For this program the flutter boundary was defined as the flow at which a vibratory stress of ± 2068 N/cm^2 (± 3000 lbf/in.^{2}) was attained.

5.2 DATA REDUCTION PROCEDURES

5.2.1 Data Requirements

The following parameters were calculated for all data points:

1. Overall stage performance
2. Blade element performance
3. Blade untwist and uncamber
4. Flutter frequency
5. Blade stress level
6. Vibratory mode
7. Pressure contours over the blade tips
8. Incidence angle at seven radial stations
9. Reduced velocity for seven radial stations.

In addition more extensive data reduction was performed for six of the data points. This reduction provided:

1. Analysis of the mirror data for intrablade amplitudes and phase relations on one blade correlated with strain gage signals and other nonsteady signals to define the rotor mode shape and its relationship with the instaneous aerodynamics
2. Intrablade average steady pressure distribution at the wall for two passages

3. Intrablade unsteady pressure distribution at the wall for two passages

4. Amplitude and phase angles of all fluctuating signals from rotor-mounted sensors--both amplitude and phase angle were determined relative to the signals from the No. 3 blade.

5.2.2 Specific Procedures

5.2.2.1 Steady-State Aerodynamic and Blade Deflection Data

All steady-state performance data were automatically recorded in millivolts, converted to engineering units, corrected, and used to calculate overall and blade element parameters.

The measured total pressure and flow angle from the wedge probes were corrected using Mach number calibration curves for individual probes. The resulting calibrated Mach number and corrected total pressure were then used in conjunction with standard tables of air properties to calculate static pressure.

Thermocouple signals were converted to temperature measurements using wire calibrations for individual sensors. These temperature measurements were converted into total temperature using Mach number calibrations for individual sensors and the pressure-level corrections of Glawe, Simms, and Stickney (ref. 2).

Circumferential distributions of total pressure obtained at the stator exit were mass-flow averaged for each pole rake at each radial location using the corresponding measured distribution of total temperature and a constant circumferential static pressure determined by linearly interpolating static pressure data from wall static measurements. Circumferential mass-flow averages of total temperature were also calculated at each radial location, using the corresponding measured distribution of total pressure and constant circumferential value of static pressure. The three values of total pressure from the pole rakes at each radial location were arithmetically averaged to obtain a single radial distribution of stator-exit total pressure. Total temperatures were averaged similarly. The peak value of total pressure from each circumferential distribution of total pressure was taken as stator inlet pressure. The three radial distributions of stator inlet pressure were also averaged to obtain a single radial distribution. Air angles measured by the two probes at the stator exit were arithmetically averaged for each radial location.

Two separate computer programs were used to transform test measurements into the desired overall and blade-element performance parameters. The first computer program converted measurements from millivolts to engineering units and corrected, averaged, and prepared the data for input to the second computer program. The second computer program, operating off line, calculated the desired overall and blade-element performance parameters by means of a streamline solution of the axisymmetric flow field.

The remaining input to the flow field program consisted of the geometric description of the rig and aerodynamic data. The geometric description included the shape of the flowpath walls, axial locations of blade edges, and blade inlet and exit metal angles and solidity. Blade edges were input as 24 straight-line segments that closely approximated the meridional profile of the manufactured blade edges. Metal angles at the rotor leading edge and trailing edge were input from beam calculations for the blade at design speed.

The output from the second program consisted of corrected speed and inlet flow; the spanwise profile of total pressure ratio at the stator inlet; the spanwise profiles of total pressure ratio, total temperature ratio, and flow angle at the stator exit; and blockage factors for each calculation station. Total pressures and temperatures were calculated as ratios to the assumed standard day inlet plenum values.

A flow blockage factor was used at each axial location to improve the accuracy of the static pressure velocity calculations. Blockages were applied equally to all stream tubes at each of the axial locations. The axial distribution of blockage factors was selected to give calculated wall static pressures that agreed with measured wall static pressures. A single axial distribution was found to provide reasonable agreement with measurements for all data points.

All static pressures and the flow angles between the rotor and stator were calculated by the flowfield program. The calculation was made assuming axisymmetric flow and using mass-flow continuity, radial equilibrium, and energy equations. Streamline curvature and enthalpy and entropy gradient terms were included.

Overall rotor performance was calculated from mass-flow averages of total pressure and temperature at rotor exit and average inlet conditions. Overall stage performance is not presented in this report because it is not required to support data evaluation.

Rotor blade element parameters were calculated for airfoil sections lying on a fixed set of conical surfaces defined by intersections of blade edges and streamlines calculated for a reference point at mid range at 75 percent speed. Streamlines were selected to include blade-element data at radial locations of transducers for blade surface measurements and mirrors for blade deflection measurements. For the blade element data tabulations presented in Appendix A, the incidence angles were based on measured air angle and the calculated metal angle at design speed. For the plot of reduced velocity parameter versus incidence angle (Figure 43), both air angle and metal angle were measured values.

The blade centrifugal untwist and uncamber resulting from centrifugal and gas bending loads were determined directly from the blade deflection data obtained with the optical mirror system. Images from twenty of the twenty-six blade mounted mirrors were used to determine blade movement.

Steady deflections were determined for speeds from 25 percent to 85 percent of design. Photographs taken at selected speeds in nine percent increments were used to determine steady blade movement. A coordinate system was established based on known details of the screen. The vertical position of each spot on each photograph was measured. Using the idle spot positions as a baseline, the movement of the spots for any speed was scaled. This movement on the screen was then converted to angle of twist and change in bending slope.

5.2.2.2 Unsteady Data Reduction

The reduction of the high frequency response data from the hot film probes, wall-mounted Kulites, blade mounted hot film sensors, blade mounted Kulites and blade mounted strain gages required sophisticated techniques. Signal enhancement, signal phasing from rotating instruments, and signal phasing between rotating and stationary instruments are discussed below. These discussions are followed by details of the analysis of each type of data.

5.2.2.2.1 Signal Enhancement

The signal enhancement, a time domain technique, extracted or enhanced particular frequency components from a broadband signal. The technique involved averaging numerous time segments of a broadband signal, the start of each segment being triggered by a reference signal. Each successive time segment was summed and averaged in a storage memory. The result was an enhancement or reinforcement of those components that were synchronous with the triggering signal and suppression of components that were not.

5.2.2.2.2 Phasing of Signals from Rotating Instrumentation

Phase information between the reference strain-gage signal on the No. 3 blade and all other strain gage and rotating Kulite and hot film signals was produced at the flutter frequency, using cross spectral density techniques, a Nicolet Scientific "Omniferous" Model 401 analyzer being used for this purpose. The analysis range for the task extended to 2 kHz. An 800-element spectural resolution was selected. To produce each final plot, 128 sweeps from the analyzer were averaged. The analysis was conducted from zero to 2000 Hz. The analyzer filter bandwidth yielded a spectral resolution of about 3.75 Hz. All resulting phase angles were corrected for errors introduced by the signal conditioning and recording systems.

5.2.2.2.3 Phasing of Signals Between Rotating and Stationary Instrumentation

It was necessary to determine the phasing between signals from the rotating blades and the stationary wall instrumentation. Of specific interest was the phasing of the reference signal from the strain gage on the No. 3 blade and the signals from the case-mounted Kulites. A variation or extension of the cross-spectral density technique was used.

The flutter component of the signals has different frequencies in the rotating and stationary coordinate systems. The frequencies in the stationary system are either higher or lower than those in the rotating system because they are composed of the fundamental flutter frequency plus or minus multiples of rotor rotational speed. This can be seen in the following derivation.

The vibration of the individual blades in a stage in flutter is fully defined by the sum of a finite series of circumferential harmonic waves where the number of component waves equals the number of blades, N, in the stage. The associated unsteady pressure, p, at a particular axial coordinate, x, varies with tangential coordinate, y, and time, t, is described by the sum of an infinite series of forward and backward rotating harmonic waves having all integer numbers of cycles around the circumference of the stage. This function is expressed in terms of sets of responses to individual orders, m, of blade vibration where $1 \leq m \leq N$.

$$p_m(x,y,t) = \sum_{n=-\infty}^{\infty} p_{mn}(x) e^{i(\beta_{mn} y + \omega t)} \tag{1}$$

Where n, the number of full waves per intrablade passage, is added to the fractional number represented by m waves around the full circumference. ω is the flutter frequency common to all phenomena in the rotating system. The unsteady periodicity condition defines the wave number

$$\beta_{mn} = \frac{\phi_m + 2\pi n}{s} \tag{2}$$

where the interblade phase angle, $\phi_m = \dfrac{2\pi m}{N}$ (3)

and blade spacing, $s = \dfrac{2\pi r}{N}$

where r is radius

hence $\beta_{mn} = \dfrac{m + Nn}{r}$

In the stationary system, the coordinates x' and y' are related to their rotating counterparts by

$$x = x'$$

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$$y = y' + \Omega rt \tag{4}$$

where Ω is the rotor speed. Equation (1) then becomes

$$p_m(x', y', t) = \sum_{n=-\infty}^{\infty} p_{mn}(x')e^{i\beta_{mn}(y' + (\Omega r + \omega/\beta_{mn})t)} \tag{5}$$

This is in the form of waves having wavelength $2\pi/\beta_{mn}$, moving at velocity $(\Omega r + \omega/\beta_{mn})$. The frequency ω_s measured by a stationary probe is the product of the wave number β_{mn} and the wave velocity. Hence

$$\omega_s = \beta_{mn}\Omega r + \omega = \Omega m + \Omega Nn + \omega \tag{6}$$

where Ωm is a multiple of shaft speed, and ΩNn is a positive or negative multiple of blade passing speed. Therefore, the single flutter frequency, ω, in the rotating system becomes a spectrum when detected by a stationary sensor. The observed frequencies, ω_s, are spaced at multiples of shaft speed, Ω. The index m identifies the associated harmonic wave component of blade vibration and the index n identifies the added number of waves within a passage between adjacent blades.

Because flutter was seen at many frequencies by the case-mounted Kulites, phase information could not be produced directly. Instead, an aliasing technique was used. By selection of the sampling rate to equal the rotational frequency, both the rotating and stationary transducer flutter signals were transformed to a new coordinate system in which a single flutter frequency existed for both sets of signals. Phasing of the signals in question could then be performed. The one-per-revolution speed pip was used as the sampling rate command.

Two different procedures were used to produce phase information. One procedure was to allow all the flutter components in the stationary signal to be aliased. The other procedure was to isolate individual spectral components of the flutter with a narrow filter before aliasing. This latter technique extracted a single nodal diameter signal plus its harmonics at multiples of the rotor speed. In all cases, the sampling command was properly conditioned to allow the rotor to be in a selected orientation before a data sample was taken. Corrections to the final phase angle were included for influences of all signal conditioning and the aliasing process.

5.2.2.2.4 Strain Gages

Each of the 32 blades was instrumented with one dynamic strain gage located near the maximum thickness point above shroud at 64 percent span. The stage flutter response was obtained from the strain-gage signals consisting of amplitude, frequency, and phase. The amplitude and frequency characteristics of the individual blades were obtained from power spectral density (PSD) plots from 0 to 2 kHz. Phases relative to the gage on the No. 3 blade were obtained by using the cross spectral analysis technique described in Section 5.2.2.2.2. The strains were of the form $S_\nu e^{i\omega t}$ where the complex number, S_ν, representing the strain in the No. 3 blade, defined phase as well as amplitude. The S_ν numbers, where $1 \leq \nu \leq N$, may be represented by the finite summation

$$S_\nu = \sum_{m=1}^{N} \sigma_m e^{\frac{i2\pi m\nu}{N}} \tag{7}$$

where σ_m is the amplitude of a series of patterns having numbers of lobes, m, where $1 \leq m \leq N$, rotating with respect to the disk at speed ω/m. From the known amplitude and phase of each strain gage, S_ν, the complex coefficients, σ_m, of the series in equation (7) may be determined by mathematical inversion to give the strength of the m^{th} modal component or spatial harmonic and its phasing with respect to all other components.

The broadband and flutter frequency amplitudes for all strain gages and rotating Kulites were plotted versus time to help establish the stability of the data during the two-minute steady-state records. The plots were also used as a cross-check with the power spectral density curves to help identify possible errors in engineering unit conversions.

5.2.2.2.5 Mirrors

Blade mode shape was determined by analysis of the laser optics mirror data. Blade deflection amplitudes were determined from the mirror data. For the blades without mirrors, the deflection amplitudes and relative phases were determined through correlation of the strain gage data and the mirror data.

Typical still photographs of the mirror data in and out of flutter are shown in Figure 11. The difference in width of the same spot in the two images is proportional to the torsional amplitude and the difference in height is proportional to the axial component of the bending slope.

The 16mm film record of the reflected laser beams was digitized using a Spatial Data Systems Scanner. The measurement accuracy was better than ±0.00254 cm (0.001 in.). The data were stored on magnetic tape for computer processing.

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A fast Fourier transform was used to convert the data from the time domain to the frequency domain. This procedure allowed the calculation of power spectral densities and cross-spectral densities to determine amplitude and phase angles for the different mirrors.

5.2.2.2.6 Case Mounted Kulites

The case mounted Kulites were used to obtain nodal diameter patterns present in the rotor system during flutter, contour maps of the pressure distributions over the blade tips during stable operation, contour maps of the unsteady pressures during operation with flutter, and contours of the real and imaginary components of the unsteady pressure and relative phase during flutter .

The nodal-diameter patterns in the rotor system during flutter operation were determined through Fourier analysis of the signals from the case-mounted Kulite pressure transducers.

The contour maps of pressure distributions over the blade tips were obtained from wall Kulite and wall static tap data. The technique discussed in Section 5.2.2.2.1 was used to enhance the broadband Kulite signals. The one-perrevolution speed signal was the reference signal used in this procedure. Data from 512 rotor revolutions were averaged to produce the final plots. The enhancements were timed to allow a selected group of blades to occupy a desired orientation relative to the wall Kulites. These enhancement techniques produced a signal-to-noise improvement factor of about 22.6.

Plots of pressure versus time were digitized to obtain an array of pressures representing the variation from the mean at the specific axial location. A minimum of ten samples per blade gap were digitized. The time location of each pressure sample was translated into a rotating frame, with the leading edge of the No. 2 blade used as the zero reference. The wall mean static pressure for each axial location was added to the local variation to obtain the steady-state pressures. The array of local static pressures was input into a contour plotting package, which linearly interpolates in space to find specified levels of pressure. The lines of constant pressure were normalized as percentages of the maximum local steady-state static pressure sampled, and contour maps of the constant percentages of pressure were machine plotted.

When the contour maps at the blade tips were plotted, the pressure fields with respect to the blade leading edges were observed to be shifted about three degrees tangentially in the direction of rotation, corresponding to a time delay of about 30 microseconds. However, this shift, which was nearly independent of rotor speed, did not appear in the nonsteady pressure plots obtained from the same data. The shift is therefore believed to have resulted from the data reduction procedure used to obtain the steady-state plots. Considerable time was spent trying to find the source of the shift either in circumferential relation between the time trigger and the blades or in unaccounted delays in the electronic equipment. Although the source was not found, the location of the blades was evident from the plots. Each steady pressure plot in the report has been corrected to place the blades in the proper positions. The amount of shift is presented in the Appendix D with the contour maps.

The procedures for obtaining the plots of unsteady pressures over the blade tips, the real and imaginary components of the unsteady pressures, and the phase angles for the unsteady pressures are given in Section 5.2.2.2.3

5.2.2.2.7 Blade-Mounted Kulites

Blade-mounted Kulites provided unsteady pressure amplitude and phase distribution for both the pressure and suction surfaces of the airfoil at two radial positions. Amplitudes were determined from the power spectral density for each signal over a frequency range of 0 to 2 kHz. The power spectral density data were confirmed by backup plots of amplitude against time during the two minute test period.

Cross-spectral density functions were used to determine the phasing of the pressure signals relative to the strain gage signal from No. 3 blade.

5.2.2.2.8 Hot Film Probes

The data obtained from the hot-film probes were analyzed using the same enhancement and reduction techniques used for the case-mounted Kulite data. Contour maps were not produced, however, because of the very low level of the signals at the flutter frequency.

5.2.2.2.9 Blade-Mounted Hot-Film Sensor

Blade-mounted hot-film sensors provided air velocity measurements on the blade suction and pressure surfaces at two radial positions. The flutter response from these sensors consisted of frequency, amplitude, and phase. Amplitude and frequency were obtained from the power spectral density for each signal over a frequency range of 0 to 2 kHz. The measured amplitude had a repeatability of +20 percent, making it possible to relate the data from one point to another. The strain gage on the No. 3 blade was used as the reference for determining phase angle. The resulting phase angles were compared with those from the blade-mounted Kulites and strain gages, and the accuracy of the measurements was comparable.

5.2.2.3 NASTRAN Prediction Procedure

In structural analysis of rotor blade systems, stresses and deflections are commonly calculated for both the stable and vibrating modes of operation by the NASTRAN finite element approach. To evaluate the effectiveness of this procedure, deflections of the TS22 rotor and blades were calculated and the results compared with measured values obtained during the test program.

NASTRAN calculations were made for both the stable and free-vibration mode for the TS22 rotor system. Calculations were made for speeds of 65, 73, and 75 percent of design. Calculations for vibrating conditions covered three through nine nodal diameter patterns. Because NASTRAN's cyclic symmetry analysis was used, only a one-blade wedge of the rotor was modeled. Rotor speed effects were included by adding a centrifugal prestress stiffness matrix to the conventional static stiffness matrix.

Finite element mesh diagrams for the blade is shown in Figure 12; the shroud and disk, not shown, were also modeled. Triangular plate elements and beam elements were employed for the NASTRAN calculations. The blade, shroud, and disk models were joined using multi-point constraint equations. On the basis of previous experience with the TS22 rotor analysis, shroud-to-shroud interfaces were assumed to be pinned together at a single center node in the cyclic symmetry analysis. The disk used for the TS22 rig was very stiff, and its flexibility did not contribute to the mode shapes.

5.2.2.4 <u>Blade-Work Interaction Calculation</u>

The flutter characteristics of the test rotor and the types of data obtained allowed for an evaluation of a theory of energy transfer that takes place during flutter. The assumptions associated with this theory are:

1) Self-excited vibrations occur in a bladed rotor when the energy supplied by the air stream exceeds the energy dissipated through the structural damping associated with that mode.

2) The complex rotor vibration mode can be defined as a summation of simple circumferential harmonic responses (i.e., Fourier decomposition).

3) The net aerodynamic energy of a mode is the algebraic sum of the aerodynamic energy associated with each harmonic response.

4) The susceptibility of a rotor vibration mode to flutter is a function of the stability of the individual harmonic responses.

An aerodynamic damping exists for each harmonic response. This damping is defined by the log decrement parameter, which is proportional to aerodynamic work divided by kinetic energy of the harmonic

$$\delta_{aero} = \frac{W_m}{E_m}$$

For positive values of the aerodynamic damping parameter, the energy flow is from the structure to the flow stream and in the reverse direction for negative values.

The aerodynamic work per cycle done by each of the individual harmonics is computed by integration

$$W_m = \int_{chord} \int_0^{2\pi} \Delta P_m \frac{dh_m}{d(\omega t)} \, d(\omega t) \, db$$

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ΔP_m = pressure jump across the airfoil from the mth harmonic and is of the form $\Delta P_m = P_m\ (x, y_p, t) - P_m\ (x, y_s, t)$

where:

y_p and y_s are blade surface coordinates on the pressure and suction surfaces at axial location x

h_m = deflection normal to the airfoil surface of the mth harmonic

(ωt) = position angle during the vibration cycle

b = chordwise location

ω = flutter frequency

t = time

The pressure at the airfoil tip at any axial location is the summation of the distribution resulting from individual blade harmonic motions.

$$P(x,y,t) = \sum_{m=1}^{N} P_m(x,y,t)$$

The pressure of each harmonic is defined by a fourier series described in Section 5.2.2.2.3.

$$P_m(x,y,t) = \sum_{n=-\infty}^{\infty} P_{mn}(x)e^{i(\omega t + \beta_{mn}y)}$$

These pressure waves are translated into the stationary system using the relationships given in Section 5.2.2.2.3.

$$P_m(x',y',t) = \sum_{n=-\infty}^{\infty} P_{mn}(x')e^{i[(\omega + (m + Nn)\Omega)t + \beta_{mn}y']}$$

The va ues of P_{mn} at frequencies (ω_{mn}=(m + Nn)Ω) are obtained by processing the casing wall Kulite signals through a wave analyzer. The frequency band of the recorded data was 40 kHz which at the maximum rotational test speed of the rotor permitted ten harmonics (i.e., $-10 \leq n \leq +10$) to be determined.

Since no direct measurement was made of the mode shape at the blade tip, a NASTRAN analysis was used to predict the deflections.

The predicted mode shapes were scaled and phased in accordance with the measured strain components to define the tip motion, hm, required to calculate the energy transfer in three dominant harmonic compcnents.

The kinetic energy per cycle of the individual harmonics was computed by integration:

$$E_m = \frac{1}{2} \int_{Chord} \int_{Span} \mu \tau \omega^2 \left(f_m^2 + g_m^2 + h_m^2\right) dl\ db$$

where:

μ	=	airfoil material density
τ	=	airfoil thickness
f_m, g_m, h_m	=	spatial components of deflection in the mth harmonic
	=	spanwise location coordinate
b	=	chordwise location coordinate
ω	=	flutter frequency

The NASTRAN mode shape energy levels were scaled in proportion with the strain component amplitude squared to determine the kinetic energy level of the individual harmonic responses.

SECTION 6.0

DISCUSSION OF PROGRAM RESULTS

6.1 OVERVIEW

The large body of time-correlated, high-quality data acquired has broadened our understanding of subsonic/transonic stall flutter. The more significant results were:

1. Deviations from uniform phase angle from blade-to-blade, previously attributed to insignificant anomalies in the data, are important, being indicative of a complex flutter characteristic.

2. Flutter alters the passage steady pressure pattern only slightly, as shown in the steady-pressure contours.

3. Work input is concentrated near the leading edge, as shown in the unsteady-pressure contours.

4. Local supersonic flow is required in order for this flutter to occur.

Details of these results and a discussion of possible causes of flutter are presented in the following sections. The bulk of the data obtained in this investigation and blade coordinate data are given in Appendices A through E:

Appendix A - Tabulations of Steady State Performance Data

Appendix B - Rotor Blade Coordinates

Appendix C - Part I, Steady Blade Structural Data
Part II, Unsteady Blade Structural Data

Appendix D - Part I, Steady Pressures
Part II, Unsteady Pressures

Appendix E - Hot Film Data

6.2 TEST MATRIX

Tests were run over a range of corrected speeds from 54 to 85 percent of design. A transient was run at each of several speeds from wide-open-throttle to surge, and the points of flutter initiation as well as the surge were determined. Data along the 70 percent speed line are shown in Figure 13.

The data points in Figure 13 were taken during a slow transient in which equilibrium conditions were not fully established. Furthermore, the pressure ratios were obtained from arithmetic averages of a limited number of rake readings. As noted on Figure 13, flutter was first indicated by the hot-film gages at about 67 percent of design flow, and the first indication of flutter on the strain gages appeared at about 63 percent of design flow. Surge occurred at about 56 percent of design flow.

A composite map for all test speeds is shown in Figure 14. These data were obtained at fully stabilized conditions and represent mass-weighted average performance. Flutter occurred at speeds between 63 and 75 percent of design. The flutter boundary shown on Figure 14 represents a blade vibratory stress level of ± 2068 N/cm^2 (3000 lbf/in.^{2}) as measured on the strain gage just above the shroud. Surge was encountered before flutter at speeds below 63 or above 75 percent of design.

Additional blade-element data and other aerodynamic performance detail are tabulated in Appendix A.

6.3 STRUCTURAL DEFORMATIONS

Steady-state structural deformations of the blades were determined from data from the optical mirror system. Unsteady deformations during flutter were determined from the optical mirror system, the strain gages, and by analysis of the high response pressure data.

6.3.1 Steady-State Deformations

The mirror system provided what is believed to be the first set of high quality data describing blade deformation at normal fan operating conditions. The results showed that the deformations under combined centrifugal and gas loads were close to the predicted levels, with slightly higher uncambering. Results are given in Appendix C, Table C-1.

Local steady-state untwist at from 35 to 85 percent of the design speed are shown in Figure 15 for the 95 percent span location. Above 25 percent speed the amount of untwist varied as the square of the rotational speed, as predicted. Below this speed, the midspan shroud was not seated, and the untwist varied in an unpredictable manner.

The distribution of untwist along the span at 73 percent speed is shown in Figure 16. Approximately equal amounts of untwist occurred above and below the shroud, which was at the 62 percent blade span and constrained untwist to near zero at this location. Untwist was essentially a function of speed only. The effects of gas loading were negligible. As shown in Figure 17, the variation of untwist with flow at 75 percent speed was less than 0.1 degree for a flow change from 70 to 59 kg/sec (155 to 130 lbm/sec), corresponding to a blade tip D-factor increase of 0.1764.

Measured untwist as a function of chordal position is shown in Figure 18 for 73 percent speed. Uncambering was significant at all stations above the shroud, exceeding 0.3 degrees near the blade tip.

Figure 19 shows both the measured untwist and the untwist calculated by the NASTRAN analysis. Generally, good agreement was obtained except close to the leading and trailing edges, where predicted deformation was greater than measured. Therefore, the measured uncambering at the tip was slightly higher than predicted. However, the deformations in this region, where the airfoil was very thin, were sensitive to the actual airfoil thickness, and slight variations within specified tolerance might have been sufficient to cause the observed discrepancies.

Additional steady-state deflection data are given in Appendix C, Part 1.

6.3.2 Unsteady Deformations

Previous to this program, fan flutter had been visualized as a sinusoidal, circularly traveling wave superimposed on the rotor, forming a single multinodal pattern, each rotor blade deflecting sinusoidally in sequence as the wave traveled around the rotor (ref. 3).

Such a wave was characterized by concentric ring nodes and traveling nodal diameters or diametral lines of zero deflection. Figure 20 shows such a system with two ring nodes and three nodal diameters. This pattern is referred to as a vibration in the second mode with three nodal diameters. On a rotating stage, the radial lines travel either forward or backward, and adjacent blades experience a relative time delay or phase difference (interblade phase angle) as the wave passes. With such a concept, all blades are assumed to flutter at the same frequency and amplitude, with uniform phase angles between adjacent blades.

The results of the current program revealed a different picture: all blades fluttered at the same frequency, but not at the same amplitude and interblade phase angles were not equal. Typical amplitudes and phase angles observed during the program are shown in Figures 21 and 22, respectively. These data were obtained from the strain-gage measurements. Amplitudes in Figure 21 are expressed in terms of measured stress. The patterns shown represent a family of spatial harmonics described by the superposition of a number of rotating nodal diameter patterns, each characterized by a different number of nodal diameters with different but uniform amplitudes and different but uniform phase indexing, with each pattern rotating at a speed that results in the same flutter frequency.

The detailed definition of the amplitude and phase for each nodal diameter pattern was determined from wall Kulite data. A result of this analysis is presented in Table VIII. As shown in the table the fifth nodal diameter pattern had the strongest signal at 67 percent speed. The seventh nodal diameter pattern was strongest at 73 percent speed, and the eighth was slightly stronger than the others at 75 percent speed.

To further study the complex mode shapes of the rotor and blading, stability calculations were made for the fifth, seventh, and ninth nodal patterns at 70 percent design speed. These patterns represented two strong signals and one weaker signal. The results of these calculations are given in Table IX in terms of the logarithmic decrement which is 2π times the ratio of available damping to critical damping. Since this number represents the percentage rise or decay of the signal, a negative value of the logarithmic decrement represents an unstable or flutter condition. Complete pressures used in the stability calculations (see equation at bottom of page 21) are listed in Table IX and plotted in Figures D-40, D-41, and D-42 for the upper and lower surfaces of the airfoil. The chordwise position of the pressures is the same as for the wall mounted Kulites from which the data was obtained.

Table IX shows that the fifth harmonic was the principal source of instability at 70 percent speed. The seventh harmonic was marginally unstable; the ninth, marginally stable. The results suggest that the effect of asymmetries, or "mistuning", on the system in flutter is to couple secondary modes into the instability. This is an important result, clearly demonstrating that any future flutter analysis that is to be correlated against test data for a mistuned bladed disk system must be capable of handling several spatial harmonics.

The present analysis is not capable of explaining the mechanism that determines what patterns will occur or what their relative indexing will be. However, the mechanism probably relates to the mistuning of the stage, which results from small dimensional differences among these airfoils. These airfoils had been deliberately grouped by frequency when the rotor was assembled, see Figure 2. And it may be significant that the group of airfoils with the highest flutter amplitudes were those that individually had natural vibratory frequencies equal to the average frequency for the blade set. It may also be significant that only forward traveling waves (traveling in the same direction as the rotor) were observed.

Additional stress level and phase angle data from strain gages are given in Appendix C, Part 2, Table C-2 and Figures C-8 through C-10. Blade deflection data from the mirror system were also reduced to obtain amplitudes of bending and torsional displacements during flutter. These data are tabulated in Tables C-3 and C-4 and plotted in Figures C-11 through C-15 of Appendix C, Part 2. These additional data corroborate the results presented above.

6.4 PRESSURE DISTRIBUTIONS

The study of the steady and unsteady pressure contours obtained with the case-mounted Kulites and unsteady pressures obtained from the blade-mounted Kulites revealed several important features concerning transonic compressors in general as well as the stall flutter phenomenon.

A review of the pressure contours outside and inside the flutter boundary showed the development of the shock structure with increasing rotor speed and the shifts in position of both the peak pressure point and the shocks with increased loading. In general, increasing rotor speed on a given operating line resulted in a strengthening of the expansion waves and normal shock and a shift rearward of the shock. Moving up a speed line to higher loading and incidence shifted the shock forward towards the leading edge. Crossing the flutter boundary produced little change although the normal shock appeared to have spread, which is probably indicative of shock oscillation. Details are presented in the following paragraphs.

6.4.1 Steady-State Pressure Distributions

At 63 percent speed outside of flutter, data from the case-mounted Kulites showed that high loading occurred at the leading edge and that the flow was subsonic (Figure 23). Moving up to a high operating line into flutter is shown in Figure 24.

At 67 percent speed on the low operating line, expansion waves occurred behind the leading edge, culminating in a shock at about 15 percent chord (Figure 25). At the flutter boundary at 67 percent speed, the shock appeared to be a gradual compression, which may be indicative of an oscillating shock (Figure 26).

At 70 percent speed outside the flutter boundary, supersonic Mach number expansion at the leading edge was more clearly evident, and the normal shock moved rearward to the 20 percent chord position (Figure 27). At the flutter boundary, the shock moved forward, very close to the leading edge (Figure 28). Near surge the leading edge expansions appeared to be weaker, but the passage shock appeared stronger (Figure 29).

At 73 percent speed on a low operating line (Figure 30), the shock moved further rearward to about the 30 percent chord position. Moving into flutter (Figure 31) the principal loading remained at the leading edge with the data showing considerable smearing of the normal shock. Essentially identical trends occurred at 75 percent speed (Figures 32 and 33).

Significant changes occurred at 85 percent speed. At this speed surge occurred before flutter. On the low operating line (Figure 34) significant reacceleration occurred behind the shock and the compression process was far from optimum, with negative lift occurring on the aft portion of the blade. Moving up the operating line (Figure 35) resulted in a high Mach number with strong leading edge expansion and a strong detached bow shock. Operating near surge (Figure 36) produced little change in this pattern.

Additional plots and tabulations of steady-state pressure distribution data are given in Appendix D, Part 1.

6.4.2 Unsteady Pressure Distributions

Unsteady pressure data were reduced to contours of unsteady pressure amplitude and contours of the real and imaginary components of the unsteady pressure to provide relative phasing information. Typical plots are presented in Figures 37, 38, and 39. To interpret these plots it should be noted that the real and imaginary components represent the instantaneous unsteady pressures at two time phases separated by 90 degrees. Hence, the square root of the sum of the squares of the real and imaginary amplitudes shown in Figures 38 and 39 is equal to the amplitudes shown in Figure 37, and the relative phase angle of the unsteady pressure is equal to the arctangent of the ratio of the real and imaginary components.

The data showed high unsteady pressures near the leading edge (back to approximately the 25 percent chord position), relatively low values near the trailing edge, and minimum amplitude near midchord. Similar trends were evident in the blade unsteady surface pressures measured by the blade-mounted Kulite (see Figure 40). The arrow lengths in this plot represent unsteady amplitudes and the directions represent phase angle as referenced to the strain-gage signal from the No. 3 blade. As shown, significant unsteady pressure amplitudes were confined to the leading edge portion of the airfoils.

These results clearly indicate that the major portion of the action was concentrated in the first quarter of the airfoil, implying that future flutter research should concentrate on the aerodynamics near the leading edge.

Additional unsteady pressure data and plots are given in Appendix D, Part 2.

6.5 VELOCITY FLUCTUATIONS FROM HOT FILM SENSORS

Hot-film probes were located ahead of and behind the rotor to determine the influence of flutter on the inlet and exit flows. Hot-film gages were also located on the rotating blades to determine velocity fluctuations occurring on the blade surface during flutter.

6.5.1 Upstream and Downstream Velocity Fluctuations

Enhanced wave forms from the hot-film probes ahead of and behind the rotor are shown in Figure 41 for two test points at 75 percent speed: one at wide open discharge, the other in the flutter region. Because these signals were not calibrated for amplitude, the magnitudes of fluctuation are not known. For the open discharge condition, the inlet signal at the blade tip showed a velocity fluctuation of blade passing frequency that was caused by the passage of expansion and shock waves emanating from the blades. There was no defined pattern at the inlet near the shroud and at the blade root where the relative inlet velocity was subsonic. At the rotor exit, a well defined blade wake pattern existed for all three radial positions. The inlet probe patterns in flutter, were similar to those for the nonflutter condition. Behind the rotor at the hub, the pattern was also similar to that for wide open throttle. However, at the near shroud and tip exit position, the blade wakes were not as well defined as for the nonflutter condition. The tip pattern had some random fluctuations at other than blade passing frequency, but did not show a significant fluctuation at flutter frequency.

6.5.2 Blade Surface Unsteady Velocities

Unsteady velocities and phase angles were determined from the hot-film gages mounted on the rotor blades. Data for a flutter condition at 67 percent speed are shown on Figure 42. The arrow length in this plot represents the amplitude of the unsteady velocity relative to the maximum fluctuation observed for that test point. The direction of the arrow indicates the phase angle referenced to the strain-gage signal from the No. 3 blade. The major fluctuations of velocity occurred on the forward part of the airfoil, but some significant fluctuations also occurred at midchord and near the trailing edge.

The blade-mounted hot-film data were not analyzed from the standpoint of determining flow separation from evaluation of turbulence levels. Determination of separation point location within the gage spacing can probably be obtained from the existing data, but the spectral analysis required is beyond the scope of the present analysis.

Additional hot-film data are given in Appendix E.

6.6 REDUCED VELOCITY VERSUS INCIDENCE ANGLE

Empirical correlations of reduced velocity versus incidence angle have been used extensively as a stall flutter criteria. The range of design types over which any specific correlation will accurately predict flutter boundaries, however, is questionable. Existing correlations were based on measured air angles, but blade metal angles were usually taken as the calculated metal angle at design speed. In this program, actual metal angles were measured. Figure 43 presents a plot of reduced velocity versus measured incidence angle. Incidence angles were based on the blade leading-edge mean-line metal angle. The reduced velocity parameter, $V/b\omega$, is the ratio of the relative inlet velocity, V_1', to the product of the blade half-chord, b, and the rotational flutter frequency, ω, in radians per second.

Figure 43 shows that flutter occurred at high incidence angles only over a limited range of reduced velocity values, with flutter-free operation being obtained at reduced velocities both above and below those at which flutter was achieved for a given incidence. A possible explanation is that locally supersonic flow may be required for flutter and that this was not achieved at low rotor speeds and velocity ratios, even at high incidence. At very high speeds and velocity ratios, the incidence was too low even at surge to support flutter.

Conventional values of incidence based on calculated design speed metal angles and reduced velocity parameters for any selected radial position can be obtained from interpolation of the blade element data in Appendix A and the blade chord data in Appendix B.

SECTION 7.0

SUMMARY REMARKS

Certain phenomena were consistently observed when flutter occurred, and some of these may be necessary for flutter.

7.1 LOADING LEVEL

Stall flutter is initiated by an increase in aerodynamic loading level, and reducing the loading level returns the stage to stable operation. The loading level at which flutter occurs, however, is not unique because small modifications to the airfoils--or sometimes simply reassembly of the rotor using a different blade sequence--will move the flutter boundary significantly.

7.2 LOCAL SEPARATION

Local separation has been a popular candidate as a cause of flutter. The physical concept by which separation, particularly oscillating separation, might put work into the system to induce flutter is conceptually attractive. In addition, such a theory would be consistent with the observed relationship between flutter and loading. Although the data analysis procedures used in this program did not clearly reveal regions of separation on the airfoils, a more detailed analysis might reveal that such separation did occur, at least on small areas of the airfoils.

7.3 OSCILLATING SHOCKS

Oscillating shocks is another intuitively attractive cause of flutter. The pressure step across the shock is on the order of 1.4 N/cm^2 (2 $lbf/in.^2$) and small oscillation could put work into the system. In addition, stall flutter does not occur, at least in the TS22 stage, at speeds below those where local supersonic flow occurs.

An oscillating shock would also be expected to produce a region of high unsteady pressure on the unsteady pressure amplitude contour plots. Such a region was not observed.

7.4 REDUCED VELOCITY VERSUS INCIDENCE

Empirical correlations of reduced velocity versus incidence have been used to predict flutter boundaries for stall flutter. This is essentially an extension of wing flutter theory. This empirical approach, however, has not been completely successful when applied to a variety of design types. The subject program supplied data for incorporation into existing correlations.

7.5 CENTER OF PRESSURE-CENTER OF TWIST

The relative position of the aerodynamic center of pressure and the structural center of twist has been considered significant in flutter. This theory states that flutter will occur if the effective aerodynamic center of pressure moves ahead of the structural center of twist of the airfoil. The case-mounted Kulites in this program gave data on pressure distributions in the blade tip region, which might give a clue to center of pressure location, but data at all radial positions must be considered in such an analysis.

SECTION 8.0

SUMMARY OF RESULTS

Although the program objective related primarily to the acquisition of data, several important conclusions can be drawn from the review of the data completed under the contract:

1. The agreement between the measured steady-state blade deflections and those predicted by NASTRAN calculations was good. The small deviations noted could have been due to slight deviations in blade leading and trailing edge thickness.

2. Unsteady work during stall flutter occurred almost entirely in the forward section of the airfoil.

3. The mode structure during stall flutter was more complicated than previously supposed, apparently because the effects of mistuning result from blade-to-blade variations that previously were assumed to be insignificant.

4. Much work remains to define the causes of stall flutter, but a clear correlation with loading has been identified.

5. Local supersonic flow over at least a portion of the airfoil appears necessary for stall flutter to develop.

SECTION 9.0

RECOMMENDATIONS

The development of a design system that will preclude stall flutter requires a better understanding of the physics of the phenomenon. This program provided new data for obtaining that understanding.

The next step should be a more detailed analysis of the available data to determine the behavior of such phenomena as mistuning, localized separation, shock oscillation, and the unsteady pressure change across the blades.

Such a detailed analysis would then suggest additional test programs in which the specific parameters identified as significant could be varied to quantify their effects.

An oscillating shock would also be expected to produce a region of high unsteady pressure on the contour plots. Although such a region was not observed, additional data might be extracted from the recorded data.

SECTION 10.0

REFERENCES

1. Stargardter, H: "Optical Determination of Rotating Fan Blade Deflections," Journal of Engineering for Power, April 1977, pp. 204-209.

2. Glawe, G. E.; Simms, F. S.; and Stickney, T. N.: "Radiation and Recovery Corrections and Time Constants of Several Chromel-Alumel Thermocouple Probes at High Temperature in High Velocity Gas Streams," NASA TM X-2170, 1971.

3. Mikolajczak, A. A.; Arnoldi, R. A.; Snyder, L. E.; and Stargardter, H.: "Advances in Fan and Compressor Blade Flutter Analysis and Predictions," Journal of Aircraft, April 1975, pp. 325-332.

4. Stargardter, H: U.S. Patent 4080823, "Vibration Measurement."

TABLE I

TS22 FAN STAGE DESIGN PARAMETERS

Aerodynamic	
Pressure ratio	
Rotor	1.702
Stage	1.67
Adiabatic Efficiency	
Rotor	0.871
Stage	0.838
Corrected Flow	95.56 kg/sec (210.67 lbm/sec)
Specific Flow (annulus at rotor inlet)	202.78 (kg/sec/m^2) (41.53 lbm/sec/ft^2)
Geometric	
Rotor Tip Diameter	0.8178m (2.7 ft)
Number of Blades	32
Hub Solidity	2.60
Tip Solidity	1.315
Hub/Tip Ratio (rotor leading edge)	0.32
Partspan Shroud Location (percent span from hub)	62

TABLE II

TS22 BLADE DESCRIPTION

Corrected Design Speed	11,042 rpm
Airfoil Series	Multiple Circular Arc
Aspect Ratio	3.6
Taper Ratio	1.5
Tip Speed	472.4 m/sec (1550 ft/sec)
Root Diameter	
Inlet	26.2 cm (10.3 in.)
Tip Diameter	
Inlet	81.7 cm (32.2 in.)
Exit	79.7 cm (31.4 in.)
Beta 1*[a]	
Root	54.999 deg
Tip	27.0399 deg
Beta 1* Suction Surface[b]	
Root	48.503 deg
Tip	25.398 deg
Chord Length	
Root	7.47 cm (2.94 in.)
Tip	10.42 cm (4.10 in.)

Notes:

(a) Beta 1* is the leading-edge metal angle, β_1^*, the angle between the tangent to the mean camber line and the meridional direction.

(b) Leading-edge metal angle based on suction surface.

TABLE III

LEADING EDGE ANGLE
BLADE INSPECTION RESULTS

Percent[a] Span	Design	Minimum	Maximum	Average	Design Value Minus Average Value
0.08	47°54'	47°40'	48°12'	47°50'	0°04'
0.12	46°10'	45°24'	46°0'	45°44'	0°26'
0.22	42°54'	42°16'	43°12'	42°42'	0°12'
0.32	40°54'	39°28'	39°46'	39°37'	0°30'
0.43	37°58'	37°18'	37°40'	37°29'	0°29'
0.52	36°52'	36°8'	37°0'	36°29'	0°23'
0.55	37°4'	36°50'	37°0'	36°55'	0°9'
0.58	37°10'	36°10'	36°28'	36°18'	0°52'
0.62	35°26'	35°0'	35°8'	35°2'	0°24'
0.66	34°36'	33°30'	34°54'	34°15'	0°21'
0.72	32°0'	31°48'	31°52'	31°5'	0°55'
0.82	28°50'	28°24'	28°44'	30°29'	0°14'
0.92	25°24'	25°4'	25°50'	25°29'	-0°05'
0.99	23°10'	22°56'	23°4'	22°58'	0°12'

Note: [a] Percent Span From Hub

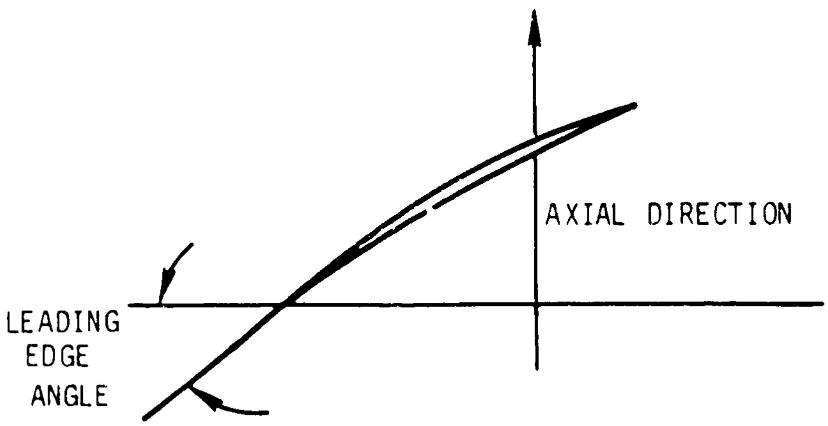


TABLE IV

TRAILING EDGE ANGLE
BLADE INSPECTION RESULTS

Percent[a] Span	Design	Minimum	Maximum	Average	Design Value Minus Average Value
0.08	96°50'	95°50'	96°2'	95°54'	0°56'
0.12	87°10'	86°14'	86°42'	86°28'	0°42'
0.22	69°56'	69°0'	70°16'	69°37'	0°29'
0.32	58°28'	57°58'	58°34'	58°14'	0°14'
0.42	49°8'	48°42'	49°0'	48°40'	0°18'
0.52	44°34'	43°44'	44°40'	44°7'	0°27'
0.55	43°42'	43°24'	43°30'	43°28'	0°14'
0.58	43°14'	42°22'	42°46'	42°37'	0°37'
0.62	41°0'	40°4'	40°28'	40°15'	0°48'
0.66	39°42'	49°4'	39°52'	39°25'	0°17'
0.72	35°28'	35°26'	35°38'	35°32'	0°4'
0.82	30°28'	30°14'	30°48'	30°29'	0°1'
0.92	24°24'	24°24'	25°0'	24°41'	−0°17'
0.99	21°58'	21°38'	21°56'	21°44'	0°14'

Note: [a]Percent span from hub

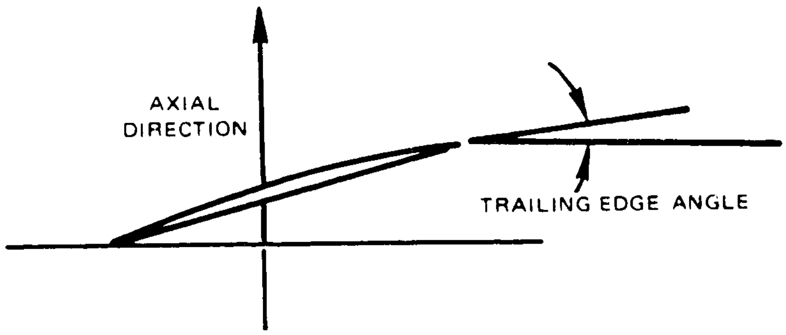


TABLE V

INSTRUMENTATION AND READOUT EQUIPMENT

<u>Non-Steady Instruments Recorded</u>

32 Strain gages

24 Hot films - blade mounted

4 Stationary hot film probes

10 Wall Kulites

<u>32</u> Blade mounted Kulites

102 Sensors

<u>Recorders</u>

1 70 channel multiplex

2 9 channels Sangamo

3 11 channels Sangamo

4 12 channels strain gage console

5 <u>4</u> channels strain gage console

106 channels

Each of the five recorders had strain gage 3 in parallel as a common signal to permit time correlations between any of the 102 sensors.

TABLE VI

HIGH RESPONSE INSTRUMENTATION SPECIFICATIONS

Kulite - Model XCQL-8V-808	
Rated Pressure:	17.24 N/cm^2 (25 $lbf/in.^2$)
Sensitivity:	3.8 x 10^4 $mV/N/m^2$ (2.62 $mV/lbf/in.^2$)
Temperature Compensation	278K to 422K (40^oF to 300^oF)
Acceleration Sensitivity:	
Traverse	0.00004% Full Scale Gage
Perpendicular:	0.0002% kHz
Natural Frequency	230 kHz
Non-Linearity and Hysteresis:	$\pm$0.75% full scale maximum
Kulite - Model LQL5-080-25S	
Rated Pressure:	17.24 N/cm^2 (25 $lbf/in.^2$)
Sensitivity	3.8 x 10^{-4} $mV/N/m^2$ (2.62 $mV/lbf/in.^2$)
Temperature Compensation:	278K to 422K (40^oF to 300^oF)
Acceleration Sensitivity:	
Transverse:	0.00008% Full Scale Gage per g
Perpendicular:	0.0004% Full Scale Gage per g
Natural Frequency:	125 kHz

Quartz Hot Film

Thermo-systems model 1210-60

0.0154 cm (0.006 in.) quartz rod with platinum sensor deposited 0.203 cm (0.080 in.) between posts

Temperature coefficient of resistance = 0.0026 ohm/ohm-^oK

Frequency Response at 91.44 m/sec (300 ft/sec): 200 kHz

TABLE VII

TS22 NASA FLUTTER TEST
TEST MATRIX

Run Number	Speed Code	Point Number	Unsteady Record	Percent Speed	Percent Corrected Design Flow	Rotor Pressure Ratio	Remarks
					Shakedown All Mirrors		
001	70	01	20-27	70	72.8	1.228	Wide Open Discharge
--	--	--	28	70	--	--	Closing Discharge Valve, Transient into Flutter
001	70	05	43	70	66.9	1.2722	Check Point Wide Open Discharge
--	--	--	64T	--	--	--	Transient
003	63	01	71	63	65.8	1.1776	Wide Open Discharge
003	63	03	76-84	63	53.4	1.2374	Stress Level Fluctuating, Shakedown Complete
					Performance All Mirrors		
003	73	01	86-94	73	74.7	1.2[illegible]87	Wide Open Discharge
003	73	02	100-108	73	60.0	1.3[illegible].7	Maximum Flutter
					3 Watt Laser 4 Rows Mirrors (Above Shro[illegible]d)		
004	70	03	128-135	70	59.8	1.3[illegible]4	70% Low Flutter Point
004	67	01	136-143	67	68.5	1.1890	Wide Open Discharge
004	75	01	176-183	75	75.3	1.2840	Wide Open Discharge
004	75	04	195-202	75	60.3	1.3369	Maximum Flutter
005	73	08	220	70	56.5	1.2978	
					All Mirrors 3 Watt Laser		
007	66	01	239	66	54.5	1.26	Maximum Flutter
007	60	01	242-249	55	52.0	1.1530	Near Surge (Rotating Stall)
007	85	02	279-286	85	85.8	1.3792	Wide Open Discharge
--	--	--	287	--	--	--	Transient To Surge
007	85	05	288-295	85	75.1	1.4862	Near Surge

TABLE VIII

UNSTEADY WALL PRESSURE AMPLITUDES FOR INDIVIDUAL NODAL DIAMETER PATTERNS FUNDAMENTAL MODES ONLY (NO HARMONICS)

Nodal Diameters	Relative Power Spectral Density									
	Percent Chord									
	-55.4	-15.1	-3.6	9.4	22.2	34.6	47.5	73.4	99.3	141.4
67 Percent Speed										
2										
3				30						
4			40	45		24	25	33	34	
5				65	58	50	100	140	220	
6				65	60	60	50	75	70	
7				65	70	75	70	85	80	
8				100	140	80	80	85	60	
9				85	100	45	35	28	20	
10							30			
73 Percent Speed										
2										
3								26	24	25
4						40	36	24	57	41
5	9	25			96	54	78	100	140	170
6	10	32			92	59	86	74	150	125
7	24	84	96	68	165	240	180	340	270	280
8	35	77		130	165	150	140	160	150	120
9				110		88	75	44	35	38
10	26			125			80	34	31	24
75 Percent Speed										
2										
3								18	17	
4								25	20	
5				50	100	55	39	45	60	
6				50	80	78	70	70	100	
7					120	70	50	45	45	
8					140	110	78	55	75	
9					120	85		45	35	
10										

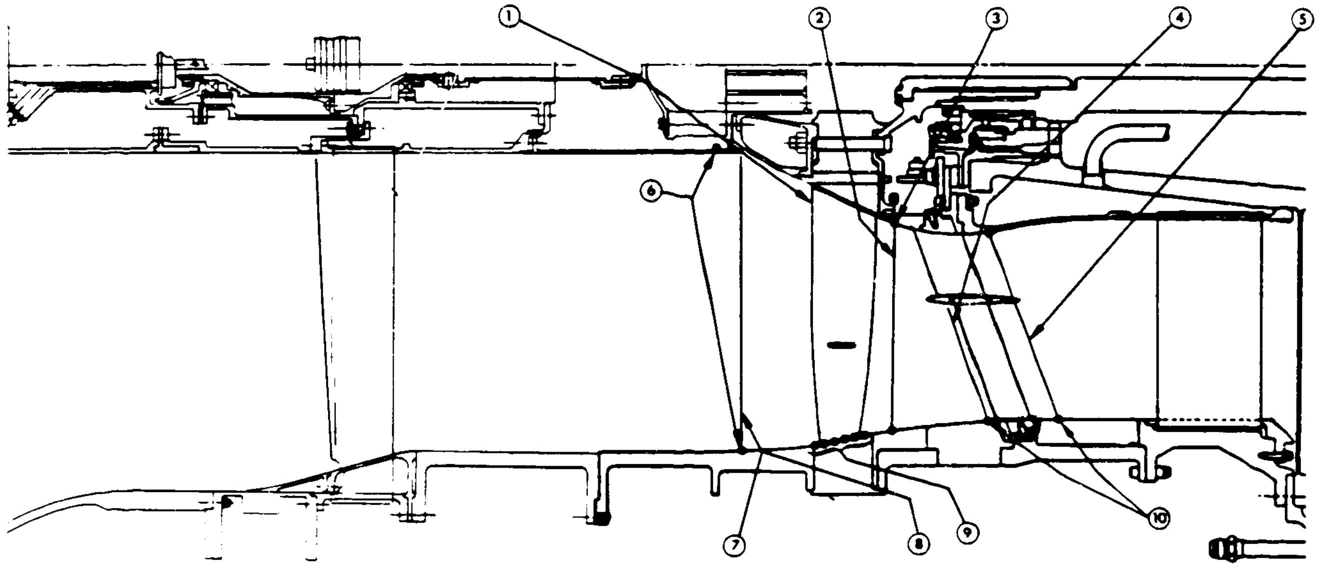
TABLE IX

COMPUTED DAMPING IN DOMINANT HARMONICS AT 70 PERCENT SPEED

Harmonic	Log Decrement
5	-0.012
7	-0.001
9	+0.002

Complex pressures used in damping calculation normalized to 1600 N/m^2 (0.232 lbf/$in.^2$).

Percent Chord	Upper Real	Upper Imaginary	Lower Real	Lower Imaginary	
-3.4	0.039	-0.091	0.022	-0.022	5 Nodal Diameters
9.4	0.573	-0.681	0.056	-0.134	
22.2	0.504	-1.000	-0.254	-0.060	
34.6	0.095	-0.125	-0.069	-0.050	
47.5	0.030	-0.24[illegible]	-0.086	-0.142	
73.4	0.138	-0.08[illegible]	-0.108	-0.086	
99.3	0.198	-0.026	-0.228	-0.039	
-3.4	-0.065	0.01	0	0.043	7 Nodal Diameters
9.4	-0.250	0.190	0.039	0.026	
22.2	-0.177	0.384	-0.091	0.241	
34.6	-0.091	0.056	-0.121	0.052	
47.5	-0.095	0.060	-0.129	0.052	
73.4	-0.129	-0.004	-0.112	0.004	
99.3	-0.112	-0.052	-0.147	-0.043	
-3.4	-0.112	-0.099	0.009	-0.009	9 Nodal Diameters
9.4	-0.030	-0.259	-0.069	-0.134	
22.2	-0.181	-0.134	-0.129	-0.091	
34.6	0.017	-0.034	-0.043	-0.043	
47.5	-0.030	-0.172	-0.052	-0.164	
73.4	-0.043	0.056	-0.017	0.060	
99.3	0.043	-0.194	0.022	-0.233	



(1) 20 MIRRORS LOCATED AT
7 RADIAL POSITIONS

20 STRAIN GAGES LOCATED ON
10 DIFFERENT BLADES
16 BLADE MOUNTED
HOT FILMS

1 STRAIN GAGE PER BLADE

32 HIGH RESPONSE PRESSURE
TRANSDUCERS ON 8 DIFFERENT
BLADES LOCATED TO OBTAIN
MEASUREMENTS AT 7 RADIAL
POSITIONS

(2) 2 HOT FILM PROBES TRAVERSED
TO 7 RADIAL POSITIONS

TOTAL AND STATIC PRESSURE,
TOTAL TEMPERATURE, FLOW ANGLE
ON ONE COMBINATION PROBE
TRAVERSED TO 7 RADIAL POSITIONS

2 WEDGE PROBES TRAVERSED TO
7 RADIAL POSITIONS

(3) 4 INNER WALL STATIC
PRESSURE TAPS

(4) TOTAL PRESSURE, STATIC
PRESSURE AND FLOW ANGLE

2 WEDGE PROBES TRAVERSED
TO 7 RADIAL POSITIONS

(5) 2 COMBINATION PROBES TRAVERSED TO
7 RADIAL POSITIONS

3 DUAL TOTAL TEMPERATURE AND
TOTAL PRESSURE PROBES WITH
KIEL HEADED SENSORS LOCATED AT 9
RADIAL POSITIONS. THESE ARE
LOCATED APPROXIMATELY 120°
APART IN A CIRCUMFERENTIALLY,
ROTATABLE TRAVERSE RING THAT
CAN BE POSITIONED TO PROVIDE AT
LEAST 11 TOTAL PRESSURE AND
TOTAL TEMPERATURE READINGS
ACROSS A ONE ID STATOR VANE
GAP AND TWO OD STATOR VANE
GAPS

(6) STATIC PRESSURE
4 ID AND OD WALL STATIC
PRESSUE PRESSURE TAPS

(7) TIME VARIATION IN
LOCAL MASS FLOE FLOW
(VZ)

BY 2 HOT FILM PROBES
TRAVERSED TO
7 RADIAL POSITIONS

(8) 2 WEDGE PROBES TRAVERSED
TO 7 RADIAL POSITIONS

(9) 10 KULITE
SENSORS

10 STATIC
PRESSURE
TAPS

(10) 4 OUTER WALL STATIC
PRESSURE TAPS

ADDITIONAL INSTRUMENTATION

GEARBOX	ROTOR ROTATIVE SPEED (RPM)	2 IMPULSE TYPE PICKUPS
INLET DUCT	FLOW RATE	CALIBRATED ORIFICE
ROTOR INLET	TOTAL PRESSURE	6 WALL STATIC PRESSURE TAPS LOCATED IN THE PLENUM CHAMBER
	TOTAL TEMPERATURE	6 BASE WIRE CHROMEL ALUMEL THERMOCOUPLES LOCATED IN THE PLENUM CHAMBER

Figure 1 Schematic Diagram of TS22 Rig

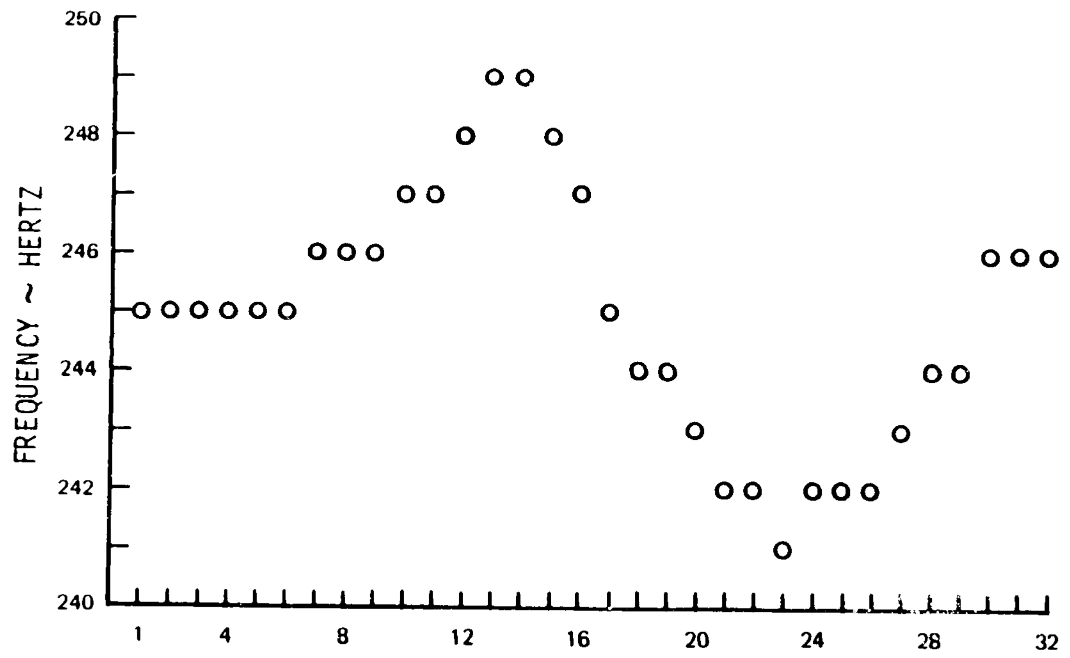


Figure 2 Distribution of Natural Second Mode Vibration Frequencies of Blades in Assembled Rotor

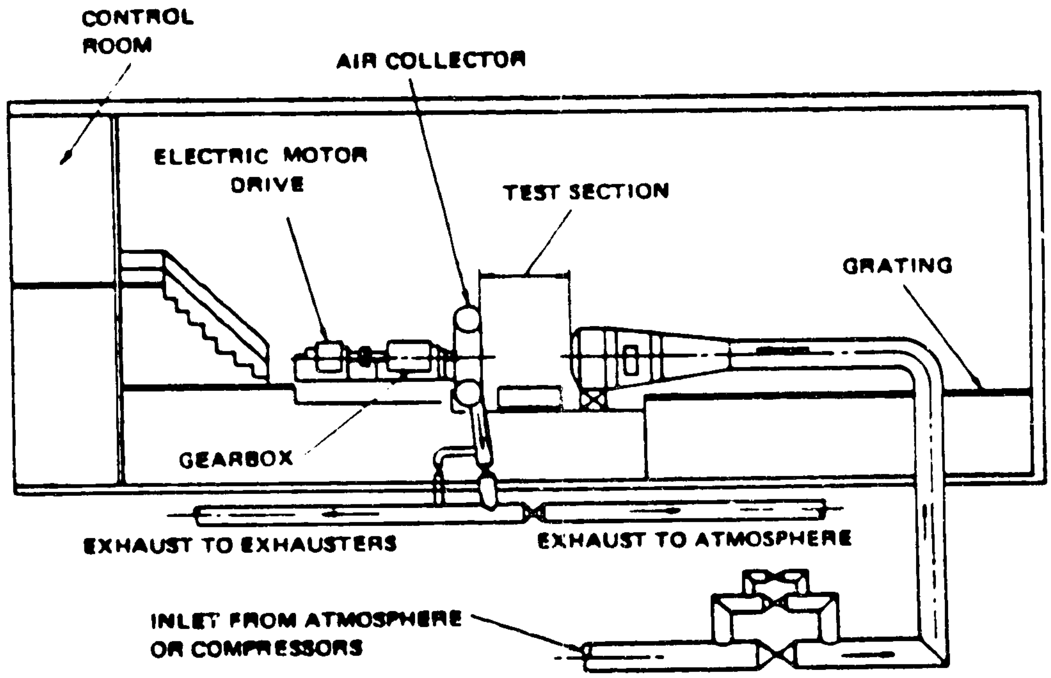


Figure 3 Schematic of X-204 Test Stand

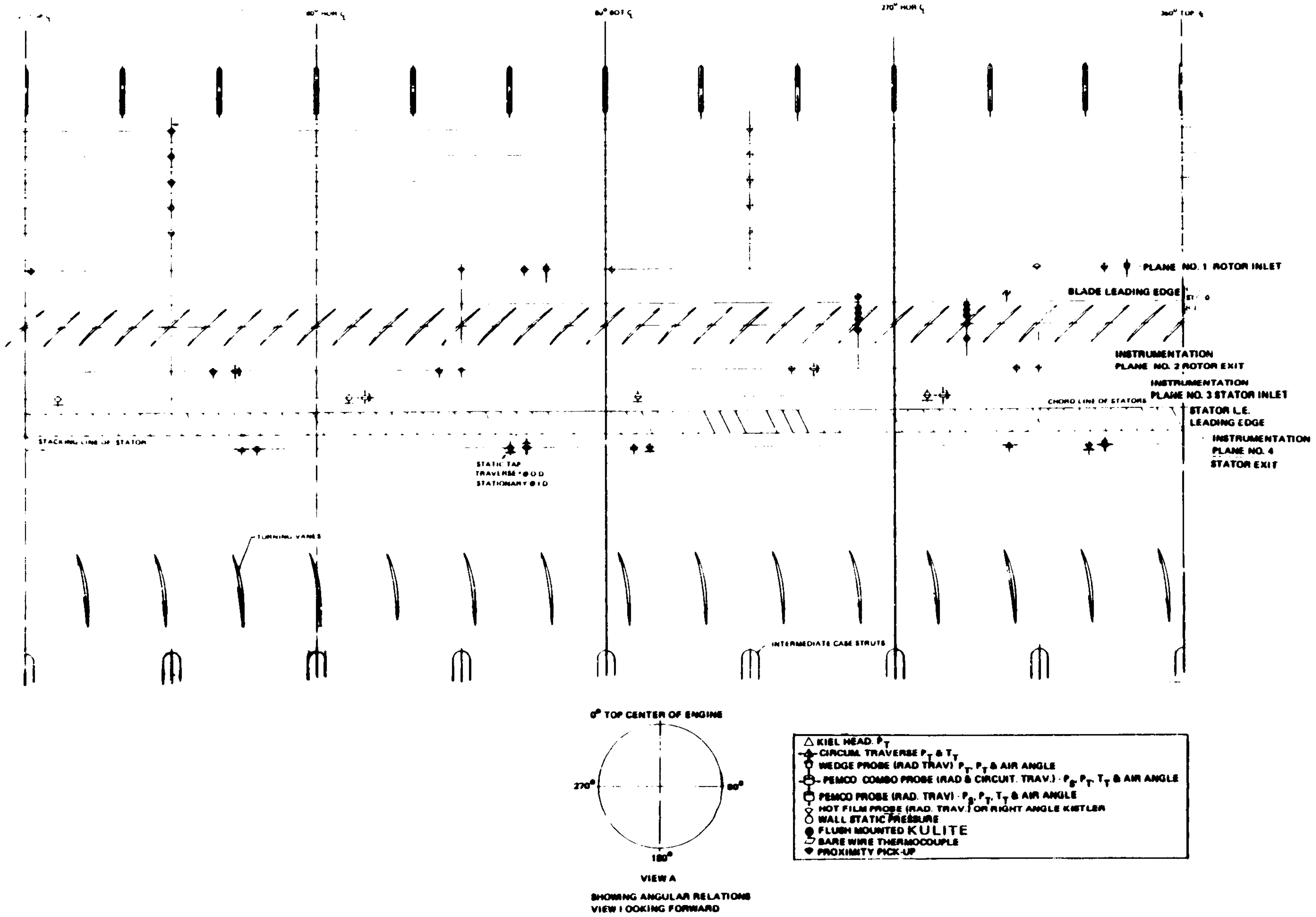


Figure 4 Circumferential Schematic View of TS22 Compressor Instrumentation

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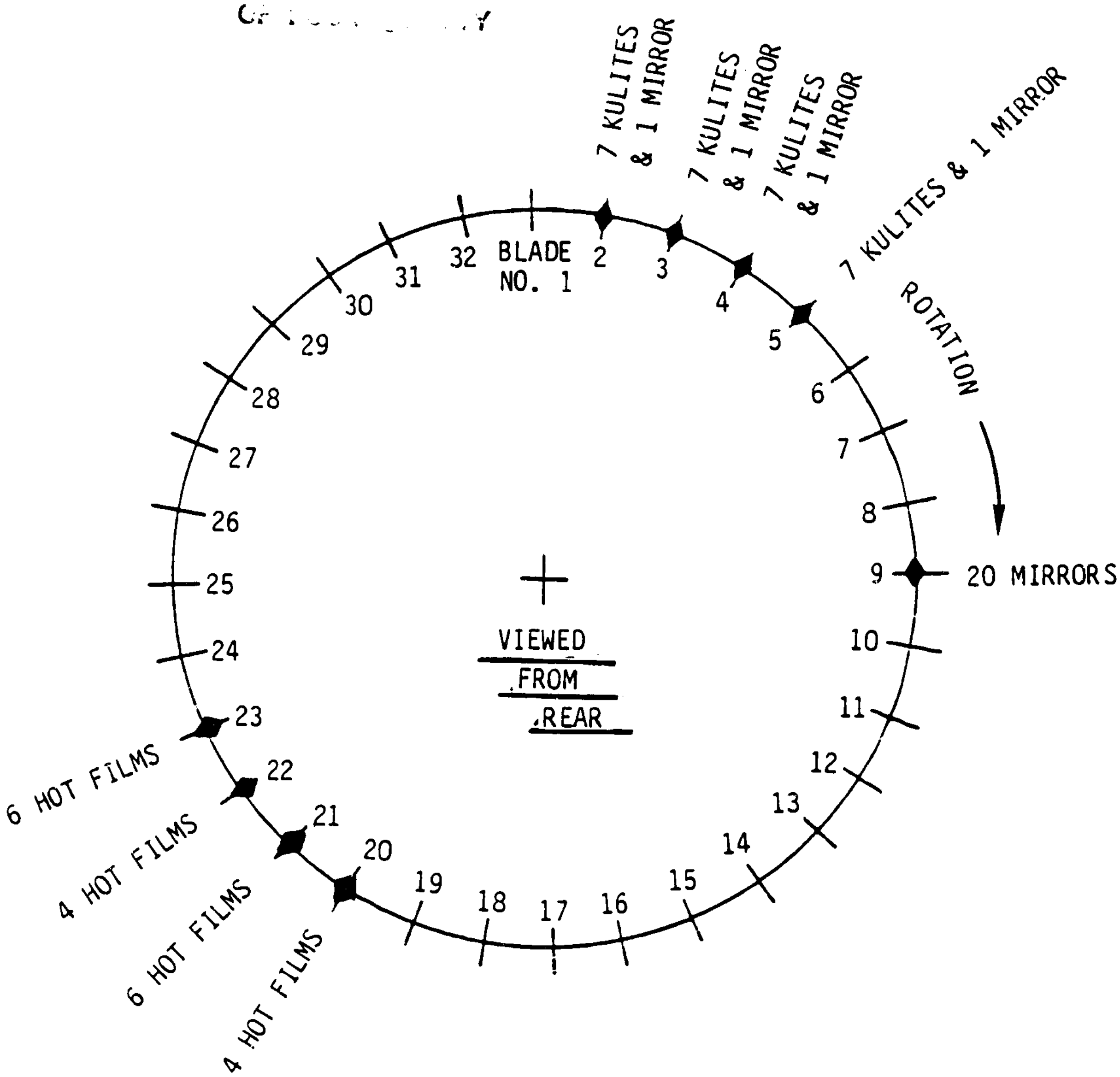


NOTE

ALL BLADES HAD ONE
ASMT STRAIN GAGES

Figure 5 Circumferential Location of Blade Instrumentation

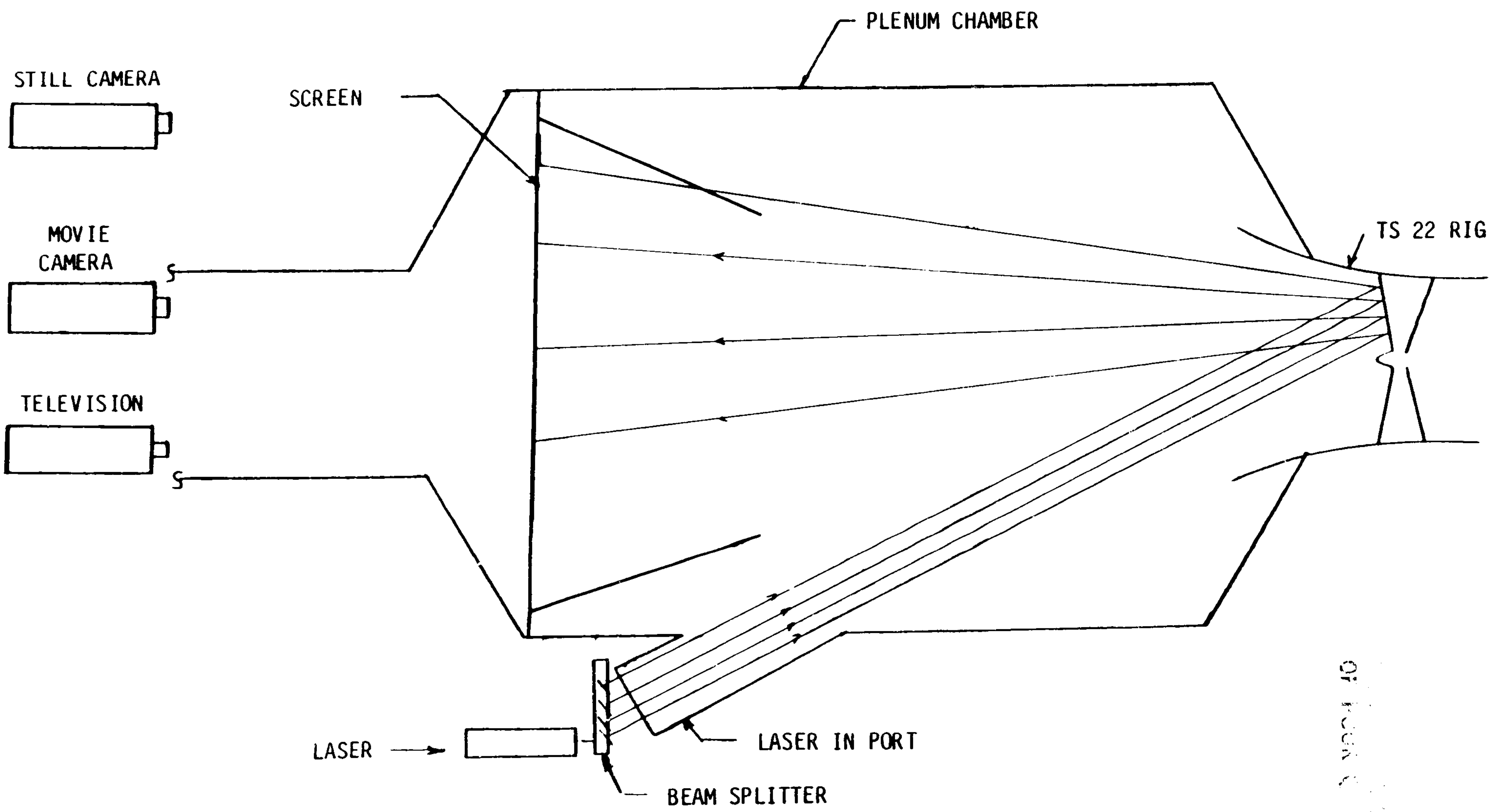


Figure 6 Schematic of TS22-X204 Laser Configuration

BLADE MIRROR LOCATION

BLADE NUMBER	PERCENT SPAN (a)	PERCENT CHORD (b)			
2	86.3			50	
3	86.3			50	
4	66.0			50	
5	66.0		25		
9	95.2	5	25	50	70
	86.3	5	25	50	70
	76.4	5	25	50	
	66.0	5	25		
	55.0	5	25	50	
	47.0	5	25		
	38.0	5			
	20.0	5			

Note: (a) Percent Span From Hub

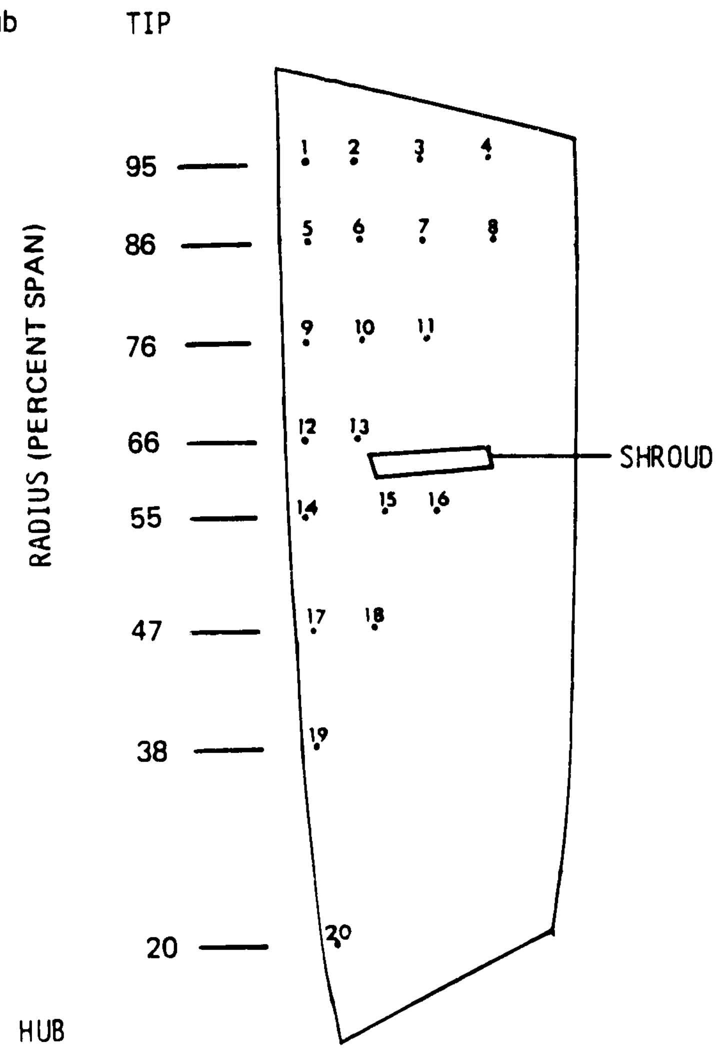
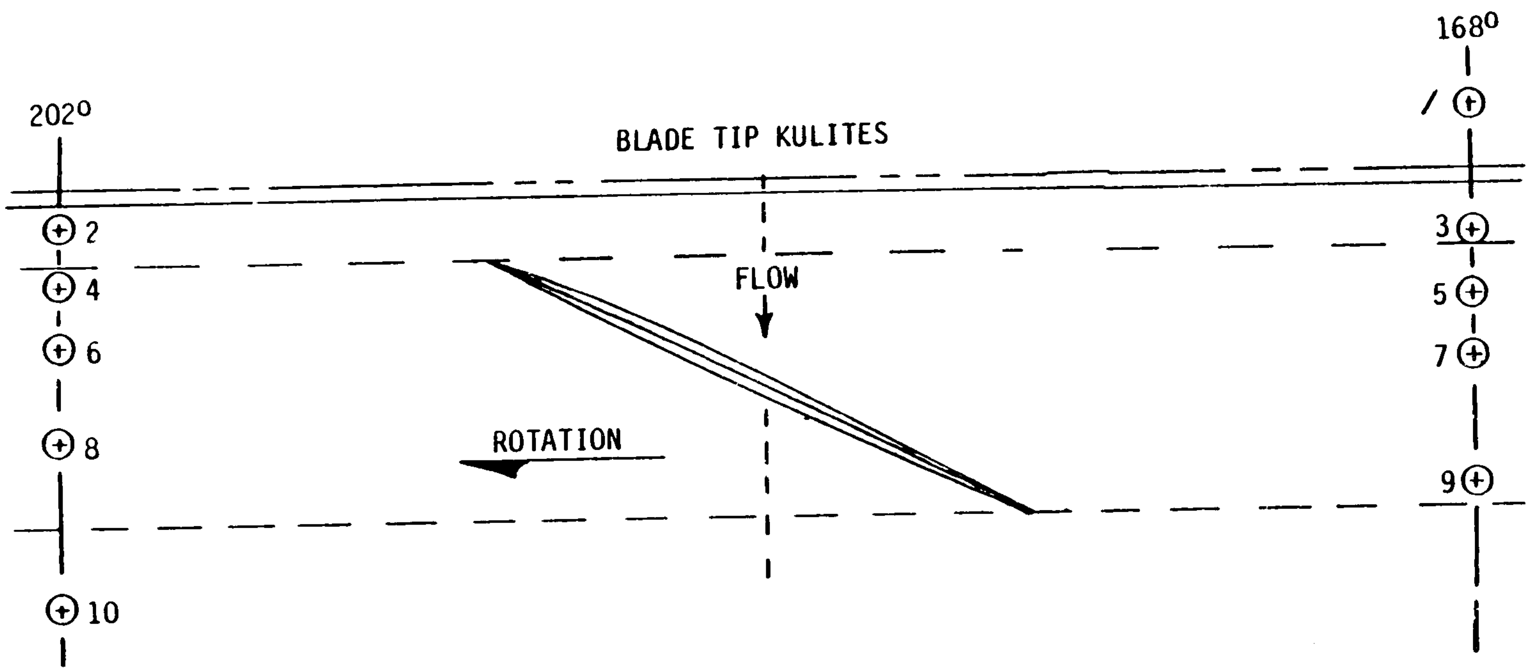
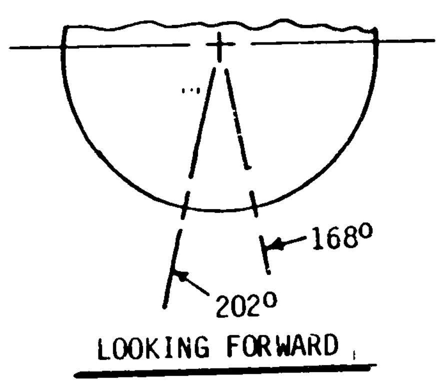


Figure 7 Mirror Installation Locations





REF.	∡	PERCENT CHORD FROM LEADING EDGE
1	168°	-55.4
2	202°	-15.1
3	168°	-3.6
4	202°	9.4
5	168°	22.2
6	202°	34.6
7	168°	47.5
8	202°	73.4
9	168°	99.3
10	202°	141.4

Figure 8 Installation Locations For Case-Mounted Kulite Pressure Transducers

LOCATION OF KULITE TRANSDUCERS
ON BLADE SURFACE

Blade No.	Percent Span (a)	Probe Location (Percent Chord) (b)											
		Pressure Surface						Suction Surface					
2	76.4	5	15	25	40	65	90	5		25			
3	76.4	5		25				5	15	25	40	65	90
4	86.3	5	15	25	40	65	90	5		25			
5	86.3	5		25				5	15	25	40	65	90
6	86.3										50		

Note: (a) Percent Span From Hub
(b) Percent Chord From Leading Edge

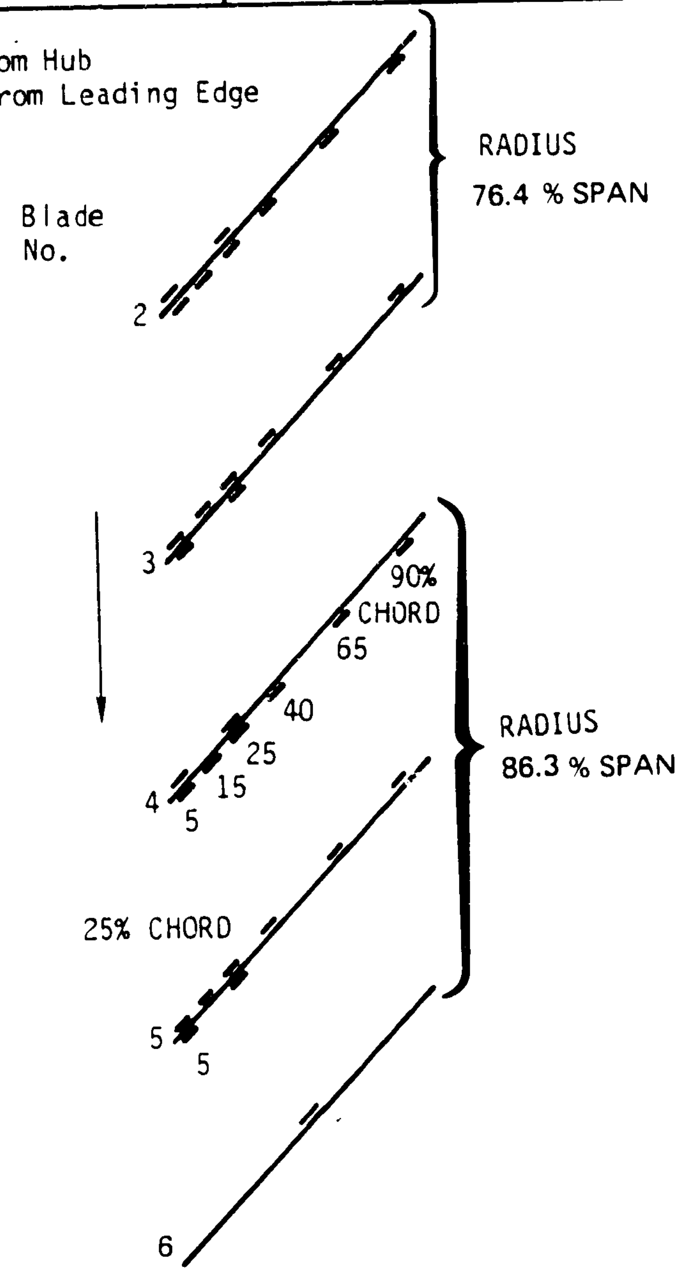


Figure 9 Installation Locations For Blade-Mounted Kulite Pressure Transducers

Location at Hot-Films On Blade Surface

Blade No.	Percent Span[a]	Probe Location (Percent Chord)[b] Pressure Surface		Suction Surface					
20	76.4	5	40	5			40		
21	76.4			5	15	25	40	65	90
22	86.3	5	40	5			40		
23	86.3			5	15	25	40	65	90

Note: (a) % Span From Hub

(b) % Chord From Leading Edge

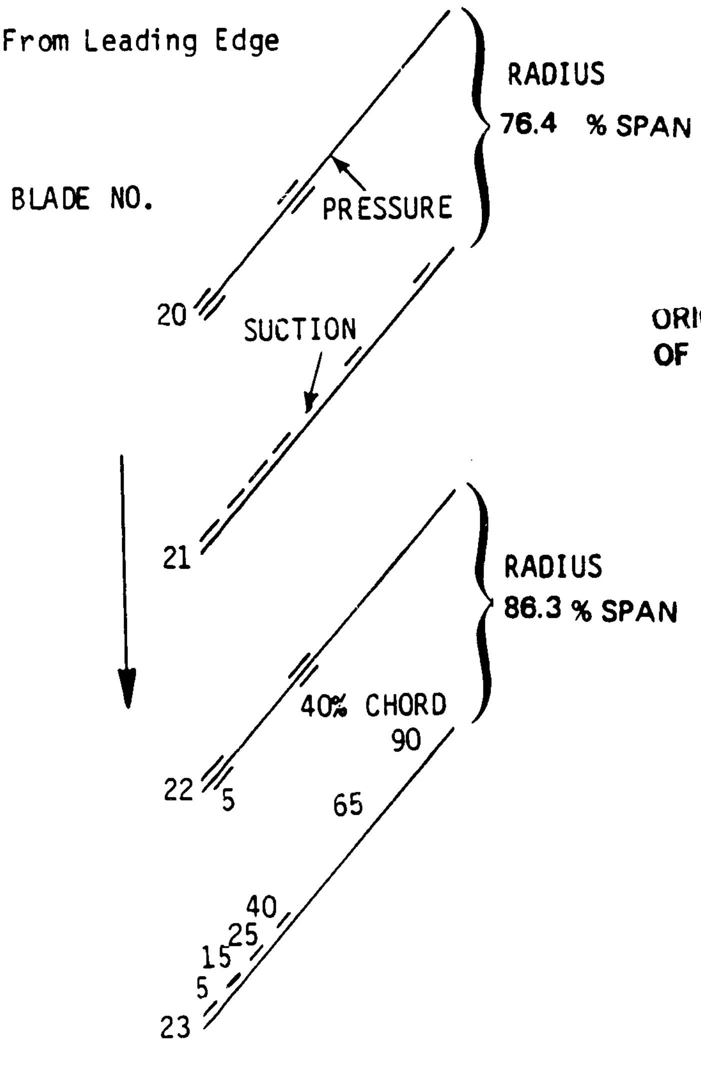


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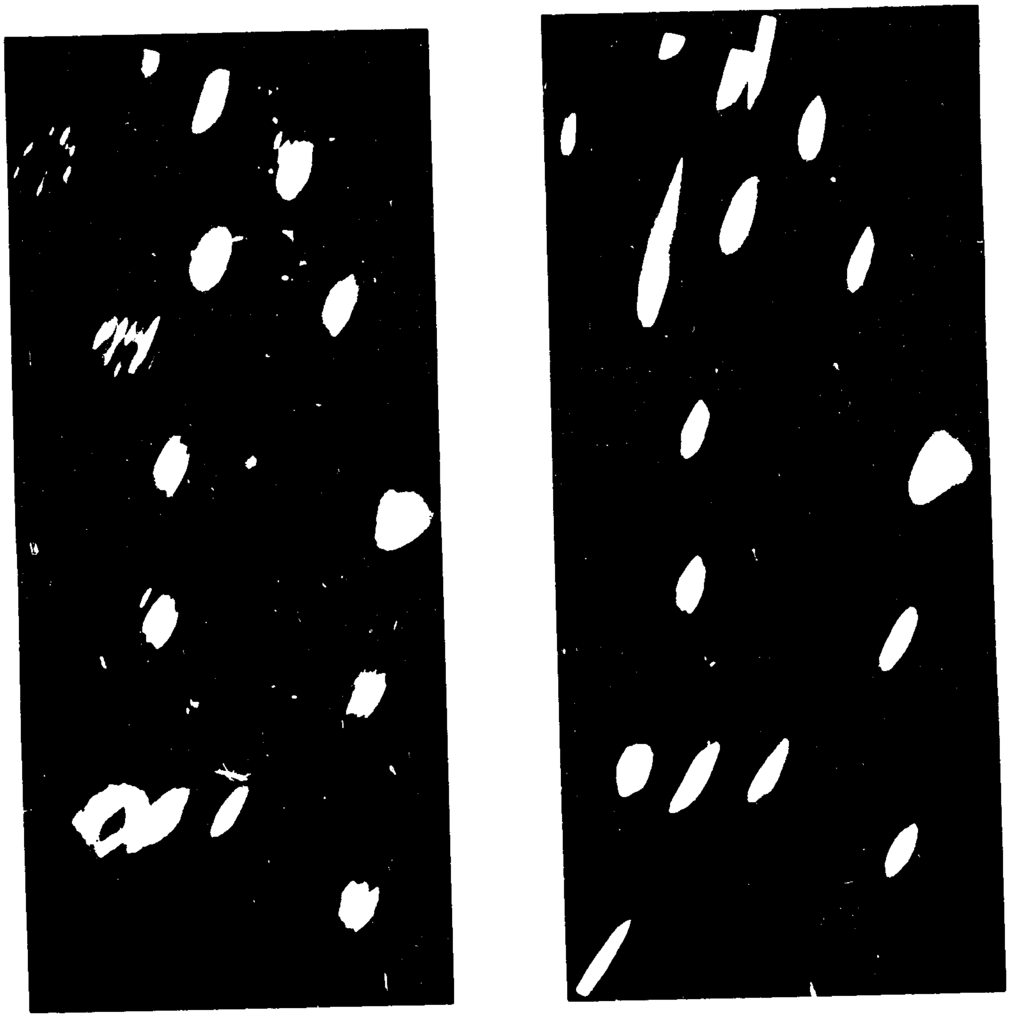
Figure 10 Installation Locations For Blade-Mounted Hot-Film Sensors



FLUTTER NO FLUTTER

Figure 11 Typical Laser Mirror Results for Operation at 67 Percent Speed In and Out of Flutter

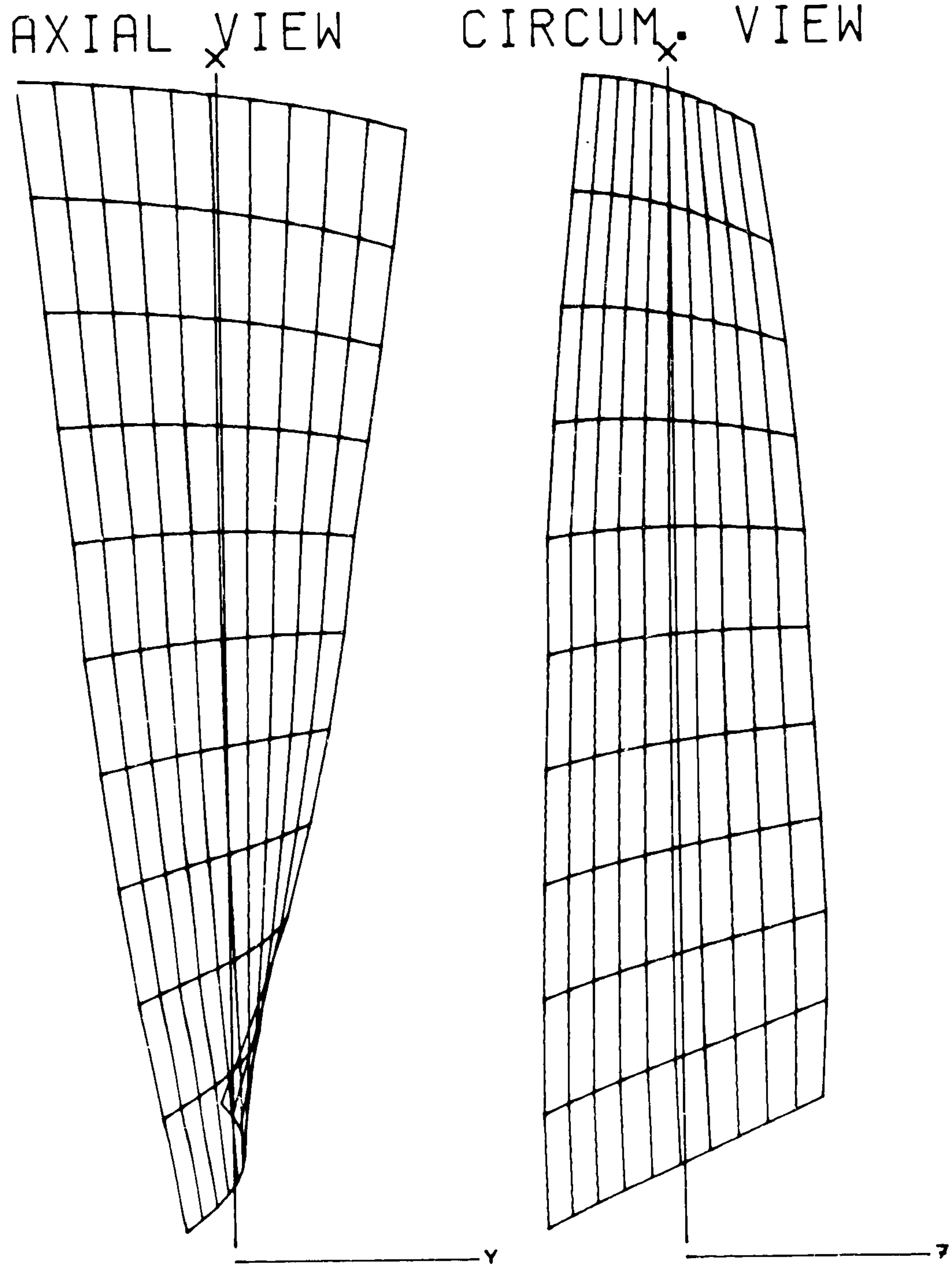


Figure 12 Finite Element Diagrams Used for NASTRAN Analysis

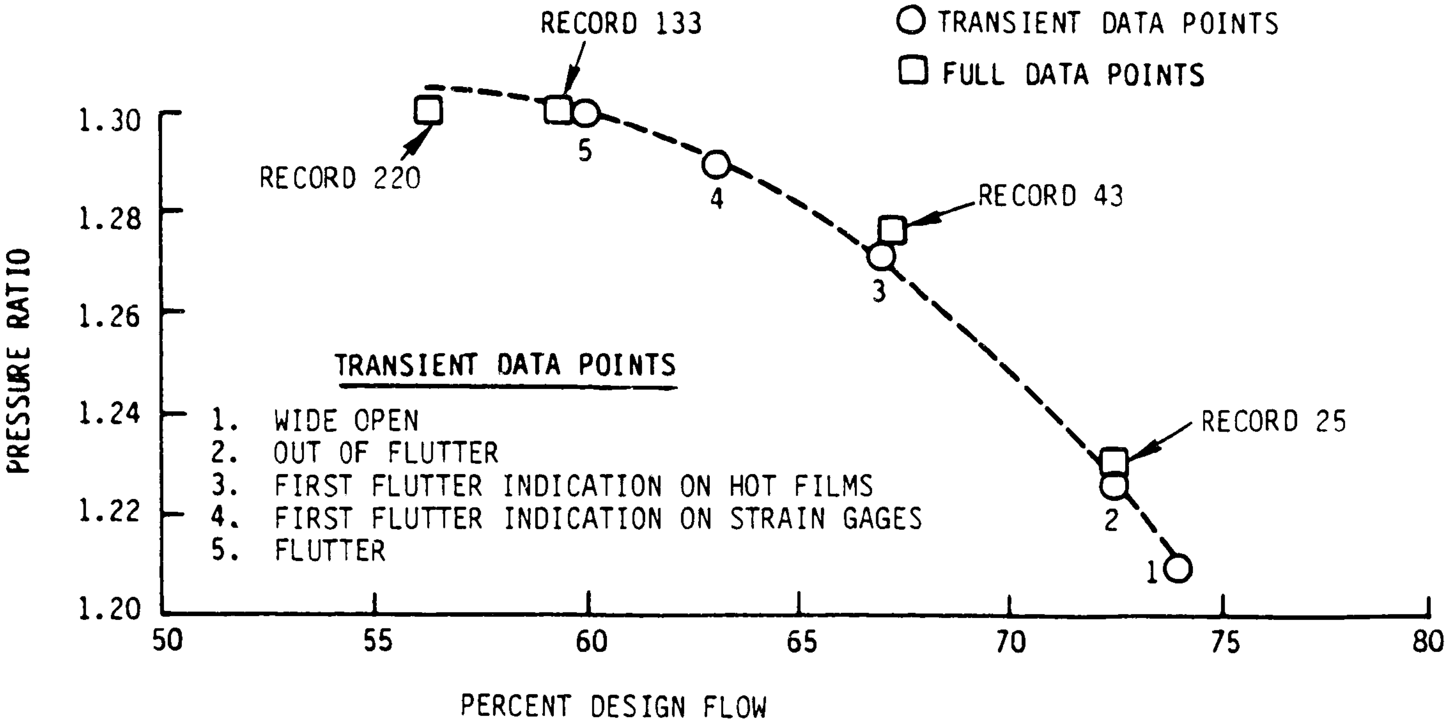


Figure 13 Identification of Data Points at 70 Percent Speed, Including Transient From Open Discharge Into Surge

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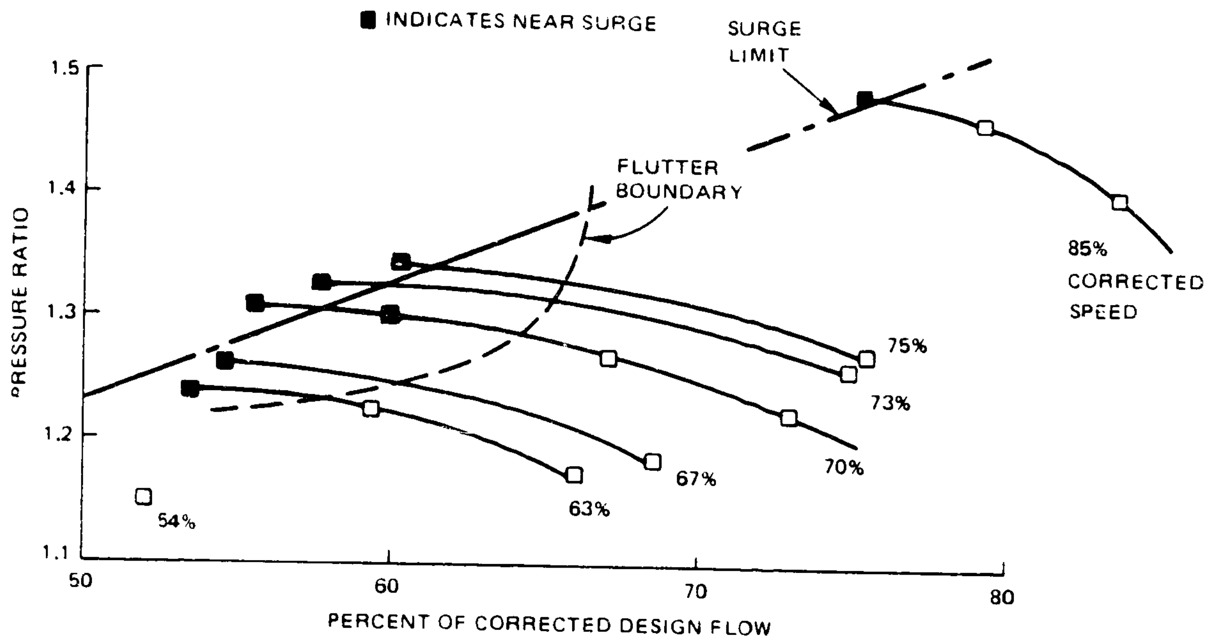

Figure 14 TS22 Performance Map Showing Test Points In Relationship To Flutter Boundary

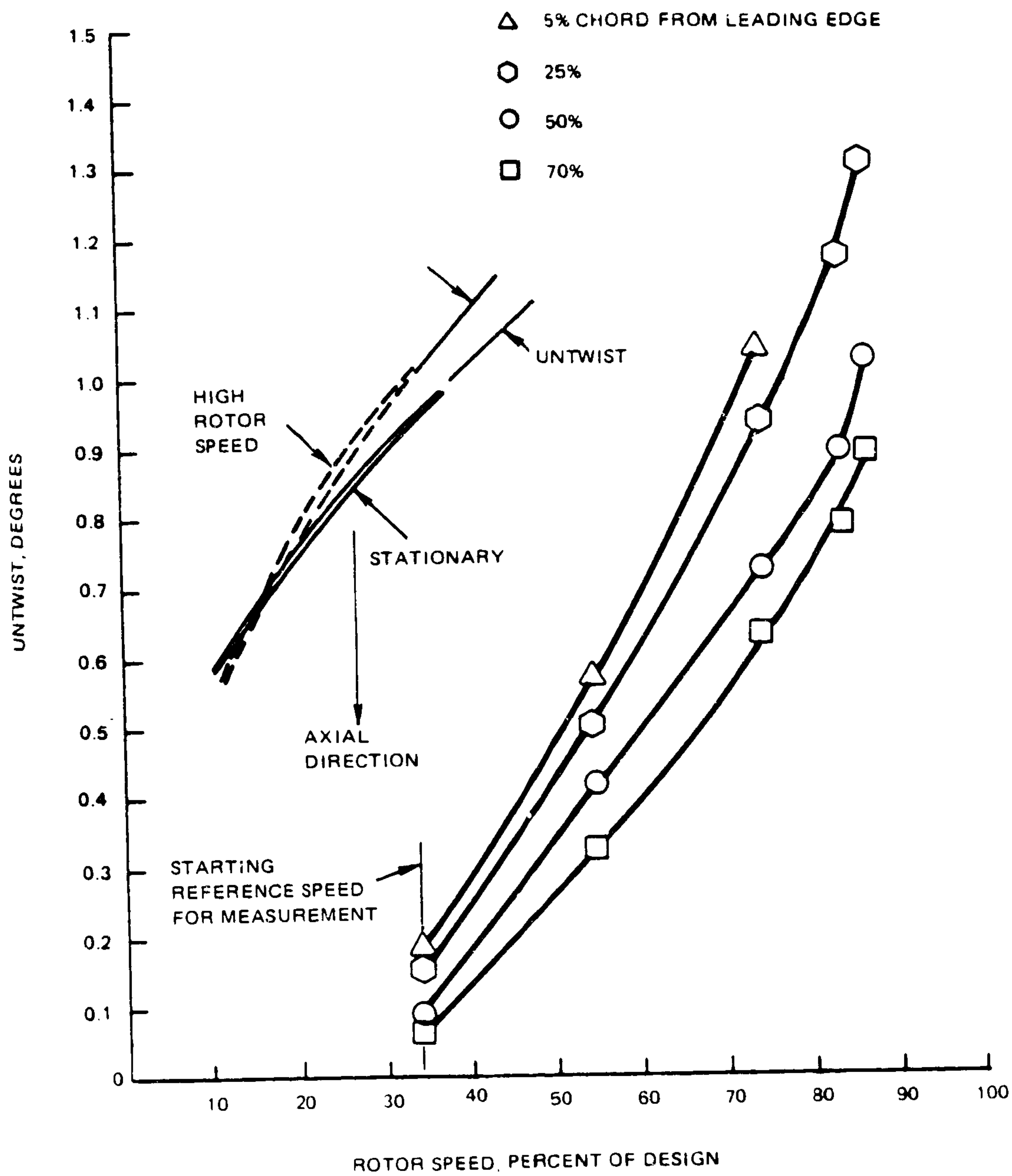

Figure 15 Measured Untwist for TS22 Fan Blade as a Function of Rotor Speed at 95 Percent Span

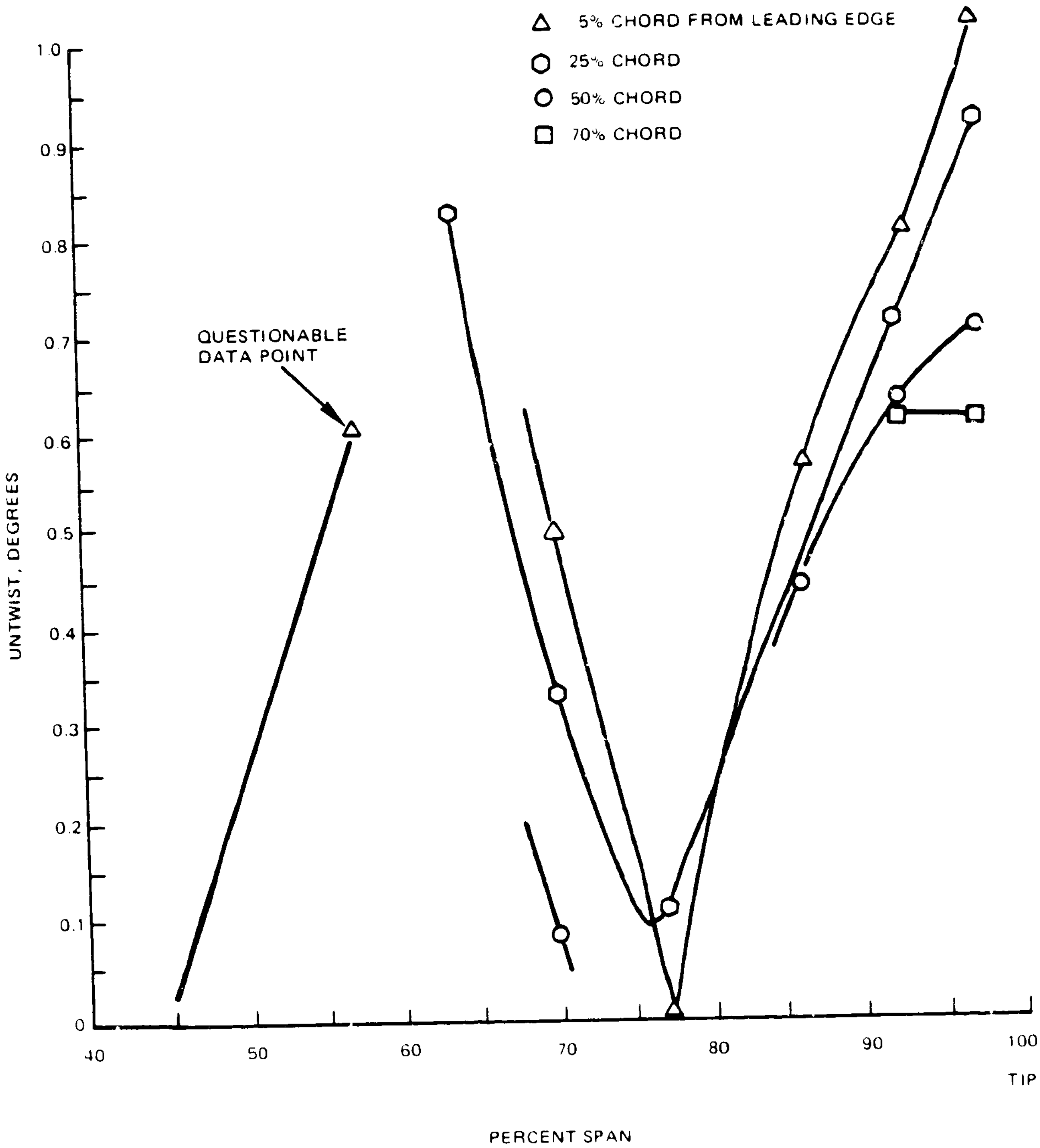

Figure 16 Measured Untwist for TS22 Fan Blade at 73 Percent Speed Relative to Untwist at 25.4 Percent Speed

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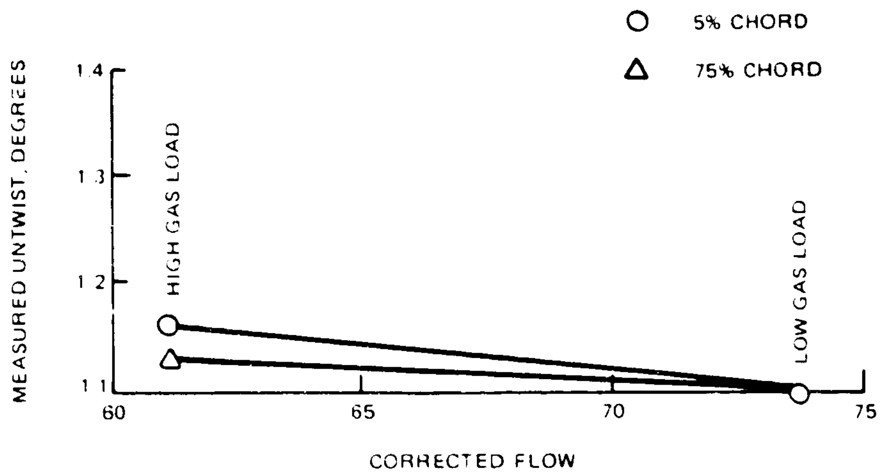

Figure 17 Measured Untwist for T322 Fan Blade as a Function of Flow Rate at 75 Percent Speed

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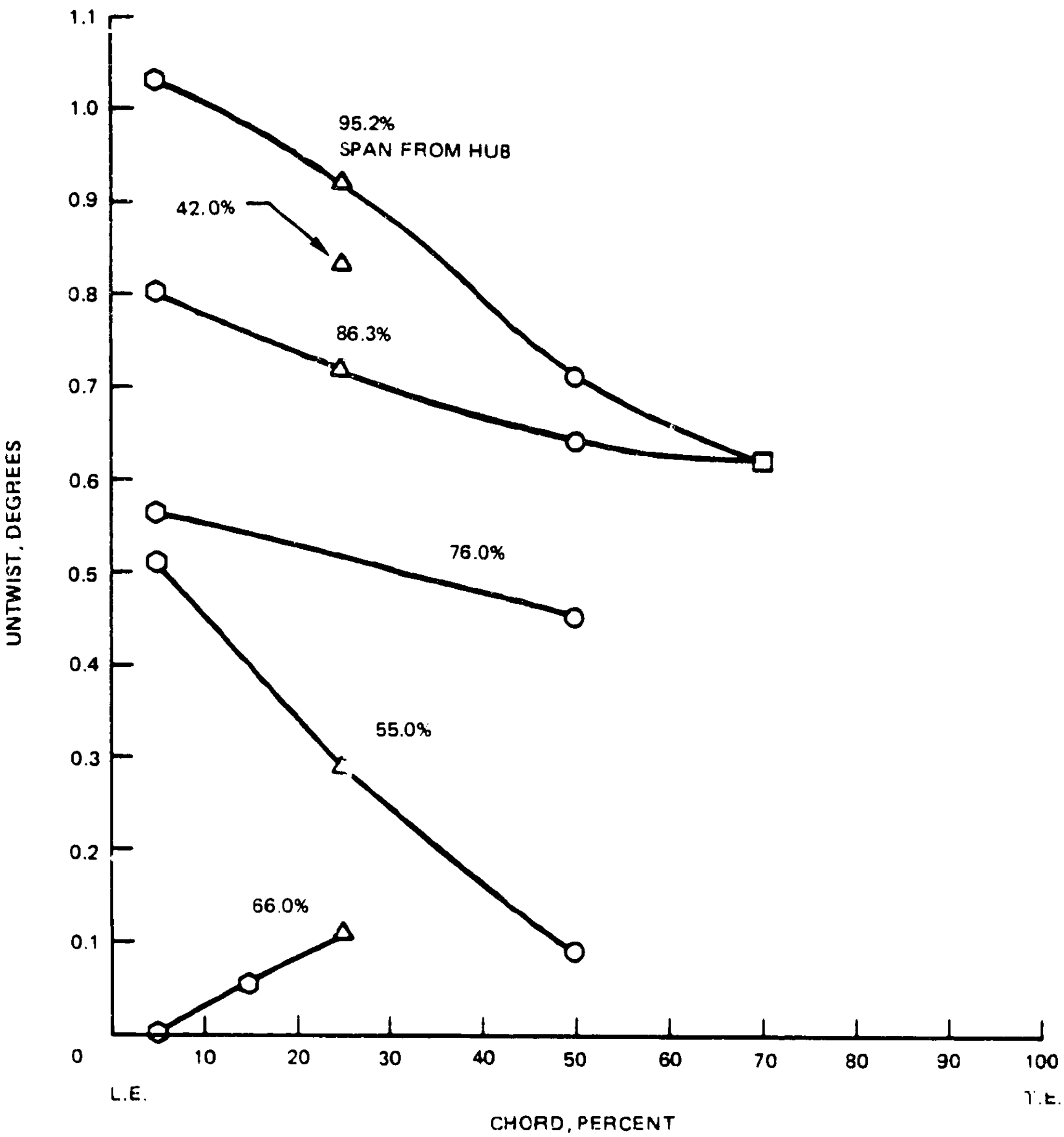

Figure 18 Measured Untwist for TS22 Fan Blade as a Function of Chord at 73 Percent Speed

C...
C...

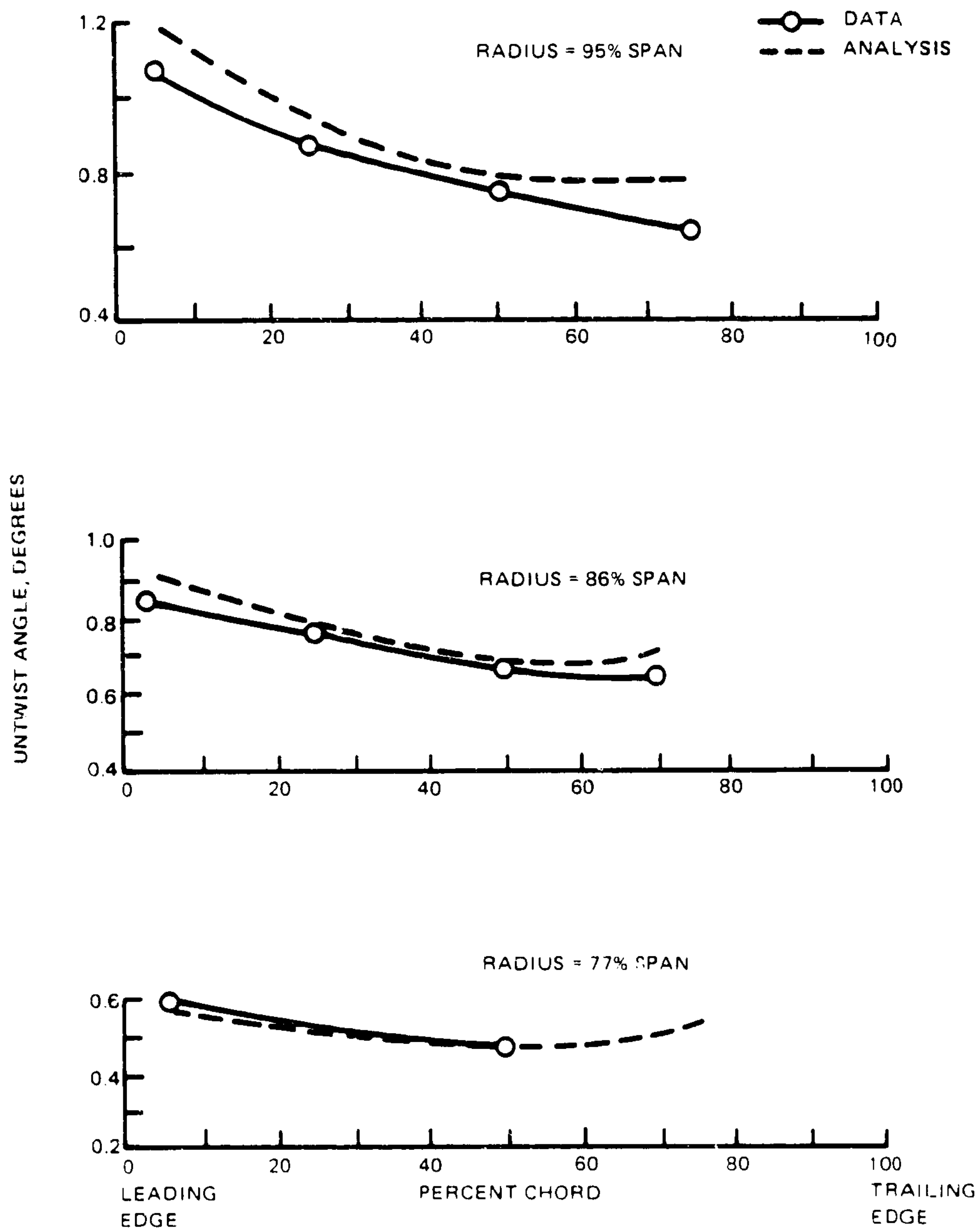

Figure 19 Measured Untwist for TS22 and Predicted by NASTRAN Analysis for Rotor Speed at 75 Percent Speed

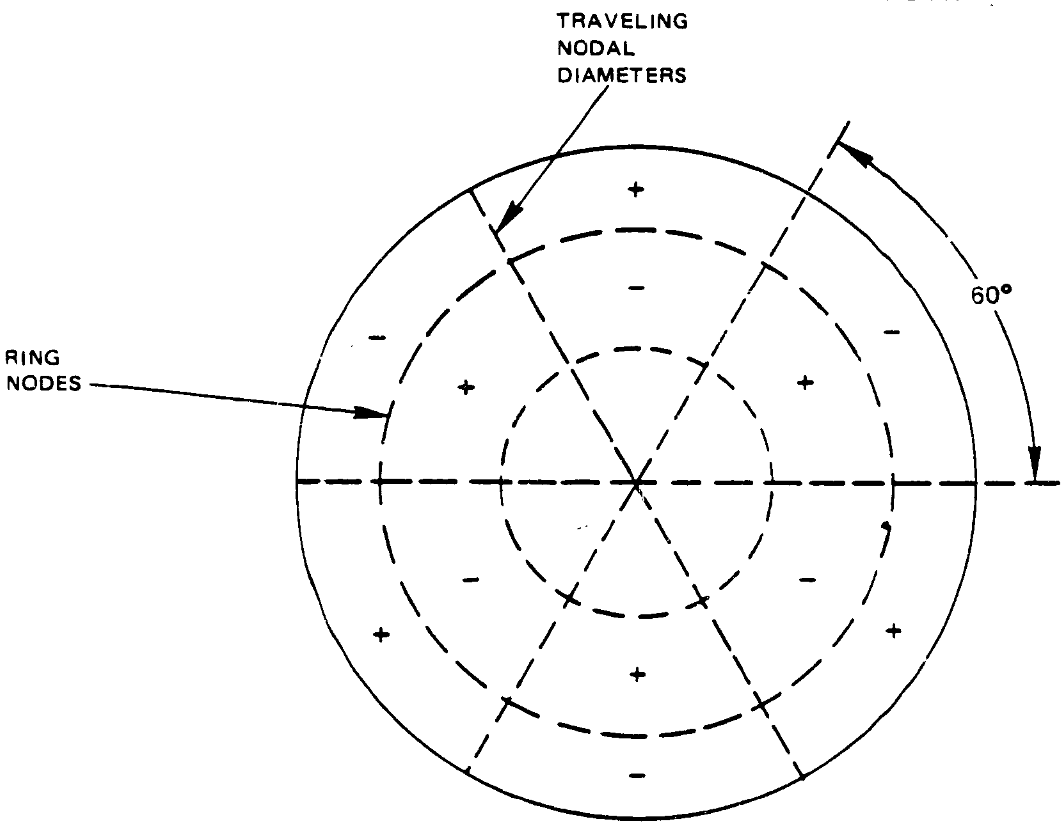

Figure 20 Three Nodal Diameter Pattern Second Mode - Previous theory predicted the presence of only one nodal diameter pattern at any time

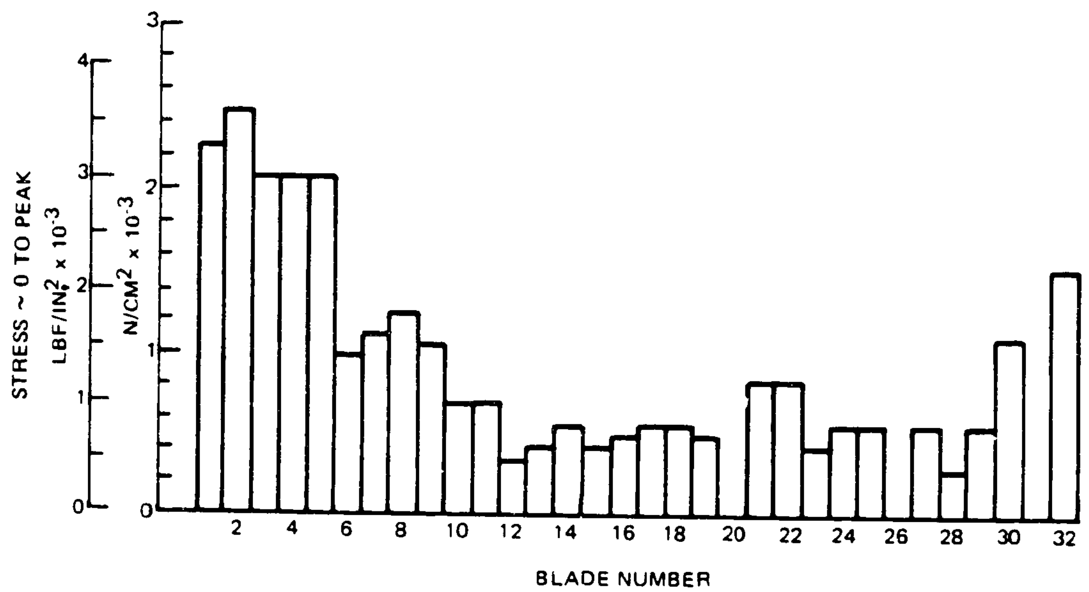

Figure 21 Blade Flutter Amplitude for TS22 Rotor at 67 Percent Speed From Strain-Gage Measurements

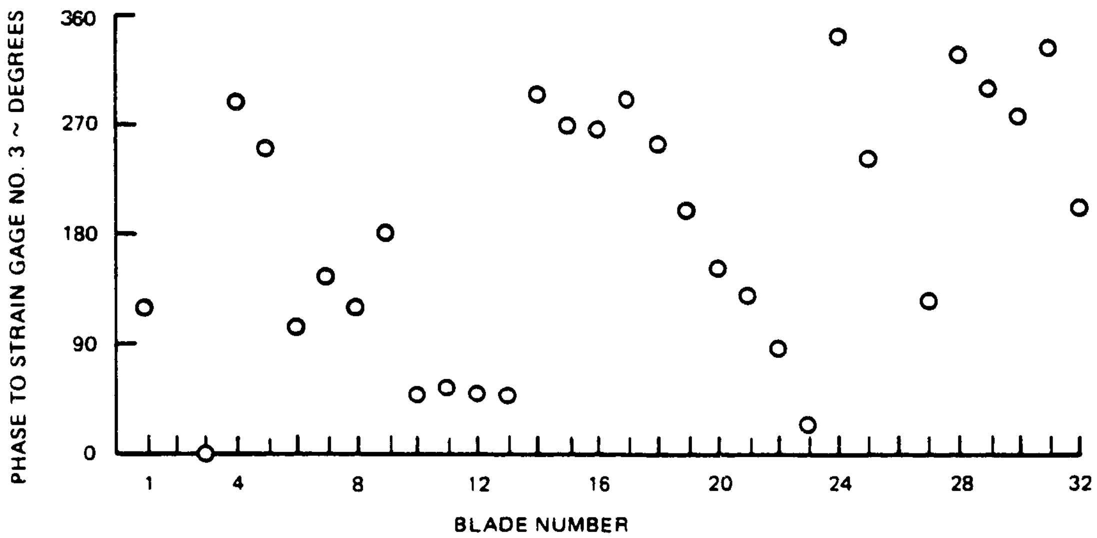

Figure 22 Blade Flutter Phase Angles for TS22 Rotor at 67 Percent Speed From Strain-Gage Measurements

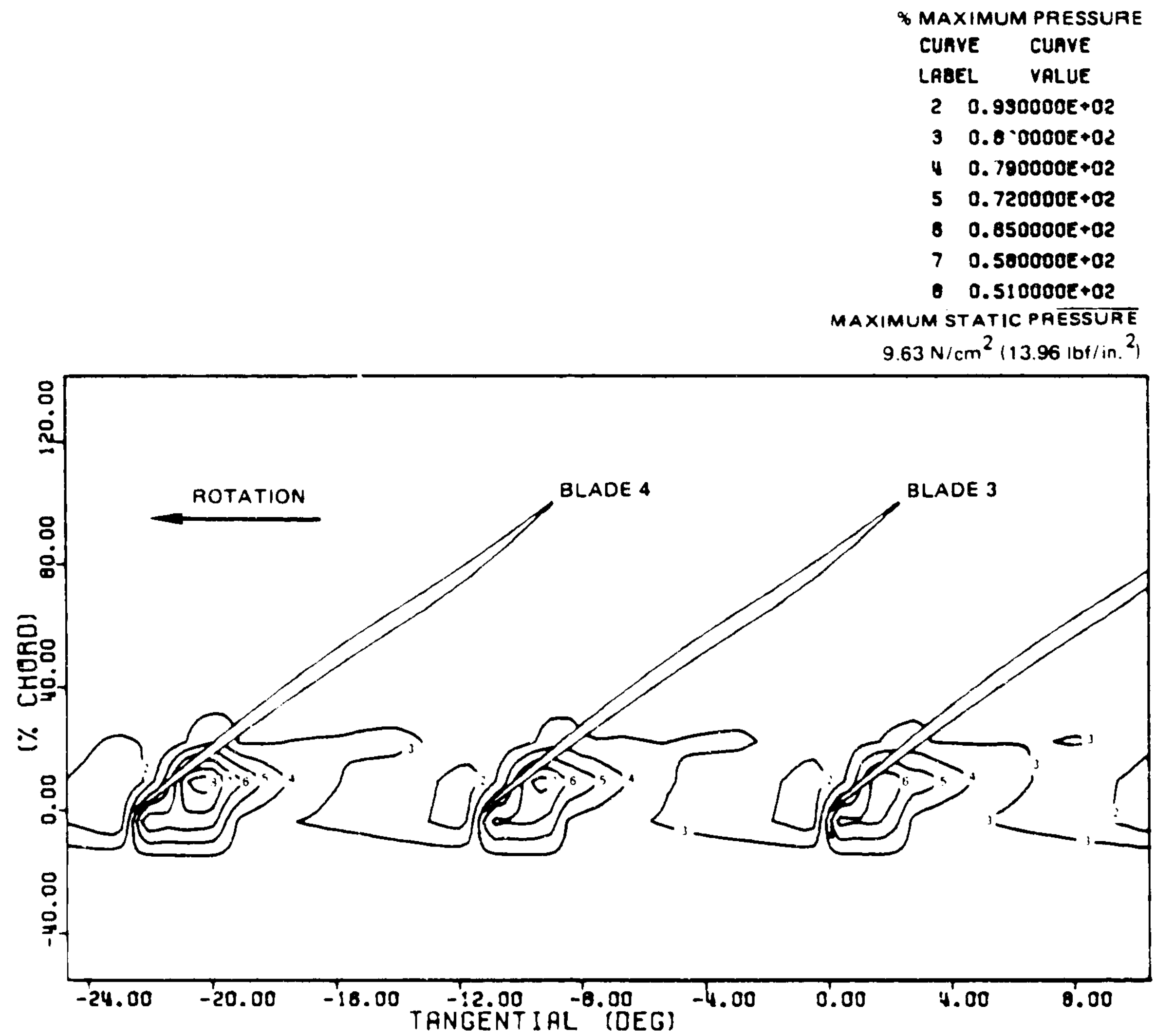

Figure 23 Steady-State Pressure Contours at Blade Tip at 63 Percent Speed Outside of Flutter on a Low Operating Line

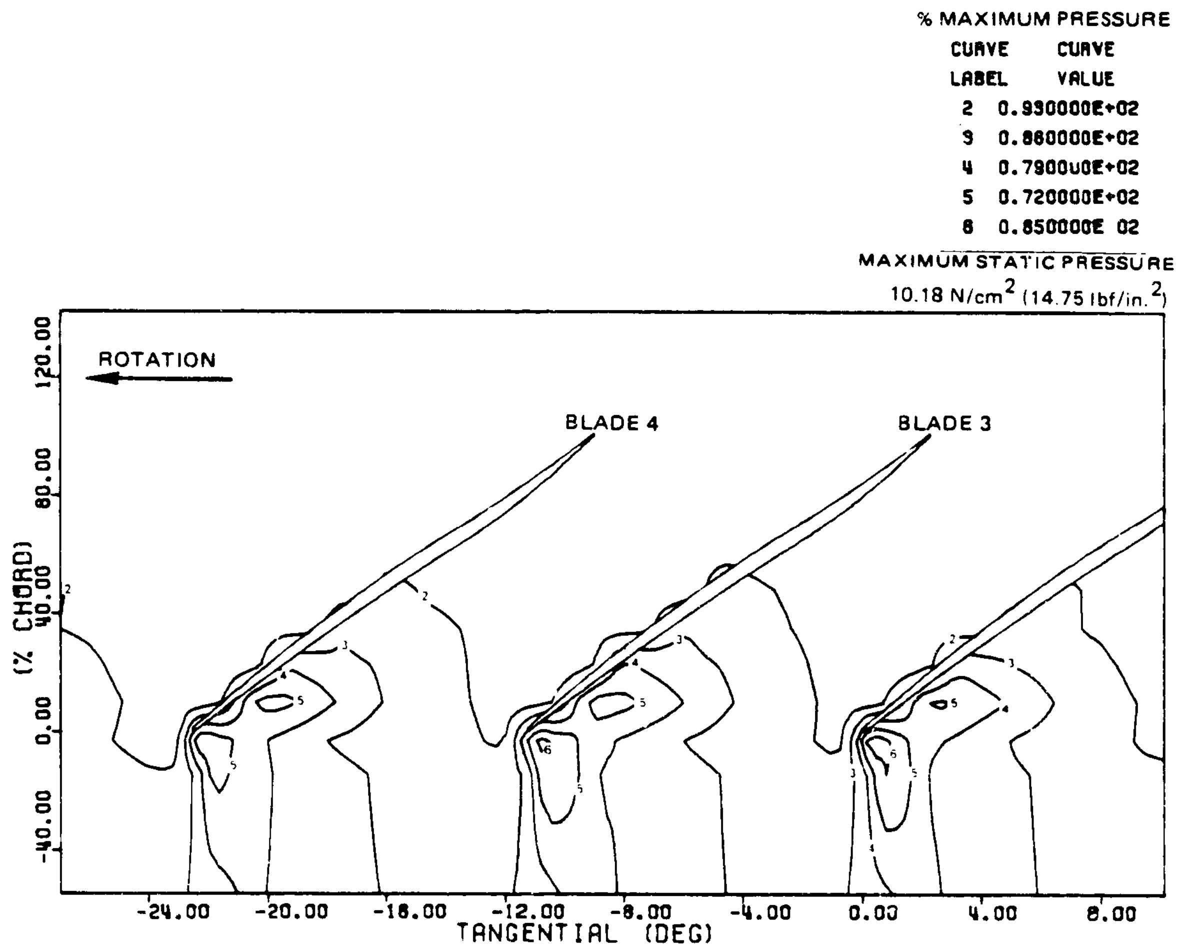

Figure 24 Steady-State Pressure Contours at Blade Tip at 63 Percent Speed Inside of Flutter on a High Operating Line

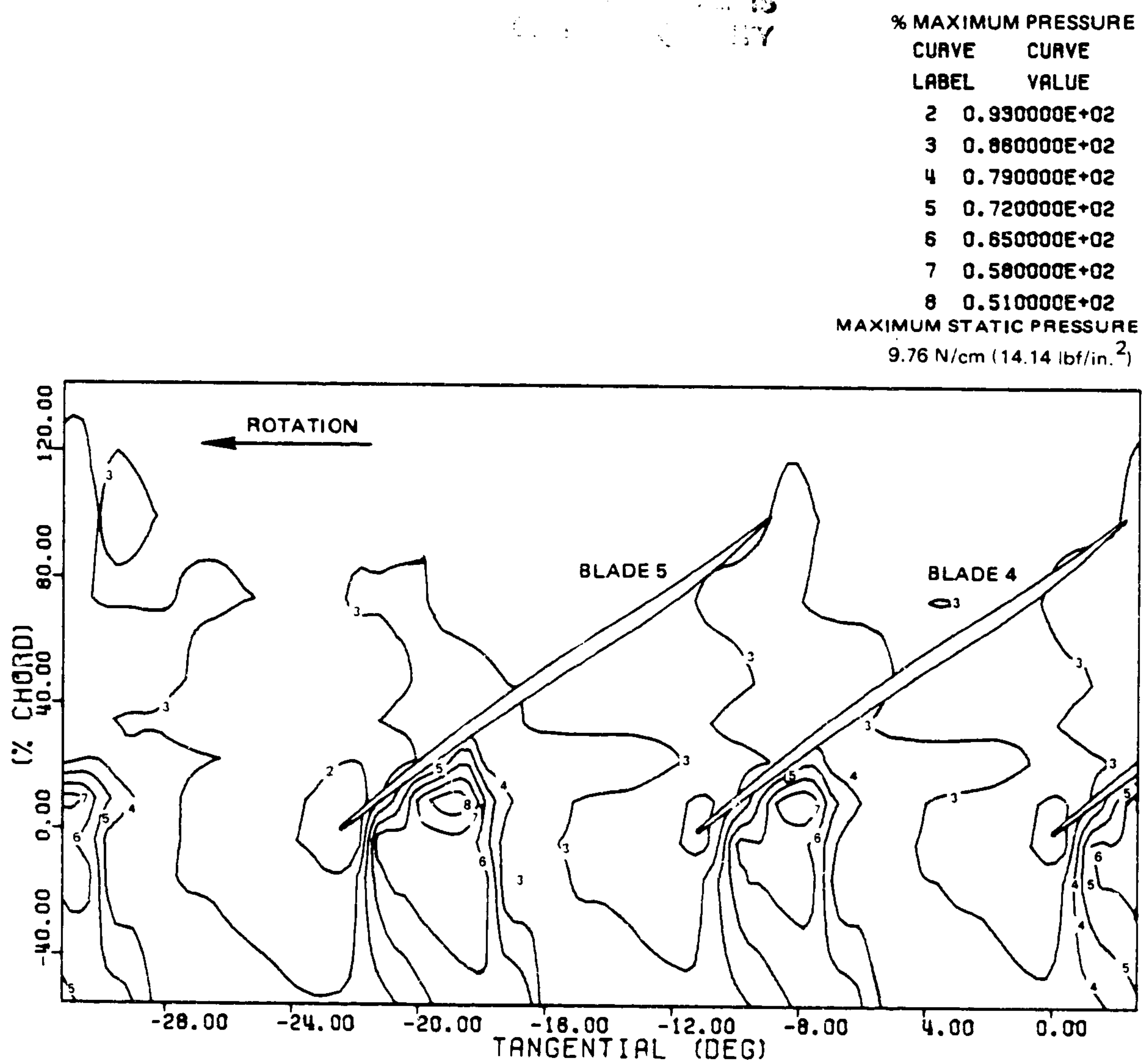

Figure 25 Steady-State Pressure Contours at Blade Tip at 67 Percent Speed Outside of Flutter on a Low Operating Line

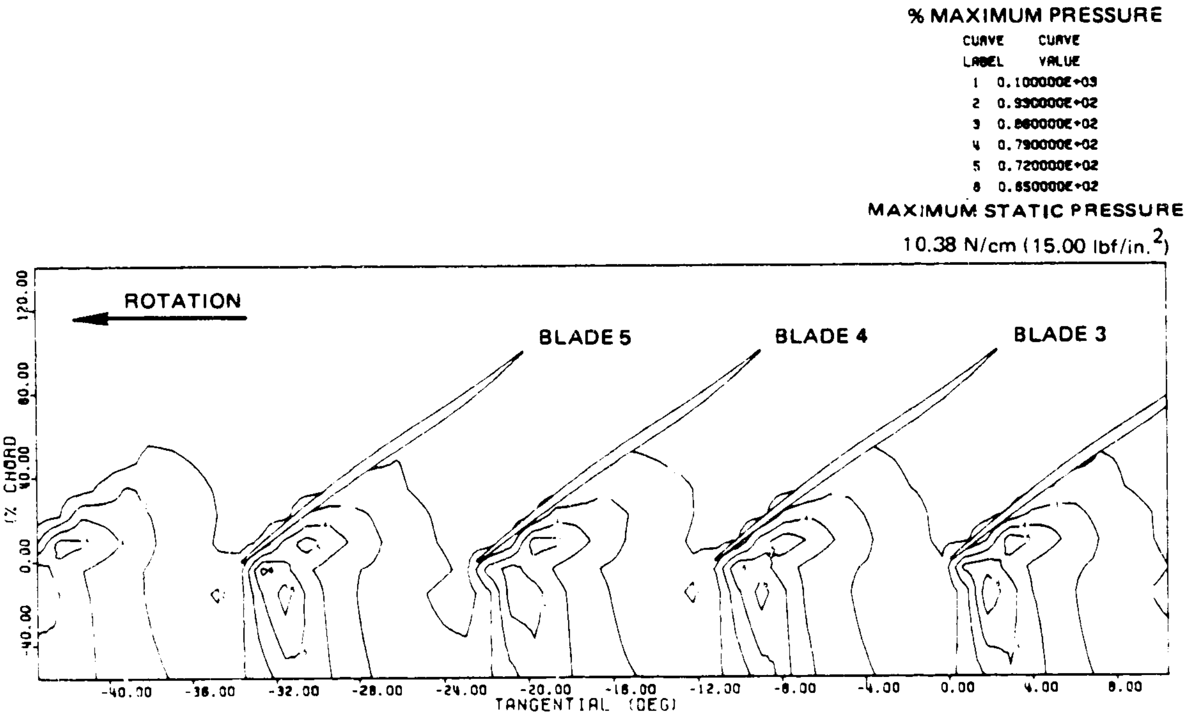

Figure 26 Steady-State Pressure Contours at Blade Tip at 67 Percent Speed Inside of Flutter on a High Operating Line

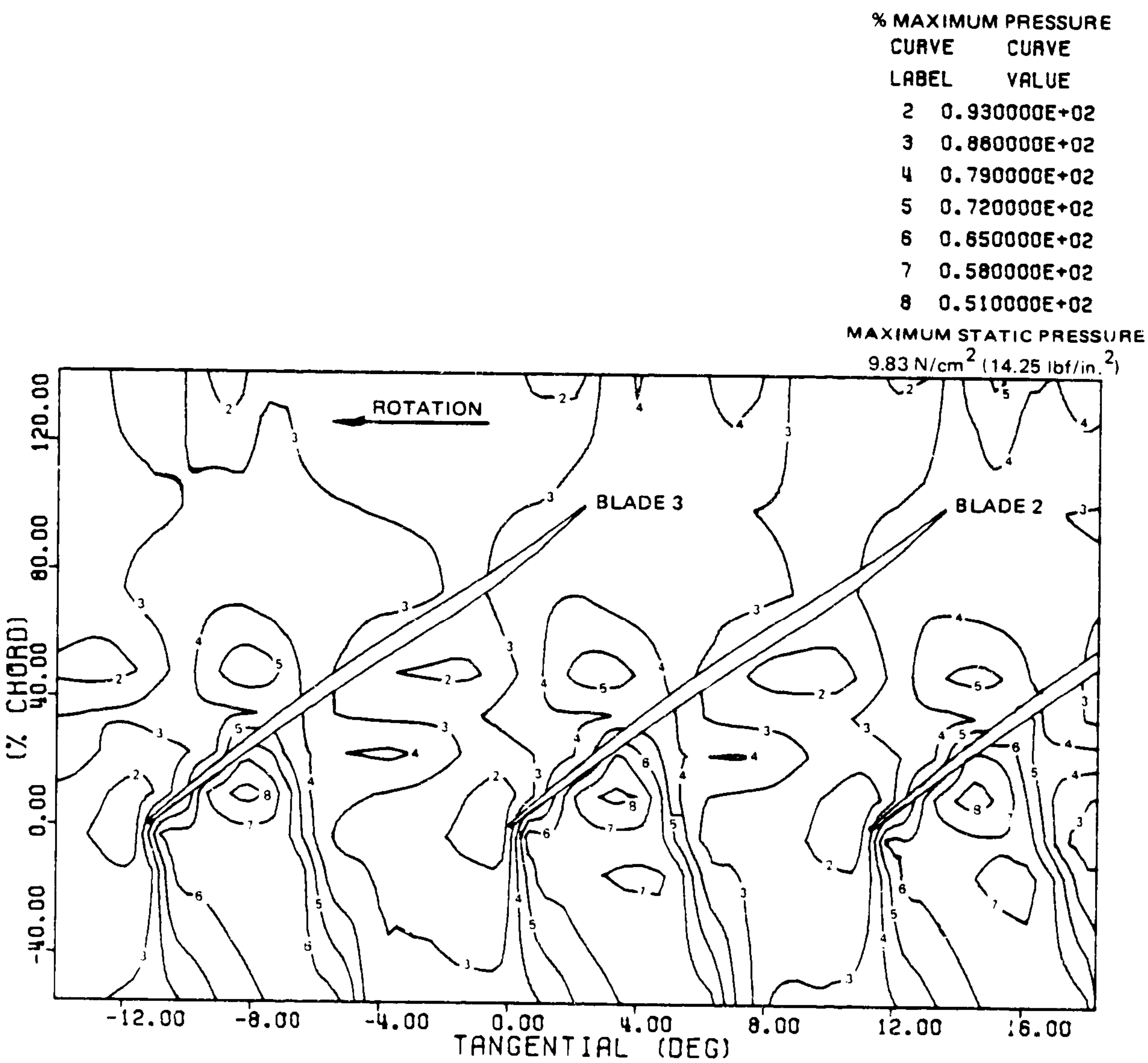

Figure 27 Steady-State Pressure Contours at Blade Tip at 70 Percent Speed Outside of Flutter on a Low Operating Line

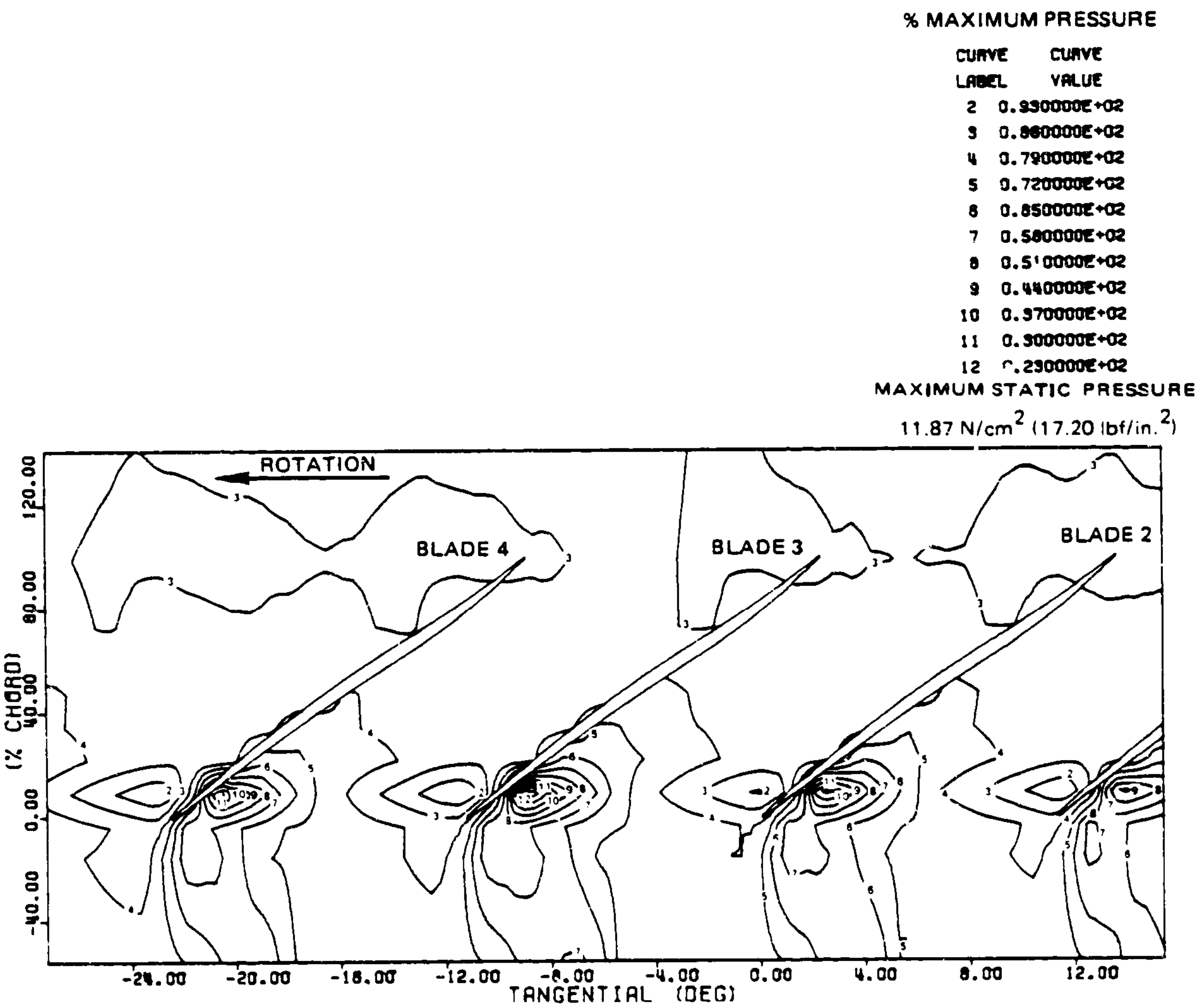

Figure 28 Steady-State Pressure Contours at Blade Tip at 70 Percent Speed Inside of Flutter on a High Operating Line

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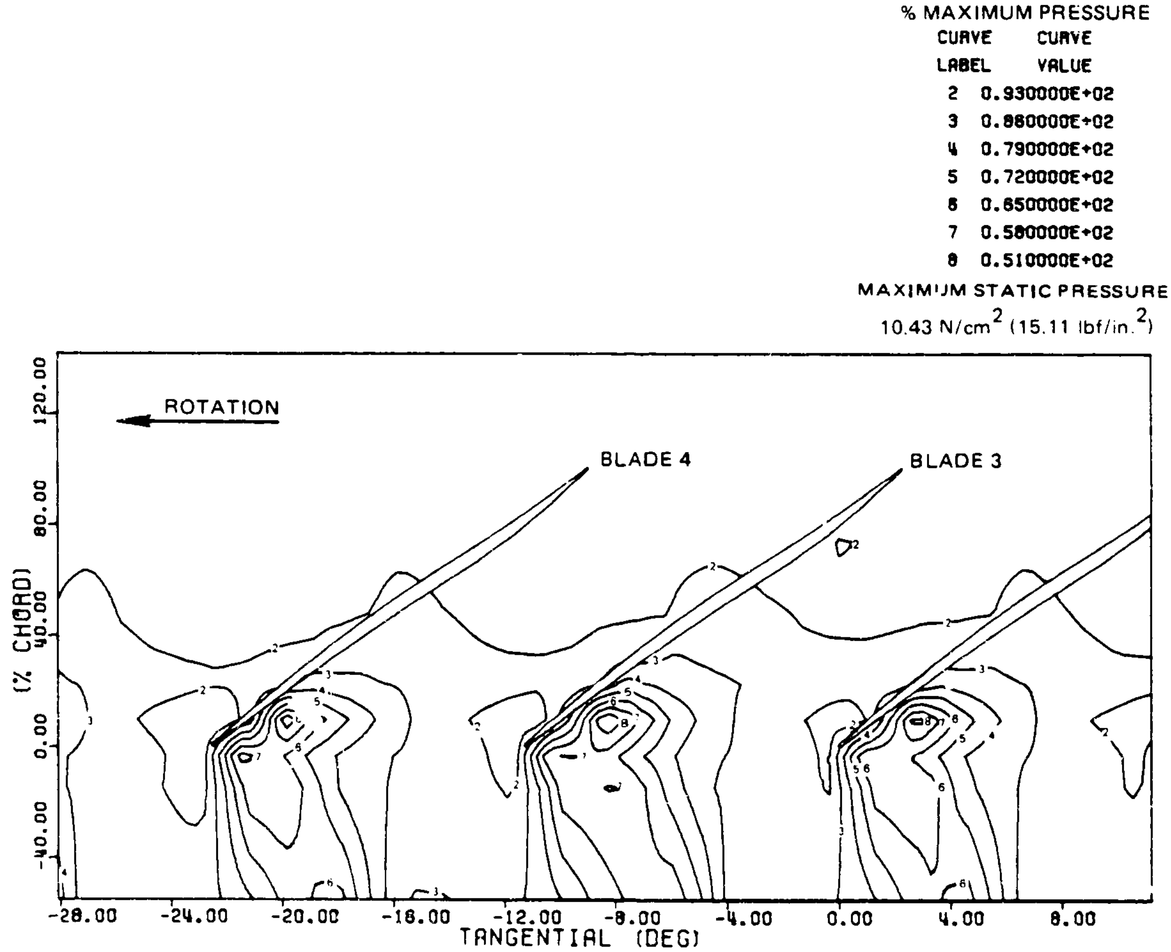

Figure 29 Steady-State Pressure Contours at Blade Tip at 70 Percent Speed Near Surge

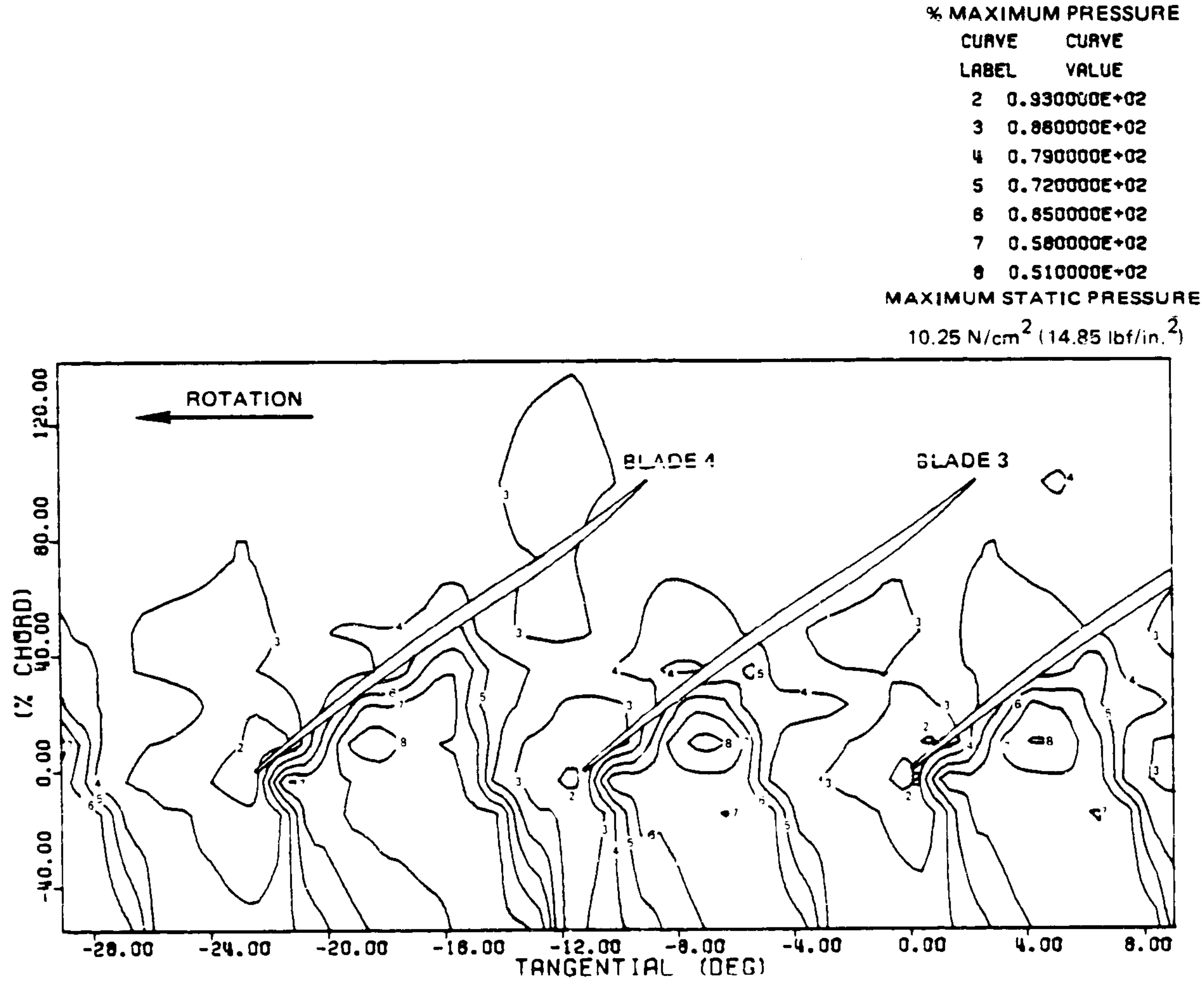

Figure 30 Steady-State Pressure Contours at Blade Tip at 73 Percent Speed Outside of Flutter on a Low Operating Line

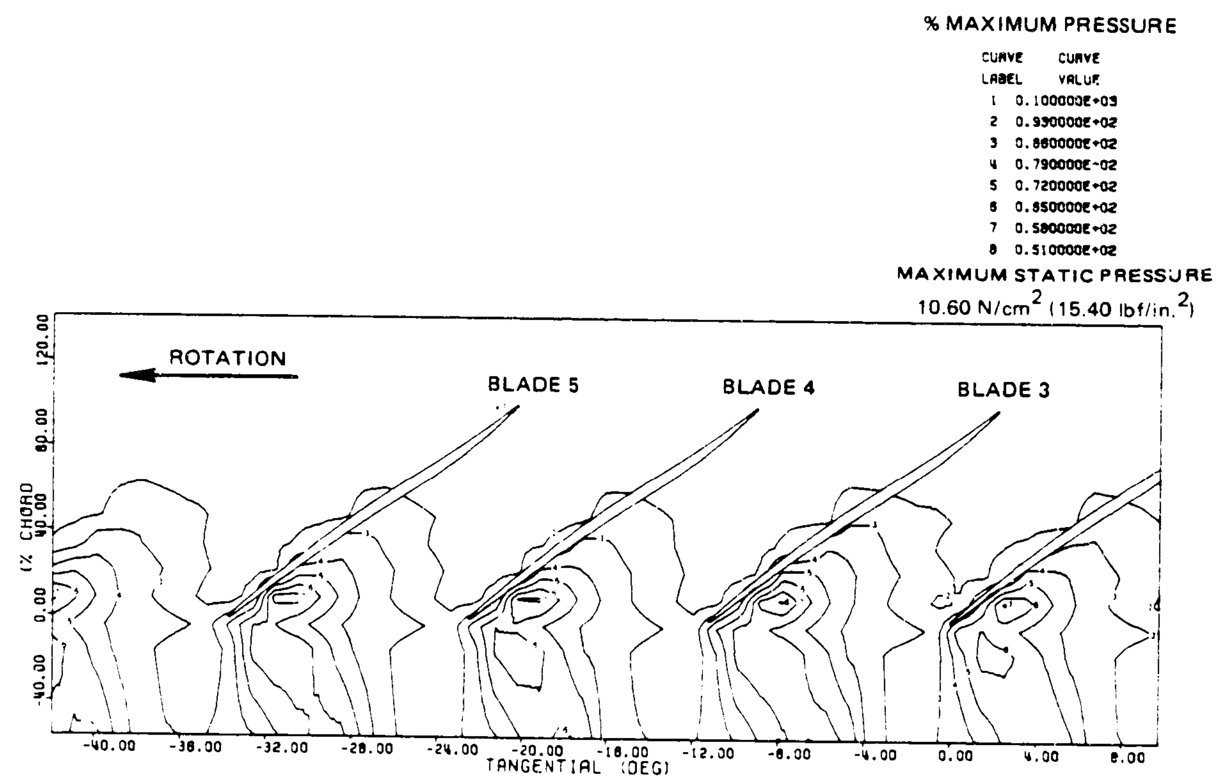

Figure 31 Steady-State Pressure Contours at Blade Tip at 73 Percent Speed Inside of Flutter on a High Operating Line

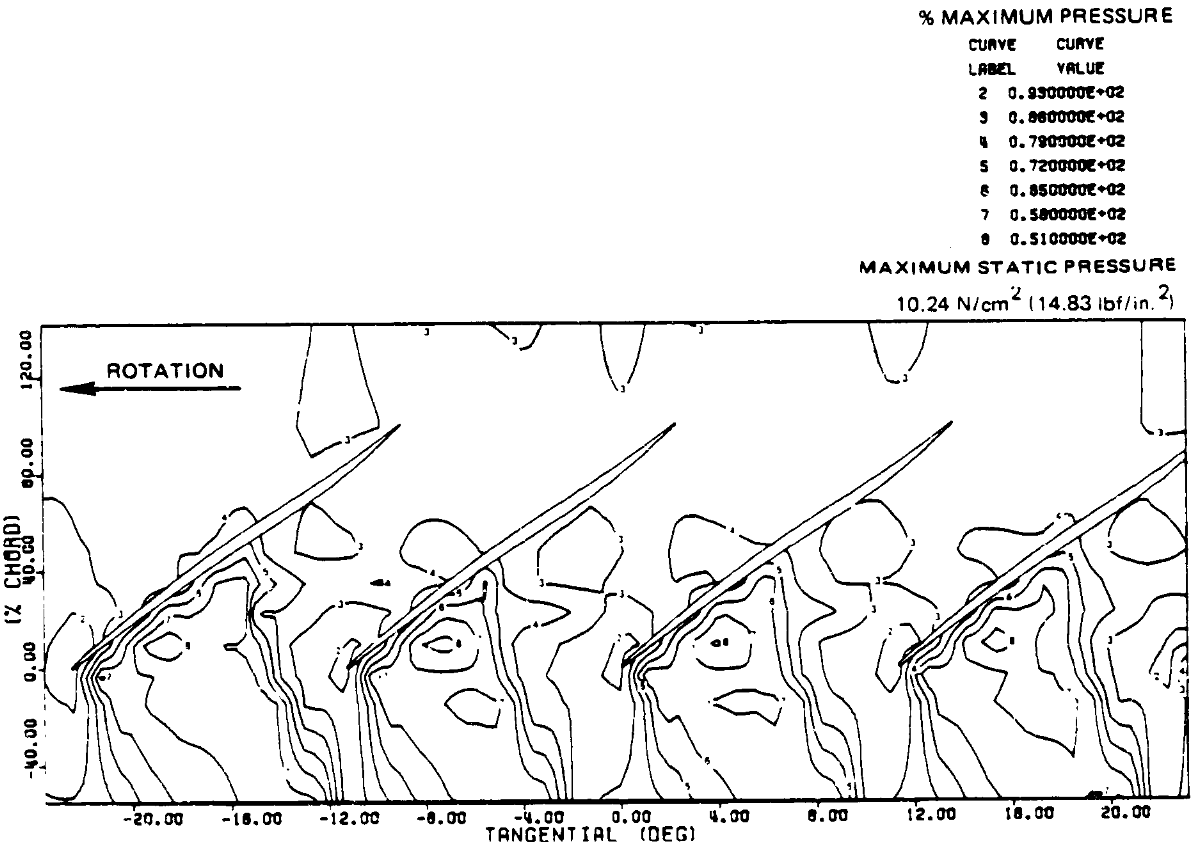

Figure 32 Steady-State Pressure Contours at Blade Tip at 75 Percent Speed Outside of Flutter on a Low Operating Line

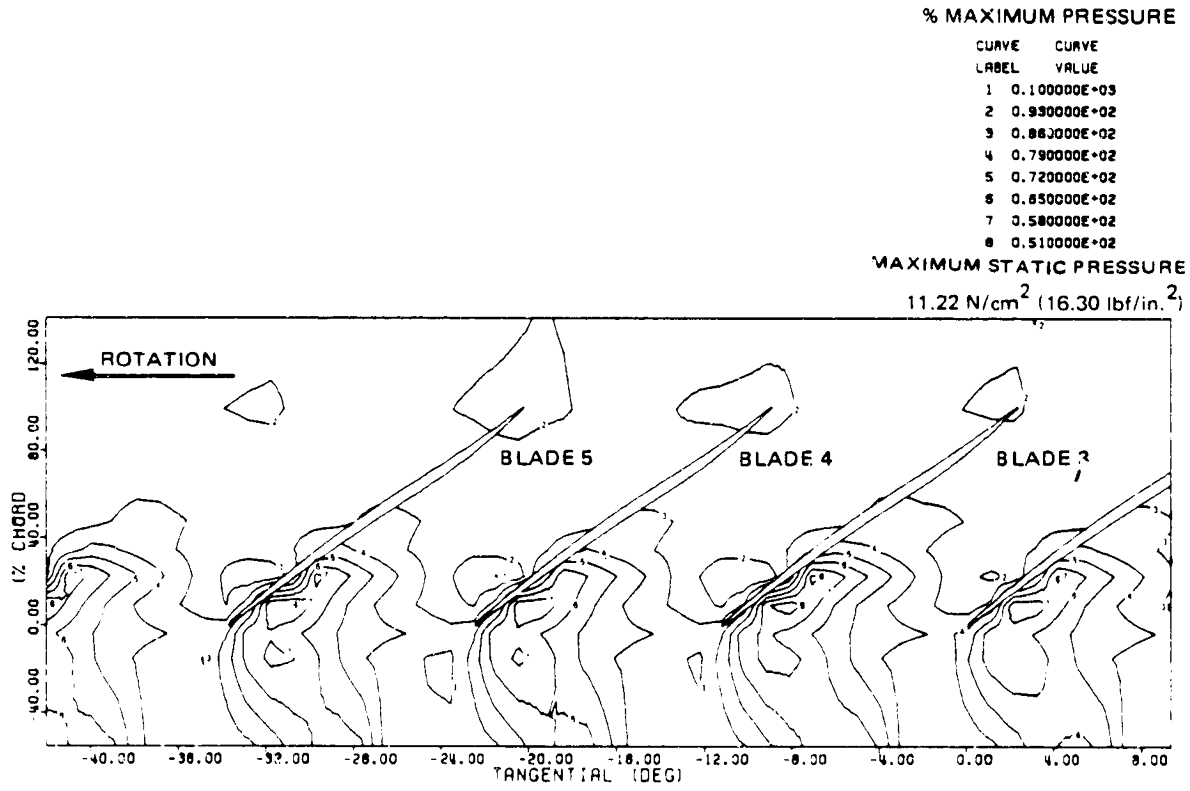

Figure 33 Steady-State Pressure Contours at Blade Tip at 75 Percent Speed Outside of Flutter on a High Operating Line

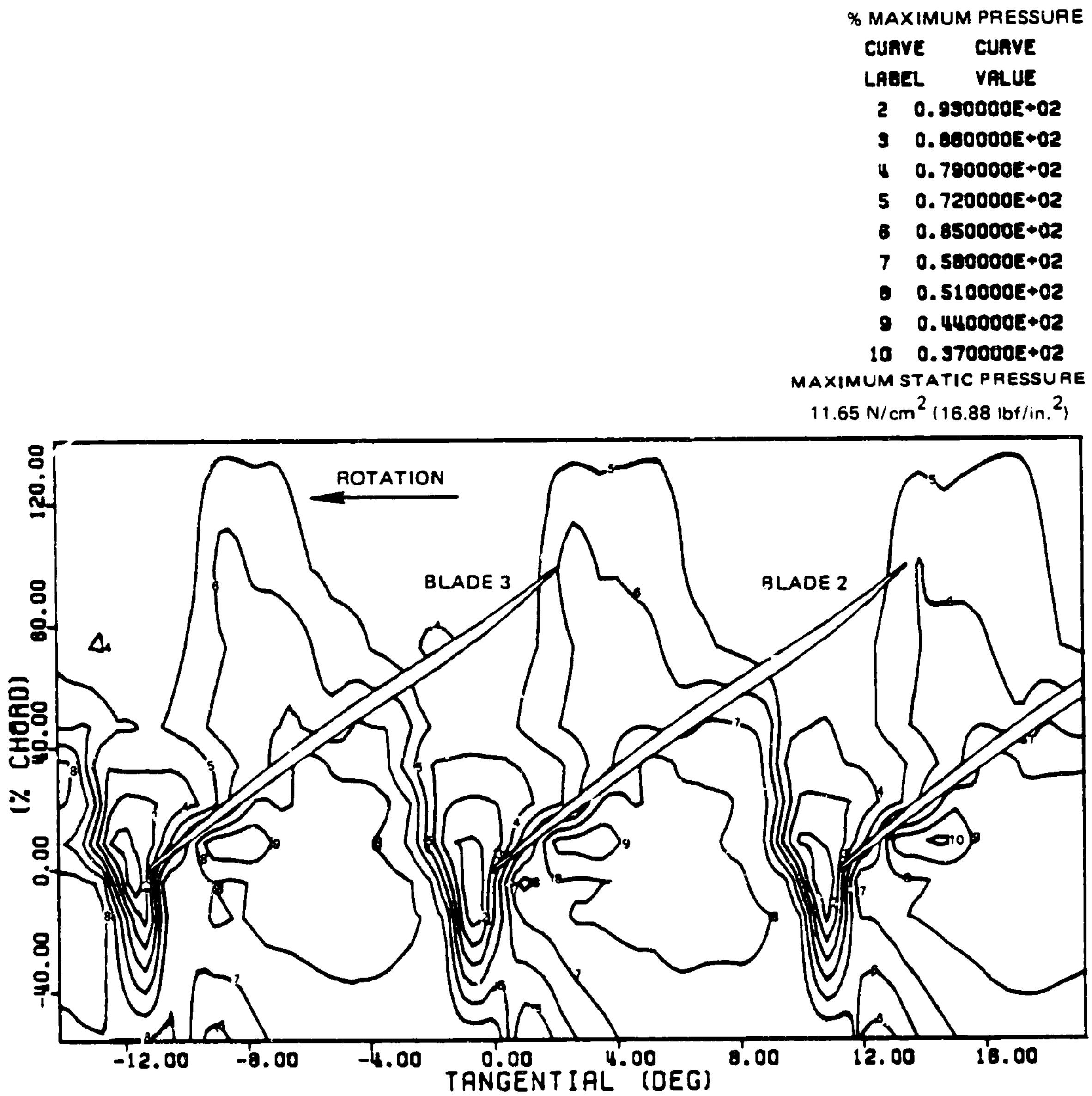

Figure 34 Steady-State Pressure Contours at Blade Tip at 85 Percent Speed Outside of Flutter on a Low Operating Line

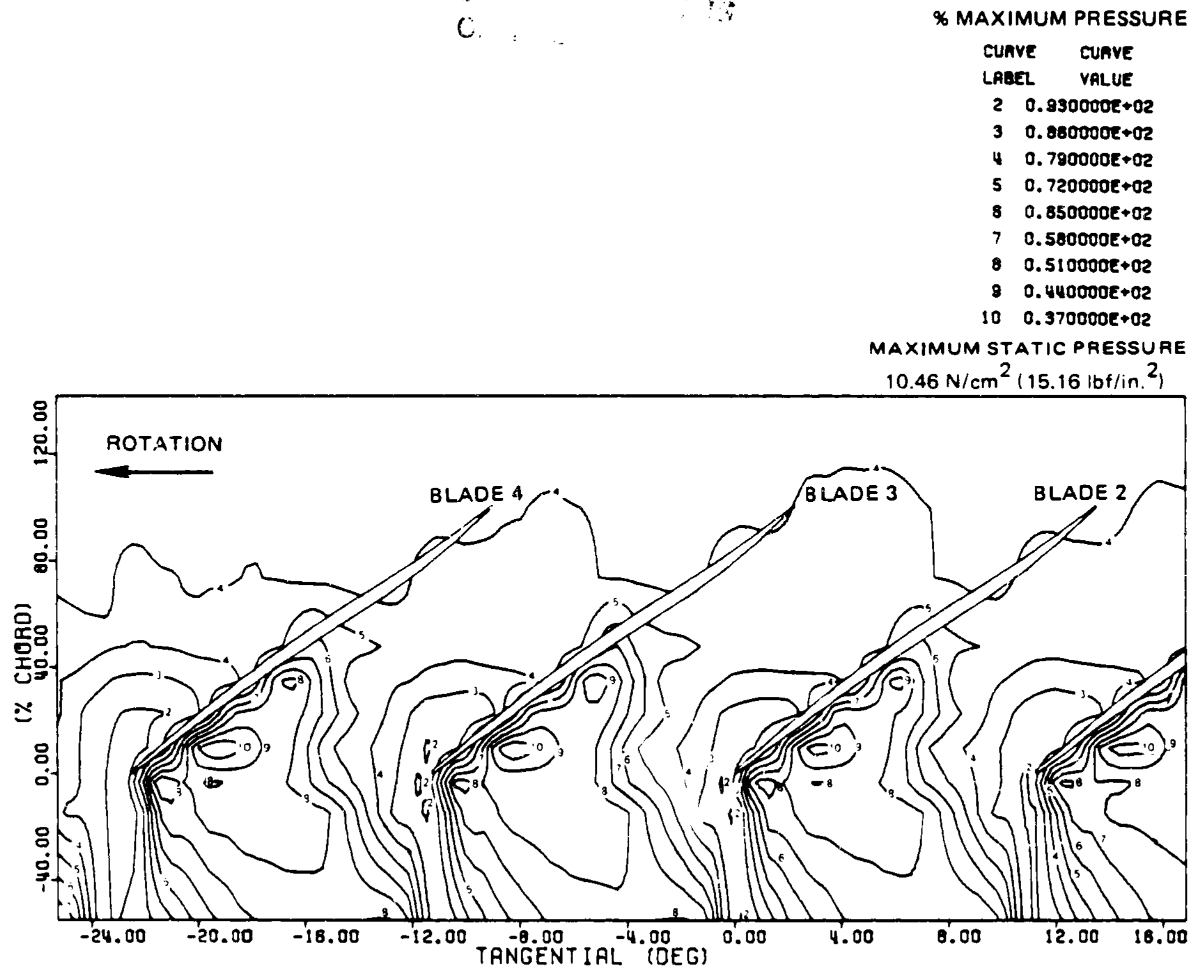

Figure 35 Steady-State Pressure Contours at Blade Tip at 85 Percent Speed on a High Operating Line

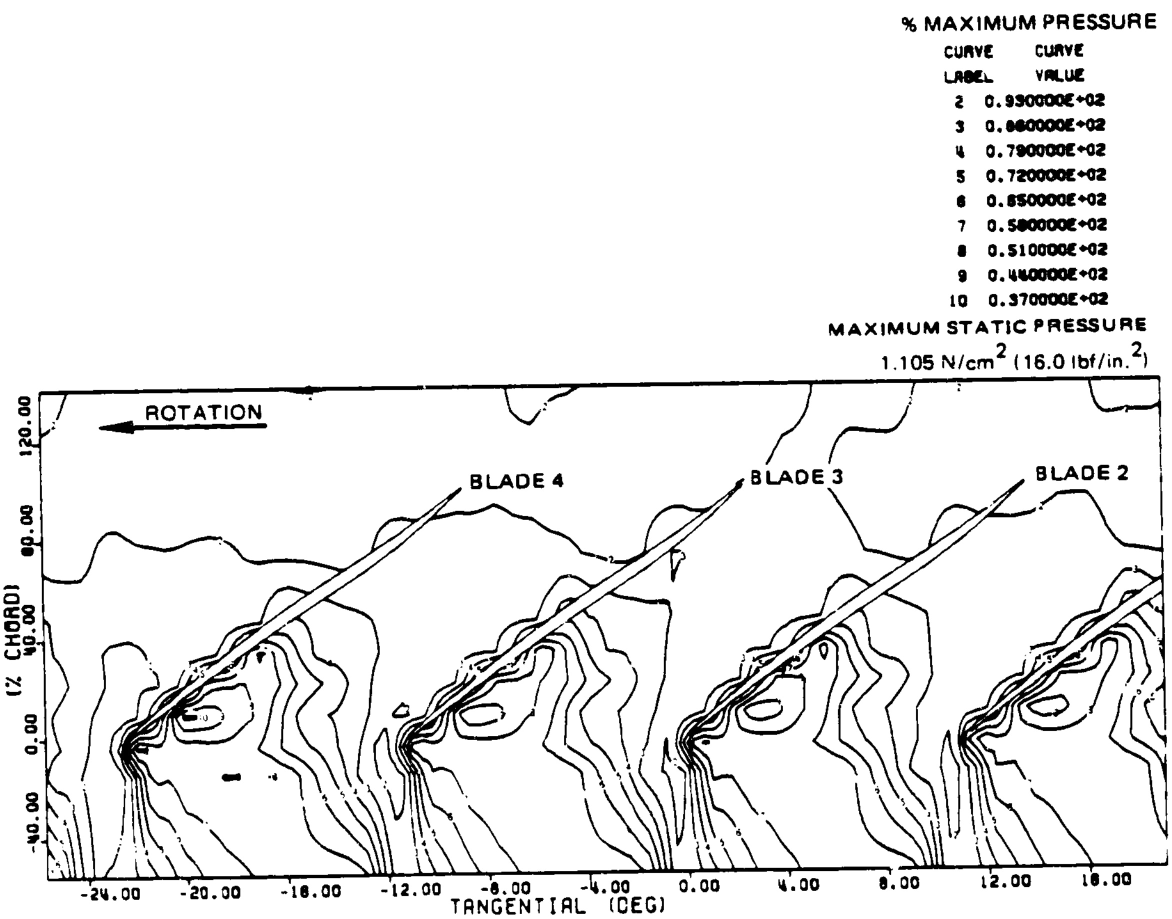

Figure 36 Steady-State Pressure Contours at Blade Tip at 85 Percent Speed Near Surge

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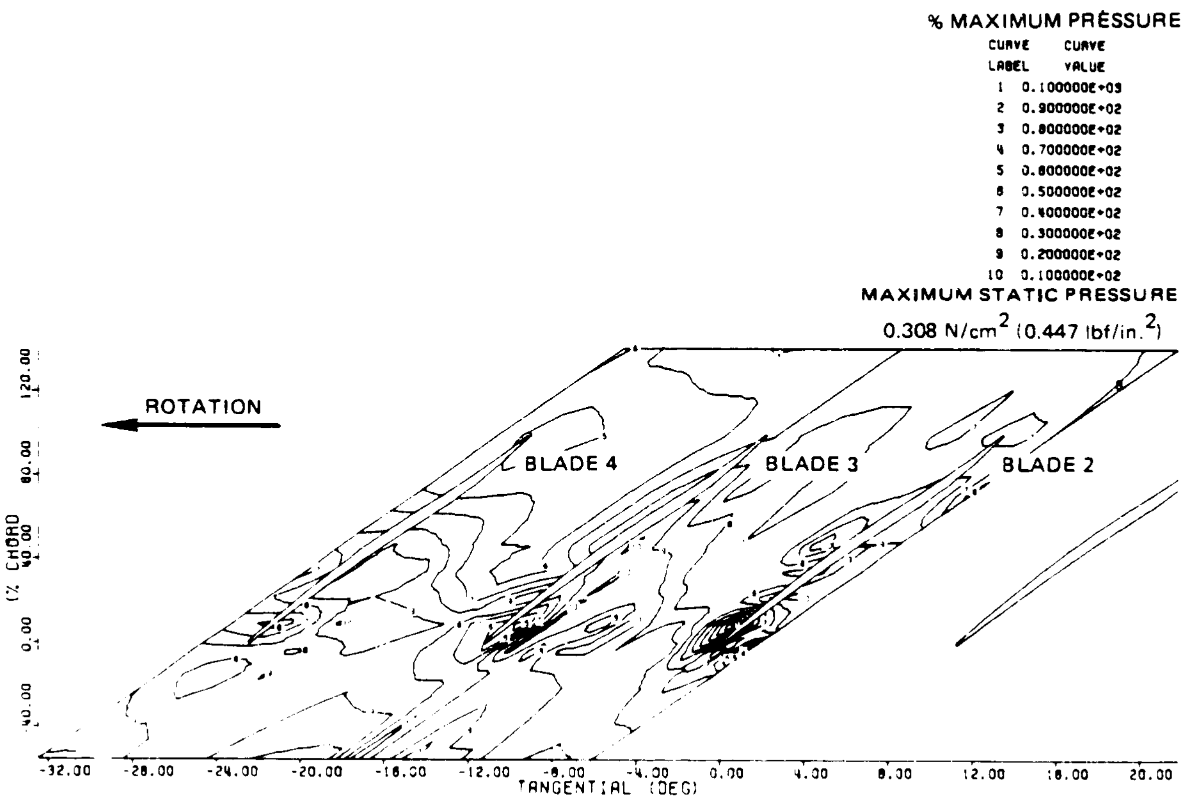

Figure 37 Unsteady Pressure Amplitude Contours for TS22 Rotor in Flutter at 73 Percent Speed

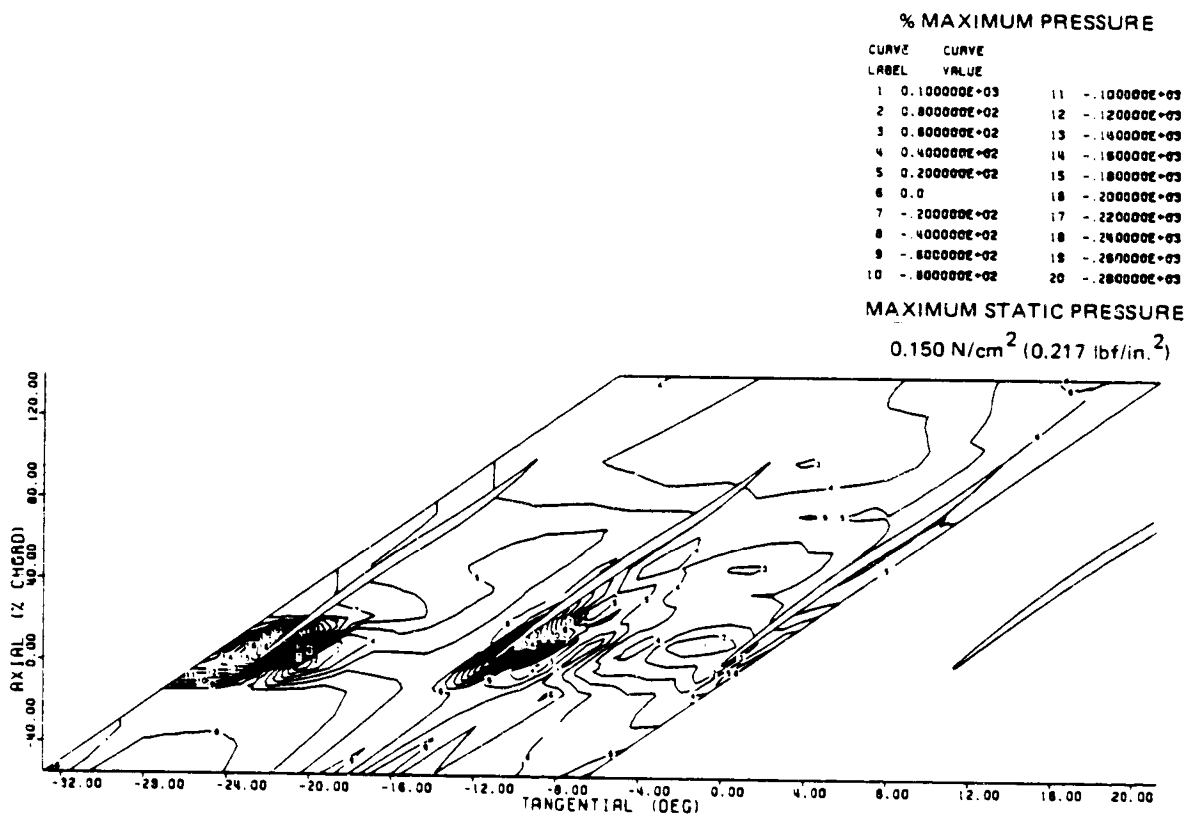

Figure 38 Real Component of Unsteady Pressure in Flutter at 73 Percent Speed

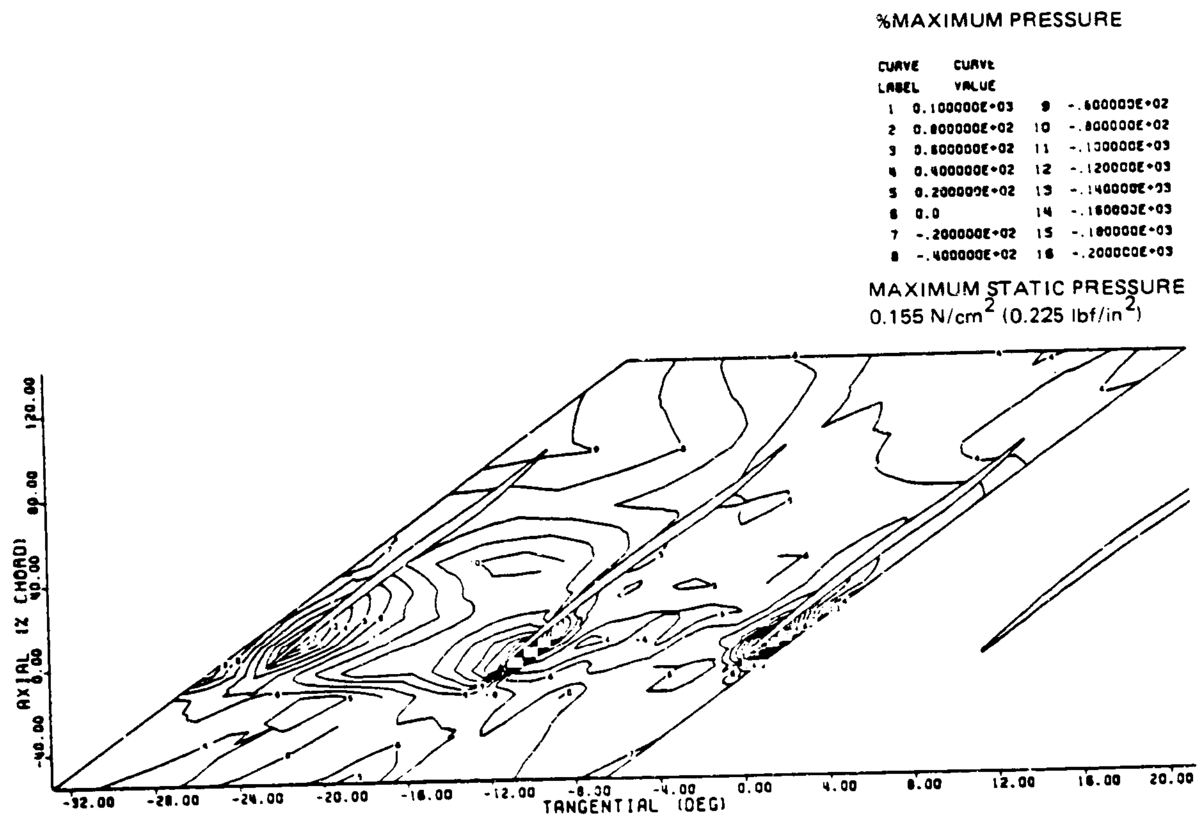

Figure 39 Imaginary Component of Unsteady Pressure in Flutter at 73 Percent Speed

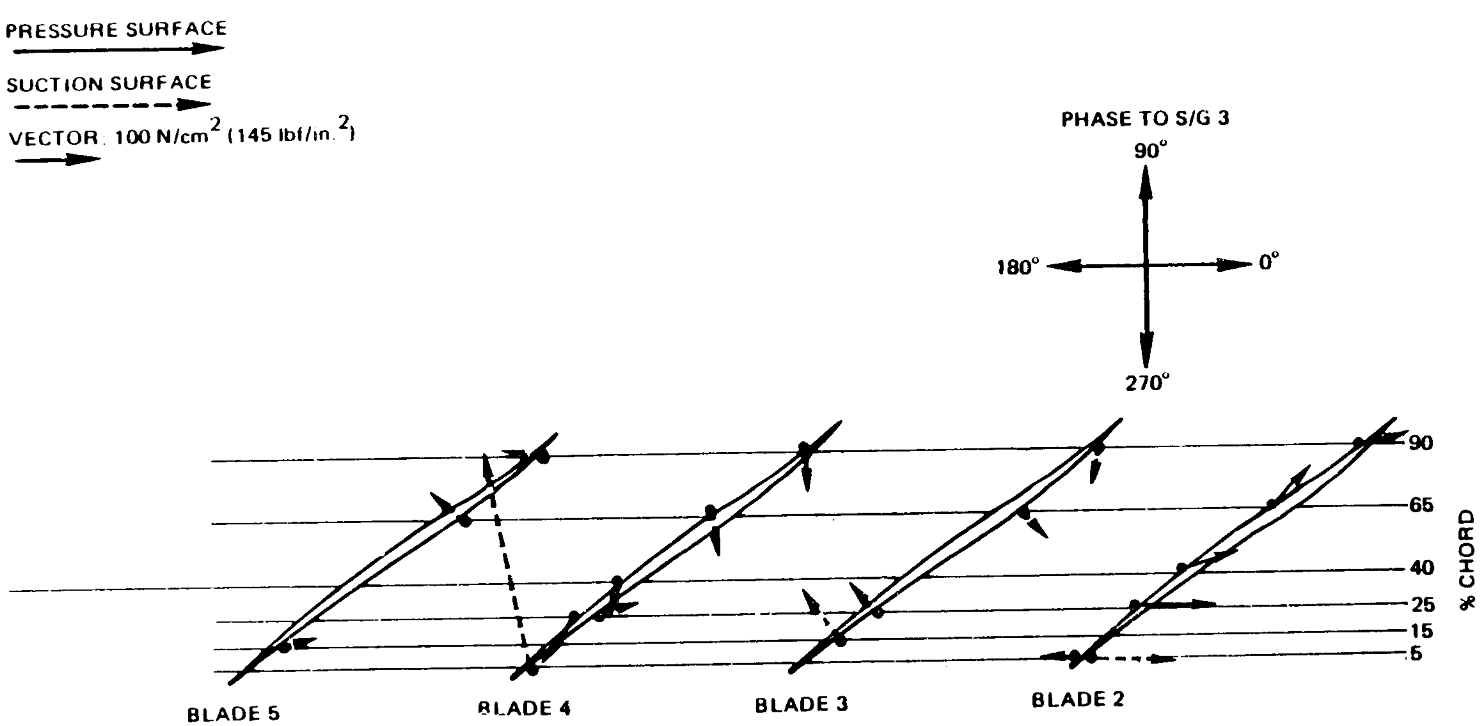

Figure 40 Blade Mounted Kulite Unsteady Pressure Amplitude and Phase Obtained in Flutter at 67 Percent Speed

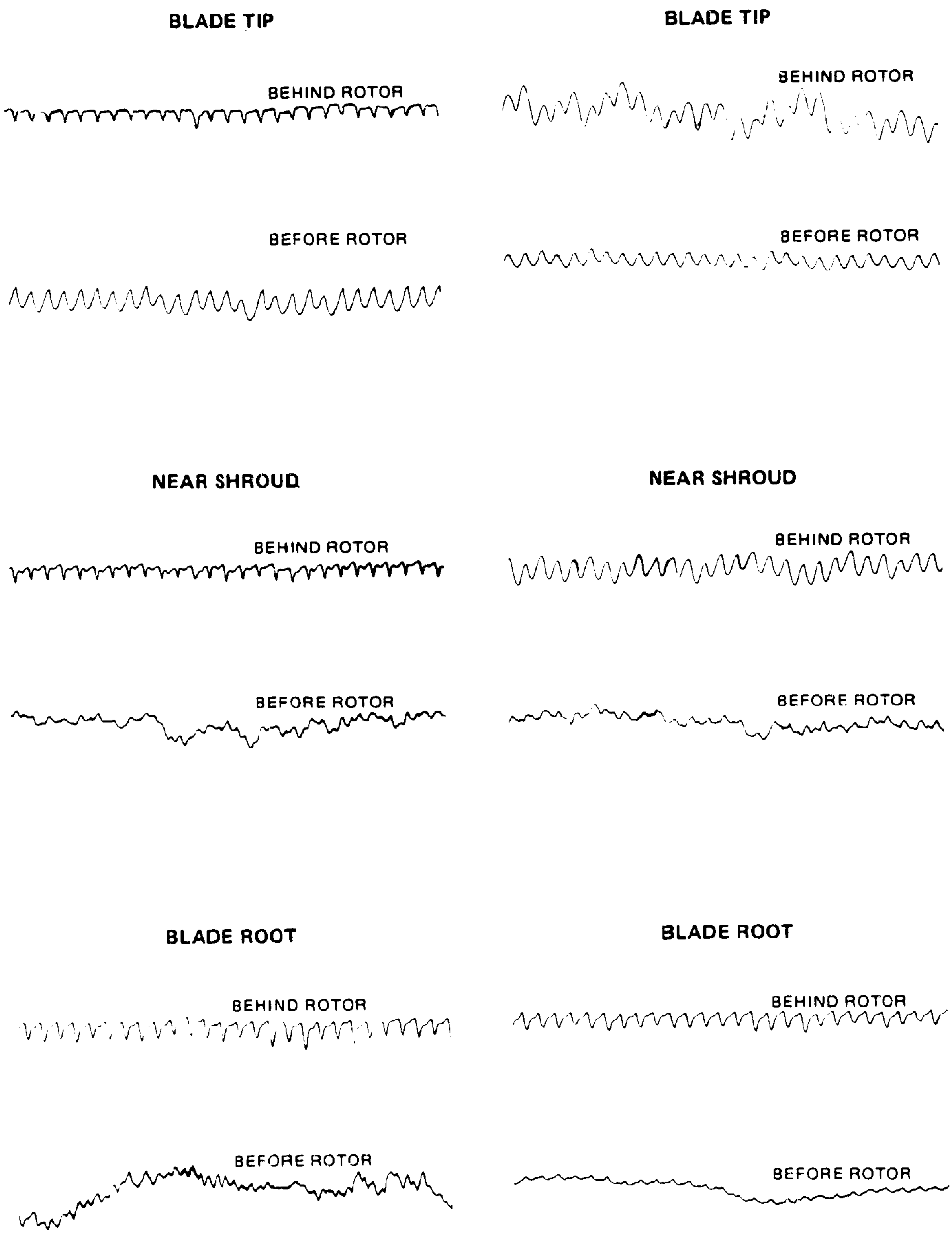

Figure 41 Signal Enhanced Wave Forms of Hot Film Probes at 73 Percent Speed (Noncalibrated Amplitudes)

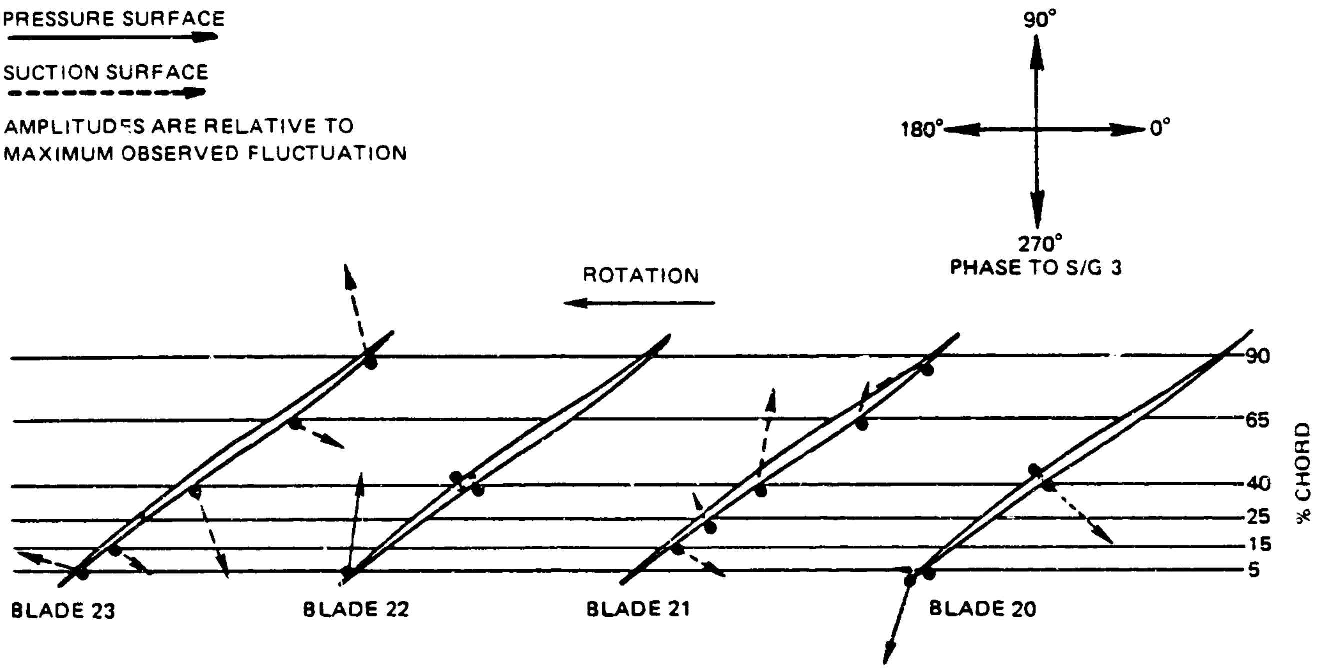

Figure 42 Blade Mounted Hot Film Unsteady Velocity Amplitude and Phase Obtained in Flutter at 67 Percent Speed

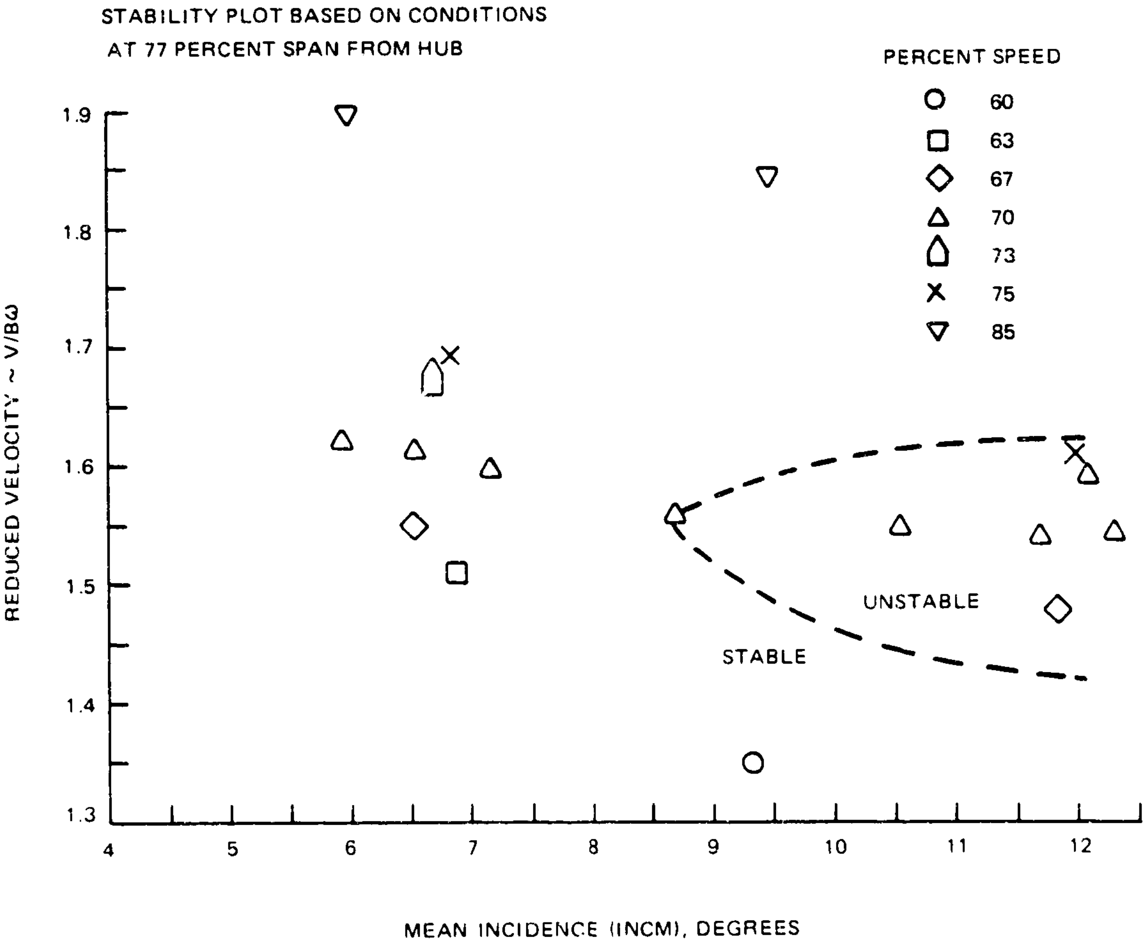

Figure 43 Observed TS22 Flutter Boundary Correlation of Reduced Velocity as a Function of Incidence

APPENDIX A

OVERALL PERFORMANCE FOR TEST MATRIX

(See Table A-1)

TABLE A-1

1S22 NASA FLUTTER TEST
TEST MATRIX

Run Number	Speed Code	Point Number	Unsteady Record	Percent Speed	Percent Corrected Design Flow	Rotor Pressure Ratio	Remarks
					Shakedown All Mirrors		
001	70	01	20-27	70	72.8	1.228	Wide Open Discharge
--	--	--	28	70	--	--	Closing Discharge Valve, Transient into Flutter
001	70	05	43	70	66.9	1.2722	Check Point Wide Open Discharge
--	--	--	64T	--	--	--	Transient
003	63	01	71	63	65.8	1.1776	Wide Open Discharge
003	63	03	76-84	63	53.4	1.2374	Stress Level Fluctuating, Shakedown Complete
					Performance All Mirrors		
003	73	01	86-94	73	74.7	1.2687	Wide Open Discharge
003	73	02	100-108	73	60.0	1.3317	Maximum Flutter
					3 Watt Laser 4 Rows Mirrors (Above Shroud)		
004	70	03	128-135	70	59.8	1.3004	70% Low Flutter Point
004	67	01	136-143	67	68.5	1.1890	Wide Open Discharge
004	75	01	176-183	75	75.3	1.2840	Wide Open Discharge
004	75	04	195-202	75	60.3	1.3369	Maximum Flutter
005	73	08	220	70	56.5	1.2978	
					All Mirrors 3 Watt Laser		
007	66	01	239	66	54.5	1.26	Maximum Flutter
007	60	01	242-249	55	52.0	1.1530	Near Surge (Rotating Stall)
007	85	02	279-286	85	85.8	1.3792	Wide Open Discharge
--	--	--	287	--	--	--	Transient To Surge
007	85	05	288-295	85	75.1	1.4862	Near Surge

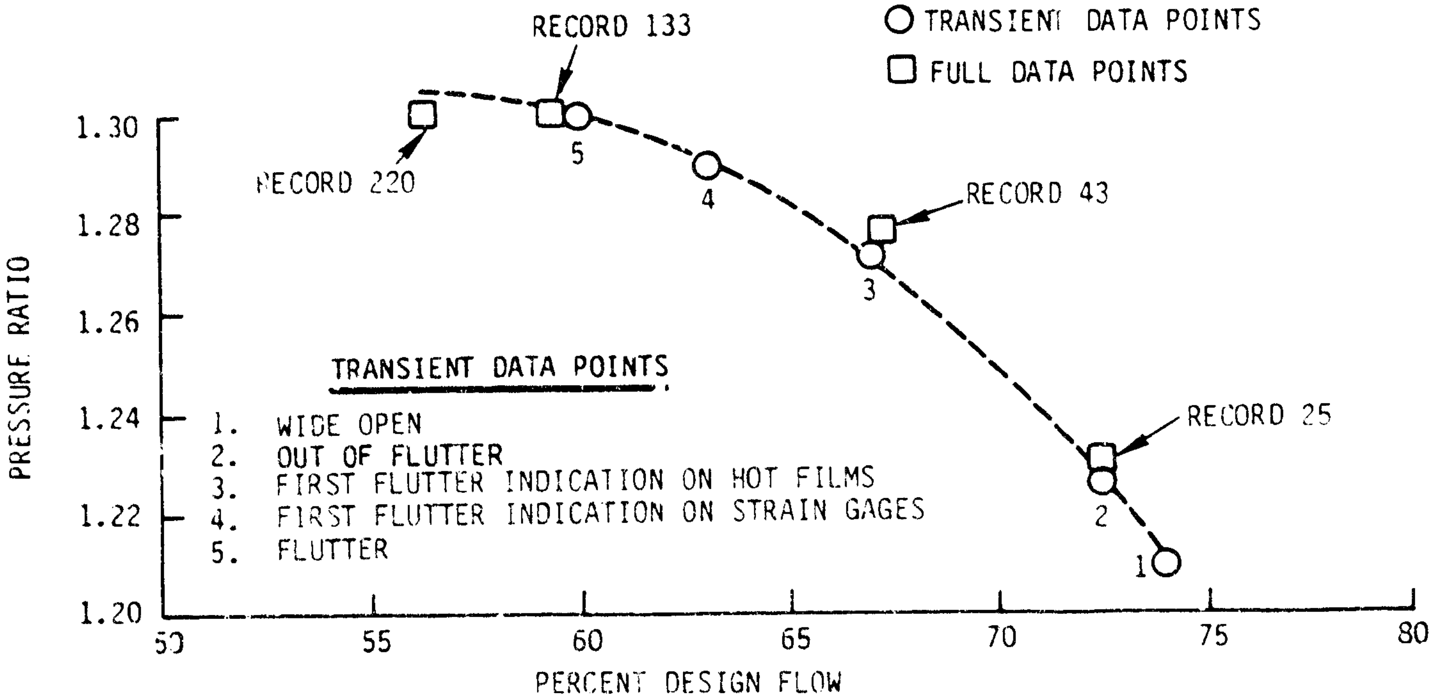

Figure A-1 Identification of Data Points at 70 Percent Speed, Including Transient From Open Discharge Into Surge

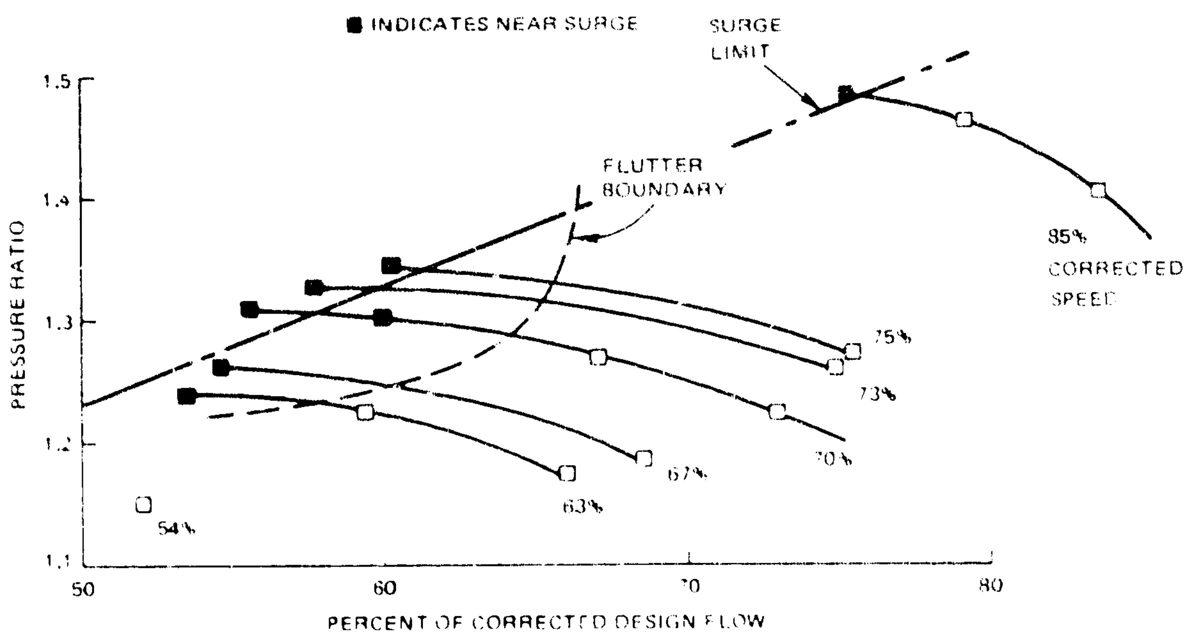

Figure A-2 Compressor Map Showing Test Points In Relationship To Flutter Boundary

AERODYNAMIC SUMMARY NOMENCLATURE

V-1	V_1	Air velocity at station into rotor
V-2	V_2	Air velocity at station out of rotor
VM-1	$V_{m,1}$	Air velocity at station into rotor in meridional direction
VM-2	$V_{m,2}$	Air velocity at station out of rotor in meridional direction
Vθ-1	$V_{\theta,1}$	Air velocity of station into rotor in circumferential direction
Vθ-2	$V_{\theta,2}$	Air velocity at station out of rotor in circumferential direction
U-1	U_1	Rotor tangential speed into rotor
U-2	U_2	Rotor tangential speed out of rotor
V'-1	V'_1	Air velocity relative to rotor at station into rotor
V'-2	V'_2	Air velocity relative to rotor at station out of rotor
Vθ'-1	$V'_{\theta,1}$	Air velocity relative to rotor at station into rotor in circumferential direction
Vθ'-2	$V'_{\theta,2}$	Air velocity relative to rotor at station out of rotor in circumferential direction
RHOVM-1	$\rho_1 V_{m,1}$	Product of air density and air velocity in meridional direction at station into rotor
RHOVM-2	$\rho_2 V_{m,2}$	Product of air density and air velocity in meridional direction, at station out of rotor
EPSI-1	ϵ_1	Angle between tangent to streamline projected on meridional plane and axial direction at station into rotor
EPSI-2	ϵ_2	Angle between tangent to streamline projected on meriodional plane and axial direction at station out of rotor

PO/PO	P_2/P_{in}	Ratio of total pressure leaving rotor and entering rig
B-1	β_1	Absolute air angle at station into rotor
B-2	β_2	Absolute air angle at station out of rotor
B'-1	β'_1	Air angle relative to rotor at station into rotor
B'-2	β'_2	Air angle relative to rotor at station out of rotor
M-1	M_1	Absolute Mach No. at rotor entrance
M-2	M_2	Absolute Mach No. at rotor exit
M'-1	M'_1	Relative Mach No. at rotor entrance
M'-2	M'_2	Relative Mach No. at rotor exit
INCS	i_{ss}	Incidence angle between inlet air direction and line tangent to blade suction surface at leading edge based on calculated metal angle for design speed
ICM	i_m	Incidence angle between inlet air direction and line tangent to blade mean camber line at leading edge based on calculated metal angle for design speed
DEV	δ^o	Deviation angle
TURN	$\beta'_1-\beta'_2$	Change in relative air angle entering and leaving rotor
D FAC	D	Diffusion factor
OMEGA-B	$\bar{\omega}$	Total pressure loss coefficient
LOSS-P	$\bar{\omega}\cos\beta'_2/2\sigma$	Loss parameter
EFF-P	η_p	Polytropic efficiency
EFF-A	η_{ad}	Adiabatic efficiency
WC1/A1	$W_1\sqrt{\theta_1}/\delta_1 A_1$	Corrected flow
TO/TO	T_2/T_{in}	Ratio of temperatures leaving rotor and entering rig

TABLE A-2

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 7 SPEED CODE 60 POINT NO 1

55 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	Vθ-1 M/SEC	Vθ-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	Vθ'-1 M/SEC	Vθ'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	91.5	146.5	91.5	105.0	0.0	102.2	102.3	115.6	137.2	105.8	-102.3	-13.4	106.08	129.31	0.3066	0.2592	1.1458
2	94.3	138.8	94.3	104.8	0.0	90.9	116.5	125.7	149.9	110.5	-116.5	-34.8	111.12	130.16	0.2260	0.1712	1.1427
3	96.0	132.7	96.0	103.0	0.0	83.8	131.9	138.4	163.1	116.5	-131.9	-54.6	112.94	126.70	0.1567	0.0940	1.1431
4	96.4	130.1	96.4	102.5	0.0	80.1	142.7	147.6	172.2	122.7	-142.7	-67.4	113.40	126.53	0.1157	0.0551	1.1444
5	96.6	127.9	96.6	103.3	0.0	75.4	159.3	161.9	186.3	134.8	-159.3	-86.5	113.63	130.21	0.0594	0.0208	1.1484
6	96.7	126.0	96.7	102.8	0.0	72.8	175.5	176.6	200.4	146.1	-175.5	-103.8	113.74	136.14	0.0115	-0.0121	1.1531
7	96.1	130.2	96.1	104.9	0.0	77.1	193.4	192.5	215.9	156.0	-193.4	-115.4	113.14	133.02	-0.0347	-0.0520	1.1674
8	94.8	125.0	94.8	103.1	0.0	70.7	210.7	207.8	231.0	171.6	-210.7	-137.2	111.73	131.15	-0.0832	-0.0927	1.1640
9	94.1	122.7	94.1	101.7	0.0	68.6	217.1	213.5	236.6	177.0	-217.1	-144.8	110.67	129.36	-0.1010	-0.1077	1.1614
10	91.4	117.6	91.4	98.6	0.0	64.1	233.3	227.7	250.6	191.0	-233.3	-163.6	108.03	125.45	-0.1468	-0.1471	1.1554
11	90.7	116.2	90.7	97.2	0.0	63.6	237.3	231.4	254.0	193.9	-237.3	-167.7	107.18	123.59	-0.1582	-0.1574	1.1535
12	88.6	111.5	88.6	90.3	0.0	65.4	246.7	240.4	262.2	197.0	-246.7	-175.1	104.95	114.30	-0.1635	-0.1627	1.1464
13	87.2	108.3	87.2	86.1	0.0	65.8	253.0	246.7	267.6	200.3	-253.0	-180.9	103.34	108.65	-0.1946	-0.1962	1.1419

SL	B-1 DEGREE	B-2 DEGREE	B'-1 DEGREE	B'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	43.9	48.26	7.20	0.2708	0.4298	0.4062	0.3104	3.97	9.53	15.02	41.06	0.4004	0.0379	0.0082	1.1458	97.00	97.14
2	0.0	40.7	51.15	18.24	0.2792	0.4005	0.4439	0.3236	4.39	9.28	14.65	32.89	0.4074	0.0178	0.0040	1.1427	98.30	98.38
3	0.0	39.0	53.99	27.77	0.2842	0.3862	0.4651	0.3406	4.87	9.21	12.46	26.22	0.4176	0.0254	0.0057	1.1431	97.26	97.31
4	0.0	37.9	55.97	33.21	0.2855	0.3801	0.5101	0.3584	5.20	9.23	11.18	22.75	0.4132	0.0328	0.0073	1.1444	96.17	96.23
5	0.0	36.1	58.75	39.89	0.2861	0.3733	0.5516	0.3933	5.50	9.12	8.60	18.87	0.3931	0.0331	0.0073	1.1484	95.64	95.72
6	0.0	35.3	61.14	45.28	0.2865	0.3672	0.5930	0.4258	5.70	9.03	6.96	15.86	0.3628	0.0450	0.0096	1.1531	93.54	93.68
7	0.0	36.3	63.57	47.74	0.2846	0.3736	0.6396	0.4533	6.35	9.38	3.77	15.83	0.3941	0.0829	0.0180	1.1674	88.16	88.41
8	0.0	34.5	65.77	53.10	0.2809	0.3651	0.6841	0.4985	6.65	9.40	4.65	12.66	0.3615	0.0776	0.0158	1.1640	87.40	87.66
9	0.0	34.0	66.57	54.94	0.2785	0.3562	0.7004	0.5137	6.72	9.34	4.98	11.63	0.3522	0.0807	0.0160	1.1614	86.33	86.61
10	0.0	32.9	68.52	58.82	0.2707	0.3412	0.7417	0.5540	6.74	8.97	5.12	9.70	0.3282	0.0882	0.0164	1.1554	83.55	83.88
11	0.0	33.1	69.06	59.70	0.2683	0.3369	0.7518	0.5620	6.73	8.86	5.14	9.22	0.3259	0.0956	0.0174	1.1535	81.93	82.28
12	0.0	35.7	70.13	62.56	0.2623	0.3224	0.7757	0.5697	6.78	8.66	5.63	7.57	0.3394	0.1412	0.0241	1.1464	73.43	73.92
13	0.0	37.2	70.87	64.42	0.2579	0.3129	0.7915	0.5785	6.80	8.56	6.06	6.45	0.3425	0.1642	0.0267	1.1419	68.95	69.52

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	300.2	480.6	300.2	344.5	0.0	335.4	335.6	379.4	450.3	347.3	-335.6	-44.0	22.14	26.48	17.567	14.850	0.0916
2	309.3	455.3	309.3	344.0	0.0	298.3	382.3	412.5	491.8	362.5	-382.3	-114.2	22.76	26.66	12.949	9.866	0.1592
3	314.9	435.5	314.9	337.8	0.0	274.9	432.8	454.0	535.2	382.3	-432.8	-179.1	23.13	26.36	8.977	5.567	0.2459
4	316.2	426.8	316.2	336.2	0.0	263.0	468.2	484.2	565.0	402.5	-468.2	-221.3	23.22	26.32	6.530	3.159	0.3055
5	316.9	419.6	316.9	339.0	0.0	247.4	522.6	531.2	611.2	442.1	-522.6	-283.8	23.27	26.67	3.406	1.194	0.4015
6	317.3	413.5	317.3	337.4	0.0	239.0	575.9	579.5	657.5	479.4	-575.9	-340.6	23.30	26.65	0.661	-0.693	0.5002
7	315.4	427.3	315.4	344.3	0.0	253.1	634.4	631.5	708.5	511.7	-634.4	-378.5	23.17	27.24	-1.967	-2.980	0.6063
8	311.2	410.2	311.2	338.4	0.0	231.9	691.1	682.0	758.0	563.1	-691.1	-450.1	22.88	26.86	-4.769	-5.310	0.7093
9	308.6	402.6	308.6	333.7	0.0	225.2	712.2	700.3	776.1	580.6	-712.2	-475.1	22.71	26.49	-5.767	-6.172	0.7468
10	300.0	385.9	300.0	323.5	0.0	210.4	765.5	747.1	822.2	626.7	-765.5	-536.7	22.13	25.69	-8.411	-8.426	0.8422
11	297.5	381.3	297.5	319.0	0.0	208.8	778.6	759.2	833.5	636.1	-778.6	-550.3	21.95	25.31	-9.065	-9.021	0.8669
12	290.6	365.8	290.6	296.4	0.0	214.4	809.6	788.8	860.2	646.4	-809.6	-574.4	21.49	23.41	-10.516	-10.469	0.9275
13	286.1	355.5	286.1	282.5	0.0	215.8	830.1	809.3	878.0	657.3	-830.1	-593.5	21.17	22.25	-11.151	-11.354	0.9693

WCI/AI LBM/SEC SQFT	WCI/AI KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
21.57	105.27	1.0472	1.1530	88.00	88.25

TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.0472	1.1530	88.00	88.25

TABLE A-3

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 3 SPEED CODE 63 POINT NO 1

U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	VO'-1 M/SEC	VO'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
133.7	144.1	139.5	-116.2	-13.9	137.56	166.93	0.3557	0.2575	1.1934
145.4	182.7	145.6	-134.7	-45.9	141.39	167.31	0.2232	0.1682	1.1841
165.5	197.6	150.1	-152.5	-67.0	143.62	164.92	0.1531	0.0881	1.1784
175.6	207.7	157.1	-165.0	-83.4	144.11	164.23	0.1119	0.0476	1.1769
187.2	223.2	174.3	-185.1	-107.2	144.08	165.66	0.0555	0.0121	1.1780
205.2	238.8	164.7	-202.9	-128.7	143.66	165.11	0.0073	-0.0156	1.1802
222.2	250.0	190.0	-223.5	[illegible]	142.87	157.13	-0.0369	-0.0577	1.1944
240.3	272.8	215.8	-245.5	-170.5	141.03	165.01	-0.0669	-0.0765	1.1869
264.8	279.0	222.2	-255.9	-179.8	139.77	163.62	-0.1049	-0.1113	1.1823
265.2	294.5	238.8	-269.7	-202.5	136.42	158.59	-0.1516	-0.1505	1.1707
267.5	298.4	242.4	-274.3	-207.5	135.36	155.88	-0.1631	-0.1609	1.1661
277.9	307.4	248.8	-285.2	-220.3	132.59	143.86	-0.1882	-0.1800	1.1485
285.2	313.4	252.8	-292.5	-228.3	130.63	134.54	-0.1969	-0.1999	1.1362

INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOTAL	%EFF-P TOTAL
0.47	6.02	13.47	39.11	0.3347	0.0766	0.0165	1.1934	93.62	93.77
0.47	5.76	12.84	31.18	0.3504	0.0558	0.0126	1.1841	94.32	94.44
1.41	5.75	11.01	24.21	0.3616	0.0543	0.0124	1.1784	93.44	93.60
1.83	5.66	9.86	20.70	0.3572	0.0558	0.0127	1.1769	92.63	92.80
2.32	5.95	7.39	16.96	0.3365	0.0495	0.0111	1.1780	92.62	92.79
2.74	6.06	5.84	14.04	0.3248	0.0547	0.0119	1.1802	91.04	91.26
3.61	6.04	2.91	13.95	0.3306	0.0921	0.0203	1.1944	85.12	85.48
4.13	6.85	3.80	10.97	0.2973	0.0711	0.0147	1.1869	86.59	86.92
4.24	6.86	4.08	10.06	0.2871	0.0712	0.0144	1.1823	85.89	86.23
4.45	6.69	4.18	8.35	0.2627	0.0756	0.0143	1.1707	83.37	83.74
4.49	6.65	4.31	7.81	0.2569	0.0811	0.0151	1.1661	81.55	81.95
4.65	6.56	5.23	5.04	0.2594	0.1144	0.0198	1.1485	72.89	73.41
4.74	6.56	6.06	4.58	0.2609	0.1598	0.0227	1.1362	66.27	66.87

V'-1 FT/SEC	V'-2 FT/SEC	VO'-1 FT/SEC	VO'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
551.6	457.7	-388.5	-45.6	28.17	34.19	17.517	14.756	0.0916
599.3	471.1	-442.0	-134.2	28.96	34.27	12.786	9.635	0.1592
648.2	492.6	-500.3	-219.7	29.41	33.78	8.769	5.049	0.2439
661.3	515.6	-541.3	-273.5	29.51	33.64	6.414	2.727	0.3055
732.2	561.9	-604.1	-351.6	29.51	33.92	3.181	0.694	0.4015
783.4	606.2	-665.1	-422.1	29.47	33.82	0.417	-1.121	0.5002
840.1	653.1	-733.4	-469.0	29.20	34.23	-2.226	-3.307	0.6063
895.1	708.0	-779.0	-559.4	28.88	33.92	-4.978	-5.528	0.7093
915.3	729.2	-823.3	-590.0	28.67	33.51	-6.056	-6.376	0.7466
966.4	763.6	-884.9	-664.3	27.94	32.48	-8.687	-8.026	0.8422
979.0	795.4	-900.1	-682.2	27.72	31.93	-9.347	-9.218	0.8669
1058.6	816.3	-935.9	-722.7	27.16	29.46	-10.783	-10.656	0.9275
1026.4	829.4	-959.6	-748.9	26.75	27.56	-11.281	-11.453	0.9693

TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
1.0553	1.1776	86.61	86.92

TO2/TO1	PO2/PO1	EFF-AD FCTCR %	EFF-P FCTCR %
1.0553	1.1776	86.61	86.92

TABLE A-4

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 5 SPEED CODE 63 POINT NO 3

63 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	Vθ-1 M/SEC	Vθ-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	Vθ'-1 M/SEC	Vθ'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	95.3	160.3	95.3	103.3	0.0	122.6	119.1	133.6	151.9	103.9	-119.1	-11.0	112.23	129.65	0.3116	0.2467	1.2054
2	97.9	152.4	97.9	103.1	0.0	112.3	134.6	145.2	166.4	108.2	-134.6	-32.9	114.98	130.74	0.2322	0.1529	1.2047
3	99.1	146.9	99.1	102.7	0.0	105.1	152.3	159.9	181.7	116.4	-152.3	-54.7	116.37	131.47	0.1642	0.0746	1.2094
4	99.3	144.6	99.3	102.6	0.0	101.9	164.8	170.4	192.4	123.4	-164.8	-68.5	116.56	131.95	0.1221	0.0397	1.2134
5	99.4	142.3	99.4	102.4	0.0	97.7	183.9	197.0	209.1	136.6	-183.9	-89.3	116.64	133.83	0.0634	0.0143	1.2208
6	99.5	140.3	99.5	102.2	0.0	96.1	202.7	204.0	225.8	148.6	-202.7	-107.9	116.78	133.02	0.0143	-0.0132	1.2294
7	99.1	145.9	99.1	105.9	0.0	100.4	223.3	222.3	244.3	161.3	-223.3	-121.8	116.33	138.17	-0.0344	-0.0491	1.2529
8	97.8	145.7	97.8	106.9	0.0	95.0	243.3	240.0	262.2	176.9	-243.3	-141.0	114.87	140.23	-0.0969	-0.0952	1.2629
9	96.3	144.3	96.3	105.9	0.0	93.0	250.7	246.5	268.7	182.4	-250.7	-148.5	113.88	138.94	-0.1079	-0.1130	1.2627
10	93.7	137.6	93.7	99.3	0.0	96.3	269.4	263.0	285.2	193.5	-269.4	-166.6	110.45	129.71	-0.1406	-0.1560	1.2544
11	92.7	136.2	92.7	95.6	0.0	97.2	274.0	267.2	289.3	195.1	-274.0	-170.0	109.45	124.98	-0.1720	-0.1660	1.2528
12	90.5	134.0	90.5	88.1	0.0	101.0	285.0	277.6	299.0	197.4	-285.0	-176.6	106.97	114.48	-0.1942	-0.1899	1.2503
13	89.0	133.1	89.0	84.9	0.0	102.5	292.2	294.9	305.4	201.2	-292.2	-182.3	105.31	110.14	-0.2010	-0.2008	1.2503

SL	β-1 DEGREE	β-2 DEGREE	β'-1 DEGREE	β'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	49.5	51.22	5.97	0.2823	0.4692	0.4495	0.3033	6.93	12.48	13.79	45.25	0.4997	0.0460	0.0130	1.2054	96.94	97.01
2	0.0	47.2	54.12	17.53	0.2899	0.4444	0.4930	0.3155	7.38	12.27	13.94	36.59	0.5096	0.0378	0.0085	1.2047	97.02	97.10
3	0.0	45.4	57.00	27.86	0.2938	0.4273	0.5396	0.3385	7.88	12.22	12.55	29.14	0.5061	0.0413	0.0093	1.2094	96.24	96.35
4	0.0	44.6	58.94	33.58	0.2944	0.4200	0.5702	0.3584	8.18	12.21	11.55	25.36	0.4997	0.0528	0.0120	1.2134	94.72	94.86
5	0.0	43.3	61.61	40.75	0.2946	0.4123	0.6196	0.3960	8.35	11.98	9.46	20.86	0.4796	0.0644	0.0140	1.2208	92.97	93.17
6	0.0	43.2	63.94	46.53	0.2950	0.4055	0.6692	0.4297	8.40	11.73	8.24	17.31	0.4715	0.0860	0.0100	1.2294	89.87	90.16
7	0.0	43.6	66.07	49.07	0.2937	0.4202	0.7240	0.4649	8.86	11.89	5.11	17.01	0.4728	0.1147	0.0242	1.2529	86.26	86.69
8	0.0	42.9	68.12	52.87	0.2896	0.4189	0.7768	0.5086	9.00	11.75	4.42	15.26	0.4539	0.1252	0.0256	1.2629	83.98	84.50
9	0.0	42.9	69.99	54.54	0.2869	0.4143	0.7960	0.5237	9.04	11.66	4.58	14.35	0.4477	0.1325	0.0265	1.2627	82.59	83.15
10	0.0	44.3	70.80	59.39	0.2773	0.3939	0.8445	0.5537	9.02	11.25	5.69	11.41	0.4424	0.1493	0.0309	1.2544	76.47	77.22
11	0.0	45.4	71.26	60.56	0.2746	0.3896	0.8565	0.5575	8.99	11.13	5.92	10.70	0.4462	0.1851	0.0329	1.2528	74.27	75.08
12	0.0	48.9	72.32	63.38	0.2672	0.3816	0.8847	0.5613	8.97	10.87	6.44	8.94	0.4640	0.2332	0.0387	1.2503	69.04	69.03
13	0.0	50.2	72.98	64.91	0.2632	0.3792	0.9036	0.5715	8.91	10.67	6.54	8.07	0.4662	0.2538	0.0405	1.2503	65.34	66.42

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	312.7	525.9	312.7	338.8	0.0	402.3	387.6	438.2	498.0	340.7	-387.6	-35.9	22.99	26.55	17.851	14.134	0.0916
2	321.1	500.2	321.1	338.3	0.0	368.5	441.5	476.4	545.9	355.1	-441.5	-107.9	23.55	26.78	13.306	8.761	0.1592
3	325.3	482.0	325.3	337.0	0.0	344.7	499.8	524.3	596.3	381.9	-499.8	-179.6	23.83	26.93	9.405	4.274	0.2439
4	325.9	474.5	325.9	336.7	0.0	334.3	540.7	559.2	631.3	404.9	-540.7	-224.9	23.87	27.02	6.994	2.275	0.3055
5	326.1	466.8	326.1	339.3	0.0	320.5	503.5	613.5	686.0	448.3	-603.5	-293.0	23.89	27.41	3.633	0.819	0.4015
6	326.6	460.3	326.6	335.5	0.0	315.2	665.0	669.3	740.9	487.7	-665.0	-354.0	23.92	27.24	0.921	-0.756	0.5002
7	325.1	475.6	325.1	347.0	0.0	329.6	732.7	729.3	801.6	529.3	-732.7	-399.7	23.83	28.30	-1.970	-2.814	0.6063
8	320.7	478.2	320.7	350.8	0.0	325.0	798.2	787.5	860.2	580.5	-798.2	-462.6	23.53	28.77	-4.974	-5.455	0.7093
9	317.7	473.4	317.7	347.4	0.0	321.6	822.4	808.9	881.6	598.4	-822.4	-487.2	23.32	28.46	-6.193	-6.474	0.7468
10	307.3	451.6	307.3	325.6	0.0	316.0	884.0	862.7	935.9	634.8	-884.0	-546.7	22.62	26.36	-9.203	-8.940	0.8422
11	304.3	447.3	304.3	313.9	0.0	318.8	899.1	876.7	949.2	640.1	-899.1	-557.9	22.42	25.60	-9.854	-9.511	0.8669
12	296.9	437.6	296.9	289.0	0.0	331.5	934.9	911.0	980.9	647.5	-934.9	-579.4	21.91	23.45	-11.126	-10.919	0.9275
13	291.9	436.7	291.9	278.7	0.0	336.3	958.6	934.6	1002.0	660.0	-958.6	-598.3	21.57	22.56	-11.518	-11.502	0.9693

WCI/AI LBM/SEC SQFT	WCI/AI KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
22.15	108.08	1.0749	1.2374	93.97	94.35

TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.0749	1.2374	83.87	84.35

TABLE A-5

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 7 SPEED CODE 66 POINT NO 1

66 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VA-1 M/SEC	VA-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	VA'-1 M/SEC	VA'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	96.7	166.1	96.7	106.2	0.0	127.7	121.7	137.6	155.4	106.7	-121.7	-9.9	113.72	133.75	0.3033	0.2539	1.2233
2	99.7	157.2	99.7	104.0	0.0	117.8	139.7	149.6	170.3	108.8	-138.7	-31.8	116.92	132.43	0.2211	0.1635	1.2219
3	101.2	149.9	101.2	101.4	0.0	110.3	157.0	164.7	186.8	115.1	-157.0	-54.4	118.57	130.43	0.1557	0.0925	1.2245
4	101.5	147.0	101.5	100.5	0.0	107.2	169.8	175.6	197.8	121.5	-169.8	-68.4	119.86	129.86	0.1176	0.0449	1.2285
5	101.6	146.4	101.6	103.8	0.0	103.2	189.5	192.7	215.1	137.1	-189.5	-89.5	119.02	135.17	0.0634	0.0187	1.2404
6	101.8	146.1	101.8	104.5	0.0	102.0	208.9	210.2	232.4	150.5	-208.9	-109.2	119.26	136.88	0.0153	-0.0096	1.2527
7	101.4	152.0	101.4	108.4	0.0	106.5	230.1	229.1	251.5	163.6	-230.1	-122.5	118.75	142.42	-0.0332	-0.0504	1.2777
8	99.9	152.0	99.9	108.9	0.0	106.1	250.7	247.4	269.9	178.3	-250.7	-141.2	117.18	143.53	-0.0971	-0.0961	1.2883
9	99.0	150.6	99.0	107.6	0.0	105.5	258.3	254.0	276.6	183.4	-258.3	-148.6	116.16	141.80	-0.1082	-0.1137	1.2983
10	95.7	144.0	95.7	99.0	0.0	104.6	277.6	271.0	293.7	193.6	-277.6	-166.4	112.69	130.14	-0.1577	-0.1568	1.2801
11	94.9	143.0	94.9	96.5	0.0	105.5	282.4	275.4	297.9	195.3	-282.4	-169.9	111.67	126.61	-0.1677	-0.1665	1.2792
12	92.5	141.9	92.5	90.2	0.0	109.5	293.7	286.1	307.9	198.3	-293.7	-176.6	109.18	117.38	-0.1871	-0.1883	1.2800
13	90.9	141.9	90.9	88.8	0.0	110.7	301.1	293.6	314.5	203.2	-301.1	-182.8	107.46	115.80	-0.1957	-0.2007	1.2824

SL	B-1 DEGREE	B-2 DEGREE	B'-1 DEGREE	B'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	49.9	51.59	5.26	0.2844	0.4850	0.4605	0.3114	7.30	12.85	13.08	46.37	0.5023	0.0361	0.0078	1.2233	97.63	97.70
2	0.0	48.3	54.37	16.87	0.2954	0.4577	0.5061	0.3167	7.63	12.52	13.28	37.51	0.5272	0.0422	0.0095	1.2219	96.75	96.83
3	0.0	47.2	57.21	28.01	0.3000	0.4352	0.5537	0.3341	8.09	12.43	12.70	29.21	0.5345	0.0571	0.0128	1.2245	94.92	95.07
4	0.0	46.7	59.15	34.09	0.3009	0.4260	0.5865	0.3523	8.39	12.41	12.06	25.06	0.5301	0.0729	0.0161	1.2285	93.05	93.25
5	0.0	44.9	61.90	40.71	0.3013	0.4235	0.6376	0.3966	8.54	12.17	9.42	21.09	0.4987	0.0719	0.0156	1.2404	97.43	97.56
6	0.0	44.3	64.00	45.98	0.3020	0.4214	0.6890	0.4342	8.56	11.89	7.69	18.02	0.4855	0.0898	0.0190	1.2527	89.84	90.16
7	0.0	44.5	66.23	48.54	0.3005	0.4370	0.7455	0.4704	9.01	12.04	4.58	17.69	0.4859	0.1212	0.0253	1.2777	86.01	86.49
8	0.0	44.3	68.29	52.41	0.2961	0.4359	0.7999	0.5113	9.17	11.92	3.97	15.88	0.4727	0.1407	0.0290	1.2883	82.79	83.39
9	0.0	44.5	69.05	54.13	0.2932	0.4313	0.8197	0.5252	9.20	11.82	4.18	14.92	0.4686	0.1507	0.0304	1.2983	81.12	81.79
10	0.0	46.5	70.94	59.19	0.2835	0.4107	0.8698	0.5522	9.16	11.39	5.49	11.75	0.4674	0.1925	0.0353	1.2801	74.70	75.57
11	0.0	47.5	71.39	60.32	0.2807	0.4071	0.8922	0.5563	9.12	11.26	5.69	11.07	0.4710	0.2075	0.0372	1.2792	72.72	73.65
12	0.0	50.4	72.43	62.87	0.2738	0.4025	0.9114	0.5626	9.08	10.99	5.88	9.61	0.4958	0.2503	0.0424	1.2800	67.54	68.65
13	0.0	51.1	73.10	63.98	0.2691	0.4019	0.9309	0.5754	9.03	10.78	5.62	9.12	0.4945	0.2654	0.0438	1.2824	65.59	66.78

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VA-1 FT/SEC	VA-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	VA'-1 FT/SEC	VA'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	317.2	545.0	317.2	349.4	0.0	419.1	399.4	451.6	510.0	349.9	-399.4	-32.5	23.29	27.39	17.376	14.545	0.0916
2	327.0	515.7	327.0	341.2	0.0	386.6	455.0	491.0	560.3	356.8	-455.0	-104.4	23.95	27.12	12.670	9.365	0.1592
3	332.0	491.7	332.0	332.7	0.0	362.0	515.0	540.3	612.8	377.5	-515.0	-178.4	24.28	26.71	8.921	4.726	0.2439
4	332.9	482.2	332.9	329.7	0.0	351.9	557.2	576.3	649.1	398.8	-557.2	-224.4	24.34	26.60	6.741	2.573	0.3055
5	333.4	480.3	333.4	340.7	0.0	338.5	621.9	632.2	705.6	449.8	-621.9	-293.7	24.38	27.68	3.634	1.074	0.4015
6	334.2	479.2	334.2	343.0	0.0	334.6	685.3	689.7	762.5	493.7	-685.3	-355.1	24.43	28.03	0.875	-0.550	0.5002
7	332.6	498.6	332.6	355.5	0.0	349.6	755.0	751.6	825.0	536.7	-755.0	-402.0	24.32	29.17	-1.903	-2.886	0.6063
8	327.8	498.9	327.8	357.3	0.0	348.2	822.5	811.6	885.4	585.1	-822.5	-463.4	24.00	29.40	-4.991	-5.504	0.7093
9	324.7	494.2	324.7	352.9	0.0	346.0	847.5	833.5	907.6	601.8	-847.5	-487.5	23.79	29.04	-6.200	-6.515	0.7468
10	314.1	472.5	314.1	324.8	0.0	343.1	911.0	889.1	963.6	635.3	-911.0	-546.0	23.08	26.65	-9.035	-8.984	0.8422
11	311.0	469.0	311.0	316.5	0.0	346.2	926.6	903.5	977.4	640.9	-926.6	-557.3	22.87	25.93	-9.610	-9.540	0.8669
12	303.5	465.5	303.5	296.0	0.0	359.3	963.5	939.8	1010.1	650.8	-963.5	-579.5	22.36	24.14	-10.720	-10.789	0.9275
13	298.3	465.7	299.3	291.3	0.0	363.3	987.8	963.2	1031.9	666.8	-987.8	-599.8	22.01	23.72	-11.210	-11.499	0.9693

WC1/A1 LBM/SEC SQFT	WC1/A1 KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
22.59	110.22	1.0924	1.2605	83.02	83.57

TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.0824	1.2605	83.02	83.57

TABLE A-6

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 4 SPEED CODE 67 POINT NO 1

67 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	Vθ-1 M/SEC	Vθ-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	Vθ'-1 M/SEC	Vθ'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	125.5	169.6	125.5	144.7	0.0	122.5	122.6	138.6	175.4	145.6	-122.6	-16.1	143.46	173.68	0.3060	0.2579	1.2063
2	129.5	179.3	129.5	143.6	0.0	107.3	139.6	150.6	190.4	150.0	-139.6	-43.4	147.42	174.38	0.2235	0.1664	1.1975
3	131.9	169.6	131.9	140.3	0.0	95.4	158.0	165.8	205.8	157.0	-158.0	-70.4	149.71	171.99	0.1531	0.0591	1.1910
4	132.4	[illegible]	132.4	138.9	0.0	89.4	171.0	176.8	216.2	164.1	-171.0	-87.4	150.19	171.07	0.1119	0.0474	1.1887
5	132.3	[illegible]	132.3	139.1	0.0	81.9	190.8	194.0	232.2	178.6	-190.8	-112.1	150.14	172.21	0.0554	0.0122	1.1891
6	13[illegible]	[illegible]	132.1	137.8	0.0	77.2	210.3	211.6	248.4	192.5	-210.3	-134.4	149.93	171.44	0.0073	-0.0191	1.1910
7	131.[illegible]	[illegible]1.4	131.1	139.3	0.0	81.5	231.7	230.6	266.2	204.1	-231.7	-149.2	148.92	173.55	-0.0384	-0.0569	1.2002
8	129.1	155.0	129.1	137.8	0.0	71.0	252.4	249.0	293.5	225.1	-252.4	-179.0	147.07	172.57	-0.0663	-0.0956	1.1967
9	128.0	152.3	128.0	136.1	0.0	58.3	260.1	255.7	289.9	231.6	-260.1	-187.4	145.99	170.47	-0.1044	-0.1106	1.1939
10	124.3	145.9	124.3	131.8	0.0	62.6	279.5	272.8	305.9	248.1	-279.5	-210.2	142.35	164.93	-0.1511	-0.1499	1.1816
11	123.2	143.6	123.2	129.8	0.0	61.4	284.3	277.2	309.9	251.9	-284.3	-215.9	141.27	162.18	-0.1626	-0.1602	1.1766
12	120.4	134.4	120.4	120.7	0.0	59.1	295.6	288.1	319.2	258.8	-295.6	-228.9	138.43	150.64	-0.1875	-0.1653	1.1578
13	119.4	127.7	119.4	113.7	0.0	58.1	303.1	295.5	325.4	263.3	-303.1	-237.5	136.42	140.75	-0.1964	-0.1995	1.1446

SL	B-1 DEGREE	B-2 DEGREE	B'-1 DEGREE	B'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	39.9	44.40	6.26	0.3737	0.5581	0.5225	0.4286	0.11	5.66	14.08	38.14	0.3309	0.0712	0.0154	1.2063	93.89	94.05
2	0.0	36.5	47.24	16.08	0.3862	0.5267	0.5678	0.4408	0.51	5.39	13.09	30.56	0.3464	0.0513	0.0116	1.1975	94.68	94.82
3	0.0	34.0	50.17	26.50	0.3935	0.4971	0.6141	0.4601	1.05	5.38	11.19	23.67	0.3571	0.0568	0.0116	1.1910	93.77	93.93
4	0.0	32.6	52.24	32.05	0.3950	0.4935	0.6452	0.4905	1.47	5.50	10.02	20.19	0.3532	0.0543	0.0123	1.1887	92.73	92.91
5	0.0	30.4	55.25	38.82	0.3948	0.4719	0.6929	0.5223	1.99	5.61	7.54	16.42	0.3331	0.0499	0.0111	1.1591	92.49	92.66
6	0.0	29.3	57.85	44.29	0.3942	0.4610	0.7410	0.5618	2.42	5.74	5.99	13.56	0.3219	0.0561	0.0122	1.1910	90.73	90.90
7	0.0	30.3	60.51	46.99	0.3909	0.4696	0.7940	0.5939	3.30	6.33	3.03	13.52	0.3337	0.0935	0.0205	1.2002	84.77	85.17
8	0.0	27.3	62.92	52.30	0.3851	0.4512	0.8453	0.6551	3.80	6.55	3.85	10.62	0.2925	0.0687	0.0142	1.1967	86.93	87.26
9	0.0	25.7	63.79	54.04	0.3616	0.4435	0.8640	0.6738	3.94	6.56	4.09	9.75	0.2833	0.0760	0.0141	1.1939	86.05	86.46
10	0.0	24.3	65.95	57.92	0.3703	0.4241	0.9111	0.7212	4.17	6.41	4.12	8.13	0.2617	0.0761	0.0149	1.1816	82.77	83.17
11	0.0	25.2	66.48	58.87	0.3669	0.4170	0.9227	0.7317	4.21	6.35	4.23	7.61	0.2581	0.0843	0.0159	1.1766	90.92	91.36
12	0.0	26.0	67.74	62.06	0.3583	0.3897	0.9499	0.7503	4.39	6.29	5.13	5.67	0.2570	0.1156	0.0201	1.1578	72.65	73.21
13	0.0	26.9	68.55	64.29	0.3521	0.3696	0.9679	0.7620	4.48	6.23	5.92	4.26	0.2571	0.1391	0.0227	1.1446	66.38	67.[illegible]

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	411.6	622.1	411.6	474.8	0.0	401.9	402.1	454.6	575.4	477.7	-402.1	-52.7	29.38	35.57	17.534	14.775	0.0516
2	424.9	588.2	424.9	471.3	0.0	351.9	458.1	494.3	624.6	492.3	-458.1	-142.3	30.19	35.71	12.864	9.046	0.1592
3	432.7	556.4	432.7	460.2	0.0	312.9	518.5	544.0	675.3	515.0	-518.5	-231.1	30.66	35.22	8.770	5.646	0.2439
4	434.4	541.9	434.4	455.7	0.0	293.3	561.0	580.2	709.5	538.5	-561.0	-286.9	30.76	35.04	6.469	2.714	0.3055
5	434.2	524.5	434.2	456.2	0.0	268.6	626.1	636.5	761.9	586.1	-626.1	-367.9	30.75	35.27	3.173	0.699	0.4015
6	433.5	518.2	433.5	452.0	0.0	253.4	690.0	694.4	814.9	631.4	-690.0	-440.9	30.71	35.11	0.419	-1.694	0.5002
7	430.0	529.5	430.0	457.1	0.0	267.3	760.1	756.7	873.3	669.7	-760.1	-489.4	30.50	35.54	-2.199	-3.259	0.6003
8	423.7	506.7	423.7	452.1	0.0	253.1	828.1	817.1	930.2	738.5	-828.1	-584.0	30.12	35.34	-4.946	-5.479	0.7093
9	420.1	499.6	420.1	446.5	0.0	224.2	853.3	839.1	951.1	759.9	-853.3	-614.9	29.90	34.91	-5.982	-6.337	0.7408
10	407.9	476.8	407.9	432.5	0.0	205.3	917.1	895.1	1003.8	814.2	-917.1	-689.8	29.16	33.76	-8.657	-8.590	0.8422
11	404.3	471.0	404.3	425.9	0.0	201.4	932.9	909.6	1010.7	826.3	-932.9	-706.2	28.93	33.22	-9.314	-9.161	0.8669
12	395.0	441.0	395.0	396.1	0.0	194.0	970.0	945.1	1047.3	849.2	-970.0	-751.1	29.35	30.73	-10.741	-10.619	0.9275
13	388.4	419.0	388.4	373.2	0.0	190.5	994.5	969.7	1067.7	863.9	-994.5	-779.2	27.94	28.83	-11.253	-11.431	0.9693

WC1/A1 LBM/SEC SQFT	WC1/A1 KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
28.42	138.67	1.0586	1.1890	96.55	96.98

TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.0566	1.1690	66.55	66.68

TABLE A-7

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 1 SPEED CODE 70 POINT NO 1

70 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	Vθ-1 M/SEC	Vθ-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	Vθ'-1 M/SEC	Vθ'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	133.9	200.9	133.9	150.0	0.0	133.7	131.3	148.5	187.5	150.7	-131.3	-14.8	151.60	180.39	0.3079	0.2610	1.2416
2	138.3	189.8	138.3	149.5	0.0	116.9	149.6	161.4	203.4	156.0	-149.6	-44.6	155.60	182.33	0.2261	0.1726	1.2326
3	141.0	179.5	141.0	145.9	0.0	104.5	169.4	177.7	220.4	163.2	-169.4	-73.2	158.29	180.13	0.1560	0.0926	1.2265
4	141.6	174.9	141.6	144.7	0.0	98.3	183.2	189.5	231.6	171.0	-183.2	-91.2	158.64	179.58	0.1151	0.0517	1.2248
5	141.6	171.0	141.6	145.2	0.0	90.4	204.5	207.9	248.8	186.8	-204.5	-117.5	158.86	181.43	0.0588	0.0166	1.2263
6	141.4	167.7	141.4	144.3	0.0	85.5	225.4	226.8	266.1	202.0	-225.4	-141.3	158.69	181.24	0.0105	-0.0141	1.2292
7	140.4	171.0	140.4	145.1	0.0	90.5	248.3	247.2	285.2	213.5	-248.3	-156.7	157.70	182.23	-0.0346	-0.0518	1.2455
8	138.5	166.5	138.5	146.3	0.0	79.6	270.5	266.9	303.9	237.7	-270.5	-187.3	155.94	185.19	-0.0818	-0.0906	1.2432
9	137.3	164.1	137.3	145.1	0.0	76.7	278.7	274.1	310.7	245.0	-278.7	-197.4	154.87	183.81	-0.1008	-0.1061	1.2391
10	133.4	157.4	133.4	140.8	0.0	70.5	299.6	292.4	327.9	262.8	-299.6	-221.9	151.17	178.10	-0.1502	-0.1474	1.2251
11	132.2	155.0	132.2	138.6	0.0	69.3	304.7	297.1	332.2	266.7	-304.7	-227.8	150.05	175.12	-0.1623	-0.1582	1.2194
12	129.2	145.4	129.2	128.7	0.0	67.6	316.8	308.7	342.2	273.3	-316.8	-241.1	147.10	161.55	-0.1880	-0.1847	1.1977
13	127.0	138.6	127.0	121.3	0.0	67.1	324.9	316.7	348.6	277.5	-324.9	-249.6	144.99	151.33	-0.1968	-0.1996	1.1828

SL	B-1 DEGREE	B-2 DEGREE	B'-1 DEGREE	B'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	41.4	44.54	5.56	0.3995	0.5908	0.5597	0.4432	0.25	5.81	13.40	38.96	0.3603	0.0840	0.0182	1.2416	93.01	93.22
2	0.0	37.6	47.36	16.50	0.4133	0.5568	0.6088	0.4577	0.62	5.51	12.90	30.87	0.3709	0.0550	0.0124	1.2326	94.47	94.63
3	0.0	35.4	50.25	26.47	0.4216	0.5252	0.6569	0.4776	1.13	5.46	11.16	23.78	0.3814	0.0540	0.0123	1.2265	93.63	93.82
4	0.0	34.1	52.30	32.09	0.4234	0.5111	0.6925	0.4997	1.54	5.57	10.05	20.22	0.3762	0.0570	0.0129	1.2248	92.68	92.69
5	0.0	31.8	55.29	38.93	0.4235	0.4991	0.7439	0.5452	2.03	5.66	7.64	16.36	0.3538	0.0522	0.0116	1.2263	92.49	92.70
6	0.0	30.6	57.88	44.40	0.4229	0.4884	0.7957	0.5881	2.44	5.77	6.10	13.48	0.3404	0.0590	0.0128	1.2292	90.74	91.01
7	0.0	32.0	60.53	47.24	0.4196	0.4958	0.8527	0.6192	3.31	6.34	3.27	13.29	0.3549	0.1051	0.0230	1.2455	83.80	84.30
8	0.0	28.6	62.90	52.04	0.4138	0.4833	0.9080	0.6897	3.78	6.53	3.59	10.66	0.3074	0.0705	0.0147	1.2432	87.46	87.84
9	0.0	27.9	63.77	55.69	0.4102	0.4762	0.9281	0.7107	3.91	6.53	3.73	10.08	0.2972	0.0701	0.0143	1.2391	86.98	87.38
10	0.0	26.5	65.92	57.51	0.3982	0.4562	0.9787	0.7615	4.14	6.38	3.81	8.41	0.2751	0.0787	0.0152	1.2251	83.89	84.34
11	0.0	26.4	66.45	58.56	0.3946	0.4488	0.9911	0.7723	4.19	6.32	3.92	7.89	0.2717	0.0859	0.0162	1.2194	82.03	82.53
12	0.0	27.6	67.71	61.76	0.3852	0.4200	1.0201	0.7692	4.36	6.27	4.82	5.96	0.2736	0.1234	0.0216	1.1977	73.32	73.99
13	0.0	28.8	68.53	63.97	0.3785	0.3993	1.0394	0.7997	4.46	6.21	5.60	4.56	0.2758	0.1511	0.0249	1.1828	66.91	67.70

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	439.2	659.3	439.2	492.2	0.0	438.6	430.9	487.2	615.3	494.6	-430.9	-48.6	31.05	36.94	17.640	14.955	0.0916
2	453.8	622.6	453.8	490.5	0.0	383.5	490.9	529.7	668.6	511.8	-490.9	-146.3	31.91	37.34	12.957	9.888	0.1592
3	462.6	588.9	462.6	478.7	0.0	342.9	555.7	583.0	723.1	535.5	-555.7	-240.1	32.42	36.89	8.941	5.304	0.2439
4	464.6	573.9	464.6	474.7	0.0	322.5	601.2	621.8	759.8	561.2	-601.2	-299.2	32.53	36.78	6.593	2.963	0.3055
5	464.6	561.2	464.6	476.5	0.0	296.5	671.0	682.1	816.2	613.0	-671.0	-385.7	32.54	37.16	3.368	0.950	0.4015
6	464.1	550.3	464.1	473.4	0.0	280.5	739.4	744.2	873.0	662.7	-739.4	-463.7	32.50	37.12	0.601	-0.806	0.5002
7	460.5	560.9	460.5	476.0	0.0	296.9	814.6	810.9	935.6	700.6	-814.6	-514.1	32.30	37.32	-1.982	-2.970	0.6063
8	454.3	546.4	454.3	480.0	0.0	261.1	887.5	875.7	997.0	779.8	-887.5	-614.6	31.94	37.93	-4.667	-5.192	0.7093
9	450.6	538.6	450.6	476.1	0.0	251.7	914.4	899.3	1019.4	803.8	-914.4	-647.6	31.72	37.65	-5.774	-6.080	0.7468
10	437.7	516.5	437.7	461.9	0.0	231.2	982.9	959.3	1076.0	862.2	-982.9	-728.0	30.96	36.48	-8.607	-8.446	0.8422
11	433.9	508.4	433.9	454.8	0.0	227.3	999.8	974.8	1089.8	874.9	-999.8	-747.5	30.73	35.87	-9.296	-9.067	0.8669
12	423.8	477.2	423.8	422.4	0.0	221.9	1039.5	1012.9	1122.6	896.7	-1039.5	-791.0	30.13	33.09	-10.774	-10.562	0.9275
13	416.7	454.7	416.7	397.9	0.0	220.2	1065.3	1039.2	1144.4	910.6	-1065.8	-819.1	29.70	30.99	-11.278	-11.436	0.9693

WC1/A1 LBM/SEC SQFT	WC1/A1 KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
30.17	147.22	1.0700	1.2284	86.50	86.90	1.0700	1.2284	86.50	86.90

TABLE A-8

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 1 SPEED CODE 70 POINT NO 5

70 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	Vθ-1 M/SEC	Vθ-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	Vθ'-1 M/SEC	Vθ'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	120.6	186.2	120.6	131.1	0.0	132.2	131.4	148.6	178.4	132.1	-131.4	-16.4	138.63	162.78	0.3022	0.2511	1.2502
2	124.5	175.9	124.5	125.6	0.0	119.9	149.7	161.5	194.7	136.4	-149.7	-42.6	142.51	163.00	0.2227	0.1570	1.2453
3	126.7	167.6	126.7	126.7	0.0	109.8	169.5	177.8	211.6	143.8	-169.5	-68.0	144.70	161.40	0.1579	0.0722	1.2468
4	127.1	164.3	127.1	126.0	0.0	105.4	183.3	199.6	223.1	151.6	-183.3	-84.2	145.12	161.48	0.1205	0.0340	1.2498
5	127.5	162.5	127.5	128.3	0.0	99.8	204.6	208.0	241.1	167.9	-204.6	-108.2	145.44	165.68	0.0658	0.0117	1.2596
6	127.9	160.8	127.9	128.7	0.0	96.4	225.5	226.9	259.2	183.3	-225.5	-130.5	145.85	167.47	0.0176	-0.0119	1.2703
7	127.4	166.2	127.4	130.7	0.0	102.7	248.4	247.3	279.2	194.9	-248.4	-144.6	145.38	170.51	-0.0301	-0.0476	1.2958
8	125.9	160.6	125.9	128.9	0.0	95.9	270.6	267.0	298.5	214.3	-270.6	-171.2	143.84	168.96	-0.0789	-0.0890	1.2931
9	124.8	158.3	124.8	127.6	0.0	93.8	278.9	274.2	305.5	221.0	-278.9	-180.5	142.85	167.34	-0.0967	-0.1042	1.2905
10	121.5	153.7	121.5	126.2	0.0	99.1	299.7	292.5	323.4	239.9	-299.7	-203.4	139.53	164.37	-0.1437	-0.1447	1.2851
11	120.5	152.3	120.5	123.9	0.0	98.5	304.9	297.3	327.8	242.8	-304.9	-208.8	138.51	162.55	-0.1555	-0.1557	1.2829
12	117.9	146.7	117.9	116.3	0.0	89.4	317.0	308.9	338.2	248.4	-317.0	-219.5	135.81	151.68	-0.1819	-0.1820	1.2717
13	115.9	142.7	115.9	111.5	0.0	89.1	325.0	316.9	345.1	253.6	-325.0	-227.9	133.84	144.99	-0.1935	-0.1975	1.2640

SL	B-1 DEGREE	B-2 DEGREE	B'-1 DEGREE	B'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	44.9	47.49	7.04	0.3589	0.5449	0.5309	0.3967	3.20	8.76	14.86	40.45	0.4275	0.0391	0.0083	1.2502	97.09	97.19
2	0.0	42.3	50.34	18.05	0.3708	0.5134	0.5799	0.3982	3.61	8.49	14.46	32.29	0.4423	0.0281	0.0063	1.2453	97.50	97.57
3	0.0	40.7	53.25	29.02	0.3776	0.4891	0.6305	0.4197	4.13	8.46	12.71	25.23	0.4505	0.0340	0.0076	1.2468	96.50	96.61
4	0.0	39.7	55.27	33.59	0.3799	0.4775	0.6649	0.4406	4.51	8.54	11.56	21.68	0.4447	0.0424	0.0094	1.2498	95.30	95.45
5	0.0	37.8	58.08	40.10	0.3799	0.4715	0.7185	0.4869	4.92	8.45	8.81	17.99	0.4201	0.0402	0.0088	1.2596	95.08	95.24
6	0.0	36.9	60.43	45.40	0.3812	0.4654	0.7727	0.5305	5.00	8.32	7.11	15.03	0.4053	0.0475	0.0101	1.2703	93.70	93.91
7	0.0	38.2	62.95	47.92	0.3797	0.4790	0.8321	0.5819	5.63	8.66	3.96	14.93	0.4202	0.0943	0.0204	1.2958	87.61	88.06
8	0.0	36.7	65.07	53.05	0.3749	0.4621	0.8892	0.6163	5.95	8.70	4.60	12.07	0.3910	0.0951	0.0193	1.2931	86.17	86.67
9	0.0	36.3	65.87	54.75	0.3718	0.4550	0.9101	0.6352	6.02	8.64	4.80	11.12	0.3821	0.0993	0.0197	1.2905	85.09	85.62
10	0.0	35.3	67.95	59.28	0.3616	0.4409	0.9626	0.6853	6.07	8.30	4.58	9.56	0.3586	0.1083	0.0204	1.2851	82.52	83.14
11	0.0	35.4	68.34	59.18	0.3535	0.4365	0.9755	0.6960	6.07	8.20	4.54	9.15	0.3553	0.1150	0.0213	1.2829	81.21	81.86
12	0.0	37.4	69.50	61.94	0.3503	0.4190	1.0058	0.7097	6.15	8.05	5.00	7.56	0.3617	0.1547	0.0270	1.2717	74.56	75.41
13	0.0	38.5	70.26	63.79	0.3444	0.4370	1.0258	0.7232	6.19	7.95	5.42	6.47	0.3607	0.1747	0.0290	1.2640	70.97	71.91

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	395.7	610.8	395.7	430.2	0.0	433.7	431.2	487.5	585.2	433.5	-431.2	-53.8	28.39	33.34	17.315	14.388	0.0916
2	408.4	577.0	408.4	425.1	0.0	390.1	491.2	530.0	638.9	447.5	-491.2	-139.9	29.19	33.38	12.757	8.993	0.1592
3	415.9	550.1	415.9	415.7	0.0	360.2	556.0	583.3	694.2	471.8	-556.0	-223.2	29.64	33.06	9.046	4.139	0.2439
4	417.2	539.1	417.2	413.6	0.0	345.8	601.5	622.1	732.0	497.4	-601.5	-276.4	29.72	33.07	6.903	1.946	0.3055
5	418.2	533.2	418.2	420.9	0.0	327.4	671.4	682.5	791.0	550.7	-671.4	-355.1	29.79	33.93	3.770	0.668	0.4015
6	419.6	527.4	419.6	422.2	0.0	316.3	739.9	744.6	850.6	601.4	-739.9	-428.3	29.87	34.30	1.008	-0.691	0.5002
7	418.1	545.3	418.1	428.9	0.0	336.9	815.1	811.4	916.0	639.6	-815.1	-474.5	29.78	34.92	-1.725	-2.729	0.6063
8	412.9	527.0	412.9	422.9	0.0	314.6	888.0	876.2	979.3	703.0	-888.0	-561.6	29.46	34.61	-4.521	-5.097	0.7093
9	409.6	519.4	409.6	418.5	0.0	307.7	915.0	899.8	1002.4	725.1	-915.0	-592.1	29.26	34.27	-5.542	-5.968	0.7468
10	398.6	504.2	398.6	410.8	0.0	292.3	983.4	959.8	1061.1	783.7	-983.4	-667.5	28.58	33.66	-8.236	-8.293	0.8422
11	395.3	499.5	395.3	406.5	0.0	290.3	1000.3	975.3	1075.6	796.5	-1000.3	-685.0	28.37	33.29	-8.912	-8.923	0.8669
12	386.5	481.2	386.5	381.5	0.0	293.3	1040.1	1013.5	1109.6	815.0	-1040.1	-720.2	27.81	31.07	-10.425	-10.427	0.9275
13	380.1	469.3	380.1	365.8	0.0	297.4	1066.4	1039.9	1132.1	832.1	-1066.4	-747.4	27.41	29.70	-11.088	-11.313	0.9693

WC1/A1 LBM/SEC SQFT	WC1/A1 KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
27.76	135.42	1.0815	1.2723	87.46	87.89	1.0915	1.2723	87.46	87.88

TABLE A-9

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 4 SPEED CODE 70 POINT NO 3

70 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	V6-1 M/SEC	V6-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	V6'-1 M/SEC	V6'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	107.1	178.5	107.1	115.4	0.0	136.1	131.6	149.8	169.7	116.1	-131.6	-12.7	124.93	145.56	0.3047	0.2553	1.2572
2	110.5	169.0	110.5	113.4	0.0	125.3	150.0	161.8	186.3	119.1	-150.0	-36.5	128.39	144.86	0.2235	0.1653	1.2559
3	112.4	161.4	112.4	110.8	0.0	117.4	169.8	178.1	203.6	126.3	-169.8	-60.7	130.34	143.26	0.1565	0.0839	1.2661
4	112.8	158.5	112.8	110.1	0.0	114.0	183.7	189.9	215.6	133.7	-183.7	-76.0	130.76	143.23	0.1204	0.0458	1.2653
5	113.2	157.9	113.2	113.8	0.0	109.5	205.0	208.4	234.1	150.8	-205.0	-98.9	131.09	149.36	0.0655	0.0197	1.2795
6	113.5	157.6	113.5	114.7	0.0	109.0	225.9	227.3	252.8	165.6	-225.9	-119.3	131.44	151.60	0.0159	-0.0080	1.2940
7	113.0	163.9	113.0	118.5	0.0	113.2	248.9	247.7	273.3	179.3	-248.9	-134.5	130.91	157.17	-0.0341	-0.0500	1.3231
8	111.3	163.7	111.3	118.6	0.0	112.6	271.1	267.5	293.1	194.9	-271.1	-154.7	129.19	157.69	-0.0890	-0.0960	1.3342
9	110.2	162.0	110.2	117.1	0.0	112.0	279.3	274.7	300.3	200.4	-279.3	-162.7	128.08	155.70	-0.1103	-0.1138	1.3337
10	106.6	154.5	106.6	108.0	0.0	110.4	300.3	293.0	318.6	212.2	-300.3	-182.6	124.28	143.23	-0.1599	-0.1572	1.3224
11	105.6	152.8	105.6	105.3	0.0	110.7	305.4	297.8	323.1	214.7	-305.4	-187.1	123.18	139.39	-0.1699	-0.1676	1.3199
12	103.0	149.1	103.0	99.1	0.0	112.3	317.6	309.4	333.8	220.2	-317.6	-197.1	120.46	129.35	-0.1892	-0.1893	1.3149
13	101.2	147.3	101.2	95.7	0.0	112.0	325.6	317.5	341.0	226.6	-325.6	-205.4	115.60	125.99	-0.1964	-0.2010	1.3132

SL	B-1 DEGREE	B-2 DEGREE	B'-1 DEGREE	B'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	49.4	50.92	6.21	0.3179	0.5205	0.5037	0.3366	6.63	12.18	14.03	44.71	0.4995	0.0513	0.0111	1.2572	96.55	96.66
2	0.0	47.6	53.70	17.73	0.3283	0.4914	0.5533	0.3464	6.96	11.84	14.14	35.97	0.5199	0.0502	0.0113	1.2559	96.64	96.17
3	0.0	46.4	56.52	28.53	0.3340	0.4080	0.6049	0.3662	7.40	11.74	13.22	27.99	0.5260	0.0604	0.0135	1.2661	94.55	94.72
4	0.0	45.8	58.45	34.45	0.3353	0.4585	0.6404	0.3870	7.69	11.71	12.42	24.00	0.5199	0.0726	0.0160	1.2653	92.97	93.20
5	0.0	43.8	61.10	40.95	0.3362	0.4559	0.6957	0.4353	7.84	11.47	9.66	20.16	0.4883	0.0697	0.0151	1.2795	92.57	92.83
6	0.0	[illegible]	63.32	40.11	0.3375	0.4537	0.7512	0.4766	7.88	11.20	7.82	17.20	0.4744	0.0856	0.0180	1.2940	90.19	90.55
7	0.0	43.7	65.59	46.64	0.3357	0.4700	0.8120	0.5140	8.37	11.40	4.06	16.95	0.4777	0.1211	0.0256	1.3231	85.93	86.47
8	0.0	43.6	67.70	52.57	0.3306	0.4676	0.8705	0.5569	8.56	11.33	4.13	15.12	0.4650	0.1434	0.0295	1.3342	82.39	83.09
9	0.0	43.6	68.48	54.30	0.3274	0.4623	0.8918	0.5719	9.63	11.25	4.35	14.19	0.4616	0.1535	0.0309	1.3337	80.66	81.45
10	0.0	45.6	70.42	59.34	0.3163	0.4388	0.9455	0.6028	8.64	10.87	5.63	11.08	0.4576	0.1939	0.0355	1.3224	74.38	75.37
11	0.0	46.3	70.86	60.55	0.3132	0.4333	0.9567	0.6090	8.62	10.75	5.91	10.33	0.4584	0.2067	0.0368	1.3199	72.55	73.61
12	0.0	48.7	71.95	63.42	0.3054	0.4215	0.9900	0.6224	8.60	10.50	6.48	8.53	0.4635	0.2417	0.0401	1.3149	67.79	69.01
13	0.0	49.4	72.63	64.92	0.3001	0.4156	1.0108	0.6394	8.56	10.32	6.56	7.71	0.4574	0.2534	0.0404	1.3132	65.91	67.19

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	V6-1 FT/SEC	V6-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	V6'-1 FT/SEC	V6'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	351.5	585.5	351.5	378.6	0.0	446.6	431.9	468.3	556.8	380.9	-431.9	-41.7	25.57	29.81	17.456	14.626	0.0916
2	362.7	554.3	362.7	371.9	0.0	411.0	492.1	530.9	611.3	390.8	-492.1	-119.9	26.29	29.67	12.805	9.469	0.1592
3	368.9	529.6	368.9	363.5	0.0	385.2	557.0	584.3	668.0	414.4	-557.0	-199.1	26.69	29.34	9.001	4.866	0.2439
4	370.2	519.9	370.2	361.2	0.0	374.0	602.6	623.2	707.2	439.5	-602.6	-249.2	26.78	29.33	6.900	2.624	0.3055
5	371.3	518.0	371.3	373.3	0.0	359.2	672.5	683.7	768.2	494.6	-672.5	-324.5	26.95	30.55	3.750	1.126	0.4015
6	372.4	517.0	372.4	376.5	0.0	354.3	741.1	745.5	829.4	543.2	-741.1	-391.6	26.92	31.65	0.911	-0.494	0.5002
7	370.7	537.8	370.7	388.6	0.0	371.5	816.5	812.8	896.7	588.1	-816.5	-441.2	26.81	32.19	-1.956	-2.605	0.6005
8	365.2	537.0	365.2	389.0	0.0	370.1	889.5	877.7	961.6	639.5	-889.5	-507.5	26.40	32.30	-5.160	-5.563	0.7095
9	361.7	531.6	361.7	364.1	0.0	367.5	916.5	901.3	985.3	657.6	-916.5	-533.8	26.23	31.89	-6.317	-6.526	0.7408
10	349.7	506.8	349.7	354.5	0.0	362.3	935.1	961.5	1045.4	696.2	-935.1	-599.2	25.45	29.53	-9.159	-9.007	0.8422
11	346.3	501.2	346.3	345.5	0.0	363.1	1002.0	977.0	1060.2	704.4	-1002.0	-613.9	25.23	28.55	-9.735	-9.576	0.9009
12	337.9	489.3	337.9	322.0	0.0	368.4	1041.9	1015.2	1095.3	722.5	-1041.9	-646.8	24.67	26.49	-10.841	-10.844	0.9275
13	332.1	483.3	332.1	313.8	0.0	367.5	1068.3	1041.6	1116.7	743.5	-1068.3	-674.1	24.29	25.76	-11.250	-11.518	0.9695

WC1/A1 LBM/SEC SQFT	WC1/A1 KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
24.82	121.13	1.0939	1.3004	83.62	83.64	1.0939	1.3004	83.02	83.64

TABLE A-10

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 3 SPEED CODE 73 POINT NO 1

73 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VΘ-1 M/SEC	VΘ-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	VΘ'-1 M/SEC	VΘ'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	P0/P0 INLET
1	130.1	200.4	130.1	153.4	0.0	138.2	137.5	155.2	193.4	154.3	-137.5	-17.0	153.76	185.83	0.3061	0.2624	1.2687
2	140.8	194.5	140.8	151.4	0.0	122.2	156.4	168.6	210.5	158.4	-156.4	-46.6	158.10	186.24	0.2278	0.1750	1.2589
3	143.8	184.3	143.8	147.6	0.0	110.3	177.1	185.8	228.1	165.8	-177.1	-75.5	160.85	184.22	0.1600	0.0958	1.2556
4	144.7	179.9	144.7	146.3	0.0	104.0	191.6	196.1	240.1	173.7	-191.6	-93.5	161.67	183.85	0.1200	0.0563	1.2563
5	145.4	176.0	145.4	140.7	0.0	97.2	213.8	217.3	258.5	189.6	-213.8	-120.1	162.28	185.96	0.0644	0.0229	1.2619
6	145.8	172.6	145.8	145.6	0.0	92.6	235.6	237.1	277.1	205.1	-235.5	-144.5	162.69	186.02	0.0163	-0.0077	1.2683
7	145.3	175.9	145.3	145.6	0.0	98.5	259.6	258.4	297.5	216.4	-259.6	-159.9	162.20	186.56	-0.0292	-0.0464	1.2887
8	143.8	171.9	143.8	147.9	0.0	87.8	282.8	279.0	317.2	241.7	-282.8	-191.3	160.82	190.95	-0.0775	-0.0860	1.2899
9	142.7	169.6	142.7	140.5	0.0	85.3	291.4	286.5	324.4	248.9	-291.4	-201.2	159.85	189.39	-0.0971	-0.1020	1.2864
10	138.9	162.0	138.9	141.9	0.0	79.8	313.2	305.7	342.6	266.7	-313.2	-225.8	156.30	183.21	-0.1482	-0.1448	1.2730
11	137.7	160.5	137.7	139.6	0.0	76.9	318.5	310.6	347.0	270.6	-318.5	-231.7	155.19	180.20	-0.1606	-0.1561	1.2677
12	134.5	151.6	134.5	129.6	0.0	76.6	331.2	322.7	357.5	276.4	-331.2	-244.1	152.22	165.80	-0.1672	-0.1637	1.2464
13	132.3	145.4	132.3	122.0	0.0	79.0	339.6	331.1	364.5	280.1	-339.6	-252.1	150.07	155.12	-0.1966	-0.1994	1.2321

SL	β-1 DEGREE	β-2 DEGREE	β'-1 DEGREE	β'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	P02/P01	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	41.7	45.33	6.28	0.4066	0.6065	0.5774	0.4533	1.04	6.60	14.10	39.05	0.3662	0.0622	0.0135	1.2687	94.94	95.11
2	0.0	38.7	48.13	17.01	0.4210	0.5700	0.6292	0.4641	1.39	6.28	13.41	31.13	0.3848	0.0465	0.0105	1.2589	95.47	95.62
3	0.0	36.6	50.96	20.92	0.4303	0.5503	0.6625	0.4643	1.84	6.18	11.61	24.04	0.3965	0.0417	0.0101	1.2556	94.95	95.11
4	0.0	35.4	52.95	32.95	0.4330	0.5244	0.7184	0.5064	2.19	6.22	10.42	20.50	0.3930	0.0478	0.0108	1.2563	94.14	94.33
5	0.0	33.5	55.75	39.26	0.4351	0.5122	0.7739	0.5518	2.53	6.15	7.98	16.52	0.3738	0.0430	0.0095	1.2619	94.14	94.34
6	0.0	32.5	58.24	44.77	0.4305	0.5010	0.8295	0.5955	2.80	6.13	6.47	13.47	0.3619	0.0496	0.0107	1.2683	92.08	92.92
7	0.0	34.0	60.77	47.67	0.4348	0.5004	0.8903	0.6253	3.55	6.58	3.70	13.10	0.3793	0.0497	0.0216	1.2887	85.53	86.04
8	0.0	30.7	63.05	52.31	0.4301	0.4970	0.9491	0.6988	3.93	6.68	3.86	10.74	0.3317	0.0653	0.0135	1.2899	89.20	89.59
9	0.0	30.2	63.90	53.94	0.4268	0.4898	0.9705	0.7191	4.04	6.66	3.98	9.96	0.3231	0.0679	0.0138	1.2864	88.37	88.77
10	0.0	29.3	66.01	57.75	0.4149	0.4695	1.0237	0.7691	4.23	6.46	4.05	8.26	0.3040	0.0823	0.0157	1.2730	84.70	85.21
11	0.0	29.3	66.54	58.77	0.4113	0.4625	1.0367	0.7796	4.27	6.40	4.13	7.77	0.3013	0.0908	0.0170	1.2677	82.85	83.41
12	0.0	31.1	67.79	61.89	0.4016	0.4352	1.0672	0.7935	4.44	6.34	4.95	5.90	0.3072	0.1347	0.0235	1.2464	74.13	74.93
13	0.0	32.8	68.60	64.05	0.3945	0.4162	1.0674	0.8017	4.54	6.29	5.68	4.56	0.3121	0.1666	0.0274	1.2321	67.97	68.90

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	440.7	677.3	440.7	503.2	0.0	453.4	450.5	509.4	634.4	506.3	-450.5	-55.9	31.49	38.06	17.651	15.035	0.0916
2	461.9	638.3	461.9	490.8	0.0	400.8	513.2	553.8	690.5	519.8	-513.2	-152.9	32.38	36.14	13.053	10.028	0.1592
3	471.8	604.6	471.8	484.4	0.0	361.9	580.9	609.5	748.4	544.0	-580.9	-247.6	32.94	37.73	9.169	5.491	0.2439
4	474.7	590.1	474.7	480.1	0.0	343.1	628.5	650.0	787.6	569.6	-628.5	-306.9	33.11	37.65	6.875	3.229	0.3055
5	477.0	577.4	477.0	481.3	0.0	319.0	701.5	713.1	848.3	622.1	-701.5	-394.1	33.24	36.09	3.690	1.313	0.4015
6	478.4	566.2	478.4	477.7	0.0	303.9	773.0	778.0	909.1	673.0	-773.0	-474.0	33.32	36.10	0.933	-0.442	0.5002
7	476.6	577.3	476.6	478.4	0.0	323.0	851.6	847.6	975.9	710.1	-851.6	-524.7	33.22	36.21	-1.676	-2.660	0.6063
8	471.7	564.1	471.7	465.1	0.0	287.9	927.8	915.4	1040.8	793.2	-927.8	-627.5	32.94	39.11	-4.438	-4.929	0.7093
9	468.2	556.3	468.2	450.8	0.0	279.9	956.0	940.1	1064.5	816.7	-956.0	-660.2	32.74	36.79	-5.564	-5.846	0.7468
10	455.6	534.2	455.6	465.6	0.0	261.9	1027.5	1002.8	1124.0	875.0	-1027.5	-746.9	32.01	37.52	-6.491	-8.299	0.8422
11	451.7	526.0	451.7	458.6	0.0	259.0	1045.1	1019.1	1138.6	887.7	-1045.1	-760.1	31.78	36.91	-9.200	-8.945	0.8669
12	441.4	497.4	441.4	425.3	0.0	258.0	1086.7	1058.9	1172.9	906.6	-1086.7	-800.9	31.18	33.96	-10.726	-10.523	0.9275
13	434.0	477.0	434.0	400.4	0.0	259.3	1114.2	1086.4	1195.8	918.9	-1114.2	-827.1	30.74	31.77	-11.265	-11.424	0.9693

WCI/AI LBM/SEC SQFT	WCI/AI KG/SEC SQM	T0/T0 INLET	P0/P0 INLET	EFF-AD INLET %	EFF-P INLET %
30.95	151.06	1.0804	1.2687	87.60	88.01

T02/T01	P02/P01	EFF-AD ROTOR %	EFF-P ROTOR %
1.0804	1.2687	87.60	88.01

TABLE A-11

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 3 SPEED CODE 73 POINT NO 2

73 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	Vθ-1 M/SEC	Vθ-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	Vθ'-1 M/SEC	Vθ'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	108.2	184.2	108.2	115.3	0.0	143.7	136.4	154.2	174.1	115.7	-136.4	-10.5	125.99	145.78	0.3091	0.2507	1.2786
2	111.4	174.8	111.4	113.6	0.0	132.9	155.4	167.7	191.2	118.8	-155.4	-34.8	129.24	145.58	0.2290	0.1590	1.2779
3	113.0	167.1	113.0	111.4	0.0	124.6	175.9	184.5	209.0	126.5	-175.9	-60.0	130.89	144.53	0.1627	0.0784	1.2820
4	113.3	164.2	113.3	110.5	0.0	121.4	190.3	196.8	221.5	133.7	-190.3	-75.4	131.21	144.23	0.1231	0.0421	1.2879
5	113.6	163.8	113.6	114.4	0.0	117.3	212.4	215.9	240.9	151.0	-212.4	-98.6	131.54	150.81	0.0653	0.0157	1.3052
6	113.8	163.6	113.8	114.9	0.0	116.6	234.1	235.6	260.3	165.3	-234.1	-119.0	131.77	152.46	0.0144	-0.0148	1.3225
7	113.0	170.2	113.0	118.6	0.0	122.1	257.9	256.7	291.6	179.4	-257.9	-134.6	130.96	153.29	-0.0381	-0.0559	1.3554
8	111.0	171.2	111.0	118.5	0.0	123.6	280.9	277.2	302.1	194.0	-280.9	-153.6	128.88	158.60	-0.0944	-0.1017	1.3716
9	109.8	169.9	109.8	116.9	0.0	123.4	289.5	284.7	309.6	199.2	-289.5	-161.3	127.63	156.38	-0.1163	-0.1193	1.3723
10	105.9	162.3	105.9	105.8	0.0	123.0	311.1	303.7	328.7	209.4	-311.1	-180.6	123.52	140.99	-0.1671	-0.1602	1.3610
11	104.8	160.7	104.8	103.0	0.0	123.3	316.5	308.6	333.4	212.0	-316.5	-185.2	122.39	137.11	-0.1770	-0.1690	1.3591
12	102.2	157.6	102.2	96.6	0.0	124.5	329.1	320.6	344.6	218.6	-329.1	-196.1	119.64	128.05	-0.1951	-0.1891	1.3558
13	100.5	156.1	100.5	95.1	0.0	123.8	337.4	329.0	352.0	226.1	-337.4	-205.2	117.83	125.98	-0.2001	-0.2005	1.3556

SL	B-1 DEGREE	B-2 DEGREE	B'-1 DEGREE	B'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	50.9	51.67	5.15	0.3213	0.5365	0.5169	0.3371	7.37	12.93	12.97	46.52	0.5235	0.0776	0.0169	1.2786	95.00	95.17
2	0.0	49.2	54.50	16.87	0.3308	0.5077	0.5679	0.3449	7.76	12.64	13.27	37.63	0.5431	0.0764	0.0172	1.2779	94.25	94.45
3	0.0	48.0	57.34	28.11	0.3356	0.4936	[illegible]	0.3660	8.22	12.56	12.90	29.24	0.5461	0.0854	0.0191	1.2820	92.63	92.89
4	0.0	47.5	59.26	34.15	0.3366	0.4740	0.6581	0.3861	8.50	12.53	12.12	25.11	0.5418	0.0998	0.0221	1.2879	90.77	91.10
5	0.0	45.7	61.86	40.72	0.3375	0.4718	0.7158	0.4350	8.60	12.23	9.43	21.14	0.5111	0.0947	0.0205	1.3052	90.37	90.73
6	0.0	45.4	64.06	46.02	0.3382	0.4695	0.7735	0.4744	8.63	11.95	7.73	18.04	0.5011	0.1130	0.0238	1.3225	87.70	88.18
7	0.0	45.9	66.34	48.65	0.3358	0.4863	0.8366	0.5125	9.12	12.15	4.69	17.69	0.5034	0.1459	0.0310	1.3554	83.84	84.52
8	0.0	46.3	69.47	52.41	0.3297	0.4870	0.8971	0.5519	9.35	12.10	3.96	16.06	0.4974	0.1742	0.0360	1.3716	79.87	80.74
9	0.0	46.6	69.26	54.13	0.3261	0.4825	0.9193	0.5656	9.40	12.02	4.17	15.13	0.4950	0.1966	0.0376	1.3723	78.02	78.98
10	0.0	49.2	71.19	59.59	0.3142	0.4582	0.9752	0.5911	9.41	11.65	5.89	11.60	0.4969	0.2333	0.0423	1.3610	71.36	72.57
11	0.0	50.0	71.65	60.84	0.3109	0.4531	0.9890	0.5976	9.38	11.52	6.20	10.81	0.4973	0.2453	0.0433	1.3591	69.73	71.01
12	0.0	52.1	72.68	63.67	0.3031	0.4426	1.0217	0.6141	9.33	11.24	6.74	9.01	0.4981	0.2743	0.0451	1.3558	65.90	67.33
13	0.0	52.3	73.33	65.02	0.2979	0.4377	1.0435	0.6341	9.26	11.01	6.66	8.30	0.4885	0.2821	0.0448	1.3556	64.56	66.04

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	Vθ-1 FT/SEC	Vθ-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	Vθ'-1 FT/SEC	Vθ'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	355.1	604.4	355.1	378.1	0.0	471.5	447.5	506.0	571.3	379.7	-447.5	-34.5	25.80	29.86	17.709	14.366	0.0916
2	365.4	573.6	365.4	372.6	0.0	436.1	509.9	550.2	627.3	389.7	-509.9	-114.0	26.47	29.82	13.118	9.053	0.1592
3	370.6	548.2	370.6	365.4	0.0	408.7	577.1	605.5	685.9	415.0	-577.1	-196.8	26.81	29.60	9.325	4.494	0.2439
4	371.6	538.7	371.6	362.4	0.0	398.5	624.4	645.8	726.6	438.8	-624.4	-247.3	26.87	29.54	7.050	2.410	0.3055
5	372.7	537.5	372.7	375.3	0.0	384.8	696.9	708.4	790.3	495.5	-696.9	-323.6	26.94	30.89	3.743	0.957	0.4015
6	373.4	536.8	373.4	376.5	0.0	382.5	768.0	772.9	854.0	542.4	-768.0	-390.3	26.99	31.23	0.823	-0.850	0.5002
7	370.9	558.5	370.9	389.1	0.0	400.6	846.1	842.2	923.8	588.5	-846.1	-441.6	26.82	32.42	-2.185	-3.204	0.6063
8	364.2	561.8	364.2	388.9	0.0	405.4	921.7	909.5	991.1	636.6	-921.7	-504.0	26.40	32.48	-5.411	-5.824	0.7093
9	360.3	557.6	360.3	383.5	0.0	404.7	949.7	934.0	1015.8	653.6	-949.7	-529.2	26.14	32.03	-6.663	-6.833	0.7468
10	347.4	532.4	347.4	347.2	0.0	403.6	1020.8	996.3	1078.3	686.9	-1020.8	-592.7	25.30	28.88	-9.575	-9.179	0.8422
11	343.9	527.3	343.9	338.1	0.0	404.7	1038.3	1012.4	1093.8	695.5	-1038.3	-607.8	25.07	28.08	-10.144	-9.691	0.8669
12	335.4	516.9	335.4	316.9	0.0	408.4	1079.7	1052.0	1130.5	717.3	-1079.7	-643.5	24.50	26.23	-11.176	-10.832	0.9275
13	329.8	512.1	329.8	311.9	0.0	406.2	1107.0	1079.3	1155.0	741.9	-1107.0	-673.1	24.13	25.80	-11.462	-11.489	0.9693

WC1/A1 LBM/SEC SQFT	WC1/A1 KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
24.87	121.37	1.1057	1.3317	80.70	81.47

TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1057	1.3317	80.70	81.47

TABLE A-12

AIRFOIL AERODYNAMIC SUMMARY PRINT

73 Percent Speed

RUN NO 5 SPEED CODE 73 POINT NO 8

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VØ-1 M/SEC	VØ-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	VØ'-1 M/SEC	VØ'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	101.0	172.6	101.0	109.1	0.0	133.8	129.9	146.8	164.5	109.9	-129.9	-13.1	118.32	138.42	0.3040	0.2536	1.2516
2	104.1	163.6	104.1	106.9	0.0	123.8	148.0	159.7	180.9	112.8	-148.0	-35.8	121.62	137.29	0.2219	0.1630	1.2508
3	105.7	156.2	105.7	104.3	0.0	116.3	167.5	175.7	198.0	120.0	-167.5	-59.5	123.29	135.33	0.1563	0.0821	1.2542
4	105.9	153.4	105.9	103.4	0.0	113.2	181.2	187.4	209.9	127.3	-181.2	-74.2	123.59	134.96	0.1180	0.0448	1.2590
5	106.2	153.3	106.2	107.6	0.0	109.2	202.2	205.6	228.4	144.5	-202.2	-96.4	123.81	141.57	0.0627	0.0187	1.2739
6	106.4	153.5	106.4	108.4	0.0	108.6	222.9	224.3	247.0	158.5	-222.9	-115.6	124.08	143.47	0.0130	-0.0109	1.2890
7	105.8	160.2	105.8	112.8	0.0	113.7	245.5	244.4	267.4	172.6	-245.5	-130.7	123.46	149.85	-0.0375	-0.0538	1.3182
8	104.1	161.0	104.1	113.1	0.0	114.6	267.5	263.9	287.0	187.3	-267.5	-149.3	121.60	150.64	-0.0941	-0.1019	1.3317
9	102.9	159.9	102.9	111.5	0.0	114.6	275.6	271.0	294.2	192.1	-275.6	-156.5	120.43	148.47	-0.1163	-0.1204	1.3324
10	99.2	153.1	99.2	101.0	0.0	115.0	296.2	289.1	312.4	201.3	-296.2	-174.1	116.45	133.93	-0.1674	-0.1646	1.3232
11	98.2	152.0	98.2	98.0	0.0	116.1	301.3	293.8	316.9	202.9	-301.3	-177.7	115.33	129.67	-0.1771	-0.1738	1.3222
12	95.6	150.0	95.6	90.4	0.0	119.7	313.3	305.3	327.6	206.5	-313.3	-185.6	112.60	119.05	-0.1945	-0.1942	1.3213
13	94.0	149.4	94.0	86.5	0.0	120.4	321.2	313.2	334.7	212.2	-321.2	-192.8	110.79	116.30	-0.1994	-0.2036	1.3229

SL	B-1 DEGREE	B-2 DEGREE	B'-1 DEGREE	B'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	50.5	52.19	6.74	0.2993	0.5031	0.4877	0.3202	7.90	13.45	14.56	45.45	0.5184	0.0373	0.0081	1.2516	97.56	97.64
2	0.0	49.0	54.96	18.37	0.3087	0.4756	0.5366	0.3277	8.22	13.10	14.78	36.59	0.5393	0.0435	0.0097	1.2508	96.66	96.77
3	0.0	47.9	57.78	29.50	0.3135	0.4525	0.5875	0.3478	8.66	12.99	14.19	28.28	0.5434	0.0597	0.0132	1.2542	94.74	94.91
4	0.0	47.4	59.69	35.49	0.3143	0.4435	0.6228	0.3680	8.93	12.96	13.46	24.20	0.5373	0.0762	0.0166	1.2590	92.81	93.05
5	0.0	45.4	62.30	41.80	0.3150	0.4425	0.6777	0.4169	9.04	12.67	10.51	20.51	0.5031	0.0738	0.0157	1.2739	92.34	92.60
6	0.0	45.1	64.47	46.84	0.3158	0.4415	0.7328	0.4560	9.04	12.36	8.55	17.63	0.4917	0.0950	0.0197	1.2890	89.43	89.81
7	0.0	45.3	66.69	49.24	0.3140	0.4590	0.7933	0.4946	9.48	12.51	5.28	17.46	0.4919	0.1277	0.0269	1.3162	85.53	86.06
8	0.0	45.4	68.77	52.92	0.3086	0.4596	0.8513	0.5349	9.65	12.40	4.46	15.85	0.4835	0.1539	0.0314	1.3317	81.67	82.40
9	0.0	45.8	69.55	54.58	0.3053	0.4557	0.8725	0.5477	9.69	12.31	4.63	14.96	0.4822	0.1676	0.0334	1.3324	79.67	80.48
10	0.0	46.7	71.47	59.85	0.2940	0.4341	0.9259	0.5708	9.69	11.93	6.14	11.62	0.4874	0.2179	0.0392	1.3232	72.55	73.61
11	0.0	49.8	71.93	61.06	0.2909	0.4302	0.9390	0.5744	9.66	11.79	6.43	10.86	0.4914	0.2337	0.0409	1.3222	70.58	71.71
12	0.0	52.8	72.96	63.93	0.2833	0.4229	0.9702	0.5819	9.61	11.52	6.99	9.03	0.5039	0.2750	0.0448	1.3213	65.66	66.98
13	0.0	53.0	73.61	65.26	0.2783	0.4202	0.9910	0.5968	9.54	11.29	6.89	8.35	0.4998	0.2883	0.0454	1.3229	63.91	65.31

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VØ-1 FT/SEC	VØ-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	VØ'-1 FT/SEC	VØ'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	331.3	566.4	331.3	357.9	0.0	439.0	426.1	481.8	539.7	360.4	-426.1	-42.9	24.23	28.35	17.415	14.530	0.0916
2	341.5	536.8	341.5	350.8	0.0	406.3	485.5	523.8	593.5	369.9	-485.5	-117.5	24.91	28.12	12.712	9.337	0.1592
3	346.7	512.3	346.7	342.0	0.0	381.4	549.5	576.5	649.7	393.8	-549.5	-195.1	25.25	27.72	8.956	4.702	0.2439
4	347.6	505.1	347.6	339.3	0.0	371.5	594.5	614.8	688.7	417.6	-594.5	-243.4	25.31	27.64	6.760	2.570	0.3055
5	348.3	503.0	348.3	353.1	0.0	358.3	663.5	674.5	749.4	474.0	-663.5	-316.2	25.36	29.00	3.595	1.073	0.4015
6	349.1	503.5	349.1	355.6	0.0	356.5	731.2	735.9	810.3	520.0	-731.2	-379.4	25.41	29.38	0.747	-0.624	0.5002
7	347.2	525.5	347.2	370.0	0.0	373.2	805.6	801.9	877.2	566.3	-805.6	-428.7	25.29	30.69	-2.146	-3.082	0.6063
8	341.4	528.2	341.4	371.1	0.0	375.9	877.6	865.9	941.7	614.7	-877.6	-490.0	24.90	30.65	-5.391	-5.838	0.7093
9	337.8	524.5	337.8	365.8	0.0	375.9	904.3	889.3	965.3	630.4	-904.3	-513.4	24.66	30.41	-6.664	-6.898	0.7468
10	325.5	502.3	325.5	331.5	0.0	377.3	972.0	948.6	1025.0	660.5	-972.0	-571.3	23.85	27.43	-9.594	-9.432	0.8422
11	322.1	498.6	322.1	321.6	0.0	381.0	988.6	964.0	1039.8	665.7	-988.6	-582.9	23.62	26.56	-10.148	-9.956	0.8669
12	313.8	492.2	313.8	296.7	0.0	392.7	1028.0	1001.6	1074.8	677.4	-1028.0	-608.9	23.06	24.38	-11.145	-11.129	0.9275
13	308.3	490.1	308.3	290.2	0.0	394.9	1054.0	1027.6	1098.2	696.1	-1054.0	-632.7	22.69	23.82	-11.425	-11.665	0.9693

WC1/A1 LBM/SEC SQFT	WC1/A1 KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
23.43	114.34	1.0944	1.2978	82.00	82.66

TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.0944	1.2978	82.00	82.66

TABLE A-13

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 4 SPEED CODE 75 POINT NO 4

75 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	VO'-1 M/SEC	VO'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	107.7	195.5	107.7	119.1	0.0	142.1	137.5	155.4	174.6	119.9	-137.5	-13.3	125.44	151.11	0.3059	0.2516	1.2843
2	111.1	175.8	111.1	116.3	0.0	131.8	156.6	169.0	192.0	122.1	-156.6	-37.2	128.97	149.51	0.2248	0.1595	1.2831
3	113.0	167.5	113.0	113.0	0.0	123.6	177.3	186.0	210.2	129.1	-177.3	-62.4	130.93	147.11	0.1593	0.0791	1.2869
4	113.5	164.2	113.5	111.5	0.0	120.5	191.8	198.4	222.9	136.0	-191.8	-77.8	131.43	146.11	0.1206	0.0421	1.2924
5	114.0	163.6	114.0	115.0	0.0	116.4	214.1	217.6	242.5	153.2	-214.1	-101.2	131.96	152.15	0.0642	0.0166	1.3096
6	114.4	163.3	114.4	115.0	0.0	116.0	235.9	237.4	262.2	167.2	-235.9	-121.4	132.39	153.27	0.0139	-0.0141	1.3270
7	113.8	169.9	113.8	113.2	0.0	122.0	259.9	258.7	283.7	180.8	-259.9	-136.7	131.80	158.36	-0.0374	-0.0557	1.3603
8	112.0	170.4	112.0	117.6	0.0	123.3	283.1	279.4	304.5	195.4	-283.1	-156.0	129.91	157.89	-0.0927	-0.1015	1.3758
9	110.9	169.0	110.9	115.7	0.0	123.2	291.7	286.9	312.1	200.4	-291.7	-163.7	128.72	155.40	-0.1140	-0.1190	1.3766
10	107.0	161.8	107.0	105.0	0.0	123.1	313.6	306.0	331.3	210.9	-313.6	-182.9	124.75	140.46	-0.1634	-0.1601	1.3671
11	106.0	160.3	106.0	102.2	0.0	123.5	318.9	311.0	336.1	213.5	-318.9	-187.5	123.63	136.58	-0.1732	-0.1690	1.3656
12	103.4	157.3	103.4	95.6	0.0	124.9	331.6	323.1	347.4	220.1	-331.6	-198.2	120.90	127.38	-0.1916	-0.1893	1.3631
13	101.7	155.9	101.7	93.8	0.0	124.5	340.0	331.5	354.9	227.3	-340.0	-207.0	119.06	124.84	-0.1981	-0.2007	1.3632

SL	B-1 DEGREE	B-2 DEGREE	B'-1 DEGREE	B'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	49.7	51.99	6.30	0.3197	0.5404	0.5194	0.3493	7.70	13.25	14.12	45.69	0.4991	0.0446	0.0097	1.2843	97.10	97.29
2	0.0	48.3	54.75	17.59	0.3300	0.5105	0.5703	0.3547	8.01	12.89	14.00	37.15	0.5261	0.0531	0.0119	1.2831	95.97	96.11
3	0.0	47.3	57.52	28.70	0.3357	0.4847	0.6246	0.3735	8.40	12.74	13.39	28.83	0.5350	0.0680	0.0152	1.2869	94.08	94.29
4	0.0	47.1	59.40	34.76	0.3372	0.4740	0.6622	0.3927	8.64	12.67	12.73	24.64	0.5331	0.0848	0.0186	1.2924	92.10	92.39
5	0.0	45.3	61.96	41.31	0.3388	0.4711	0.7207	0.4412	8.70	12.33	10.02	20.65	0.5042	0.0823	0.0177	1.3096	91.56	91.88
6	0.0	45.2	64.12	46.56	0.3401	0.4686	0.7792	0.4798	8.68	12.00	8.26	17.56	0.4964	0.1041	0.0217	1.3270	88.59	89.04
7	0.0	45.9	66.35	49.18	0.3383	0.4851	0.8431	0.5162	9.13	12.16	5.22	17.17	0.5019	0.1413	0.0297	1.3603	84.30	84.97
8	0.0	46.4	68.44	53.06	0.3327	0.4843	0.9045	0.5554	9.32	12.07	4.62	15.38	0.4964	0.1704	0.0346	1.3758	80.21	81.09
9	0.0	46.9	69.22	54.79	0.3293	0.4796	0.9269	0.5698	9.36	11.98	4.84	14.42	0.4946	0.1833	0.0364	1.3766	78.32	79.28
10	0.0	49.5	71.13	60.10	0.3177	0.4565	0.9833	0.5951	9.35	11.58	6.40	11.02	0.4961	0.2289	0.0409	1.3671	71.84	73.05
11	0.0	50.3	71.58	61.33	0.3145	0.4517	0.9972	0.6016	9.31	11.45	6.69	10.25	0.4967	0.2409	0.0418	1.3656	70.23	71.50
12	0.0	52.4	72.61	64.13	0.3066	0.4416	1.0302	0.6177	9.26	11.17	7.19	8.48	0.4983	0.2705	0.0437	1.3631	66.37	67.81
13	0.0	52.9	73.26	65.51	0.3014	0.4368	1.0572	0.6368	9.20	10.95	7.15	7.75	0.4900	0.2797	0.0436	1.3632	64.91	66.41

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	VO'-1 FT/SEC	VO'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	353.4	641.5	353.4	390.9	0.0	466.3	451.0	510.0	573.0	393.3	-451.0	-43.7	25.69	30.95	17.524	14.418	0.0916
2	364.5	576.8	364.5	381.6	0.0	432.3	513.9	554.4	630.0	400.7	-513.9	-122.1	26.41	30.62	12.880	9.140	0.1597
3	370.7	549.5	370.7	370.7	0.0	405.6	581.6	610.2	689.7	423.4	-581.6	-204.6	26.81	30.13	9.126	4.534	0.2439
4	372.3	538.7	372.3	365.9	0.0	395.4	629.3	650.8	731.2	446.2	-629.3	-255.4	26.92	29.93	6.909	2.411	0.3055
5	374.1	536.7	374.1	377.2	0.0	381.8	702.3	714.0	795.7	502.6	-702.3	-332.1	27.03	31.16	3.676	0.950	0.4015
6	375.4	535.8	375.4	377.2	0.0	380.5	774.0	778.9	860.2	548.6	-774.0	-398.4	27.11	31.39	0.796	-0.810	0.5002
7	373.5	557.4	373.5	387.9	0.0	400.2	852.7	848.8	930.9	593.1	-852.7	-448.6	26.99	32.43	-2.140	-3.190	0.6063
8	367.5	559.0	367.5	395.7	0.0	404.6	928.9	916.6	999.0	641.0	-928.9	-512.0	26.61	32.34	-5.309	-5.814	0.7093
9	363.7	554.6	363.7	379.6	0.0	404.2	957.1	941.3	1023.9	657.7	-957.1	-537.0	26.36	31.83	-6.533	-6.820	0.7468
10	351.2	530.8	351.2	344.4	0.0	403.9	1028.8	1004.1	1087.1	692.0	-1028.8	-600.2	25.55	28.77	-9.365	-9.173	0.8422
11	347.7	526.0	347.7	335.3	0.0	405.2	1046.4	1020.3	1102.7	700.6	-1046.4	-615.1	25.32	27.97	-9.924	-9.682	0.8669
12	339.2	516.2	339.2	313.8	0.0	409.9	1088.1	1060.2	1139.7	722.1	-1088.1	-650.3	24.76	26.09	-10.976	-10.846	0.9275
13	333.5	511.5	333.5	307.7	0.0	408.5	1115.6	1087.7	1164.4	745.7	-1115.6	-679.2	24.38	25.57	-11.349	-11.500	0.9693

WC1/A1 LBM/SEC SQFT	WC1/A1 KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
25.00	122.03	1.1063	1.3369	81.39	82.14

TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.1063	1.3369	81.39	82.14

TABLE A-14

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 4 SPEED CODE 75 POINT NO 1

75 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	VO'-1 M/SEC	VO'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	138.0	207.9	138.0	152.4	0.0	141.4	139.6	157.9	196.3	153.3	-139.6	-16.5	155.51	185.30	0.3099	0.2595	1.2794
2	142.5	196.4	142.5	145.0	0.0	125.5	159.1	171.6	213.6	157.9	-159.1	-46.1	159.64	186.50	0.2306	0.1701	1.2708
3	145.2	186.1	145.2	147.5	0.0	113.5	180.1	188.9	231.3	165.7	-180.1	-75.4	162.16	184.[illegible]	0.[illegible]629	0.0907	1.2672
4	146.0	181.6	146.0	146.0	0.0	108.0	194.8	201.5	243.4	173.4	-194.8	-93.5	162.85	184.12	0.1229	0.0521	1.2678
5	146.6	178.1	146.6	146.7	0.0	100.9	217.4	221.0	262.2	189.6	-217.4	-120.2	163.59	186.08	0.0675	0.0215	1.2746
6	147.0	174.7	147.0	143.4	0.0	96.3	239.6	241.1	281.1	205.5	-239.6	-144.9	163.79	187.09	0.0194	-0.0077	1.2821
7	146.6	178.4	146.6	146.5	0.0	101.8	264.0	262.8	301.9	217.7	-264.0	-161.0	163.38	186.37	-0.0265	-0.0448	1.3046
8	145.2	174.6	145.2	146.0	0.0	91.2	287.6	283.8	322.1	243.3	-287.6	-192.5	162.11	193.30	-0.0751	-0.0641	1.3072
9	144.1	172.3	144.1	141.5	0.0	89.0	296.3	291.4	329.5	250.4	-296.3	-202.4	161.17	191.66	-0.0949	-0.1001	1.3039
10	140.4	165.7	140.4	142.9	0.0	84.0	318.5	310.8	348.1	268.1	-318.5	-226.8	157.72	185.47	-0.1461	-0.1430	1.2914
11	139.2	163.6	139.2	140.8	0.0	83.2	324.0	315.9	352.6	272.0	-324.0	-232.6	156.03	182.59	-0.1585	-0.1544	1.2865
12	136.1	155.1	136.1	130.7	0.0	83.4	336.9	328.2	363.3	277.6	-336.9	-244.9	153.71	166.16	-0.1855	-0.1822	1.2659
13	133.9	149.1	133.9	123.5	0.0	83.7	345.4	336.7	370.4	281.6	-345.4	-253.1	151.59	157.88	-0.1959	-0.1964	1.2521

SL	B-1 DEGREE	B-2 DEGREE	B'-1 DEGREE	B'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	42.5	45.44	6.10	0.4123	0.6102	0.5866	0.4499	1.15	6.71	13.92	39.34	0.3644	0.0678	0.0147	1.2794	94.56	94.75
2	0.0	37.5	46.29	16.83	0.4261	0.5749	0.6388	0.4623	1.56	6.44	13.27	31.43	0.3994	0.0503	0.0113	1.2708	95.20	95.36
3	0.0	37.4	51.17	26.91	0.4347	0.5431	0.6924	0.4834	2.05	6.39	11.60	24.26	0.4086	0.0496	0.0112	1.2672	94.51	94.69
4	0.0	36.3	53.16	32.49	0.4371	0.5269	0.7268	0.5050	2.41	6.44	10.46	20.68	0.4058	0.0556	0.0125	1.2678	93.35	93.57
5	0.0	34.5	56.02	39.27	0.4369	0.5175	0.7652	0.5512	2.76	6.39	7.98	16.75	0.3860	0.0514	0.0114	1.2746	93.21	93.44
6	0.0	33.4	58.40	44.30	0.4403	0.5066	0.8419	0.5959	3.02	6.35	6.51	13.66	0.3730	0.0571	0.0123	1.2821	91.81	92.10
7	0.0	34.8	60.90	47.72	0.4369	0.5147	0.9041	0.6280	3.74	6.77	5.76	13.24	0.3875	0.1050	0.0223	1.3046	85.43	85.97
8	0.0	31.5	63.21	52.31	0.4340	0.5039	0.9642	0.7023	4.09	6.84	3.86	10.90	0.3402	0.0669	0.0143	1.3072	88.95	89.36
9	0.0	31.1	64.04	53.91	0.4313	0.4968	0.9860	0.7222	4.19	6.81	3.96	10.13	0.3326	0.0729	0.0148	1.3039	87.91	88.36
10	0.0	30.4	66.13	57.68	0.4197	0.4770	1.0405	0.7714	4.35	6.56	3.98	8.45	0.3150	0.0896	0.0172	1.2914	83.99	84.56
11	0.0	30.4	66.65	56.67	0.4161	0.4704	1.0538	0.7820	4.38	6.51	4.03	7.98	0.3126	0.0962	0.0185	1.2865	82.21	82.83
12	0.0	32.4	67.89	61.75	0.4064	0.4441	1.0850	0.7950	4.54	6.44	4.81	6.14	0.3196	0.1431	0.0251	1.2659	73.76	74.62
13	0.0	34.0	68.70	63.86	0.3995	0.4266	1.1056	0.8043	4.63	6.38	5.50	4.83	0.3235	0.1730	0.0287	1.2521	68.18	69.17

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	VO'-1 FT/SEC	VO'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	452.8	682.1	452.8	500.0	0.0	464.[illegible]	458.1	516.0	644.1	502.9	-458.1	-54.0	31.85	37.95	17.756	14.866	0.0916
2	467.4	644.4	467.4	475.6	0.0	411.9	522.0	563.2	700.7	518.2	-522.0	-151.3	32.70	38.20	13.212	9.744	0.1592
3	476.5	610.7	476.5	484.0	0.0	372.4	590.8	619.8	759.0	543.6	-590.8	-247.4	33.21	37.84	9.336	5.198	0.2439
4	479.0	595.9	479.0	479.2	0.0	354.2	639.2	661.0	798.6	569.0	-639.2	-306.8	33.35	37.71	7.041	2.987	0.3055
5	481.0	584.2	481.0	481.3	0.0	331.0	713.4	725.2	860.4	622.2	-713.4	-394.2	33.46	38.23	3.855	1.220	0.4015
6	482.5	573.3	482.5	470.4	0.0	315.9	786.2	791.2	922.4	674.4	-786.2	-475.3	33.55	38.32	1.110	-0.442	0.5002
7	481.0	585.3	481.0	480.7	0.0	334.0	866.1	862.2	990.7	714.2	-866.1	-528.2	33.46	38.58	-1.519	-2.566	0.6063
8	476.3	572.8	476.3	480.3	0.0	299.3	943.5	931.0	1057.0	798.4	-943.5	-631.6	33.20	39.59	-4.363	-4.616	0.7093
9	472.9	565.2	472.9	463.9	0.0	292.1	972.2	956.1	1081.1	821.6	-972.2	-664.0	33.01	39.25	-5.435	-5.736	0.7468
10	460.6	543.6	460.6	468.7	0.0	275.7	1045.0	1019.9	1142.0	879.5	-1045.0	-744.2	32.30	37.98	-8.371	-8.194	0.8422
11	456.8	536.8	456.8	462.1	0.0	273.1	1062.9	1036.4	1156.9	892.3	-1062.9	-763.3	32.08	37.40	-9.084	-8.848	0.8669
12	446.5	508.7	446.5	429.0	0.0	273.5	1105.2	1076.9	1192.0	910.6	-1105.2	-803.4	31.48	34.44	-10.629	-10.440	0.9275
13	439.2	489.3	439.2	405.1	0.0	274.5	1133.2	1104.9	1215.3	923.9	-1133.2	-830.4	31.05	32.34	-11.222	-11.370	0.9693

WCT/AI LBM/SEC SQFT	WCT/AI KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %
31.22	152.37	1.0851	1.2840	87.05	87.50

TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
1.0851	1.2840	87.05	87.50

TABLE A-15

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 7 SPEED CODE 85 POINT NO 2

85 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VØ-1 M/SEC	VØ-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	VØ'-1 M/SEC	VØ'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	162.6	231.6	162.6	166.2	0.0	159.2	159.0	179.7	227.4	169.4	-159.0	-20.5	177.22	205.01	0.3174	0.2617	1.3630
2	168.3	219.7	168.3	167.9	0.0	141.7	181.1	195.4	247.2	176.3	-181.1	-53.7	181.86	208.90	0.2386	0.1743	1.3562
3	171.9	208.4	171.9	165.0	0.0	128.9	205.0	215.1	267.5	185.1	-205.0	-86.2	184.77	207.41	0.1709	0.0968	1.3523
4	173.0	203.9	173.0	162.6	0.0	122.7	221.8	229.4	281.3	194.6	-221.8	-106.6	185.61	207.91	0.1305	0.0580	1.3546
5	174.0	201.2	174.0	165.2	0.0	114.8	247.5	251.6	302.6	214.5	-247.5	-136.8	186.38	213.60	0.0731	0.0246	1.3682
6	174.6	198.4	174.6	165.2	0.0	109.8	272.8	274.5	323.9	233.3	-272.8	-164.7	186.84	216.12	0.0223	-0.0078	1.3817
7	173.7	202.1	173.7	164.5	0.0	117.5	300.5	299.2	347.1	245.0	-300.5	-181.6	186.15	215.21	-0.0261	-0.0475	1.4094
8	171.6	198.6	171.6	167.5	0.0	106.7	327.4	[illegible]	369.6	273.6	-327.4	-216.3	184.51	221.69	-0.0753	-0.0870	1.4149
9	170.2	196.0	170.2	166.1	0.0	104.1	337.3	[illegible]	377.8	281.8	-337.3	-227.6	183.39	220.05	-0.0955	-0.1028	1.4105
10	165.3	188.2	165.3	160.6	0.0	98.1	362.6	353.9	398.5	302.0	-362.6	-255.8	179.46	212.43	-0.1475	-0.1450	1.3915
11	163.8	185.6	163.8	158.3	0.0	96.9	368.8	359.6	403.6	306.7	-368.8	-262.7	178.25	208.99	-0.1660	-0.1561	1.3843
12	160.0	175.0	160.0	146.7	0.0	95.5	383.5	373.7	415.5	314.4	-383.5	-278.1	175.03	191.91	-0.1865	-0.1831	1.3540
13	157.3	167.8	157.3	136.8	0.0	94.3	393.2	383.4	423.5	320.7	-393.2	-289.1	172.73	180.50	-0.1963	-0.1987	1.3343

SL	B-1 DEGREE	B-2 DEGREE	B'-1 DEGREE	B'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	45.1	44.53	6.69	0.4890	0.6784	0.6839	0.4963	0.24	5.80	14.71	37.65	0.4129	0.0768	0.0171	1.3630	93.57	93.85
2	0.0	40.0	47.30	17.62	0.5069	0.6418	0.7448	0.5149	0.56	5.45	14.03	29.68	0.4205	0.0514	0.0115	1.3562	95.07	95.28
3	0.0	36.0	50.11	27.60	0.5186	0.6062	0.8070	0.5384	0.99	5.33	12.29	22.51	0.4294	0.0538	0.0121	1.3523	94.08	94.32
4	0.0	36.9	52.10	33.09	0.5220	0.5917	0.8487	0.5648	1.33	5.36	11.06	19.00	0.4233	0.0579	0.0130	1.3546	93.15	93.44
5	0.0	34.8	54.92	39.58	0.5251	0.5826	0.9132	0.6211	1.65	5.28	8.29	15.33	0.3983	0.0474	0.0104	1.3682	93.87	94.13
6	0.0	33.6	57.38	44.90	0.5270	0.5727	0.9777	0.6737	1.94	5.26	6.61	12.47	0.3824	0.0501	0.0108	1.3817	93.03	93.35
7	0.0	35.0	59.97	47.87	0.5242	0.5795	1.0475	0.7024	2.76	5.79	3.90	12.11	0.4032	0.1120	0.0242	1.4094	84.83	85.54
8	0.0	32.5	62.33	52.27	0.5175	0.5693	1.1148	0.7842	3.22	5.97	3.82	10.06	0.3576	0.0832	0.0172	1.4149	87.51	88.11
9	0.0	32.1	63.21	53.89	0.5130	0.5614	1.1390	0.8071	3.36	5.98	3.93	9.33	0.3466	0.0671	0.0177	1.4105	86.54	87.18
10	0.0	31.3	65.41	57.77	0.4976	0.5376	1.1995	0.8627	3.63	5.86	4.06	7.64	0.3291	0.1054	0.0202	1.3915	82.55	83.35
11	0.0	31.4	65.95	58.80	0.4929	0.5296	1.2142	0.8751	3.69	5.82	4.16	7.15	0.3256	0.1138	0.0213	1.3843	80.89	81.75
12	0.0	32.9	67.25	62.05	0.4807	0.4972	1.2488	0.8932	3.90	5.80	5.12	5.19	0.3273	0.1551	0.0269	1.3540	73.35	74.46
13	0.0	34.0	68.06	64.22	0.4722	0.4754	1.2717	0.9085	4.01	5.77	5.86	3.66	0.3254	0.1791	0.0293	1.3343	68.79	70.03

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VØ-1 FT/SEC	VØ-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	VØ'-1 FT/SEC	VØ'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	533.4	759.8	533.4	551.7	0.0	522.4	521.6	589.7	746.1	555.8	-521.6	-67.3	36.30	41.99	18.188	14.993	0.0916
2	552.1	720.9	552.1	550.9	0.0	465.0	594.2	641.2	811.1	578.4	-594.2	-176.2	37.25	42.78	13.669	9.987	0.1592
3	564.1	683.8	564.1	537.4	0.0	422.8	672.6	705.6	877.8	607.3	-672.6	-282.8	37.64	42.48	9.790	5.544	0.2439
4	567.6	669.0	567.6	534.2	0.0	402.7	727.7	752.6	922.9	638.6	-727.7	-349.9	38.01	42.58	7.477	3.321	0.3055
5	570.9	660.1	570.9	542.0	0.0	376.8	812.2	825.6	992.7	703.7	-812.2	-448.8	38.17	43.75	4.190	1.418	0.4015
6	572.8	650.9	572.8	542.2	0.0	360.2	895.0	900.7	1062.6	765.6	-895.0	-540.5	38.27	44.26	1.276	-0.446	0.5002
7	569.9	663.2	569.9	539.6	0.0	385.6	986.0	981.5	1138.9	803.9	-986.0	-595.9	38.13	44.08	-1.496	-2.721	0.6063
8	563.0	651.6	563.0	549.5	0.0	350.2	1074.2	1059.9	1212.8	897.5	-1074.2	-709.7	37.79	45.40	-4.316	-4.982	0.7093
9	558.4	643.2	558.4	545.0	0.0	341.6	1106.8	1088.5	1239.7	924.5	-1106.8	-746.9	37.56	45.07	-5.469	-5.892	0.7468
10	542.4	617.5	542.4	527.0	0.0	321.9	1189.7	1161.1	1307.5	991.0	-1189.7	-839.2	36.75	43.51	-8.451	-8.306	0.8422
11	537.5	608.9	537.5	519.3	0.0	318.0	1210.1	1179.9	1324.1	1006.2	-1210.1	-861.9	36.51	42.80	-9.169	-8.946	0.8669
12	524.8	574.3	524.8	481.2	0.0	313.5	1258.2	1226.0	1363.3	1031.6	-1258.2	-912.5	35.85	39.31	-10.688	-10.493	0.9275
13	515.9	550.6	515.9	455.4	0.0	309.4	1290.1	1257.8	1389.4	1052.1	-1290.1	-948.4	35.38	36.99	-11.249	-11.387	0.9693

WC1/A1 LBM/SEC SQFT	WC1/A1 KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
35.54	173.44	1.1112	1.3792	86.52	87.12	1.1112	1.3792	86.52	87.12

TABLE A-16

AIRFOIL AERODYNAMIC SUMMARY PRINT

RUN NO 7 SPEED CODE 95 POINT NO 5

85 Percent Speed

SL	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VΘ-1 M/SEC	VΘ-2 M/SEC	U-1 M/SEC	U-2 M/SEC	V'-1 M/SEC	V'-2 M/SEC	VΘ'-1 M/SEC	VΘ'-2 M/SEC	RHOVM-1 KG/M2 SEC	RHOVM-2 KG/M2 SEC	EPSI-1 RADIAN	EPSI-2 RADIAN	PO/PO INLET
1	135.5	214.5	135.5	137.9	0.0	164.3	159.2	180.0	209.1	138.8	-159.2	-15.7	153.16	176.23	0.3068	0.2596	1.3861
2	140.3	203.9	140.3	134.9	0.0	152.9	191.4	195.7	229.3	141.4	-181.4	-42.8	157.61	175.59	0.2302	0.1714	1.3879
3	143.2	195.3	143.2	130.9	0.0	145.0	205.3	215.4	250.3	148.6	-205.3	-70.4	160.29	173.66	0.1695	0.0914	1.3988
4	144.0	192.0	144.0	129.1	0.0	142.2	222.1	229.7	264.7	155.9	-222.1	-87.5	161.08	172.78	0.1331	0.0546	1.4093
5	145.1	191.1	145.1	131.8	0.0	138.5	247.9	252.0	287.2	173.9	-247.9	-113.6	162.01	178.74	0.0838	0.0277	1.4343
6	146.1	190.0	146.1	130.5	0.0	138.0	273.2	274.9	309.8	189.1	-273.2	-136.9	162.94	178.82	0.0417	0.0029	1.4577
7	146.6	196.9	146.6	138.4	0.0	142.9	301.0	299.6	334.8	209.1	-301.0	-156.7	163.41	191.72	-0.0028	-0.0314	1.5131
8	146.1	200.4	146.1	143.3	0.0	140.0	327.9	323.5	359.9	232.9	-327.9	-183.5	162.92	200.81	-0.0557	-0.0721	1.5437
9	145.2	199.2	145.2	141.8	0.0	139.8	337.8	332.2	367.7	239.1	-337.8	-192.4	162.15	199.94	-0.0775	-0.0991	1.5469
10	141.8	194.6	141.8	135.5	0.0	139.7	363.1	354.4	389.8	253.9	-363.1	-214.7	159.06	190.00	-0.1312	-0.1335	1.5478
11	140.7	193.5	140.7	133.6	0.0	140.0	369.4	360.1	395.3	257.5	-369.4	-220.2	158.05	187.20	-0.1439	-0.1453	1.5475
12	137.8	190.7	137.8	127.5	0.0	141.8	384.1	374.2	406.0	265.0	-384.1	-232.4	155.30	177.97	-0.1724	-0.1741	1.5459
13	135.5	188.8	135.5	124.3	0.0	142.1	393.8	383.9	416.4	271.9	-393.8	-241.8	153.18	173.23	-0.1888	-0.1940	1.5449

SL	B-1 DEGREE	B-2 DEGREE	B'-1 DEGREE	B'-2 DEGREE	M-1	M-2	M'-1	M'-2	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	D FAC	OMEGA-B TOTAL	LOSS-P TOTAL	PO2/ PO1	%EFF-A TOTAL	%EFF-P TOTAL
1	0.0	49.7	49.69	6.42	0.4046	0.6234	0.6242	0.4034	5.40	10.95	14.24	43.27	0.5130	0.0638	0.0138	1.3861	95.69	95.89
2	0.0	48.4	52.42	17.50	0.4193	0.5898	0.6854	0.4092	5.68	10.56	13.91	34.92	0.5386	0.0646	0.0145	1.3879	95.00	95.23
3	0.0	47.7	55.19	28.11	0.4283	0.5623	0.7488	0.4279	6.07	10.40	12.79	27.08	0.5508	0.0773	0.0173	1.3988	93.28	93.60
4	0.0	47.6	57.09	34.00	0.4310	0.5510	0.7921	0.4474	6.33	10.36	11.97	23.09	0.5507	0.0949	0.0210	1.4093	91.28	91.70
5	0.0	46.4	59.70	40.71	0.4342	0.5463	0.8597	0.4972	6.44	10.07	9.42	18.99	0.5274	0.1007	0.0219	1.4343	90.05	90.55
6	0.0	46.6	61.87	46.35	0.4374	0.5401	0.9275	0.5377	6.44	9.76	8.06	15.52	0.5208	0.1277	0.0268	1.4577	86.71	87.40
7	0.0	45.9	64.02	48.56	0.4390	0.5627	1.0024	0.5915	6.80	9.83	4.59	15.46	0.5083	0.1424	0.0303	1.5131	84.96	85.81
8	0.0	44.3	65.96	51.99	0.4373	0.5649	1.0746	0.6564	6.84	9.59	3.54	13.96	0.4799	0.1390	0.0290	1.5437	84.40	85.32
9	0.0	44.5	66.69	53.57	0.4347	0.5602	1.1007	0.6724	6.84	9.46	3.62	13.12	0.4774	0.1509	0.0308	1.5469	82.76	83.79
10	0.0	45.7	68.54	57.59	0.4242	0.5441	1.1659	0.7099	6.76	9.00	3.99	10.96	0.4736	0.1877	0.0361	1.5478	77.76	79.08
11	0.0	46.1	69.01	58.58	0.4208	0.5400	1.1817	0.7187	6.74	8.87	3.94	10.43	0.4735	0.1999	0.0375	1.5475	76.31	77.71
12	0.0	47.8	70.12	61.07	0.4116	0.5295	1.2190	0.7360	6.77	8.67	4.13	9.05	0.4763	0.2308	0.0414	1.5459	72.32	73.95
13	0.0	48.6	70.87	62.65	0.4047	0.5226	1.2435	0.7528	6.81	8.56	4.28	8.23	0.4734	0.2468	0.0427	1.5449	70.20	71.96

SL	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VΘ-1 FT/SEC	VΘ-2 FT/SEC	U-1 FT/SEC	U-2 FT/SEC	V'-1 FT/SEC	V'-2 FT/SEC	VΘ'-1 FT/SEC	VΘ'-2 FT/SEC	RHOVM-1 LBM/FT2SEC	RHOVM-2 LBM/FT2SEC	EPSI-1 DEGREE	EPSI-2 DEGREE	PCT TE SPAN
1	444.6	703.9	444.6	452.6	0.0	539.1	522.3	590.6	685.9	455.5	-522.3	-51.5	31.37	36.09	17.690	14.975	0.0916
2	460.2	668.8	460.2	442.3	0.0	501.6	595.1	642.1	752.3	464.1	-595.1	-140.5	32.28	35.96	13.192	9.622	0.1592
3	469.7	640.9	469.7	429.4	0.0	475.7	673.6	706.7	821.2	487.6	-673.6	-231.0	32.83	35.57	9.652	5.235	0.2439
4	472.6	630.1	472.6	423.4	0.0	466.6	728.7	753.7	868.6	511.6	-728.7	-287.1	32.99	35.39	7.625	3.130	0.3055
5	476.0	627.1	476.0	432.3	0.0	454.3	813.3	826.8	942.4	570.7	-813.3	-372.6	33.18	36.61	4.303	1.585	0.4015
6	479.4	623.3	479.4	428.2	0.0	452.9	896.3	902.0	1016.4	620.5	-896.3	-449.1	33.37	36.62	2.391	0.166	0.5002
7	481.1	652.7	481.1	454.2	0.0	468.7	987.5	983.0	1098.4	686.1	-987.5	-514.2	33.47	39.27	-0.158	-1.799	0.6063
8	479.3	657.4	479.3	470.3	0.0	459.4	1075.7	1061.4	1177.7	764.0	-1075.7	-602.0	33.37	41.13	-3.193	-4.133	0.7093
9	476.5	653.4	476.5	465.4	0.0	458.7	1108.4	1090.0	1206.5	784.4	-1108.4	-631.4	33.21	40.74	-4.438	-5.107	0.7468
10	465.4	638.6	465.4	444.7	0.0	458.3	1191.4	1162.8	1279.1	833.2	-1191.4	-704.5	32.58	38.93	-7.518	-7.652	0.8422
11	461.9	634.9	461.9	439.3	0.0	459.3	1211.8	1181.6	1296.8	844.9	-1211.8	-722.3	32.37	38.34	-8.246	-8.322	0.8669
12	452.1	625.7	452.1	418.2	0.0	465.3	1260.1	1227.8	1338.7	969.6	-1260.1	-762.4	31.91	36.45	-9.877	-9.977	0.9275
13	444.7	619.4	444.7	407.7	0.0	466.3	1292.0	1259.7	1366.3	892.0	-1292.0	-793.4	31.37	35.48	-10.817	-11.113	0.9693

WC1/A1 LBM/SEC SQFT	WC1/A1 KG/SEC SQM	TO/TO INLET	PO/PO INLET	EFF-AD INLET %	EFF-P INLET %	TO2/TO1	PO2/PO1	EFF-AD ROTOR %	EFF-P ROTOR %
31.17	152.09	1.1439	1.4862	83.39	84.29	1.1438	1.4862	83.39	84.29

APPENDIX B

BLADE COORDINATES

MANUFACTURING COORDINATES FOR BLADE SECTIONS
NORMAL TO STACKING LINE

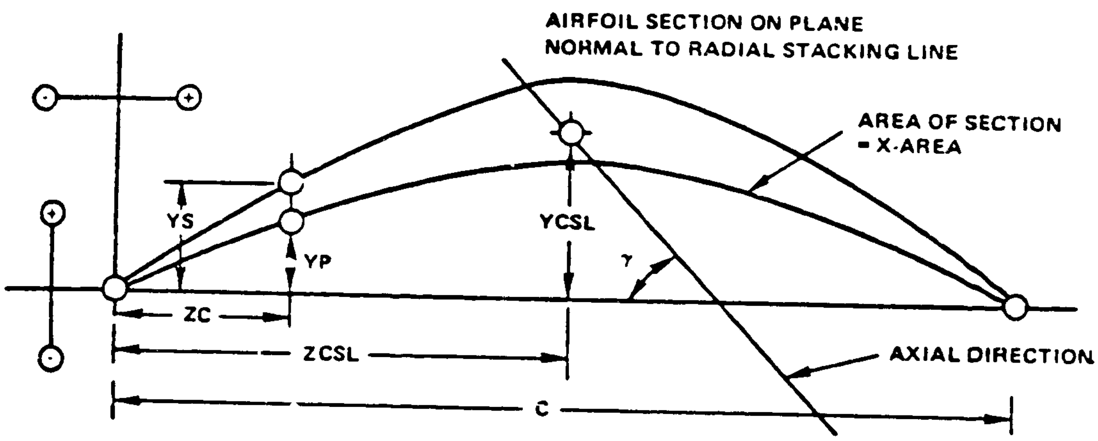

Figure B-1 Airfoil Designations for Manufacturing Coordinates

TABLE B-1

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0003	0.0004	0.0	-0.0117	0.0140
0.0003	-0.0002	0.0005	0.0115	-0.0077	0.0216
0.0021	0.0004	0.0017	0.0827	0.0166	0.0686
0.0042	0.0011	0.0031	0.1654	0.0448	0.1220
0.0063	0.0018	0.0044	0.2481	0.0711	0.1726
0.0084	0.0024	0.0056	0.3309	0.0957	0.2206
0.0105	0.0030	0.0068	0.4136	0.1187	0.2663
0.0126	0.0036	0.0079	0.4963	0.1402	0.3101
0.0147	0.0041	0.0089	0.5790	0.1603	0.3508
0.0168	0.0045	0.0099	0.6617	0.1788	0.3879
0.0189	0.0050	0.0107	0.7444	0.1955	0.4210
0.0210	0.0053	0.0114	0.8272	0.2104	0.4502
0.0231	0.0057	0.0121	0.9099	0.2233	0.4754
0.0252	0.0060	0.0126	0.9926	0.2343	0.4969
0.0273	0.0062	0.0131	1.0753	0.2433	0.5144
0.0294	0.0064	0.0134	1.1580	0.2502	0.5282
0.0315	0.0065	0.0137	1.2407	0.2551	0.5382
0.0336	0.0065	0.0138	1.3235	0.2578	0.5443
0.0357	0.0066	0.0139	1.4062	0.2583	0.5464
0.0378	0.0065	0.0138	1.4889	0.2565	0.5445
0.0399	0.0064	0.0137	1.5716	0.2524	0.5384
0.0420	0.0062	0.0134	1.6543	0.2459	0.5279
0.0441	0.0060	0.0130	1.7370	0.2368	0.5129
0.0462	0.0057	0.0125	1.8197	0.2251	0.4931
0.0483	0.0054	0.0119	1.9025	0.2107	0.4683
0.0504	0.0049	0.0111	1.9852	0.1935	0.4380
0.0525	0.0044	0.0102	2.0679	0.1733	0.4018
0.0546	0.0038	0.0091	2.1506	0.1500	0.3593
0.0567	0.0031	0.0079	2.2333	0.1235	0.3099
0.0588	0.0024	0.0064	2.3160	0.0936	0.2528
0.0609	0.0015	0.0048	2.3988	0.0600	0.1873
0.0630	0.0006	0.0028	2.4815	0.0227	0.1122
0.0647	-0.0003	0.0011	2.5477	-0.0106	0.0429
0.0651	-0.0005	0.0007	2.5642	-0.0189	0.0256

RADIUS (METERS)	= 0.1307	RADIUS (INCHES)	= 5.1440
CHORD (METERS)	= 0.0651	CHORD (INCHES)	= 2.5643
ZCSL (METERS)	= 0.0344	ZCSL (INCHES)	= 1.3535
YCSL (METERS)	= 0.0080	YCSL (INCHES)	= 0.3139
RLE (METERS)	=0.000330	RLE (INCHES)	= 0.0130
RTE (METERS)	=0.000531	RTE (INCHES)	= 0.0209
X-AREA(SQ.METERS)	=0.000342	X-AREA (SQ. IN.)	= 0.5299
GAMMA-CHORD(RAD.)	= 0.0890	GAMMA-CHORD(DEG.)	= 5.10

TABLE B-2

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0003	0.0003	0.0	-0.0100	0.0115
0.0002	-0.0001	0.0005	0.0086	-0.0059	0.0182
0.0022	0.0008	0.0020	0.0856	0.0312	0.0778
0.0043	0.0018	0.0036	0.1711	0.0698	0.1398
0.0065	0.0027	0.0050	0.2567	0.1059	0.1981
0.0087	0.0035	0.0064	0.3423	0.1397	0.2528
0.0109	0.0043	0.0077	0.4279	0.1710	0.3039
0.0130	0.0051	0.0089	0.5134	0.1997	0.3516
0.0152	0.0057	0.0101	0.5990	0.2258	0.3957
0.0174	0.0063	0.0111	0.6846	0.2492	0.4360
0.0196	0.0068	0.0120	0.7701	0.2695	0.4716
0.0217	0.0073	0.0127	0.8557	0.2866	0.5019
0.0239	0.0076	0.0134	0.9413	0.3003	0.5273
0.0261	0.0079	0.0139	1.0269	0.3107	0.5478
0.0283	0.0081	0.0143	1.1124	0.3175	0.5634
0.0304	0.0081	0.0146	1.1980	0.3198	0.5735
0.0326	0.0081	0.0147	1.2836	0.3195	0.5790
0.0348	0.0081	0.0147	1.3691	0.3170	0.5806
0.0369	0.0079	0.0147	1.4547	0.3128	0.5787
0.0391	0.0078	0.0146	1.5403	0.3065	0.5731
0.0413	0.0076	0.0143	1.6259	0.2981	0.5635
0.0435	0.0073	0.0140	1.7114	0.2874	0.5499
0.0456	0.0070	0.0135	1.7970	0.2744	0.5319
0.0478	0.0066	0.0129	1.8826	0.2590	0.5093
0.0500	0.0061	0.0122	1.9681	0.2409	0.4819
0.0522	0.0056	0.0114	2.0537	0.2202	0.4491
0.0543	0.0050	0.0104	2.1393	0.1966	0.4106
0.0565	0.0043	0.0093	2.2249	0.1701	0.3658
0.0587	0.0036	0.0080	2.3104	0.1404	0.3141
0.0609	0.0027	0.0065	2.3960	0.1074	0.2548
0.0630	0.0018	0.0047	2.4816	0.0708	0.1866
0.0652	0.0008	0.0028	2.5671	0.0304	0.1084
0.0671	-0.0002	0.0008	2.6408	-0.0077	0.0311
0.0674	-0.0004	0.0005	2.6527	-0.0139	0.0186

RADIUS (METERS) = 0.1459	RADIUS (INCHES) = 5.7445
CHORD (METERS) = 0.0674	CHORD (INCHES) = 2.6539
ZCSL (METERS) = 0.0358	ZCSL (INCHES) = 1.4089
YCSL (METERS) = 0.0090	YCSL (INCHES) = 0.3530
RLE (METERS) =0.000257	RLE (INCHES) = 0.0101
RTE (METERS) =0.000384	RTE (INCHES) = 0.0151
X-AREA(SQ.METERS)=0.000324	X-AREA (SQ. IN.) = 0.5021
GAMMA-CHORD(RAD.)= 0.1424	GAMMA-CHORD(DEG.)= 8.16

TABLE B-3

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0003	0.0	-0.0097	0.0111
0.0002	-0.0001	0.0004	0.0083	-0.0057	0.0173
0.0022	0.0008	0.0019	0.0864	0.0312	0.0759
0.0044	0.0018	0.0035	0.1727	0.0704	0.1378
0.0066	0.0027	0.0050	0.2591	0.1076	0.1964
0.0088	0.0036	0.0064	0.3454	0.1426	0.2518
0.0110	0.0045	0.0077	0.4318	0.1755	0.3040
0.0132	0.0052	0.0090	0.5182	0.2060	0.3531
0.0154	0.0059	0.0101	0.6045	0.2336	0.3983
0.0175	0.0066	0.0112	0.6909	0.2584	0.4398
0.0197	0.0071	0.0121	0.7773	0.2803	0.4768
0.0219	0.0076	0.0129	0.8636	0.2994	0.5090
0.0241	0.0080	0.0136	0.9500	0.3152	0.5363
0.0263	0.0083	0.0142	1.0364	0.3278	0.5588
0.0285	0.0086	0.0146	1.1227	0.3371	0.5766
0.0307	0.0087	0.0150	1.2091	0.3430	0.5895
0.0329	0.0088	0.0152	1.2954	0.3455	0.5976
0.0351	0.0087	0.0153	1.3818	0.3444	0.6008
0.0373	0.0086	0.0152	1.4682	0.3395	0.5988
0.0395	0.0084	0.0150	1.5545	0.3307	0.5914
0.0417	0.0081	0.0147	1.6409	0.3198	0.5790
0.0439	0.0078	0.0143	1.7273	0.3069	0.5634
0.0461	0.0074	0.0138	1.8136	0.2922	0.5438
0.0483	0.0070	0.0132	1.9000	0.2750	0.5201
0.0505	0.0065	0.0125	1.9864	0.2551	0.4912
0.0526	0.0059	0.0116	2.0727	0.2326	0.4571
0.0548	0.0053	0.0106	2.1591	0.2073	0.4173
0.0570	0.0045	0.0094	2.2454	0.1791	0.3713
0.0592	0.0038	0.0081	2.3318	0.1477	0.3183
0.0614	0.0029	0.0065	2.4182	0.1130	0.2576
0.0636	0.0019	0.0048	2.5045	0.0748	0.1881
0.0658	0.0008	0.0028	2.5909	0.0329	0.1084
0.0677	-0.0002	0.0007	2.6664	-0.0071	0.0285
0.0680	-0.0003	0.0004	2.6772	-0.0128	0.0171

RADIUS (METERS) = 0.1509	RADIUS (INCHES) = 5.9420
CHORD (METERS) = 0.0680	CHORD (INCHES) = 2.6790
ZCSL (METERS) = 0.0362	ZCSL (INCHES) = 1.4252
YCSL (METERS) = 0.0092	YCSL (INCHES) = 0.3617
RLE (METERS) =0.000249	RLE (INCHES) = 0.0098
RTE (METERS) =0.000348	RTE (INCHES) = 0.0137
X-AREA(SQ.METERS)=0.000319	X-AREA (SQ. IN.) = 0.4939
GAMMA-CHORD(RAD.)= 0.1673	GAMMA-CHORD(DEG.)= 9.59

TABLE B-4

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0003	0.0	-0.0094	0.0107
0.0002	-0.0001	0.0004	0.0082	-0.0057	0.0166
0.0022	0.0008	0.0019	0.0872	0.0305	0.0736
0.0044	0.0018	0.0034	0.1744	0.0690	0.1339
0.0066	0.0027	0.0049	0.2616	0.1056	0.1912
0.0089	0.0036	0.0062	0.3488	0.1403	0.2455
0.0111	0.0044	0.0075	0.4360	0.1731	0.2968
0.0133	0.0052	0.0088	0.5232	0.2038	0.3453
0.0155	0.0059	0.0099	0.6104	0.2325	0.3909
0.0177	0.0066	0.0110	0.6976	0.2590	0.4338
0.0199	0.0072	0.0120	0.7848	0.2832	0.4728
0.0221	0.0077	0.0129	0.8720	0.3048	0.5075
0.0244	0.0082	0.0137	0.9592	0.3234	0.5375
0.0266	0.0086	0.0143	1.0464	0.3389	0.5630
0.0288	0.0089	0.0148	1.1336	0.3507	0.5835
0.0310	0.0091	0.0152	1.2208	0.3591	0.5987
0.0332	0.0093	0.0155	1.3080	0.3643	0.6093
0.0354	0.0093	0.0156	1.3952	0.3661	0.6152
0.0377	0.0093	0.0156	1.4824	0.3643	0.6161
0.0399	0.0091	0.0155	1.5696	0.3589	0.6119
0.0421	0.0089	0.0153	1.6568	0.3496	0.6025
0.0443	0.0085	0.0149	1.7440	0.3364	0.5874
0.0465	0.0081	0.0144	1.8312	0.3188	0.5664
0.0487	0.0075	0.0137	1.9184	0.2968	0.5390
0.0509	0.0069	0.0128	2.0056	0.2698	0.5043
0.0532	0.0062	0.0118	2.0928	0.2434	0.4641
0.0554	0.0055	0.0107	2.1800	0.2162	0.4220
0.0576	0.0048	0.0095	2.2672	0.1873	0.3752
0.0598	0.0039	0.0082	2.3544	0.1545	0.3219
0.0620	0.0030	0.0066	2.4416	0.1183	0.2601
0.0642	0.0020	0.0048	2.5288	0.0786	0.1894
0.0664	0.0009	0.0028	2.6160	0.0351	0.1084
0.0684	-0.0002	0.0007	2.6933	-0.0065	0.0264
0.0687	-0.0003	0.0004	2.7032	-0.0119	0.0158

RADIUS (METERS) = 0.1560	RADIUS (INCHES) = 6.1420
CHORD (METERS) = 0.0687	CHORD (INCHES) = 2.7037
ZCSL (METERS) = 0.0367	ZCSL (INCHES) = 1.4440
YCSL (METERS) = 0.0094	YCSL (INCHES) = 0.3708
RLE (METERS) =0.000244	RLE (INCHES) = 0.0096
RTE (METERS) =0.000323	RTE (INCHES) = 0.0127
X-AREA(SQ.METERS)=0.000313	X-AREA (SQ. IN.) = 0.4855
GAMMA-CHORD(RAD.)= 0.1915	GAMMA-CHORD(DEG.)= 10.97

TABLE B-5

METERS ZC	METERS YP	METERS YS	INCHES ZC	INCHES YP	INCHES YS
0.0	-0.0002	0.0003	0.0	-0.0093	0.0104
0.0002	-0.0001	0.0004	0.0082	-0.0057	0.0161
0.0022	0.0008	0.0018	0.0881	0.0296	0.0713
0.0045	0.0017	0.0033	0.1762	0.0671	0.1298
0.0067	0.0026	0.0047	0.2643	0.1030	0.1856
0.0090	0.0035	0.0061	0.3524	0.1372	0.2387
0.0112	0.0043	0.0073	0.4405	0.1698	0.2892
0.0134	0.0051	0.0086	0.5286	0.2006	0.3370
0.0157	0.0058	0.0097	0.6166	0.2295	0.3822
0.0179	0.0065	0.0108	0.7047	0.2564	0.4250
0.0201	0.0071	0.0118	0.7928	0.2814	0.4665
0.0224	0.0077	0.0127	0.8809	0.3041	0.5001
0.0246	0.0082	0.0135	0.9690	0.3240	0.5313
0.0269	0.0087	0.0142	1.0571	0.3412	0.5580
0.0291	0.0090	0.0147	1.1452	0.3554	0.5803
0.0313	0.0093	0.0152	1.2333	0.3668	0.5982
0.0336	0.0095	0.0155	1.3214	0.3751	0.6118
0.0358	0.0097	0.0158	1.4095	0.3803	0.6208
0.0380	0.0097	0.0159	1.4976	0.3822	0.6253
0.0403	0.0097	0.0159	1.5857	0.3807	0.6251
0.0425	0.0095	0.0157	1.6737	0.3751	0.6196
0.0448	0.0093	0.0155	1.7618	0.3657	0.6083
0.0470	0.0089	0.0150	1.8499	0.3523	0.5914
0.0492	0.0085	0.0144	1.9380	0.3348	0.5684
0.0515	0.0079	0.0137	2.0261	0.3128	0.5390
0.0537	0.0073	0.0128	2.1142	0.2861	0.5026
0.0559	0.0065	0.0116	2.2023	0.2542	0.4582
0.0582	0.0055	0.0103	2.2904	0.2169	0.4051
0.0604	0.0044	0.0087	2.3785	0.1737	0.3419
0.0627	0.0031	0.0068	2.4666	0.1235	0.2663
0.0649	0.0020	0.0048	2.5547	0.0801	0.1888
0.0671	0.0009	0.0027	2.6428	0.0355	0.1065
0.0691	-0.0002	0.0006	2.7214	-0.0062	0.0248
0.0694	-0.0003	0.0004	2.7309	-0.0113	0.0149

RADIUS (METERS) = 0.1612	RADIUS (INCHES) = 6.3470
CHORD (METERS) = 0.0694	CHORD (INCHES) = 2.7324
ZCSL (METERS) = 0.0372	ZCSL (INCHES) = 1.4643
YCSL (METERS) = 0.0096	YCSL (INCHES) = 0.3783
RLE (METERS) =0.000239	RLE (INCHES) = 0.0094
RTE (METERS) =0.000305	RTE (INCHES) = 0.0120
X-AREA(SQ.METERS)=0.000307	X-AREA (SQ. IN.) = 0.4762
GAMMA-CHORD(RAD.)= 0.2150	GAMMA-CHORD(DEG.)= 12.32

TABLE B-6

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0003	0.0	-0.0092	0.0102
0.0002	-0.0001	0.0004	0.0082	-0.0057	0.0156
0.0023	0.0007	0.0017	0.0892	0.0281	0.0686
0.0045	0.0016	0.0032	0.1783	0.0641	0.1248
0.0068	0.0025	0.0045	0.2675	0.0987	0.1784
0.0091	0.0033	0.0058	0.3567	0.1316	0.2296
0.0113	0.0041	0.0071	0.4459	0.1629	0.2782
0.0136	0.0049	0.0082	0.5351	0.1927	0.3244
0.0159	0.0056	0.0094	0.6242	0.2208	0.3682
0.0181	0.0063	0.0104	0.7134	0.2473	0.4099
0.0204	0.0069	0.0114	0.8026	0.2721	0.4487
0.0227	0.0075	0.0123	0.8918	0.2949	0.4842
0.0249	0.0080	0.0131	0.9809	0.3151	0.5157
0.0272	0.0085	0.0138	1.0701	0.3328	0.5428
0.0294	0.0088	0.0144	1.1593	0.3478	0.5656
0.0317	0.0091	0.0148	1.2485	0.3600	0.5843
0.0340	0.0094	0.0152	1.3376	0.3694	0.5987
0.0362	0.0095	0.0155	1.4268	0.3759	0.6089
0.0385	0.0096	0.0156	1.5160	0.3793	0.6146
0.0408	0.0096	0.0156	1.[illegible]052	0.3796	0.6158
0.0430	0.0096	0.0156	1.[illegible]944	0.3767	0.6123
0.0453	0.0094	0.0153	1.7835	0.3703	0.6040
0.0476	0.0092	0.0150	1.8727	0.3603	0.5904
0.0498	0.0088	0.0145	1.9619	0.3465	0.5714
0.0521	0.0083	0.0139	2.0511	0.3287	0.5464
0.0544	0.0078	0.0131	2.1402	0.3060	0.5149
0.0566	0.0071	0.0121	2.2294	0.2784	0.4754
0.0589	0.0062	0.0109	2.3186	0.2458	0.4276
0.0612	0.0053	0.0094	2.4078	0.2076	0.3706
0.0634	0.0041	0.0077	2.4969	0.1633	0.3029
0.0657	0.0029	0.0057	2.5861	0.1126	0.2229
0.0680	0.0014	0.0032	2.6753	0.0545	0.1278
0.0700	-0.0001	0.0006	2.7569	-0.0057	0.0244
0.0702	-0.0003	0.0004	2.7645	-0.0113	0.0148

RADIUS (METERS) = 0.1661	RADIUS (INCHES) = 6.5400
CHORD (METERS) = 0.0703	CHORD (INCHES) = 2.7666
ZCSL (METERS) = 0.0377	ZCSL (INCHES) = 1.4856
YCSL (METERS) = 0.0095	YCSL (INCHES) = 0.3749
RLE (METERS) =0.000236	RLE (INCHES) = 0.0093
RTE (METERS) =0.000267	RTE (INCHES) = 0.0105
X-AREA(SQ.METERS)=0.000301	X-AREA (SQ. IN.) = 0.4670
GAMMA-CHORD(RAD.)= 0.2488	GAMMA-CHORD(DEG.)= 14.26

TABLE B-7

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0002	0.0	-0.0089	0.0096
0.0002	-0.0002	0.0004	0.0085	-0.0061	0.0142
0.0024	0.0006	0.0015	0.0926	0.0220	0.0595
0.0047	0.0013	0.0027	0.1852	0.0519	0.1077
0.0071	0.0020	0.0039	0.2779	0.0804	0.1537
0.0094	0.0027	0.0050	0.3705	0.1076	0.1976
0.0118	0.0034	0.0061	0.4631	0.1335	0.2394
0.0141	0.0040	0.0071	0.5558	0.1580	0.2790
0.0165	0.0046	0.0080	0.6484	0.1812	0.3166
0.0188	0.0052	0.0089	0.7410	0.2028	0.3523
0.0212	0.0057	0.0098	0.8336	0.2232	0.3857
0.0235	0.0061	0.0106	0.9263	0.2419	0.4172
0.0259	0.0066	0.0113	1.0189	0.2590	0.4454
0.0282	0.0070	0.0119	1.1115	0.2740	0.4700
0.0306	0.0073	0.0125	1.2042	0.2868	0.4907
0.0329	0.0076	0.0129	1.2968	0.2973	0.5077
0.0353	0.0078	0.0132	1.3894	0.3055	0.5207
0.0376	0.0079	0.0135	1.4820	0.3113	0.5300
0.0400	0.0080	0.0136	1.5746	0.3145	0.5352
0.0423	0.0080	0.0136	1.6673	0.3151	0.5364
0.0447	0.0080	0.0135	1.7599	0.3130	0.5334
0.0471	0.0078	0.0134	1.8525	0.3080	0.5259
0.0494	0.0076	0.0131	1.9452	0.2999	0.5138
0.0518	0.0073	0.0126	2.0378	0.2886	0.4968
0.0541	0.0070	0.0121	2.1304	0.2739	0.4744
0.0565	0.0065	0.0113	2.2230	0.2552	0.4463
0.0588	0.0059	0.0105	2.3157	0.2323	0.4118
0.0612	0.0052	0.0094	2.4083	0.2051	0.3700
0.0635	0.0044	0.0081	2.5009	0.1732	0.3204
0.0659	0.0035	0.0066	2.5935	0.1363	0.2616
0.0682	0.0024	0.0049	2.6862	0.0937	0.1922
0.0706	0.0011	0.0028	2.7788	0.0451	0.1101
0.0727	-0.0001	0.0005	2.8635	-0.0054	0.0211
0.0729	-0.0003	0.0003	2.8714	-0.0101	0.0128

RADIUS (METERS) = 0.1775 RADIUS (INCHES) = 6.9882
CHORD (METERS) = 0.0730 CHORD (INCHES) = 2.8730
ZCSL (METERS) = 0.0391 ZCSL (INCHES) = 1.5387
YCSL (METERS) = 0.0079 YCSL (INCHES) = 0.3116
RLE (METERS) =0.000236 RLE (INCHES) = 0.0093
RTE (METERS) =0.000257 RTE (INCHES) = 0.0101
X-AREA(SQ.METERS)=0.000289 X-AREA (SQ. IN.) = 0.4483
GAMMA-CHORD(RAD.)= 0.3535 GAMMA-CHORD(DEG.)= 20.25

TABLE B-8

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0002	0.0	-0.0088	0.0093
0.0002	-0.0002	0.0003	0.0090	-0.0069	0.0126
0.0025	0.0003	0.0012	0.1000	0.0118	0.0463
0.0051	0.0008	0.0021	0.2000	0.0316	0.0819
0.0076	0.0013	0.0029	0.3001	0.0504	0.1160
0.0102	0.0017	0.0038	0.4001	0.0683	0.1484
0.0127	0.0022	0.0046	0.5001	0.0852	0.1791
0.0152	0.0026	0.0053	0.6001	0.1010	0.2082
0.0178	0.0029	0.0060	0.7001	0.1158	0.2356
0.0203	0.0033	0.0066	0.8002	0.1295	0.2613
0.0229	0.0036	0.0072	0.9002	0.1421	0.2854
0.0254	0.0039	0.0078	1.0002	0.1536	0.3079
0.0279	0.0042	0.0083	1.1002	0.1641	0.3286
0.0305	0.0044	0.0088	1.2002	0.1733	0.3474
0.0330	0.0046	0.0092	1.3003	0.1811	0.3632
0.0356	0.0048	0.0095	1.4003	0.1873	0.3759
0.0381	0.0049	0.0098	1.5003	0.1919	0.3854
0.0406	0.0049	0.0099	1.6003	0.1948	0.3916
0.0432	0.0050	0.0100	1.7003	0.1959	0.3944
0.0457	0.0050	0.0100	1.8004	0.1954	0.3940
0.0483	0.0049	0.0099	1.9004	0.1929	0.3901
0.0508	0.0048	0.0097	2.0004	0.1886	0.3826
0.0534	0.0046	0.0094	2.1004	0.1824	0.3716
0.0559	0.0044	0.0091	2.2004	0.1741	0.3568
0.0584	0.0042	0.0086	2.3005	0.1638	0.3380
0.0610	0.0038	0.0080	2.4005	0.1513	0.3151
0.0635	0.0035	0.0073	2.5005	0.1364	0.2878
0.0661	0.0030	0.0065	2.6005	0.1192	0.2559
0.0686	0.0025	0.0056	2.7005	0.0995	0.2188
0.0711	0.0020	0.0045	2.8005	0.0770	0.1762
0.0737	0.0013	0.0032	2.9006	0.0517	0.1276
0.0762	0.0006	0.0018	3.0006	0.0234	0.0721
0.0786	-0.0001	0.0004	3.0926	-0.0055	0.0143
0.0788	-0.0002	0.0002	3.1006	-0.0083	0.0093

RADIUS (METERS) = 0.2028 RADIUS (INCHES) = 7.9850
CHORD (METERS) = 0.0788 CHORD (INCHES) = 3.1012
ZCSL (METERS) = 0.0416 ZCSL (INCHES) = 1.6383
YCSL (METERS) = 0.0049 YCSL (INCHES) = 0.1937
RLE (METERS) =0.000239 RLE (INCHES) = 0.0094
RTE (METERS) =0.000226 RTE (INCHES) = 0.0089
X-AREA(SQ.METERS)=0.000273 X-AREA (SQ. IN.) = 0.4234
GAMMA-CHORD(RAD.)= 0.5316 GAMMA-CHORD(DEG.)= 30.46

TABLE B-9

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0002	0.0	-0.0087	0.0090
0.0002	-0.0002	0.0003	0.0091	-0.0075	0.0116
0.0027	0.0001	0.0010	0.1057	0.0055	0.0384
0.0054	0.0005	0.0017	0.2114	0.0191	0.0663
0.0081	0.0008	0.0024	0.3170	0.0318	0.0928
0.0107	0.0011	0.0030	0.4227	0.0436	0.1178
0.0134	0.0014	0.0036	0.5284	0.0546	0.1414
0.0161	0.0016	0.0042	0.6340	0.0648	0.1635
0.0188	0.0019	0.0047	0.7397	0.0742	0.1841
0.0215	0.0021	0.0052	0.8454	0.0826	0.2033
0.0242	0.0023	0.0056	0.9510	0.0903	0.2211
0.0268	0.0025	0.0060	1.0567	0.0970	0.2374
0.0295	0.0026	0.0064	1.1624	0.1029	0.2523
0.0322	0.0027	0.0068	1.2681	0.1080	0.2658
0.0349	0.0028	0.0071	1.3737	0.1121	0.2777
0.0376	0.0029	0.0073	1.4794	0.1152	0.2876
0.0403	0.0030	0.0075	1.5851	0.1173	0.2949
0.0429	0.0030	0.0076	1.6908	0.1184	0.2995
0.0456	0.0030	0.0077	1.7964	0.1184	0.3013
0.0483	0.0030	0.0076	1.9021	0.1174	0.3004
0.0510	0.0029	0.0075	2.0078	0.1152	0.2967
0.0537	0.0028	0.0074	2.1135	0.1119	0.2902
0.0564	0.0027	0.0071	2.2191	0.1075	0.2808
0.0590	0.0026	0.0068	2.3248	0.1018	0.2685
0.0617	0.0024	0.0064	2.4305	0.0950	0.2532
0.0644	0.0022	0.0060	2.5361	0.0869	0.2348
0.0671	0.0020	0.0054	2.6418	0.0775	0.2132
0.0698	0.0017	0.0048	2.7475	0.0669	0.1883
0.0725	0.0014	0.0041	2.8532	0.0549	0.1599
0.0752	0.0011	0.0032	2.9588	0.0415	0.1279
0.0778	0.0007	0.0023	3.0645	0.0267	0.0920
0.0805	0.0003	0.0013	3.1702	0.0104	0.0520
0.0830	-0.0002	0.0003	3.2680	-0.0060	0.0113
0.0832	-0.0002	0.0002	3.2759	-0.0073	0.0080

RADIUS (METERS) = 0.2281	RADIUS (INCHES) = 8.9819
CHORD (METERS) = 0.0832	CHORD (INCHES) = 3.2760
ZCSL (METERS) = 0.0436	ZCSL (INCHES) = 1.7149
YCSL (METERS) = 0.0029	YCSL (INCHES) = 0.1125
RLE (METERS) =0.000236	RLE (INCHES) = 0.0093
RTE (METERS) =0.000208	RTE (INCHES) = 0.0082
X-AREA(SQ.METERS)=0.000263	X-AREA (SQ. IN.) = 0.4074
GAMMA-CHORD(RAD.)= 0.6579	GAMMA-CHORD(DEG.)= 37.69

TABLE B-10

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0002	0.0	-0.0088	0.0090
0.0002	-0.0002	0.0003	0.0093	-0.0080	0.0109
0.0028	0.0000	0.0008	0.1104	0.0003	0.0320
0.0056	0.0002	0.0014	0.2208	0.0088	0.0538
0.0084	0.0004	0.0019	0.3312	0.0168	0.0745
0.0112	0.0006	0.0024	0.4416	0.0242	0.0940
0.0140	0.0008	0.0029	0.5520	0.0310	0.1122
0.0168	0.0009	0.0033	0.6623	0.0372	0.1293
0.0196	0.0011	0.0037	0.7727	0.0428	0.1452
0.0224	0.0012	0.0041	0.8831	0.0478	0.1598
0.0252	0.0013	0.0044	0.9935	0.0523	0.1733
0.0280	0.0014	0.0047	1.1039	0.0561	0.1856
0.0308	0.0015	0.0050	1.2143	0.0594	0.1967
0.0336	0.0016	0.0052	1.3247	0.0620	0.2066
0.0365	0.0016	0.0055	1.4351	0.0641	0.2154
0.0393	0.0017	0.0057	1.5455	0.0656	0.2229
0.0421	0.0017	0.0058	1.6559	0.0664	0.2290
0.0449	0.0017	0.0059	1.7663	0.0667	0.2331
0.0477	0.0017	0.0060	1.8766	0.0664	0.2348
0.0505	0.0017	0.0060	1.9870	0.0654	0.2343
0.0533	0.0016	0.0059	2.0974	0.0637	0.2314
0.0561	0.0016	0.0057	2.2078	0.0614	0.2261
0.0589	0.0015	0.0056	2.3182	0.0585	0.2185
0.0617	0.0014	0.0053	2.4286	0.0549	0.2086
0.0645	0.0013	0.0050	2.5390	0.0506	0.1962
0.0673	0.0012	0.0046	2.6494	0.0457	0.1814
0.0701	0.0010	0.0042	2.7598	0.0401	0.1642
0.0729	0.0009	0.0037	2.8702	0.0339	0.1445
0.0757	0.0007	0.0031	2.9806	0.0270	0.1222
0.0785	0.0005	0.0025	3.0910	0.0195	0.0974
0.0813	0.0003	0.0018	3.2013	0.0114	0.0699
0.0841	0.0001	0.0010	3.3117	0.0027	0.0397
0.0867	-0.0002	0.0002	3.4149	-0.0060	0.0091
0.0869	-0.0002	0.0002	3.4221	-0.0066	0.0070

RADIUS (METERS)	= 0.2535	RADIUS (INCHES)	= 9.9799
CHORD (METERS)	= 0.0869	CHORD (INCHES)	= 3.4222
ZCSL (METERS)	= 0.0451	ZCSL (INCHES)	= 1.7759
YCSL (METERS)	= 0.0013	YCSL (INCHES)	= 0.0519
RLE (METERS)	=0.000239	RLE (INCHES)	= 0.0094
RTE (METERS)	=0.000188	RTE (INCHES)	= 0.0074
X-AREA(SQ.METERS)	=0.000253	X-AREA (SQ. IN.)	= 0.3919
GAMMA-CHORD(RAD.)	= 0.7633	GAMMA-CHORD(DEG.)	= 43.73

TABLE B-11

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0002	0.0	-0.0088	0.0090
0.0002	-0.0002	0.0003	0.0093	-0.0083	0.0105
0.0029	-0.0001	0.0007	0.1146	-0.0030	0.0290
0.0058	0.0001	0.0012	0.2292	0.0023	0.0459
0.0087	0.0002	0.0016	0.3438	0.0071	0.0626
0.0116	0.0003	0.0020	0.4584	0.0114	0.0782
0.0146	0.0004	0.0024	0.5730	0.0154	0.0930
0.0175	0.0005	0.0027	0.6876	0.0190	0.1[illegible]
0.0204	0.0006	0.0030	0.8022	0.0222	0.1192
0.0233	0.0006	0.0033	0.9168	0.0248	0.1306
0.0262	0.0007	0.0036	1.0314	0.0270	0.1410
0.0291	0.0007	0.0038	1.1460	0.0287	0.1502
0.0320	0.0008	0.0040	1.2606	0.0299	0.1584
0.0349	0.0008	0.0042	1.3752	0.0307	0.1655
0.0378	0.0008	0.0044	1.4898	0.0310	0.1715
0.0408	0.0008	0.0045	1.6044	0.0309	0.1764
0.0437	0.0008	0.0046	1.7191	0.0303	0.1803
0.0466	0.000[illegible]	0.0046	1.8336	0.0292	0.1830
0.0495	0.0007	0.0047	1.9482	0.0280	0.1841
0.0524	0.0007	0.0047	2.0629	0.0265	0.1834
0.0553	0.000[illegible]	0.0046	2.1775	0.0250	0.1809
0.0582	0.000[illegible]	0.0045	2.2921	0.0232	0.1765
0.0611	0.0005	0.0043	2.4067	0.0213	0.1703
0.0640	0.0005	0.0041	2.5213	0.0192	0.1622
0.0670	0.0004	0.0039	2.6359	0.0169	0.1523
0.0699	0.0004	0.0036	2.7505	0.0145	0.1406
0.0728	0.0003	0.0032	2.8651	0.0120	0.1270
0.0757	0.0002	0.0028	2.9797	0.0092	0.1115
0.0786	0.0002	0.0024	3.0943	0.0064	0.0942
0.0815	0.0001	0.0019	3.2089	0.0034	0.0750
0.0844	0.0000	0.0014	3.3235	0.0003	0.0540
0.0873	-0.0001	0.0008	3.4381	-0.0029	0.0310
0.0901	-0.0001	0.0002	3.5460	-0.0059	0.0077
0.0902	-0.0002	0.0002	3.5527	-0.0061	0.0063

RADIUS (METERS) = 0.2788
CHORD (METERS) = 0.0902
ZCSL (METERS) = 0.0464
YCSL (METERS) = 0.0001
RLE (METERS) =0.000236
RTE (METERS) =0.000170
X-AREA(SQ.METERS)=0.000245
GAMMA-CHORD(RAD.)= 0.8159

RADIUS (INCHES) =10.9762
CHORD (INCHES) = 3.5527
ZCSL (INCHES) = 1.8279
YCSL (INCHES) = 0.0039
RLE (INCHES) = 0.0093
RTE (INCHES) = 0.0067
X-AREA (SQ. IN.) = 0.3797
GAMMA-CHORD(DEG.)= 46.75

TABLE B-12

METERS ZC	METERS YP	METERS YS	INCHES ZC	INCHES YP	INCHES YS
0.0	-0.0002	0.0002	0.0	-0.0088	0.0090
0.0002	-0.0002	0.0003	0.0093	-0.0083	0.0105
0.0029	-0.0001	0.0007	0.1159	-0.0029	0.0280
0.0059	0.0001	0.0012	0.2318	0.0025	0.0458
0.0088	0.0002	0.0016	0.3478	0.0073	0.0623
0.0118	0.0003	0.0020	0.4637	0.0115	0.0777
0.0147	0.0004	0.0023	0.5796	0.0152	0.0913
0.0177	0.0005	0.0027	0.6955	0.0183	0.1047
0.0206	0.0005	0.0030	0.8115	0.0208	0.1164
0.0236	0.0006	0.0032	0.9274	0.0228	0.1270
0.0265	0.0006	0.0035	1.0433	0.0243	0.1364
0.0294	0.0006	0.0037	1.1592	0.0252	0.1446
0.0324	0.0007	0.0039	1.2751	0.0256	0.1517
0.0353	0.0006	0.0040	1.3911	0.0255	0.1576
0.0383	0.0006	0.0041	1.5070	0.0249	0.1624
0.0412	0.000[illegible]	0.0042	1.6229	0.0238	0.1660
0.0442	0.0006	0.0043	1.7388	0.0221	0.1685
0.0471	0.0005	0.0043	1.8547	0.0200	0.1699
0.0501	0.0004	0.0043	1.9707	0.0176	0.1700
0.0530	0.0004	0.0043	2.0866	0.0153	0.1684
0.0559	0.0003	0.0042	2.2025	0.0130	0.1654
0.0589	0.0003	0.0041	2.3184	0.0108	0.1607
0.0618	0.0002	0.0039	2.4343	0.0087	0.1544
0.0648	0.0002	0.0037	2.5503	0.0067	0.1466
0.0677	0.0001	0.0035	2.6662	0.0047	0.1372
0.0707	0.0001	0.0032	2.7821	0.0029	0.1262
0.0736	0.0000	0.0029	2.8980	0.0012	0.1137
0.0766	-0.0000	0.0025	3.0140	-0.0004	0.0996
0.0795	-0.0000	0.0021	3.1299	-0.0019	0.0840
0.0824	-0.0001	0.0017	3.2458	-0.0032	0.0668
0.0854	-0.0001	0.0012	3.3617	-0.0043	0.0480
0.0883	-0.0001	0.0007	3.4776	-0.0052	0.0278
0.0911	-0.0001	0.0002	3.5871	-0.0059	0.0073
0.0913	-0.0002	0.0002	3.5935	-0.0059	0.0061

RADIUS (METERS) = 0.2872	RADIUS (INCHES) = 11.3080
CHORD (METERS) = 0.0913	CHORD (INCHES) = 3.5935
ZCSL (METERS) = 0.0468	ZCSL (INCHES) = 1.8443
YCSL (METERS) = -0.0002	YCSL (INCHES) = -0.0096
RLE (METERS) = 0.000239	RLE (INCHES) = 0.0094
RTE (METERS) = 0.000165	RTE (INCHES) = 0.0065
X-AREA (SQ.METERS) = 0.000243	X-AREA (SQ. IN.) = 0.3763
GAMMA-CHORD (RAD.) = 0.8204	GAMMA-CHORD (DEG.) = 47.00

TABLE B-13

METERS ZC	METERS YP	METERS YS	INCHES ZC	INCHES YP	INCHES YS
0.0	-0.0002	0.0002	0.0	-0.0088	0.0090
0.0002	-0.0002	0.0003	0.0093	-0.0084	0.0105
0.0030	-0.0001	0.0007	0.1169	-0.0029	0.0278
0.0059	0.0001	0.0012	0.2338	0.0025	0.0454
0.0089	0.0002	0.0016	0.3507	0.0072	0.0617
0.0119	0.0003	0.0020	0.4676	0.0114	0.0768
0.0148	0.0004	0.0023	0.5845	0.0149	0.0906
0.0178	0.0005	0.0026	0.7014	0.0178	0.1031
0.0208	0.0005	0.0029	0.8183	0.0201	0.1145
0.0238	0.0006	0.0032	0.9352	0.0219	0.1246
0.0267	0.0006	0.0034	1.0521	0.0230	0.1334
0.0297	0.0006	0.0036	1.1690	0.0236	0.1411
0.0327	0.0006	0.0038	1.2859	0.0237	0.1477
0.0356	0.0006	0.0039	1.4029	0.0232	0.1530
0.0386	0.0006	0.0040	1.5197	0.0221	0.1571
0.0416	0.0005	0.0041	1.6367	0.0205	0.1601
0.0445	0.0005	0.0041	1.7536	0.0184	0.1619
0.0475	0.0004	0.0041	1.8705	0.0157	0.1626
0.0505	0.0003	0.0041	1.9874	0.0127	0.1620
0.0534	0.0002	0.0041	2.1043	0.0097	0.1600
0.0564	0.0002	0.0040	2.2212	0.0071	0.1566
0.0594	0.0001	0.0039	2.3381	0.0046	0.1518
0.0624	0.0001	0.0037	2.4550	0.0024	0.1455
0.0653	0.0000	0.0035	2.5719	0.0004	0.1378
0.0683	-0.0000	0.0033	2.6888	-0.0014	0.1287
0.0713	-0.0001	0.0030	2.8057	-0.0030	0.1182
0.0742	-0.0001	0.0027	2.9226	-0.0042	0.1063
0.0772	-0.0001	0.0024	3.0395	-0.0052	0.0930
0.0802	-0.0002	0.0020	3.1564	-0.0060	0.0783
0.0831	-0.0002	0.0016	3.2733	-0.0064	0.0622
0.0861	-0.0002	0.0011	3.3902	-0.0065	0.0448
0.0891	-0.0002	0.0007	3.5071	-0.0063	0.0260
0.0919	-0.0001	0.0002	3.6177	-0.0058	0.0070
0.0921	-0.0001	0.0002	3.6240	-0.0058	0.0059

RADIUS (METERS)	= 0.2935	RADIUS (INCHES)	=11.5570
CHORD (METERS)	= 0.0920	CHORD (INCHES)	= 3.6240
ZCSL (METERS)	= 0.0472	ZCSL (INCHES)	= 1.8568
YCSL (METERS)	= -0.0005	YCSL (INCHES)	=-0.0180
RLE (METERS)	=0.000239	RLE (INCHES)	= 0.0094
RTE (METERS)	=0.000163	RTE (INCHES)	= 0.0064
X-AREA(SQ.METERS)	=0.000241	X-AREA (SQ. IN.)	= 0.3730
GAMMA-CHORD(RAD.)	= 0.8235	GAMMA-CHORD(DEG.)	= 47.19

TABLE B-14

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0002	0.0	-0.0089	0.0091
0.0002	-0.0002	0.0003	0.0094	-0.0084	0.0106
0.0030	-0.0001	0.0007	0.1179	-0.0030	0.0276
0.0060	0.0001	0.0011	0.2357	0.0025	0.0451
0.0090	0.0002	0.0016	0.3536	0.0072	0.0612
0.0120	0.0003	0.0019	0.4714	0.0114	0.0761
0.0150	0.0004	0.0023	0.5893	0.0149	0.0897
0.0180	0.0005	0.0026	0.7072	0.0178	0.1020
0.0210	0.0005	0.0029	0.8250	0.0200	0.1130
0.0239	0.0006	0.0031	0.9429	0.0217	0.1228
0.0269	0.0006	0.0033	1.0608	0.0227	0.1314
0.0299	0.0006	0.0035	1.1786	0.0232	0.1387
0.0329	0.0006	0.0037	1.2965	0.0230	0.1448
0.0359	0.0006	0.0038	1.4144	0.0223	0.1497
0.0389	0.0005	0.0039	1.5322	0.0210	0.1534
0.0419	0.0005	0.0040	1.6501	0.0191	0.1559
0.0449	0.0004	0.0040	1.7679	0.0168	0.1572
0.0479	0.0003	0.0040	1.8858	0.0137	0.1574
0.0509	0.0003	0.0040	2.0037	0.0102	0.1563
0.0539	0.0002	0.0039	2.1215	0.0068	0.1539
0.0569	0.0001	0.0038	2.2394	0.0037	0.1502
0.0599	0.0000	0.0037	2.3573	0.0009	0.1452
0.0629	-0.0000	0.0035	2.4751	-0.0015	0.1388
0.0659	-0.0001	0.0033	2.5930	-0.0037	0.1312
0.0689	-0.0001	0.0031	2.7108	-0.0055	0.1222
0.0718	-0.0002	0.0028	2.8287	-0.0069	0.1120
0.0748	-0.0002	0.0026	2.9466	-0.0080	0.1005
0.0778	-0.0002	0.0022	3.0644	-0.0087	0.0879
0.0808	-0.0002	0.0019	3.1823	-0.0090	0.0738
0.0838	-0.0002	0.0015	3.3002	-0.0088	0.0586
0.0868	-0.0002	0.0011	3.4180	-0.0082	0.0422
0.0898	-0.0002	0.0006	3.5359	-0.0072	0.0246
0.0926	-0.0001	0.0002	3.6475	-0.0058	0.0068
0.0928	-0.0001	0.0001	3.6538	-0.0057	0.0058

RADIUS (METERS) = 0.2999 RADIUS (INCHES) =11.8062
CHORD (METERS) = 0.0928 CHORD (INCHES) = 3.6537
ZCSL (METERS) = 0.0474 ZCSL (INCHES) = 1.8674
YCSL (METERS) = -0.0006 YCSL (INCHES) =-0.0242
RLE (METERS) =0.000239 RLE (INCHES) = 0.0094
RTE (METERS) =0.000163 RTE (INCHES) = 0.0064
X-AREA(SQ.METERS)=0.000238 X-AREA (SQ. IN.) = 0.3694
GAMMA-CHORD(RAD.)= 0.8450 GAMMA-CHORD(DEG.)= 48.41

TABLE B-15

METERS ZC	METERS YP	METERS YS	INCHES ZC	INCHES YP	INCHES YS
0.0	-0.0002	0.0002	0.0	-0.0089	0.0091
0.0002	-0.0002	0.0003	0.0094	-0.0085	0.0105
0.0030	-0.0001	0.0007	0.1188	-0.0036	0.0268
0.0060	0.0000	0.0011	0.2376	0.0012	0.0435
0.0091	0.0001	0.0015	0.3564	0.0054	0.0589
0.0121	0.0002	0.0019	0.4753	0.0091	0.0731
0.0151	0.0003	0.0022	0.5941	0.0122	0.0861
0.0181	0.0004	0.0025	0.7129	0.0147	0.0979
0.0211	0.0004	0.0028	0.8317	0.0166	0.1084
0.0241	0.0005	0.0030	0.9505	0.0180	0.1177
0.0272	0.0005	0.0032	1.0693	0.0188	0.1258
0.0302	0.0005	0.0034	1.1881	0.0190	0.1327
0.0332	0.0005	0.0035	1.3069	0.0187	0.1384
0.0362	0.0005	0.0036	1.4257	0.0179	0.1430
0.0392	0.0004	0.0037	1.5445	0.0165	0.1464
0.0422	0.0004	0.0038	1.6634	0.0147	0.1486
0.0453	0.0003	0.0038	1.7822	0.0123	0.1498
0.0483	0.0002	0.0038	1.9010	0.0094	0.1498
0.0513	0.0002	0.0038	2.0198	0.0062	0.1488
0.0543	0.0001	0.0037	2.1386	0.0029	0.1465
0.0573	-0.0000	0.0036	2.2574	-0.0002	0.1430
0.0604	-0.0001	0.0035	2.3762	-0.0028	0.1382
0.0634	-0.0001	0.0034	2.4950	-0.0052	0.1322
0.0664	-0.0002	0.0032	2.6138	-0.0071	0.1249
0.0694	-0.0002	0.0030	2.7327	-0.0087	0.1164
0.0724	-0.0003	0.0027	2.8515	-0.0099	0.1067
0.0754	-0.0003	0.0024	2.9703	-0.0106	0.0957
0.0785	-0.0003	0.0021	3.0891	-0.0109	0.0836
0.0815	-0.0003	0.0018	3.2079	-0.0108	0.0703
0.0845	-0.0003	0.0014	3.3267	-0.0102	0.0559
0.0875	-0.0002	0.0010	3.4455	-0.0091	0.0403
0.0905	-0.0002	0.0006	3.5643	-0.0076	0.0235
0.0934	-0.0001	0.0002	3.6770	-0.0057	0.0066
0.0936	-0.0001	0.0001	3.6832	-0.0056	0.0057

RADIUS (METERS) = 0.3062
CHORD (METERS) = 0.0936
ZCSL (METERS) = 0.0477
YCSL (METERS) = -0.0008
RLE (METERS) =0.000241
RTE (METERS) =0.000152
X-AREA(SQ.METERS)=0.000236
GAMMA-CHORD(RAD.)= 0.8598

RADIUS (INCHES) =12.0552
CHORD (INCHES) = 3.6831
ZCSL (INCHES) = 1.8773
YCSL (INCHES) =-0.0320
RLE (INCHES) = 0.0095
RTE (INCHES) = 0.0060
X-AREA (SQ. IN.) = 0.3654
GAMMA-CHORD(DEG.)= 49.26

TABLE B-16

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0002	0.0	-0.0089	0.0091
0.0002	-0.0002	0.0003	0.0094	-0.0086	0.0104
0.0030	-0.0001	0.0006	0.1198	-0.0049	0.0254
0.0061	-0.0000	0.0010	0.2395	-0.0012	0.0408
0.0091	0.0001	0.0014	0.3593	0.0020	0.0549
0.0122	0.0001	0.0017	0.4790	0.0047	0.0680
0.0152	0.0002	0.0020	0.5988	0.0070	0.0800
0.0183	0.0002	0.0023	0.7185	0.0088	0.0908
0.0213	0.0003	0.0026	0.8383	0.0101	0.1005
0.0243	0.0003	0.0028	0.9580	0.0110	0.1091
0.0274	0.0003	0.0030	1.0778	0.0114	0.1167
0.0304	0.0003	0.0031	1.1975	0.0114	0.1232
0.0335	0.0003	0.0033	1.3173	0.0110	0.1285
0.0365	0.0003	0.0034	1.4371	0.0102	0.1329
0.0395	0.0002	0.0035	1.5568	0.0090	0.1362
0.0426	0.0002	0.0035	1.6766	0.0074	0.1385
0.0456	0.0001	0.0036	1.7963	0.0055	0.1399
0.0487	0.0001	0.0036	1.9161	0.0032	0.1403
0.0517	0.0000	0.0035	2.0358	0.0006	0.1397
0.0548	-0.0001	0.0035	2.1556	-0.0021	0.1381
0.0578	-0.0001	0.0034	2.2753	-0.0046	0.1352
0.0608	-0.0002	0.0033	2.3951	-0.0067	0.1310
0.0639	-0.0002	0.0032	2.5149	-0.0086	0.1256
0.0669	-0.0003	0.0030	2.6346	-0.0100	0.1189
0.0700	-0.0003	0.0028	2.7544	-0.0112	0.1110
0.0730	-0.0003	0.0026	2.8741	-0.0120	0.1018
0.0760	-0.0003	0.0023	2.9939	-0.0124	0.0915
0.0791	-0.0003	0.0020	3.1136	-0.0124	0.0799
0.0821	-0.0003	0.0017	3.2334	-0.0121	0.0672
0.0852	-0.0003	0.0014	3.3531	-0.0113	0.0533
0.0882	-0.0003	0.0010	3.4729	-0.0098	0.0385
0.0913	-0.0002	0.0006	3.5927	-0.0079	0.0226
0.0941	-0.0001	0.0002	3.7064	-0.0056	0.0064
0.0943	-0.0001	0.0001	3.7124	-0.0055	0.0056

RADIUS (METERS) = 0.3125	RADIUS (INCHES) =12.3050
CHORD (METERS) = 0.0943	CHORD (INCHES) = 3.7124
ZCSL (METERS) = 0.0479	ZCSL (INCHES) = 1.8857
YCSL (METERS) = -0.0010	YCSL (INCHES) =-0.0411
RLE (METERS) =0.000241	RLE (INCHES) = 0.0095
RTE (METERS) =0.000140	RTE (INCHES) = 0.0055
X-AREA(SQ.METERS)=0.000233	X-AREA (SQ. IN.) = 0.3608
GAMMA-CHORD(RAD.)= 0.8825	GAMMA-CHORD(DEG.)= 50.56

TABLE B-17 [illegible]

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0002	0.0	-0.0090	0.0091
0.0002	-0.0002	0.0003	0.0094	-0.0089	0.0100
0.0031	-0.0002	0.0005	0.1222	-0.0082	0.0215
0.0062	-0.0002	0.0008	0.2443	-0.0075	0.0332
0.0093	-0.0002	0.0011	0.3665	-0.0070	0.0442
0.0124	-0.0002	0.0014	0.4887	-0.0067	0.0543
0.0155	-0.0002	0.0016	0.6108	-0.0065	0.0636
0.0186	-0.0002	0.0018	0.7330	-0.0065	0.0722
0.0217	-0.0002	0.0020	0.8551	-0.0066	0.0800
0.0248	-0.0002	0.0022	0.9773	-0.0068	0.0870
0.0279	-0.0002	0.0024	1.0995	-0.0071	0.0933
0.0310	-0.0002	0.0025	1.2216	-0.0075	0.0988
0.0341	-0.0002	0.0026	1.3438	-0.0080	0.1036
0.0372	-0.0002	0.0027	1.4660	-0.0085	0.1078
0.0403	-0.0002	0.0028	1.5681	-0.0092	0.1112
0.0434	-0.0002	0.0029	1.7103	-0.0098	0.1140
0.0465	-0.0003	0.0029	1.8325	-0.0104	0.1161
0.0496	-0.0003	0.0030	1.9546	-0.0110	0.1177
0.0528	-0.0003	0.0030	2.0768	-0.0115	0.1187
0.0559	-0.0003	0.0030	2.1989	-0.0119	0.1191
0.0590	-0.0003	0.0030	2.3211	-0.0123	0.1184
0.0621	-0.0003	0.0030	2.4433	-0.0126	0.1163
0.0652	-0.0003	0.0029	2.5654	-0.0127	0.1129
0.0683	-0.0003	0.0027	2.6876	-0.0128	0.1080
0.0714	-0.0003	0.0026	2.8098	-0.0127	0.1018
0.0745	-0.0003	0.0024	2.9319	-0.0124	0.0943
0.0776	-0.0003	0.0022	3.0541	-0.0120	0.0854
0.0807	-0.0003	0.0019	3.1763	-0.0113	0.0753
0.0838	-0.0003	0.0016	3.2984	-0.0105	0.0638
0.0869	-0.0002	0.0013	3.4206	-0.0095	0.0510
0.0900	-0.0002	0.0009	3.5428	-0.0082	0.0370
0.0931	-0.0002	0.0006	3.6649	-0.0068	0.0217
0.0961	-0.0001	0.0002	3.7816	-0.0051	0.0060
0.0962	-0.0001	0.0001	3.7871	-0.0051	0.0052

RADIUS (METERS)	= 0.3295	RADIUS (INCHES)	=12.9722
CHORD (METERS)	= 0.0962	CHORD (INCHES)	= 3.7871
ZCSL (METERS)	= 0.0484	ZCSL (INCHES)	= 1.9053
YCSL (METERS)	= -0.0016	YCSL (INCHES)	=-0.0616
RLE (METERS)	=0.000244	RLE (INCHES)	= 0.0096
RTE (METERS)	=0.000127	RTE (INCHES)	= 0.0050
X-AREA(SQ.METERS)	=0.000224	X-AREA (SQ. IN.)	= 0.3475
GAMMA-CHORD(RAD.)	= 0.9442	GAMMA-CHORD(DEG.)	= 54.10

TABLE B-18

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0002	0.0	-0.0093	0.0091
0.0002	-0.0002	0.0002	0.0096	-0.0095	0.0097
0.0032	-0.0003	0.0004	0.1255	-0.0115	0.0174
0.0064	-0.0003	0.0006	0.2511	-0.0136	0.0252
0.0096	-0.0004	0.0008	0.3766	-0.0155	0.0325
0.0128	-0.0004	0.0010	0.5022	-0.0172	0.0393
0.0159	-0.0005	0.0012	0.6277	-0.0190	0.0455
0.0191	-0.0005	0.0013	0.7533	-0.0208	0.0512
0.0223	-0.0006	0.0014	0.8788	-0.0225	0.0564
0.0255	-0.0006	0.0016	1.0044	-0.0241	0.0612
0.0287	-0.0006	0.0017	1.1299	-0.0255	0.0655
0.0319	-0.0007	0.0018	1.2555	-0.0270	0.0693
0.0351	-0.0007	0.0018	1.3811	-0.0281	0.0727
0.0383	-0.0007	0.0019	1.5066	-0.0288	0.0758
0.0415	-0.0008	0.0020	1.6322	-0.0296	0.0785
0.0446	-0.0008	0.0021	1.7577	-0.0301	0.0808
0.0478	-0.0008	0.0021	1.8833	-0.0300	0.0828
0.0510	-0.0008	0.0021	2.0088	-0.0298	0.0846
0.0542	-0.0007	0.0022	2.1344	-0.0293	0.0861
0.0574	-0.0007	0.0022	2.2599	-0.0286	0.0873
0.0606	-0.0007	0.0022	2.3855	-0.0274	0.0883
0.0638	-0.0007	0.0022	2.5110	-0.0259	0.0882
0.0670	-0.0006	0.0022	2.6366	-0.0246	0.0869
0.0702	-0.0006	0.0021	2.7621	-0.0232	0.0843
0.0733	-0.0006	0.0020	2.8877	-0.0217	0.0804
0.0765	-0.0005	0.0019	3.0132	-0.0201	0.0752
0.0797	-0.0005	0.0017	3.1388	-0.0183	0.0688
0.0829	-0.0004	0.0016	3.2643	-0.0164	0.0612
0.0861	-0.0004	0.0013	3.3899	-0.0143	0.0523
0.0893	-0.0003	0.0011	3.5154	-0.0120	0.0423
0.0925	-0.0002	0.0008	3.6410	-0.0097	0.0311
0.0957	-0.0002	0.0005	3.7665	-0.0074	0.0183
0.0987	-0.0001	0.0001	3.8870	-0.0047	0.0054
0.0989	-0.0001	0.0001	3.8921	-0.0046	0.0049

RADIUS (METERS) = 0.3549
CHORD (METERS) = 0.0989
ZCSL (METERS) = 0.0491
YCSL (METERS) = -0.0023
RLE (METERS) =0.000241
RTE (METERS) =0.000104
X-AREA(SQ.METERS)=0.000207
GAMMA-CHORD(RAD.)= 1.0226

RADIUS (INCHES) =13.9709
CHORD (INCHES) = 3.8921
ZCSL (INCHES) = 1.9327
YCSL (INCHES) =-0.0908
RLE (INCHES) = 0.0095
RTE (INCHES) = 0.0041
X-AREA (SQ. IN.) = 0.3213
GAMMA-CHORD(DEG.)= 58.59

TABLE B-19

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0002	0.0	-0.0092	0.0091
0.0002	-0.0002	0.0002	0.0095	-0.0097	0.0093
0.0033	-0.0004	0.0003	0.1287	-0.0159	0.0113
0.0065	-0.0006	0.0003	0.2574	-0.0223	0.0132
0.0098	-0.0007	0.0004	0.3861	-0.0283	0.0151
0.0131	-0.0009	0.0004	0.5148	-0.0340	0.0168
0.0163	-0.0010	0.0005	0.6435	-0.0393	0.0184
0.0196	-0.0011	0.0005	0.7722	-0.0441	0.0199
0.0229	-0.0012	0.0005	0.9009	-0.0484	0.0213
0.0262	-0.0013	0.0006	1.0296	-0.0523	0.0227
0.0294	-0.0014	0.0006	1.1583	-0.0556	0.0241
0.0327	-0.0015	0.0007	1.2870	-0.0583	0.0256
0.0360	-0.0015	0.0007	1.4157	-0.0604	0.0272
0.0392	-0.0016	0.0007	1.5444	-0.0619	0.0289
0.0425	-0.0016	0.0008	1.6731	-0.0628	0.0308
0.0458	-0.0016	0.0008	1.8018	-0.0628	0.0329
0.0490	-0.0016	0.0009	1.9305	-0.0621	0.0353
0.0523	-0.0015	0.0010	2.0592	-0.0606	0.0380
0.0556	-0.0015	0.0010	2.1879	-0.0582	0.0411
0.0588	-0.0014	0.0011	2.3166	-0.0549	0.0448
0.0621	-0.0013	0.0013	2.4453	-0.0504	0.0492
0.0654	-0.0011	0.0014	2.5740	-0.0453	0.0535
0.0686	-0.0010	0.0014	2.7027	-0.0399	0.0568
0.0719	-0.0009	0.0015	2.8314	-0.0349	0.0587
0.0752	-0.0008	0.0015	2.9601	-0.0300	0.0591
0.0785	-0.0006	0.0015	3.0888	-0.0255	0.0579
0.0817	-0.0005	0.0014	3.2175	-0.0212	0.0552
0.0850	-0.0004	0.0013	3.3462	-0.0173	0.0508
0.0883	-0.0003	0.0011	3.4749	-0.0137	0.0448
0.0915	-0.0003	0.0009	3.6036	-0.0106	0.0372
0.0948	-0.0002	0.0007	3.7323	-0.0078	0.0279
0.0981	-0.0001	0.0004	3.8610	-0.0058	0.0167
0.1012	-0.0001	0.0001	3.9855	-0.0039	0.0045
0.1013	-0.0001	0.0001	3.9897	-0.0038	0.0041

RADIUS (METERS) = 0.3802
CHORD (METERS) = 0.1013
ZCSL (METERS) = 0.0497
YCSL (METERS) = -0.0032
RLE (METERS) =0.000239
RTE (METERS) =0.000104
X-AREA(SQ.METERS)=0.000186
GAMMA-CHORD(RAD.)= 1.1154

RADIUS (INCHES) =14.9699
CHORD (INCHES) = 3.9896
ZCSL (INCHES) = 1.9558
YCSL (INCHES) =-0.1242
RLE (INCHES) = 0.0094
RTE (INCHES) = 0.0041
X-AREA (SQ. IN.) = 0.2877
GAMMA-CHORD(DEG.)= 63.91

TABLE B-20

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0002	0.0	-0.0092	0.0091
0.0002	-0.0002	0.0002	0.0094	-0.0098	0.0090
0.0033	-0.0005	0.0002	0.1311	-0.0183	0.0079
0.0067	-0.0007	0.0002	0.2622	-0.0264	0.0068
0.0100	-0.0009	0.0002	0.3933	-0.0340	0.0061
0.0133	-0.0010	0.0001	0.5244	-0.0409	0.0056
0.0166	-0.0012	0.0001	0.6555	-0.0471	0.0054
0.0200	-0.0013	0.0001	0.7866	-0.0525	0.0054
0.0233	-0.0015	0.0001	0.9177	-0.0572	0.0058
0.0266	-0.0016	0.0002	1.0488	-0.0611	0.0066
0.0300	-0.0016	0.0002	1.1799	-0.0641	0.0077
0.0333	-0.0017	0.0002	1.3110	-0.0663	0.0093
0.0366	-0.0017	0.0003	1.4421	-0.0677	0.0112
0.0400	-0.0017	0.0003	1.5732	-0.0682	0.0136
0.0433	-0.0017	0.0004	1.7043	-0.0677	0.0165
0.0466	-0.0017	0.0005	1.8354	-0.0664	0.0199
0.0499	-0.0016	0.0006	1.9665	-0.0641	0.0238
0.0533	-0.0015	0.0007	2.0976	-0.0607	0.0283
0.0566	-0.0014	0.0008	2.2287	-0.0564	0.0333
0.0599	-0.0013	0.0010	2.3598	-0.0510	0.0393
0.0633	-0.0011	0.0012	2.4909	-0.0441	0.0460
0.0666	-0.0009	0.0013	2.6220	-0.0366	0.0529
0.0699	-0.0007	0.0015	2.7531	-0.0291	0.0593
0.0733	-0.0006	0.0016	2.8842	-0.0222	0.0637
0.0766	-0.0004	0.0017	3.0154	-0.0162	0.0660
0.0799	-0.0003	0.0017	3.1465	-0.0111	0.0661
0.0832	-0.0002	0.0016	3.2775	-0.0071	0.0639
0.0866	-0.0001	0.0015	3.4087	-0.0040	0.0595
0.0899	-0.0001	0.0013	3.5398	-0.0020	0.0529
0.0932	-0.0000	0.0011	3.6709	-0.0009	0.0440
0.0966	-0.0000	0.0008	3.8020	-0.0008	0.0329
0.0999	-0.0000	0.0005	3.9331	-0.0018	0.0196
0.1031	-0.0001	0.0001	4.0601	-0.0037	0.0045
0.1032	-0.0001	0.0001	4.0642	-0.0037	0.0040

RADIUS (METERS) = 0.3977 RADIUS (INCHES) =15.6572
CHORD (METERS) = 0.1032 CHORD (INCHES) = 4.0642
ZCSL (METERS) = 0.0505 ZCSL (INCHES) = 1.9877
YCSL (METERS) = -0.0033 YCSL (INCHES) =-0.1304
RLE (METERS) =0.000236 RLE (INCHES) = 0.0093
RTE (METERS) =0.000104 RTE (INCHES) = 0.0041
X-AREA(SQ.METERS)=0.000173 X-AREA (SQ. IN.) = 0.2675
GAMMA-CHORD(RAD.)= 1.1675 GAMMA-CHORD(DEG.)= 66.89

TABLE B-21

METERS ZC	METERS YP	METERS YS	INCHES ZC	INCHES YP	INCHES YS
0.0	-0.0002	0.0002	0.0	-0.0091	0.0090
0.0002	-0.0002	0.0002	0.0093	-0.0098	0.0089
0.0033	-0.0005	0.0002	0.1318	-0.0185	0.0071
0.0067	-0.0007	0.0001	0.2635	-0.0272	0.0053
0.0100	-0.0009	0.0001	0.3953	-0.0352	0.0039
0.0134	-0.0011	0.0001	0.5271	-0.0424	0.0029
0.0167	-0.0012	0.0001	0.6588	-0.0488	0.0022
0.0201	-0.0014	0.0000	0.7906	-0.0544	0.0019
0.0234	-0.0015	0.0001	0.9223	-0.0591	0.0021
0.0268	-0.0016	0.0001	1.0541	-0.0630	0.0026
0.0301	-0.0017	0.0001	1.1859	-0.0661	0.0036
0.0335	-0.0017	0.0001	1.3176	-0.0683	0.0050
0.0368	-0.0018	0.0002	1.4494	-0.0695	0.0070
0.0403	-0.0018	0.0002	1.5882	-0.0699	0.0094
0.0435	-0.0018	0.0003	1.7129	-0.0693	0.0124
0.0469	-0.0017	0.0004	1.8447	-0.0677	0.0160
0.0502	-0.0017	0.0005	1.9764	-0.0651	0.0201
0.0535	-0.0016	0.0006	2.1082	-0.0615	0.0249
0.0569	-0.0014	0.0008	2.2400	-0.0569	0.0303
0.0602	-0.0013	0.0009	2.3717	-0.0513	0.0367
0.0636	-0.0011	0.0011	2.5035	-0.0439	0.0437
0.0669	-0.0009	0.0013	2.6353	-0.0360	0.0509
0.0703	-0.0007	0.0015	2.7670	-0.0281	0.0581
0.0736	-0.0005	0.0016	2.8988	-0.0207	0.0631
0.0770	-0.0004	0.0017	3.0306	-0.0145	0.0658
0.0803	-0.0002	0.0017	3.1623	-0.0093	0.0662
0.0837	-0.0001	0.0016	3.2941	-0.0051	0.0644
0.0870	-0.0001	0.0015	3.4258	-0.0021	0.0602
0.0904	-0.0000	0.0014	3.5576	-0.0001	0.0538
0.0937	0.0000	0.0011	3.6894	0.0008	0.0450
0.0971	0.0000	0.0009	3.8211	0.0005	0.0338
0.1004	-0.0000	0.0005	3.9529	-0.0009	0.0203
0.1036	-0.0001	0.0001	4.0807	-0.0036	0.0045
0.1038	-0.0001	0.0001	4.0847	-0.0037	0.0040

RADIUS (METERS) = 0.4027	RADIUS (INCHES) =15.8554
CHORD (METERS) = 0.1038	CHORD (INCHES) = 4.0847
ZCSL (METERS) = 0.0507	ZCSL (INCHES) = 1.9973
YCSL (METERS) = -0.0034	YCSL (INCHES) =-0.1329
RLE (METERS) =0.000236	RLE (INCHES) = 0.0093
RTE (METERS) =0.000104	RTE (INCHES) = 0.0041
X-AREA(SQ.METERS)=0.000169	X-AREA (SQ. IN.) = 0.2620
GAMMA-CHORD(RAD.)= 1.1805	GAMMA-CHORD(DEG.)= 67.64

TABLE B-22

METERS			INCHES		
ZC	YP	YS	ZC	YP	YS
0.0	-0.0002	0.0002	0.0	-0.0091	0.0089
0.0002	-0.0002	0.0002	0.0092	-0.0098	0.0088
0.0034	-0.0005	0.0002	0.1324	-0.0190	0.0062
0.0067	-0.0007	0.0001	0.2648	-0.0281	0.0038
0.0101	-0.0009	0.0000	0.3971	-0.0364	0.0018
0.0135	-0.0011	0.0000	0.5295	-0.0439	0.0003
0.0168	-0.0013	-0.0000	0.6619	-0.0505	-0.0008
0.0202	-0.0014	-0.0000	0.7943	-0.0562	-0.0015
0.0235	-0.0016	-0.0000	0.9267	-0.0611	-0.0016
0.0269	-0.0017	-0.0000	1.0591	-0.0651	-0.0013
0.0303	-0.0017	-0.0000	1.1915	-0.0682	-0.0005
0.0336	-0.0018	0.0000	1.3238	-0.0703	0.0008
0.0370	-0.0018	0.0001	1.4562	-0.0716	0.0027
0.0404	-0.0018	0.0001	1.5886	-0.0718	0.0052
0.0437	-0.0018	0.0002	1.7210	-0.0711	0.0083
0.0471	-0.0018	0.0003	1.8534	-0.0694	0.0120
0.0504	-0.0017	0.0004	1.9858	-0.0666	0.0163
0.0538	-0.0016	0.0005	2.1181	-0.0628	0.0213
0.0572	-0.0015	0.0007	2.2505	-0.0579	0.0269
0.0605	-0.0013	0.0009	2.3829	-0.0520	0.0336
0.0639	-0.0011	0.0010	2.5153	-0.0444	0.0410
0.0673	-0.0009	0.0012	2.6477	-0.0361	0.0485
0.0706	-0.0007	0.0014	2.7801	-0.0279	0.0562
0.0740	-0.0005	0.0016	2.9124	-0.0201	0.0618
0.0773	-0.0003	0.0017	3.0448	-0.0135	0.0651
0.0807	-0.0002	0.0017	3.1772	-0.0081	0.0659
0.0841	-0.0001	0.0016	3.3096	-0.0038	0.0644
0.0874	-0.0000	0.0015	3.4420	-0.0007	0.0605
0.0908	0.0000	0.0014	3.5744	0.0012	0.0542
0.0942	0.0000	0.0012	3.7067	0.0019	0.0455
0.0975	0.0000	0.0009	3.8391	0.0013	0.0343
0.1009	-0.0000	0.0005	3.9715	-0.0004	0.0206
0.1041	-0.0001	0.0001	4.0998	-0.0037	0.0046
0.1042	-0.0001	0.0001	4.1039	-0.0038	0.0041

RADIUS (METERS) = 0.4078
CHORD (METERS) = 0.1042
ZCSL (METERS) = 0.0510
YCSL (METERS) = -0.0034
RLE (METERS) =0.000236
RTE (METERS) =0.000104
X-AREA(SQ.METERS)=0.000166
GAMMA-CHORD(RAD.)= 1.1928

RADIUS (INCHES) =16.0534
CHORD (INCHES) = 4.1039
ZCSL (INCHES) = 2.0064
YCSL (INCHES) =-0.1356
RLE (INCHES) = 0.0093
RTE (INCHES) = 0.0041
X-AREA (SQ. IN.) = 0.2568
GAMMA-CHORD(DEG.)= 68.34

APPENDIX C

PART 1

STEADY BLADE STRUCTURAL DATA

TABLE C-1

BLADE LOCAL UNTWIST IN DEGREES
(MIRROR MEASUREMENTS)

Percent Span Measured From Hub	Percent Chord Measured From Leading Edge	Percent Design Speed 54	73	82	85
95	5	0.57	1.03		
	25	0.54	0.92	1.15	1.28
	50	0.42	0.71	0.33	1.01
	70	0.33	0.52	0.78	0.38
86	5	0.47	0.80	1.04	1.13
	25	0.42	0.72	0.90	[illegible]
	50	0.39	0.64	0.81	[illegible]
	70	0.38	0.62	0.79	0.87
75	5	0.35	0.57	0.71	0.78
	25	-	-	-	-
	50	0.26	0.45	0.62	0.68
66	5	0	0	0	[illegible]
	25	0.09	0.11	0.12	0.21
55	5	0.32	0.51	0.66	0.72
	25	0.19	0.29	0.36	0.39
	50	0.04	0.09	0.11	0.11
47	5	-	-	-	-
	25	0.40	0.83		
38	5		0.6*		
20	25	0	0	-0.05	-0.13
66	25				
86	25	0.43	0.71	0.83	0.90
76	50	0.25	0.51	0.62	0.68
66	25	0.03	0.06	0.09	0.09

*Questionable data.

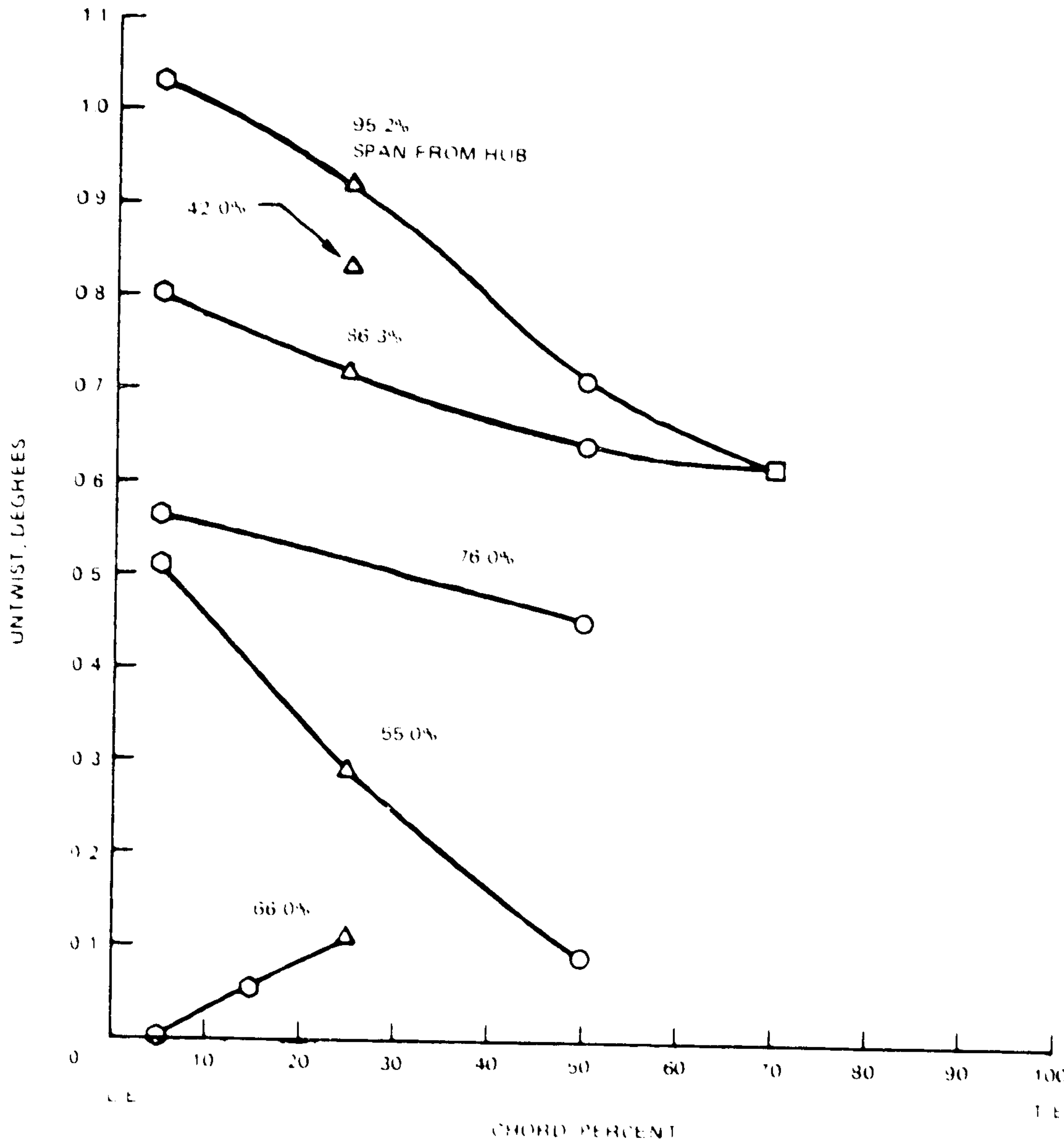

Figure C-1 Measured Untwist for TS22 Fan Blade as a Function of Chord at 73 Percent Speed

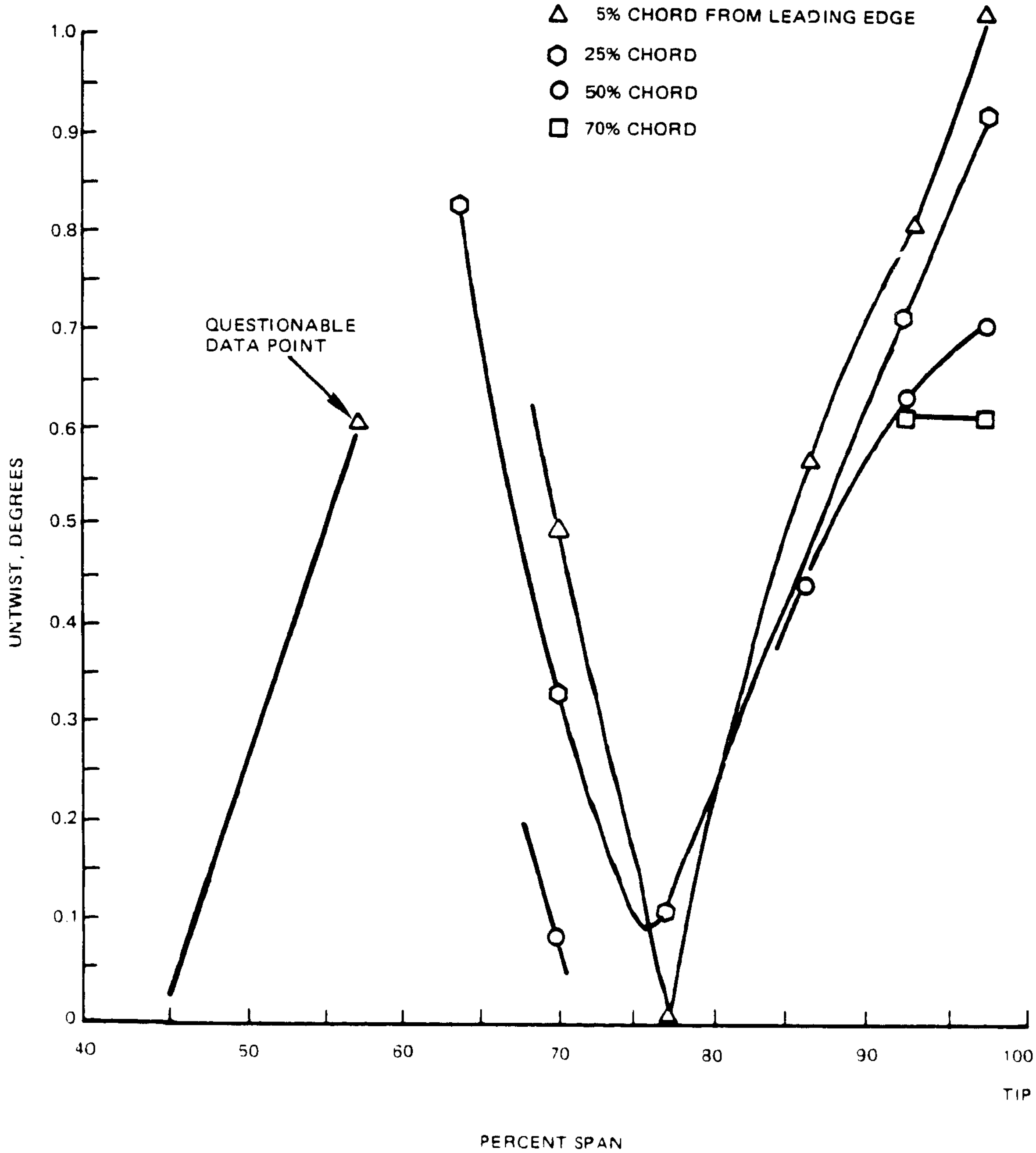

Figure C-2 Measured Untwist for TS22 Fan Blade at 73 Percent Speed Relative to Untwist at 25.4 Percent Speed

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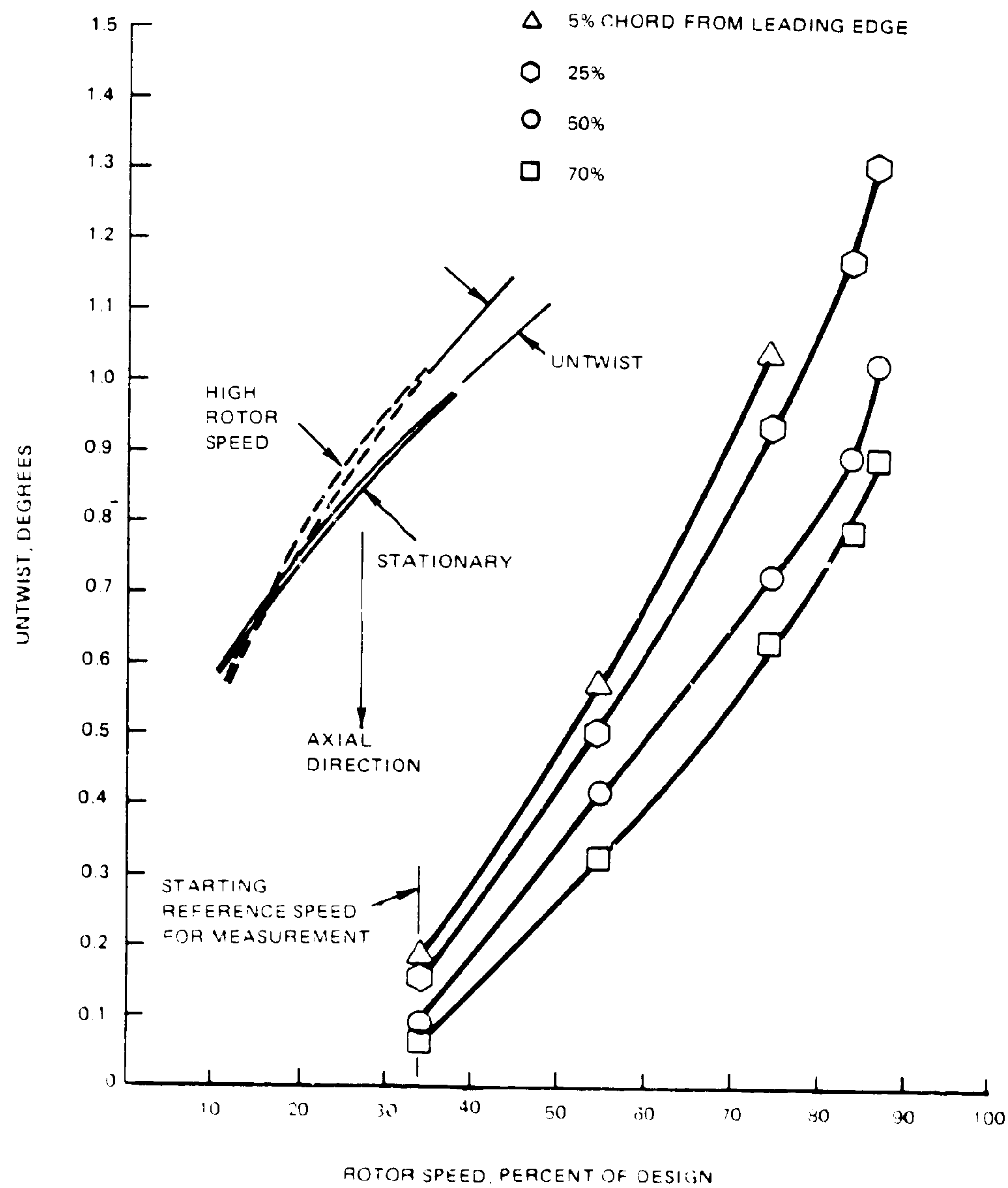

Figure C-3 Measured Untwist for TS22 Fan Blade as a Function of Rotor Speed at 95 Percent Span

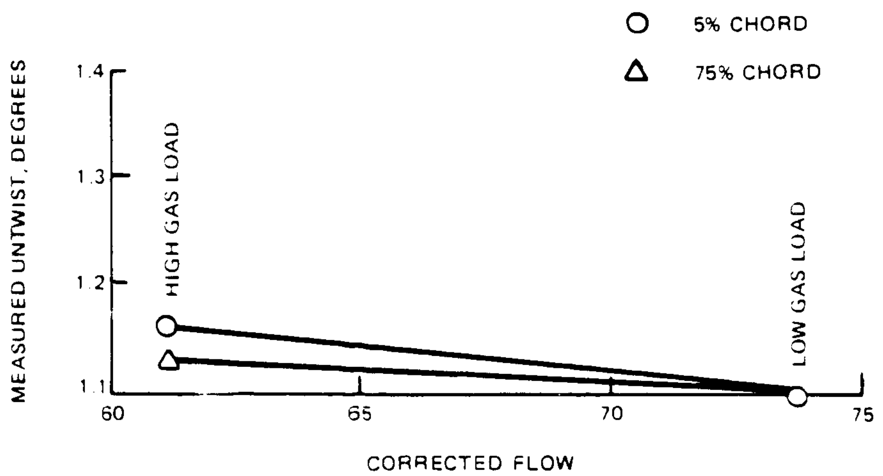

Figure C-4 Measured Untwist for TS22 Fan Blade as a Function of Chord at 73 Percent Speed

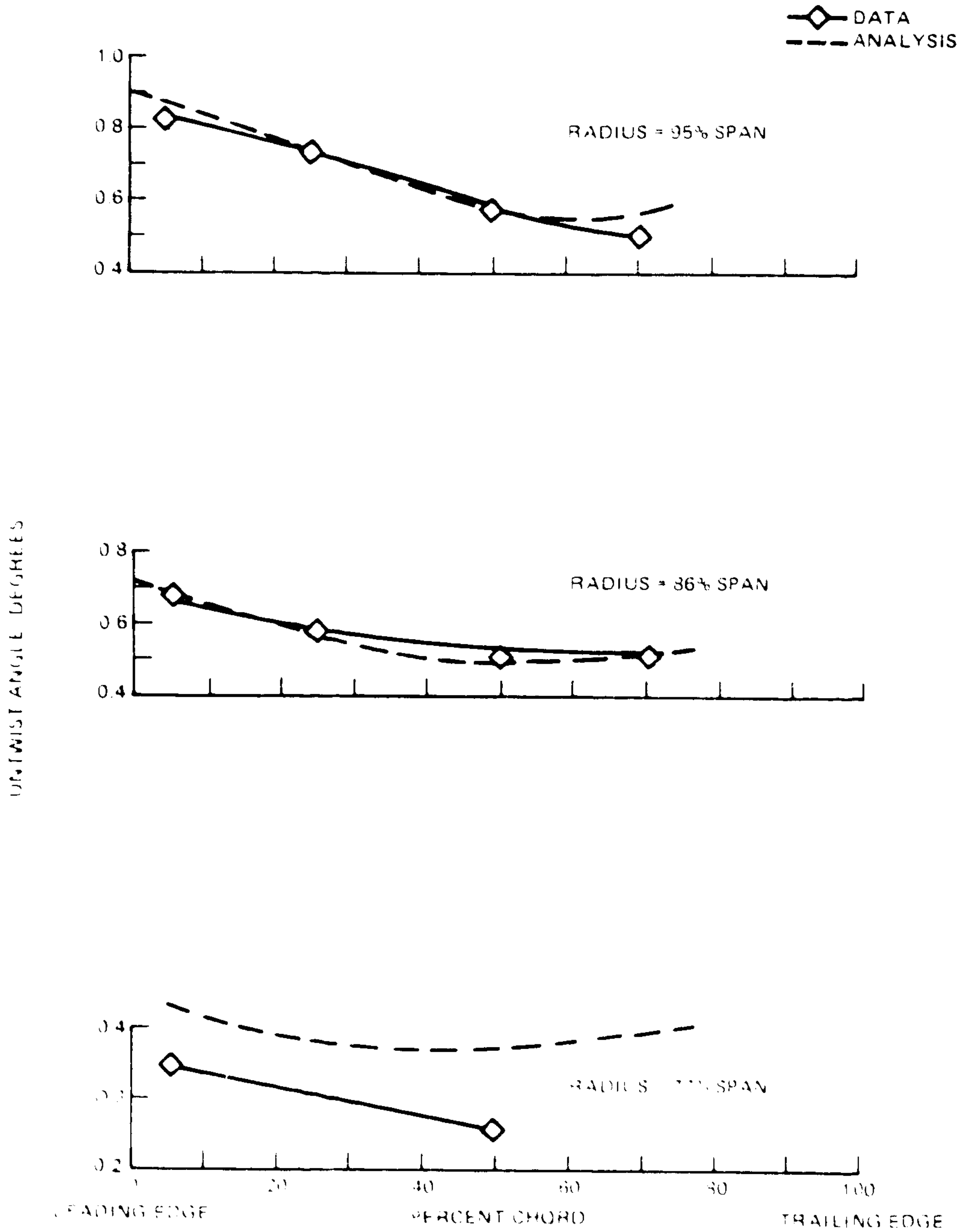

Figure C-5 Measured Untwist for TS22 Fan Blade and Predicted by NASTRAN Analysis for Rotor Speed at 65 Percent Speed

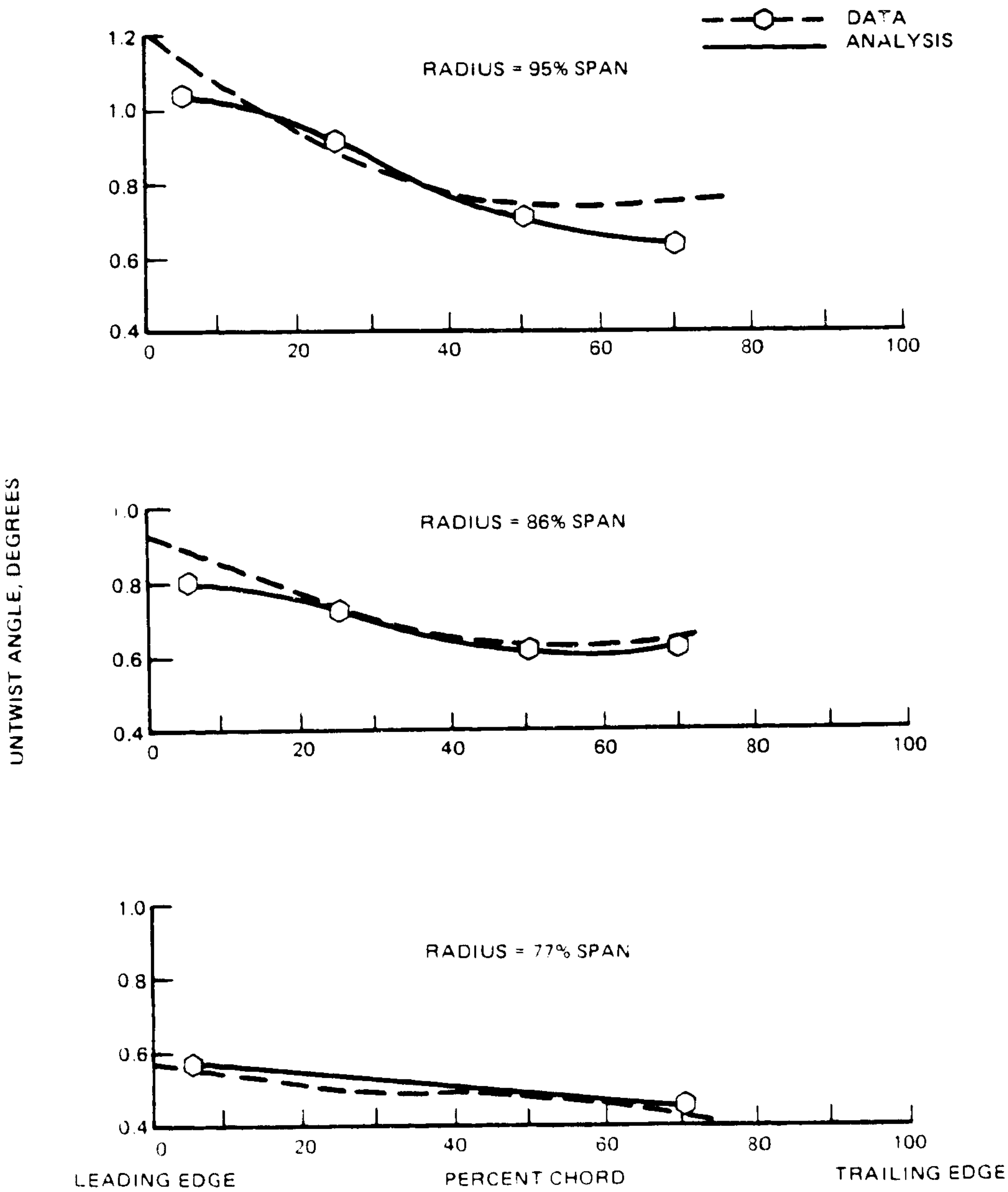

Figure C-6 Measured Untwist for TS22 Fan Blade and Predicted by NASTRAN Analysis for Rotor Speed at 73 Percent Speed

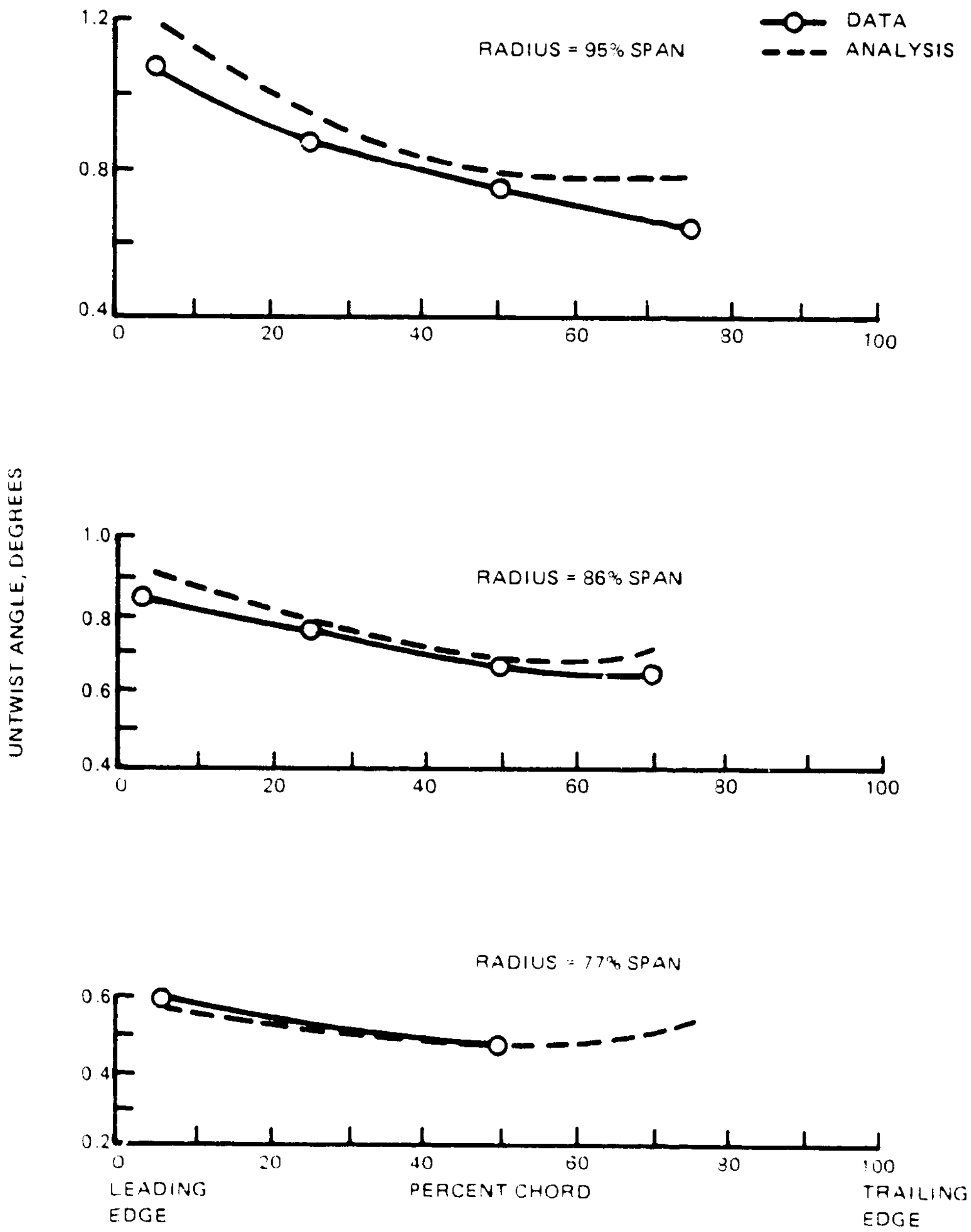

Figure C-7 Measured Untwist for TS22 Fan Blade and Predicted by NASTRAN Analysis for Rotor Speed at 75 Percent Speed

APPENDIX C

PART 2

UNSTEADY BLADE STRUCTURAL DATA

TABLE C-2

STRAIN GAGE AMPLITUDE AND PHASES

Speed (Percent)	67			72			75		
Frequency (Hz)	619			638			638		
	Stress		Phase Relative to Blade Number 3	Stress		Phase Relative to Blade Number 3	Stress		Phase Relative to Blade Number 3
Blade Position	(N/cm^2)	(lbf/in^2)	(Degrees)	(N/cm^2)	(lbf/in^2)	(Degrees)	(N/cm^2)	(lbf/in^2)	(Degrees)
1	2,275	3,300	123	2,275	3,300	97	1,723	2,500	120
2	2,482	3,600	-	2,620	3,800	70	2,275	3,300	-
3	2,068	3,000	0	2,068	3,000	0	1,723	2,500	0
4	2,068	3,000	280	2,895	4,200	283	1,585	2,300	290
5	2,068	3,000	248	2,482	3,600	255	1,585	2,300	251
6	965	1,400	99	1,034	1,500	90	827	1,200	104
7	1,103	1,600	128	1,378	2,000	117	1,103	1,600	148
8	1,241	1,800	102	1,310	1,900	94	896	1,300	120
9	1,034	1,500	164	1,241	1,800	155	1,103	1,600	182
10	689	1,000	42	965	1,400	32	689	1,000	49
11	689	1,000	42	551	800	31	482	700	55
12	344	500	22	344	500	32	344	500	50
13	413	600	336	344	500	347	413	600	47
14	551	800	255	551	800	280	551	800	295
15	413	600	264	551	800	272	551	800	270
16	482	700	258	689	1,000	256	482	700	267
17	551	800	278	827	1,200	271	482	700	291
18	551	800	-	1,034	1,500	240	413	600	254
19	482	700	204	827	1,200	204	482	700	200
20	-	-	126	896	1,300	138	827	1,200	153
21	827	1,200	94	1,516	2,200	82	965	1,400	130
22	827	1,200	69	1,241	1,800	56	827	1,200	88
23	413	600	318	551	800	316	896	1,300	25
24	551	800	264	620	900	235	896	1,300	343
25	551	800	113	344	500	101	827	1,200	244
26	-	-	-	-	-	-	-	-	-
27	551	800	107	413	600	188	-	-	128
28	275	400	318	344	500	270	344	500	328
29	551	800	301	551	800	287	482	700	299
30	413	600	287	827	1,200	267	965	1,400	278
31	-	-	321	1,172	1,700	261	1,172	1,700	334
32	137	200	202	965	1,400	194	965	1,400	203

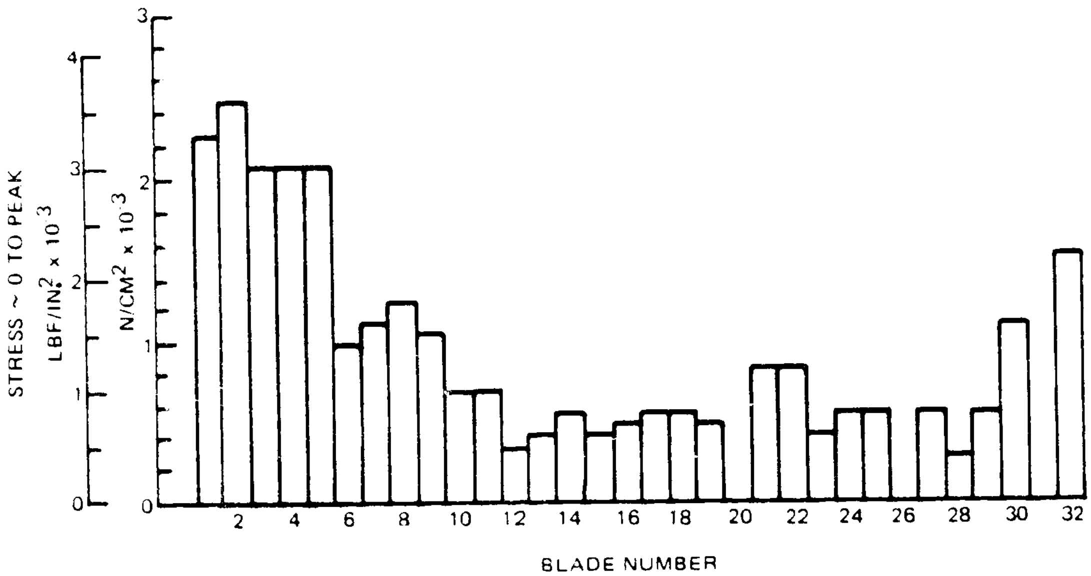

Figure C-8 Blade Flutter Amplitude for TS22 Rotor at 67 Percent Speed From Strain-Gage Measurements

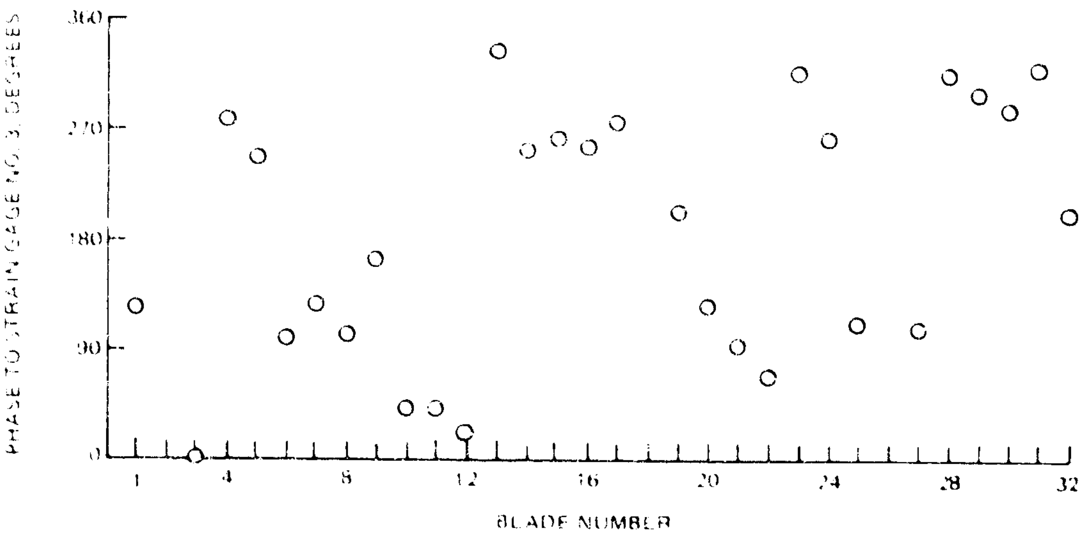

Figure C-9 Peripheral distribution of Blade Strain-Gage Angles in Flutter at 619 Hz, 67 Percent Speed

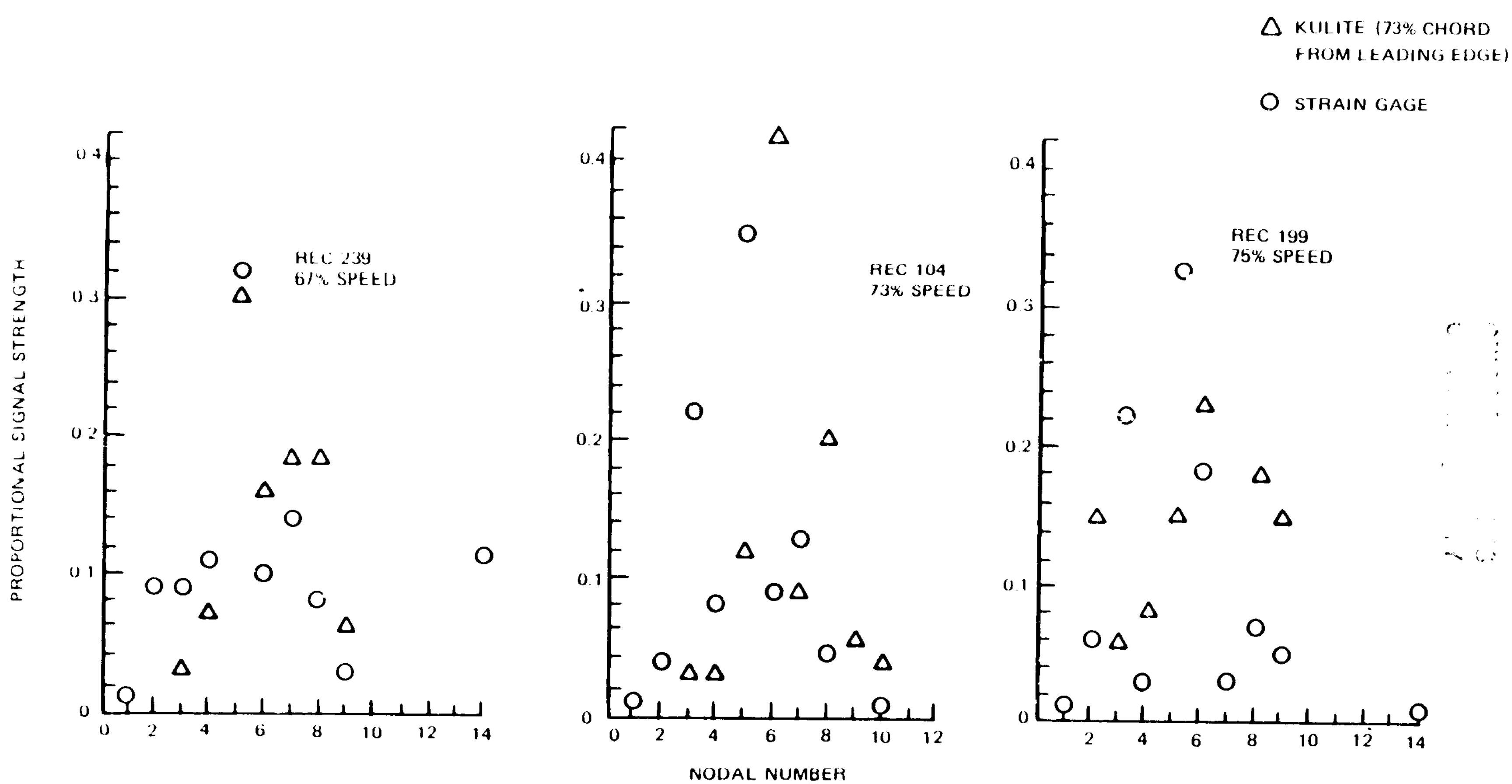

Figure C-10 Spectral Comparison of Vibratory Rotor Pressure Amplitudes in Terms of Distribution Among Spatial Harmonics

TABLE C-3

BLADE AMPLITUDE IN FLUTTER
(Measured From Mirrors From Still Photographs)

Blade Number	Percent Span	Percent Chord	67 Percent Speed: Peak-to-Peak Torsion (Degrees)	67 Percent Speed: Peak-to-Peak Axial Component Bending Slope (Degrees)	73 Percent Speed: Peak-to-Peak Torsion (Degrees)	73 Percent Speed: Peak-to-Peak Axial Component Bending Slope (Degrees)	75 Percent Speed: Peak-to-Peak Torsion (Degrees)	75 Percent Speed: Peak-to-Peak Axial Component Bending Slope (Degrees)
9	95	5	0.33	0.23	-	-	-	-
		25	0.20	0.35	0.12	0.46	0.23	0.28
		50	0.21	0.40	0.18	0.59	0.17	0.26
		70	0.18	0.50	0.20	0.53	0.18	0.26
	86	5	0.22	0.25	0.20	0.50	0.25	0.30
		25	0.15	0.21	0.10	0.28	0.17	0.17
		50	0.17*	0.30	0.15	0.45	0.20	0.17
		70	0.13	0.30	0.17	0.43	0.17	0.11
	76	5	0.17	0.18	0.12	0.43	0.18	0.2
		50	0.17	0.21	0.08	0.25	0.18	0.2
	66	5	0.05	-	0.03	-	0.07	-
		25	0.02	-	0	-	0.08	0.15
	55	5	-	-	-	-	0.05	0.06
		25	-	-	-	-	0.05	0.05
		50	-	-	-	-	0.05	0.10
	47	25	-	-	-	-	0.03	0.10
	38	5	-	-	-	-	0.10	0.17
	20	5	-	-	-	-	0.05	0.08
3	86	50	0.44	0.48	0.54	0.69	0.24	0.40
4	86	50	0.50*	0.53	0.53	0.55	0.14	0.23
2	76	50	0.58	0.55	0.43	0.63	0.24	0.40
5	66	25	0.21	0.17	0.17	0.23	0.10	0.17

* Relative to strain gages 4 and 9

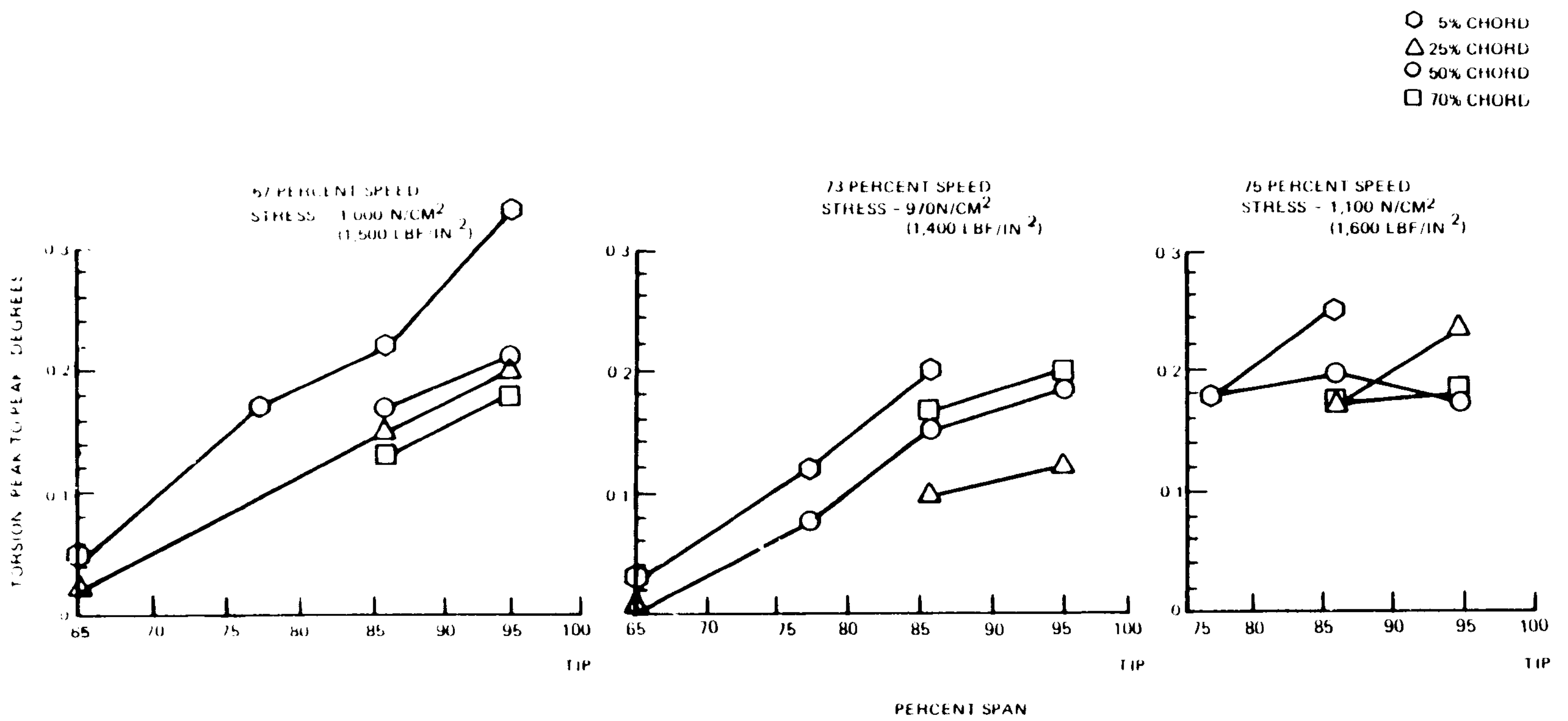

Figure C-11 Radial Distribution of Vibratory Torsion Component in Flutter Measured by Mirrors; Still Pictures Used to Reduce Data

TABLE C-4

BLADE AMPLITUDE AND PHASE DEFLECTIONS DETERMINED FROM MIRRORS
(Reduced from High Speed Movies)

Blade Number	Location Percent Span	Percent Chord	Bending Phase (Degrees)	Torsional Phase (Degrees)	Bending - Torsion Phase Angle (Degrees)
65% Speed					
9	95	25	41.1	26.6	45.2
9	95	50	-12.1	0.50	14.2
9	95	70	-72.6	-28.9	-8.9
9	86	25	31.9	36.3	25.1
9	86	50	0	0	31.8
3	86	50	-72.7	65.9	-106.8
4	86	50	19.3	-59.9	113.8
9	77	5	63.6	69.6	23.5
9	77	50	-0.3	9.4	24.1
2	77	50	49.4	-18.4	103.2
5	65	25	-95.3	-86.2	25.5
73% Speed					
9	95	25	-20.5	1.0	-86
9	95	50	-6.1	20.9	-91.9
9	95	70	8.8	28.7	-84.8
9	86	25	-22.3	2.1	-89.0
9	86	50	0		-64.9
4	86	50	-125.8	-99	-97.8
9	86	70	14.4	34.6	-85
9	77	5	-24.5	-23	-66.6
2	77	50	6.5	35	-93.4
5	65	25	2.6	-19.2	-76.2
75% Speed					
9	95	25	-5.9	15.3	-45.7
9	95	50	0.4	23.1	-41.1
9	95	70	2.0	14.5	-30.9
9	86	5	4.2	44.2	-67.0
9	86	25	0.7	22.9	-48.7
9	86	50	0	0	-15.0
3	86	50	-2.6	-117.0	99.8
4	86	50	-6.6	-103.7	31.9
9	86	70	-1.7	18.6	-40.4
9	77	5	5.9	56.9	-101.1
9	77	50	-5.5	28.2	-52.0
2	77	50	-14.8	54.0	-83.3
5	65	25	134.5	-115.2	-16.8

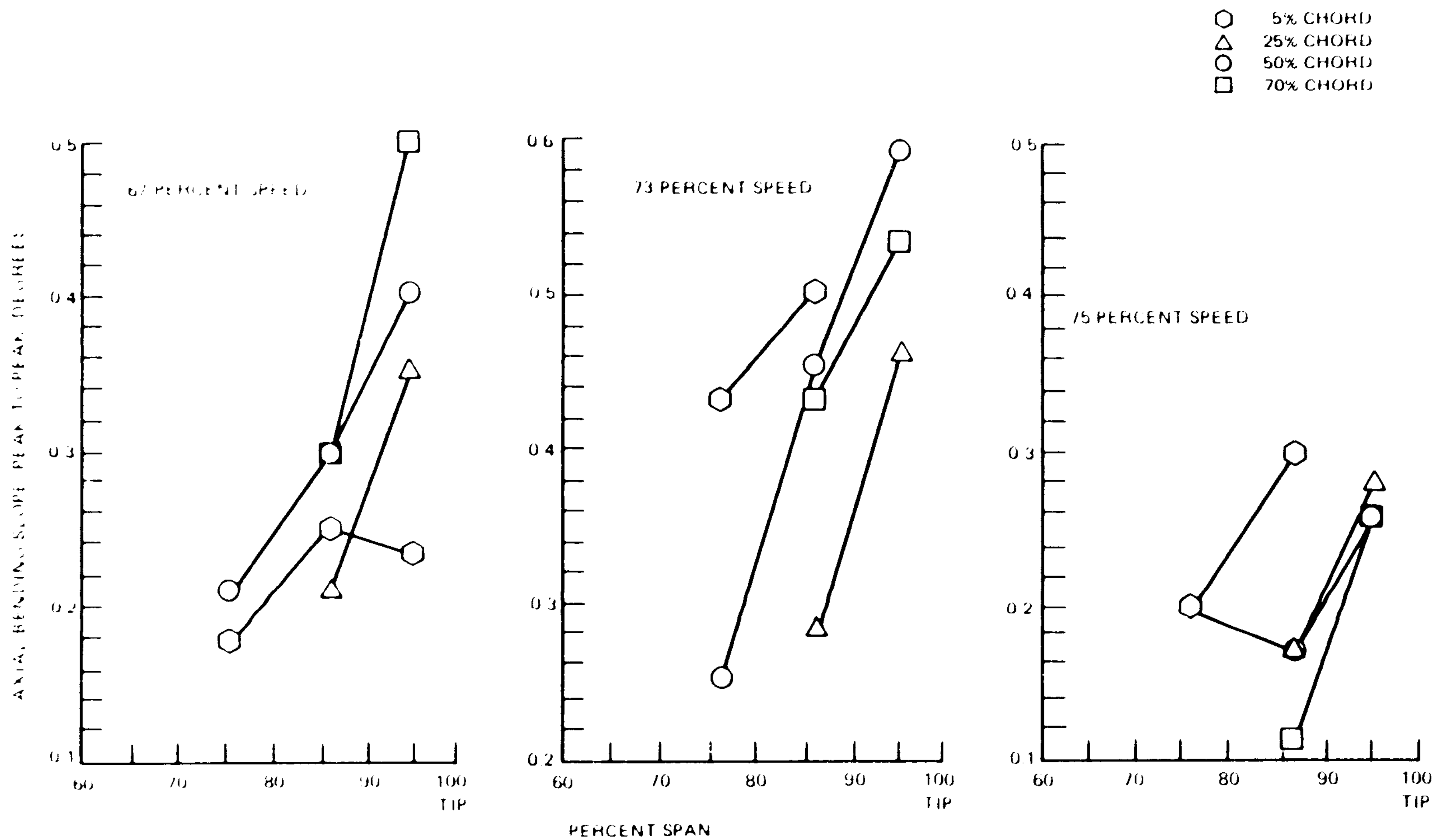

Figure C-12 Radial Distribution of Vibratory Bending Slope Amplitude in Flutter (Mirror Data; Still Pictures)

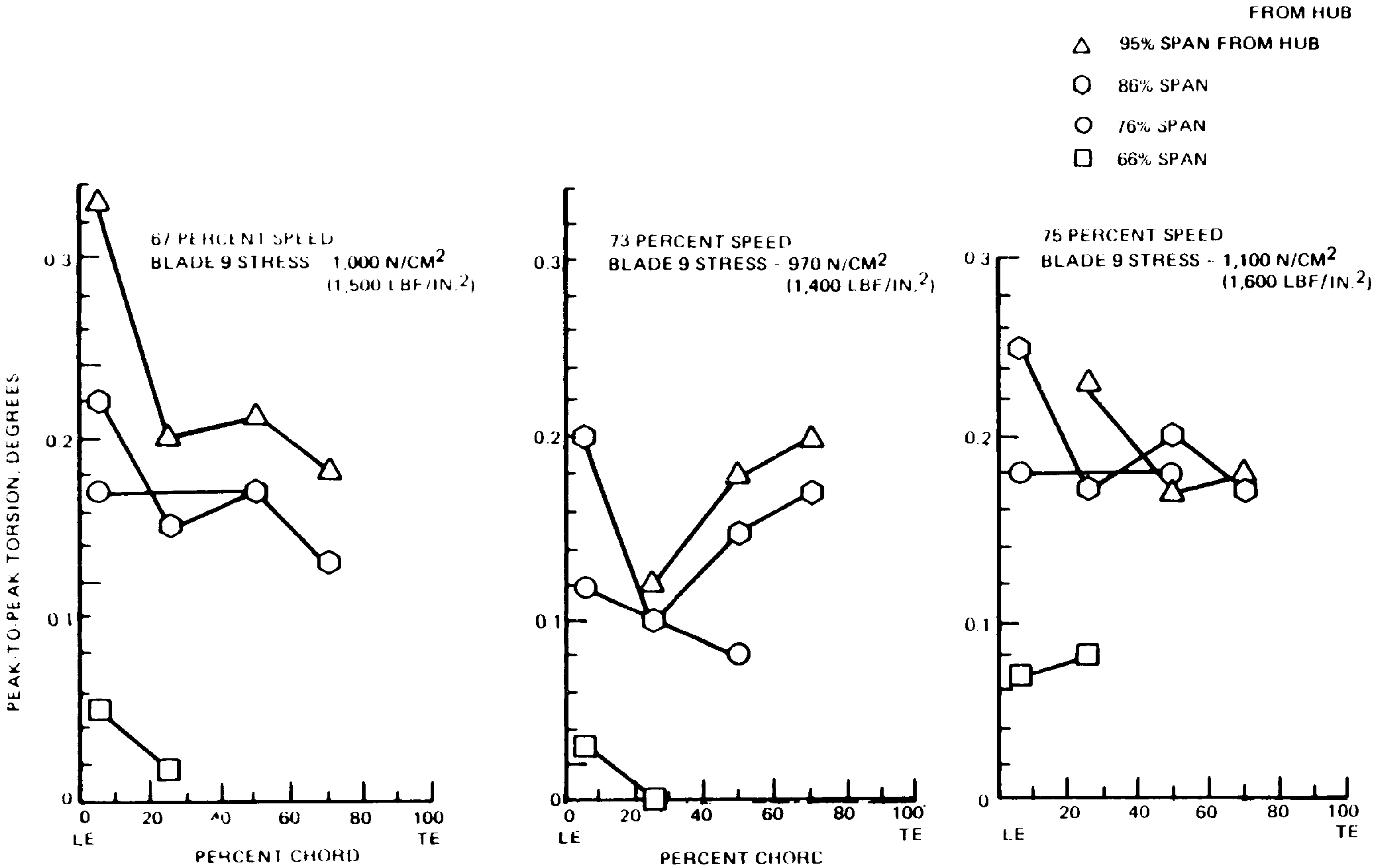

Figure C-13 Chordwise Variation of Vibratory Torsional Amplitudes in Flutter (Mirror Data)

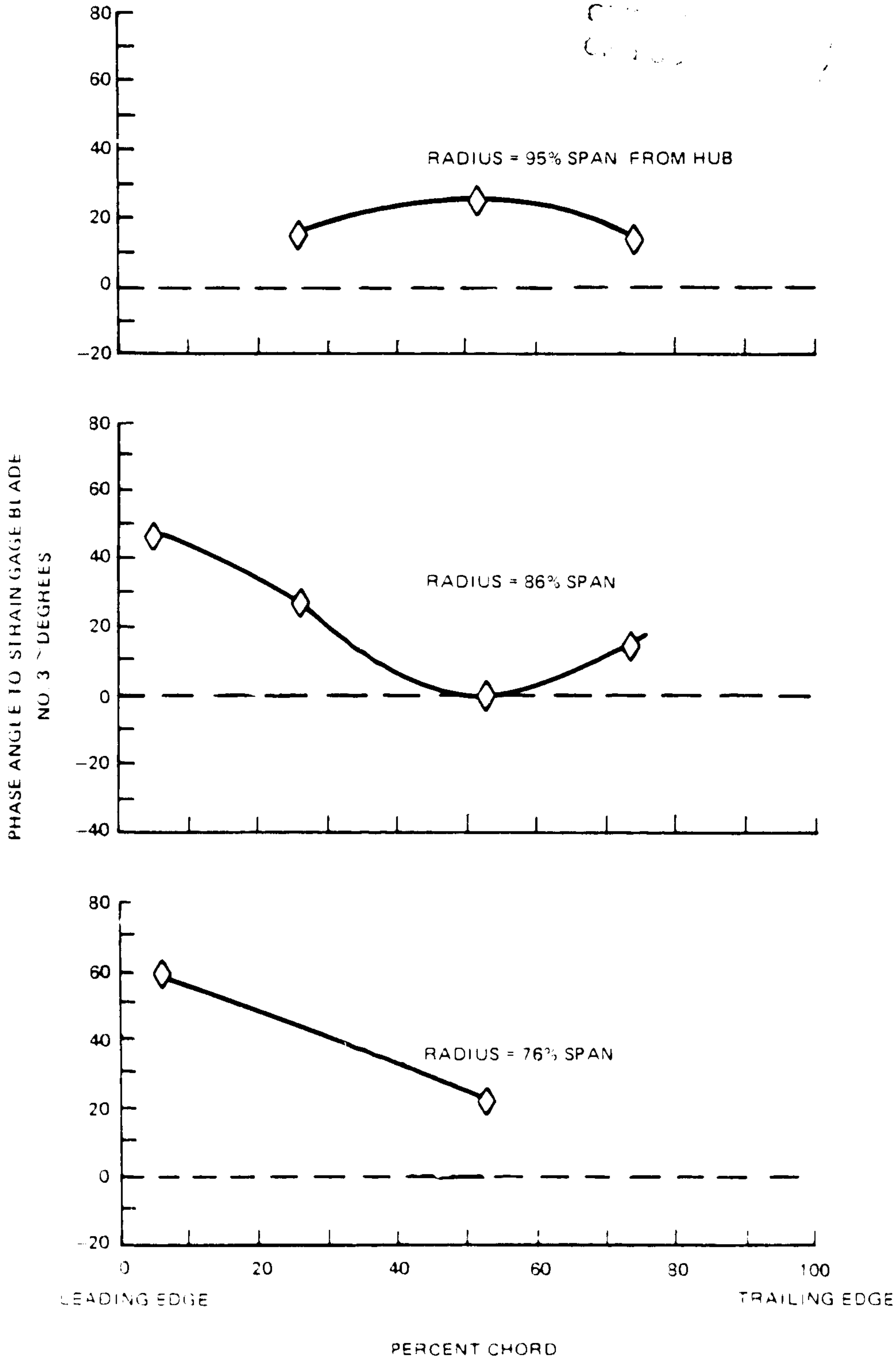

Figure C-14 Vibratory Phase of Torsional Deflection at 75 Percent Speed

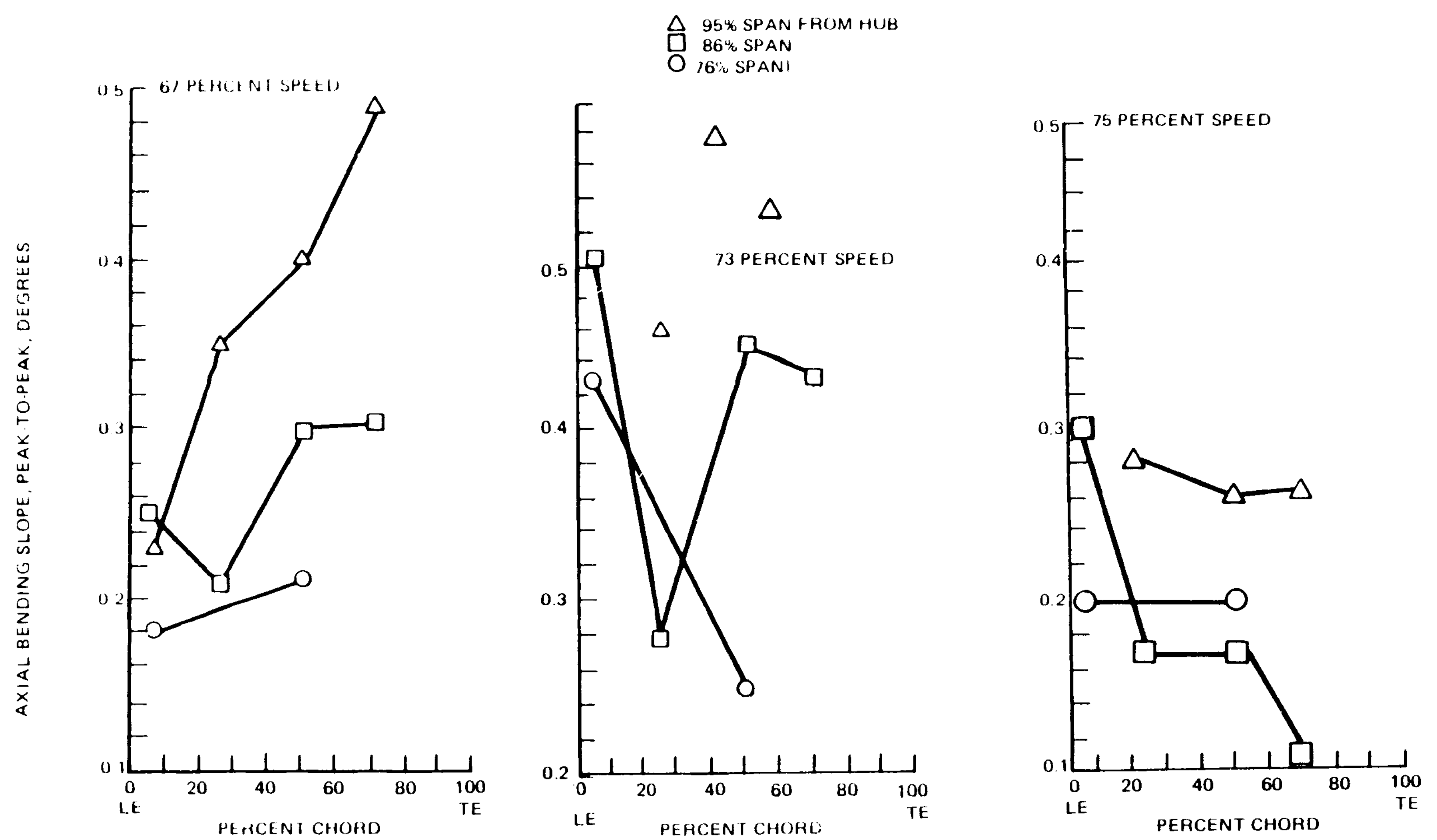

Figure C-15 Chordwise Variation of Vibratory Axial Bending Axial Bending Slope in Flutter

APPENDIX D

PART 1

STEADY PRESSURE

NOTE: On the following tables, "Tangential" data represents the angular displacement on the rotor. Pressure data represents static pressure.

TABLE D-1

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

55% SPEED RECORD 247

Inlet Total Pressure = 90,400 N/m^2 (1888 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.962
-15.1	0.962
- 3.6	0.971
9.4	0.964
22.2	1.004
34.6	1.029
47.5	1.041
73.4	1.053
99.3	1.063
141.4	1.065

TABLE D-2

RECORD 247 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 98.8 KILOPASCALS = 14.31 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	% CHORD= -55.4 %MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	% CHORD= -15.1 %MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	% CHORD= -3.6 %MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	% CHORD= 9.4 %MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	% CHORD= 22.2 %MAXIMUM PRESSURE
1	-37.6	90.7	-37.6	92.6	-37.6	93.6	-37.6	91.9	-37.6	92.1
2	-36.7	91.1	-36.7	93.2	-36.7	94.6	-36.7	93.3	-36.8	92.8
3	-35.9	91.2	-35.8	94.2	-35.9	95.9	-35.8	94.7	-35.8	94.0
4	-34.9	92.9	-34.5	95.1	-34.9	97.9	-34.9	96.8	-35.0	95.7
5	-34.0	94.5	-33.8	89.4	-34.2	99.9	-33.9	100.0	-34.1	97.2
6	-33.2	87.3	-33.1	78.4	-33.1	72.5	-33.1	95.7	-33.0	97.6
7	-32.2	85.0	-32.2	79.0	-32.2	76.4	-32.2	78.9	-32.3	96.5
8	-31.4	84.5	-31.3	82.3	-31.3	81.1	-31.0	73.5	-31.3	92.8
9	-30.4	85.4	-30.4	85.3	-30.5	84.9	-30.4	75.7	-30.4	95.3
10	-29.5	86.6	-29.5	87.0	-29.6	87.4	-29.5	80.3	-29.7	87.0
11	-28.6	87.6	-28.6	89.5	-28.7	89.1	-28.6	84.4	-28.6	87.1
12	-27.7	88.6	-27.7	89.6	-27.7	93.6	-27.7	87.2	-27.7	87.5
13	-26.8	89.3	-26.8	90.7	-26.8	92.0	-26.8	89.4	-26.8	88.2
14	-25.9	92.5	-25.9	91.5	-25.9	93.1	-25.9	91.0	-26.0	89.6
15	-25.0	91.1	-25.0	92.3	-25.0	94.1	-25.0	92.3	-25.0	90.9
16	-24.2	92.2	-24.1	93.1	-24.1	95.1	-24.1	93.7	-24.1	92.5
17	-23.2	99.3	-23.3	93.0	-23.1	96.7	-23.2	95.5	-23.2	94.3
18	-22.3	87.7	-21.9	77.9	-21.9	71.7	-22.5	96.6	-22.3	95.2
19	-21.4	85.5	-21.1	80.0	-21.4	76.6	-21.4	86.4	-21.4	95.9
20	-20.5	84.3	-20.5	82.6	-20.5	81.5	-20.6	77.0	-20.6	94.7
21	-19.6	85.4	-19.6	85.0	-19.6	84.9	-19.8	76.2	-19.3	86.2
22	-18.7	86.5	-18.7	86.6	-18.7	87.3	-18.7	79.9	-18.7	87.0
23	-17.8	87.4	-17.9	87.9	-17.8	88.8	-17.8	83.7	-17.8	87.9
24	-16.9	88.3	-16.8	89.3	-17.0	90.0	-16.9	86.7	-16.9	88.5
25	-16.0	99.1	-16.0	90.3	-16.0	91.1	-16.0	89.0	-16.0	89.0
26	-15.1	89.8	-15.0	91.2	-15.1	92.2	-15.1	90.7	-15.1	89.5
27	-14.2	90.2	-14.2	91.9	-14.2	93.3	-14.2	91.9	-14.3	90.5
28	-13.3	90.2	-13.3	92.8	-13.3	94.5	-13.3	93.2	-13.2	91.9
29	-12.4	89.9	-12.1	93.4	-12.4	96.3	-12.3	95.0	-12.4	93.7
30	-11.5	89.7	-11.5	89.4	-11.7	97.6	-11.4	97.6	-11.6	95.4
31	-10.6	96.5	-10.5	77.1	-10.6	69.1	-10.6	94.1	-10.6	96.1
32	-9.5	85.7	-9.6	80.7	-9.7	78.1	-9.4	90.7	-9.7	95.6
33	-8.8	85.4	-8.8	84.6	-8.8	83.6	-8.8	81.3	-8.8	93.6
34	-7.9	86.4	-7.8	86.6	-7.9	87.1	-7.9	80.8	-7.9	87.9
35	-7.0	87.4	-6.9	87.8	-7.0	89.1	-7.0	82.6	-7.0	89.4
36	-6.1	88.4	-6.0	89.3	-6.1	90.4	-6.1	85.9	-6.1	90.1
37	-5.2	89.7	-5.1	90.3	-5.2	91.4	-5.2	98.3	-5.2	90.7
38	-4.3	95.9	-4.2	91.4	-4.3	92.4	-4.3	95.2	-4.3	91.0
39	-3.4	90.3	-3.4	92.2	-3.4	93.3	-3.4	91.6	-3.4	91.5
40	-2.4	90.6	-2.4	93.0	-2.5	94.6	-2.4	93.2	-2.5	92.6
41	-1.6	90.6	-1.6	93.8	-1.6	96.0	-1.6	94.9	-1.6	94.1
42	-0.7	89.3	-0.7	95.7	-0.5	98.3	-0.7	97.4	-0.7	95.6
43	0.3	88.[illegible]	0.6	77.7	0.6	71.2	-0.1	99.1	0.1	96.6
44	1.2	85.5	1.1	79.3	1.2	75.9	1.1	87.9	0.8	97.0
45	2.0	84.9	2.0	82.7	2.0	81.0	2.0	79.2	2.0	95.0

TABLE D-2 (Contd)

RECORD 207 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 98.8 KILOPASCALS = 14.31 PSI

SAMPLE NUMBER	% CHORD= 24.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-37.6	94.6	-37.6	95.3	-37.6	96.4	-37.6	96.8	-37.6	96.6
2	-36.7	95.[illegible]	-36.8	96.1	-36.7	96.7	-36.7	97.3	-36.7	96.3
3	-35.8	95.9	-35.8	96.5	-35.8	97.3	-35.9	97.6	-35.6	96.9
4	-35.	96.9	-34.9	97.1	-35.2	97.5	-35.0	97.9	-34.5	97.2
5	-34.1	97.5	-34.6	97.5	-33.7	95.6	-34.0	98.2	-3318	97.9
6	-33.2	97.3	-33.2	97.5	-33.1	96.3	-33.2	98.3	-33.1	97.7
7	[illegible]	96.[illegible]	-32.3	97.1	-32.2	96.7	-32.2	98.0	-32.2	97.7
8	-31.3	96.6	-31.3	96.6	-31.3	97.1	-31.6	97.7	-31.3	97.9
9	-30.[illegible]	96.2	-30.4	95.9	-30.1	97.4	-30.7	98.4	-30.4	97.6
10	-29.5	92.6	-29.6	95.7	-29.4	97.4	-29.5	97.2	-29.5	97.1
11	-28.9	9[illegible].9	-28.7	95.6	-29.6	97.2	-28.7	96.8	-28.6	97.2
12	-28.0	92.4	-27.7	95.4	-27.9	96.9	-27.8	97.0	-27.5	97.0
13	-26.8	92.5	-27.	93.9	-26.8	96.9	-26.9	97.4	-26.8	97.2
14	-26.0	92.5	-25.9	94.9	-25.9	97.2	-25.9	97.8	-25.5	97.6
15	-25.0	93.2	-25.1	94.3	-25.0	97.6	-25.0	98.2	-25.0	97.4
16	-24.1	94.5	-24.2	95.7	-24.2	98.1	-24.2	98.4	-24.2	97.1
17	-23.2	95.5	-23.2	96.2	-22.7	95.1	-23.2	98.5	-22.3	97.7
18	-22.3	95.9	-22.3	96.5	-22.3	95.3	-22.3	98.6	-22.3	97.5
19	-21.5	95.6	-21.4	96.4	-21.4	95.6	-21.4	98.4	-21.6	97.2
20	-20.5	95.1	-20.7	96.3	-20.5	96.2	-20.0	97.6	-20.1	98.0
21	-19.6	94.6	-19.6	95.7	-19.6	96.7	-19.5	97.8	-19.6	97.8
22	-18.7	93.7	-18.7	95.0	-18.7	97.2	-18.7	96.9	-18.8	97.6
23	-17.6	91.4	-17.8	95.0	-17.8	97.1	-17.8	96.5	-17.9	97.8
24	-16.9	91.5	-16.9	95.2	-16.8	96.7	-17.1	96.5	-16.9	97.7
25	-16.0	92.0	-15.7	93.3	-16.0	96.7	-15.9	97.1	-16.1	97.7
26	-15.1	92.4	-15.1	94.0	-15.1	96.7	-15.1	97.6	-14.9	98.2
27	-14.2	93.0	-14.2	94.6	-14.2	97.1	-14.2	97.9	-14.2	97.8
28	-13.3	93.8	-13.3	95.2	-13.2	97.6	-13.3	98.2	-13.2	97.6
29	-12.4	94.9	-12.4	95.7	-12.4	96.6	-12.4	98.3	-12.4	97.9
30	-11.5	95.5	-11.2	95.3	-11.3	94.3	-11.5	98.4	-11.5	98.6
31	-10.6	95.6	-10.6	96.1	-10.5	94.6	-10.6	98.4	-10.6	97.9
32	-9.7	95.1	-9.7	95.9	-9.7	95.3	-9.7	98.0	-10.0	97.6
33	-8.9	94.8	-9.9	95.5	-9.7	96.0	-8.8	97.4	-8.6	98.1
34	-8.0	94.7	-7.9	94.9	-7.9	96.4	-7.9	96.6	-7.9	97.7
35	-7.	92.9	-7.	94.8	-7.0	96.6	-6.5	95.5	-6.9	97.3
36	-6.2	94.5	-6.1	95.1	-6.1	96.4	-6.0	95.6	-6.1	97.2
37	-5.2	93.0	-5.5	95.2	-5.1	96.2	-5.1	96.1	-5.1	96.9
38	-4.3	93.6	-4.3	94.1	-4.3	96.3	-4.3	96.7	-4.3	97.1
39	-3.4	94.1	-3.4	95.0	-3.4	96.6	-3.4	97.2	-3.4	97.4
40	-2.5	94.7	-2.5	95.7	-2.5	97.2	-2.4	97.6	-2.5	97.5
41	-1.6	95.7	-1.6	96.2	-1.6	97.4	-1.5	97.9	-1.7	97.3
42	-0.5	96.9	-.7	96.0	-.7	96.3	-0.6	98.2	-.7	97.7
43	0.2	96.9	.1	97.1	0.1	95.2	0.2	98.3	[illegible]	98.0
44	1.1	96.2	1.1	95.9	1.1	95.9	1.1	98.2	1.1	97.8
45	2.0	95.4	2.0	96.6	2.0	96.3	2.0	97.8	2.	98.1

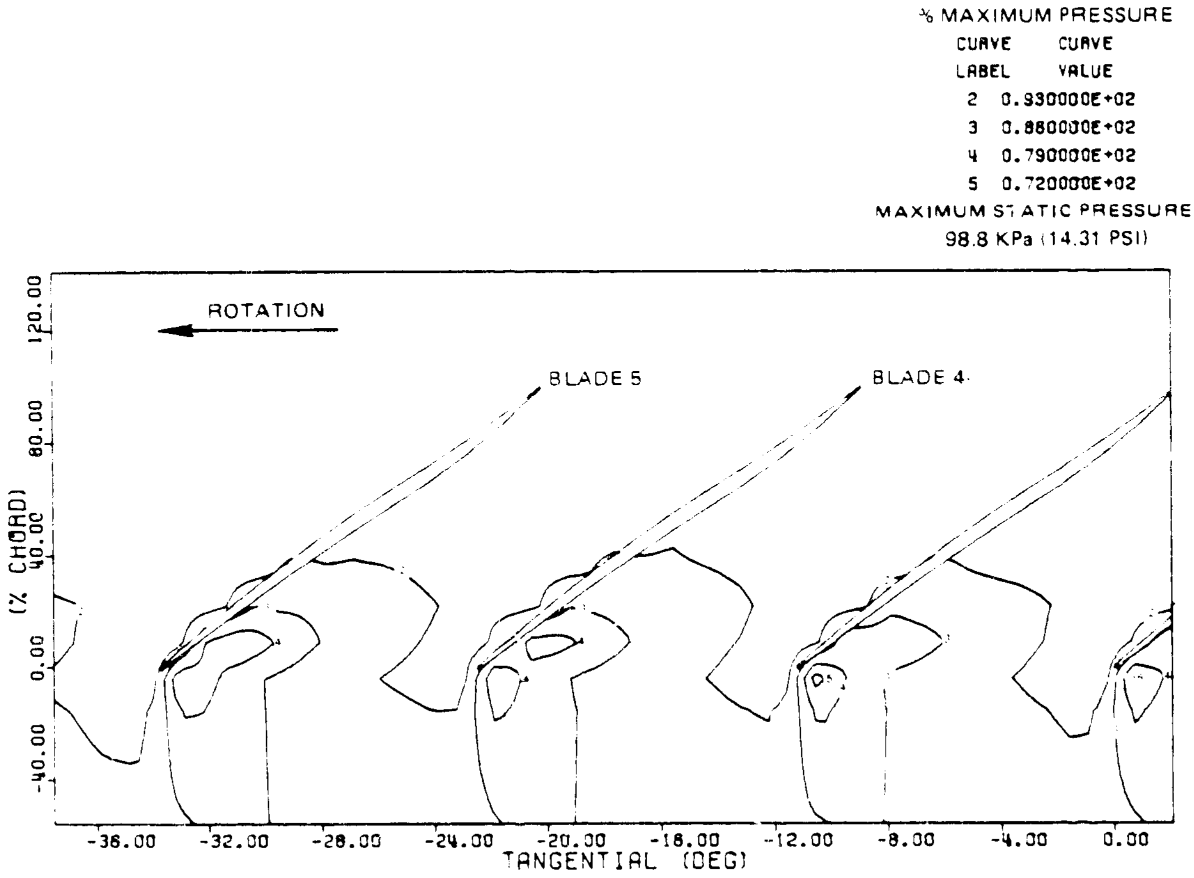

Figure D-1 Steady State Pressure Contours at Blade Tip; Out of Flutter, High Operating Line, 55 Percent Speed, 5[illegible] Percent Flow, Pressure Ratio 1.153

TABLE D-3

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

63% SPEED RECORD 71

Inlet Total Pressure = 83,410 N/m^2 (1742 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.935
-15.1	0.941
- 3.6	0.958
9.4	0.949
22.2	1.002
34.6	1.018
47.5	1.020
73.4	1.019
99.3	1.031
141.4	1.038

TABLE D-4

RECORD 71 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 96.3 KILOPASCALS = 13.96 PSI

SAMPLE	% CHORD= -55.4		% CHORD= -15.1		% CHORD= -3.6		% CHORD= 9.4		% CHORD= 22.2	
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-24.8	81.1	-24.8	82.5	-24.8	93.2	-24.8	92.9	-24.8	88.9
2	-23.9	81.1	-24.2	82.6	-24.4	94.6	-24.1	94.9	-24.1	91.2
3	-22.9	81.1	-23.5	82.8	-23.7	97.5	-23.6	97.5	-23.7	92.3
4	-21.8	81.0	-23.1	82.4	-23.3	99.5	-23.2	99.2	-23.4	93.8
5	-21.6	81.0	-22.2	80.1	-23.1	100.0	-22.9	99.6	-22.9	94.1
6	-20.5	81.1	-21.9	79.7	-22.9	95.3	-22.4	96.8	-22.0	91.9
7	-19.9	80.9	-21.5	79.7	-22.2	61.0	-22.1	91.1	-21.2	88.4
8	-19.4	80.9	-21.0	79.4	-22.1	59.2	-21.6	79.4	-20.4	82.8
9	-19.0	80.9	-20.5	79.2	-21.9	58.4	-20.8	49.8	-20.1	80.0
10	-18.5	80.9	-20.2	79.3	-21.8	60.5	-20.6	47.5	-19.9	78.9
11	-18.2	81.0	-20.0	79.5	-21.5	62.2	-20.3	46.2	-19.5	80.7
12	-18.0	81.0	-19.1	81.9	-21.2	61.1	-20.0	48.7	-19.3	85.3
13	-17.8	81.0	-18.9	82.1	-20.9	60.0	-19.7	56.5	-19.2	86.7
14	-17.6	81.1	-18.4	81.9	-20.5	61.0	-18.9	65.3	-18.9	87.1
15	-17.3	81.1	-17.9	82.0	-20.2	61.3	-18.2	73.5	-18.6	86.8
16	-16.7	81.1	-17.4	82.0	-20.0	63.1	-17.4	80.3	-18.2	86.6
17	-15.8	81.1	-16.9	82.0	-19.5	72.1	-16.6	84.6	-17.7	86.0
18	-14.6	81.1	-16.3	82.0	-19.2	80.3	-15.6	86.5	-16.7	85.7
19	-13.2	81.1	-15.9	82.1	-18.7	83.7	-14.2	88.5	-15.9	85.6
20	-12.4	81.1	-15.2	82.1	-17.4	85.9	-13.2	91.3	-15.0	85.0
21	-11.1	81.1	-13.9	82.3	-15.2	98.1	-12.4	94.4	-14.1	84.6
22	-10.3	81.0	-12.7	82.5	-13.5	91.1	-11.8	96.0	-13.4	84.6
23	-9.6	81.0	-12.3	82.5	-12.5	94.7	-11.3	92.9	-12.7	87.7
24	-9.1	81.0	-11.7	82.1	-12.1	96.4	-10.6	82.9	-12.2	89.1
25	-8.6	80.9	-10.8	80.1	-11.8	92.8	-10.1	68.2	-11.7	89.9
26	-8.2	80.9	-10.6	79.9	-11.0	65.3	-9.8	59.8	-11.2	89.9
27	-7.7	81.0	-10.2	79.8	-10.9	63.5	-9.5	55.9	-10.7	90.2
28	-7.5	81.0	-9.9	79.7	-10.8	63.1	-9.3	54.4	-9.9	88.5
29	-7.2	81.0	-9.5	79.6	-10.7	64.4	-8.9	58.4	-9.3	84.9
30	-6.8	81.0	-9.1	79.8	-10.4	65.2	-8.6	64.0	-9.0	82.7
31	-6.6	81.1	-8.9	80.2	-10.3	64.0	-7.9	68.0	-8.7	81.8
32	-5.8	81.1	-8.3	81.3	-9.9	63.4	-7.2	74.9	-8.5	82.7
33	-5.2	81.1	-8.1	81.9	-9.6	64.8	-6.1	81.8	-8.2	84.5
34	-4.6	81.1	-7.6	81.8	-9.1	67.3	-5.2	85.6	-7.9	85.5
35	-3.5	81.1	-7.2	81.9	-8.7	74.4	-3.2	88.7	-7.5	85.9
36	-2.6	81.1	-6.6	81.9	-8.5	79.6	-2.3	90.7	-6.8	85.6
37	-1.6	81.1	-6.1	82.0	-8.1	82.6	-1.4	93.6	-6.0	85.9
38	-0.9	81.1	-5.4	82.0	-4.7	87.6	-1.0	95.7	-5.4	86.1
39	-0.1	81.1	-4.9	82.1	-2.5	91.2	-0.5	96.4	-4.1	85.4
40	0.4	81.0	-4.3	82.1	-1.4	94.4	0.1	91.2	-3.0	85.0
41	0.6	81.0	-2.5	82.3	-1.3	96.4	0.6	84.6	-2.3	86.0
42	1.0	81.0	-1.6	82.6	-0.7	97.2	0.8	79.5	-1.7	87.6
43	1.4	81.0	-0.5	82.2	-0.4	94.4	1.1	71.9	-1.2	89.2
44	1.7	81.0	0.3	82.1	-0.5	90.9	1.3	65.4	-0.9	90.0
45	2.0	81.0	0.5	79.9	0.3	64.1	1.4	61.8	-0.5	90.3
46	2.3	80.9	0.8	79.8	0.4	61.4	1.8	58.6	0.6	88.7
47	2.8	80.9	1.1	79.7	0.6	63.6	2.1	61.0	1.4	86.7
48	3.2	80.9	1.6	79.6	0.9	64.3	2.2	63.6	2.2	84.5

TABLE D-4 (Contd)

RECORD 71 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 96.3 KILOPASCALS = 13.96 PSI

SAMPLE	% CHORD=	-55.4	% CHORD=	-15.1	% CHORD=	-3.6	% CHORD=	9.4	% CHORD=	22.2
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	3.4	81.[illegible]	2.[illegible]	79.3	1.1	63.8	2.5	65.9	2.7	83.1
50	3.7	81.[illegible]	2.9	81.9	1.4	63.1	2.7	67.6	3.1	84.9
51	4.0	81.[illegible]	3.[illegible]	82.[illegible]	1.7	64.9	3.[illegible]	67.9	3.3	86.1
52	4.2	81.0	[illegible].5	81.8	2.0	67.5	3.4	69.9	3.5	86.6
53	4.6	81.1	3.9	81.9	2.5	76.5	3.8	73.9	4.6	86.6
54	5.6	81.1	4.6	81.9	2.8	82.4	4.3	76.7	5.6	86.1
55	6.2	81.1	5.[illegible]	82.[illegible]	3.3	84.1	4.8	80.2	7.2	86.1
56	7.1	81.1	5.8	82.0	5.1	86.1	5.3	82.9	7.8	85.7
57	9.0	81.1	6.4	82.1	7.4	89.[illegible]	7.9	89.[illegible]	8.2	85.6
58	9.6	81.1	8.[illegible]	82.3	9.1	92.7	8.9	91.4	9.1	87.1
59	10.3	81.1	10.1	82.6	9.9	95.9	9.9	94.7	9.9	89.6
60	10.5	81.1	10.5	82.5	10.5	97.9	10.5	97.4	10.5	91.3

TABLE D-4 (Contd)

RECORD 71 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 96.3 KILOPASCALS = 13.96 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	% CHORD= 34.6 %MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	% CHORD= 47.5 %MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	% CHORD= 73.4 %MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	% CHORD= 99.3 %MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	% CHORD= 141.4 %MAXIMUM PRESSURE
1	-24.8	89.2	-24.5	89.5	-24.8	88.3	-24.8	89.9	-24.[illegible]	89.8
2	-24.2	99.2	-24.2	89.5	-24.4	88.3	-24.2	90.1	-24.6	89.9
3	-23.7	93.2	-23.5	89.5	-24.1	88.3	-23.3	90.3	-24.3	90.[illegible]
4	-23.1	88.2	-22.9	89.5	-23.6	88.3	-22.7	90.5	-23.8	90.2
5	-22.7	88.2	-22.1	89.5	-23.2	88.3	-21.8	90.2	-23.4	90.3
6	-22.2	99.2	-21.2	89.5	-23.1	88.3	-21.3	89.4	-22.7	90.1
7	-21.9	89.2	-20.5	89.5	-22.9	88.3	-20.9	88.8	-22.[illegible]	89.9
8	-21.4	98.2	-19.8	89.5	-22.6	88.3	-20.6	89.3	-21.2	89.7
9	-21.0	89.2	-19.2	89.5	-22.3	88.3	-20.3	90.4	-20.7	89.6
10	-20.7	99.2	-18.6	88.5	-21.5	88.3	-20.1	90.9	-20.4	89.6
11	-20.1	88.2	-17.6	88.5	-20.7	88.3	-19.7	90.3	-19.9	89.7
12	-18.9	88.2	-16.9	89.5	-20.1	93.3	-19.3	89.9	-1[illegible].5	89.6
13	-18.5	89.[illegible]	-16.3	88.5	-19.9	88.3	-18.6	89.9	-17.2	89.5
14	-18.0	83.2	-15.5	89.5	-19.5	88.3	-17.8	89.8	-16.0	89.3
15	-17.5	88.2	-14.7	88.5	-18.7	88.3	-16.5	89.9	-15.4	89.4
16	-17.0	88.2	-13.9	89.5	-18.3	89.3	-15.7	90.3	-14.3	89.9
17	-16.5	89.2	-13.2	83.5	-17.9	88.3	-14.0	90.7	-13.8	90.0
18	-16.0	88.2	-12.2	83.5	-17.1	89.3	-13.0	91.0	-13.2	90.0
19	-15.6	98.2	-11.3	89.5	-16.6	88.3	-12.3	91.1	-12.7	90.0
20	-15.2	88.2	-10.4	89.5	-16.2	88.3	-11.0	90.7	-11.5	90.0
21	-14.7	99.2	-9.5	88.5	-15.5	88.3	-10.4	89.8	-10.6	90.1
22	-14.[illegible]	88.2	-9.	88.5	-14.8	88.3	-9.9	88.6	-10.2	90.2
23	-13.9	83.2	-8.6	88.5	-14.3	88.3	-9.5	87.5	-9.7	90.3
24	-13.4	88.2	-8.4	89.5	-13.9	88.3	-9.0	88.1	-8.9	90.5
25	-12.7	88.2	-7.7	88.5	-13.6	98.3	-8.8	88.6	-8.4	90.6
26	-12.2	98.2	-7.1	89.5	-13.3	88.3	-8.5	88.3	-7.6	90.7
27	-11.[illegible]	99.2	-6.6	89.5	-12.3	88.3	-8.2	88.1	-6.6	90.5
28	-11.3	89.2	-6.[illegible]	88.5	-12.3	88.3	-7.5	88.4	-[illegible]	90.4
29	-10.8	83.2	-5.3	89.5	-12.1	88.3	-6.4	88.9	-[illegible]	90.1
30	-10.2	98.2	-5.0	89.5	-11.9	88.3	-5.8	89.2	-4.2	89.9
31	-9.8	98.2	-4.4	88.5	-11.6	88.3	-5.1	89.6	-3.7	90.[illegible]
32	-9.4	98.2	-3.7	88.5	-10.8	89.3	-4.5	90.0	-3.4	90.2
33	-8.9	88.2	-3.2	89.5	-9.9	88.3	-3.9	90.2	-3.1	90.4
34	-8.4	88.2	-2.[illegible]	88.5	-8.9	88.3	-2.9	90.1	-2.6	90.5
35	-7.9	98.2	-[illegible].4	88.5	-8.2	89.3	-2.2	90.4	-1.9	90.4
36	-7.4	89.2	-2.[illegible]	88.5	-7.5	[illegible]	-1.3	90.6	-1.4	90.[illegible]
37	-6.7	89.2	-1.6	83.5	-6.7	88.3	-0.5	90.6	-0.8	90.3
38	-6.2	88.2	-[illegible].8	89.5	-5.8	89.3	0.4	90.1	-0.1	90.4
39	-5.7	88.2	-0.3	88.5	-5.3	89.3	0.9	89.2	0.6	90.1
40	-5.2	89.2	1.1	88.5	-4.8	89.3	1.2	88.2	0.9	90.0
41	-4.7	89.2	1.6	83.5	-4.2	89.3	1.5	87.5	1.3	89.9
42	-4.2	93.2	2.1	88.5	-3.2	88.3	1.7	87.2	2.[illegible]	90.0
43	-3.5	83.2	2.5	83.5	-2.7	88.3	2.0	87.7	2.5	89.9
44	-3.3	98.2	3.1	89.5	-2.1	88.3	2.4	88.1	2.9	89.9
45	-2.2	89.2	3.5	88.5	-1.6	88.3	2.8	87.5	3.4	89.9
46	-1.5	88.2	4.0	89.5	-1.3	89.3	3.4	86.9	4.	89.7
47	-0.9	89.2	4.6	89.5	-0.9	88.3	4.[illegible]	86.7	4.5	89.6
48	-0.2	88.2	5.1	89.5	-0.6	98.3	4.7	87.2	5.[illegible]	89.6

TABLE D-4 (Contd)

RECORD 71 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 96.3 KILOPASCALS = 13.96 PSI

SAMPLE NUMBER	% CHORD= 24.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	[illegible]	88.2	5.8	88.5	-.4	88.3	5.2	87.8	5.3	89.6
50	.9	88.2	6.2	88.5	0.9	88.3	5.7	88.2	5.8	89.5
51	1.8	88.2	6.7	88.5	2.2	88.3	6.2	88.6	6.[illegible]	89.3
52	2.[illegible]	88.2	7.1	88.5	3.0	88.3	6.4	88.9	6.6	89.2
53	3.4	88.2	7.6	88.5	4.2	88.3	6.5	89.2	7.1	89.3
54	4.5	88.2	8.0	88.5	4.7	88.3	6.7	89.4	7.5	89.5
55	5.5	88.2	8.[illegible]	88.5	6.3	88.3	7.3	89.6	7.7	89.8
56	6.3	88.2	9.[illegible]	88.5	7.3	88.3	7.8	89.7	8.[illegible]	[illegible]
57	7.[illegible]	88.2	9.5	88.5	8.6	88.3	8.5	89.7	8.3	[illegible].2
58	8.0	88.2	9.8	88.5	9.3	88.3	9.5	90.1	9.[illegible]	90.3
59	9.4	88.2	10.1	88.5	10.1	88.3	9.9	90.2	10.[illegible]	90.4
60	10.5	88.2	10.5	88.5	10.5	88.3	10.5	90.4	10.5	90.5

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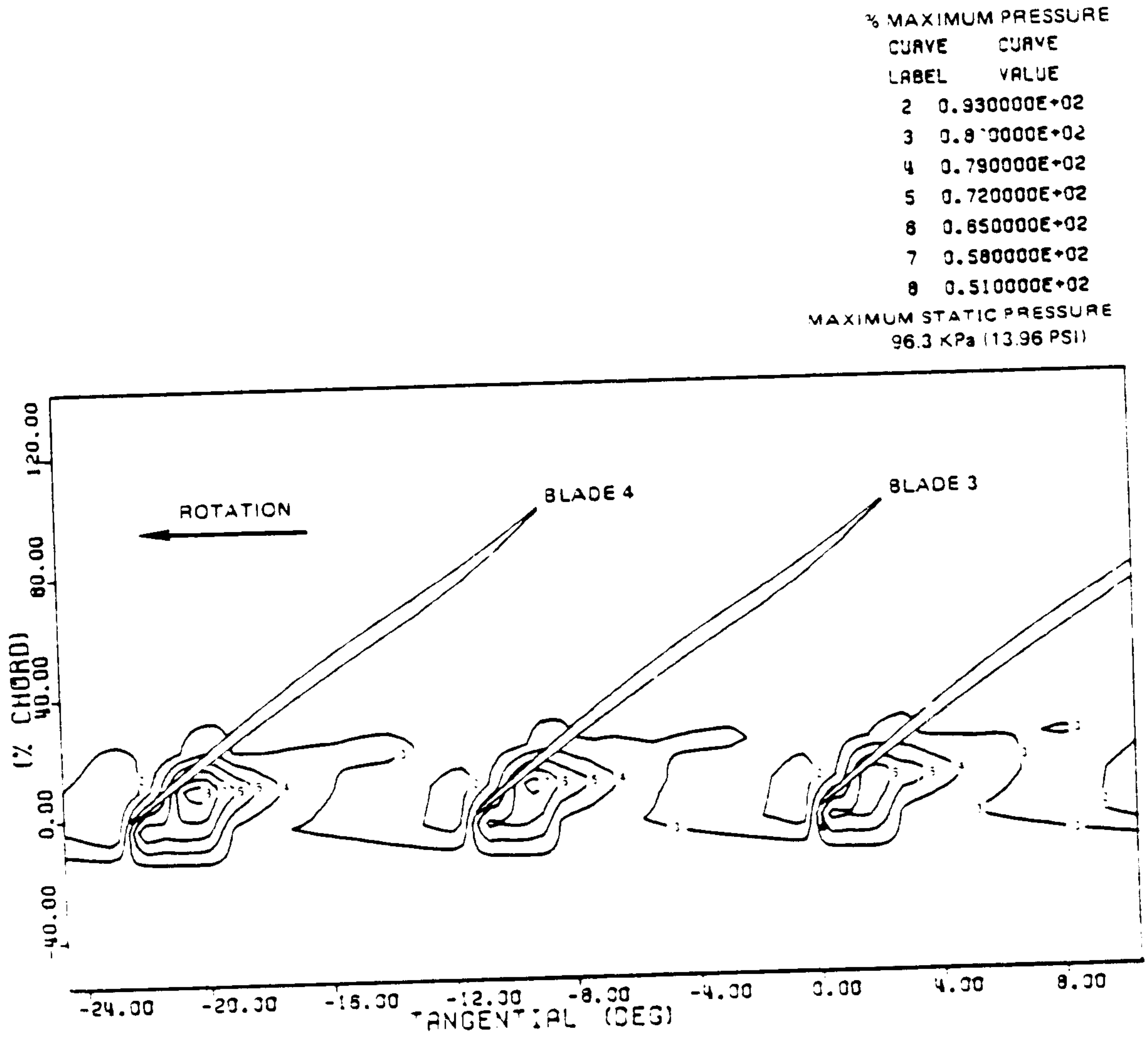

Figure D-2 Steady State Pressure Contour at Blade Tip; No Flutter, Low Operating Line, 63 Percent Speed, 65.8 Percent Flow, Pressure Ratio 1.1776

TABLE D-5

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

63% SPEED   RECORD 82

Inlet Total Pressure = 88,770 N/m^2 (1854 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.965
-15.1	0.960
- 3.6	0.963
9.4	0.977
22.2	1.033
34.6	1.067
47.5	1.089
73.4	1.118
99.3	1.136
141.4	1.127

TABLE D-6

RECORD 82 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 101.8 KILOPASCALS = 14.75 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-27.2	87.6	-27.1	90.5	-27.2	89.7	-27.0	88.1	-27.2	89.6
2	-26.6	88.3	-26.2	89.7	-26.3	91.1	-26.0	90.5	-26.6	90.5
3	-25.9	89.9	-25.2	[illegible]	-25.3	92.8	-24.8	93.2	-26.0	[illegible]
4	-24.3	89.3	-24.1	92.3	-24.3	94.7	-23.6	95.8	-25.2	93.4
5	-24.6	89.6	-23.5	92.6	-23.7	96.1	-22.9	97.5	-24.7	94.9
6	-23.7	88.9	-22.7	89.7	-23.4	96.8	-22.3	98.2	-24.0	96.3
7	-22.9	86.8	-22.5	84.5	-23.0	95.2	-21.7	94.9	-23.7	97.4
8	-22.2	83.9	-22.2	78.4	-22.9	90.1	-21.3	90.4	-23.3	98.0
9	-21.6	81.2	-22.1	73.2	-22.5	71.0	-21.1	85.3	-22.8	95.7
10	-21.2	79.4	-21.9	71.0	-22.3	67.6	-20.9	80.4	-22.2	92.9
11	-20.9	78.5	-21.6	70.0	-22.2	65.4	-20.6	74.3	-21.5	91.6
12	-20.5	78.0	-21.1	73.4	-21.9	67.1	-20.3	71.4	-20.8	95.0
13	[illegible]	79.1	[illegible]	74.1	-21.6	71.5	-20.2	69.9	-20.4	96.3
14	-19.6	82.8	-20.3	76.8	-21.6	73.8	-19.9	69.2	-20.3	[illegible]
15	-17.7	84.1	-19.9	79.6	-21.2	71.1	-19.3	70.4	[illegible]	[illegible]
16	-16.5	85.7	-19.4	79.8	-20.8	74.8	-18.8	72.3	-19.8	97.3
17	-15.5	86.8	-18.0	83.8	-20.0	79.0	-18.1	77.0	-19.7	94.3
18	-14.4	87.9	-16.2	86.7	-19.1	82.7	-17.6	79.6	-19.6	82.1
19	-13.4	88.2	-13.7	89.7	-17.9	86.6	-17.0	82.6	-19.4	81.0
20	-12.3	87.5	-12.7	91.0	-16.4	88.9	-16.4	85.3	-19.2	[illegible]
21	-11.5	85.5	-12.1	91.1	-14.8	90.7	-15.2	88.5	-18.7	82.0
22	-11.1	83.9	-11.5	89.5	-13.9	91.6	-14.5	90.8	-18.2	82.7
23	[illegible]	81.8	-11.3	83.4	-13.4	91.9	-13.3	92.7	-17.7	84.0
24	-10.3	79.7	[illegible]	74.7	-12.9	93.0	-12.5	94.2	-16.0	[illegible]
25	-9.9	77.5	[illegible]	69.0	-12.1	93.5	-11.8	96.1	-14.2	[illegible]
26	-9.6	76.2	-10.4	65.8	-11.8	95.9	-11.2	96.5	-12.8	94.1
27	-9.3	75.6	-9.9	69.8	-11.7	85.9	-10.5	93.9	-12.1	95.9
28	[illegible]	75.5	-9.2	74.6	-11.4	75.8	-10.0	88.4	-11.6	97.1
29	-8.9	76.2	-8.9	78.7	-11.0	66.1	-9.7	81.7	[illegible]	97.6
30	-8.3	78.2	-8.6	[illegible]	[illegible]	62.9	-9.5	77.0	-10.4	97.9
31	-8.1	80.1	-8.1	79.6	-10.3	67.8	-9.1	71.5	[illegible]	97.9
32	-7.7	81.5	-7.5	81.2	-9.9	69.3	-8.9	68.7	-9.4	96.6
33	-7.2	82.2	-5.9	83.9	-9.5	72.6	-8.6	68.5	-8.9	91.8
34	-6.3	83.5	-3.8	87.7	-8.4	78.5	-7.9	76.0	-9.6	86.3
35	-5.3	84.3	-1.9	[illegible]	-7.3	82.5	-6.6	76.1	-8.5	83.5
36	-4.9	85.7	[illegible]	[illegible]	-5.8	96.5	-5.6	80.8	-8.3	[illegible]
37	-3.8	87.1	[illegible]	85.4	-4.4	89.0	-4.5	85.4	[illegible]	[illegible]
38	-2.6	88.0	0.2	77.4	-3.2	90.3	-2.3	89.2	-7.9	79.6
39	-1.8	89.3	0.3	72.3	-2.1	92.1	-1.9	92.0	-7.5	79.8
40	-1.0	87.5	0.5	69.1	-1.4	93.4	-1.2	94.0	-6.9	82.0
41	[illegible]	96.1	[illegible]	66.0	-1.2	94.2	-0.4	95.7	[illegible]	83.8
42	-0.1	94.7	[illegible]	64.7	-0.9	94.4	[illegible]	96.1	-4.8	86.3
43	0.2	83.4	1.3	67.9	-0.6	[illegible]	0.6	94.0	-3.8	88.5
44	0.4	82.0	1.6	71.1	-0.4	89.2	1.1	89.3	-2.1	92.2
45	0.7	80.8	1.7	73.6	-0.2	91.0	1.4	84.9	-1.3	94.4
46	[illegible]	71.1	2.0	76.4	-0.1	75.5	1.6	80.2	[illegible]	96.0
47	1.3	77.9	2.2	79.9	-0.1	71.3	1.6	76.6	0.1	96.8
48	1.5	76.7	2.4	[illegible]	[illegible]	67.8	2.0	73.3	[illegible]	96.9

TABLE D-6(Contd)

RECORD 82 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 101.8 KILOPASCALS = 14.75 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	1.7	75.9	2.5	81.6	0.1	63.9	2.4	71.5	1.7	96.4
50	2.0	75.7	3.0	80.9	0.3	62.0	2.7	70.8	2.4	92.6
51	2.4	78.[illegible]	3.4	82.[illegible]	0.3	60.6	3.5	74.2	2.7	88.1
52	2.9	80.7	3.6	82.9	0.4	59.8	4.5	77.9	2.8	86.2
53	3.3	82.6	4.1	83.2	0.7	63.6	5.3	81.6	2.9	83.6
54	4.5	84.1	4.6	84.6	1.4	70.0	6.4	85.9	3.1	81.7
55	5.7	85.7	5.4	85.7	1.9	76.3	7.2	88.5	3.4	81.1
56	6.8	87.3	6.2	86.8	5.2	80.9	7.8	89.9	3.9	82.6
57	7.9	88.3	7.3	88.4	6.6	88.7	8.4	91.3	4.9	85.9
58	9.0	88.9	7.9	89.4	8.4	91.4	9.1	92.7	6.7	89.2
59	10.0	88.3	9.3	91.3	9.5	93.9	9.9	94.5	8.6	93.1
60	10.1	87.9	10.3	91.5	10.1	94.8	10.2	95.3	10.2	97.0

TABLE D-6(Contd)

RECORD 82 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 101.8 KILOPASCALS = 14.75 PSI

SAMPLE	% CHORD=	34.6	% CHORD=	47.5	% CHORD=	73.4	% CHORD=	99.3	% CHORD=	141.4
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-27.2	92.9	-26.9	92.7	-27.2	97.6	-27.1	98.3	-26.9	99.3
2	-26.8	93.4	-26.7	93.4	-26.6	97.7	-26.2	98.4	-26.6	98.4
3	-26.[illegible]	94.1	-26.3	94.4	-25.9	98.1	-25.3	98.6	-25.7	98.6
4	-24.[illegible]	96.2	-25.8	95.3	-25.2	99.6	-24.5	98.9	-24.5	98.5
5	-23.5	97.3	-24.8	96.0	-24.6	99.1	-23.2	99.5	-24.1	98.4
6	-22.9	97.9	-23.9	96.9	-24.3	99.3	-22.1	99.6	-23.9	99.4
7	-22.[illegible]	98.3	-22.8	97.6	-23.7	99.0	-21.3	99.6	-23.3	99.4
8	-21.1	97.7	-22.3	97.8	-23.5	93.3	-20.8	99.5	-22.0	98.3
9	-20.4	97.3	-21.4	97.4	-23.0	96.9	-21.5	99.4	-22.1	98.2
10	-19.3	96.6	-19.8	96.9	-22.7	96.4	-20.1	99.6	-21.7	98.2
11	-18.7	95.6	-19.1	96.8	-22.5	96.2	-19.9	99.9	-21.3	98.2
12	-18.4	94.1	-18.[illegible]	96.7	-22.1	96.7	-19.6	100.0	-20.7	93.2
13	-18.[illegible]	92.2	-17.7	96.6	-21.6	97.3	-19.1	99.6	-20.2	98.2
14	-17.8	89.9	-17.2	96.1	-19.9	97.9	-18.5	99.2	-19.8	93.2
15	-17.7	98.5	-16.9	94.9	-19.0	98.3	-17.9	98.7	-19.3	98.[illegible]
16	-17.6	87.8	-16.5	93.2	-18.0	98.1	-17.2	98.4	-19.0	98.0
17	-17.4	97.5	-16.2	92.2	-17.3	97.9	-16.7	98.3	-18.6	98.1
18	-17.1	93.4	-16.1	91.8	-16.7	97.8	-15.9	98.5	-17.6	98.4
19	-16.5	89.6	-16.0	91.6	-15.6	98.0	[illegible].4	98.7	-17.3	98.4
20	-15.6	91.6	-15.6	92.0	-14.6	98.4	-14.9	98.8	-16.6	98.4
21	-13.1	93.6	-15.2	92.7	-13.9	99.1	-14.5	98.8	-16.1	98.4
22	-12.3	95.0	-14.8	93.4	-13.3	99.5	-13.6	99.1	-15.5	96.5
23	-11.5	95.8	-14.5	93.7	-13.0	99.6	-12.8	99.3	-14.5	98.6
24	-10.8	96.2	-13.9	94.2	-12.4	98.7	-12.2	99.4	-13.9	98.4
25	-1[illegible].1	96.3	-12.7	95.5	-12.0	97.0	-11.4	99.4	-13.4	98.3
26	-9.[illegible]	96.2	-11.8	96.0	-11.8	96.4	-11.[illegible]	99.5	-12.8	98.2
27	-7.7	95.6	-11.0	96.3	-11.4	96.1	-10.7	99.6	-12.2	98.1
28	-7.3	94.5	-10.4	96.5	-10.3	96.5	-10.2	99.6	-11.8	98.1
29	-7.[illegible]	93.1	-9.7	96.3	-9.3	97.1	-9.5	99.4	-11.3	98.0
30	-6.9	92.0	-9.3	96.1	-8.5	97.4	-9.0	99.2	-11.0	97.8
31	-6.9	91.2	-8.9	96.[illegible]	-7.4	97.7	-8.7	99.3	-10.7	97.7
32	-6.7	91.4	-8.[illegible]	95.9	-6.1	97.6	-8.3	99.4	-10.0	97.7
33	-6.[illegible]	89.1	-7.5	96.2	-5.0	97.8	-7.8	99.0	-9.3	97.8
34	-6.4	89.2	-7.[illegible]	96.4	-4.1	98.0	-7.3	98.6	-8.7	97.6
35	-6.3	87.3	-6.2	96.1	-3.2	98.6	-6.7	98.3	-8.2	97.5
36	-6.1	86.7	-5.6	94.9	-2.7	99.0	-5.9	98.3	-7.4	97.7
37	-5.9	86.4	-5.4	93.3	-2.2	99.2	-5.4	98.2	-6.5	97.9
38	-5.6	87.1	-5.3	92.6	-1.8	99.1	-4.4	98.5	-5.9	98.2
39	-5.2	88.6	-5.0	91.4	-1.3	98.1	-3.7	98.7	-5.2	98.3
40	-4.4	90.1	-4.7	9[illegible].3	-1.0	97.2	-2.4	98.9	-4.3	98.5
41	-3.6	91.3	-4.6	9[illegible].5	-0.7	96.6	-1.7	99.2	-3.7	98.9
42	-2.8	92.4	-4.1	91.1	-0.6	95.9	-1.2	99.4	-3.2	98.9
43	-2.6	93.8	-3.6	92.1	-[illegible].5	95.5	-0.7	99.7	-2.9	98.9
44	-1.6	95.1	-2.8	93.3	0.2	95.5	-0.4	99.8	-2.5	98.8
45	-1.[illegible]	96.[illegible]	-1.8	94.4	0.6	95.8	0.1	99.7	-1.7	98.5
46	0.5	96.4	-[illegible].3	95.7	1.2	96.2	0.8	99.7	-1.3	98.5
47	1.2	96.3	-[illegible]	96.[illegible]	1.0	96.7	1.2	99.8	-0.3	98.6
48	1.8	96.4	[illegible].9	95.9	2.1	97.1	1.7	99.6	-0.3	99.7

TABLE D-6(Contd)

RECORD 82 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 101.8 KILOPASCALS = 14.75 PSI

SAMPLE	% CHORD= 34.6		% CHORD= 47.5		% CHORD= 73.4		% CHORD= 99.3		% CHORD= 141.4	
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	3.[illegible]	96.4	1.[illegible]	95.6	2.6	97.3	2.0	99.4	1.5	98.2
50	3.9	95.6	2.5	95.5	3.5	97.5	2.2	99.3	2.0	98.1
51	4.2	94.2	3.3	95.9	4.9	97.6	2.8	99.5	2.5	97.9
52	4.6	92.1	4.7	96.5	6.1	97.6	3.3	99.1	2.9	97.9
53	4.7	90.7	5.5	95.7	6.7	97.9	3.6	98.9	4.3	98.1
54	4.[illegible]	89.7	6.0	93.9	7.4	98.1	4.2	98.7	4.8	98.2
55	5.2	88.3	6.5	92.3	8.3	98.7	4.8	98.4	5.4	98.2
56	6.[illegible]	9[illegible].3	6.8	92.[illegible]	8.8	99[illegible]	5.1	98.2	7.6	98.3
57	6.4	91.5	7.5	93.4	9.2	[illegible].3	5.7	98.2	8.1	98.8
58	7.7	93.5	8.3	94.8	9.8	99.1	6.7	98.4	8.8	98.7
59	8.9	95.0	9.4	9[illegible].9	10.1	98.7	8.9	98.9	9.8	98.9
60	10.1	96.8	10.2	96.8	10.1	99.4	10.2	99.4	10.2	98.8

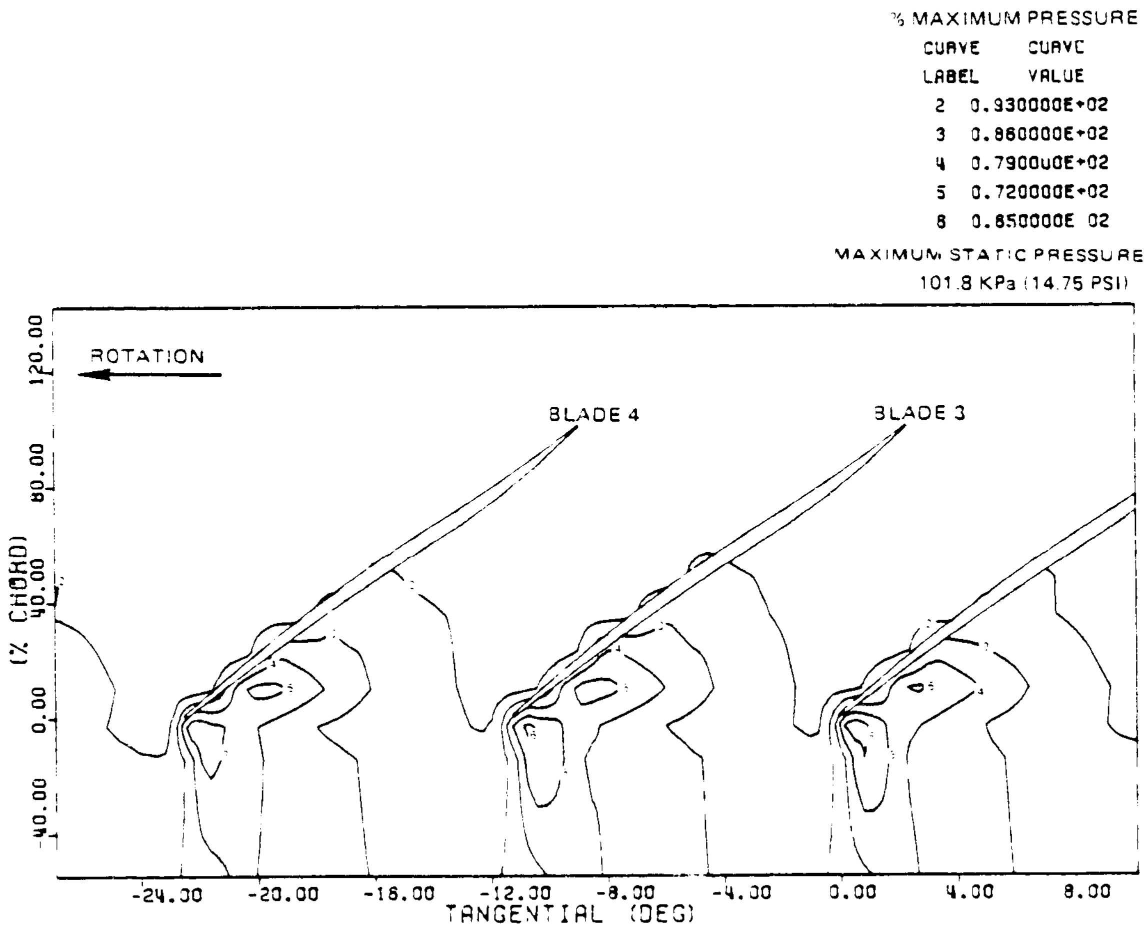

Figure D-3 Steady State Pressure Contours at Blade Tip; In Flutter, High Operating Line, 63 Percent Speed, 53.1 Percent Flow, Pressure Ratio 1.2374

TABLE D-7

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

66% SPEED RECORD 239

Inlet Total Pressure = 89,440 N/m^2 (1867 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.963
-15.1	0.960
- 3.6	0.962
9.4	0.981
22.2	1.041
34.6	1.079
47.5	1.100
73.4	1.130
99.3	1.149
141.4	1.139

TABLE D-8

RECORD 239 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 103.8 KILOPASCALS = 15.00 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-43.5	79.7	-43.5	65.3	-43.5	68.0	-43.5	86.0	-43.5	96.3
2	-42.4	73.4	-42.4	72.0	-42.4	74.2	-42.4	69.3	-42.4	93.2
3	-41.3	75.9	-41.3	79.2	-41.3	78.9	-41.3	71.0	-41.3	79.8
4	-40.3	81.2	-40.3	80.9	-40.3	82.1	-40.3	75.3	-40.3	81.0
5	-39.2	82.3	-39.2	83.9	-39.2	84.6	-39.2	80.4	-39.2	83.5
6	-38.1	84.6	-38.1	86.7	-38.1	86.5	-38.1	85.0	-38.1	85.9
7	-37.0	96.3	-37.0	89.4	-37.0	88.2	-37.0	88.4	-37.0	88.1
8	-36.0	87.7	-36.0	91.8	-36.0	89.8	-36.0	91.1	-36.0	91.3
9	-34.9	88.5	-34.9	93.5	-34.9	91.4	-34.9	93.5	-34.9	93.0
10	-33.8	87.0	-33.8	88.6	-33.8	88.4	-33.8	95.7	-33.8	95.2
11	-32.7	82.2	-32.7	71.8	-32.7	63.1	-32.7	91.4	-32.7	96.2
12	-31.7	75.2	-31.7	61.6	-31.7	70.0	-31.7	76.3	-31.7	95.8
13	-30.6	72.[illegible]	-30.6	73.4	-30.6	78.1	-30.6	68.6	-30.6	84.5
14	-29.5	78.5	-29.5	81.9	-29.5	82.3	-29.5	74.9	-29.5	81.1
15	-28.4	84.7	-28.4	85.4	-28.4	85.5	-28.4	80.2	-28.4	84.0
16	-27.3	86.3	-27.3	87.9	-27.3	86.7	-27.3	84.8	-27.3	86.7
17	-26.3	87.8	-26.3	90.1	-26.3	87.9	-26.3	88.3	-26.3	89.3
18	-25.2	99.0	-25.2	92.4	-25.2	89.4	-25.2	91.2	-25.2	91.9
19	-24.1	89.9	-24.1	94.8	-24.1	91.9	-24.1	93.6	-24.1	94.4
20	-23.0	89.6	-23.0	96.6	-23.0	94.7	-23.0	95.9	-23.0	96.4
21	-22.0	87.0	-22.0	89.1	-22.0	75.6	-22.0	97.6	-22.0	97.8
22	-20.9	81.1	-20.9	68.4	-20.9	69.3	-20.9	89.9	-20.9	97.8
23	-19.8	74.6	-19.8	69.0	-19.8	75.0	-19.8	68.9	-19.8	93.4
24	-18.7	75.[illegible]	-18.7	76.7	-18.7	80.2	-18.7	70.5	-18.7	82.2
25	-17.6	81.2	-17.6	82.0	-17.6	93.7	-17.6	76.3	-17.6	81.8
26	-16.6	83.5	-16.6	85.2	-16.6	86.3	-16.6	81.7	-16.6	83.7
27	-15.5	85.3	-15.5	87.8	-15.5	87.9	-15.5	85.9	-15.5	85.6
28	-14.4	86.8	-14.4	90.1	-14.4	89.4	-14.4	89.0	-14.4	87.9
29	-13.3	88.2	-13.3	92.0	-13.3	90.6	-13.3	91.5	-13.3	90.2
30	-12.3	88.7	-12.3	93.6	-12.3	92.1	-12.3	93.8	-12.3	92.9
31	-11.2	87.3	-11.2	89.1	-11.2	85.3	-11.2	96.0	-11.2	95.6
32	-10.1	82.7	-10.1	72.9	-10.1	64.6	-10.1	92.6	-10.1	96.6
33	-9.0	75.3	-9.0	62.0	-9.0	69.1	-9.0	75.4	-9.0	96.1
34	-7.9	73.[illegible]	-7.9	71.2	-7.9	76.1	-7.9	67.6	-7.9	84.4
35	-6.9	76.9	-6.9	8[illegible].5	-6.9	80.9	-6.9	72.2	-6.9	80.0
36	-5.8	82.7	-5.8	83.8	-5.8	84.0	-5.8	77.9	-5.8	81.8
37	-4.7	84.6	-4.7	86.1	-4.7	85.7	-4.7	82.5	-4.7	84.7
38	-3.6	86.0	-3.6	88.1	-3.6	86.7	-3.6	86.2	-3.6	87.2
39	-2.6	87.4	-2.6	90.2	-2.6	88.3	-2.6	89.2	-2.6	89.6
40	-1.5	88.4	-1.5	92.1	-1.5	90.0	-1.5	91.8	-1.5	92.1
41	-0.4	89.[illegible]	-0.4	93.1	-0.4	92.4	-0.4	94.0	-0.4	94.4
42	0.7	84.7	0.7	82.5	0.7	69.8	0.7	94.7	0.7	95.8
43	1.8	78.3	1.8	59.6	1.8	67.4	1.8	86.0	1.8	96.1
44	2.8	72.4	2.8	69.8	2.8	74.8	2.8	68.0	2.8	92.4
45	3.9	73.7	3.9	79.1	3.9	80.5	3.9	72.2	3.9	84.7
46	5.0	83.1	5.0	83.6	5.0	83.9	5.0	77.5	5.0	82.4
47	6.1	85.[illegible]	6.1	86.2	6.1	85.6	6.1	82.5	6.1	85.2
48	7.1	86.4	7.1	88.5	7.1	86.8	7.1	86.1	7.1	87.5

TABLE D-8(Contd)

RECORD 239 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 103.8 KILOPASCALS = 15.00 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	8.2	87.9	8.2	91.6	8.2	88.3	8.2	89.6	8.2	89.5
50	9.3	89.0	9.3	92.7	9.3	90.3	9.3	91.9	9.3	92.2
51	10.4	89.6	10.4	94.6	10.4	92.9	10.4	94.6	10.4	94.8

TABLE D-8(Contd)

RECORD 239 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 103.8 KILOPASCALS = 15.00 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-43.5	95.4	-43.5	95.8	-43.5	95.8	-43.5	100.0	-43.5	98.2
2	-42.4	95.5	-42.4	95.6	-42.4	96.4	-42.4	99.7	-42.4	98.0
3	-41.3	94.9	-41.3	95.6	-41.3	97.0	-41.3	99.1	-41.3	97.9
4	-40.3	91.1	-40.3	95.8	-40.3	97.2	-40.3	98.3	-40.3	97.5
5	-39.2	84.8	-39.2	94.6	-39.2	97.1	-39.2	98.0	-39.2	97.5
6	-38.1	87.7	-38.1	90.9	-38.1	97.1	-38.1	97.9	-38.1	97.8
7	-37.0	89.7	-37.0	91.6	-37.0	97.3	-37.0	98.1	-37.0	97.9
8	-36.0	91.5	-36.0	93.2	-36.0	97.9	-36.0	98.4	-36.0	98.2
9	-34.9	93.4	-34.9	94.3	-34.9	98.5	-34.9	98.8	-34.9	98.2
10	-33.8	95.4	-33.8	95.0	-33.8	97.0	-33.8	99.2	-33.8	98.1
11	-32.7	95.9	-32.7	95.6	-32.7	95.7	-32.7	99.5	-32.7	97.8
12	-31.7	95.9	-31.7	95.8	-31.7	96.3	-31.7	99.2	-31.7	97.8
13	-30.6	95.7	-30.6	95.9	-30.6	96.9	-30.6	99.4	-30.6	97.8
14	-29.5	93.9	-29.5	96.1	-29.5	97.3	-29.5	98.7	-29.5	97.5
15	-28.4	89.6	-28.4	95.8	-28.4	97.3	-28.4	98.1	-28.4	97.4
16	-27.3	89.4	-27.3	94.1	-27.3	97.3	-27.3	97.9	-27.3	97.7
17	-26.3	92.1	-26.3	92.8	-26.3	97.5	-26.3	98.1	-26.3	97.9
18	-25.2	94.0	-25.2	94.6	-25.2	97.9	-25.2	98.4	-25.2	98.1
19	-24.1	95.7	-24.1	96.0	-24.1	98.4	-24.1	98.9	-24.1	98.2
20	-23.0	97.3	-23.0	97.0	-23.0	98.7	-23.0	99.3	-23.0	98.3
21	-22.0	98.1	-22.0	97.2	-22.0	97.9	-22.0	99.7	-22.0	98.3
22	-20.9	97.9	-20.9	97.3	-20.9	96.8	-20.9	99.7	-20.9	98.3
23	-19.8	97.4	-19.8	97.1	-19.8	97.7	-19.8	99.6	-19.8	98.4
24	-18.7	96.2	-18.7	96.9	-18.7	98.2	-18.7	99.4	-18.7	98.5
25	-17.6	97.4	-17.6	96.7	-17.6	99.3	-17.6	98.7	-17.6	98.1
26	-16.6	96.5	-16.6	95.8	-16.6	98.1	-16.6	98.4	-16.6	97.9
27	-15.5	88.2	-15.5	94.7	-15.5	98.0	-15.5	98.4	-15.5	98.0
28	-14.4	89.5	-14.4	92.4	-14.4	98.[illegible]	-14.4	98.7	-14.4	98.[illegible]
29	-13.3	91.1	-13.3	93.6	-13.3	93.5	-13.3	99.1	-13.3	98.1
30	-12.3	93.0	-12.3	94.7	-12.3	99.2	-12.3	99.6	-12.3	98.2
31	-11.2	94.8	-11.2	95.3	-11.2	97.5	-11.2	99.7	-11.2	98.0
32	-10.1	95.9	-10.1	95.7	-10.1	96.5	-10.1	99.6	-10.1	97.9
33	-9.0	96.[illegible]	-9.0	95.9	-9.0	96.7	-9.0	99.5	-9.0	97.7
34	-7.9	95.7	-7.9	96.0	-7.9	97.1	-7.9	99.5	-7.9	98.[illegible]
35	-6.9	93.7	-6.9	96.1	-6.9	97.5	-6.9	98.8	-6.9	97.8
36	-5.8	87.5	-5.8	95.9	-5.8	97.6	-5.8	98.5	-5.8	97.8
37	-4.7	87.2	-4.7	93.0	-4.7	97.6	-4.7	98.3	-4.7	98.1
38	-3.6	89.9	-3.6	91.4	-3.6	97.7	-3.6	98.3	-3.6	98.1
39	-2.6	91.8	-2.6	93.2	-2.6	98.1	-2.6	99.5	-2.6	98.3
40	-1.5	93.6	-1.5	94.6	-1.5	98.6	-1.5	98.9	-1.5	98.4
41	-0.4	95.0	-0.4	95.4	-0.4	98.3	-0.4	99.3	-0.4	98.4
42	0.7	96.0	0.7	96.0	0.7	95.7	0.7	99.5	0.7	98.5
43	1.8	96.3	1.8	96.2	1.8	95.3	1.8	99.4	1.8	98.4
44	2.9	96.2	2.9	96.2	2.9	96.5	2.8	99.1	2.8	98.4
45	3.9	95.6	3.9	96.1	3.9	97.4	3.9	98.5	3.9	98.3
46	5.0	92.8	5.0	96.1	5.0	97.7	5.0	98.1	5.0	98.1
47	6.1	89.3	6.1	95.5	6.1	97.8	6.1	98.0	6.1	98.[illegible]
48	7.1	90.7	7.1	[illegible]	7.1	97.7	7.1	99.1	7.1	98.[illegible]

TABLE D-8(Contd)

RECORD 239 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 103.8 KILOPASCALS = 15.00 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	34.6 %MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	47.5 %MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	73.4 %MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	99.3 %MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	141.4 %MAXIMUM PRESSURE
49	8.2	92.8	8.2	93.5	8.2	98.0	8.2	98.5	8.2	98.1
50	9.3	94.6	9.3	95.1	9.3	98.5	9.3	99.0	9.3	98.3
51	10.4	96.2	10.4	96.1	10.4	99.0	10.4	99.5	10.4	98.5

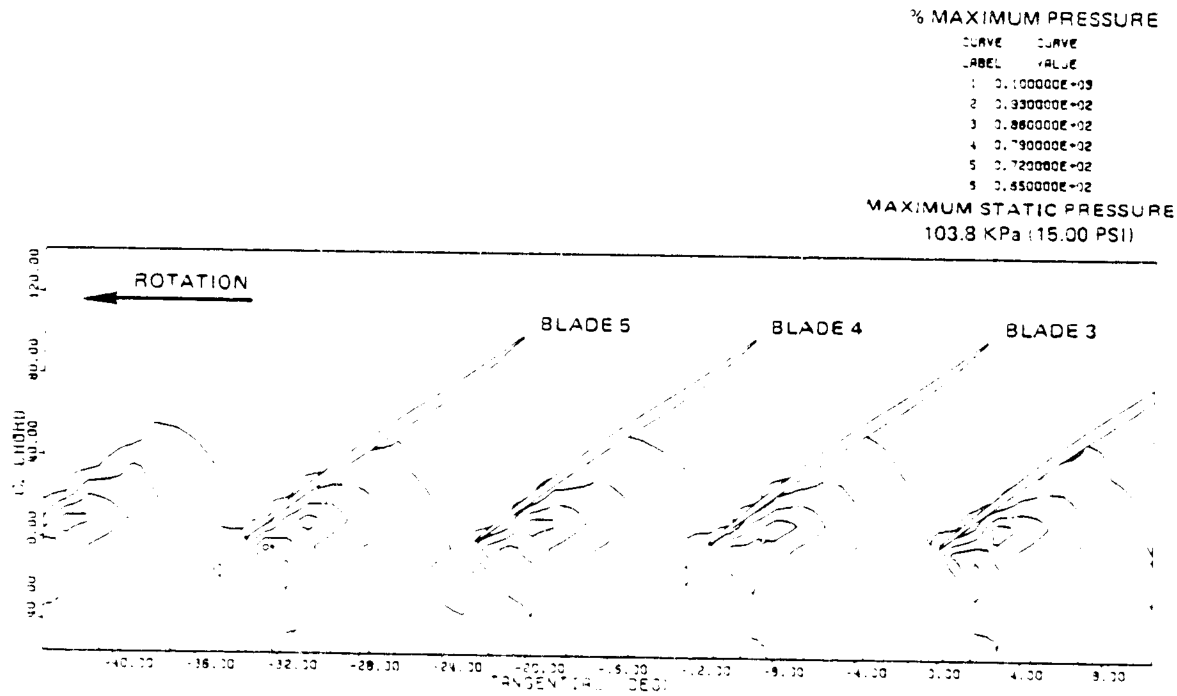

Figure D-4 Steady State Pressure Contours at Blade Tip; In Flutter, High Operating Line, 66 Percent Speed, 54.5 Percent Flow, Pressure Ratio 1.26

TABLE D-9

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

67% SPEED RECORD 141

Inlet Total Pressure = 82,500 N/m^2 (1723 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.931
-15.1	0.938
- 3.6	0.957
9.4	0.952
22.2	0.994
34.6	1.020
47.5	1.022
73.4	1.017
99.3	1.030
141.4	1.036

TABLE D-10

RECORD 141 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 97.6 KILOPASCALS = 14.14 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-31.9	77.5	-31.7	63.8	-31.8	64.3	-31.7	64.2	-31.9	85.8
2	-31.2	73.7	[illegible]	61.4	-31.5	62.8	-31.5	59.3	-31.1	82.8
3	[illegible]	[illegible]	-30.4	63.6	-31.0	64.6	-31.4	57.0	-30.7	[illegible]
4	[illegible]	69.1	-30.2	71.1	-30.5	67.3	-31.1	55.0	-30.3	79.3
5	-29.7	69.4	-30.0	77.9	-30.1	74.3	-30.7	56.9	-30.0	80.7
6	-29.2	69.9	-29.8	84.4	-30.0	80.4	-30.5	59.3	-29.9	92.4
7	-29.0	72.0	-29.5	86.1	-29.5	83.7	-30.3	63.2	-29.6	84.2
8	-28.6	76.7	-29.0	84.0	-28.0	85.3	-29.9	70.2	-29.3	85.5
9	-28.4	79.6	-28.5	85.5	-25.8	88.4	-29.3	76.1	-28.5	84.9
10	-28.1	81.8	-27.9	85.5	-23.3	94.2	-28.6	82.4	-27.9	84.3
11	-27.8	82.5	-27.4	86.5	-22.3	100.0	-27.4	86.5	-27.1	85.5
12	-27.0	82.4	-26.5	86.8	-21.9	96.3	-26.2	88.3	-26.3	86.0
13	-26.0	83.7	-26.0	87.5	-21.3	64.4	-25.4	90.9	-25.1	86.2
14	-24.8	84.6	-24.4	88.9	-21.3	61.9	-23.4	93.5	-24.3	87.1
15	-24.0	85.3	-23.3	91.4	-20.9	57.9	-22.8	96.5	-23.5	88.9
16	-23.2	95.7	-22.6	92.8	-20.6	63.1	-22.2	97.9	-23.2	90.4
17	-22.3	85.2	-22.1	90.0	-20.1	60.6	-21.7	94.9	-22.7	91.9
18	-21.2	92.7	-21.2	67.3	-19.5	61.7	-21.4	89.3	-22.3	92.3
19	-20.8	79.9	-20.8	62.9	-18.9	60.4	-21.0	82.3	-22.0	92.9
20	-20.2	76.3	-20.4	62.7	-18.4	62.4	-20.6	74.8	-21.3	91.3
21	-19.6	72.2	-19.8	59.9	-17.9	63.4	-20.2	60.3	-20.3	87.3
22	-18.7	63.0	-18.9	58.4	-17.5	79.9	-19.9	54.9	-19.7	82.9
23	-18.0	65.6	-18.3	60.1	-16.9	84.1	-19.6	50.1	-19.5	77.9
24	-17.5	64.4	-17.8	65.3	-15.7	96.0	-19.3	47.3	-19.1	73.1
25	-17.1	64.2	-17.3	83.7	-14.2	86.9	-18.9	45.1	-18.6	65.6
26	-16.9	65.5	-17.0	86.4	-12.7	99.6	-18.6	47.1	-18.3	63.2
27	-16.7	63.1	-16.5	84.6	-11.7	93.2	-18.2	55.7	-18.3	77.9
28	-16.3	73.4	-16.0	85.9	-11.1	95.6	-17.8	68.3	-18.1	78.1
29	-16.2	79.4	-15.5	85.6	-10.8	91.4	-17.3	77.7	-18.0	81.9
30	-15.9	81.6	-14.9	86.5	-10.4	81.3	-16.3	84.1	-17.9	83.4
31	-15.8	93.5	-14.2	96.6	-10.1	65.8	-14.7	86.9	-17.6	83.4
32	-15.4	84.7	-13.5	87.1	-9.9	62.3	-13.4	88.1	-17.0	84.1
33	-15.1	94.0	-12.2	89.0	-9.4	65.2	-12.4	90.1	-16.5	82.7
34	-14.6	83.3	-11.4	90.2	-8.9	53.2	-11.7	92.3	-15.7	81.5
35	-13.5	83.8	-10.8	83.2	-8.5	63.9	-11.3	93.9	-15.1	81.3
36	-12.3	84.3	-9.9	67.0	-8.0	63.3	-11.1	94.3	-14.3	81.4
37	-11.4	84.5	-9.6	64.6	-7.7	64.7	-10.6	92.7	-13.4	81.1
38	-10.6	83.5	-9.2	64.6	-7.2	75.9	-10.2	88.4	-11.5	86.7
39	-9.9	90.5	-8.7	62.7	-6.9	78.8	-9.7	81.1	-10.9	88.5
40	-9.9	75.4	-8.3	61.8	-6.5	83.0	-9.1	66.0	-9.8	98.3
41	-9.1	71.3	-7.2	61.7	-5.6	34.7	-8.8	58.8	-8.9	85.9
42	-7.5	69.0	-7.5	64.6	-4.0	36.3	-8.7	55.9	-9.4	81.3
43	-7.1	67.6	-6.9	83.3	-1.9	95.1	-8.3	52.5	-8.1	77.1
44	-6.6	66.9	-6.5	85.2	-1.0	91.5	-8.0	50.3	-7.7	72.2
45	-6.2	63.9	-6.0	84.0	-1.5	93.9	-7.7	52.6	-7.4	75.5
46	-6.0	71.6	-5.4	85.3	-.1	95.6	-7.4	55.3	-7.1	[illegible]
47	-5.7	75.4	-4.9	85.2	.3	96.3	-7.0	67.7	-6.7	83.4
48	-5.4	78.5	-4.5	85.9	.5	95.7	-6.3	78.0	-6.0	83.6

TABLE D-10(Contd)

RECORD 141 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 97.6 KILOPASCALS = 14.14 PSI

SAMPLE	% CHORD= -55.4		% CHORD= -15.1		% CHORD= -3.6		% CHORD= 9.4		% CHORD= 22.2	
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	-5.2	91.6	-3.6	86.1	0.6	89.6	-5.3	83.8	-5.5	93.1
50	-4.7	92.9	-3.1	96.6	0.0	92.4	-3.2	86.4	-4.7	83.1
51	-4.2	92.3	-2.2	87.0	0.8	76.1	-2.3	87.3	-4.1	80.5
52	-3.0	93.4	-1.5	89.2	1.0	72.1	-1.5	89.3	-3.4	80.4
53	-1.9	85.6	-0.9	89.7	1.2	67.0	-1.0	90.9	-2.7	62.0
54	-1.1	84.2	-0.2	90.8	1.3	61.5	-0.5	92.9	-1.9	82.9
55	-0.4	94.7	0.2	89.4	1.6	63.4	-0.1	94.2	-1.0	85.2
56	.6	93.3	0.5	84.8	1.9	65.0	0.2	94.5	-0.2	[illegible]
57	1.2	91.5	1.0	69.3	2.2	64.1	0.9	90.6	0.5	89.3
58	1.7	73.9	1.5	64.2	2.3	63.3	1.6	79.2	1.6	86.6
59	2.5	74.7	2.0	64.3	2.4	62.9	2.7	57.8	2.4	84.0
60	2.8	72.9	2.7	61.7	2.8	64.1	2.8	55.4	2.7	82.2

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TABLE D-10(Contd)

RECORD 141 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 97.6 KILOPASCALS = 14.14 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-31.7	82.3	-31.9	84.5	-31.3	84.3	-31.9	86.1	-32.[illegible]	86.7
2	-31.2	83.[illegible]	-31.2	83.3	-30.7	85.4	-31.6	85.5	-31.2	86.7
3	-30.[illegible]	84.4	-30.7	82.6	-30.3	86.2	-31.4	84.6	-30.3	[illegible]
4	-29.7	86.0	-30.1	92.1	-29.9	86.6	-31.0	83.8	-28.6	86.9
5	-29.2	86.7	-29.5	82.6	-29.5	86.5	-30.7	84.2	-27.9	86.9
6	-28.6	86.3	-28.7	83.4	-29.1	86.4	-30.6	84.9	-27.3	87.0
7	-28.2	86.6	-27.4	85.9	-28.6	86.5	-30.4	85.8	-26.5	87.0
8	-27.7	87.6	-26.6	83.[illegible]	-28.0	86.2	-30.2	86.2	-25.6	86.9
9	-27.1	[illegible].4	-25.8	89.5	-27.0	85.4	-29.8	85.3	-25.[illegible]	86.8
10	-26.3	[illegible]	-24.9	90.4	-26.6	85.3	-29.5	85.1	-24.3	87.[illegible]
11	-24.9	89.6	-23.9	90.8	-26.3	85.3	-29.2	85.4	-23.7	87.0
12	-23.8	[illegible]	-23.1	90.9	-25.9	85.5	-28.5	86.0	-23.2	87.1
13	-23.[illegible]	89.7	-22.1	90.1	-25.7	85.8	-27.8	86.2	-22.3	87.4
14	-22.2	88.3	-21.3	88.8	-25.2	86.[illegible]	-27.2	86.6	-21.6	87.2
15	-21.6	86.5	-20.9	87.2	-24.9	86.4	-26.4	86.9	-21.0	87.2
16	-21.[illegible]	85.5	-20.0	85.6	-23.8	87.9	-25.4	87.3	-20.1	86.8
17	-[illegible].7	85.0	-19.5	84.7	-23.3	89.3	-24.7	87.6	-19.4	86.9
18	-19.[illegible]	84.7	-18.9	84.3	-22.8	87.8	-24.1	87.7	-18.8	87.1
19	-19.1	84.7	-18.3	84.9	-22.5	86.5	-23.3	87.8	-17.9	87.1
20	-18.5	85.1	-17.5	85.9	-22.1	85.1	-21.9	87.7	-17.[illegible]	87.3
21	-18.2	[illegible].5	-16.5	85.5	-21.9	84.9	-20.8	87.3	-16.3	87.6
22	-17.9	86.1	-15.6	85.8	-21.4	85.4	-20.2	86.6	-15.2	87.8
23	-17.[illegible]	85.0	-15.2	87.5	-20.8	85.0	-20.0	86.2	-14.7	87.7
24	-16.5	86.7	-14.5	89.4	-20.3	85.4	-19.7	85.9	-13.6	87.5
25	-16.2	87.4	-13.6	89.8	-19.6	86.2	-19.5	86.4	-13.0	87.4
26	-15.9	87.7	-12.6	89.1	-19.2	87.0	-19.4	87.1	-12.3	87.2
27	-15.5	89.[illegible]	-12.0	89.4	-18.7	87.6	-19.2	87.8	-11.8	87.2
28	-14.6	88.2	-11.4	89.4	-17.8	87.5	-19.1	88.4	-11.2	87.4
29	-14.2	88.1	-10.7	89.7	-17.0	87.4	-18.4	89.6	-10.6	87.6
30	-13.3	88.[illegible]	-10.3	87.9	-16.3	87.1	-18.3	87.8	-10.1	87.7
31	-11.3	87.2	-9.6	86.4	-15.5	87.1	-17.7	88.1	-9.5	87.7
32	-10.7	85.7	-9.1	85.1	-14.8	87.0	-17.1	88.2	-8.9	87.6
33	-10.2	84.2	-8.5	83.8	-13.7	87.3	-16.7	88.0	-8.5	87.7
34	-9.7	83.0	-8.1	83.0	-13.0	88.0	-16.2	87.8	-8.0	87.9
35	-9.3	82.5	-7.7	82.4	-12.4	88.4	-15.6	87.9	-7.4	88.0
36	-9.2	82.4	-7.3	82.3	-11.9	87.7	-14.8	87.8	-6.6	87.9
37	-7.9	83.1	-6.7	82.7	-11.7	85.3	-14.4	83.0	-6.1	88.1
38	-7.4	84.4	-6.1	82.6	-10.9	84.7	-13.7	88.4	-5.7	88.2
39	-7.1	85.4	-5.6	84.7	-10.5	84.4	-12.1	88.7	-5.2	88.3
40	-6.6	86.2	-5.2	85.9	-10.2	84.5	-12.1	88.8	-4.9	88.4
41	-6.1	85.8	-4.7	86.2	-9.4	84.4	-11.1	88.7	-4.4	88.5
42	-5.6	86.3	-3.3	87.6	-8.7	84.8	-10.[illegible]	87.6	-3.9	88.5
43	-5.4	87.1	-3.0	88.1	-8.0	85.9	-9.[illegible]	85.9	-3.5	88.1
44	-4.9	87.0	-2.1	88.5	-7.4	85.9	-8.2	84.4	-3.0	87.3
45	-4.0	87.9	-2.5	88.6	-6.7	87.1	-7.9	85.1	-2.7	87.0
46	-3.1	87.9	-2.[illegible]	88.5	-5.8	86.3	-7.5	86.2	-2.4	87.4
47	-2.[illegible]	87.[illegible]	-1.[illegible]	89.7	-4.2	86.1	-7.1	86.1	-1.0	87.5
49	-1.2	87.6	-[illegible].0	89.[illegible]	-3.5	85.9	-6.6	86.6	-[illegible].0	87.5

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TABLE D-10(Contd)

PAGE 4

RECORD 141 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 97.6 KILOPASCALS = 14.14 PSI

SAMPLE NUMBER	% CHORD= TANGENTIAL (DEG.)	34.6 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	47.5 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	73.4 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	99.3 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	141.4 %MAXIMUM PRESSURE
49	-0.4	87.1	-0.2	89.9	-2.6	86.3	-6.0	87.2	0.0	87.5
50	.2	86.0	0.2	88.2	-1.8	87.0	-5.0	87.3	0.3	87.6
51	0.5	85.1	0.5	87.7	-1.2	87.4	-3.8	87.6	0.8	87.6
52	0.7	84.4	1.0	86.8	-0.7	86.9	-2.5	85.0	1.2	87.6
53	1.1	83.2	1.2	86.1	-0.3	85.5	-1.9	88.3	1.5	87.6
54	1.2	82.6	1.5	85.3	0.3	83.4	-1.5	88.5	1.8	87.5
55	1.4	82.1	1.7	84.7	0.7	82.9	0.4	87.9	2.0	87.5
56	1.6	81.3	1.9	84.2	1.4	83.3	1.9	86.4	2.1	87.4
57	1.9	81.7	2.2	83.7	1.9	83.2	2.3	85.4	2.3	87.3
58	2.2	81.7	2.5	83.2	2.6	83.8	2.4	84.8	2.4	87.3
59	2.6	82.1	2.7	82.9	2.7	84.1	2.6	84.1	2.5	87.3
60	2.7	82.4	2.8	82.7	2.9	84.2	2.8	83.6	2.8	87.3

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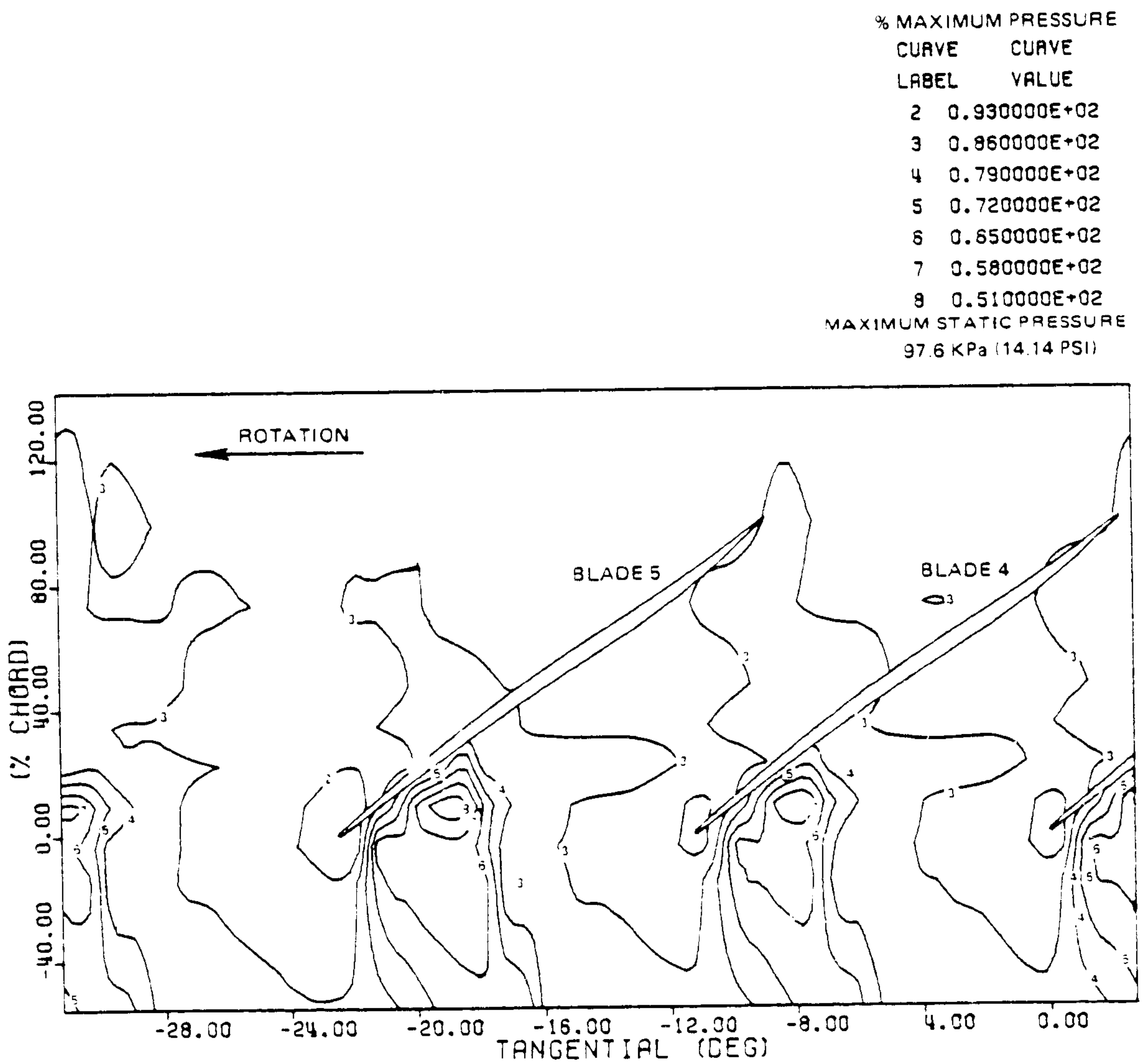

Figure D-6 Steady State Pressure Contours at Blade Tip; Out of Flutter, Low Operating Line, 57 Percent Speed, 68.5 Percent Flow, Pressure Ratio 1.1900

TABLE D-11 (Transient Data)

RECORD 28A WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 97.9 KILOPASCALS = 14.19 PSI

SAMPLE NUMBER	% CHORD= TANGENTIAL (DEG.)	-55.4 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	-15.1 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	-3.6 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	9.4 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	22.2 %MAXIMUM PRESSURE
1	-30.1	66.1	-29.9	59.7	-30.2	62.9	-30.0	51.2	-30.0	61.7
2	-29.3	64.4	-29.1	61.4	-29.5	65.1	-29.5	59.3	-29.8	65.1
3	-28.7	[illegible]	-28.3	62.9	-29.1	72.3	-29.0	72.4	-29.2	78.6
4	-28.2	62.4	-28.1	85.7	-28.7	83.2	-28.6	80.3	-29.7	81.3
5	-27.8	63.6	-27.5	84.5	-28.3	85.6	-28.2	84.2	-28.1	[illegible]
6	-27.5	67.4	-27.2	85.6	-27.6	87.0	-27.9	85.8	-26.6	82.9
7	-27.4	71.5	-26.8	87.0	-25.7	89.6	-27.5	87.1	-25.8	82.7
8	-27.1	75.6	-26.2	86.6	-24.2	92.6	-26.7	87.8	-24.9	83.5
9	-26.9	79.5	-25.9	87.2	-23.2	96.9	-26.1	88.3	-23.9	85.8
10	-26.9	84.3	-25.6	87.8	-22.7	100.0	-25.4	89.6	-23.3	39.6
11	-26.7	85.7	-23.2	92.0	-22.3	96.6	-24.6	90.8	-22.6	92.5
12	-26.4	86.4	-22.5	93.6	-21.5	64.1	-24.0	92.0	-22.2	93.4
13	-25.8	85.6	-22.1	91.9	-21.2	60.1	-23.0	95.3	-21.6	92.1
14	-25.2	94.9	-21.9	89.6	-20.8	63.5	-22.5	97.6	-20.9	88.9
15	-24.7	84.9	-21.0	63.2	-20.2	61.2	-21.9	98.8	-20.4	86.0
16	-23.9	85.6	-20.7	61.7	-19.6	61.6	-21.2	90.9	-19.7	80.6
17	[illegible]	86.1	-20.3	60.8	-19.1	60.4	-20.7	82.1	-19.3	73.8
18	[illegible]	85.6	-19.9	58.1	-17.9	60.0	-20.2	64.7	-18.5	57.7
19	-21	81.4	-18.8	55.6	-16.9	62.0	-19.6	49.4	-18.4	57.5
20	[illegible]	76.1	-18.4	55.2	-16.4	67.4	-19.2	46.5	[illegible]	59.3
21	-19.2	68.1	-17.4	56.1	-15.6	84.6	-18.6	45.4	-17.4	58.2
22	-18.4	64.2	-16.7	57.2	-15.3	87.1	-17.8	54.4	-17.2	[illegible]
23	-17.4	61.7	-16.1	60.8	-14.5	88.5	-17.1	58.5	-16.8	64.3
24	-16.2	59.9	[illegible]	63.7	-12.9	90.2	-16.1	76.1	-16.3	72.9
25	-15.4	59.9	-15.2	84.3	-12.3	92.2	-15.7	80.9	-16.2	74.2
26	-15.1	58.5	-15.0	85.4	-11.5	96.5	-15.4	84.8	-15.6	74.4
27	-14.8	59.8	-14.6	84.8	-11.1	93.4	-14.9	86.8	-15.0	74.7
28	-14.6	62.6	-14.0	88.4	-10.3	66.3	-13.6	88.0	-13.5	71.9
29	-13.8	87.3	-13.4	89.2	-10.2	64.5	-12.8	88.9	-11.9	85.0
30	-13.7	88.4	-12.7	89.0	-9.6	66.6	-12.0	90.7	-11.2	88.7
31	-13.6	88.9	-12.0	90.2	-9.1	64.1	-11.3	93.9	-10.6	89.5
32	-13.5	89.4	-11.4	91.7	-8.6	64.7	-10.8	95.0	-9.8	86.0
33	-13.1	89.1	-10.8	89.4	-8.1	63.3	-10.2	91.0	-8.8	84.3
34	-12.7	97.6	-9.8	65.2	-7.2	62.6	-9.6	83.3	-8.3	76.4
35	-12.4	86.7	-9.5	63.4	-6.7	62.9	-8.6	58.5	-7.6	62.6
36	-11.7	86.2	-9.1	63.3	-6.3	66.2	-8.4	55.2	-7.3	60.6
37	-10.8	84.7	-8.3	[illegible]	-5.4	91.9	-7.7	49.8	-6.8	64.0
38	-9.9	80.4	-7.9	60.3	-5.2	84.8	-7.4	49.5	-6.2	71.5
39	-8.6	73.0	-7.2	59.9	-4.7	86.8	-6.5	61.1	-5.7	78.2
40	-7.7	67.9	-6.3	59.0	-3.6	88.0	-5.5	78.5	-4.7	73.9
41	-6.5	63.6	[illegible]	61.3	-1.7	90.8	-5.2	82.8	-3.7	78.2
42	-5.6	62.4	-5.0	83.7	-0.9	93.6	-4.6	84.9	-2.6	78.2
43	[illegible]	61.9	-4.8	85.1	[illegible]	97.2	-3.0	86.9	-1.5	81.1
44	-4.6	63.7	-4.3	84.5	0.4	93.7	-1.7	88.8	-0.5	86.6
45	-4.2	68.0	-3.7	86.8	0.5	84.9	-0.8	91.1	0.0	89.5
46	-3.6	84.7	-3.2	86.5	0.5	79.9	0.1	94.4	0.7	90.1
47	-3.4	86.2	-2.7	87.6	0.8	72.9	0.7	95.2	1.4	36.7
48	-3.1	86.4	-1.9	87.7	0.8	66.9	1.3	87.5	2.3	83.3

TABLE D-11 (Transient Data) (Cont'd)

RECORD 23A WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 97.9 KILOPASCALS = 14.19 PSI

SAMPLE	% CHORD= -55.4		% CHORD= -15.1		% CHORD= -3.6		% CHORD= 9.4		% CHORD= 22.2	
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	-2.4	85.0	-1.2	89.1	1.1	62.7	1.9	77.8	3.1	75.9
50	-1.6	84.8	-0.1	91.6	1.6	65.8	2.4	65.2	3.5	69.6
51	-0.3	85.1	0.6	89.5	2.2	63.3	2.7	57.3	3.8	62.5
52	[illegible]	84.9	1.6	64.8	2.7	63.7	3.2	53.5	4.0	56.9
53	1.0	82.6	1.7	62.8	3.3	62.8	3.8	50.8	4.3	58.0
54	1.6	78.9	2.1	62.7	4.0	62.6	4.1	50.8	4.6	61.4
55	3.3	68.1	3.0	59.3	4.7	62.3	4.9	58.0	5.0	67.1
56	3.8	66.1	4.1	58.2	5.2	64.8	5.4	69.3	5.4	71.4
57	4.5	63.7	5.2	53.2	5.8	73.2	6.0	81.7	5.6	75.4
58	5.6	62.0	6.4	84.2	6.1	84.0	6.3	84.9	5.8	78.2
59	6.5	61.3	6.7	85.6	6.4	86.6	6.7	86.1	6.2	78.8
60	7.2	66.1	7.2	84.7	7.0	87.7	7.1	87.2	7.1	78.8

TABLE D-11 (Transient Data) (Cont'd)

RECORD 28A WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 97.9 KILOPASCALS = 14.19 PSI

SAMPLE NUMBER	% CHORD= TANGENTIAL (DEG.)	34.6 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	47.5 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	73.4 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	99.3 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	141.4 %MAXIMUM PRESSURE
1	-30.1	80.6	-29.9	78.3	-30.1	83.5	-30.1	83.6	-29.8	85.5
2	-29.6	81.7	-29.3	81.2	-29.4	84.6	-29.4	82.2	-29.2	85.4
3	-29.2	82.0	-25.9	89.2	-29.1	84.9	-28.7	82.6	-28.2	85.0
4	-28.6	82.8	-25.6	89.8	-28.3	84.8	-28.1	83.5	-27.7	84.7
5	-26.3	83.7	-25.2	90.1	-27.5	84.3	-27.3	84.5	-27.4	84.7
6	-27.8	86.3	-24.4	90.2	-26.4	83.5	-26.6	85.4	-26.9	84.8
7	-27.4	87.8	-23.7	90.3	-25.6	84.0	-25.9	85.9	-26.3	84.7
8	-26.8	88.9	-23.3	90.4	-25.1	84.3	-25.1	86.5	-25.8	84.6
9	-25.8	89.8	-22.8	90.4	-24.0	86.7	-24.0	86.8	-25.3	84.9
10	-25.0	89.6	-22.4	89.9	-23.3	87.5	-23.3	86.8	[illegible]	86.5
11	-24.4	89.9	-22.1	89.1	-23.1	87.6	-22.7	86.9	-22.6	86.6
12	-23.7	89.8	-21.6	88.2	-22.6	87.2	-22.0	86.9	-21.9	86.5
13	-23.0	89.1	-19.6	81.0	-21.7	83.4	-21.1	86.5	-21.3	86.5
14	-22.4	87.4	-19.3	[illegible]	-21.2	84.1	-20.4	85.6	-20.6	86.5
15	-21.6	85.0	-16.9	80.3	-20.3	83.3	[illegible]	84.9	-21.1	86.3
16	-21.3	84.5	-18.5	80.2	-19.6	83.9	-19.8	83.3	-19.5	85.9
17	-20.6	84.4	-17.8	80.8	-18.5	85.4	-19.2	84.2	-19.1	86.0
18	-19.6	83.6	-17.1	81.7	-17.8	85.8	-19.0	85.9	-18.5	86.1
19	-18.8	82.6	-16.6	82.8	-17.1	85.9	-18.9	86.1	-17.9	86.3
20	-18.2	80.5	-16.3	83.2	-16.1	85.7	-18.3	85.0	-17.3	86.0
21	-17.8	77.4	-15.7	82.9	-15.5	85.9	-17.9	85.5	-16.9	85.8
22	-17.1	68.2	-15.4	83.3	-15.0	85.9	-17.1	85.9	-16.3	85.7
23	-16.5	80.3	-15.2	83.8	-14.6	85.7	-16.3	86.3	-15.9	85.6
24	-16.3	82.7	-14.5	87.2	-13.9	86.1	-15.5	86.9	-15.3	85.7
25	-15.3	84.5	-14.1	88.0	-13.1	87.2	-14.8	87.3	-14.7	85.7
26	-15.4	86.0	-13.7	88.6	-12.6	87.6	-13.5	87.8	-14.2	86.2
27	-15.0	86.9	-13.0	89.1	-12.3	87.6	-12.4	88.3	-13.3	86.3
28	-14.1	87.3	-12.3	89.3	-11.8	87.1	-11.5	88.5	-13.0	86.2
29	-13.4	86.9	-11.6	89.5	-10.8	83.1	-11.0	88.5	-12.5	86.2
30	-12.4	86.5	-11.0	89.0	-9.8	82.6	-10.3	87.8	-11.7	86.2
31	-11.7	86.2	-10.5	87.6	-9.1	82.3	-9.6	86.8	-11.0	86.0
32	-11.2	84.4	-8.0	77.7	-8.5	82.3	-8.4	82.7	-10.6	85.9
33	-10.7	82.4	-7.9	77.4	-6.7	85.7	-8.1	82.4	-9.9	85.9
34	-10.3	80.6	-7.6	77.1	-6.4	85.9	-7.9	83.1	-8.2	86.9
35	-9.8	79.9	-7.4	77.1	-5.4	85.4	-7.6	83.7	-7.7	87.0
36	-9.0	81.0	-7.2	77.6	-4.6	84.3	-6.9	83.1	-7.2	87.1
37	-8.7	81.6	-6.9	78.1	-3.4	83.6	-6.3	83.5	-6.8	87.3
38	-8.1	81.4	-6.7	78.7	-2.5	84.5	-5.6	84.7	-6.2	87.2
39	-7.8	80.7	-5.5	83.3	-1.5	86.4	-4.7	85.9	-5.7	87.0
40	-7.1	79.9	-5.1	84.2	-1.2	87.1	-3.8	86.6	-5.2	86.7
41	-6.6	78.7	-4.8	84.8	-1.0	87.2	-2.2	86.9	-4.3	86.3
42	-6.3	78.0	-4.3	85.1	-0.5	86.7	-1.2	87.1	-3.5	86.5
43	-5.7	80.1	-4.0	85.9	-0.3	84.9	-0.1	87.3	-2.7	86.4
44	-5.4	83.7	-3.6	86.7	0.8	81.2	1.1	86.9	-2.1	86.6
45	-4.9	86.7	-3.5	87.2	1.4	81.3	2.1	85.6	-1.2	86.5
46	-4.3	88.0	-3.3	87.7	1.9	81.0	2.6	83.4	0.3	87.0
47	-3.0	88.1	-3.2	88.2	2.2	80.9	2.9	82.1	1.1	87.0
48	-2.1	87.7	-2.5	83.6	2.7	81.0	3.1	81.4	1.6	86.7

TABLE D-11 (Transient Data) (Cont'd)

RECORD 28A WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 97.9 KILOPASCALS = 14.19 PSI

SAMPLE	% CHORD=	34.6	% CHORD=	47.5	% CHORD=	73.4	% CHORD=	99.3	% CHORD=	141.4
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	-1.0	86.9	-1.9	89.6	3.1	81.6	3.9	82.8	2.3	86.5
50	0.3	84.1	-1.4	88.6	3.5	82.7	4.3	92.0	3.0	96.6
51	0.8	91.7	-0.9	89.3	3.9	83.7	4.6	91.4	3.7	86.5
52	1.4	80.4	-0.3	89.6	4.3	84.4	5.2	81.0	4.4	86.4
53	2.1	79.9	0.4	87.5	4.6	85.0	5.6	81.5	4.4	86.4
54	2.7	80.4	2.5	79.1	4.8	85.0	5.9	82.3	4.7	86.2
55	3.4	80.4	2.7	79.3	5.3	94.9	6.3	83.1	5.2	85.9
56	4.2	79.7	[illegible]	77.9	5.5	84.8	6.6	83.6	5.5	95.7
57	4.6	79.1	3.3	77.6	5.8	84.9	6.7	84.1	5.8	85.6
58	5.3	77.7	3.8	77.7	6.3	84.7	6.9	84.3	5.9	85.4
59	6.2	86.4	6.2	84.7	6.9	84.3	7.0	84.5	6.1	85.3
60	7.0	88.1	7.0	85.2	7.1	84.3	7.0	84.8	6.4	85.3

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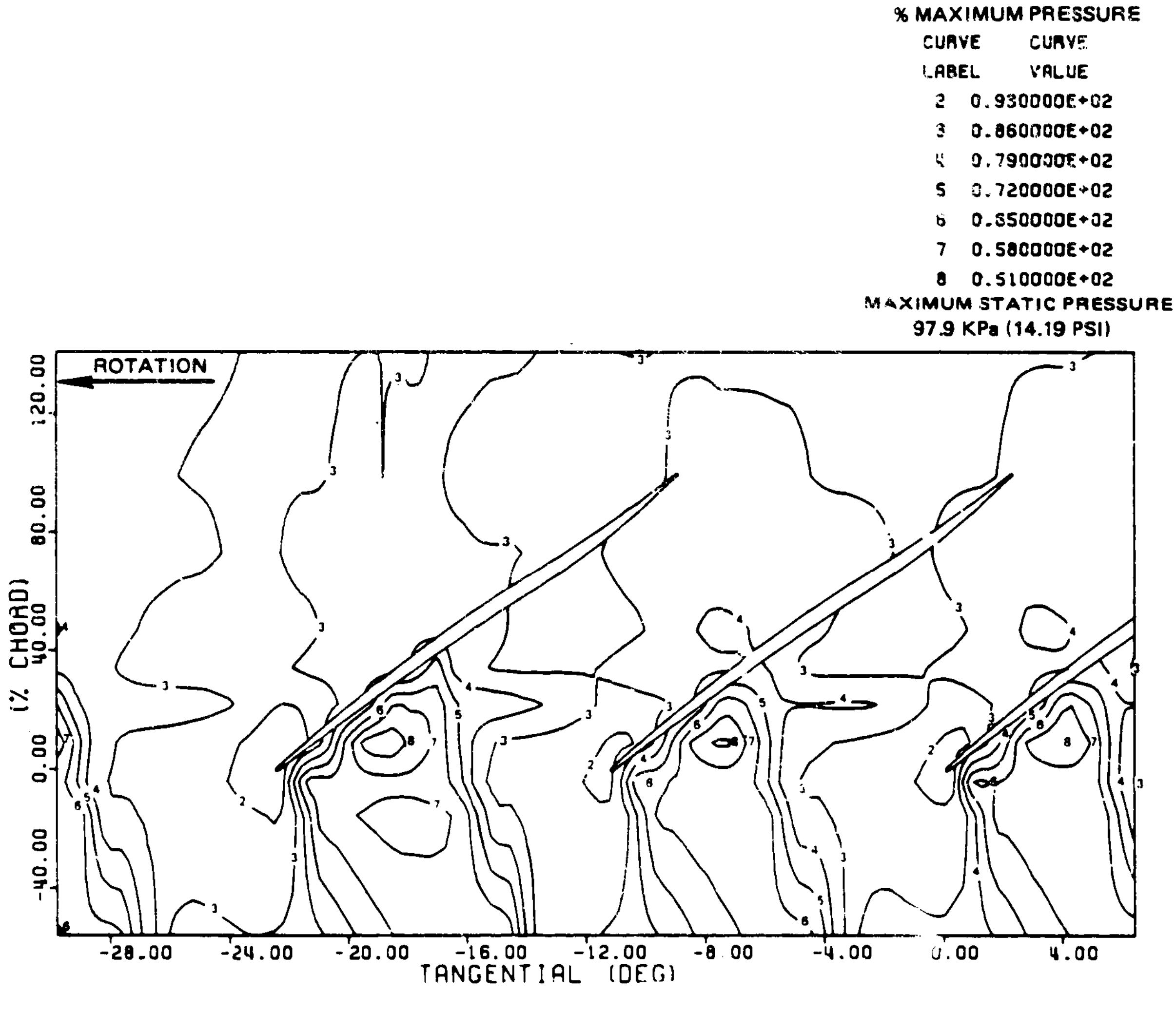

Figure D-6 Steady State Pressure Contours at Blade Tip; Transient Into Flutter, 70 Percent Speed, 74.5 Percent Flow, Pressure Ratio 1.2120, Incidence to Mean Camberline 5.6 Degrees

TABLE D-12 (Transient Data)

RECORD 288 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 101.5 KILOPASCALS = 14.70 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-30.6	66.1	-30.6	58.3	-30.6	61.1	-30.5	49.6	-30.6	63.6
2	-30.2	64.4	-30.3	58.1	-30.2	63.9	-30.0	58.8	-30.3	69.8
3	-29.7	63.2	-28.7	85.9	-29.5	74.7	-29.7	70.0	-30.3	76.3
4	-29.2	62.2	-28.5	86.6	-29.0	83.4	-29.0	79.9	-30.0	80.6
5	-29.0	62.0	-28.1	85.6	-28.3	86.3	-28.0	85.7	+29.7	81.3
6	-29.3	64.7	-27.5	88.1	-27.4	88.1	-26.5	88.5	-28.9	83.9
7	-27.7	84.4	-26.9	87.7	-26.4	89.0	-24.9	90.8	-28.3	83.6
8	-27.6	85.8	-26.5	88.7	-25.5	90.0	-23.9	92.9	-27.0	84.1
9	-27.2	86.2	-25.7	89.1	-24.5	92.7	-23.1	96.5	-25.6	84.0
10	-26.8	84.8	-24.4	91.6	-23.7	95.5	-22.5	98.8	-24.7	85.2
11	-26.3	84.0	-23.2	94.2	-22.9	100.0	-21.9	92.6	-23.7	89.4
12	-25.8	83.9	-22.4	86.0	-22.6	96.2	-21.4	83.4	-23.2	92.2
13	-25.2	84.5	-21.7	62.5	-22.0	61.9	-20.7	65.5	-22.5	93.1
14	-24.5	84.9	-21.0	61.0	-21.7	57.8	-20.5	56.0	-21.4	89.6
15	-23.9	85.3	-20.3	57.8	-21.1	61.8	-20.2	48.4	-20.8	86.0
16	-23.1	85.0	-19.8	56.3	-20.6	58.7	-19.9	45.1	-20.4	81.2
17	-22.2	82.2	-19.0	54.8	-20.1	59.4	-19.5	44.1	-19.9	72.9
18	-21.1	75.5	-18.5	55.3	-19.5	57.6	-19.0	45.1	-19.6	65.3
19	-20.0	69.5	-17.8	55.8	-18.3	58.0	-18.5	51.7	-19.5	60.2
20	-18.5	62.5	-17.2	59.6	-17.8	61.5	-17.6	64.2	-19.3	56.6
21	-16.9	59.5	-16.4	84.8	-17.2	69.5	-17.1	75.8	-18.6	59.2
22	-16.3	59.3	-16.1	86.0	-16.7	79.4	-16.5	82.1	-18.3	63.5
23	-15.9	61.6	-15.5	85.2	-16.4	83.4	-15.7	86.1	-18.0	68.1
24	-15.6	64.7	-15.1	86.7	-15.9	86.4	-14.7	87.2	-17.8	72.0
25	-15.0	86.3	-14.8	88.3	-15.2	87.4	-13.6	88.6	-17.2	73.8
26	-14.8	87.8	-13.7	89.5	-14.3	88.7	-12.5	91.2	-16.5	75.4
27	-14.5	87.9	-13.1	90.0	-13.5	89.6	-12.0	93.6	-15.3	75.7
28	-13.9	86.1	-12.3	91.4	-12.8	91.1	-11.3	94.0	-14.1	78.9
29	-13.5	85.4	-12.0	91.8	-12.2	93.9	-10.5	88.8	-13.1	81.8
30	-12.7	85.1	-11.5	89.3	-11.8	96.4	-10.0	80.3	-12.2	85.7
31	-11.7	83.9	-10.5	66.3	-11.4	93.8	-9.5	67.2	-11.8	88.8
32	-10.9	81.3	-10.1	63.0	-10.7	64.4	-9.2	60.7	-11.1	89.8
33	-10.2	78.2	-9.7	62.9	-10.5	60.9	-8.7	51.0	-10.1	88.8
34	-9.5	73.3	-9.3	60.7	-10.1	63.5	-8.2	48.1	-9.3	84.5
35	-8.6	68.1	-8.6	59.5	-9.4	60.6	-7.9	47.6	-8.9	75.7
36	-7.6	64.4	-7.7	59.0	-8.9	61.5	-7.3	52.5	-7.6	62.2
37	-6.9	62.6	-6.5	59.1	-8.3	60.1	-6.9	58.7	-7.0	68.3
38	-6.1	61.4	-6.3	62.2	-7.3	60.1	-6.7	65.5	-6.7	73.5
39	-5.6	61.3	-5.5	85.2	-6.8	64.3	-6.4	73.3	-6.3	75.7
40	-5.1	64.0	-5.4	85.2	-5.8	81.0	-5.9	79.2	-5.3	77.5
41	-4.8	70.5	-5.2	86.0	-5.6	83.8	-5.3	84.2	-4.1	78.0
42	-4.3	84.7	-4.8	85.3	-5.1	85.7	-4.7	84.8	-2.9	78.9
43	-4.1	86.1	-4.3	87.6	-4.0	87.3	-3.5	87.2	-2.0	81.7
44	-3.9	86.1	-3.6	87.7	-3.1	88.4	-2.2	88.6	-1.5	85.2
45	-3.1	84.7	-3.0	88.7	-2.1	89.6	-1.3	90.9	-0.8	87.8
46	-2.5	84.3	-2.4	89.1	-1.4	91.7	-0.4	93.7	0.0	90.2
47	-1.3	84.4	-1.4	91.0	-0.9	94.3	-0.1	94.6	0.8	88.3
48	-0.4	83.8	-0.7	92.4	-0.4	96.6	0.7	88.3	0.8	88.3

TABLE D-12 (Transient Data) (Cont'd)

RECORD 28B WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 101.5 KILOPASCALS = 14.70 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	0.9	79.0	-0.1	89.7	-0.1	93.1	1.3	78.5	1.9	84.7
50	1.7	73.3	0.9	64.[illegible]	0.8	59.9	1.8	66.3	2.5	79.0
51	2.1	71.1	1.1	62.7	1.4	63.1	2.2	58.5	2.6	73.0
52	2.8	69.[illegible]	1.6	62.7	2.0	6[illegible].6	2.5	52.8	2.9	66.7
53	3.5	65.1	2.1	59.8	2.4	61.3	3.0	49.4	3.1	61.4
54	4.1	63.3	3.3	58.3	3.0	60.1	3.5	48.2	3.3	56.9
55	4.7	62.1	4.5	58.2	4.1	60.0	4.0	52.0	3.7	59.7
56	5.6	61.4	5.1	62.4	4.7	67.8	4.4	58.9	4.0	65.5
57	5.9	62.6	5.3	72.3	5.1	74.2	4.7	68.5	4.3	71.4
58	6.2	64.1	5.8	86.9	5.4	81.0	5.3	80.6	5.2	76.6
59	6.3	67.6	6.1	85.3	5.8	85.0	5.6	84.6	5.7	79.8
60	6.4	69.1	6.3	85.7	6.5	87.0	6.4	86.2	6.4	80.0

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TABLE 12 (Transient Data) (Cont'd)

RECORD 288 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 101.5 KILOPASCALS = 14.70 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-30.5	82.7	-30.6	80.6	-30.6	85.7	-30.5	85.5	-3[illegible].7	87.5
2	-30.0	82.7	-29.9	82.[illegible]	-30.2	86.2	-30.0	84.4	-27.7	86.4
3	-29.5	82.5	-29.3	83.2	-29.4	86.5	-29.2	84.2	-26.3	86.7
4	-29.0	91.9	-28.5	84.9	-28.1	86.1	-28.8	84.5	-25.5	86.9
5	-28.7	84.3	-27.8	86.0	-27.3	85.6	-28.1	85.2	-25.0	87.3
6	-28.1	87.4	-27.2	87.3	-26.7	84.9	-27.3	86.5	-24.6	87.7
7	-27.7	88.3	-26.7	83.6	-26.1	85.9	-26.6	86.8	-24.2	87.9
8	-27.1	89.3	-26.4	89.5	-25.3	86.2	-26.0	87.3	-23.2	88.0
9	-26.0	89.3	-25.8	90.1	-24.9	86.3	-25.5	87.7	-23.0	88.1
10	-24.7	89.4	-25.1	91.3	-24.1	89.9	-24.7	87.8	-22.9	88.1
11	-24.0	89.4	-24.1	90.6	-23.7	89.0	-23.8	88.1	-22.7	88.1
12	-22.9	88.[illegible]	-23.4	91.6	-23.4	88.7	-23.1	88.4	-22.1	88.2
13	-22.2	86.4	-22.7	90.0	-23.1	88.0	-22.5	88.6	-21.6	88.2
14	-21.6	85.[illegible]	-21.9	83.5	-22.7	85.7	-22.[illegible]	88.6	-21.1	88.0
15	-21.0	84.2	-21.3	86.8	-22.5	85.3	-21.4	88.2	-20.3	87.7
16	-20.4	84.0	-20.7	84.8	-22.3	85.1	-21.1	87.7	-20.0	87.7
17	-19.7	83.9	-20.3	83.8	-22.0	85.5	-20.6	86.9	-19.5	87.7
18	-19.0	82.9	-19.6	83.0	-21.7	85.9	-20.3	86.2	-18.9	87.6
19	-18.5	80.2	-19.9	82.8	-21.1	85.7	-20.0	86.5	-18.4	87.7
20	-17.6	72.[illegible]	-18.5	83.2	-20.8	86.0	-19.6	87.9	-18.[illegible]	87.5
21	-17.3	74.3	-18.1	83.8	[illegible]	86.4	-19.3	87.4	-17.0	86.9
22	-17.1	78.4	-17.5	84.6	-19.6	85.9	-19.1	86.9	-16.6	86.8
23	-16.8	83.4	-17.1	85.0	-18.7	87.2	-19.0	86.8	-16.1	86.9
24	-16.1	85.1	-16.5	84.6	-18.3	87.3	-18.7	86.3	-15.3	87.0
25	-15.7	86.2	-16.1	84.1	-17.7	87.2	-18.2	86.5	-13.8	87.7
26	-15.0	86.3	-15.9	84.6	-17.1	87.4	-17.7	86.7	-13.4	87.8
27	-14.4	86.9	-15.7	85.6	-16.4	87.2	-17.2	87.3	-12.4	87.6
28	-13.6	86.4	-15.3	86.9	-15.8	86.9	-16.8	87.6	-12.1	87.7
29	-12.3	85.3	-15.[illegible]	87.8	-14.7	87.0	-16.1	88.0	-11.3	87.9
30	-11.1	83.3	-14.2	88.5	-14.0	87.4	-15.6	88.1	-1[illegible].8	87.8
31	-10.5	81.9	-13.4	88.8	-13.1	89.8	-14.6	86.5	-1[illegible].2	87.9
32	-9.9	91.0	-12.4	89.0	-12.7	89.0	-14.1	89.1	-9.9	87.9
33	-9.2	81.4	-11.6	88.7	-12.4	88.5	-13.0	89.6	-9.3	87.9
34	-8.8	81.8	-10.9	87.6	-11.4	84.7	-12.4	89.7	-8.9	88.0
35	-8.0	81.7	-10.4	86.2	-11.1	84.4	-11.9	89.6	-8.5	88.2
36	-7.3	79.7	-9.9	84.4	-10.7	84.3	-11.1	89.4	-7.9	88.2
37	-6.9	77.6	-9.3	82.8	-10.1	84.4	-1[illegible].2	88.6	-7.2	88.2
38	-6.5	75.5	-9.0	81.7	-9.4	84.6	-9.3	86.4	-6.3	88.1
39	-6.2	77.7	-8.6	81.0	-8.8	85.2	-9.2	85.6	-5.9	87.9
40	-6.0	80.4	-8.1	80.7	-7.4	86.6	-8.9	84.9	-5.3	87.8
41	-5.7	83.1	-7.5	81.3	-7.2	86.8	-8.1	85.7	-4.8	87.7
42	-5.3	85.2	-7.1	82.2	-5.7	86.7	-7.8	85.3	-3.8	87.9
43	-4.7	87.0	-6.7	83.1	-5.1	86.4	-7.3	85.0	-3.0	88.1
44	-4.0	87.5	-6.4	84.1	-4.7	86.3	-6.5	85.2	-2.4	88.3
45	-2.6	87.2	-5.6	85.5	-4.2	85.8	-6.0	85.9	-1.6	88.4
46	-1.4	86.1	-5.0	84.9	-3.5	86.2	-5.5	86.7	-1.1	88.5
47	-0.4	84.3	-4.5	85.9	-2.0	88.5	-4.4	87.5	-0.7	88.6
48	0.3	92.3	-4.0	87.3	-1.7	89.7	-3.2	88.2	-0.4	88.9

TABLE D-12 (Transient Data) (Cont'd)

RECORD 288 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 101.5 KILOPASCALS = 14.70 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	1.2	90.8	-3.2	88.2	-1.2	88.0	-2.5	88.2	0.0	89.0
50	2.3	81.9	-2.5	89.4	0.1	83.3	-1.6	88.8	0.8	88.8
51	2.9	82.6	-1.5	88.7	0.2	83.1	-0.3	88.9	1.3	88.5
52	3.6	82.4	-0.7	88.6	0.9	83.5	1.1	88.4	1.9	88.1
53	4.2	83.4	-0.2	87.8	1.9	83.5	1.4	87.8	2.6	88.2
54	4.7	79.2	0.6	85.9	2.2	83.8	2.4	84.5	3.2	88.0
55	4.8	78.7	1.0	84.6	3.5	86.1	2.6	84.0	4.5	87.5
56	5.1	80.3	1.7	82.5	3.8	86.3	3.1	84.7	5.2	87.2
57	5.4	83.8	2.2	81.4	4.5	86.5	4.4	83.2	5.6	87.1
58	6.0	86.9	3.0	80.8	5.3	86.4	5.1	83.9	5.9	86.9
59	6.3	87.5	3.7	81.5	6.0	86.2	5.9	85.4	6.3	86.8
60	6.4	87.9	6.4	85.7	6.6	85.6	6.2	86.4	6.6	86.9

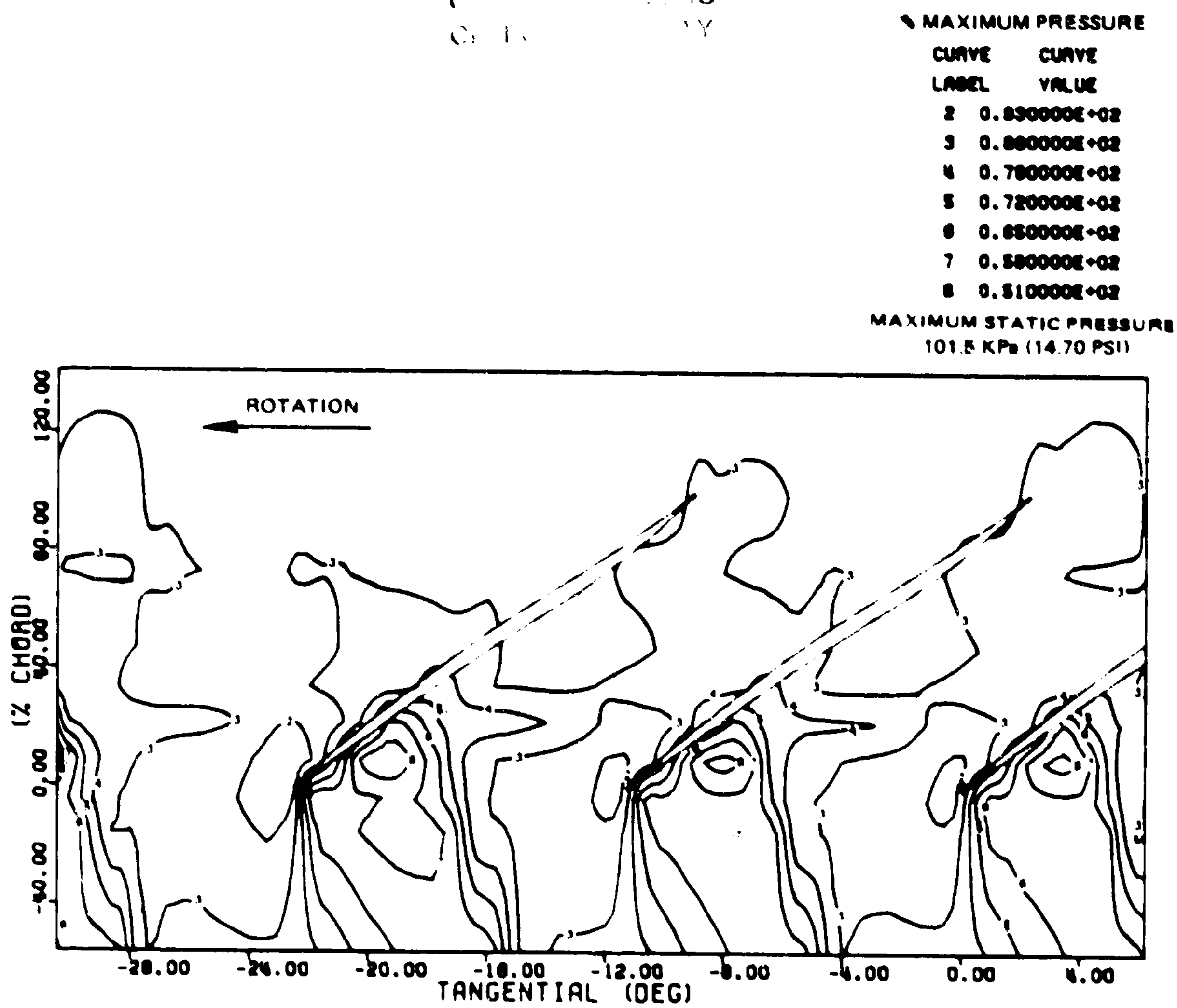

Figure D-7 Steady State Pressure Contours at Blade Tip; Transient Into Flutter, 70 Percent Speed, 72.5 Percent Flow, Pressure Ratio 1.2230, Incidence to Mean Camberline 6.35 Degrees

TABLE D-13 (Transient Data)

RECORD 28C WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 105.5 KILOPASCALS = 15.29 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-30.[illegible]	78.9	-30.0	54.5	-30.1	62.3	-30.1	47.9	-30.1	65.8
2	-29.1	76.2	-29.6	57.7	-29.7	70.1	-29.7	56.1	-30.0	64.3
3	-28.5	74.8	-28.6	79.5	-29.2	76.0	-29.0	68.6	-29.7	68.1
4	-28.0	77.4	-28.2	82.1	-28.5	82.0	-28.1	77.3	-29.3	78.7
5	-27.1	97.9	-27.7	81.8	-27.2	84.3	-26.7	82.3	-28.7	78.7
6	-26.9	99.6	-27.2	83.8	-24.[illegible]	89.3	-25.0	89.2	-28.3	80.8
7	-26.7	100.0	-26.6	84.4	-23.[illegible]	94.5	-23.6	93.1	-27.6	80.7
8	-26.3	98.7	-26.1	86.0	-22.[illegible]	97.1	-22.6	96.6	-27.2	81.5
9	-25.8	97.8	-25.1	87.1	-21.9	76.7	-22.0	97.8	-26.3	81.7
10	-24.9	98.2	-23.8	89.6	-21.1	54.3	-21.5	94.1	-25.8	82.7
11	-23.9	99.0	-22.7	92.1	-20.6	58.5	-21.1	88.6	-24.7	86.2
12	-23.2	99.6	-22.3	92.3	-20.0	56.2	-20.9	80.1	-23.6	88.6
13	-22.3	99.2	-21.9	89.8	-19.5	57.3	-19.9	46.2	-22.6	90.7
14	-21.6	96.8	-22.0	87.1	-19.0	57.0	-19.7	42.2	-21.7	91.6
15	-21.0	93.6	-20.9	59.5	-18.4	65.5	-19.5	40.8	-20.9	89.6
16	-19.0	80.8	-20.7	58.1	-17.9	73.3	-19.2	40.5	-20.0	86.7
17	-18.4	77.9	-20.2	57.5	-17.2	78.5	-18.9	43.4	-19.5	81.6
18	-17.7	75.5	-19.7	54.9	-16.6	81.5	-18.5	46.9	-19.2	75.1
19	-17.2	74.3	-19.2	53.7	-15.6	84.0	-18.1	56.9	-18.6	65.5
20	-16.9	73.9	-16.3	53.6	-13.6	86.2	-17.4	70.1	-16.3	68.7
21	-16.5	75.2	-17.9	55.6	-12.9	87.8	-16.0	77.8	-17.9	79.4
22	-16.2	78.9	-17.0	78.0	-12.1	90.2	-14.7	82.5	-17.3	77.9
23	-15.5	96.3	-16.8	80.7	-11.3	94.2	-13.5	87.7	-16.9	78.9
24	-15.5	98.3	-16.1	81.2	-10.6	75.8	-11.8	91.9	-16.2	78.6
25	-15.2	99.1	-14.5	84.7	-9.9	57.6	-11.3	94.3	-15.7	79.4
26	-15.2	99.3	-13.8	85.1	-9.6	59.2	-10.8	94.9	-15.2	79.6
27	-14.6	98.2	-12.6	87.2	-8.9	57.5	-10.1	91.5	-14.3	80.4
28	-14.2	97.2	-11.4	90.1	-8.4	57.9	-9.7	85.1	-13.2	83.6
29	-13.7	97.2	-11.0	90.1	-7.8	57.4	-9.4	79.5	-12.1	86.6
30	-12.3	97.9	-10.8	87.9	-7.4	57.2	-8.4	45.7	-11.2	88.6
31	-11.4	98.1	-9.7	61.5	-7.1	59.7	-8.2	43.0	-10.3	89.3
32	-10.6	96.5	-9.5	59.6	-6.7	63.7	-8.1	41.8	-9.3	87.5
33	-10.0	94.1	-8.9	59.8	-5.9	74.7	-7.6	42.8	-8.4	84.0
34	-9.4	90.4	-8.3	55.3	-5.6	78.6	-7.2	45.2	-8.0	76.8
35	-7.6	79.8	-7.9	54.9	-5.2	81.1	-7.0	48.9	-7.1	55.6
36	-6.9	77.1	-7.1	53.6	-4.7	82.4	-6.7	54.0	-6.8	61.5
37	-6.3	75.3	-6.5	54.4	-4.0	83.7	-6.5	61.2	-6.3	68.3
38	-5.7	74.1	-6.1	58.3	-2.5	85.9	-6.0	69.6	-5.3	72.5
39	-5.3	73.6	-4.8	80.4	-1.6	87.4	-5.7	74.4	-5.5	75.8
40	-5.0	73.4	-4.4	81.4	-1.1	88.6	-5.3	77.3	-4.7	76.5
41	-4.7	74.9	-3.6	83.8	0.0	93.4	-4.9	78.9	-3.7	78.0
42	-4.5	77.6	-2.5	85.4	0.4	91.7	-3.7	81.3	-2.2	82.0
43	-3.7	96.4	-1.8	86.0	0.7	76.2	-2.4	86.0	-1.3	84.0
44	-3.7	98.6	-0.2	89.8	1.1	59.6	-1.4	88.9	-0.1	86.9
45	-3.4	99.6	0.1	90.1	1.4	56.6	-0.6	91.4	0.7	88.2
46	-3.2	99.3	0.6	89.8	1.9	59.1	-0.[illegible]	93.8	1.5	86.9
47	-2.6	98.7	0.7	86.8	2.2	58.1	0.4	94.8	2.0	86.1
48	-2.1	98.2	1.7	60.8	2.4	57.4	0.7	93.9	2.9	84.6

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TABLE D-13 (Transient Data) (Cont'd)

RECORD 28C WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 105.5 KILOPASCALS = 15.29 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	-55.4 %MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	-15.1 %MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	-3.6 %MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	9.4 %MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	22.2 %MAXIMUM PRESSURE
49	-1.4	98.4	1.7	59.3	2.8	58.3	1.3	89.8	3.4	75.4
50	-0.3	98.6	2.3	59.0	3.2	58.1	1.7	83.1	3.7	72.9
51	0.6	97.3	3.6	55.8	3.6	58.1	2.2	70.6	4.0	64.7
52	2.2	95.0	3.9	55.3	3.9	60.6	2.9	50.2	4.1	66.2
53	3.8	79.7	4.1	54.8	4.2	65.3	3.0	47.2	4.4	63.5
54	4.4	77.1	4.5	56.2	4.5	69.8	3.3	45.5	4.5	68.1
55	4.9	75.6	4.7	58.5	4.3	73.6	3.6	45.3	4.7	72.2
56	5.3	74.6	5.7	79.1	5.3	79.5	3.9	48.0	4.8	74.9
57	5.7	74.2	5.9	80.7	5.7	81.1	4.3	52.0	5.5	78.1
58	6.2	76.7	6.3	81.5	6.1	82.8	4.6	61.2	5.8	79.2
59	6.9	93.5	6.9	83.1	6.5	83.5	6.0	76.9	6.4	78.8
60	7.1	94.1	7.0	83.5	6.9	84.5	6.9	80.1	7.0	79.4

TABLE 13 (Transient Data) (Cont'd)

RECORD 28C WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 105.5 KILOPASCALS = 15.29 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-30.2	86.1	-30.2	86.5	-29.9	89.2	-30.2	89.7	-30.1	90.3
2	-29.7	86.1	-29.2	87.0	-28.3	89.3	-29.7	88.8	-28.7	90.1
3	-29.3	85.5	-28.6	87.1	-27.3	88.9	-29.5	88.4	-27.5	89.7
4	-28.7	83.0	-28.2	86.9	-26.7	88.8	-28.9	88.3	-26.8	89.3
5	-28.4	82.1	-27.4	86.9	-26.1	88.8	-28.2	88.8	-26.2	89.5
6	-28.1	83.1	-27.1	86.6	-25.0	89.6	-27.1	89.7	-25.7	89.6
7	-27.6	85.7	-26.5	86.2	-24.6	89.9	-26.3	90.3	-25.1	89.8
8	-26.9	86.3	-26.4	86.7	-23.5	90.6	-25.7	90.5	-24.4	89.6
9	-26.3	87.2	-25.9	87.9	-23.3	90.6	-25.1	90.4	-23.6	89.9
10	[illegible]	87.1	-25.6	88.9	-22.9	90.3	-24.4	90.7	-23.0	89.9
11	[illegible]	87.9	-24.7	90.0	-22.1	88.5	-23.6	91.0	-22.1	90.2
12	[illegible]	89.3	-23.8	90.8	-21.9	88.4	-22.7	91.3	-21.4	90.1
13	-23.1	90.4	-23.2	91.2	-21.6	88.5	-22.1	91.4	-20.9	90.1
14	-22.3	90.5	-22.6	91.1	-21.2	89.3	-21.6	91.7	-20.4	90.3
15	-21.9	90.6	-21.8	91.1	-20.6	89.3	-21.1	91.8	-19.9	90.6
16	-21.3	[illegible]	-21.3	91.5	-19.8	90.0	-20.6	91.4	-19.5	90.7
17	-20.4	88.3	-20.8	89.5	-19.0	90.2	-19.8	90.7	-18.9	90.7
18	-19.8	87.1	-20.1	88.6	-18.4	90.3	-19.1	91.3	-18.1	90.6
19	-19.3	86.8	-19.3	89.0	-17.5	89.9	-18.2	90.2	-17.7	90.6
20	-18.4	86.9	-18.5	87.9	-16.0	89.2	-16.0	90.1	-17.3	90.5
21	-17.8	85.4	-18.1	88.1	-15.9	89.1	-17.2	90.2	-16.1	89.8
22	-17.3	83.4	-17.5	88.1	-15.3	89.2	-16.6	90.4	-15.8	89.7
23	-17.[illegible]	82.4	-17.0	87.7	-14.9	89.1	-16.1	90.5	-15.0	89.6
24	-16.9	82.0	-16.2	87.1	-14.0	89.9	-15.2	91.0	-14.2	89.7
25	-16.3	83.7	-15.8	86.3	-13.5	90.1	-14.7	91.1	-13.5	89.7
26	-15.6	85.1	-15.3	85.2	-12.9	90.3	-13.9	91.0	-12.9	89.6
27	-14.8	85.5	-14.6	86.0	-12.5	90.3	-13.2	91.3	-12.1	89.8
28	-14.0	85.9	-14.4	87.0	-12.0	90.0	-12.6	91.5	-11.6	89.8
29	-13.[illegible]	86.9	-14.0	87.7	-11.2	87.7	-11.8	91.5	-10.8	90.2
30	-12.2	88.0	-13.4	88.1	-11.1	87.4	-11.2	91.2	-10.2	90.1
31	-11.5	89.5	-12.7	88.9	-10.9	87.4	-10.9	91.0	-8.7	90.5
32	-10.5	88.9	-1[illegible].9	89.6	-10.6	87.6	-10.3	91.2	-7.8	90.5
33	-9.9	88.5	-10.1	89.4	-9.6	87.7	-9.7	91.3	-7.2	90.6
34	-8.8	86.7	-9.4	88.5	-9.2	88.2	-9.2	91.1	-6.6	90.7
35	-8.1	85.4	-8.9	87.5	-8.3	89.3	-8.5	89.5	-6.2	90.8
36	-7.1	84.7	-8.4	86.9	-7.7	89.3	-8.2	89.4	-5.5	90.6
37	-6.5	82.1	-7.6	86.6	-7.1	89.6	-7.7	89.6	-4.9	90.3
38	-6.0	78.9	-7.3	86.6	-6.4	89.6	-7.2	89.1	-4.3	90.1
39	-5.8	78.3	-6.7	87.3	-5.9	89.9	-6.7	88.4	-3.6	90.2
40	-5.4	79.8	-6.3	87.2	-5.2	89.5	-5.9	88.8	-2.6	90.4
41	-5.0	83.2	-5.7	87.4	-4.2	89.3	-5.2	89.4	-2.0	90.3
42	-4.5	84.6	-5.3	87.4	-3.7	89.4	-4.5	90.1	-1.2	90.5
43	-3.6	85.1	-4.8	86.7	-3.0	89.4	-3.7	90.5	-0.5	90.8
44	-2.6	85.1	-4.5	85.8	-2.3	90.0	-2.5	90.6	-0.3	91.0
45	-1.6	86.1	-4.[illegible]	84.3	-1.4	90.3	-1.8	91.0	0.1	91.1
46	-0.9	87.1	-3.8	84.3	-0.8	89.8	-1.2	91.1	0.9	91.1
47	0.2	87.9	-3.4	85.3	0.2	86.6	-0.5	91.4	1.6	90.7
48	1.2	88.0	-2.8	86.7	0.6	86.3	0.7	91.6	2.3	90.7

TABLE D-13 (Transient Data) (Cont'd)

RECORD 28C WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 105.5 KILOPASCALS = 15.29 PSI

SAMPLE	% CHORD=	34.6	% CHORD=	47.5	% CHORD=	73.4	% CHORD=	99.3	% CHORD=	141.4
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	1.7	87.0	-1.5	88.1	0.8	86.6	1.1	91.8	3.1	90.8
50	2.2	86.0	-0.8	88.6	1.5	87.6	1.5	91.9	4.1	90.9
51	3.1	85.8	-0.3	89.0	2.3	88.1	2.1	91.1	4.7	90.7
52	4.0	86.2	0.4	88.9	2.8	88.5	2.7	89.9	5.0	90.5
53	4.5	85.8	1.6	89.1	3.1	88.9	3.0	89.1	5.3	90.4
54	5.1	84.6	2.2	87.0	3.5	89.0	3.9	88.2	5.5	90.2
55	5.4	83.4	2.6	86.4	4.1	89.3	4.5	87.7	5.8	89.9
56	5.5	82.7	3.1	86.3	4.7	89.3	5.2	88.2	6.1	89.8
57	5.7	82.5	4.1	86.9	5.3	89.4	5.7	88.9	6.4	89.7
58	6.2	84.6	4.6	87.4	6.2	89.1	6.2	89.3	6.6	89.6
59	6.5	85.9	5.7	87.6	6.5	88.9	6.6	89.7	6.7	89.5
60	6.9	86.6	6.9	86.3	7.1	88.8	7.0	89.9	6.8	89.5

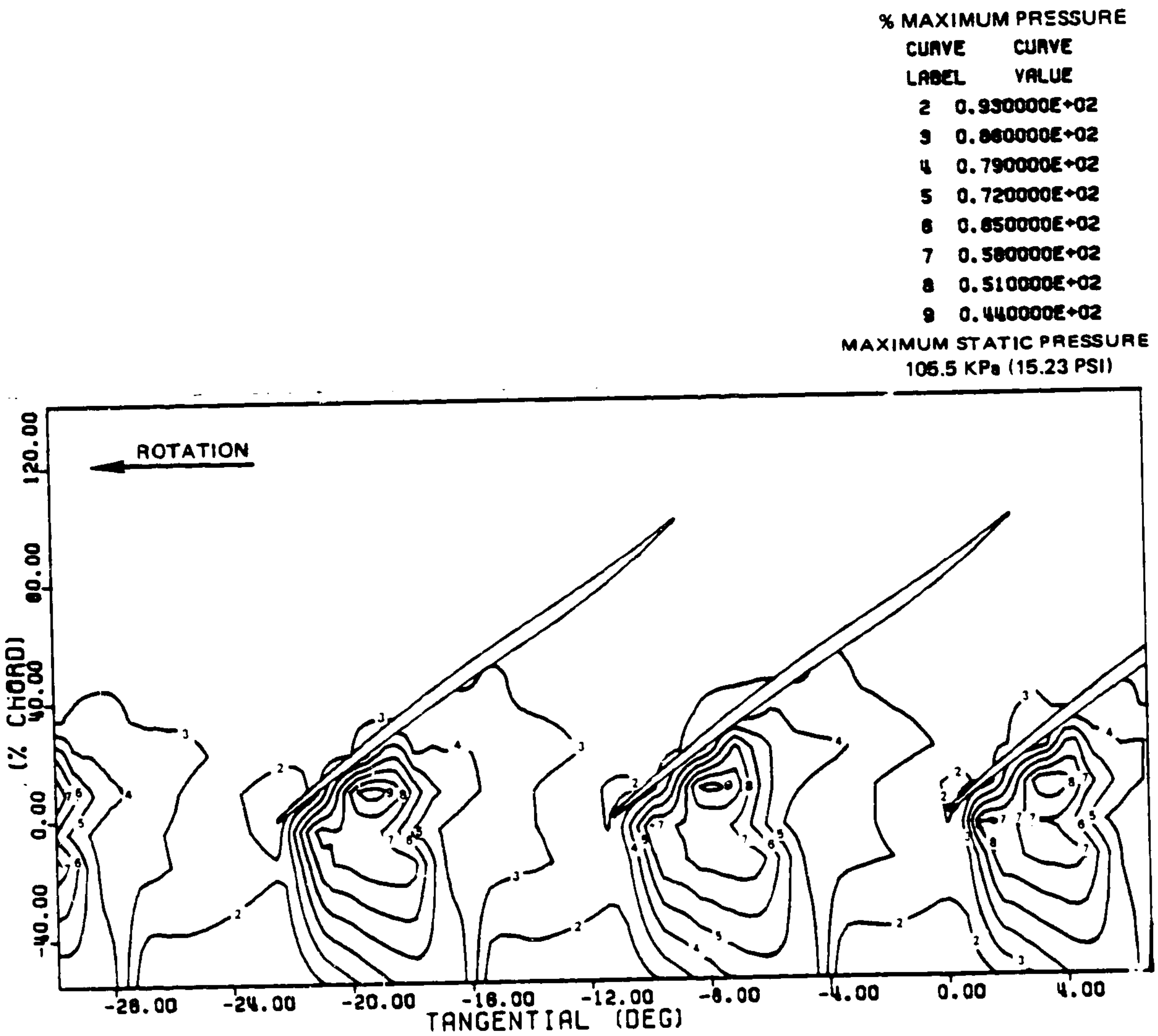

Figure D-8 Steady State Pressure Contours at Blade Tip; Transient Into Flutter, 70 Percent Speed, 66.8 Percent Flow, Pressure Ratio 1.2740, Incidence to Mean Camberline 8.05 Degrees

TABLE D-14 (Transient Data)

RECORD 28D WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 104.0 KILOPASCALS = 15.07 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	-55.4 %MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	-15.1 %MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	-3.6 %MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	9.4 %MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	22.2 %MAXIMUM PRESSURE
1	-30.4	71.3	-30.2	57.0	-30.3	67.8	-30.4	54.0	-30.4	73.2
2	-29.8	69.2	-30.0	60.5	-29.7	74.9	-29.7	64.7	-30.2	72.0
3	-29.1	67.3	-29.3	73.8	-29.1	78.7	-28.5	76.9	-29.9	74.4
4	-28.7	66.8	-28.8	81.6	-28.5	82.6	-27.1	85.7	-29.7	77.4
5	-28.2	70.0	-27.9	84.7	-28.0	84.4	-25.4	92.2	-29.5	80.0
6	-27.7	89.5	-26.5	88.4	-27.4	86.3	-24.1	95.6	-29.1	80.3
7	-27.5	91.8	-25.1	90.9	-26.9	87.1	-23.1	98.6	-28.7	81.9
8	-27.1	93.1	-23.5	94.1	-26.2	87.8	-22.6	100.0	-28.1	82.2
9	-26.6	91.7	-22.8	94.8	-25.7	88.3	-21.8	97.0	-27.3	84.6
10	-26.0	91.1	-22.2	92.1	-25.1	89.1	-21.2	87.7	-26.4	86.7
11	-25.2	91.9	-22.0	84.5	-24.5	91.5	-20.8	75.1	-25.6	87.9
12	-24.3	92.4	-21.6	76.1	-23.9	92.2	-20.4	57.9	-24.6	91.1
13	-23.2	92.9	-21.5	67.6	-23.4	94.7	-20.1	46.2	-23.7	93.9
14	-22.3	91.2	-21.2	61.4	-22.6	97.8	-19.7	42.7	-22.7	95.4
15	-21.8	89.0	-21.0	59.5	-22.3	93.5	-19.4	46.9	-21.4	94.8
16	-21.3	86.2	-2[illegible].5	59.0	-21.5	57.1	-19.1	55.4	-20.2	9[illegible].7
17	-19.3	73.3	-20.0	56.9	-21.3	55.5	-18.5	62.8	-19.5	85.9
18	-18.7	70.2	-19.2	56.5	-20.7	58.2	-17.5	72.2	-19.3	81.5
19	-18.1	68.2	-19.0	58.6	-20.3	56.9	-16.6	80.0	-18.8	78.0
20	-17.5	67.0	-18.5	67.5	-19.4	62.3	-15.7	84.1	-18.4	80.9
21	-17.1	69.7	-13.1	76.7	-18.6	74.0	-14.7	88.5	-17.7	80.7
22	-1[illegible].5	87.1	-17.6	81.4	-18.1	76.7	-13.4	91.9	-17.4	81.9
23	-16.[illegible]	9[illegible].2	-16.8	83.1	-17.4	81.1	-12.5	93.8	-16.5	82.2
24	-16.0	91.9	-15.9	85.9	-16.5	84.2	-11.9	97.0	-15.7	85.2
25	-15.3	90.4	-14.3	88.2	-15.6	95.7	-11.3	98.5	-13.2	90.0
26	-14.7	89.9	-13.3	89.5	-1[illegible]	86.7	-10.7	97.5	-12.5	91.7
27	-13.8	90.7	-12.3	92.1	-14.[illegible]	87.0	-10.0	88.2	-11.4	94.2
28	-11.8	91.3	-11.6	93.1	-13.5	89.6	-9.6	76.7	-10.3	94.6
29	-10.7	89.2	-11.0	87.4	-12.6	91.3	-9.2	66.7	-8.9	92.1
30	-10.[illegible]	95.4	-10.8	81.5	-12.0	93.5	-9.0	57.3	-8.4	86.1
31	-8.1	72.5	-10.1	65.1	-11.5	96.2	-8.7	50.0	-8.3	80.7
32	-7.1	68.7	-9.9	61.6	-11.2	95.5	-8.5	44.6	-7.6	66.1
33	-6.4	66.7	-9.3	60.7	-10.3	61.2	-8.3	42.2	-7.4	63.2
34	-5.6	65.6	-8.7	57.9	-10.1	59.4	-7.9	45.4	-7.0	67.1
35	-5.2	66.6	-8.4	56.6	-9.7	60.2	-7.3	55.9	-6.6	73.6
36	-5.0	69.9	-7.2	56.6	-9.1	57.8	-6.6	69.8	-6.3	74.1
37	-4.4	86.6	-6.8	60.5	-8.5	59.3	-5.5	77.6	-5.7	77.2
38	-4.1	92.2	-6.4	66.7	-8.0	58.7	-4.3	84.3	-5.2	77.5
39	-3.7	93.1	-6.1	71.9	-7.2	65.9	-3.2	89.0	-4.0	81.4
40	-3.3	92.2	-5.6	78.4	-6.6	71.4	-1.9	91.1	-2.8	85.4
41	-2.7	91.5	-5.3	81.7	-6.1	75.9	-0.9	93.8	-1.9	88.1
42	-2.0	91.7	-5.0	83.5	-5.6	79.8	-0.2	96.2	-1.2	90.2
43	-1.1	92.0	-4.3	84.5	-5.0	82.7	0.3	96.2	-0.3	91.5
44	-0.2	91.5	-3.2	87.5	-4.4	84.6	1.1	91.3	0.6	92.2
45	0.9	89.0	-2.2	89.2	-3.6	85.3	1.6	82.7	1.5	91.4
46	1.5	93.5	-1.4	91.9	-2.9	86.6	2.0	76.3	2.3	93.7
47	2.6	76.2	-0.4	92.6	-2.1	88.5	2.4	55.[illegible]	3.0	87.5
48	3.5	72.3	0.2	90.2	-1.3	90.5	2.6	50.4	3.3	81.7

TABLE D-14 (Transient Data) (Cont'd)

RECORD 28D WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 104.0 KILOPASCALS = 15.07 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	4.7	68.9	0.8	73.2	-0.6	92.5	2.7	47.7	3.9	69.8
50	4.6	67.9	1.1	66.[illegible]	-0.1	94.4	2.8	45.6	4.6	78.5
51	5.0	67.0	1.6	60.5	1.1	58.5	3.1	45.1	4.9	79.2
52	5.3	66.9	1.9	60.8	1.8	60.6	3.3	47.4	5.2	80.4
53	5.5	63.6	2.3	59.2	2.2	58.8	3.4	50.4	5.4	81.3
54	5.7	71.1	2.7	57.5	3.1	61.0	3.7	56.0	5.7	82.1
55	6.[illegible]	76.2	3.2	57.1	3.7	67.9	3.9	61.6	5.9	82.0
56	6.1	80.2	3.6	56.9	4.3	74.3	4.1	66.0	6.3	82.3
57	6.3	84.0	4.1	59.2	4.8	78.7	4.6	70.7	6.5	82.5
58	6.4	88.5	4.5	71.1	5.4	81.8	5.8	78.2	6.7	82.6
59	6.5	90.2	6.2	85.1	6.1	83.8	6.1	80.6	6.8	83.2
60	6.7	91.1	6.9	86.2	6.8	85.2	6.5	82.6	6.8	83.3

TABLE D-14 (Transient Data) (Cont'd)

RECORD 28D WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 104.0 KILOPASCALS = 15.07 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	34.6 %MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	47.5 %MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	73.4 %MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	99.3 %MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	141.4 %MAXIMUM PRESSURE
1	-30.4	90.6	-30.3	91.7	-30.4	93.8	-30.2	94.9	-30.3	94.6
2	-29.5	[illegible]	-30.0	91.8	-29.7	93.8	-29.9	94.4	-29.8	94.6
3	-29.0	87.3	-29.5	91.6	-29.1	93.6	-29.6	93.9	-29.0	94.5
4	-28.6	84.2	-29.0	91.6	-28.6	93.4	-29.2	93.8	-28.3	94.3
5	-28.5	93.6	-28.6	91.7	-28.2	93.3	-28.8	93.7	-27.6	94.1
6	-28.3	84.6	-28.2	91.7	-27.0	93.3	-28.2	94.2	-26.6	94.0
7	-27.8	87.1	-27.8	91.4	-26.3	93.5	-27.8	94.3	-26.1	94.2
8	-27.5	89.3	-27.4	91.4	-25.7	93.9	-27.3	94.6	-25.3	94.4
9	-26.7	89.5	-27.0	89.1	-25.0	94.3	-26.9	94.9	-25.5	94.5
10	-25.7	90.6	-26.8	89.0	-24.6	94.7	-26.3	94.8	-25.1	94.3
11	-24.9	92.0	-26.6	89.3	-24.4	95.0	-25.6	94.8	-24.6	94.2
12	-24.2	93.2	-26.0	91.3	-23.9	95.1	-24.9	95.2	-24.0	94.4
13	-23.6	94.8	-25.5	92.3	-23.3	94.8	-24.3	95.6	-23.5	94.6
14	-23.3	95.2	-24.5	93.3	-22.8	94.1	-23.6	96.0	-23.2	94.8
15	-22.6	95.1	-23.7	94.5	-22.2	93.1	-22.2	96.4	-22.6	95.0
16	-21.9	95.3	-23.0	95.0	-21.9	93.4	-21.5	96.5	-21.8	94.9
17	-21.1	94.5	-22.2	95.2	-21.4	94.1	-20.8	96.3	-21.5	94.9
18	-20.4	92.9	-21.7	95.4	-21.3	94.4	-20.5	96.0	-20.9	94.9
19	-19.7	92.0	-21.5	94.2	-21.0	94.5	-20.0	95.7	-20.6	94.8
20	-18.7	91.5	-21.1	93.9	-20.6	94.7	-19.2	96.2	-20.0	95.0
21	-18.0	89.3	-19.5	93.6	-20.1	94.9	-18.8	95.8	-19.4	95.1
22	-17.6	86.5	-18.8	93.6	-19.5	94.7	-18.3	95.3	-18.9	95.1
23	-17.1	84.4	-17.9	[illegible]	-18.8	94.9	-17.9	94.9	-18.1	95.0
24	-16.6	85.3	-17.3	92.3	-18.2	94.6	-17.5	94.8	-17.7	94.8
25	-16.2	87.3	-16.8	92.4	-17.2	93.7	-17.1	95.0	-17.2	94.7
26	-15.6	88.5	-16.4	91.9	-16.6	93.6	-16.1	95.1	-16.5	94.5
27	-14.9	89.1	-16.1	90.9	-16.1	93.7	-14.8	95.3	-16.0	94.4
28	-14.0	90.5	-15.7	89.3	-15.2	93.8	-13.9	95.6	-15.3	94.5
29	-12.8	[illegible]	-15.4	88.8	-14.5	94.2	-13.2	95.9	-14.7	94.5
30	-12.2	[illegible]	-14.6	91.0	-13.9	94.4	-12.4	96.0	-14.1	94.3
31	-11.6	93.7	-14.0	91.5	-12.9	95.1	-11.8	96.3	-13.6	94.1
32	-11.0	93.8	-13.3	92.2	-12.2	94.6	-11.0	96.5	-13.2	94.0
33	-10.4	93.3	-12.4	93.0	-11.8	92.7	-10.6	96.7	-12.6	94.1
34	-9.4	92.7	-11.6	93.7	-11.2	91.4	-9.8	96.4	-12.2	94.3
35	-8.8	91.5	-11.0	94.1	-10.4	92.2	-9.4	96.1	-12.1	94.5
36	[illegible]	[illegible]	-10.4	94.1	-9.5	92.9	-9.0	95.4	-11.7	94.7
37	-7.3	[illegible]	-9.6	93.8	-8.8	93.4	-8.6	94.7	-11.3	94.9
38	-6.7	88.0	-9.2	93.5	-8.3	93.9	-8.0	95.1	-10.7	94.8
39	-6.4	85.5	-8.7	92.3	-7.9	94.1	-7.2	94.0	-10.4	94.6
40	-6.2	83.4	-8.0	91.7	-6.9	94.1	-7.1	93.8	-9.5	94.7
41	-6.1	81.3	-7.6	91.5	-5.6	94.1	-6.6	93.9	-9.0	94.7
42	-5.7	80.8	-7.2	91.5	-4.8	94.1	-6.1	93.9	-8.3	94.7
43	-5.5	82.2	-6.8	91.7	-4.1	94.0	-5.7	94.2	-7.6	95.0
44	-5.2	84.3	-6.2	91.7	-3.7	94.3	-5.2	94.5	-7.0	95.0
45	-4.8	85.6	-5.6	91.3	-3.2	94.5	-4.8	94.7	-6.7	95.1
46	-3.5	87.3	-5.2	90.7	-2.6	94.5	-4.5	94.9	-6.3	95.1
47	-2.5	89.2	-4.6	87.8	-2.1	94.7	-3.9	95.0	-5.9	94.9
48	-2.2	90.9	-4.2	86.7	-1.6	94.8	-3.4	95.2	-5.5	94.6

TABLE D-14 (Transient Data) (Cont'd)

RECORD 2PD WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 104.0 KILOPASCALS = 15.07 PSI

SAMPLE	% CHORD=	34.6	% CHORD=	47.5	% CHORD=	73.4	% CHORD=	99.3	% CHORD=	141.4
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	-0.4	91.9	-2.7	87.8	-1.1	94.4	-2.5	95.3	-5.1	94.5
50	0.2	92.5	-3.3	89.0	-0.6	93.4	-1.4	96.1	-4.7	94.4
51	0.8	92.7	-2.9	90.0	-0.4	92.2	-0.3	96.4	-4.0	94.8
52	2.1	90.5	-2.2	91.0	0.2	91.4	1.1	96.9	-3.1	95.1
53	3.5	90.6	-0.3	93.3	0.8	92.4	1.8	96.0	-1.8	94.8
54	4.4	89.9	0.1	93.4	1.8	93.2	2.6	94.7	-0.9	95.2
55	4.9	88.6	1.2	92.9	2.4	93.4	2.9	94.5	-0.5	95.5
56	5.1	86.4	2.6	92.2	2.9	94.0	4.2	93.8	0.2	95.5
57	5.6	84.4	4.6	92.6	3.8	94.1	4.9	93.6	1.1	95.2
58	6.0	86.4	5.3	92.3	4.6	93.9	5.6	94.0	2.1	94.9
59	6.2	87.2	6.1	91.3	5.6	93.5	6.2	94.5	3.3	95.4
60	6.7	89.1	6.7	90.1	6.7	93.3	6.8	95.0	6.8	94.3

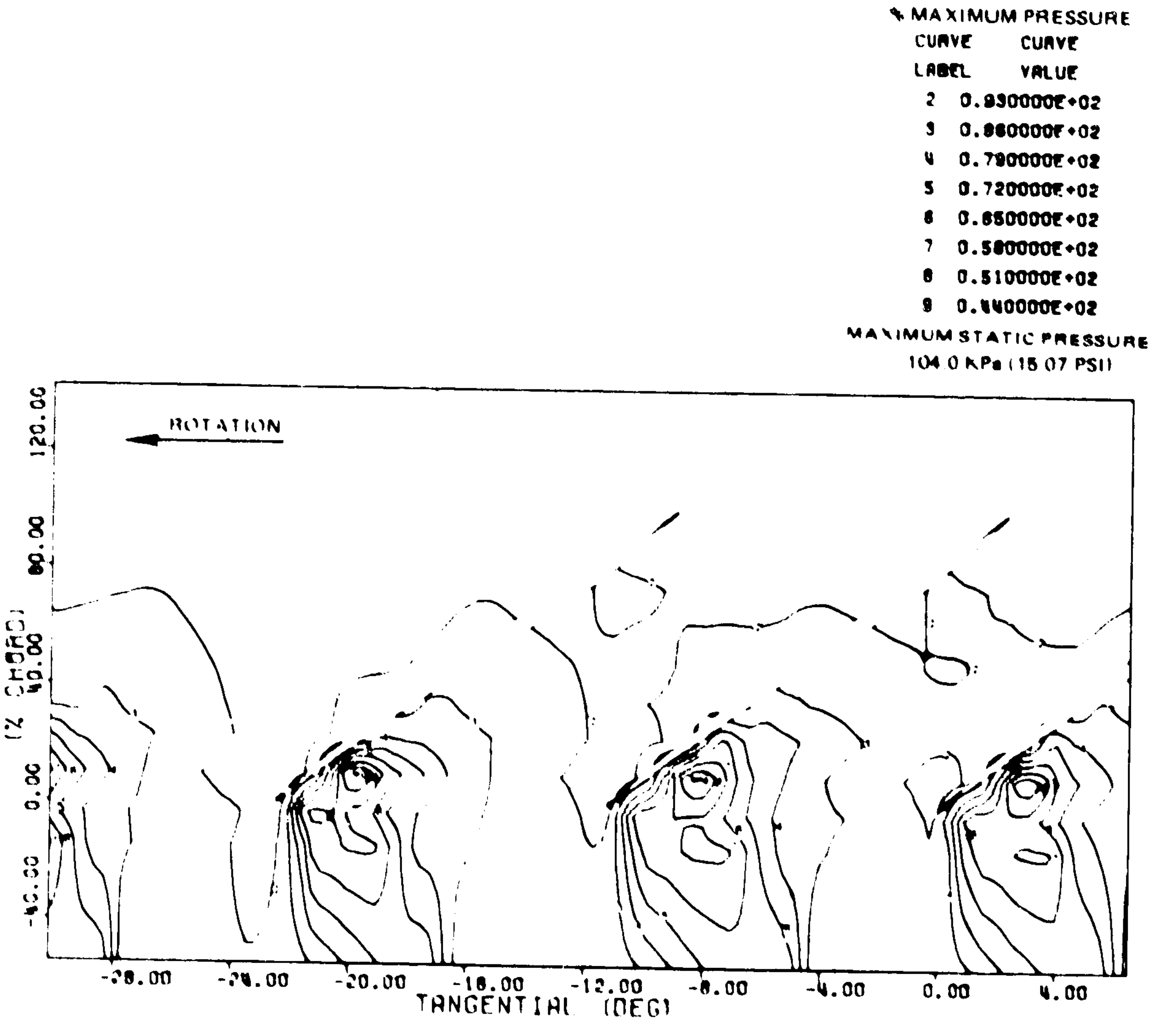

Figure D-9 Steady State Pressure Contours at Blade Tip; Transient Into Flutter, 70 Percent Speed, 62.9 Percent Flow, Pressure Ratio 1.2960, Incidence to Mean Camberline 9.2 Degrees

TABLE D-15 (Transient Data)

RECORD 28E WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 104.3 KILOPASCALS = 15.11 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-29.8	79.6	-29.9	67.9	-30.0	73.6	-30.0	63.1	-30.1	74.7
2	-29.3	77.8	-29.5	73.0	-29.3	78.0	-29.5	69.2	-29.4	76.9
3	-28.8	79.6	-29.[illegible]	79.0	-28.4	82.3	-28.6	74.6	-28.4	80.4
4	-28.0	81.8	-27.4	85.0	-26.9	34.7	-28.0	80.7	-27.1	84.1
5	-28.0	95.9	-25.0	89.7	-25.8	84.7	-26.6	86.3	-25.3	89.5
6	-27.7	97.9	-23.9	92.3	-24.6	87.1	-25.2	90.9	-23.9	90.2
7	-27.4	93.7	-23.0	93.4	-23.9	89.3	-24.0	94.1	-22.9	95.3
8	-26.8	98.1	-22.3	88.6	-22.7	92.8	-22.0	97.2	-21.9	96.0
9	-26.1	98.0	-21.9	87.4	-22.3	88.3	-22.2	98.9	-20.7	96.3
10	-25.4	99.1	-21.9	79.1	-22.1	81.9	-21.5	94.9	-19.9	94.5
11	-24.6	100.0	-21.5	70.2	-21.8	71.4	-21.2	88.1	-19.5	88.1
12	-23.2	99.9	-21.3	65.[illegible]	-21.6	64.8	-20.8	79.5	-19.1	81.4
13	-22.4	99.5	-21.0	60.7	-21.4	58.7	-20.6	73.1	-19.0	71.4
14	-21.8	97.6	-20.9	60.0	-20.6	63.1	-20.5	64.0	-18.6	70.7
15	-21.4	95.2	-20.3	60.[illegible]	-19.9	69.0	-20.2	58.1	-15.2	75.0
16	-19.2	82.2	-20.0	59.1	-19.4	72.8	-20.1	54.2	-17.5	79.6
17	-19.[illegible]	80.3	-19.6	60.9	-18.5	76.7	-19.5	51.4	-16.6	82.4
18	-18.5	75.4	-15.2	64.5	-17.2	82.3	-19.6	54.7	-15.0	85.6
19	-18.[illegible]	77.5	-18.6	70.8	-16.0	84.3	-19.1	61.2	-14.3	88.9
20	-17.6	79.1	-18.4	75.4	-14.8	85.0	-18.4	66.7	-13.8	90.7
21	-17.6	81.0	-18.1	79.1	-13.8	86.7	-17.7	72.3	-12.5	92.0
22	-17.4	83.4	-17.7	81.0	-12.6	89.6	-17.1	77.4	-11.5	94.6
23	-16.8	95.3	-17.0	83.0	-12.0	92.0	-16.3	81.5	-10.6	96.0
24	-16.6	96.9	-16.0	85.1	-11.5	92.6	-15.5	85.9	-9.7	96.2
25	-16.3	98.1	-15.2	86.8	-11.0	87.7	-14.3	89.6	-9.0	95.3
26	-15.8	97.6	-14.0	88.4	-10.8	79.1	-13.4	92.7	-8.4	94.0
27	-15.1	97.2	-13.1	90.0	-10.6	72.0	-12.6	93.9	-8.1	85.3
28	-14.2	98.2	-12.3	91.4	-10.4	67.6	-11.9	95.6	-7.9	81.2
29	-13.3	99.[illegible]	-11.6	91.9	-10.3	67.6	-11.4	95.9	-7.4	72.3
30	-12.1	99.7	-11.0	88.7	-10.1	59.3	-10.9	96.9	-7.3	70.7
31	-11.2	98.7	[illegible]	84.2	-9.6	60.4	-10.3	93.6	-7.1	70.3
32	-10.4	96.2	-10.8	79.5	-9.0	60.9	-10.0	88.7	-6.7	72.2
33	-9.7	91.9	-10.5	74.7	-8.4	65.3	-9.7	82.8	-5.8	76.1
34	-7.8	80.3	-10.3	69.8	-7.8	69.3	-9.5	73.5	-4.9	79.8
35	-7.2	73.1	-10.1	64.7	-6.9	73.6	-8.8	53.6	-4.3	81.6
36	-6.5	76.3	-9.8	61.2	-5.1	79.0	-8.7	47.4	-3.7	83.5
37	-5.9	75.5	-9.2	60.2	-5.2	81.7	-8.6	44.7	-3.[illegible]	86.4
38	-5.5	77.9	-8.7	53.1	-4.3	83.1	-8.4	44.3	-1.9	88.2
39	-5.3	80.7	-8.3	57.7	-3.2	83.3	-8.2	45.5	-1.1	91.3
40	-4.5	96.9	-7.6	60.3	-2.7	83.4	-7.9	51.1	-0.6	92.5
41	-4.2	99.0	-7.1	65.1	-2.0	85.3	-7.4	57.4	[illegible]	93.0
42	-4.2	99.9	-6.4	70.2	-1.3	87.3	-6.3	68.4	0.8	94.2
43	-3.7	99.7	-6.0	76.2	-0.9	89.2	-5.5	75.6	1.4	94.5
44	-3.1	99.2	-5.7	80.0	-0.3	90.7	-4.2	83.2	2.0	94.7
45	-2.2	99.2	-4.9	83.9	0.0	90.7	-2.8	88.5	2.6	93.5
46	-0.5	99.2	-3.9	86.3	0.4	85.7	-1.3	91.4	2.8	91.5
47	[illegible]	99.1	-3.0	87.7	0.6	[illegible]	-0.4	93.5	3.1	88.8
48	0.8	96.4	-1.8	89.7	0.6	74.4	0.3	95.0	3.2	85.1

TABLE D-15 (Transient Data) (Cont'd)

RECORD 28E WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 104.3 KILOPASCALS = 15.11 PSI

SAMPLE NUMBER	% CHORD= TANGENTIAL (DEG.)	-55.4 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	-15.1 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	-3.6 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	9.4 %MAXIMUM PRESSURE	% CHORD= TANGENTIAL (DEG.)	22.2 %MAXIMUM PRESSURE
49	1.6	92.7	-1.[illegible]	9[illegible].8	0.9	65.1	0.7	94.8	3.5	81.1
50	3.1	82.5	-[illegible].6	91.1	1.0	62.4	1.2	91.1	3.6	78.6
51	3.7	80.1	-[illegible]	89.4	1.2	6[illegible].8	1.5	84.7	3.7	76.9
52	4.2	78.[illegible]	0.4	83.9	1.6	63.2	[illegible].9	73.3	3.9	76.1
53	4.7	77.9	1.2	63.3	2.3	65.4	2.3	57.6	4.0	75.1
54	5.0	79.6	1.4	61.5	2.8	70.3	2.6	51.8	4.2	74.7
55	5.1	92.4	1.9	6[illegible].5	3.5	73.7	2.8	50.0	4.5	76.9
56	6.[illegible]	96.9	2.5	59.4	4.4	77.6	3.2	53.7	5.1	7[illegible].6
57	6.1	98.2	4.7	77.9	5.1	81.0	3.4	59.1	5.5	8[illegible].1
58	6.4	98.6	5.4	82.4	5.5	82.9	3.8	63.2	6.3	82.5
59	6.8	99.8	6.0	84.2	6.3	83.9	6.3	82.3	6.7	84.2
60	7.1	98.6	7.0	86.0	7.1	84.2	7.0	85.4	7.0	84.8

TABLE D-15 (Transient Data) (Cont'd)

RECORD 2PE WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 104.3 KILOPASCALS = 15.11 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-30.1	92.8	-30.0	94.2	-30.0	95.7	-30.0	97.7	-30.1	96.4
2	-29.5	93.4	-29.2	94.0	-29.1	95.4	-29.2	96.8	-29.8	96.5
3	-29.1	86.9	-28.5	93.8	-28.3	95.4	-28.7	96.6	-28.9	96.5
4	-28.8	93.9	-27.9	93.4	-27.7	95.6	-28.3	96.8	-28.5	96.4
5	-28.6	82.0	-27.5	92.4	-27.0	95.5	-27.9	96.8	-27.7	95.7
6	-28.4	81.1	-27.2	95.4	-26.5	96.0	-27.2	96.6	-27.4	95.6
7	-28.0	83.0	-26.6	88.4	-25.9	96.3	-26.5	96.4	-27.0	95.7
8	-27.6	85.3	-26.1	89.3	-24.9	96.7	-25.9	96.7	-25.9	96.3
9	-27.1	88.1	-25.8	91.1	-24.5	97.1	-25.0	97.3	-24.4	95.8
10	-26.2	90.7	-25.2	92.2	-24.0	97.3	-23.0	98.0	-23.8	96.1
11	-25.3	92.5	-24.6	93.2	-23.5	96.9	-22.4	98.0	-22.3	96.5
12	-24.3	94.0	-23.7	94.2	-23.2	96.1	-21.4	98.3	-22.0	97.3
13	-23.5	95.9	-22.8	95.0	-22.5	94.2	-20.7	98.5	-20.4	96.4
14	-22.3	96.5	-22.5	95.1	-22.3	94.0	[illegible]	98.2	-20.0	96.7
15	-21.0	95.9	-21.9	95.5	-22.0	94.4	-19.2	98.9	-19.5	97.0
16	-20.0	94.9	-21.4	95.5	-21.6	95.3	-18.6	98.5	-18.8	96.9
17	-18.9	94.6	-20.7	95.8	-21.1	95.9	-18.2	97.9	-18.2	96.9
18	-18.3	93.0	-20.2	95.9	-20.7	96.3	-17.7	97.7	-17.6	96.7
19	-18.0	90.7	-19.9	96.0	-20.4	96.5	-16.9	97.4	-17.1	96.4
20	-17.7	88.1	-19.4	96.0	-19.3	96.8	-16.3	97.1	-16.3	95.9
21	-17.5	85.3	-18.9	96.0	-18.3	96.6	-15.7	96.9	-15.6	95.7
22	-17.4	84.5	-18.3	96.1	-17.7	96.3	-15.4	96.9	-14.9	95.9
23	-17.1	83.7	-17.9	95.8	-17.0	96.3	-14.5	97.1	-14.3	95.7
24	-16.7	85.0	-17.2	95.6	-16.5	96.2	-13.9	97.4	-13.8	95.6
25	-16.2	87.1	-16.6	94.4	-15.2	96.2	-13.5	97.7	-13.2	95.5
26	-15.6	88.9	-15.6	89.8	-14.6	96.6	-13.0	97.7	-12.8	95.7
27	-15.0	90.0	-15.3	89.1	-13.5	96.8	-11.9	97.7	-12.4	96.0
28	-14.0	91.3	-15.1	89.4	-12.9	96.9	-11.1	98.0	-11.9	96.1
29	-13.4	92.4	-14.0	91.7	-12.4	96.4	-10.7	98.0	-11.3	96.3
30	-12.8	93.9	-13.4	92.3	-11.4	93.7	-10.2	98.3	-11.0	96.5
31	-12.1	95.0	-12.8	93.0	-11.2	93.7	-9.6	98.4	-10.5	96.7
32	-11.1	95.5	-12.4	93.9	-10.8	94.2	-9.2	98.1	-9.4	96.2
33	-10.4	96.0	-12.0	94.1	-10.4	94.3	-8.8	97.8	-8.6	96.4
34	-9.3	94.4	-11.3	94.5	-9.9	94.9	-8.6	97.7	-7.9	96.6
35	-8.4	94.7	-10.4	94.8	-9.7	95.2	-8.1	97.9	-7.0	96.3
36	-7.3	97.8	-9.1	94.9	-9.0	95.2	-7.7	97.6	-6.5	96.0
37	-6.8	89.7	-8.0	94.5	-8.6	95.4	-7.1	96.7	-5.8	95.6
38	-6.0	80.7	-6.9	94.0	-8.1	95.4	-6.5	96.2	-5.3	95.5
39	-5.7	79.6	-5.9	93.7	-7.2	95.9	-5.8	95.9	-4.8	95.7
40	-5.3	81.5	-5.6	93.5	-6.6	95.7	-5.2	95.7	-4.2	96.1
41	-4.8	84.1	-5.1	92.3	-6.0	95.8	-4.7	95.8	-3.8	96.4
42	-4.1	86.3	-4.2	86.8	-5.4	95.8	-4.0	95.9	-3.1	96.5
43	-3.4	88.3	-3.8	85.9	-4.0	96.6	-3.6	96.3	-2.6	96.4
44	-2.6	90.0	-3.4	86.9	-3.2	96.8	-3.0	96.7	-2.0	96.2
45	-1.7	91.8	-3.0	88.6	-2.0	97.4	-2.5	97.1	-1.4	96.4
46	-1.0	93.2	-2.5	90.1	-1.3	97.4	-2.0	97.4	-0.7	97.0
47	-0.3	94.3	-1.6	91.9	-1.3	97.0	-1.7	97.7	-0.5	97.1
48	0.6	94.3	-0.7	92.7	0.0	93.1	-1.2	97.8	0.3	97.1

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TABLE D-15 (Transient Data) (Cont'd)

RECORD 2PE WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 104.3 KILOPASCALS = 15.11 PSI

SAMPLE	% CHORD=	34.6	% CHORD=	47.5	% CHORD=	73.4	% CHORD=	99.3	% CHORD=	141.4
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	1.5	93.8	-.1	93.3	0.1	92.9	-0.3	97.8	0.5	97.1
50	2.3	93.6	0.9	93.7	0.4	93.3	0.3	98.0	1.1	96.9
51	3.2	94.[illegible]	1.6	94.7	0.8	94.2	0.9	98.1	1.7	96.7
52	4.2	92.5	2.5	94.7	1.4	94.7	1.5	98.2	2.7	96.9
53	4.7	89.4	3.1	94.7	1.8	95.5	2.0	97.9	3.6	96.8
54	5.1	85.8	4.1	94.5	2.3	95.7	2.4	97.5	4.0	96.8
55	5.6	82.9	4.8	94.4	2.5	96.0	2.8	97.3	4.5	96.6
56	5.9	83.9	5.3	94.6	2.9	96.3	3.4	97.4	5.1	96.2
57	6.2	95.4	5.8	94.3	3.2	96.4	3.9	97.0	5.6	96.[illegible]
58	6.3	85.7	6.4	92.3	3.7	96.1	4.5	[illegible].6	6.1	95.8
59	6.5	87.6	6.7	91.0	5.6	96.0	5.7	[illegible].5	6.6	95.8
60	7.0	88.0	7.1	89.2	7.1	96.1	7.0	[illegible].6	7.1	95.8

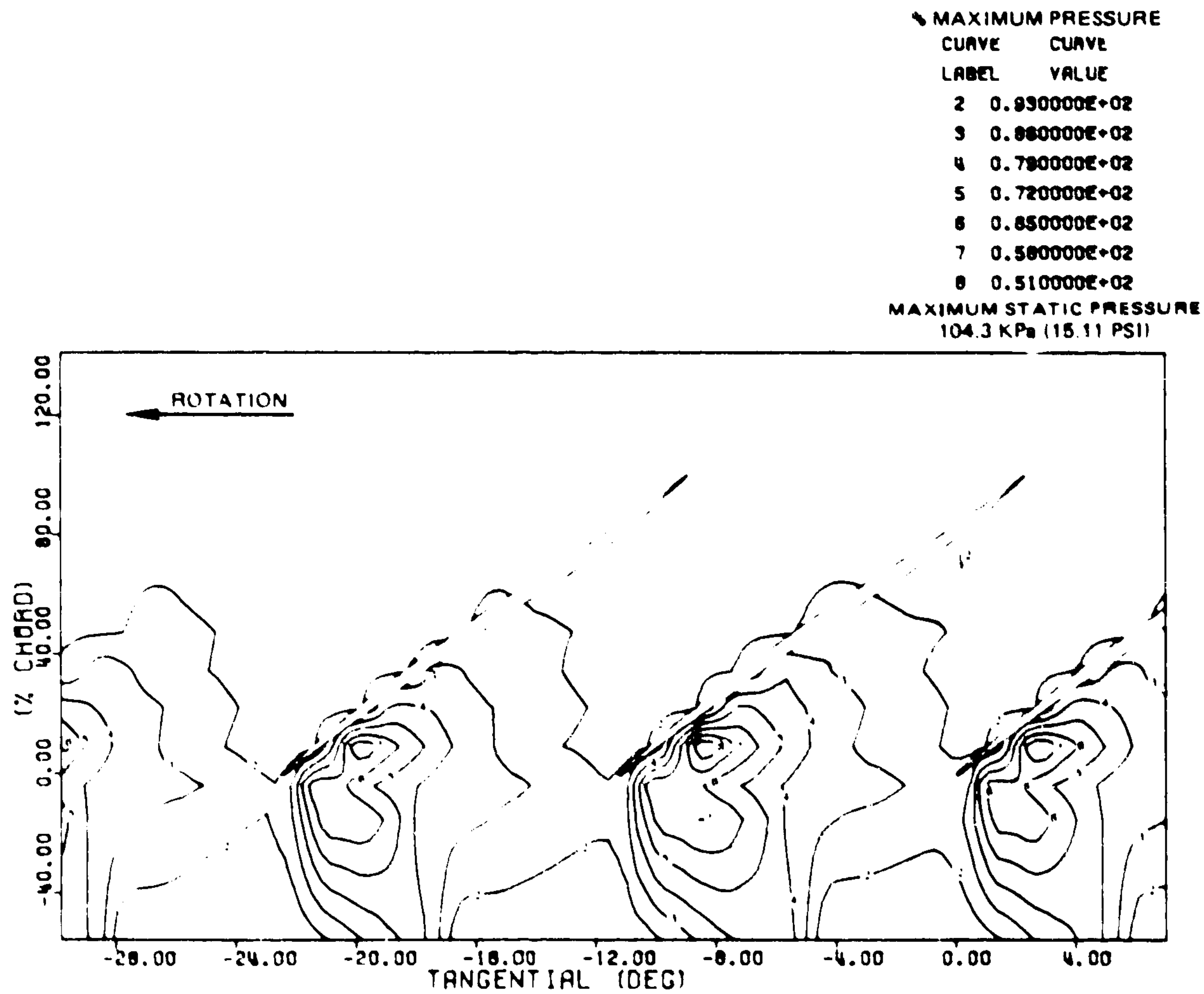

Figure D-10 Steady State Pressure Contours at Blade Tip; Transient Into Flutter, 70 Percent Speed, 59.8 Percent Flow, Pressure Ratio 1.300, Incidence to Mean Camberline 10.3 Degrees

TABLE D-16

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

70% SPEED RECORD 25

Inlet Total Pressure = 80,100 N/m^2 (1673 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	1.258
-15.1	0.919
- 3.6	0.950
9.4	0.958
22.2	0.968
34.6	1.022
47.5	1.035
73.4	1.030
99.3	1.045
141.4	1.054

TABLE -17

RECORD 25 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 98.3 KILOPASCALS = 14.25 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	% CHORD= -55.4 %MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	% CHORD= -15.1 %MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	% CHORD= -3.6 %MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	% CHORD= 9.4 %MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	% CHORD= 22.2 %MAXIMUM PRESSURE
1	-14.2	83.8	-14.2	83.4	-14.2	90.5	-14.2	87.9	-14.2	78.8
2	-14.2	85.9	-14.0	88.7	-13.5	91.8	-13.6	88.7	-13.4	82.6
3	-14.1	87.5	-13.6	88.4	-12.8	94.5	-12.9	91.0	-12.7	86.5
4	-13.9	93.6	-12.4	92.0	-12.2	97.4	-12.3	93.7	-12.0	89.4
5	-13.7	89.0	-12.0	92.5	-11.9	99.0	-11.8	95.1	-11.2	89.9
6	-13.1	87.4	-11.4	91.0	-11.6	94.0	-11.4	95.3	-10.4	87.8
7	-12.5	86.0	-11.1	87.7	-11.4	84.8	-10.9	91.9	-9.5	82.7
8	-11.5	84.3	-10.5	66.1	-11.1	72.4	-10.5	85.1	-9.0	77.1
9	-10.9	91.9	-10.3	63.0	-10.9	65.0	-10.0	78.5	-8.7	70.1
10	-10.2	79.2	-10.0	62.1	-10.6	61.8	-9.7	66.7	-8.6	64.5
11	-8.6	69.0	-9.7	62.6	-9.8	63.4	-9.4	57.9	-8.4	61.1
12	-7.6	65.0	-9.2	61.5	-9.6	62.2	-9.1	53.6	-8.1	60.1
13	-6.8	63.1	-8.7	60.0	-9.1	63.1	-8.6	50.7	-7.8	62.6
14	-6.1	62.2	-8.4	59.8	-8.7	61.4	-8.4	48.6	-7.3	66.0
15	-5.7	62.0	-7.7	58.2	-8.0	61.1	-8.1	48.4	-7.1	71.0
16	-5.3	64.1	-7.0	58.3	-7.3	60.7	-7.7	50.7	-6.9	75.5
17	-5.0	67.6	-6.4	60.6	-6.9	64.5	-7.3	55.1	-6.4	78.9
18	-4.7	71.9	-6.4	63.7	-6.5	70.3	-7.0	60.4	-5.7	79.4
19	-4.6	75.4	-5.7	78.6	-6.2	77.3	-6.6	69.2	-5.0	78.9
20	-4.5	79.1	-5.5	83.6	-5.9	83.4	-6.3	78.4	-3.8	77.5
21	-4.3	82.3	-5.2	84.8	-5.4	86.8	-5.9	83.0	-2.9	79.5
22	-4.1	84.1	-4.7	84.9	-4.5	88.3	-5.1	85.2	-1.5	86.0
23	-3.7	85.4	-4.2	86.7	-3.2	89.9	-4.1	86.1	-1.1	83.9
24	-3.2	84.4	-3.6	86.6	-1.8	93.5	-3.0	87.7	-0.5	90.8
25	-2.6	84.0	-3.0	87.7	-1.0	97.5	-1.8	90.8	0.5	86.9
26	-1.7	84.0	-2.4	88.3	-0.5	100.0	-1.2	93.5	1.2	83.7
27	-0.9	84.2	-1.6	91.9	-0.1	95.3	-0.5	95.5	2.0	79.2
28	-0.1	83.9	-1.1	90.9	0.1	83.6	-0.2	95.6	2.7	70.6
29	0.7	80.9	-0.5	92.0	0.3	72.0	0.4	91.9	3.1	58.8
30	1.1	78.1	-0.1	90.3	0.4	64.4	0.9	83.3	3.4	56.8
31	2.3	70.7	0.8	64.6	0.6	60.5	1.3	75.4	3.7	59.9
32	3.1	66.4	1.0	67.3	1.2	64.6	1.4	70.9	4.2	66.5
33	3.9	64.0	1.3	61.9	1.7	61.4	1.7	63.6	4.7	72.1
34	4.8	62.1	1.6	62.4	2.2	61.9	1.9	59.8	4.8	75.1
35	5.4	61.3	2.4	59.4	2.8	60.3	2.1	56.1	5.0	78.4
36	5.9	61.0	3.0	58.0	3.5	60.5	2.6	51.9	5.7	79.3
37	6.3	62.9	3.5	57.1	4.3	59.8	3.0	50.0	6.4	78.9
38	6.5	65.5	4.7	57.2	4.9	64.3	3.4	48.9	7.1	73.4
39	6.6	67.8	5.2	59.8	5.1	71.3	4.0	52.7	8.2	80.7
40	6.8	72.9	5.3	63.0	5.5	78.3	4.6	60.4	9.9	89.2
41	7.3	91.9	6.1	81.4	5.7	83.9	4.8	67.7	10.5	90.8
42	7.4	84.3	6.2	84.4	6.1	87.7	5.0	74.9	11.0	91.3
43	7.5	86.0	6.4	85.2	7.1	88.9	5.5	82.5	11.7	88.7
44	7.8	86.6	6.9	84.7	8.3	90.0	6.1	86.0	12.4	85.1
45	8.4	95.6	7.5	87.2	9.3	93.3	7.2	87.3	13.1	81.3
46	9.0	85.0	8.0	67.4	10.1	97.2	8.1	88.0	13.4	76.7
47	9.8	85.2	9.5	91.1	10.6	99.8	9.3	91.8	13.7	69.7
48	11.1	85.7	10.1	91.2	11.2	96.6	10.1	94.2	14.6	64.3

TABLE D-17 (Cont'd)

RECORD 25 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 98.3 KILOPASCALS = 14.25 PSI

SAMPLE	% CHORD=	-55.4	% CHORD=	-15.1	% CHORD=	-3.6	% CHORD=	9.4	% CHORD=	22.2
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	12.0	79.9	10.7	92.2	11.4	78.0	11.0	96.9	14.1	59.0
50	12.9	74.8	11.2	87.8	11.7	65.2	11.7	92.2	14.4	56.1
51	14.1	68.2	12.2	64.2	11.8	61.5	12.1	84.9	14.5	54.3
52	14.7	65.2	12.5	62.6	12.4	65.3	12.4	77.5	14.8	56.3
53	15.4	63.4	12.9	62.8	12.9	62.0	12.7	70.5	15.1	58.1
54	16.1	62.3	13.9	59.6	13.6	62.4	13.0	62.7	15.5	59.5
55	17.0	61.0	15.2	56.4	14.5	59.7	13.5	54.2	15.7	63.1
56	17.6	60.6	16.2	55.8	15.5	58.6	14.1	49.0	16.1	68.7
57	18.0	62.6	16.8	61.9	16.2	61.7	14.6	47.3	16.3	72.1
58	18.2	66.7	17.8	84.0	17.3	56.2	15.6	55.9	16.5	75.3
59	18.3	70.3	18.0	84.9	18.0	88.5	17.1	82.4	17.2	75.7
60	18.4	71.1	18.4	84.8	18.4	88.9	18.4	87.1	18.4	75.9

TABLE D-17 (Cont'd)

RECORD 25 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 98.3 KILOPASCALS = 14.25 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-14.2	87.1	-14.2	94.7	-14.2	85.2	-14.2	88.0	-14.2	85.9
2	-13.5	86.3	-13.6	95.6	-13.6	87.3	-13.7	88.2	-14.0	87.7
3	-12.7	85.6	-13.[illegible]	96.2	-13.3	87.7	-12.9	88.5	-13.4	88.9
4	-12.0	84.3	-12.3	95.7	-13.0	88.0	-12.3	88.6	-12.7	87.4
5	-11.4	83.5	-11.6	93.[illegible]	-12.7	88.1	-11.4	88.3	-12.2	85.9
6	-11.0	80.9	-10.9	85.6	-12.3	87.6	-11.2	87.7	-11.5	81.2
7	-10.7	79.7	-10.3	83.8	-12.1	86.3	-10.4	86.4	-11.1	80.5
8	-10.5	79.3	-8.9	69.1	-11.8	84.7	-9.9	85.3	-10.8	82.1
9	-10.0	79.5	-8.5	67.8	-11.5	83.5	-9.6	83.7	-10.1	86.0
10	-9.5	80.1	-8.1	67.0	-11.2	83.0	-9.2	82.0	-9.8	90.0
11	-8.9	80.7	-7.6	69.5	-10.7	83.0	-8.9	81.7	-9.3	95.3
12	-8.4	79.8	-7.3	70.4	-10.4	82.6	-8.6	82.6	-8.8	98.3
13	-8.0	79.2	-6.2	82.6	-10.0	81.7	-8.3	83.3	-8.2	94.2
14	-7.2	78.1	-5.8	85.[illegible]	-9.8	81.2	-8.0	83.0	-5.1	94.5
15	-6.8	77.4	-5.6	86.0	-9.5	81.0	-7.6	82.7	-7.8	87.0
16	-6.5	78.8	-5.2	86.4	-9.0	81.2	-7.2	83.2	-6.9	87.0
17	-6.1	81.1	-4.8	88.0	-8.4	81.7	-6.5	84.0	-6.6	89.6
18	-5.9	83.6	-4.5	89.6	-8.2	82.4	-5.9	85.3	-6.2	91.7
19	-5.7	85.5	-4.1	92.1	-7.8	83.9	-4.7	86.1	-5.8	91.1
20	-5.1	86.9	-3.5	93.[illegible]	-7.2	85.0	-3.5	86.0	-5.2	93.4
21	-3.6	88.[illegible]	-2.5	93.8	-6.9	85.4	-3.1	86.8	-4.6	90.4
22	-2.8	87.9	-1.8	94.4	-6.6	85.6	-2.2	86.8	-4.2	87.4
23	-1.9	87.5	-1.2	94.0	-5.7	85.2	-0.8	87.1	-3.6	86.8
24	-1.2	87.2	-0.6	91.9	-5.2	84.5	-0.3	86.8	-3.0	88.8
25	-0.6	84.9	-0.3	89.1	-4.9	83.9	0.2	86.1	-2.4	91.4
26	-0.1	82.6	0.3	85.5	-4.3	83.5	0.5	85.9	-1.6	92.2
27	0.4	80.9	1.7	72.1	-3.9	83.4	0.9	85.5	-1.0	91.0
28	0.8	79.7	2.1	69.6	-3.2	83.9	1.4	84.6	-[illegible]	89.7
29	1.8	79.7	2.4	69.6	-2.5	85.0	1.6	83.3	0.7	94.5
30	2.6	79.9	2.8	63.4	-1.6	87.2	2.2	80.4	1.3	94.6
31	3.2	78.8	3.3	69.2	-1.4	87.4	2.5	81.4	1.9	95.7
32	3.9	77.4	3.8	71.9	-1.0	87.0	2.9	82.2	2.3	92.5
33	4.7	75.9	4.3	74.6	-0.1	81.8	3.4	81.3	3.0	81.6
34	5.1	77.7	5.0	81.4	0.3	81.3	3.8	80.7	3.5	80.5
35	5.2	79.6	5.6	85.8	0.7	80.5	4.2	80.6	4.0	79.0
36	5.5	82.7	6.3	87.0	1.3	79.7	4.6	81.0	4.4	81.3
37	5.9	85.6	6.6	89.1	1.9	79.2	5.1	82.1	4.6	84.5
38	6.4	87.3	7.2	92.1	2.3	79.7	5.8	83.7	5.4	81.9
39	6.9	88.2	7.7	94.3	3.2	82.6	6.4	85.1	5.8	81.1
40	7.9	88.7	8.2	95.5	3.7	83.5	7.9	86.3	6.1	79.6
41	8.7	88.8	9.[illegible]	95.0	4.1	84.2	8.8	86.7	6.5	76.5
42	9.5	88.5	9.5	96.2	4.4	84.7	9.5	86.7	6.9	75.1
43	10.1	88.[illegible]	10.3	95.7	4.6	84.9	10.0	86.7	7.7	77.6
44	10.7	85.9	10.7	93.3	5.8	84.4	10.6	86.9	9.2	82.1
45	11.9	80.8	11.3	89.5	6.7	83.9	11.2	86.5	8.7	86.7
46	12.2	80.5	11.8	85.6	7.3	83.9	12.1	85.5	9.0	88.7
47	13.0	80.6	12.3	81.4	7.7	84.2	12.9	83.7	9.6	89.7
48	13.6	80.9	12.5	79.9	9.7	87.5	13.2	82.9	10.2	88.9

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TABLE D-17 (Cont'd)

RECORD 25 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 98.3 KILOPASCALS = 14.25 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	14.3	79.5	12.9	76.0	10.1	87.8	13.4	82.7	10.8	89.5
50	14.9	77.9	13.2	73.5	10.7	86.4	13.8	83.5	11.9	94.1
51	15.4	76.[illegible]	13.5	72.1	11.9	81.3	14.1	84.3	12.9	93.1
52	15.5	73.4	14.0	70.8	12.3	81.2	14.5	83.5	14.1	77.6
53	15.8	7[illegible].4	14.6	69.9	13.0	80.5	14.9	82.7	14.5	76.3
54	16.1	69.2	15.2	71.4	13.6	81.1	15.4	83.3	15.1	69.8
55	16.2	70.5	15.7	74.2	14.3	82.6	16.2	84.3	15.9	78.4
56	16.4	73.2	16.6	83.0	15.7	84.9	16.5	85.2	16.4	76.4
57	16.5	80.9	16.8	83.7	16.2	84.9	17.0	85.7	16.9	79.3
58	16.9	83.6	17.3	83.7	16.8	85.0	17.3	86.0	17.6	75.4
59	17.6	85.3	17.9	86.3	17.7	84.7	17.9	86.4	18.0	74.4
60	18.4	87.0	18.4	90.2	18.4	84.8	18.4	86.6	18.4	75.4

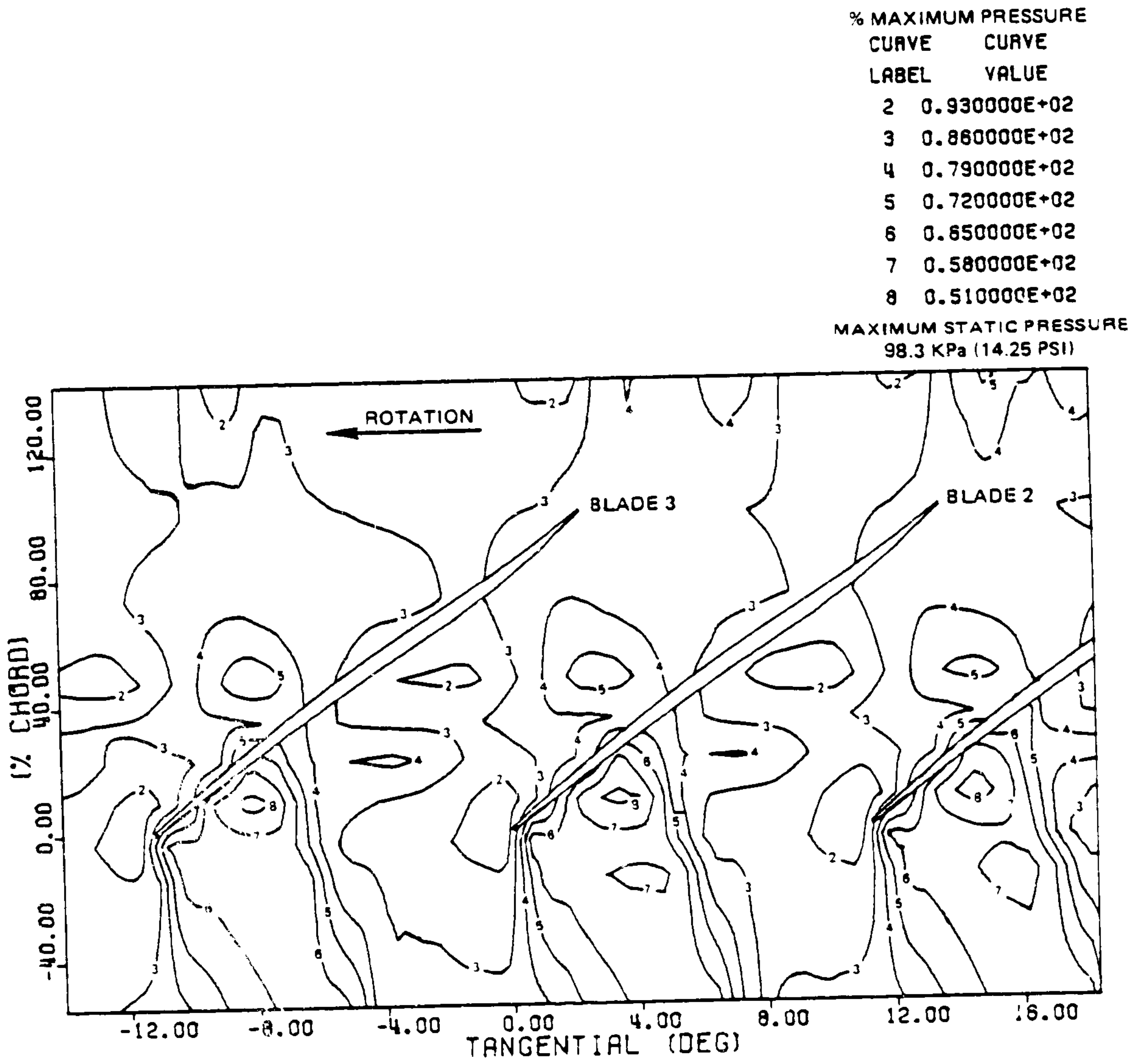

Figure D-11 Steady State Pressure Contours at Blade Tip; No Flutter, Low Operating Line, 70 Percent Speed, 72.8 Percent Flow, Pressure Ratio 1.2280

TABLE D-18

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

70% SPEED RECORD 133

Inlet Total Pressure = 86,140 N/m^2 (1799 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.952
-15.1	0.954
- 3.6	0.957
9.4	0.973
22.2	1.061
34.6	1.108
47.5	1.128
73.4	1.152
99.3	1.171
141.4	1.161

TABLE D-19

RECORD 133 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 104.3 KILOPASCALS = 15.11 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-28.1	74.1	-28.1	84.7	-28.1	84.8	-28.1	78.9	-28.1	84.7
2	-27.2	89.5	-26.9	88.7	-27.0	87.6	-26.9	86.3	-27.0	66.8
3	-26.0	87.3	-25.8	90.9	-25.8	88.9	-25.8	91.5	-25.9	83.5
4	-24.6	83.2	-24.7	92.2	-24.7	91.4	-24.7	94.5	-24.7	90.0
5	-23.5	89.0	-23.5	94.7	-23.6	95.1	-23.5	96.7	-23.5	91.3
6	-22.3	86.9	-22.8	95.9	-22.9	97.9	-22.3	100.0	-22.4	92.4
7	-21.2	80.0	-21.2	60.2	-21.5	55.4	-21.1	88.7	-21.3	91.8
8	-20.0	70.8	-19.9	53.0	-20.1	63.9	-19.9	45.4	-20.1	89.8
9	-18.8	64.3	-18.8	70.3	-18.9	74.6	-18.8	61.4	-18.9	82.7
10	-17.4	62.0	-17.6	82.6	-17.7	80.7	-17.7	71.7	-17.7	84.4
11	-16.3	87.2	-16.5	85.5	-16.5	85.3	-16.5	80.1	-16.6	85.7
12	-15.3	85.8	-15.3	89.1	-15.4	86.9	-15.4	86.2	-15.4	86.8
13	-14.2	85.8	-14.2	90.1	-14.3	88.6	-14.1	91.0	-14.3	88.3
14	-13.0	86.8	-13.0	91.2	-13.1	91.2	-13.0	93.7	-13.1	89.7
15	-11.9	87.6	-11.6	94.1	-11.6	96.9	-11.8	96.0	-12.0	91.0
16	-10.7	94.5	-10.7	77.8	-10.4	58.2	-10.8	93.5	-10.8	91.7
17	-9.6	76.3	-9.9	61.3	-9.4	57.7	-9.5	76.4	-9.6	94.9
18	-8.4	68.1	-8.1	57.2	-8.4	60.2	-8.4	42.9	-8.5	85.2
19	-7.2	62.7	-7.2	62.1	-7.2	70.3	-7.2	53.1	-7.7	76.0
20	-5.9	67.2	-6.0	75.0	-6.1	77.5	-6.0	72.4	-6.1	81.6
21	-4.9	71.2	-4.9	84.6	-4.9	84.6	-4.9	80.5	-4.9	83.6
22	-3.9	89.6	-3.7	89.4	-3.7	86.5	-3.7	86.4	-3.8	85.6
23	-2.7	87.9	-2.5	89.5	-2.5	87.6	-2.5	90.4	-2.6	87.4
24	-1.4	93.0	-1.4	91.7	-1.4	90.1	-1.4	92.6	-1.5	89.0
25	-0.5	87.6	-0.3	93.4	-0.4	94.6	0.2	96.9	-0.5	90.4
26	1.0	82.0	1.3	61.8	0.9	52.7	1.0	92.7	0.8	95.5
27	2.0	73.5	2.4	59.8	1.9	59.4	2.8	46.5	2.0	90.0
28	3.2	66.3	3.3	61.6	3.3	69.6	3.3	53.6	3.5	79.7
29	4.6	62.4	4.4	75.8	4.4	78.4	4.4	60.6	4.4	82.2
30	5.5	73.3	5.7	83.7	5.6	94.0	5.6	77.7	5.6	84.4
31	6.5	87.9	6.8	87.2	6.7	86.0	6.8	84.9	6.6	86.0
32	7.6	86.2	7.9	89.9	7.9	87.5	8.0	89.0	7.8	87.4
33	9.0	87.3	9.1	91.0	10.2	93.0	9.1	93.2	9.1	89.0
34	10.2	83.1	10.7	93.8	10.8	95.2	10.3	95.2	10.2	90.5
35	11.4	85.8	11.4	88.7	11.4	86.6	11.4	98.5	11.4	91.4

TABLE D-19 (Cont'd)

RECORD 133 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 104.3 KILOPASCALS = 15.11 PSI

SAMPLE	% CHORD= 34.6		% CHORD= 47.5		% CHORD= 73.4		% CHORD= 99.3		% CHORD= 141.4	
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-28.1	88.1	-28.1	92.8	-28.1	94.3	-28.1	96.2	-28.1	95.5
2	-26.9	90.5	-27.0	89.7	-27.0	94.9	-27.1	96.3	-26.9	94.0
3	-25.8	91.7	-25.9	93.3	-25.8	95.4	-25.8	96.6	-25.8	95.2
4	-24.6	93.0	-24.7	94.9	-24.6	96.5	-24.7	96.9	-24.6	95.8
5	-23.5	93.8	-23.5	95.7	-23.8	97.1	-23.5	97.3	-23.5	96.9
6	-22.3	92.9	-22.4	96.3	-22.3	94.1	-22.0	97.5	-22.4	97.5
7	-21.2	93.7	-21.2	96.1	-21.2	95.3	-21.2	97.4	-21.3	96.2
8	-20.0	92.7	-20.1	95.3	-20.3	96.1	-20.2	96.9	-19.9	96.7
9	-18.8	92.3	-18.9	94.7	-19.3	96.5	-19.3	97.4	-18.7	95.6
10	-17.2	88.3	-17.7	94.3	-17.7	95.7	-17.6	96.8	-17.4	96.3
11	-16.5	89.3	-16.6	92.5	-16.5	95.4	-16.5	96.8	-16.5	95.2
12	-15.3	[illegible]	-15.7	89.5	-15.3	95.3	-15.3	96.9	-15.5	94.2
13	-14.2	91.4	-14.3	92.7	-14.2	95.6	-14.2	96.9	-14.2	95.2
14	-13.0	92.6	-13.1	93.8	-12.9	96.5	-13.0	97.2	-13.2	95.1
15	-11.9	93.2	-12.0	94.7	-11.3	93.4	-11.9	97.3	-11.6	96.2
16	-10.7	93.3	-11.0	95.5	-10.5	93.8	-10.7	97.3	-10.6	95.3
17	-9.5	92.8	-9.6	94.5	-9.6	94.0	-8.9	96.6	-10.0	95.3
18	-8.4	91.7	-8.6	93.7	-8.4	94.9	-8.2	96.6	-8.8	96.4
19	-7.1	90.9	-7.3	93.4	-7.5	95.5	-7.2	96.1	-7.2	94.7
20	-5.9	86.2	-6.1	93.2	-6.1	95.1	-6.2	96.1	-6.0	95.2
21	-4.9	88.0	-4.5	87.2	-4.9	95.3	-4.8	96.2	-4.9	95.2
22	-3.7	89.4	-3.7	89.2	-3.7	95.8	-3.8	96.6	-3.7	95.6
23	-2.5	90.9	-2.7	91.7	-2.6	96.3	-2.6	96.8	-2.6	96.9
24	-1.4	92.2	-1.4	93.3	-1.7	96.9	-1.4	97.3	-1.4	98.0
25	-0.2	92.4	-0.3	94.0	0.0	92.7	-0.2	97.5	-0.2	98.1
26	0.9	92.5	0.8	94.2	0.9	92.3	0.9	97.6	0.9	97.6
27	2.1	92.3	2.0	93.6	2.1	94.6	2.1	96.8	1.9	96.5
28	3.7	92.0	3.2	93.2	3.4	95.9	3.2	96.4	2.6	96.9
29	4.4	91.0	4.3	93.4	4.4	95.3	4.3	96.2	3.9	95.7
30	5.4	87.6	5.5	93.0	5.6	95.0	5.5	96.4	4.9	96.3
31	6.3	89.8	6.7	89.7	6.6	94.7	6.7	96.6	6.8	94.4
32	7.9	91.2	7.3	92.3	7.9	95.4	7.7	96.8	7.9	95.2
33	9.1	92.3	9.0	93.8	9.0	96.3	9.0	96.9	9.1	95.8
34	10.2	93.4	10.1	94.8	9.9	96.6	10.2	97.2	10.2	96.8
35	11.4	93.4	11.4	95.6	11.4	93.3	11.4	97.3	11.4	97.7

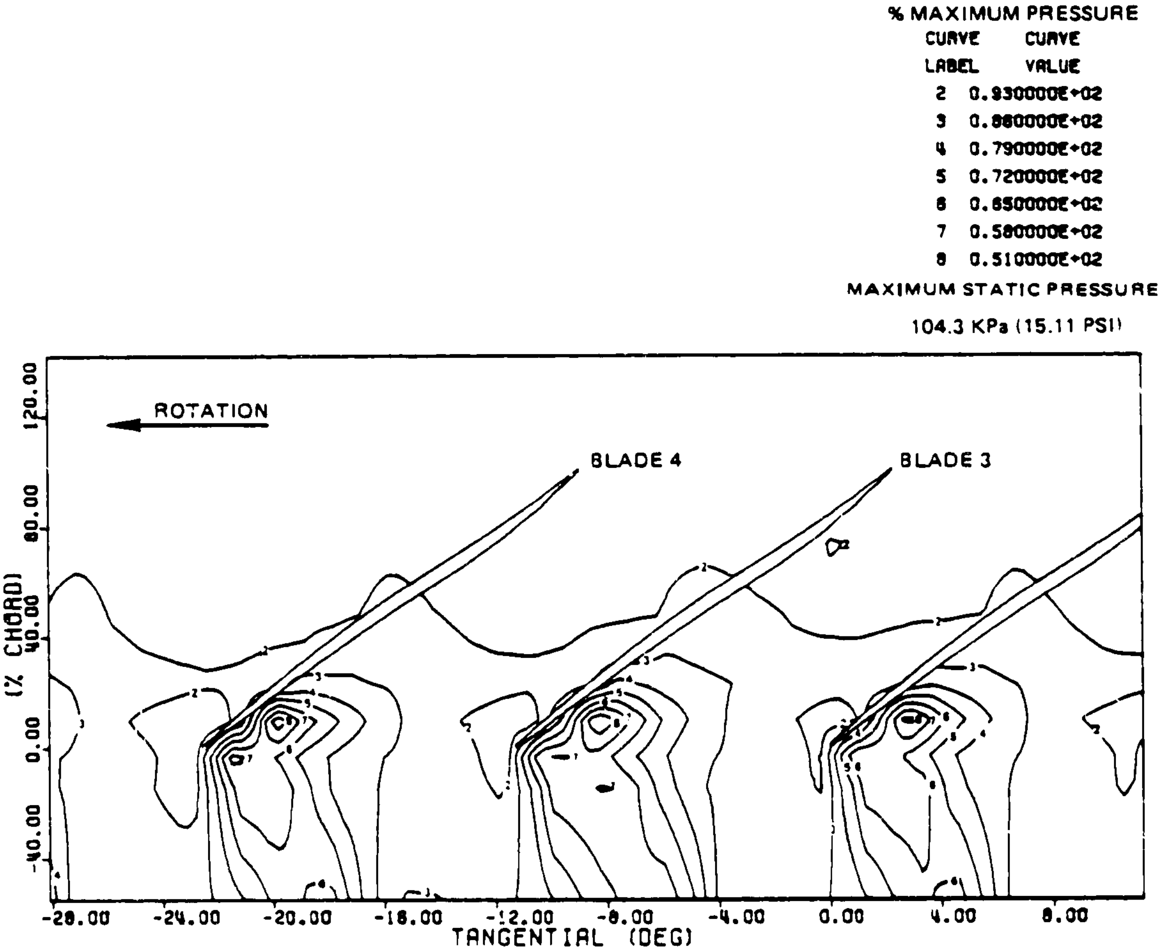

Figure D-12 Steady State Pressure Contours at Blade Tip; In Flutter, High Operating Line, 70 Percent Speed, 59.8 Percent Flow, Pressure Ratio 1.3004

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TABLE D-20

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

70% SPEED RECORD 220

Inlet Total Pressure = 87,000 N/m^2 (1817 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.962
-15.1	0.957
- 3.6	0.962
9.4	0.988
22.2	1.056
34.6	1.098
47.5	1.120
73.4	1.158
99.3	1.180
141.4	1.165

TABLE D-21

RECORD 220 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 118.7 KILOPASCALS = 17.20 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-27.6	74.3	-28.2	75.4	-27.6	74.0	-28.2	75.9	-27.4	74.5
2	-26.6	75.7	-27.4	76.3	-26.6	75.5	-27.6	81.0	-26.9	76.2
3	-24.9	76.7	-26.2	79.6	-24.7	79.5	-26.0	87.8	-25.8	79.1
4	-23.9	77.0	-24.8	81.4	-23.7	81.6	-24.4	94.1	-24.4	82.0
5	-22.7	74.7	-23.8	81.5	-23.3	82.3	-23.4	98.3	-23.2	84.1
6	-21.8	70.5	-23.3	79.2	-22.9	80.0	-22.9	99.2	-21.7	85.1
7	[illegible]	61.8	-22.2	57.1	-22.1	57.4	-21.7	76.4	-20.7	84.3
8	-19.7	60.2	-22.1	54.5	-22.1	54.3	-21.5	61.6	-20.2	81.2
9	-19.3	59.7	-21.8	53.2	-21.8	51.8	-21.2	47.3	-19.9	77.7
10	-19.8	61.1	-21.3	55.0	-21.5	54.0	-20.9	35.2	-19.7	74.4
11	-18.5	64.1	-20.9	55.3	-21.3	56.9	-20.7	29.9	-19.6	70.5
12	-18.3	67.5	-20.4	60.2	-20.9	58.6	-20.6	28.4	-19.2	67.9
13	-17.9	71.8	-19.4	69.2	-20.4	62.6	-20.0	36.4	-19.1	67.3
14	-17.7	73.3	-18.9	71.9	-19.4	67.4	-19.3	45.3	-18.4	69.4
15	-17.3	73.6	-18.5	72.1	-18.2	72.2	-18.8	53.3	-17.7	71.4
16	-16.8	73.3	-17.6	74.5	-16.5	74.1	-17.9	64.0	-16.4	74.3
17	-16.2	73.5	-17.2	75.1	-14.8	[illegible]	-17.0	72.0	-15.1	76.1
18	-15.4	74.5	-16.6	75.9	-13.3	79.7	-14.7	85.4	-13.7	79.5
19	-14.1	75.9	-16.3	75.9	-12.2	81.5	-13.4	91.1	-12.5	82.8
20	-13.1	76.3	-14.9	77.2	-11.4	79.7	-12.2	97.9	-11.3	84.6
21	-12.2	76.3	-13.4	79.4	-10.8	62.7	-11.5	100.0	-9.9	84.8
22	-11.5	75.0	-12.5	80.6	-10.5	53.6	-10.6	91.4	-8.9	82.4
23	-10.7	72.0	-11.7	77.4	-10.2	50.4	-10.2	77.2	-6.5	76.5
24	-9.8	67.2	-10.8	59.5	-9.6	53.7	-9.9	62.1	-8.1	69.4
25	-8.8	62.1	-10.6	55.3	-9.0	55.9	-9.7	47.3	-7.7	64.9
26	-9.1	58.9	-10.3	53.9	-8.6	60.7	-9.5	34.6	-7.6	62.9
27	-7.5	57.4	-9.9	54.4	-7.7	64.5	-9.2	24.2	-7.1	64.2
28	-7.0	57.1	-9.3	53.6	-6.8	69.2	-9.1	18.0	-6.0	68.2
29	-6.4	60.2	-9.0	54.8	-6.1	71.1	-8.9	17.1	-4.5	72.0
30	-6.0	64.2	-7.8	60.6	-5.5	71.8	-8.6	21.2	-3.4	74.8
31	-5.9	69.5	-7.2	66.4	-4.4	73.2	-7.9	36.4	-2.0	78.0
32	-5.6	72.9	-6.3	72.9	-3.6	74.6	-6.9	50.0	-1.0	80.5
33	-5.4	74.9	-4.4	75.4	-2.2	76.3	-5.5	68.1	1.3	83.3
34	-5.0	75.4	-2.7	77.9	-1.2	78.3	-4.4	76.7	2.2	83.6
35	-4.6	75.0	-1.3	79.0	-0.5	79.7	-2.9	83.6	2.7	81.2
36	-4.0	74.9	-0.8	79.0	0.2	75.9	-1.4	90.1	3.0	76.9
37	-2.7	75.6	-0.2	75.4	0.8	57.9	-0.1	94.0	3.2	73.0
38	-1.1	76.0	0.7	57.1	1.0	54.7	0.7	89.3	3.5	68.8
39	0.2	74.4	0.8	55.7	1.1	53.4	1.4	71.8	3.7	66.5
40	1.1	70.1	1.0	54.9	1.6	56.6	1.7	54.3	4.0	65.6
41	1.9	65.6	1.7	56.4	2.2	58.6	1.9	42.5	4.9	68.9
42	2.6	62.3	2.0	56.1	2.6	62.8	2.1	31.8	5.7	71.3
43	3.2	60.2	2.6	57.9	3.5	66.5	2.5	26.5	7.1	74.4
44	3.8	59.4	3.4	64.2	4.4	69.6	3.1	37.8	7.7	75.9
45	4.1	59.4	4.5	71.5	5.4	72.1	4.3	53.5	8.6	78.3
46	4.5	62.6	5.5	75.0	7.7	74.7	5.4	66.3	9.7	80.5
47	5.1	71.0	6.8	75.9	8.6	76.7	6.7	78.7	10.9	82.9
48	5.4	73.6	8.4	77.9	9.7	78.7	8.6	86.5	11.9	84.4

TABLE D-21 (Cont'd)

RECORD 220 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 118.7 KILOPASCALS = 17.20 PSI

SAMPLE	% CHORD=	-55.4	% CHORD=	-15.1	% CHORD=	-3.6	% CHORD=	9.4	% CHORD=	22.2
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	5.7	74.5	9.9	79.4	10.7	81.2	10.2	93.9	12.8	84.7
50	6.4	74.3	10.5	79.9	11.0	81.6	11.1	98.1	13.5	84.2
51	7.3	75.1	11.[illegible]	76.9	11.4	78.2	11.5	99.3	14.1	80.9
52	8.3	76.0	11.5	73.9	11.8	72.9	12.5	86.6	14.5	76.3
53	9.3	76.3	12.3	57.0	12.3	59.0	12.9	70.9	14.7	73.1
54	10.5	76.6	12.5	56.2	12.4	56.9	13.1	59.6	14.8	71.1
55	11.6	74.7	12.9	57.8	12.4	56.0	13.3	51.9	15.0	69.5
56	13.0	67.3	13.4	60.4	13.0	59.6	13.4	45.4	15.1	68.2
57	14.0	63.2	13.9	65.0	13.2	61.1	13.8	42.2	15.3	67.7
58	14.6	62.0	14.4	67.8	13.9	65.1	14.7	47.5	15.6	68.7
59	15.3	64.7	15.0	68.9	15.4	69.7	15.2	51.7	15.7	69.5
60	16.0	69.6	15.4	69.6	16.0	70.6	15.5	53.7	16.3	70.2

TABLE D-21 (Cont'd)

RECORD 220 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 118.7 KILOPASCALS = 17.20 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-28.1	76.0	-27.3	77.9	-28.1	84.6	-27.5	85.7	-28.1	84.6
2	-27.4	72.1	-27.2	77.7	-27.3	84.9	-27.2	85.8	-26.5	85.2
3	-25.3	8[illegible].7	-26.9	78.4	-26.5	85.2	-26.7	85.9	-25.5	85.3
4	-24.0	82.5	-26.4	79.5	-25.9	85.7	-26.1	86.1	-25.2	85.6
5	-23.2	82.6	-25.9	80.8	-25.0	86.3	-25.3	86.4	-24.4	85.9
6	-22.3	84.2	-25.2	81.8	-24.2	85.7	-24.0	86.5	-23.7	86.0
7	-21.9	84.2	-24.3	83.0	-23.6	84.1	-22.4	87.0	-22.7	85.8
8	-21.2	83.7	-23.3	83.8	-22.9	83.1	-21.7	87.1	-22.1	85.7
9	-19.9	83.4	-22.2	84.3	-22.2	84.6	-20.7	86.9	-20.9	85.5
10	-18.5	81.5	-21.0	84.7	-21.5	85.0	-20.1	87.0	-20.1	85.3
11	-17.9	74.7	-20.2	85.0	-20.8	85.5	-19.6	87.2	-19.4	85.2
12	-17.8	73.4	-19.1	84.6	-20.1	85.7	-18.7	86.6	-18.7	85.3
13	-17.6	73.2	-18.2	84.4	-19.3	85.7	-18.1	86.6	-18.0	85.0
14	-17.2	74.2	-17.9	84.0	-18.5	85.4	-17.4	86.3	-17.1	84.7
15	-16.7	76.3	-17.0	83.1	-17.8	85.5	-16.6	86.1	-15.9	85.1
16	-15.8	78.4	-16.6	81.9	-17.1	85.3	-15.9	86.2	-14.4	85.4
17	-15.0	79.3	-16.4	80.7	-16.4	85.3	-15.3	86.2	-13.7	85.6
18	-13.3	80.3	-16.1	79.4	-15.4	85.5	-14.7	86.5	-12.8	85.9
19	-13.5	80.5	-16.1	78.8	-14.7	86.0	-14.1	86.7	-11.7	85.6
20	-12.5	81.9	-15.7	79.4	-14.0	86.3	-13.4	86.8	-10.9	85.3
21	-11.9	83.0	-15.2	79.2	-13.5	86.7	-12.6	86.7	-10.2	85.4
22	-11.2	83.7	-14.5	80.1	-12.5	84.7	-11.0	87.0	-9.2	85.0
23	-10.9	84.0	-14.1	80.9	-11.6	82.9	-9.8	86.8	-8.4	84.7
24	-10.2	83.5	-13.3	81.4	-10.9	83.7	-8.8	86.3	-7.9	84.6
25	-9.4	83.3	-12.3	82.1	-10.4	84.0	-8.2	86.5	-7.1	84.7
26	-8.1	82.2	-12.3	83.0	-8.8	85.0	-7.0	85.8	-6.5	84.6
27	-7.5	80.5	-11.6	83.6	-7.8	84.9	-6.0	85.5	-6.1	84.6
28	-7.1	78.3	-10.5	84.0	-6.8	84.8	-5.1	85.5	-4.8	84.9
29	-6.3	71.1	-9.5	83.9	-6.2	84.9	-4.3	85.7	-4.3	85.3
30	-6.0	69.9	-8.5	83.6	-5.2	85.0	-3.9	85.7	-3.4	85.8
31	-5.6	71.4	-7.[illegible]	83.4	-4.6	85.1	-3.1	86.0	-2.8	85.9
32	-4.9	73.9	-6.1	83.3	-3.9	85.6	-2.6	86.3	-2.4	86.2
33	-4.2	76.1	-5.4	82.1	-3.2	86.0	-1.9	86.4	-2.0	86.5
34	-3.0	78.3	-4.6	79.0	-2.4	86.4	-1.2	86.4	-1.3	86.6
35	-1.6	80.[illegible]	-4.4	77.0	-1.6	85.9	-0.3	86.9	-0.3	86.3
36	-0.7	81.4	-4.3	76.3	-1.0	84.1	1.1	87.4	0.4	85.8
37	0.7	82.5	-4.1	76.1	-0.5	82.5	2.2	86.7	1.1	85.4
38	1.7	82.5	-3.5	77.3	-0.1	81.9	2.6	86.3	1.6	85.4
39	2.4	82.7	-2.7	79.4	0.6	83.0	2.9	86.2	2.2	85.3
40	3.3	82.6	-1.5	81.2	1.3	84.0	3.5	86.4	2.7	85.3
41	4.1	81.2	-0.2	82.4	2.7	85.2	4.2	86.0	3.4	85.3
42	4.5	79.8	0.6	83.0	3.4	85.1	4.8	86.1	3.9	85.3
43	5.3	72.6	1.9	83.3	4.1	85.3	5.5	85.9	4.5	85.0
44	5.5	71.8	2.6	83.6	5.0	85.1	6.4	86.1	5.7	84.8
45	6.0	73.6	4.1	83.6	6.2	85.0	7.0	86.1	6.9	85.2
46	6.5	75.7	5.4	83.7	7.0	85.1	7.8	86.1	7.6	85.5
47	7.2	77.5	6.0	82.7	8.0	85.6	8.5	86.4	8.6	85.6
48	8.3	79.4	7.[illegible]	78.1	8.5	86.0	9.4	86.6	9.2	85.8

TABLE D-21 (Cont'd)

RECORD 220 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 119.7 KILOPASCALS = 17.20 PSI

SAMPLE	% CHORD= 34.6		% CHORD= 47.5		% CHORD= 73.4		% CHORD= 99.3		% CHORD= 141.4	
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	9.3	80.7	7.2	77.5	9.5	84.2	9.5	86.5	10.1	85.9
50	1 .2	81.7	7.3	77.2	9.8	86.0	11.2	87.1	11.[illegible]	85.7
51	1 .9	82.6	7.5	79.3	10.3	85.4	11.9	87.5	11.4	85.5
52	11.5	83.4	8.3	79.	10.3	84.1	12.6	87.6	11.9	85.3
53	12.4	83.7	9.3	8[illegible].1	11.1	83.2	13.2	87.3	12.4	85.5
54	12.9	83.7	9.5	81.1	11.4	82.9	13.8	86.7	12.7	85.7
55	13.3	83.9	10.5	82.4	12.1	83.9	14.1	86.6	12.9	85.9
56	13.7	83.9	11.1	83.	12.6	84.7	14.4	86.5	13.4	85.9
57	14.3	83.6	12.6	84.0	13.2	85.3	14.9	86.7	14.1	85.8
58	14.9	83.	13.4	84.2	14.3	85.7	15.4	86.6	14.7	85.7
59	15.7	82.3	15.2	84.1	14.8	85.5	15.7	86.5	15.6	85.6
60	15.4	81.5	16.1	83.9	15.3	85.4	16.1	86.5	15.5	85.7

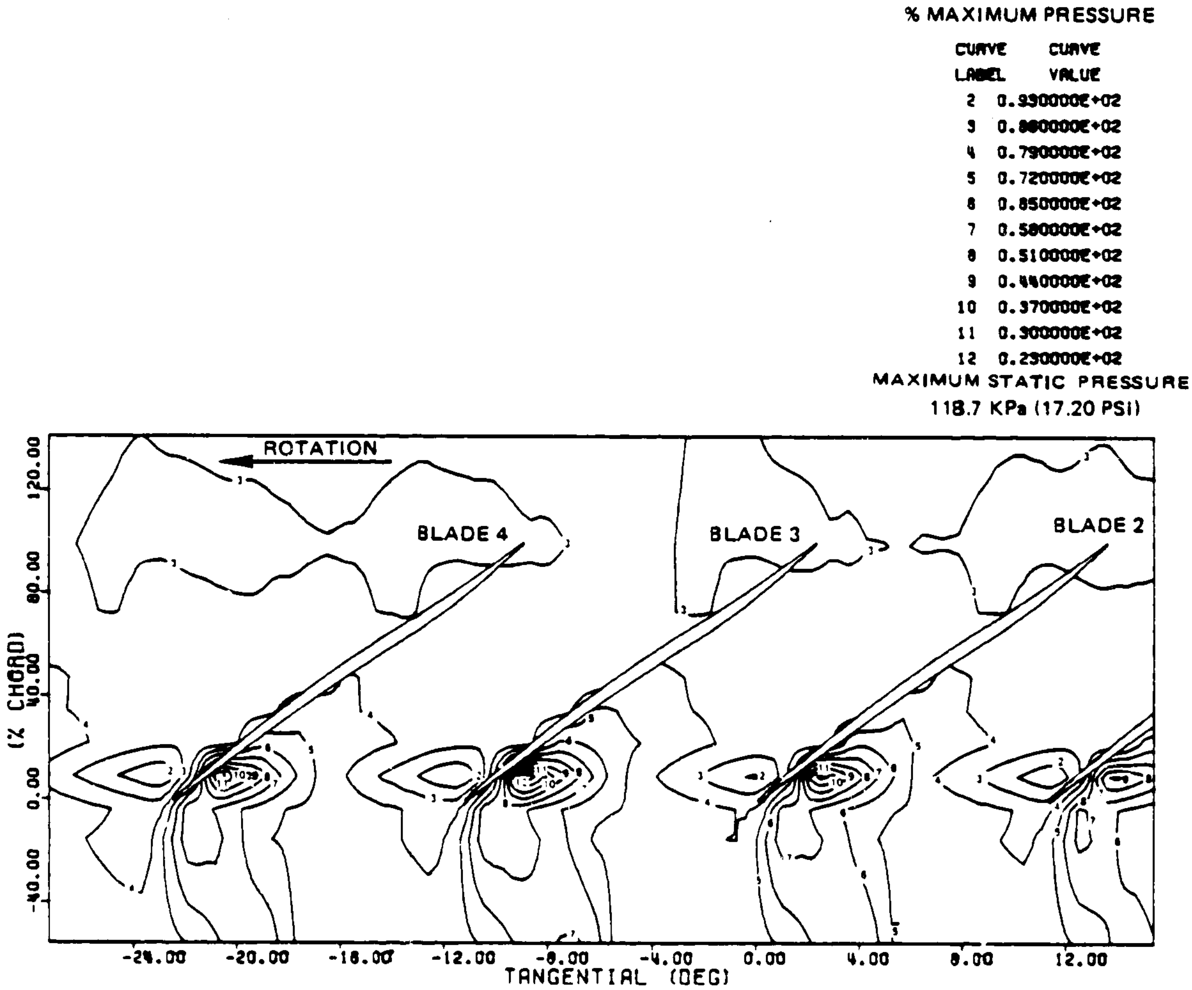

Figure D-13 Steady State Pressure Contours at Blade Tip; High Operating Line, 70 Percent Speed, 56.5 Percent Flow, Pressure Ratio 1.2978

TABLE D-22

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

73% SPEED RECORD 92

Inlet Total Pressure = 79,960 N/m^2 (1670 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.911
-15.1	0.911
- 3.6	0.938
9.4	0.961
22.2	0.971
34.6	1.024
47.5	1.051
73.4	1.059
99.3	1.074
141.4	1.086

TABLE D-23

PAGE 1

RECORD 92 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 102.5 KILOPASCALS = 14.85 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-29.5	63.0	-29.2	58.6	-29.5	59.1	-29.2	54.7	-29.6	64.7
2	-28.9	61.5	-28.3	59.5	-28.6	66.9	-28.5	65.0	-29.1	70.5
3	-28.2	60.7	-27.9	62.6	-28.2	74.0	-27.6	61.8	-28.7	76.2
4	-27.7	60.3	-26.9	83.6	-27.9	80.9	-27.0	85.0	-28.1	78.5
5	-27.4	60.3	-26.3	82.7	[illegible]	84.9	-25.5	86.6	-27.5	79.4
6	-27.0	62.1	-25.7	95.3	-26.4	86.9	-24.0	89.5	-26.8	79.1
7	-26.7	65.4	[illegible]	85.3	-24.4	[illegible]	-23.1	92.6	-25.7	81.9
8	-26.5	67.9	-24.4	86.9	-23.4	96.4	-22.1	96.9	-24.4	85.2
9	-25.8	83.8	-23.9	87.5	-22.8	100.0	-21.5	95.1	-23.6	89.7
10	-25.7	85.0	-22.4	91.6	-22.5	96.1	-20.9	87.2	-22.9	92.2
11	-25.4	85.5	-21.8	88.9	-21.6	59.9	-19.5	52.5	-22.5	92.8
12	-24.9	84.6	-21.6	85.8	-21.3	55.7	-19.2	49.4	-21.4	87.9
13	-24.3	83.9	-20.8	62.7	-20.8	61.2	-18.3	44.8	-20.6	83.6
14	-23.5	84.5	-20.5	61.5	-20.2	58.3	-17.9	47.9	-20.0	77.1
15	-22.6	84.5	-20.2	62.0	-19.7	59.2	-17.4	53.2	-19.4	69.2
16	-21.9	82.8	-19.3	56.7	-18.9	57.2	-16.7	56.5	-19.0	60.2
17	-20.9	77.3	-18.7	56.4	-18.4	57.4	-16.3	58.0	-18.8	57.4
18	-19.3	68.0	-18.1	55.2	-17.6	56.9	-15.6	58.6	-18.5	56.7
19	-18.5	64.3	-17.4	56.2	-16.8	57.3	-14.9	63.3	-18.0	58.7
20	-17.2	59.6	-16.7	56.3	-15.8	56.4	-14.5	72.9	-17.4	55.5
21	-15.7	57.8	-15.7	57.4	-15.4	58.3	-13.9	83.5	-16.2	51.7
22	-14.5	56.6	-14.0	56.0	-15.0	62.0	-13.1	87.1	-15.7	55.2
23	-13.5	56.2	-14.1	57.6	-14.4	80.0	-12.0	88.8	-15.4	61.8
24	-13.0	58.4	-13.3	81.0	-14.0	84.5	-11.4	90.9	-15.2	68.5
25	-12.7	62.1	-13.0	85.6	-13.2	88.2	-10.8	93.0	-14.8	72.3
26	-12.5	67.3	-12.5	85.2	-12.4	91.2	-10.2	96.8	-14.0	77.0
27	-12.4	73.1	-11.7	[illegible]	-11.7	95.7	-9.6	84.4	-13.0	91.5
28	-12.3	90.2	-11.3	88.3	-11.2	91.4	-9.2	78.0	-12.2	85.4
29	-12.1	84.9	[illegible]	88.9	-10.3	59.9	-8.3	56.6	-11.7	87.5
30	-12.0	37.1	-10.6	86.6	-10.0	58.1	-7.9	52.9	-10.9	38.2
31	-11.6	88.4	-9.4	64.5	-9.5	61.4	-7.3	48.7	-9.9	86.5
32	-11.0	84.8	-9.3	62.3	-9.1	59.9	-7.0	47.8	-8.9	80.7
33	-7.8	67.9	-8.7	63.5	-8.5	61.2	-6.4	50.5	-8.5	75.7
34	-7.2	55.7	-8.2	62.2	-8.0	60.5	-5.9	55.3	-8.2	70.3
35	-6.5	62.6	-7.5	59.1	-7.0	[illegible]	-5.7	58.8	-8.0	65.8
36	-5.5	61.2	-6.4	57.8	-6.3	60.0	-5.0	75.1	-7.7	62.2
37	-4.8	60.8	-5.6	58.8	-5.7	62.0	-4.4	80.6	-7.5	60.2
38	-4.2	60.7	-4.9	60.6	-5.6	64.9	-3.6	83.0	-7.3	59.9
39	-3.7	62.8	-3.9	82.3	-4.9	79.9	-1.4	87.4	-6.4	63.1
40	-3.5	66.2	-3.6	83.8	-4.5	83.5	-0.1	91.4	-5.7	73.8
41	-3.2	70.3	[illegible]	92.3	-3.5	85.5	0.7	94.1	-5.5	76.0
42	-2.8	80.6	-2.4	84.4	-1.9	87.9	1.4	89.1	-4.5	76.7
43	-2.8	82.5	-1.8	64.5	-0.7	92.8	1.9	81.7	-3.7	75.8
44	-2.6	83.7	0.5	89.7	-0.4	95.4	2.4	71.1	-2.8	76.5
45	-2.5	84.7	0.9	84.9	-0.1	96.3	3.1	56.2	-1.7	80.8
46	-1.9	84.0	1.6	69.4	1.0	63.1	3.5	53.9	-0.9	85.0
47	-1.2	83.2	2.2	62.9	1.3	59.0	4.0	50.9	-0.5	87.4
48	-0.7	83.2	2.6	62.9	1.9	63.7	4.4	49.9	0.2	88.4

TABLE D-23(Contd)

RECORD 92 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 102.5 KILOPASCALS = 14.85 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	0.1	83.2	3.1	61.0	2.4	60.8	5.2	54.2	1.6	93.4
50	0.9	91.7	3.6	58.6	2.9	61.8	5.9	59.2	2.9	75.3
51	1.6	78.4	4.8	53.3	3.7	59.8	6.5	63.9	3.3	68.3
52	3.6	67.0	5.5	58.4	4.1	59.7	6.8	69.9	3.7	62.3
53	4.3	64.1	6.4	57.8	5.0	58.6	7.1	75.6	4.1	56.4
54	4.9	61.9	7.1	59.2	5.8	58.6	7.4	80.6	4.7	58.9
55	6.1	60.4	7.5	62.4	6.4	62.6	7.8	84.0	5.3	58.7
56	7.0	59.6	8.2	81.4	6.8	67.3	8.0	85.2	5.8	63.1
57	8.0	59.2	8.3	83.0	7.4	82.8	8.3	85.9	6.2	69.2
58	8.4	61.4	8.5	84.2	7.7	85.0	8.6	86.5	6.7	74.0
59	8.7	69.5	9.2	83.4	8.4	86.5	9.0	87.0	8.3	76.5
60	9.1	75.9	9.4	84.2	9.0	87.7	9.3	87.3	9.1	80.7

TABLE D-23(Contd)

RECORD 92 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 102.5 KILOPASCALS = 14.85 PSI

SAMPLE NUMBER	% CHORD= 24.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-29.3	76.4	-29.7	76.1	-29.3	82.0	-29.6	80.6	-29.2	84.5
2	-28.7	75.[illegible]	-29.[illegible]	79.3	-28.2	82.9	-29.[illegible]	80.5	-29.5	83.5
3	-28.3	74.2	-28.1	81.2	-27.9	83.3	-28.5	81.0	-27.9	82.8
4	-27.9	77.8	-27.4	83.4	-27.6	83.5	-27.9	81.8	-27.3	83.2
5	-27.4	83.4	-26.8	85.3	-27.0	82.9	-27.4	82.7	+26.7	83.1
6	-26.7	85.9	-26.3	87.4	-26.2	82.3	-27.0	83.4	-25.9	83.7
7	-25.4	87.7	-25.4	83.9	-25.9	82.2	-26.2	83.9	-25.1	85.4
8	-24.2	88.3	-24.1	89.5	-25.3	82.6	-25.6	84.7	-24.3	84.2
9	-22.7	86.6	-23.1	69.3	-24.8	83.3	-24.8	85.2	-23.2	84.8
10	-21.6	84.2	-22.1	87.3	-24.2	84.1	-24.0	85.6	-22.3	85.2
11	-20.7	83.0	-21.5	84.7	-23.9	84.7	-23.1	85.7	-21.4	84.8
12	-19.7	83.1	-20.9	82.3	-23.6	85.5	-22.1	85.4	-20.6	84.6
13	-18.3	78.7	-20.2	79.6	-23.3	85.9	-21.3	85.0	-19.4	84.7
14	-17.4	74.8	-19.8	78.7	-22.9	86.3	-20.8	84.1	-18.3	84.9
15	-17.1	69.5	-19.1	78.4	-22.2	85.6	-20.4	83.1	-17.7	84.8
16	-16.5	61.7	-18.2	78.7	-22.1	84.7	-20.1	82.4	-17.0	85.0
17	-16.2	5[illegible].9	-17.4	78.5	-22.0	83.7	-19.3	84.7	-16.5	84.6
18	-15.6	58.3	-16.6	76.5	-21.8	82.8	-18.6	83.4	-15.6	82.9
19	-15.2	61.2	-16.2	73.3	-21.7	82.3	-18.2	83.8	-14.7	84.2
20	-15.0	66.5	-16.0	70.8	-21.5	82.0	-17.6	83.9	-14.2	84.3
21	-14.6	71.4	-15.6	69.2	-20.9	82.4	-16.9	84.4	-13.6	84.8
22	-14.2	74.2	-15.3	71.5	-20.5	81.9	-16.2	84.7	-12.8	85.2
23	-13.4	77.9	-15.2	74.0	-20.0	81.3	-15.8	85.1	-12.1	85.6
24	-12.7	80.5	-15.1	76.8	-19.5	81.9	-15.1	85.2	-11.4	85.9
25	-12.2	81.6	-15.0	79.5	-19.2	82.4	-14.7	85.3	-10.5	84.9
26	-11.2	80.6	-14.9	80.7	-18.9	82.9	-13.9	86.1	-9.5	84.3
27	-10.5	79.6	-14.4	82.4	-18.4	83.2	-13.2	87.3	-9.4	84.3
28	-9.9	77.7	-14.[illegible]	84.6	-17.7	83.0	-12.7	87.7	-6.8	84.5
29	-9.3	77.3	-13.5	86.3	-17.3	83.3	-11.9	87.8	-7.8	84.5
30	-8.6	78.8	-13.1	87.2	-17.1	83.6	-11.1	87.3	-7.2	85.1
31	-8.0	80.3	-12.1	87.6	-16.1	83.0	-10.1	86.0	-6.1	85.7
32	-7.6	80.6	-11.2	86.7	-15.8	83.3	-9.2	84.1	-5.2	85.9
33	-6.8	78.2	-10.5	84.4	-15.1	83.9	-8.6	81.5	-4.3	85.6
34	-6.0	74.4	-9.9	82.0	-14.7	84.5	-7.8	82.9	-3.8	84.7
35	-5.8	72.3	-9.3	79.4	-14.2	85.1	-7.0	81.7	-3.3	84.2
36	-5.5	70.3	-8.9	77.2	-13.6	85.7	-6.2	81.6	-2.5	84.8
37	-5.2	72.2	-8.5	75.6	-12.9	85.9	-5.6	82.3	-1.8	84.6
38	-5.0	75.6	-7.6	74.1	-12.6	86.2	-4.7	83.5	-1.1	84.9
39	-4.8	79.8	-6.8	75.1	-12.1	86.6	-3.7	84.3	-0.6	85.4
40	-4.5	82.6	-6.2	77.2	-11.4	86.0	-2.8	85.2	-0.5	85.7
41	-4.0	83.9	-5.6	79.8	-10.4	81.9	-2.1	85.7	-0.6	85.9
42	-3.2	85.6	-5.2	81.9	-9.9	81.7	-1.3	85.8	0.6	85.6
43	-1.7	86.3	-4.5	82.9	-9.2	80.9	-0.5	85.6	1.3	85.1
44	-0.9	86.3	-4.0	84.3	-8.2	80.4	0.1	85.3	1.6	85.1
45	0.1	84.0	-3.6	86.1	-5.8	84.0	0.9	85.3	2.4	85.2
46	1.6	79.3	-3.[illegible]	86.8	-4.8	83.3	1.7	84.6	3.4	85.[illegible]
47	2.2	78.8	-1.7	87.6	-3.7	81.6	2.[illegible]	83.1	4.6	85.[illegible]
48	3.2	78.9	-0.7	87.7	-2.4	82.6	2.4	80.8	5.2	85.[illegible]

TABLE D-23(Contd)

RECORD 92 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 102.5 KILOPASCALS = 14.85 PSI

SAMPLE	% CHORD=	34.6	% CHORD=	47.5	% CHORD=	73.4	% CHORD=	99.3	% CHORD=	141.4
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	5.0	75.4	0.3	86.0	-1.4	83.9	2.7	79.4	5.7	85.2
50	5.6	72.4	1.0	92.8	-0.9	85.2	3.0	80.2	6.2	84.8
51	5.8	69.6	1.4	80.5	-0.2	85.5	3.3	81.0	6.5	83.9
52	6.0	67.6	1.9	78.1	1.4	80.0	3.5	81.4	6.9	83.2
53	6.3	65.2	2.4	76.2	1.7	79.9	4.0	80.1	7.0	82.9
54	6.6	68.4	2.9	75.1	2.8	78.6	4.4	79.2	7.5	83.3
55	6.7	71.3	3.7	74.8	4.4	81.4	4.8	78.6	7.8	83.7
56	6.9	[illegible]	4.4	75.8	4.8	81.4	5.2	78.4	8.0	84.1
57	7.1	79.1	6.3	79.5	5.7	82.7	5.8	79.9	8.5	[illegible]
58	7.4	81.1	7.0	81.4	6.2	82.5	6.5	81.6	8.8	84.2
59	8.5	84.6	7.9	85.4	7.3	82.9	7.6	83.8	9.1	84.4
60	9.5	85.3	9.1	88.5	9.4	84.6	9.1	85.6	9.5	84.5

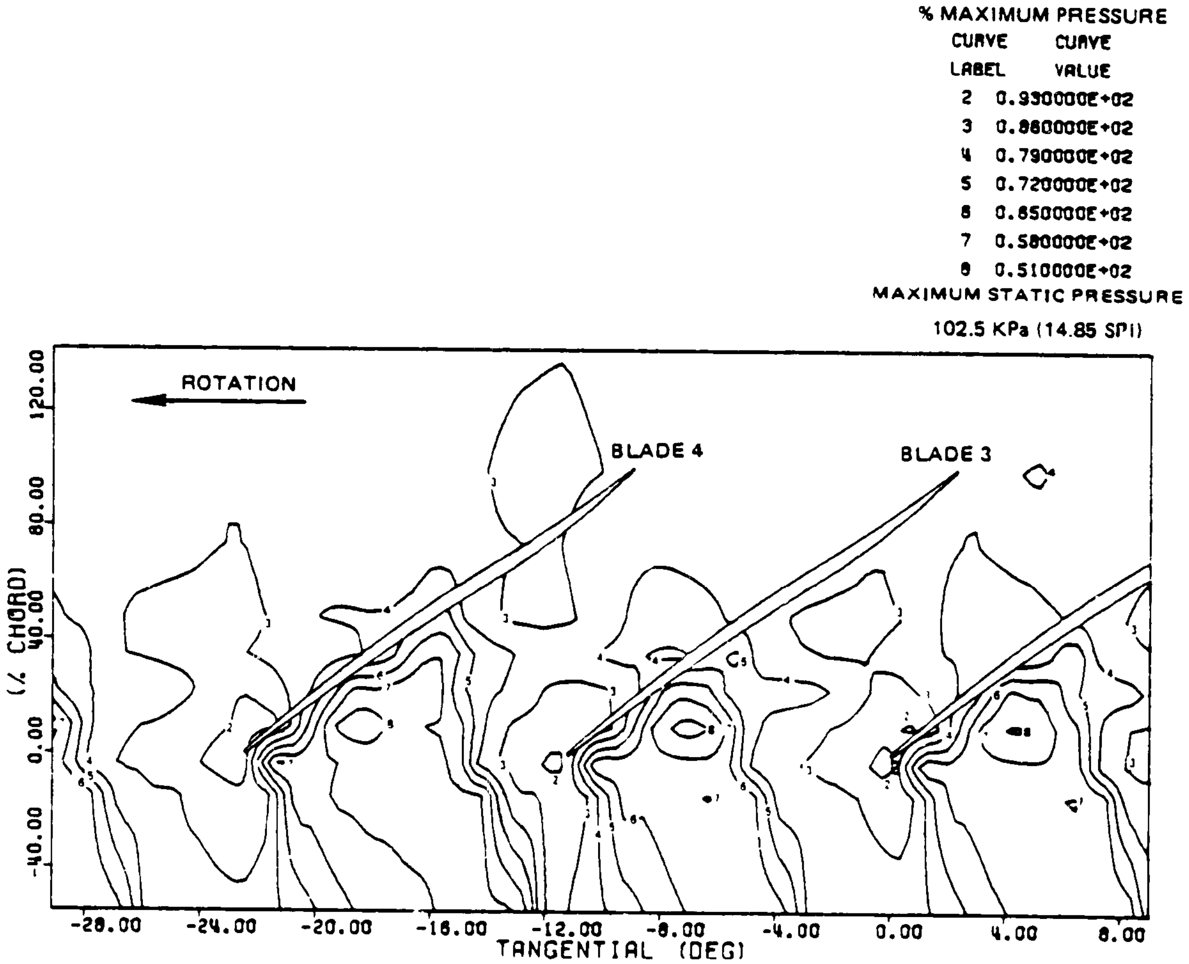

Figure D-14 Steady State Pressure Contours at Blade Tip; No Flutter, High Operating Line, 73 Percent Speed, 74.7 Percent Flow, Pressure Ratio 1.2687

TABLE D-24

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

73% SPEED RECORD 104

Inlet Total Pressure = 86,280 N/m^2 (1802 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.953
-15.1	0.948
- 3.6	0.953
9.4	0.981
22.2	1.066
34.6	1.177
47.5	1.143
73.4	1.184
99.3	1.206
141.4	1.190

TABLE D-25

RECORD 104 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 106.0 KILOPASCALS = 15.40 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-41.9	68.1	-41.9	61.4	-41.9	69.4	-41.9	55.2	-41.9	78.3
2	-40.9	64.2	-40.9	67.8	-40.9	73.7	-40.9	63.6	-40.9	73.4
3	-39.8	63.9	-39.8	75.5	-39.8	77.9	-39.8	72.6	-39.8	76.7
4	-38.8	74.7	-38.8	81.0	-38.8	91.2	-38.8	79.4	-38.8	80.1
5	-37.8	83.0	-37.8	84.3	-37.8	82.1	-37.8	84.4	-37.8	83.1
6	-36.7	95.6	-36.7	97.2	-36.7	83.6	-36.7	87.9	-36.7	86.2
7	-35.7	86.2	-35.7	89.9	-35.7	85.4	-35.7	91.3	-35.7	89.6
8	-34.7	65.9	-34.7	91.6	-34.7	88.2	-34.7	95.3	-34.7	92.7
9	-33.6	83.9	-33.6	83.4	-33.6	76.9	-33.6	97.3	-33.6	95.0
10	-32.6	79.4	-32.6	62.7	-32.6	64.8	-32.6	98.6	-32.6	95.6
11	-31.6	73.0	-31.6	59.4	-31.6	64.3	-31.6	55.9	-31.6	94.5
12	-30.5	67.4	-30.5	59.7	-30.5	69.8	-30.5	55.0	-30.5	76.6
13	-29.5	63.2	-29.5	67.0	-29.5	74.3	-29.5	64.4	-29.5	74.3
14	-28.5	63.0	-28.5	76.0	-28.5	78.9	-28.5	73.3	-28.5	77.7
15	-27.4	73.2	-27.4	82.0	-27.4	82.0	-27.4	80.3	-27.4	81.3
16	-26.4	84.5	-26.4	85.3	-26.4	83.0	-26.4	85.2	-26.4	84.7
17	-25.4	87.1	-25.4	88.4	-25.4	84.3	-25.4	88.9	-25.4	87.9
18	-24.3	87.6	-24.3	90.8	-24.3	86.4	-24.3	92.3	-24.3	91.1
19	-23.3	87.2	-23.3	91.1	-23.3	89.8	-23.3	95.8	-23.3	94.1
20	-22.3	84.9	-22.3	82.7	-22.3	75.4	-22.3	96.6	-22.3	96.4
21	-21.2	79.7	-21.2	64.0	-21.2	65.0	-21.2	86.7	-21.2	97.1
22	-20.2	72.9	-20.2	59.9	-20.2	66.5	-20.2	57.8	-20.2	95.4
23	-19.2	67.0	-19.2	63.3	-19.2	71.5	-19.2	56.8	-19.2	77.0
24	-18.1	63.9	-18.1	71.2	-18.1	75.6	-18.1	65.6	-18.1	75.9
25	-17.1	66.0	-17.1	78.7	-17.1	79.5	-17.1	74.3	-17.1	78.9
26	-16.1	80.9	-16.1	82.8	-16.1	92.1	-16.1	80.4	-16.1	82.6
27	-15.0	85.2	-15.0	85.6	-15.0	83.3	-15.0	85.3	-15.0	85.5
28	-14.0	86.1	-14.0	83.2	-14.0	84.7	-14.0	88.9	-14.0	88.4
29	-13.0	86.7	-13.0	91.1	-13.0	86.9	-13.0	92.3	-13.0	91.5
30	-11.9	86.5	-11.9	91.2	-11.9	89.8	-11.9	96.0	-11.9	94.3
31	-10.9	83.8	-10.9	79.1	-10.9	72.0	-10.9	96.1	-10.9	96.2
32	-9.9	78.0	-9.9	62.3	-9.9	62.8	-9.9	83.2	-9.9	96.5
33	-8.8	71.4	-8.8	59.4	-8.8	63.5	-8.8	56.6	-8.8	91.8
34	-7.8	66.0	-7.8	58.9	-7.8	67.5	-7.8	50.0	-7.8	69.0
35	-6.8	62.4	-6.8	65.1	-6.8	71.8	-6.8	62.1	-6.8	69.9
36	-5.7	61.8	-5.7	71.2	-5.7	76.4	-5.7	71.1	-5.7	74.2
37	-4.7	66.4	-4.7	79.7	-4.7	80.3	-4.7	77.9	-4.7	78.0
38	-3.7	82.9	-3.7	84.0	-3.7	82.0	-3.7	82.8	-3.7	81.5
39	-2.6	87.2	-2.6	87.6	-2.6	82.8	-2.6	87.3	-2.6	85.1
40	-1.6	87.4	-1.6	89.3	-1.6	84.9	-1.6	91.1	-1.6	88.4
41	-0.6	96.1	-0.6	88.2	-0.6	87.6	-0.6	93.9	-0.6	91.4
42	0.5	83.3	0.5	74.8	0.5	67.3	0.5	92.5	0.5	93.7
43	1.5	77.5	1.5	62.5	1.5	64.7	1.5	77.0	1.5	94.0
44	2.5	71.3	2.5	63.0	2.5	69.0	2.5	57.1	2.5	89.1
45	3.6	66.7	3.6	67.4	3.6	73.4	3.6	62.1	3.6	74.2
46	4.6	65.2	4.6	73.4	4.6	77.5	4.6	70.5	4.6	75.9
47	5.6	70.7	5.6	80.8	5.6	80.4	5.6	77.8	5.6	79.3
48	6.7	81.8	6.7	83.9	6.7	81.8	6.7	83.0	6.7	82.5

TABLE D-25 (Contd).

RECORD 104 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 106.0 KILOPASCALS = 15.40 PSI

SAMPLE	% CHORD=	-55.4	% CHORD=	-15.1	% CHORD=	-3.6	% CHORD=	9.4	% CHORD=	22.2
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	7.7	85.5	7.7	86.0	7.7	82.9	7.7	87.3	7.7	85.4
50	8.7	86.4	8.7	89.2	8.7	84.5	8.7	90.5	8.7	88.7
51	9.8	86.5	9.8	90.6	9.8	86.5	9.8	93.7	9.8	91.9

TABLE D-25(Contd)

RECORD 104 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 106.0 KILOPASCALS = 15.40 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-41.9	92.7	-41.9	94.5	-41.9	96.2	-41.9	98.2	-41.9	97.8
2	-40.9	90.6	-40.9	94.3	-40.9	95.2	-40.9	97.3	-40.9	97.3
3	-39.8	81.5	-39.8	93.8	-39.8	95.3	-39.8	96.7	-39.8	96.5
4	-38.8	82.9	-38.8	90.2	-38.8	95.8	-38.8	96.6	-38.8	95.7
5	-37.8	86.1	-37.8	87.4	-37.8	96.4	-37.8	97.0	-37.8	95.4
6	-36.7	88.7	-36.7	89.6	-36.7	96.8	-36.7	97.8	-36.7	96.2
7	-35.7	90.9	-35.7	91.5	-35.7	97.0	-35.7	98.4	-35.7	96.8
8	-34.7	93.7	-34.7	93.1	-34.7	95.8	-34.7	98.7	-34.7	96.6
9	-33.6	96.2	-33.6	94.1	-33.6	95.0	-33.6	98.9	-33.6	96.3
10	-32.6	96.4	-32.6	94.6	-32.6	96.1	-32.6	99.2	-32.6	96.2
11	-31.6	94.2	-31.6	94.3	-31.6	96.5	-31.6	98.0	-31.6	96.7
12	-30.5	92.5	-30.5	94.3	-30.5	95.9	-30.5	97.6	-30.5	97.3
13	-29.5	89.5	-29.5	94.6	-29.5	95.1	-29.5	97.0	-29.5	97.1
14	-28.5	80.7	-28.5	94.3	-28.5	95.3	-28.5	96.5	-28.5	96.5
15	-27.4	83.3	-27.4	90.4	-27.4	96.0	-27.4	96.6	-27.4	95.8
16	-26.4	87.2	-26.4	88.9	-26.4	96.6	-26.4	97.3	-26.4	95.6
17	-25.4	90.0	-25.4	91.0	-25.4	97.1	-25.4	98.1	-25.4	96.6
18	-24.3	93.3	-24.3	92.7	-24.3	97.6	-24.3	98.6	-24.3	97.3
19	-23.3	95.7	-23.3	94.1	-23.3	97.0	-23.3	98.9	-23.3	97.3
20	-22.3	97.6	-22.3	95.5	-22.3	96.7	-22.3	99.5	-22.3	96.9
21	-21.2	97.2	-21.2	96.2	-21.2	97.3	-21.2	100.0	-21.2	97.1
22	-20.2	95.1	-20.2	96.2	-20.2	97.4	-20.2	99.1	-20.2	97.7
23	-19.2	93.5	-19.2	95.8	-19.2	96.9	-19.2	98.9	-19.2	98.2
24	-18.1	89.8	-18.1	95.4	-18.1	96.1	-18.1	98.3	-18.1	97.6
25	-17.1	82.4	-17.1	94.3	-17.1	96.3	-17.1	97.6	-17.1	96.8
26	-16.1	84.8	-16.1	89.6	-16.1	96.8	-16.1	97.6	-16.1	96.3
27	-15.0	88.0	-15.0	89.0	-15.0	97.2	-15.0	98.2	-15.0	96.2
28	-14.0	90.4	-14.0	91.1	-14.0	97.5	-14.0	98.9	-14.0	96.9
29	-13.0	92.7	-13.0	93.0	-13.0	97.7	-13.0	99.3	-13.0	97.1
30	-11.9	95.2	-11.9	94.5	-11.9	96.0	-11.9	99.5	-11.9	96.7
31	-10.9	97.3	-10.9	95.4	-10.9	96.1	-10.9	99.6	-10.9	96.4
32	-9.9	97.2	-9.9	95.6	-9.9	96.9	-9.9	99.5	-9.9	96.6
33	-8.8	94.5	-8.8	94.9	-8.8	97.0	-8.8	98.3	-8.8	97.4
34	-7.8	92.0	-7.8	94.2	-7.8	96.3	-7.8	97.4	-7.8	98.0
35	-6.8	86.5	-6.8	94.3	-6.8	95.7	-6.8	96.6	-6.8	97.6
36	-5.7	79.3	-5.7	93.9	-5.7	95.9	-5.7	96.4	-5.7	97.1
37	-4.7	82.1	-4.7	86.9	-4.7	96.6	-4.7	97.0	-4.7	96.5
38	-3.7	83.7	-3.7	86.3	-3.7	97.6	-3.7	97.8	-3.7	96.1
39	-2.6	87.4	-2.6	89.6	-2.6	97.7	-2.6	98.4	-2.6	96.9
40	-1.6	90.7	-1.6	90.8	-1.6	97.7	-1.6	98.6	-1.6	97.7
41	-0.6	93.4	-0.6	92.4	-0.6	95.4	-0.6	98.9	-0.6	97.6
42	0.5	95.3	0.5	93.4	0.5	95.5	0.5	99.3	0.5	97.3
43	1.5	94.3	1.5	94.1	1.5	96.2	1.5	99.0	1.5	97.3
44	2.5	92.8	2.5	94.3	2.5	96.2	2.5	97.9	2.5	97.8
45	3.6	91.8	3.6	94.5	3.6	95.8	3.6	97.6	3.6	97.8
46	4.6	87.1	4.6	94.7	4.6	95.7	4.6	97.2	4.6	97.0
47	5.6	83.0	5.6	94.3	5.6	96.0	5.6	97.0	5.6	96.2
48	6.7	84.7	6.7	87.9	6.7	96.6	6.7	97.5	6.7	96.0

TABLE D-25(Contd)

RECORD 104 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 106.0 KILOPASCALS = 15.40 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	7.7	87.8	7.7	88.7	7.7	97.1	7.7	98.3	7.7	96.1
50	8.7	90.6	8.7	90.7	8.7	97.4	8.7	98.8	8.7	97.0
51	9.8	93.0	9.8	92.7	9.8	97.5	9.8	99.2	9.8	97.0

ORIGINAL PAGE IS OF POOR QUALITY

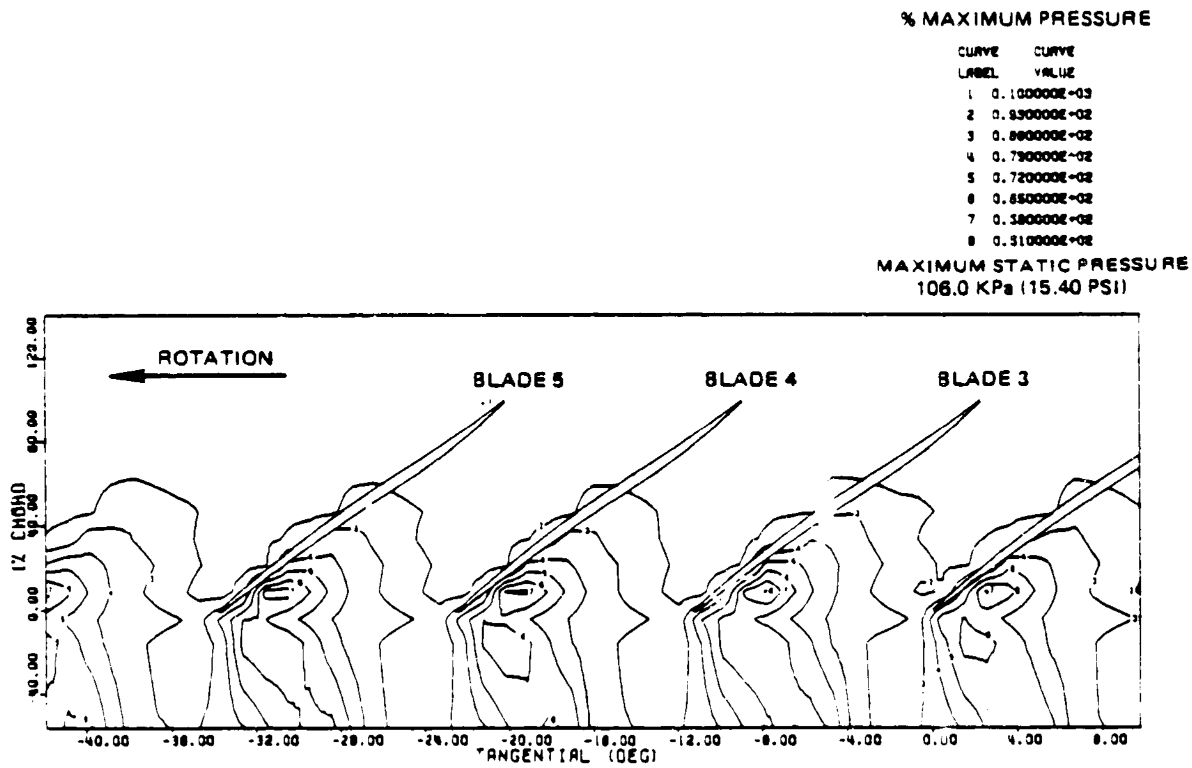

Figure D-15 Steady State Pressure Contours at Blade Tip; In Flutter, High Operating Line, 73 Percent Speed, 60 Percent Flow, Pressure Ratio 1.3317

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TABLE D-26

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

75% SPEED RECORD 181

Inlet Total Pressure = 79,480 N/m^2 (1660 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.909
-15.1	0.907
- 3.6	0.928
9.4	0.961
22.2	0.974
34.6	1.026
47.5	1.057
73.4	1.072
99.3	1.087
141.4	1.102

TABLE D-27

RECORD 181 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 102.4 KILOPASCALS = 14.83 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-23.7	85.4	-23.7	90.5	-23.7	92.2	-23.7	91.9	-23.7	87.6
2	-23.2	85.6	-22.4	93.7	-23.1	96.4	-23.0	95.3	-22.3	93.9
3	-22.6	85.7	-22.[illegible]	90.8	-22.5	100.0	-22.1	98.4	-21.4	9[illegible].4
4	-21.8	84.2	-20.7	60.1	-21.2	55.0	-21.7	95.9	-20.1	85.3
5	-21.0	80.6	-20.1	61.0	-20.7	61.4	-19.6	51.2	-19.6	78.0
6	-20.1	74.1	-19.3	57.0	-20.0	58.3	-19.6	49.6	-18.7	59.4
7	-19.4	69.7	-18.0	54.6	-19.5	59.0	-18.5	45.0	-18.4	57.5
8	-18.3	64.8	-16.0	56.4	-18.9	57.2	-18.2	47.6	-17.9	59.4
9	-16.4	59.9	-14.7	54.9	-18.2	57.7	-17.6	53.2	-16.9	55.6
10	-14.6	56.3	-14.0	57.8	-17.6	57.2	-16.4	58.2	-15.9	51.9
11	-13.7	55.5	-13.0	86.3	-16.9	57.6	-15.6	58.2	-15.4	55.6
12	-12.9	55.5	-12.9	87.7	-15.4	56.3	-15.1	60.3	-15.0	77.3
13	-12.5	57.9	-12.4	87.0	-14.7	59.1	-14.4	72.5	-14.8	80.4
14	-12.2	62.4	-11.4	90.9	-13.9	81.5	-13.8	84.9	-14.2	79.3
15	-11.4	87.1	-10.9	87.2	-13.1	87.6	-12.9	88.9	-12.9	85.1
16	-11.3	98.4	-9.8	62.2	-12.0	93.3	-12.2	90.0	-11.7	88.3
17	-11.1	89.0	-9.5	61.1	-11.5	96.0	-10.9	94.5	-10.9	89.6
18	-10.6	87.0	-9.1	62.0	-11.0	90.5	-10.1	90.1	-9.5	86.3
19	-10.0	81.9	-8.2	58.6	-10.2	58.4	-9.2	68.3	-8.6	79.1
20	-8.8	73.5	-7.7	58.9	-10.1	56.2	-8.4	51.9	-7.6	62.1
21	-7.2	65.9	-6.5	56.4	-9.5	60.0	-7.2	47.4	-7.3	59.6
22	-5.5	60.9	-6.0	56.8	-8.9	59.2	-6.5	52.5	-6.7	60.4
23	-4.2	59.3	-5.2	57.0	-8.4	59.9	-5.5	61.3	-6.2	59.7
24	-3.6	59.2	-4.6	59.5	-7.7	59.3	-4.8	77.0	-5.8	62.8
25	-3.1	61.0	-3.7	83.4	-7.1	59.7	-3.8	83.8	-5.1	72.8
26	-2.9	65.8	-3.4	85.9	-5.8	59.6	-3.1	84.6	-3.9	75.6
27	-2.2	84.1	-2.9	83.8	-5.2	62.0	-1.1	89.4	-3.2	75.3
28	-2.1	85.9	-2.2	86.9	-4.3	78.7	-0.2	93.8	-2.1	78.8
29	-1.8	87.2	-1.7	96.7	-3.7	84.8	0.4	95.0	-0.2	88.0
30	-1.0	86.1	-0.1	91.6	-1.9	88.5	1.0	91.1	0.3	89.2
31	-0.1	85.1	0.6	87.2	-0.5	94.2	2.6	58.5	1.6	85.0
32	1.3	81.2	1.5	63.4	-0.2	95.9	3.4	52.4	2.6	80.7
33	3.0	71.1	1.8	61.3	0.2	92.1	3.9	49.6	3.1	74.1
34	5.6	61.4	2.3	63.6	1.0	60.0	4.8	54.6	3.8	60.5
35	7.4	59.1	3.2	57.6	1.2	58.0	5.7	61.2	4.1	58.0
36	8.3	53.5	3.9	57.7	1.8	62.8	6.3	64.2	4.7	60.3
37	8.8	61.7	4.6	57.0	2.3	60.5	7.4	81.8	5.4	59.0
38	9.2	69.3	5.4	57.6	2.9	61.5	8.2	87.4	5.8	61.0
39	9.7	85.0	6.3	57.2	3.5	60.0	10.0	90.2	6.6	7[illegible].2
40	9.9	87.0	7.1	59.6	4.0	59.9	11.0	94.7	7.0	73.9
41	10.0	87.8	7.3	61.9	5.5	58.4	11.6	96.5	8.6	78.3
42	10.9	96.2	8.0	84.3	6.3	60.8	12.3	92.0	9.7	83.4
43	12.0	84.3	8.3	85.6	7.4	80.0	12.8	81.3	10.9	90.3
44	12.7	79.9	8.8	85.1	8.2	86.0	13.8	60.3	11.6	91.4
45	14.2	70.3	9.5	88.0	10.0	91.3	14.1	54.1	12.6	87.4
46	14.9	66.4	9.9	89.2	11.1	97.4	14.6	51.6	13.9	80.4
47	16.7	61.4	11.0	91.7	11.4	90.0	15.3	46.8	14.5	71.4
48	18.6	58.4	11.8	86.1	12.3	60.4	15.9	50.9	14.8	62.0

TABLE D-27(Contd)

RECORD 181 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 102.4 KILOPASCALS = 14.83 PSI

SAMPLE	% CHORD= -55.4		% CHORD= -15.1		% CHORD= -3.6		% CHORD= 9.4		% CHORD= 22.2	
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	19.7	56.9	12.8	64.0	12.5	58.3	16.4	55.8	15.1	57.8
50	20.1	56.7	12.9	61.7	13.0	62.4	17.2	59.7	15.3	55.1
51	20.6	58.8	13.4	62.6	13.6	60.0	18.1	62.5	15.9	52.4
52	20.9	63.5	14.7	58.7	14.1	61.1	18.5	69.5	16.6	56.2
53	21.0	69.4	16.5	55.9	16.0	57.4	19.0	77.6	16.9	56.8
54	21.2	76.0	18.5	57.0	17.7	59.1	19.3	82.0	17.5	56.9
55	21.4	81.0	19.3	63.9	18.5	64.4	19.8	86.7	18.0	61.4
56	21.4	84.8	19.8	83.2	19.5	83.3	20.6	88.7	18.5	69.8
57	21.6	86.9	20.3	86.6	20.4	87.9	21.6	90.4	19.4	75.6
58	21.7	89.3	20.8	85.8	22.0	94.9	22.2	93.1	21.7	86.3
59	22.0	88.7	22.5	91.8	22.4	96.0	22.9	95.7	22.6	89.8
60	23.2	84.7	23.2	82.4	23.2	72.3	23.2	94.7	23.2	89.4

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TABLE D-27 (Contd)

RECORD 191 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 102.4 KILOPASCALS = 14.83 PSI

PAGE 3

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-23.7	89.4	-23.7	89.7	-23.7	95.3	-23.7	85.3	-23.7	85.2
2	-22.3	87.3	-23.0	89.4	-23.5	85.6	-23.3	85.5	-22.2	95.7
3	-20.8	85.1	-21.3	84.6	-23.2	85.6	-22.6	85.6	-21.4	85.9
4	-19.3	83.2	-20.2	80.8	-22.6	85.0	-21.6	85.5	-20.6	85.6
5	-18.7	82.3	-19.6	79.5	-22.1	83.1	-20.6	85.2	-19.9	85.4
6	-17.9	77.7	-18.5	79.0	-21.7	82.8	-20.2	84.5	-19.1	95.5
7	-16.6	57.7	-17.4	79.2	-21.3	93.1	-19.7	83.9	-18.3	85.2
8	-16.4	55.9	-16.3	76.7	-20.4	82.5	-18.9	84.9	-17.8	85.1
9	-15.6	54.9	-15.9	71.4	-19.6	82.9	-13.5	84.4	-16.5	84.7
10	-15.2	56.5	-15.6	67.8	-18.7	83.7	-16.1	84.0	-15.8	85.2
11	-14.9	63.6	-15.4	66.6	-17.6	84.2	-17.5	84.1	-14.8	84.1
12	-14.5	70.4	-15.1	63.9	-16.9	83.7	-17.0	84.2	-14.7	85.0
13	-13.7	74.0	-14.8	75.8	-16.4	83.7	-15.9	85.0	-13.4	85.9
14	-13.1	78.7	-14.5	81.2	-15.7	83.1	-15.3	85.5	-12.8	85.8
15	-12.2	80.9	-13.7	85.0	-15.2	83.8	-14.3	85.5	-11.8	86.5
16	-11.7	80.5	-12.8	87.3	-14.3	84.9	-13.0	86.1	-11.8	86.0
17	-11.3	80.1	-12.2	87.7	-13.2	85.5	-12.1	86.5	-10.2	85.5
18	-10.9	78.4	-11.0	87.2	-12.6	85.7	-11.1	86.7	-9.3	85.3
19	-9.0	80.2	-10.3	84.0	-11.7	84.5	-9.8	86.0	-3.6	85.8
20	-8.3	81.9	-9.3	90.1	-10.7	82.6	-9.2	84.9	[illegible]	86.1
21	-7.3	79.6	-8.4	76.5	-10.1	82.6	-8.7	83.7	-7.4	85.9
22	-6.6	77.5	-7.8	74.6	-9.4	82.3	-8.2	83.1	-6.6	85.9
23	-6.1	71.6	-7.3	74.4	-8.5	82.2	-7.7	83.7	-5.9	85.7
24	-5.5	63.6	-6.1	77.7	-7.5	83.1	-7.0	83.1	-5.1	86.1
25	-5.2	63.9	-5.4	80.6	-5.7	84.5	-6.1	82.8	-3.9	86.5
26	-4.8	79.3	-4.9	81.1	-4.7	83.5	-5.2	83.8	-3.0	85.9
27	-4.6	82.5	-4.0	83.1	-4.0	82.7	-4.2	84.6	-2.2	85.3
28	-4.1	83.1	-3.6	85.9	-3.2	82.7	-3.1	85.1	-1.6	85.3
29	-3.3	86.6	-2.5	87.5	-2.4	83.4	-2.5	85.1	-0.7	86.0
30	-2.8	86.6	-0.6	87.7	-1.9	94.4	-1.3	95.7	0.1	86.7
31	-2.1	97.5	0.6	84.9	-1.2	85.4	-0.2	85.7	1.0	86.0
32	-1.1	87.2	1.4	81.6	-0.4	84.4	1.6	85.4	1.8	85.5
33	0.1	83.9	2.5	76.8	0.6	81.7	2.3	83.5	3.3	86.2
34	1.4	79.7	3.0	75.7	1.1	81.6	2.9	82.1	5.2	85.0
35	2.3	79.0	4.0	76.1	1.7	81.2	3.2	82.6	6.0	85.2
36	3.0	80.1	4.8	77.7	2.4	80.5	3.7	83.0	6.9	84.8
37	3.5	80.5	5.5	78.5	3.4	82.1	4.1	82.0	7.7	84.0
38	4.5	76.4	6.6	78.0	4.3	83.3	4.8	81.4	8.3	84.6
39	5.0	71.7	7.2	81.3	5.4	83.1	5.2	81.2	8.6	85.3
40	5.4	66.0	8.1	86.4	6.0	83.3	5.9	82.3	9.0	85.6
41	5.9	60.7	9.2	89.9	6.8	82.9	6.9	83.9	9.6	85.5
42	6.3	64.1	10.3	99.1	7.8	83.5	7.8	84.5	10.2	86.1
43	6.5	69.9	11.3	87.9	8.6	84.5	8.5	84.7	11.2	86.5
44	6.7	76.5	12.4	84.0	9.5	85.0	9.5	85.3	11.9	86.2
45	7.7	82.9	13.4	79.9	10.4	85.3	10.7	85.7	12.7	86.0
46	9.0	86.7	14.2	77.2	10.9	84.7	11.9	85.7	13.4	85.7
47	11.2	85.6	15.4	76.9	11.3	83.8	12.7	85.9	13.9	85.9
48	12.1	32.1	16.4	77.6	12.0	82.5	13.5	84.7	14.2	86.0

TABLE D-27(Contd)

RECORD 181 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 102.4 KILOPASCALS = 14.83 PSI

SAMPLE	% CHORD=	34.6	% CHORD=	47.5	% CHORD=	73.4	% CHORD=	99.3	% CHORD=	141.4
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	13.2	81.5	17.1	77.6	13.5	82.0	13.9	83.9	14.9	85.7
50	14.4	82.1	17.7	75.5	14.5	82.6	14.1	63.7	15.6	85.0
51	15.8	77.5	17.8	73.9	15.2	83.3	15.1	83.5	16.1	34.6
52	16.4	69.8	18.1	72.9	16.3	83.8	15.6	83.1	17.1	84.6
53	17.3	56.7	18.6	75.4	17.1	83.5	16.1	82.8	18.2	84.3
54	18.1	62.5	18.7	78.2	17.6	83.5	16.5	82.8	19.3	84.5
55	18.5	71.5	19.1	80.0	18.3	83.2	17.5	83.8	19.5	85.2
56	19.2	76.9	19.5	84.8	19.4	84.2	18.3	84.8	20.5	85.7
57	20.3	82.2	20.1	87.2	20.6	85.1	19.3	85.4	21.2	95.8
58	21.3	84.1	21.4	88.4	21.4	85.5	21.3	86.0	21.7	86.4
59	22.6	82.7	22.5	87.8	22.4	83.9	22.4	86.5	22.4	86.7
60	23.2	80.6	23.2	86.1	23.2	82.7	23.2	86.5	23.2	86.4

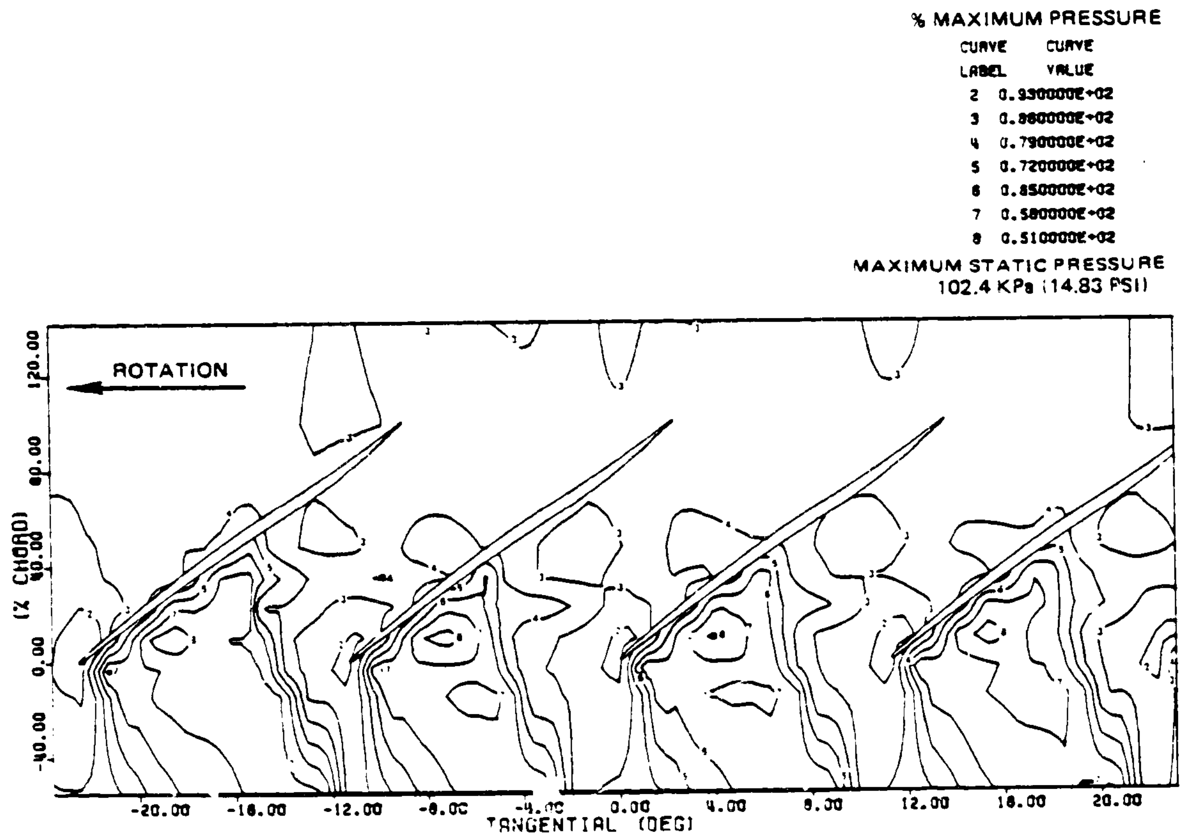

Figure D-16 Steady State Pressure Contours at Blade Tip; Out of Flutter, Low Operating Line, 75 Percent Speed, 75.3 Percent Flow, Pressure Ratio 1.284

TABLE D-28

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

75% SPEED RECORD 199

Inlet Total Pressure = 85,610 N/m^2 (1788 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.981
-15.1	0.948
- 3.6	0.951
9.4	0.981
22.2	1.065
34.6	1.117
47.5	1.145
73.4	1.185
99.3	1.207
141.4	1.190

TABLE D-29

RECORD 199 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 112.2 KILOPASCALS = 16.30 PSI

SAMPLE	% CHORD=	-55.4	% CHORD=	-15.2	% CHORD=	-3.9	% CHORD=	9.3	% CHORD=	22.5
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-42.1	69.6	-42.1	58.2	-42.1	63.3	-42.1	50.6	-42.1	88.4
2	-41.0	64.8	-41.0	63.7	-41.0	67.5	-41.0	59.9	-41.0	53.1
3	[illegible]	61.9	-40.0	71.1	-40.0	71.8	-40.0	67.9	-40.0	59.2
4	-39.0	64.2	-39.0	77.0	-39.0	75.1	-39.0	74.4	-39.0	66.1
5	-38.0	76.8	-38.0	79.5	-38.0	77.0	-38.0	79.7	-38.0	[illegible]
6	-36.9	82.1	-36.9	81.9	-36.9	78.4	-36.9	83.1	-36.9	77.7
7	-35.9	83.3	-35.9	84.3	-35.9	80.0	-35.9	86.3	-35.9	83.3
8	-34.9	83.6	-34.9	86.2	-34.9	81.9	-34.9	89.5	-34.9	88.8
9	-33.8	83.1	-33.8	75.1	-33.8	79.9	-33.8	93.2	-33.8	94.4
10	-32.8	80.6	-32.8	62.1	-32.8	[illegible]	-32.8	82.0	-32.8	[illegible]
11	-31.8	75.6	-31.8	56.0	-31.8	58.8	-31.8	52.2	-31.8	98.2
12	-30.8	69.2	-30.8	57.7	-30.8	63.6	-30.8	51.0	-30.8	89.6
13	-29.7	64.1	-29.7	63.9	-29.7	67.9	-29.7	60.5	-29.7	56.3
14	-28.7	61.3	-28.7	71.7	-28.7	[illegible]	-28.7	69.3	-28.7	61.4
15	-27.7	63.7	-27.7	78.3	-27.7	75.7	-27.7	76.2	-27.7	60.3
16	-26.7	79.9	-26.7	81.4	-26.7	77.5	-26.7	81.0	-26.7	75.0
17	-25.6	84.1	-25.6	83.8	-25.6	79.0	-25.6	84.7	-25.6	81.0
18	-24.6	84.7	-24.6	86.6	-24.6	80.8	-24.6	87.9	-24.6	86.8
19	-23.6	84.8	-23.6	87.3	-23.6	83.4	-23.6	91.1	-23.6	92.5
20	-22.6	83.5	-22.6	75.6	-22.6	80.4	-22.6	93.6	-22.6	97.1
21	-21.5	79.8	-21.5	61.4	-21.5	58.2	-21.5	82.8	-21.5	100.0
22	-20.5	73.9	-20.5	56.5	-20.5	59.8	-20.5	52.5	-20.5	96.6
23	-19.5	67.5	-19.5	60.5	-19.5	65.3	-19.5	52.4	-19.5	79.1
24	-18.4	63.2	-18.4	67.7	-18.4	69.3	-18.4	61.5	-18.4	58.9
25	-17.4	61.9	-17.4	74.2	-17.4	73.6	-17.4	69.4	-17.4	64.7
26	-16.4	70.6	-16.4	73.5	-16.4	76.3	-16.4	76.0	-16.4	70.1
27	-15.4	81.3	-15.4	80.9	-15.4	77.7	-15.4	81.0	-15.4	75.4
28	-14.3	83.3	-14.3	82.8	-14.3	79.1	-14.3	84.4	-14.3	81.2
29	-13.3	83.7	-13.3	85.2	-13.3	80.9	-13.3	87.3	-13.3	87.8
30	-12.3	84.1	-12.3	87.0	-12.3	83.4	-12.3	90.9	-12.3	93.0
31	-11.3	83.2	-11.3	76.3	-11.3	79.7	-11.3	93.8	-11.3	97.1
32	-10.2	79.4	-10.2	61.9	-10.2	59.3	-10.2	85.5	-10.2	100.0
33	-9.2	73.5	-9.2	55.4	-9.2	56.9	-9.2	51.9	-9.2	98.8
34	-8.2	67.6	-8.2	55.5	-8.2	61.0	-8.2	46.7	-8.2	84.5
35	-7.2	63.2	-7.2	60.4	-7.2	65.1	-7.2	55.8	-7.2	49.1
36	-6.1	60.7	-6.1	67.3	-6.1	68.9	-6.1	65.1	-6.1	54.3
37	-5.1	[illegible]	-5.1	73.9	-5.1	73.3	-5.1	72.1	-5.1	61.8
38	-4.1	65.5	-4.1	78.7	-4.1	76.1	-4.1	77.7	-4.1	63.0
39	-3.1	80.4	-3.1	81.6	-3.1	77.5	-3.1	81.4	-3.1	75.2
40	-2.0	84.2	-2.0	84.3	-2.0	78.7	-2.0	64.3	-2.0	81.3
41	-1.0	84.8	-1.0	84.5	-1.0	80.6	-1.0	87.9	-1.0	67.1
42	0.0	83.7	0.0	71.7	0.0	76.1	0.0	90.3	0.0	91.7
43	1.1	80.6	1.1	61.3	1.1	60.3	1.1	84.2	1.1	94.2
44	2.1	75.4	2.1	58.2	2.1	60.9	2.1	53.4	2.1	91.9
45	3.1	69.3	3.1	61.8	3.1	65.7	3.1	54.1	3.1	76.6
46	4.1	64.9	4.1	67.5	4.1	69.9	4.1	62.4	4.1	[illegible]
47	5.2	63.2	5.2	73.5	5.2	73.4	5.2	76.6	5.2	63.4
48	6.2	66.5	6.2	79.1	6.2	75.5	6.2	76.6	6.2	69.4

TABLE D-29(Contd)

RECORD 199 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 112.2 KILOPASCALS = 16.30 PSI

PAGE 2

SAMPLE	% CHORD=	-55.4	% CHORD=	-15.2	% CHORD=	-3.9	% CHORD=	9.3	% CHORD=	22.5
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	7.2	80.8	7.2	80.4	7.2	76.8	7.2	80.5	7.2	74.8
50	8.2	83.1	8.2	82.9	8.2	78.4	8.2	83.8	8.2	79.9
51	9.3	83.7	9.3	85.4	9.3	80.3	9.3	87.3	9.3	85.2

TABLE D-29(Contd)

RECORD 199 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 112.2 KILOPASCALS = 16.30 PSI

SAMPLE	% CHORD=	34.4	% CHORD=	47.6	% CHORD=	73.4	% CHORD=	99.2	% CHORD=	141.3
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-42.1	87.0	-42.1	89.0	-42.1	89.7	-42.1	92.5	-42.1	92.1
2	-41.0	82.9	-41.0	88.6	-41.0	89.5	-41.0	90.7	-41.0	91.3
3	-40.0	76.5	-40.0	88.6	-40.0	89.9	-40.0	89.8	-40.0	89.3
4	-39.0	78.4	-39.0	85.8	-39.0	90.1	-39.0	88.9	-39.0	88.6
5	-38.0	81.5	-38.0	83.1	-38.0	90.7	-38.0	89.0	-38.0	88.5
6	-36.9	84.2	-36.9	83.5	-36.9	91.0	-36.9	90.0	-36.9	89.5
7	-35.9	86.6	-35.9	85.6	-35.9	91.1	-35.9	91.5	-35.9	90.1
8	-34.9	88.9	-34.9	87.3	-34.9	89.2	-34.9	92.5	-34.9	89.9
9	-33.8	90.6	-33.8	88.6	-33.8	89.[illegible]	-33.8	93.1	-33.8	89.5
10	-32.8	90.1	-32.8	89.2	-32.8	90.1	-32.8	93.8	-32.8	89.6
11	-31.8	88.4	-31.8	89.1	-31.8	90.7	-31.8	93.9	-31.8	90.9
12	-30.8	86.0	-30.8	88.6	-30.8	90.2	-30.8	92.4	-30.8	91.6
13	-29.7	80.9	-29.7	88.4	-29.7	89.6	-29.7	91.6	-29.7	91.2
14	-28.7	76.2	-28.7	88.6	-28.7	89.3	-28.7	90.4	-28.7	90.1
15	-27.7	80.6	-27.7	85.5	-27.7	89.9	-27.7	89.3	-27.7	89.5
16	-26.7	83.5	-26.7	83.9	-26.7	90.8	-26.7	89.4	-26.7	89.2
17	-25.6	85.8	-25.6	84.9	-25.6	91.4	-25.6	90.6	-25.6	90.2
18	-24.6	88.3	-24.6	86.7	-24.6	91.6	-24.6	92.0	-24.6	91.2
19	-23.6	90.5	-23.6	87.9	-23.6	90.4	-23.6	92.9	-23.6	91.4
20	-22.6	91.8	-22.6	89.2	-22.6	90.3	-22.6	93.6	-22.6	91.2
21	-21.5	90.9	-21.5	90.1	-21.5	91.1	-21.5	94.5	-21.5	91.4
22	-20.5	89.4	-20.5	90.5	-20.5	91.4	-20.5	94.9	-20.5	92.4
23	-19.5	87.4	-19.5	90.2	-19.5	90.9	-19.5	93.9	-19.5	92.4
24	-18.4	82.4	-18.4	89.7	-18.4	90.4	-18.4	93.5	-18.4	92.7
25	-17.4	78.3	-17.4	89.4	-17.4	90.6	-17.4	92.1	-17.4	91.1
26	-16.4	91.3	-16.4	87.0	-16.4	91.1	-16.4	91.4	-16.4	9[illegible].6
27	-15.4	83.7	-15.4	84.4	-15.4	91.5	-15.4	90.9	-15.4	89.3
28	-14.3	86.0	-14.3	84.6	-14.3	91.6	-14.3	91.8	-14.3	9[illegible].2
29	-13.3	87.9	-13.3	86.3	-13.3	91.9	-13.3	93.0	-13.3	9[illegible].8
30	-12.3	90.0	-12.3	87.6	-12.3	90.4	-12.3	93.8	-12.3	90.2
31	-11.3	91.3	-11.3	88.7	-11.3	89.8	-11.3	94.2	-11.3	89.7
32	-10.2	90.3	-10.2	89.4	-10.2	90.5	-10.2	94.6	-10.2	90.1
33	-9.2	88.1	-9.2	89.9	-9.2	91.0	-9.2	94.6	-9.2	9[illegible].4
34	-8.2	85.6	-8.2	89.5	-8.2	90.6	-8.2	93.3	-8.2	92.3
35	-7.2	79.2	-7.2	88.9	-7.2	90.0	-7.2	92.2	-7.2	92.8
36	-6.1	73.5	-6.1	88.8	-6.1	89.8	-6.1	90.0	-6.1	91.0
37	-5.1	76.1	-5.1	87.9	-5.1	90.3	-5.1	89.4	-5.1	90.0
38	-4.1	79.8	-4.1	82.3	-4.1	91.3	-4.1	89.5	-4.1	89.7
39	-3.1	82.5	-3.1	80.9	-3.1	91.5	-3.1	90.7	-3.1	9[illegible].6
40	-2.0	85.7	-2.0	83.1	-2.0	91.9	-2.0	91.8	-2.0	91.6
41	-1.0	88.2	-1.0	84.9	-1.0	89.5	-1.0	92.6	-1.0	91.9
42	0.0	90.0	0.0	86.3	0.0	89.0	0.0	93.1	0.0	91.7
43	1.1	89.1	1.1	87.7	1.1	89.8	1.1	93.7	1.1	91.7
44	2.1	87.8	2.1	89.5	2.1	90.6	2.1	93.6	2.1	92.3
45	3.1	85.7	3.1	83.7	3.1	90.6	3.1	92.3	3.1	92.0
46	4.1	80.1	4.1	89.9	4.1	90.0	4.1	91.2	4.1	91.[illegible]
47	5.2	76.6	5.2	89.1	5.2	89.9	5.2	90.5	5.2	90.4
48	6.2	79.9	6.2	87.7	6.2	90.4	6.2	90.1	6.2	89.7

TABLE D-29(Contd)

RECORD 199 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 112.2 KILOPASCALS = 16.30 PSI

SAMPLE	% CHORD=	34.4	% CHORD=	47.6	% CHORD=	73.4	% CHORD=	99.2	% CHORD=	141.3
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	7.2	82.9	7.2	83.8	7.2	91.0	7.2	90.4	7.2	99.5
50	8.2	85.2	8.2	83.7	8.2	91.7	8.2	91.5	8.2	99.8
51	9.3	87.3	9.3	85.4	9.3	91.7	9.3	92.7	9.3	99.9

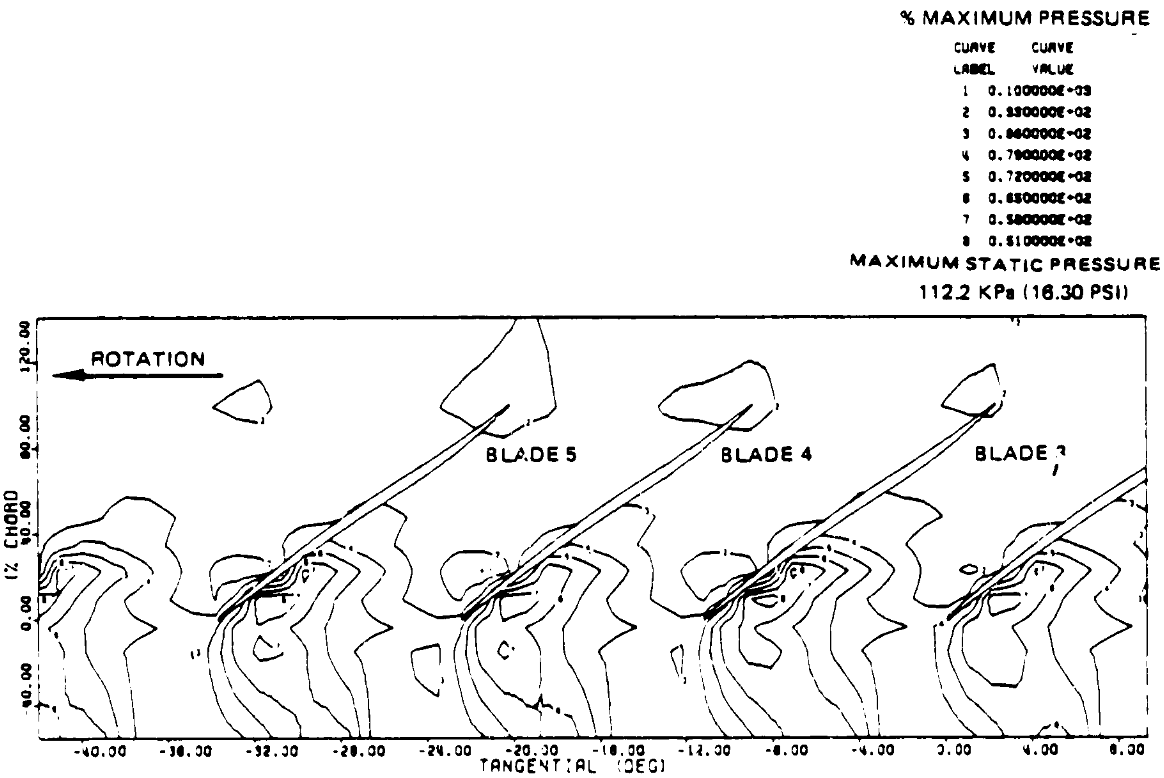

Figure D-17 Steady State Pressure Contours at Blade Tip; In Flutter, High Operating Line, 75 Percent Speed, 60.3 Percent Flow, Pressure Ratio 1.3369

TABLE D-30

RECORD 297 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 104.6 KILOPASCALS = 15.16 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-25.4	51.6	-25.4	82.9	-25.3	81.0	-25.5	79.8	-25.4	76.4
2	-24.7	56.3	-24.9	87.3	-24.6	85.0	-24.4	86.0	-24.7	92.3
3	-24.4	66.7	-24.4	86.9	-23.9	88.9	-23.2	93.7	-24.3	87.1
4	-24.1	77.2	-23.8	[illegible]	-23.3	94.1	-22.4	98.3	-23.7	[illegible]
5	-23.9	85.7	-22.7	98.0	-22.8	100.0	-21.3	86.5	-23.1	92.4
6	-23.3	94.6	-22.4	95.8	-22.1	75.0	-20.8	67.3	-22.6	93.9
7	-22.2	89.5	-22.0	65.5	-21.6	48.2	-20.4	49.4	-21.8	93.8
8	-21.2	81.5	-21.7	68.3	-21.4	44.1	-20.1	38.8	-20.6	92.5
9	[illegible]	75.0	-21.4	56.2	-20.8	51.6	-19.4	29.3	-20.1	89.8
10	-19.7	67.0	[illegible]	51.8	-20.0	53.0	-18.8	33.0	-19.6	53.5
11	-18.5	59.9	-20.5	53.6	-19.5	52.2	-18.2	37.1	-19.4	71.5
12	-17.6	54.7	-19.6	47.5	-18.8	50.0	-17.4	46.5	-19.1	61.9
13	-16.1	54.0	-18.8	47.5	-17.8	49.8	-16.6	48.0	-18.9	55.1
14	-14.9	52.2	-18.1	45.6	-17.0	49.5	-15.8	58.6	-18.4	48.3
15	-13.0	50.1	-17.3	46.8	-16.2	53.7	-15.4	67.4	-18.0	49.2
16	-12.7	54.9	-16.3	46.9	-15.3	63.1	-14.7	73.9	-17.2	46.3
17	-12.0	65.2	-15.5	43.1	-14.3	71.3	-13.6	78.8	-16.2	49.5
18	-11.8	73.0	-15.1	50.3	-13.1	80.8	-12.3	86.4	-15.6	54.4
19	-11.7	79.8	-14.5	57.7	-12.4	87.8	-11.4	94.4	-14.9	63.0
20	-11.5	82.5	-13.3	78.1	-11.6	96.1	-10.2	86.2	-14.2	[illegible]
21	-11.4	[illegible]	-12.6	89.2	-10.9	72.8	-9.8	73.2	-12.8	80.5
22	-11.0	93.3	-12.2	90.0	-10.6	52.7	-9.4	60.7	-11.4	91.1
23	-10.4	85.8	-11.3	94.4	-10.3	46.3	-9.1	49.1	-10.1	92.5
24	-9.7	76.3	-10.7	77.0	-9.7	52.2	-8.9	39.2	-9.3	90.9
25	-9.0	69.7	-10.2	56.2	-8.9	48.1	-8.4	29.7	-8.9	86.1
26	-8.0	62.4	-9.8	53.0	-8.2	50.9	-7.7	34.1	-8.5	76.0
27	-6.9	56.9	-9.3	55.0	-7.7	49.5	-7.2	38.0	-8.2	63.1
28	-6.1	54.0	-8.5	48.1	-6.8	49.3	-6.3	46.2	-7.6	52.1
29	-4.4	52.3	-7.9	47.8	-5.9	48.6	-5.5	47.5	-7.2	47.7
30	-2.9	50.9	-6.9	46.0	-5.1	51.4	-4.6	56.0	-6.7	47.0
31	-1.8	50.5	-5.6	46.7	-4.4	60.2	-4.2	65.5	-6.2	45.2
32	-1.1	54.3	-4.4	47.8	-3.7	67.6	-3.5	73.8	-5.2	46.5
33	-0.8	62.2	-3.9	50.5	-2.1	76.7	-2.2	78.7	-4.6	[illegible]
34	-0.6	70.9	-3.2	60.3	-1.2	84.8	-1.1	83.7	-3.7	61.4
35	-0.6	77.1	-2.0	75.3	-0.3	95.9	0.0	92.4	-2.9	70.0
36	-0.3	83.2	-1.3	89.1	0.4	71.2	1.1	82.2	-1.6	78.1
37	-0.1	88.9	-0.7	89.8	0.6	53.5	1.6	76.7	-0.6	86.1
38	0.3	93.9	-0.0	94.5	1.1	45.8	2.2	47.4	-0.0	88.3
39	0.9	96.9	0.3	88.7	1.6	51.8	2.9	32.6	0.8	89.8
40	1.5	78.7	0.7	71.2	2.3	48.9	4.0	37.5	1.9	90.5
41	1.9	72.9	1.3	52.4	3.0	51.5	4.9	47.4	2.4	86.3
42	2.7	66.6	1.9	54.3	3.7	50.6	5.6	48.9	3.1	69.4
43	3.5	61.2	2.7	47.4	4.5	50.6	6.3	56.2	3.7	49.2
44	4.2	57.4	3.1	47.2	5.2	50.1	6.8	64.9	4.1	46.0
45	5.4	53.8	3.5	47.5	6.3	55.8	7.1	71.5	4.7	48.2
46	6.2	53.3	4.4	46.8	6.9	63.5	8.0	77.0	5.3	47.1
47	7.4	52.3	5.2	47.9	7.6	69.3	9.2	81.9	6.2	51.8
48	9.2	51.2	6.5	47.6	8.8	78.3	10.4	89.1	6.8	55.2

TABLE D-30(Contd)

RECORD 287 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 104.6 KILOPASCALS = 15.16 PSI

SAMPLE NUMBER	% CHORD=	-55.4	% CHORD=	-15.1	% CHORD=	-3.6	% CHORD=	9.4	% CHORD=	22.2
	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DLG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	9.9	57.5	7.3	52.0	9.8	84.6	11.4	93.6	8.0	69.4
50	10.2	65.8	9.5	69.3	11.0	96.2	12.3	85.2	9.1	76.7
51	10.4	72.9	9.5	[illegible]	11.6	71.4	12.9	68.0	10.7	98.5
52	[illegible]	[illegible]	10.2	87.5	11.9	55.0	13.3	55.9	11.7	91.6
53	10.9	88.4	[illegible]	95.9	12.3	47.4	13.7	42.3	12.8	91.2
54	[illegible]	94.3	[illegible]	89.3	12.9	53.1	14.2	32.8	13.6	88.6
55	12.3	85.6	11.9	73.8	13.5	50.6	14.8	34.2	14.2	77.0
56	[illegible]	75.7	12.7	53.2	14.2	52.4	15.3	35.0	14.5	63.7
57	14.0	67.3	13.2	55.1	14.9	[illegible]	15.8	39.9	15.4	46.9
58	14.7	67.0	14.1	[illegible]	15.6	50.7	16.1	43.9	15.9	48.2
59	15.8	56.9	14.8	49.5	16.3	49.5	16.4	46.3	16.7	46.1
60	16.9	54.3	16.9	47.6	17.0	49.5	16.8	47.3	17.1	46.8

OF POOR QUALITY

TABLE D-30(Contd)

RECORD 287 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 104.6 KILOPASCALS = 15.16 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-25.3	78.4	-25.4	73.2	-25.4	80.8	-25.3	80.3	-25.3	80.9
2	-24.4	90.6	-24.0	76.2	-24.9	81.7	-24.6	80.1	-24.3	81.7
3	-23.7	94.2	-23.3	78.4	-24.2	82.5	-24.1	80.1	-23.4	82.4
4	-23.0	87.1	-22.6	77.7	-23.6	81.6	-23.3	81.0	-22.5	82.3
5	-22.1	87.9	-22.0	79.2	-23.2	79.2	-22.9	81.8	-21.9	82.4
6	-21.1	86.9	-21.5	78.8	-22.7	76.7	-22.2	81.9	-21.3	83.1
7	-20.3	84.6	-20.8	78.3	-22.2	76.0	-21.4	82.5	-21.0	83.6
8	-19.6	84.1	-19.9	76.2	-21.8	77.6	-20.8	82.1	-20.5	84.1
9	-18.8	82.3	-19.1	75.8	-21.3	78.5	-20.1	81.2	-19.9	83.7
10	-18.2	77.4	-18.4	75.6	-20.9	78.7	-19.4	80.9	-19.4	83.3
11	-17.6	63.3	-17.5	75.6	-20.0	80.1	-18.4	79.7	-18.6	83.5
12	-17.1	46.8	-16.7	71.1	-19.5	79.5	-17.4	79.3	-18.3	83.7
13	-16.5	40.6	-16.4	69.1	-18.9	79.5	-16.9	79.2	-17.6	83.7
14	-15.8	49.5	-16.[illegible]	62.8	-18.1	78.8	-16.2	79.3	-17.1	83.1
15	-15.0	64.2	-15.7	61.5	-16.8	79.3	-15.5	79.9	-16.5	82.5
16	-14.1	77.3	-15.5	62.5	-15.8	80.7	-14.9	80.8	-15.5	82.5
17	-13.5	75.6	-15.0	67.2	-15.0	80.5	-14.0	81.5	-14.6	82.5
18	-12.5	78.5	-14.7	63.2	-14.0	81.9	-13.5	81.5	-13.9	82.5
19	-12.1	78.9	-13.7	70.7	-12.9	83.3	-12.7	81.9	-13.3	82.3
20	-11.3	81.2	-13.2	71.8	-12.3	81.6	-12.4	82.3	-12.7	82.1
21	-10.8	91.5	-12.5	73.6	-11.8	77.5	-12.0	82.8	-12.2	82.2
22	-10.[illegible]	83.3	-11.3	76.2	-11.0	73.1	-11.4	82.8	-11.3	81.9
23	-8.6	81.6	-10.3	76.8	-10.2	75.8	-10.6	82.7	-10.7	82.5
24	-7.4	79.4	-9.5	75.0	-9.8	75.9	-9.9	82.5	-10.2	83.1
25	-6.5	69.4	-8.8	74.0	-8.9	76.9	-9.5	81.5	-9.3	83.9
26	-6.0	57.3	-8.0	73.7	-8.1	77.0	-9.0	80.6	-8.3	83.3
27	-5.6	42.0	-7.0	74.1	-7.7	77.1	-8.5	79.4	-7.3	82.3
28	-5.2	37.3	-6.2	74.3	-7.2	76.9	-8.0	79.6	-6.7	82.6
29	-4.1	52.4	-5.6	72.2	-6.2	77.7	-7.6	78.9	-5.5	82.4
30	-2.9	71.9	-5.1	65.0	-5.7	78.1	-7.0	78.2	-4.5	82.7
31	-2.4	74.6	-4.8	60.1	-4.9	74.3	-6.4	78.7	-3.7	82.3
32	-1.8	74.8	-4.4	57.4	-4.2	79.5	-5.6	79.0	-2.8	81.9
33	-0.9	76.9	-4.[illegible]	61.5	-3.2	80.6	-5.2	79.2	-2.1	31.9
34	-0.1	80.4	-3.7	66.6	-2.1	81.7	-4.7	79.3	-1.4	82.3
35	1.0	81.8	-3.1	68.2	-1.5	81.3	-3.7	79.8	-0.8	82.6
36	1.6	81.1	-2.7	69.7	-0.6	77.2	-3.0	79.9	0.1	82.6
37	3.[illegible]	80.6	-2.0	71.3	0.3	72.3	-2.2	80.2	0.9	82.9
38	3.6	80.3	-0.8	73.4	0.8	73.6	-1.4	80.5	1.4	83.2
39	4.4	78.[illegible]	0.1	74.1	1.2	75.1	-0.7	80.8	2.0	83.6
40	5.2	59.6	0.9	73.5	2.4	76.7	0.0	81.2	2.3	83.7
41	6.1	37.6	2.6	73.3	3.1	76.3	0.7	81.2	3.2	83.3
42	7.[illegible]	56.3	3.2	73.6	3.6	76.9	1.2	81.3	3.7	83.3
43	7.7	67.6	4.0	73.6	4.5	76.6	1.8	80.0	4.4	82.8
44	8.5	78.9	4.5	74.0	5.1	77.0	2.8	77.1	5.0	82.3
45	9.3	77.0	5.2	74.1	5.7	76.9	3.4	77.4	6.2	82.1
46	10.0	76.7	5.6	73.0	6.5	78.3	4.2	76.7	7.1	81.9
47	11.2	83.1	6.1	63.0	7.2	78.7	4.7	77.2	8.1	81.5
48	11.9	84.3	6.8	61.7	8.3	79.7	5.7	77.2	9.6	81.0

ORIGINAL PAGE IS OF POOR QUALITY

TABLE D-30(Contd)

RECORD 287 WALL KULITE STEADY STATE PRESSURES — PAGE 4

MAXIMUM PRESSURE SAMPLED = 104.6 KILOPASCALS = 15.16 PSI

SAMPLE	% CHORD= 34.6		% CHORD= 47.5		% CHORD= 73.4		% CHORD= 99.3		% CHORD= 141.4	
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	12.8	82.9	7.4	66.5	8.9	81.0	6.4	78.0	9.8	81.5
50	14.1	81.8	7.8	69.2	9.7	92.2	7.1	78.9	10.5	81.9
51	15.1	80.3	9.6	71.3	10.7	78.0	7.9	79.3	11.5	81.6
52	15.9	76.3	9.4	72.4	11.8	73.1	9.1	79.4	12.3	82.5
53	16.2	69.9	10.4	74.6	12.5	75.6	9.9	80.2	13.1	83.3
54	16.3	65.9	11.2	76.2	13.6	77.6	11.2	81.1	13.7	82.9
55	16.2	62.5	[illegible]	76.2	14.4	77.9	12.3	82.2	14.4	82.4
56	16.5	59.3	13.6	74.9	14.9	77.8	13.3	81.1	14.5	82.3
57	16.6	54.6	14.9	74.9	15.7	77.2	14.0	80.2	15.7	82.3
58	16.7	50.3	15.8	75.0	16.2	77.5	15.7	77.9	16.3	82.1
59	15.9	45.7	16.5	74.2	16.5	77.7	16.3	78.1	16.8	82.0
60	17.0	42.4	16.9	72.4	17.0	77.9	16.9	78.4	17.1	82.1

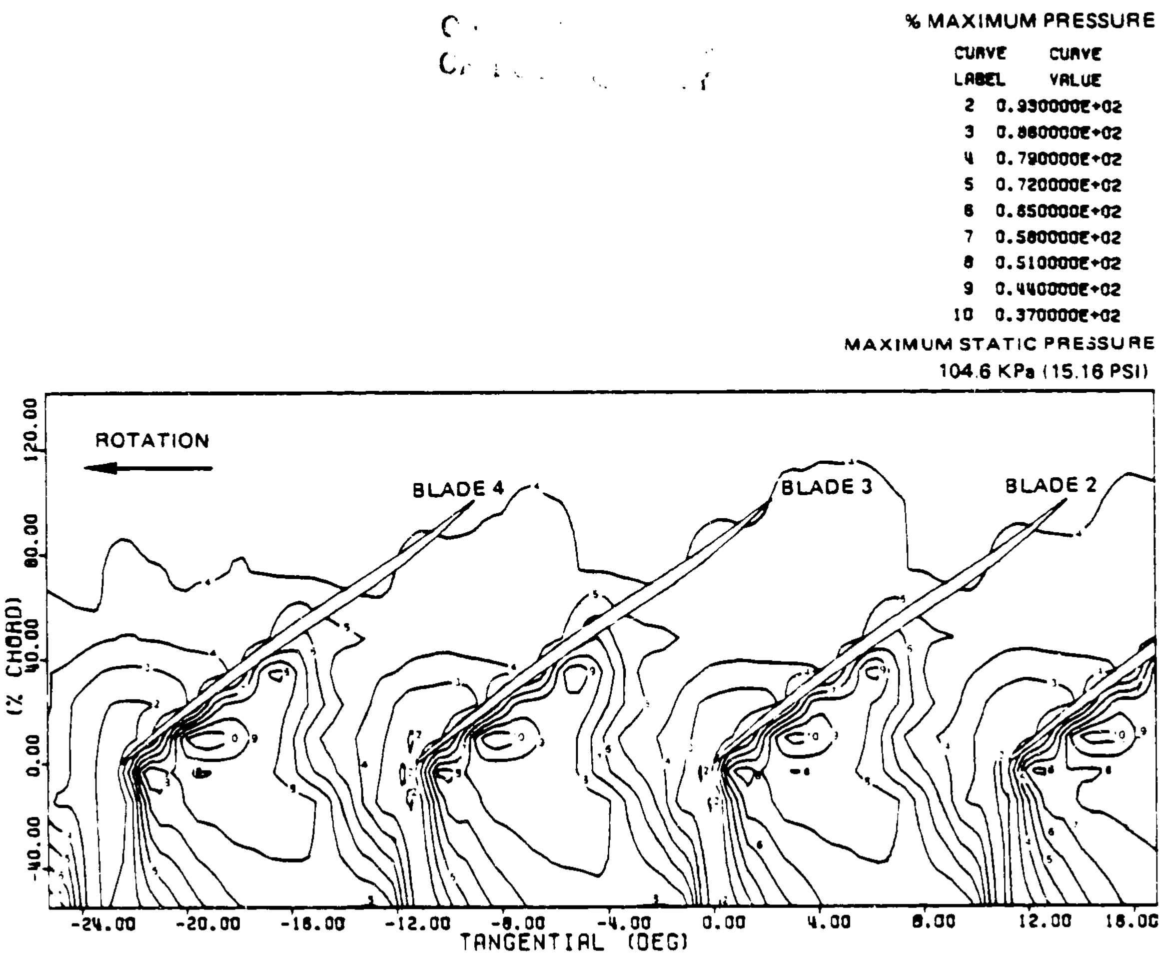

Figure D-18 Steady State Pressure Contours at Blade Tip; Out of Flutter, Transient to Surge, 85 Percent Speed, 77.6 Percent Flow, Pressure Ratio 1.4380

TABLE D-31

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

85% SPEED RECORD 283

Inlet Total Pressure = 76,130 N/m^2 (1590 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.870
-15.1	0.851
- 3.6	0.867
9.4	0.892
22.2	0.978
34.6	0.999
47.5	1.002
73.4	1.081
99.3	1.101
141.4	1.137

TABLE D-32

RECORD 283 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 116.5 KILOPASCALS = 16.88 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-14.7	52.1	-14.5	48.2	-14.1	48.3	-14.6	56.2	-14.2	50.2
2	-13.5	51.4	-13.8	49.0	-13.5	48.6	-13.9	57.8	-13.6	51.9
3	-12.5	51.1	-13.0	49.0	-13.0	50.5	-13.4	61.1	-13.3	55.1
4	-11.5	50.3	-12.7	49.3	-12.7	52.9	-12.4	93.3	-13.0	56.2
5	-10.7	49.3	-12.4	52.9	-12.6	57.0	-12.1	96.2	-12.4	85.3
6	-10.4	50.5	-12.3	56.1	-11.8	95.9	-11.8	95.3	-11.9	89.2
7	-10.1	54.3	-11.5	85.6	-11.5	100.0	-11.6	91.8	-11.2	87.3
8	-9.5	65.2	-11.4	90.1	-11.4	95.4	-11.0	86.7	-10.7	85.3
9	-9.2	67.7	-11.1	85.3	-10.7	56.9	-10.7	78.8	-10.3	82.7
10	-8.8	66.7	-10.6	57.9	-10.7	54.9	-9.2	41.3	-9.2	77.4
11	-7.8	60.1	-10.6	54.6	-10.5	51.6	-9.0	38.7	-8.9	72.1
12	-7.1	56.9	-10.3	52.5	-10.3	51.0	-8.5	37.9	-7.9	52.3
13	-6.3	54.6	-9.8	57.2	-9.7	54.9	-8.0	36.9	-7.9	50.3
14	-5.6	53.1	-9.6	53.9	-9.1	51.5	-7.6	39.5	-7.5	49.2
15	-4.6	52.2	-9.0	49.6	-8.5	52.5	-6.9	46.0	-6.9	52.2
16	-3.9	52.0	-8.3	51.5	-8.1	51.5	-6.3	46.3	-6.4	50.7
17	-3.[illegible]	52.1	-7.8	50.1	-7.7	50.0	-5.2	46.8	-5.9	49.3
18	-2.4	52.4	-7.4	48.9	-6.9	49.7	-4.2	49.7	-5.2	47.6
19	-1.5	52.1	-6.7	49.2	-6.0	49.4	-3.4	52.9	-4.3	46.6
20	-0.5	51.8	-5.8	49.2	-4.5	48.5	-2.9	57.0	-4.4	46.6
21	-0.1	52.6	-5.0	49.4	-3.7	48.4	-2.5	61.5	-3.6	48.5
22	0.2	56.4	-4.3	49.9	-2.7	50.0	-1.5	89.8	-3.2	52.1
23	0.9	77.7	-3.5	50.2	-2.3	53.2	-1.5	92.5	-2.6	58.1
24	1.[illegible]	73.5	-2.4	50.8	-1.9	58.0	-1.1	93.1	-1.7	81.9
25	1.4	77.5	-1.8	52.8	-1.0	92.7	-0.7	94.0	-1.0	84.6
26	2.2	68.8	-1.8	55.9	-0.7	98.2	-0.0	91.5	-1.2	86.5
27	3.2	61.7	-1.5	59.6	-0.4	95.5	0.3	86.3	-0.5	87.7
28	4.0	58.0	-0.9	90.2	0.7	53.0	2.0	42.9	0.3	85.6
29	4.9	55.5	-0.7	96.3	1.0	48.4	2.1	41.2	1.1	81.1
30	5.3	54.0	-0.4	94.0	1.2	51.0	2.5	41.2	2.6	69.8
31	6.7	53.8	-0.2	86.3	1.6	53.2	3.4	37.7	3.5	50.8
32	7.6	53.6	0.8	58.7	1.9	52.1	3.7	40.3	3.7	49.1
33	8.5	52.6	1.2	56.1	2.2	51.0	4.3	45.0	4.0	48.4
34	9.5	51.7	1.8	54.6	2.8	52.4	5.0	46.6	4.2	50.0
35	10.3	51.1	2.3	51.8	3.5	51.1	5.8	47.0	4.6	51.6
36	1[illegible].9	51.1	2.[illegible]	50.1	4.3	[illegible]	6.4	47.2	5.1	50.4
37	11.2	52.2	3.2	50.4	4.8	49.9	7.6	51.6	5.7	50.1
38	11.4	53.8	3.8	49.7	5.6	49.7	8.4	51.9	6.2	48.7
39	11.6	55.6	4.5	48.9	7.0	49.2	8.8	55.5	6.6	47.9
40	11.9	62.4	5.1	49.5	8.1	50.5	9.9	91.5	7.6	50.3
41	11.8	66.0	5.6	48.9	9.3	54.4	10.0	95.0	8.7	54.2
42	11.9	69.3	6.1	48.5	9.6	56.9	10.5	93.4	9.1	60.9
43	11.9	72.2	6.8	49.2	10.4	93.9	10.8	92.2	9.9	66.2
44	12.1	73.4	8.0	49.6	10.7	99.5	11.3	88.2	10.1	88.1
45	12.5	74.9	9.2	51.2	11.1	93.3	12.2	71.2	11.6	66.1
46	12.8	74.1	9.7	53.5	11.8	55.0	12.6	58.9	12.3	81.2
47	13.1	71.2	9.9	55.6	11.9	52.4	13.1	40.5	13.5	7[illegible]
49	13.4	69.1	1[illegible].1	61.5	12.0	[illegible].9	13.2	39.0	14.3	57.[illegible]

TABLE D-32(Contd)

RECORD 233 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 116.5 KILOPASCALS = 16.88 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	13.5	66.9	16.7	91.1	12.6	54.0	13.7	38.9	14.8	47.8
50	13.9	63.7	[illegible]	95.8	13.2	52.6	14.2	36.9	15.0	45.2
51	14.5	[illegible]	[illegible]	91.6	13.4	51.5	14.6	34.8	15.4	47.5
52	15.2	57.4	11.7	61.5	14.0	51.6	14.9	37.1	15.6	49.5
53	15.7	55.7	11.9	57.6	14.8	49.6	15.2	40.0	16.0	50.4
54	16.1	54.3	12.4	57.6	15.6	49.0	15.5	43.8	16.2	48.9
55	16.7	53.4	12.7	55.5	16.3	48.0	16.1	45.7	16.4	48.2
56	17.1	53.0	13.3	51.3	17.4	47.8	16.8	46.7	17.1	43.1
57	17.6	52.7	14.3	49.4	18.0	48.1	17.3	47.1	17.8	46.3
58	18.0	52.7	16.7	47.1	18.7	49.2	17.8	48.6	18.2	46.5
59	18.5	52.9	18.4	48.6	19.1	49.7	18.8	50.2	18.8	48.3
60	19.4	52.6	19.6	50.0	19.5	49.8	19.3	51.2	19.6	51.0

TABLE D-32(Contd)

RECORD 283 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 116.5 KILOPASCALS = 16.88 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-14.3	43.3	-14.4	64.2	-14.3	73.6	-14.2	76.0	-14.5	74.6
2	-14.0	48.0	-13.9	65.6	-14.0	75.5	-13.5	76.9	-14.2	75.0
3	-13.7	49.3	-13.2	64.0	-13.7	76.7	-12.9	77.4	-13.7	75.6
4	-12.8	77.3	-12.7	65.3	-13.3	78.7	-12.0	77.3	-13.4	76.1
5	-12.5	79.0	-12.7	67.1	-12.7	79.4	-11.0	76.6	-12.9	76.2
6	-11.9	77.5	-12.2	71.5	-12.2	77.9	-10.2	75.2	-12.2	76.0
7	-11.3	77.9	-11.7	71.5	-11.8	76.7	-9.6	72.8	-11.6	75.6
8	-10.8	77.9	-11.3	72.5	-11.5	76.5	-9.3	70.2	-11.0	75.0
9	-10.4	78.6	-10.8	72.5	-11.0	76.4	-9.1	67.6	-10.3	74.0
10	-9.8	77.8	-10.5	71.3	-10.3	74.0	-8.9	65.1	-9.9	73.5
11	-9.4	74.6	-9.7	68.2	-9.7	70.8	-8.9	62.9	-9.5	73.3
12	-9.1	63.7	-9.0	62.5	-9.2	68.2	-8.8	61.6	-8.9	73.6
13	-7.6	61.7	-8.0	59.8	-8.6	65.2	-8.4	60.8	-8.3	73.7
14	-7.1	57.1	-7.6	53.8	-8.1	62.5	-8.3	61.8	-7.7	73.5
15	-5.9	46.8	-7.0	58.2	-7.6	60.4	-8.0	63.6	-7.0	72.9
16	-5.6	48.2	-6.4	57.1	-7.0	59.6	-7.9	64.8	-5.5	74.1
17	-5.2	51.1	-6.0	58.5	-6.6	59.3	-7.7	65.8	-5.4	74.4
18	-5.0	53.5	-5.5	61.1	-6.2	61.2	-7.6	66.8	-5.1	74.7
19	-4.4	53.7	-5.3	62.1	-5.9	63.8	-7.2	66.9	-4.6	75.2
20	-3.7	54.1	-4.8	60.3	-5.7	65.6	-6.9	67.4	-4.4	75.4
21	-3.4	56.5	-4.3	56.9	-5.5	67.8	-6.7	68.5	-3.8	75.5
22	-2.1	78.1	-3.[illegible]	59.0	-5.4	[illegible]	-6.4	69.9	-3.3	75.9
23	-1.9	79.3	-3.3	58.1	-5.2	70.2	-6.2	71.1	-2.5	76.6
24	-0.8	79.8	-3.0	59.4	-4.7	69.8	-5.7	72.1	-2.3	76.9
25	-0.3	79.8	-2.3	61.3	-4.3	70.5	-5.1	73.1	-1.9	77.0
26	0.4	79.9	-2.4	69.1	-3.9	72.2	-4.6	74.0	-1.5	77.1
27	1.2	77.7	-1.8	73.3	-3.4	74.0	-3.8	74.6	-0.9	76.8
28	2.3	72.4	-1.0	76.5	-3.1	75.5	-3.3	74.9	-0.1	76.3
29	4.5	53.1	-0.6	77.2	-2.8	76.9	-2.7	75.3	0.2	75.6
30	5.3	48.2	0.4	75.3	-2.4	78.5	-1.1	75.1	0.5	75.0
31	5.8	5[illegible].3	1.0	71.1	-2.2	79.8	0.2	74.9	1.1	74.4
32	6.2	52.7	1.6	67.5	-2.0	80.3	1.1	74.2	1.9	74.1
33	6.8	54.5	2.5	63.9	-1.6	80.5	1.6	72.1	2.3	74.4
34	7.0	54.4	4.0	59.6	-1.2	79.7	2.0	69.6	2.5	74.7
35	7.8	53.1	4.9	59.0	-1.0	79.5	2.1	67.3	3.0	74.8
36	8.3	52.3	6.1	60.5	-0.6	77.3	2.2	65.2	3.4	74.5
37	8.5	53.8	7.[illegible]	57.0	-0.4	76.4	2.3	63.2	4.4	73.5
38	8.7	55.1	7.2	56.9	0.5	76.1	2.6	61.0	4.8	72.8
39	9.5	78.8	7.9	57.3	0.8	75.3	2.7	59.6	5.5	72.4
40	9.5	80.6	8.5	58.7	1.6	71.5	3.0	60.6	6.5	72.7
41	9.6	81.6	9.0	60.7	2.6	65.5	3.2	62.7	7.0	73.1
42	9.9	80.9	9.1	65.9	3.5	61.0	3.3	64.1	9.2	75.9
43	10.5	8[illegible].6	9.5	76.9	3.8	6[illegible].4	3.4	65.2	9.6	76.1
44	11.0	80.[illegible]	9.9	78.5	4.3	6[illegible].7	3.6	65.8	9.9	76.1
45	11.4	79.1	10.8	79.4	5.0	61.0	4.1	65.5	10.5	75.6
46	11.9	79.6	11.7	77.6	6.0	69.1	4.4	66.4	12.6	74.1
47	12.4	77.2	12.1	74.4	6.2	7[illegible].6	4.7	67.6	12.9	74.0
48	13.1	73.9	13.7	64.2	6.9	71.0	5.4	69.5	13.9	74.8

TABLE D-32(Contd)

RECORD 283 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 116.5 KILOPASCALS = 16.88 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	13.8	70.1	14.9	60.0	8.4	75.1	5.8	71.0	14.1	74.8
50	14.4	65.8	15.7	53.6	9.2	78.3	6.4	72.2	14.8	74.6
51	15.1	60.6	16.0	57.7	9.7	78.7	6.9	73.7	15.3	74.1
52	15.6	53.1	16.9	62.8	10.9	75.4	7.4	74.7	16.0	73.0
53	16.3	45.9	17.1	63.6	11.6	75.3	8.4	75.7	16.3	72.7
54	16.7	47.5	17.4	62.3	12.1	73.4	10.7	75.5	16.7	72.4
55	17.0	49.8	17.5	60.4	14.8	61.2	11.6	75.8	17.2	72.3
56	17.3	52.8	18.0	57.1	15.1	62.2	12.6	74.4	17.6	72.4
57	17.5	53.9	18.5	59.1	16.0	63.7	13.9	64.3	17.9	72.7
58	18.2	53.0	18.5	60.5	17.2	71.4	14.7	68.4	18.3	73.3
59	19.0	51.6	18.7	61.2	17.8	76.7	15.4	66.9	18.9	74.4
60	19.5	50.9	19.5	61.4	19.2	73.4	19.5	74.7	19.3	75.0

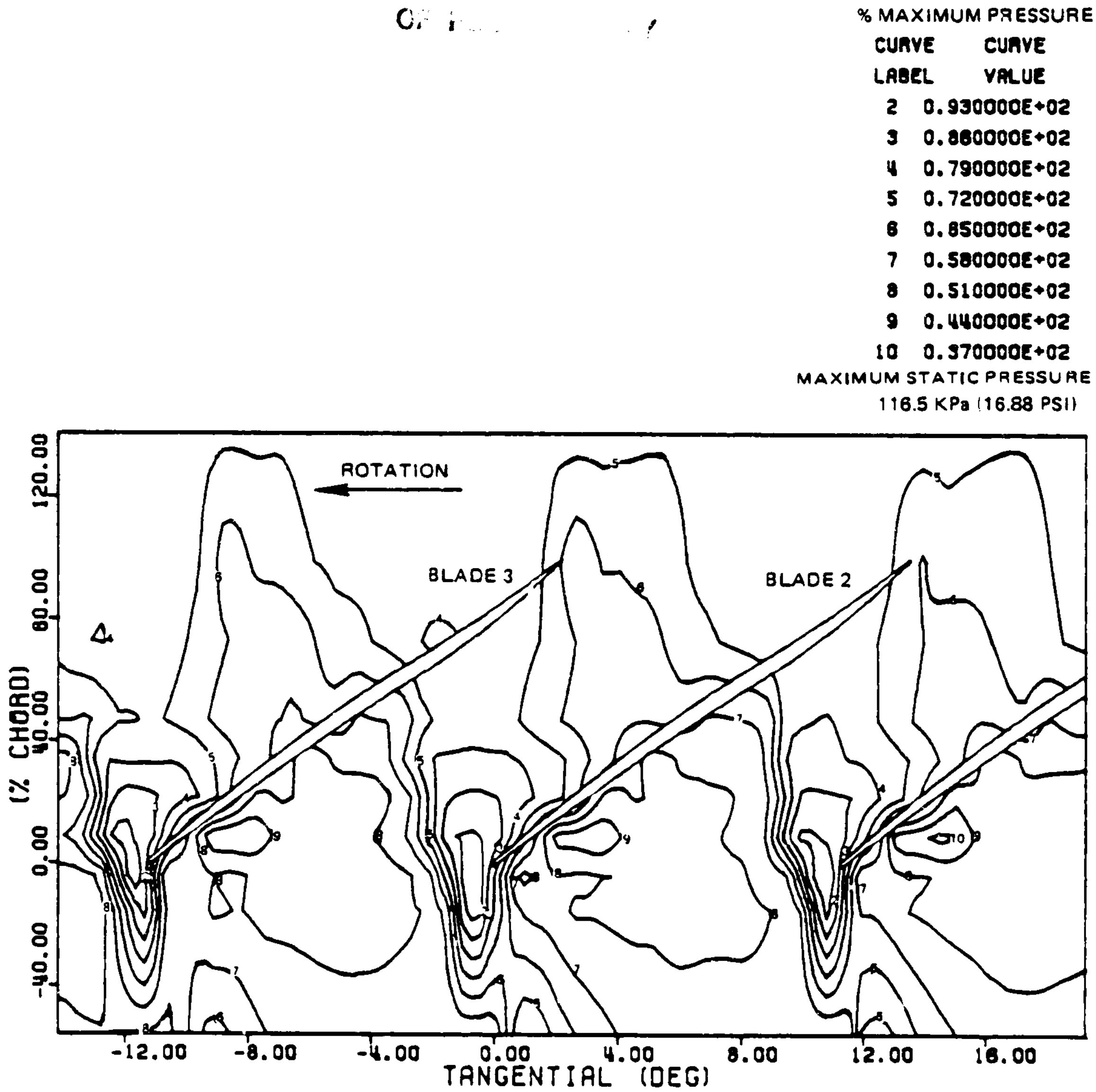

Figure D-19 Steady State Pressure Contours at Blade Tip; Out of Flutter, Low Operating Line, 85 Percent Speed, 85.8 Percent Flow, Pressure Ratio 1.3792

TABLE D-33

STEADY STATE STATIC PRESSURE FOR CONTOUR PLOTS

85% SPEED RECORD 293

Inlet Total Pressure = 80,680 N/m^2 (1685 lbf/ft^2)

Axial Location (Percent Chord)	Static Pressure to Inlet Total Pressure Ratio
-55.4	0.901
-15.1	0.904
- 3.6	0.914
9.4	0.935
22.2	1.000
34.6	1.096
47.5	1.177
73.4	1.259
99.3	1.302
141.4	1.287

TABLE D-34

RECORD 293 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 110.5 KILOPASCALS = 16.01 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-25.8	55.2	-25.8	84.4	-25.8	83.1	-25.8	82.8	-25.8	78.8
2	-25.1	64.1	-25.3	89.8	-25.0	86.6	-25.2	87.7	-25.2	83.8
3	-24.5	82.8	-24.7	89.8	-24.2	90.9	-24.5	90.4	-24.5	87.5
4	-23.8	93.7	-24.1	95.0	-23.5	98.7	-23.7	93.6	-23.1	93.8
5	-23.2	92.1	-23.1	100.0	-22.8	85.6	-22.7	97.4	-22.6	94.2
6	-22.3	87.8	-22.5	94.7	-22.5	68.2	-22.1	94.0	-22.0	93.7
7	-21.7	82.7	-22.1	77.8	-22.2	54.8	-21.5	83.3	-21.1	93.6
8	-21.0	76.2	-21.6	59.2	-22.0	48.8	-21.2	74.7	-20.5	87.3
9	-20.3	70.1	-21.3	56.2	-21.3	56.3	-20.9	62.5	-20.0	79.8
10	-19.6	65.3	-20.8	57.8	-20.7	54.4	-20.7	53.4	-19.7	67.7
11	-18.8	61.8	-20.1	52.4	-19.9	56.0	-20.5	43.8	-19.3	56.3
12	-18.2	59.9	-19.2	52.3	-19.1	53.8	-20.1	34.9	-18.8	51.4
13	-17.4	57.8	-18.6	50.7	-18.6	53.9	-19.0	39.5	-18.5	52.1
14	-16.6	56.8	-17.7	51.2	-18.0	53.6	-18.0	48.9	-17.7	50.4
15	-16.0	55.8	-16.6	50.9	-16.7	61.0	-17.3	50.9	-17.1	53.3
16	-14.7	53.9	-16.[illegible]	53.7	-16.0	68.2	-16.5	61.0	-16.3	57.5
17	-13.5	53.2	-15.1	63.3	-14.6	74.1	-15.7	72.6	-15.9	62.8
18	-12.9	57.7	-13.9	76.0	-13.7	81.7	-14.9	78.2	-15.2	68.7
19	-12.6	69.2	-13.2	87.3	-12.9	88.1	-14.0	79.9	-14.5	74.2
20	-12.0	85.7	-12.8	91.8	-12.5	94.9	-13.7	86.7	-13.1	82.4
21	-11.6	93.1	-11.9	96.5	-12.2	96.7	-13.0	92.3	-12.4	88.4
22	-11.0	88.3	-11.5	95.5	-11.8	88.7	-11.6	94.5	-11.7	90.9
23	-10.5	82.4	-11.0	79.5	-11.6	76.8	-10.8	90.7	-10.2	92.0
24	-10.0	76.5	-10.6	65.5	-11.3	64.5	-10.2	79.5	-9.6	89.7
25	-9.4	71.2	-10.3	57.9	-11.1	53.2	-9.7	60.2	-9.3	86.0
26	-8.8	66.9	-9.7	53.6	-10.8	50.4	-9.3	44.9	-8.8	75.1
27	-8.1	62.9	-8.7	52.6	-10.3	55.3	-8.7	36.1	-8.3	63.1
28	-7.6	60.2	-8.2	52.6	-10.2	56.2	-8.1	39.5	-8.0	54.3
29	-6.9	58.1	-7.6	51.2	-9.5	53.2	-7.6	41.5	-7.6	50.3
30	-6.0	56.7	-6.6	51.7	-8.7	55.5	-6.7	49.8	-7.0	50.4
31	-4.8	55.4	-5.7	51.6	-8.2	54.1	-6.0	51.9	-6.6	48.9
32	-4.0	54.5	-4.8	53.7	-7.3	54.2	-5.1	61.3	-5.9	50.8
33	-3.2	53.9	-4.0	60.8	-6.8	53.8	-4.7	68.3	-5.4	53.4
34	-2.4	54.3	-3.4	68.5	-5.6	59.5	-4.0	75.1	-4.8	57.8
35	-1.6	60.0	-2.6	75.2	-4.9	65.6	-2.0	81.7	-4.3	62.7
36	-1.3	69.7	-1.9	89.9	-4.3	70.0	-1.3	86.3	-3.9	68.0
37	-1.0	78.8	-1.5	92.3	-3.3	74.5	-0.6	92.6	-3.1	72.1
38	-0.8	85.9	-0.9	93.4	-2.4	80.9	-0.1	93.1	-2.0	79.4
39	-0.5	92.7	-0.6	95.8	-1.6	86.7	0.9	84.3	-1.1	85.7
40	-0.2	93.1	-0.2	95.2	-1.0	94.7	1.3	70.9	-0.4	87.9
41	0.6	85.1	0.3	75.4	-0.4	83.9	1.6	59.8	0.3	89.1
42	1.2	77.4	1.0	55.7	-0.2	69.3	1.9	49.6	1.3	90.3
43	1.8	71.4	1.6	57.8	0.2	52.4	2.6	37.3	2.1	86.3
44	2.7	65.1	2.4	52.7	0.5	49.3	3.6	42.0	2.5	74.6
45	3.3	61.7	3.1	52.6	1.1	56.1	4.6	51.0	2.8	65.3
46	4.2	58.7	3.9	51.0	1.8	53.4	5.1	52.7	3.2	55.7
47	4.7	57.0	4.6	52.0	2.5	56.0	5.9	61.9	3.6	48.8
48	5.9	55.9	5.8	52.0	3.2	54.5	6.3	70.1	4.2	50.9

TABLE D-34(Contd)

RECORD 293 WALL KULITE STEADY STATE PRESSURES

PAGE 2

MAXIMUM PRESSURE SAMPLED = 110.5 KILOPASCALS = 16.01 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	6.5	55.3	6.3	54.[illegible]	4.2	54.8	7.0	75.8	4.7	51.0
50	7.8	54.3	7.6	69.6	5.4	59.8	8.1	79.9	5.3	54.1
51	8.4	54.2	9.0	89.3	6.1	65.9	9.2	86.3	5.8	57.1
52	8.9	55.6	9.5	89.6	7.1	72.2	10.9	95.4	6.6	62.6
53	9.2	60.4	10.5	96.9	7.9	77.2	11.9	87.4	7.3	69.2
54	9.7	73.3	11.4	82.1	8.7	83.0	12.4	78.1	8.3	75.1
55	10.0	83.9	11.7	69.7	10.3	94.4	12.7	65.8	9.1	8[illegible].9
56	10.2	90.2	12.3	56.6	10.8	85.9	13.2	47.6	9.0	65.1
57	10.6	94.0	12.7	58.4	11.0	76.7	14.0	38.2	10.2	88.6
58	11.4	88.0	12.9	58.9	11.0	68.8	14.9	41.4	11.1	90.5
59	11.9	82.8	13.8	54.0	11.3	61.4	15.9	49.5	11.9	91.0
60	12.6	75.8	14.4	54.3	11.8	51.8	16.5	52.2	12.6	90.7
61	13.1	71.9	15.0	52.9	12.3	57.5	17.1	56.2	13.4	85.9
62	13.7	67.4	16.1	52.8	13.0	55.4	17.4	61.1	13.9	73.3
63	14.2	64.6	16.7	52.0	13.6	56.9	17.8	65.9	14.4	59.0
64	14.6	62.2	17.7	53.2	14.3	54.7	17.9	68.0	14.9	48.8
65	15.1	61.5	18.2	56.1	15.1	55.1	18.0	69.6	15.5	50.0
66	15.8	58.5	18.5	59.8	15.9	54.2	18.1	71.3	16.1	49.[illegible]
67	16.5	57.1	16.7	62.2	17.0	59.2	18.3	73.4	17.0	52.2
68	17.4	56.2	18.8	64.3	17.5	64.2	18.5	74.5	17.6	56.2
69	18.2	55.3	18.9	65.9	18.0	69.1	18.7	75.8	18.3	63.2
70	19.1	54.2	19.1	67.2	19.1	73.6	19.1	77.1	19.1	71.3

TABLE D-34(Contd)

RECORD 293 WALL KULITE STEADY STATE PRESSURES
MAXIMUM PRESSURE SAMPLED = 110.5 KILOPASCALS = 16.01 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-25.8	84.2	-25.8	84.5	-25.8	95.3	-25.8	94.9	-25.8	91.6
2	-25.0	87.2	-25.4	86.6	-25.3	96.1	-25.1	94.8	-25.2	92.1
3	-24.1	90.9	-24.5	88.1	-24.6	95.7	-24.4	95.3	-24.7	92.9
4	-23.1	93.9	-23.8	89.8	-24.3	95.3	-23.8	96.2	-24.2	93.6
5	-22.3	94.4	-23.1	90.8	-23.9	93.6	-23.1	96.5	-22.6	93.9
6	-20.9	91.2	-22.2	91.2	-23.3	90.9	-22.2	97.0	-21.9	94.6
7	-19.9	90.4	-21.3	91.2	-22.8	90.2	-21.4	96.6	-21.3	95.4
8	-19.1	88.6	-20.7	90.4	-22.4	91.1	-20.6	96.0	-20.5	94.7
9	-18.6	83.5	-19.8	90.3	-21.9	92.0	-20.1	95.9	-19.8	94.7
10	-18.0	71.5	-19.2	90.0	-21.5	92.2	-19.4	95.3	-18.8	95.1
11	-17.6	55.1	-18.0	89.9	-20.7	92.6	-19.0	94.9	-17.8	[illegible]
12	-17.1	50.0	-17.1	85.7	-19.7	92.1	-18.5	94.8	-16.9	93.2
13	-16.1	63.8	-16.6	[illegible]	-19.1	92.0	-17.6	94.4	-16.1	93.0
14	-15.5	73.3	-16.1	76.3	-18.2	92.5	-17.0	94.7	-15.3	92.9
15	-14.7	82.0	-15.5	78.5	-17.1	93.6	-16.3	95.2	-14.5	93.0
16	-14.0	81.4	-15.0	80.3	-16.4	93.7	-15.8	95.8	-13.2	93.4
17	-12.9	84.3	-14.6	81.1	-15.1	94.1	-15.0	96.5	-12.2	93.2
18	-12.2	86.7	-13.9	83.1	-14.4	95.0	-14.3	96.6	-11.3	93.9
19	-11.3	89.1	-13.1	84.4	-13.5	96.2	-13.3	96.4	-10.4	94.5
20	-10.4	88.4	-12.5	86.3	-12.8	94.3	-12.1	97.0	-9.0	94.5
21	-9.5	88.1	-11.8	87.6	-12.2	90.3	-11.2	96.7	-8.5	94.6
22	-8.8	88.4	-11.2	88.5	-11.6	87.5	-10.8	96.6	-7.7	94.0
23	-7.6	86.2	-10.6	89.6	-11.0	88.7	-10.0	95.5	-7.4	93.3
24	-7.0	77.5	-9.5	88.1	-10.2	89.2	-9.3	94.6	-6.9	92.7
25	-6.7	67.3	-8.7	87.7	-9.6	89.8	-8.8	94.8	-6.3	92.6
26	-6.1	49.8	-7.9	87.9	-8.9	89.7	-8.2	94.2	-5.3	92.9
27	-5.7	45.4	-7.3	89.1	-7.9	91.5	-7.7	93.6	-4.6	92.9
28	-4.8	59.6	-6.1	87.2	-6.7	92.0	-7.0	93.8	-4.0	93.0
29	-4.1	70.7	-5.7	83.5	-5.5	92.5	-6.2	93.7	-3.3	93.3
30	-3.4	79.3	-5.2	78.6	-4.8	92.5	-5.3	93.9	-2.4	93.2
31	-2.5	79.6	-5.2	76.5	-4.1	93.1	-4.7	94.3	-1.8	93.2
32	-1.6	82.9	-5.0	73.5	-3.5	93.9	-3.8	94.7	-0.9	93.5
33	-0.7	86.9	-4.7	73.0	-3.1	94.7	-2.9	94.8	-0.4	93.8
34	0.2	88.4	-4.3	75.5	-2.6	95.1	-2.0	95.3	0.4	93.9
35	1.3	88.8	-4.2	77.3	-1.6	92.9	-0.9	95.9	1.0	94.2
36	2.4	86.9	-4.0	78.8	-1.1	88.8	-0.3	95.9	1.7	94.6
37	3.2	86.3	-3.4	79.6	-0.7	86.2	0.4	96.0	2.3	94.5
38	4.0	82.3	-3.2	80.2	-0.3	85.3	1.4	94.4	2.7	94.5
39	4.6	67.8	-2.9	81.6	0.1	87.0	2.2	92.7	3.3	94.1
40	4.9	57.5	-2.1	82.9	0.3	88.1	2.7	93.0	3.8	93.7
41	5.4	47.3	-1.2	85.0	1.0	88.7	3.8	92.4	4.1	93.6
42	6.1	59.4	-0.6	86.2	1.5	89.6	4.7	92.3	4.6	93.5
43	6.5	67.4	0.2	87.1	1.8	90.1	5.7	93.0	[illegible]	93.1
44	6.9	72.5	0.8	87.2	3.0	90.3	6.5	93.8	5.4	92.8
45	7.2	78.6	1.8	87.0	3.9	89.9	7.6	94.3	5.9	92.5
46	7.8	83.1	2.8	87.4	4.9	89.5	8.4	94.3	6.4	92.4
47	8.5	81.9	3.6	87.8	5.5	90.5	9.1	94.5	6.9	92.2
48	9.3	84.2	4.5	88.2	5.9	91.5	9.7	95.2	7.4	92.0

TABLE D-34(Contd)

RECORD 293 WALL KULITE STEADY STATE PRESSURES

MAXIMUM PRESSURE SAMPLED = 110.5 KILOPASCALS = 16.01 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
49	10.2	88.7	5.2	87.3	6.7	92.5	10.3	95.9	7.9	91.8
50	11.0	90.7	5.6	84.6	7.4	93.3	11.0	95.9	8.4	91.9
51	12.0	[illegible]	5.5	81.7	7.8	93.6	11.9	96.5	8.7	92.2
52	12.9	90.2	6.3	77.3	8.8	94.9	12.7	95.8	9.1	92.6
53	13.8	87.7	6.5	76.1	9.4	94.1	13.2	95.5	9.2	92.9
54	14.5	86.7	7.1	79.8	9.9	92.4	13.7	95.2	9.7	93.3
55	15.2	83.4	7.4	81.0	10.3	89.3	14.3	94.4	10.6	92.9
56	15.8	71.7	8.1	82.9	10.6	87.7	14.9	93.6	11.0	93.0
57	16.1	61.2	8.9	84.7	10.8	87.1	15.4	93.5	11.5	93.4
58	16.5	51.3	9.8	86.4	11.4	88.3	16.0	93.4	11.7	93.7
59	16.9	46.9	10.7	89.0	11.7	89.4	16.6	93.7	11.9	94.1
60	17.2	51.3	11.7	89.9	12.4	90.0	16.9	94.1	12.4	94.5
61	17.5	54.6	13.0	88.6	12.9	90.5	17.3	94.4	13.5	94.2
62	17.7	58.9	14.1	88.7	14.0	90.4	17.7	94.9	13.8	93.9
63	18.0	62.6	15.6	88.7	14.9	89.6	18.0	95.1	14.3	93.8
64	18.3	66.4	16.3	87.5	15.8	90.7	18.2	95.2	15.1	93.9
65	18.6	69.9	17.1	80.7	16.3	91.6	18.4	95.3	16.0	93.1
66	18.8	71.7	17.5	74.0	16.8	92.7	18.6	95.4	16.8	92.5
67	18.8	72.7	17.8	72.5	17.4	92.9	18.7	95.4	17.3	92.4
68	18.8	73.5	18.3	76.7	18.1	93.5	18.8	95.5	18.2	92.1
69	18.9	74.4	18.6	79.0	18.6	93.9	19.0	95.5	18.7	92.0
70	19.1	75.7	19.1	80.2	19.1	94.4	19.1	95.5	19.1	92.3

OF ...

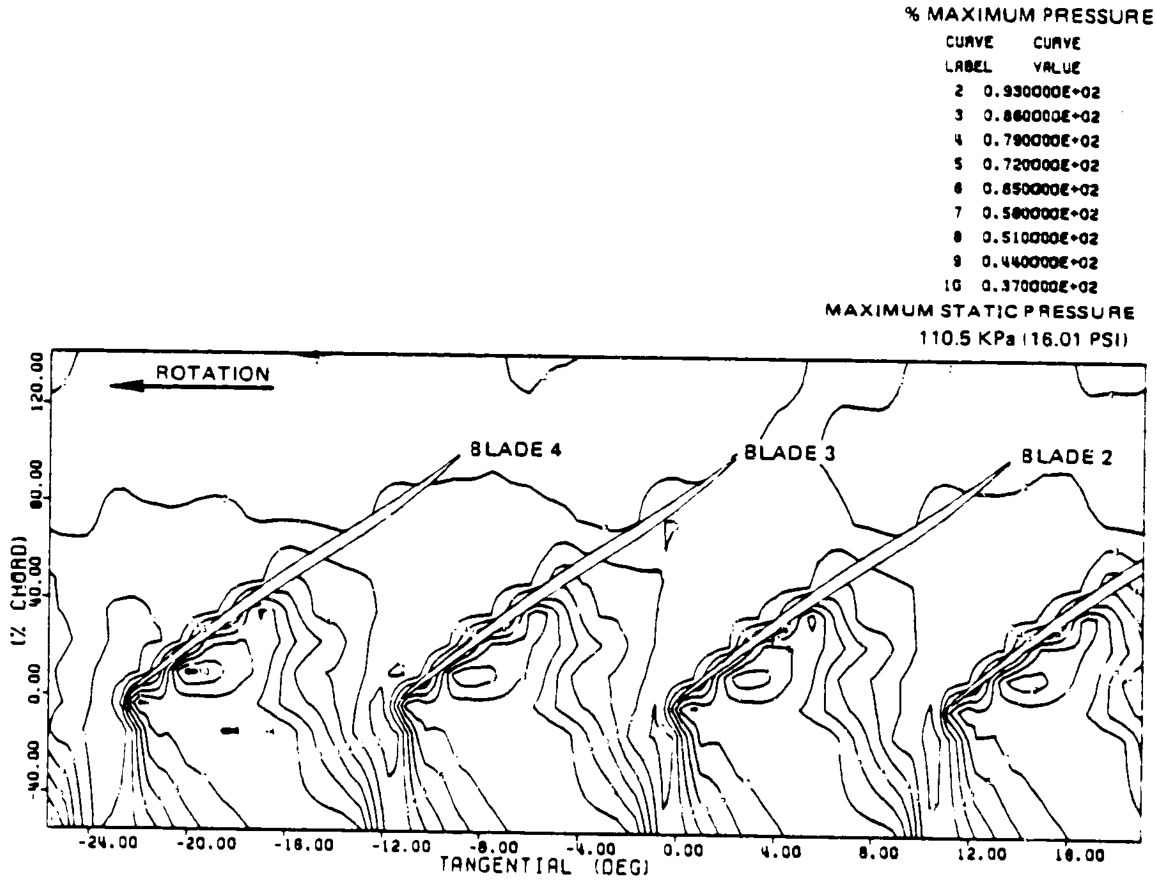

Figure D-20 Steady State Pressure Contours at Blade Tip; Out of Flutter, High Operating Line, 85 Percent Speed, 75.1 Percent Flow, Pressure Ratio 1.4862

APPENDIX D

PART 2

UNSTEADY PRESSURE

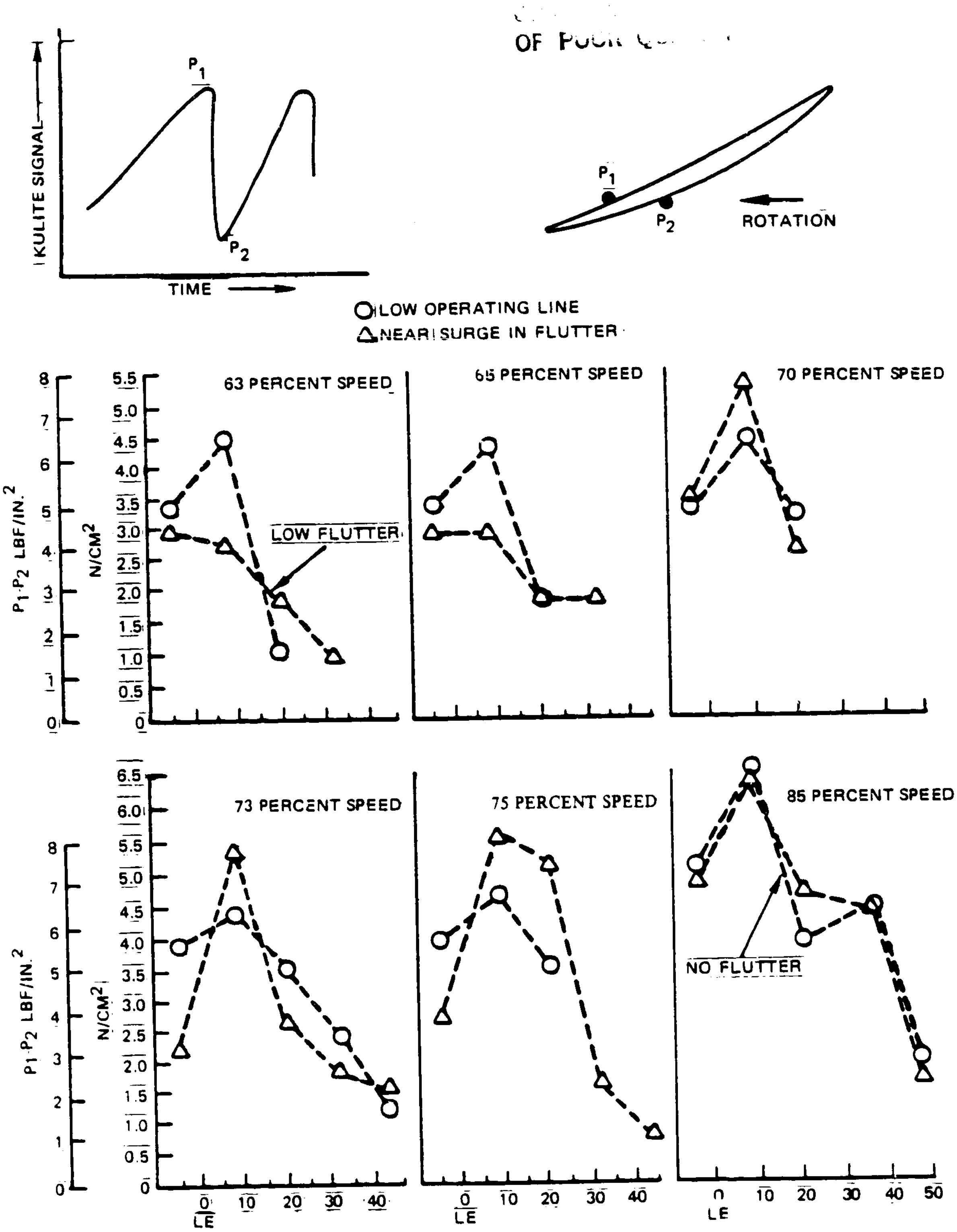

Figure D-21 Steady Pressure Differential Between Pressure and Suction Surfaces at Operating Conditions In and Out of Flutter

BLADE MOUNTED KULITE SENSOR FLUTTER DATA SURVEY

Sensor Position			67 Percent Speed			73 Percent Speed			75 Percent Speed		
Percent Span From Hub	Percent Chord From Leading Edge	Blade Slot and Surface	Unsteady Pressure Amplitude (N/cm^2)	Unsteady Pressure Amplitude (lbf/in^2)	Phase Relative to Strain Gage on Blade 3 (Degrees)	Unsteady Pressure Amplitude (N/cm^2)	Unsteady Pressure Amplitude (lbf/in^2)	Phase Relative to Strain Gage on Blade 3 (Degrees)	Unsteady Pressure Amplitude (N/cm^2)	Unsteady Pressure Amplitude (lbf/in^2)	Phase Relative to Strain Gage on Blade 3 (Degrees)
76.4	5	2 concave	64.81	94	357	55.16	80	5	103.42	150	7
	15		-	-	-	-	-	-	-	-	-
	25		52.40	76	5	44.13	64	0	82.74	120	5
	40		38.61	56	19	33.10	48	12	51.71	75	40
	65		38.61	56	46	35.85	52	37	33.10	48	47
	90		28.27	41	15	26.89	39	10	28.96	42	18
	5	2 convex	24.13	35	180	25.51	37	162	62.74	91	188
	25		-	-	-	-	-	-	-	-	-
	5	3 convex	-	-	-	-	-	-	-	-	-
	15		42.75	62	129	127.55	185	195	137.90	200	205
	25		22.06	32	131	50.33	73	152	49.64	72	143
	40		-	-	238	16.55	24	63	22.06	32	68
	65		17.93	26	316	26.89	39	324	33.10	48	336
	90		17.93	26	260	30.34	44	282	30.34	44	284
	5	3 concave	56.54	82	-	-	-	-	82.74	120	262
	25		51.02	74	-	-	-	-	75.84	110	257
86.3	5	4 concave	-	-	-	-	-	-	-	-	-
	15		-	-	-	-	-	-	-	-	-
	25		40.68	59	225	33.10	48	220	59.98	87	221
	40		32.41	47	240	23.44	34	231	51.02	74	233
	65		26.20	38	273	23.44	34	261	42.06	61	268
	90		26.20	38	266	23.44	34	247	44.82	65	297
	5	4 convex	151.69	220	101	35.85	52	353	57.23	83	350
	25		26.20	38	15	27.58	40	51	39.30	57	51
	5	5 convex	-	-	-	21.37	31	253	-	-	-
	15		12.41	18	13	70.33	102	48	179.26	260	36
	25		-	-	-	-	-	-	-	-	-
	40		-	-	-	-	-	-	-	-	-
	65		21.37	31	136	22.06	32	119	33.10	48	117
	90		21.37	31	178	25.51	37	157	35.85	52	166
	50	6 convex	17.24	25	93	143.41	208	120	34.47	50	104

TABLE D-36

RECORD 239 WALL KULITE NONSTEADY PRESSURE AMPLITUDES
MAXIMUM PRESSURE SAMPLED = 3.13 KILOPASCALS = 0.454 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-32.3	29.1	-26.4	26.9	-25.0	35.5	-22.9	63.0	-21.3	41.6
2	-29.8	23.6	-23.9	26.9	-22.4	60.1	-20.4	22.5	-18.8	8.8
3	-27.3	14.5	-21.4	26.9	-19.9	25.1	-17.9	43.8	-16.3	22.5
4	-24.8	16.3	-18.9	12.1	-17.4	25.1	-15.4	28.2	-13.7	36.3
5	-22.3	12.6	-16.4	21.4	-14.9	35.5	-12.9	31.7	-11.2	44.7
6	-19.7	25.3	-13.9	3[illegible].2	-12.4	56.2	-10.4	7.9	-8.8	22.5
7	-18.5	14.5	-12.6	38.1	-11.2	77.5	-9.1	20.0	-7.5	6.6
8	-17.2	15.9	-11.4	9.5	-9.9	25.1	-7.9	9.9	-6.2	4.0
9	-16.0	12.6	-10.1	24.0	-8.6	14.1	-6.6	24.9	-5.0	8.8
10	-14.7	22.5	-8.8	15.2	-7.4	5.1	-5.4	1.3	-3.7	22.5
11	-13.5	16.7	-7.6	18.9	-6.1	14.8	-4.1	9.9	-2.5	19.4
12	-12.2	14.1	-6.3	21.4	-4.9	22.5	-2.8	20.0	-1.2	26.2
13	-10.9	5.3	-5.1	11.2	-3.6	15.9	-1.6	20.0	0.1	33.0
14	-9.7	31.7	-3.8	13.4	-2.3	39.0	-0.3	89.2	1.3	50.0
15	-8.4	43.8	-2.5	17.0	-1.1	56.2	0.9	83.0	2.6	4.4
16	-7.2	31.7	-1.3	26.9	0.2	100.0	2.2	41.6	3.8	12.6
17	-5.9	12.6	-0.0	6.8	1.4	22.5	3.5	16.5	5.1	12.6

RECORD 239 WALL KULITE NONSTEADY PRESSURE AMPLITUDES
MAXIMUM PRESSURE SAMPLED = 3.13 KILOPASCALS = 0.454 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-19.4	31.5	-17.7	24.0	-13.9	23.8	-10.4	38.8	-4.3	35.2
2	-16.9	22.2	-15.2	10.8	-11.4	35.2	-7.8	39.6	-1.7	35.2
3	-14.4	35.5	-12.7	33.9	-8.9	38.3	-5.3	33.0	0.8	39.6
4	-11.8	44.5	-10.2	33.9	-6.3	37.0	-2.9	26.2	3.3	32.2
5	-9.3	50.0	-7.7	33.9	-3.8	37.0	-0.3	31.5	5.8	32.2
6	-6.8	7.9	-5.1	17.0	-1.3	35.2	2.2	32.2	8.3	31.5
7	-5.5	14.1	-3.9	21.6	-0.1	38.8	3.4	39.6	9.6	24.4
8	-4.3	15.9	-2.6	30.2	1.[illegible]	39.6	4.7	31.5	10.8	24.4
9	-3.0	27.2	-1.4	26.9	2.5	37.9	6.0	31.5	12.1	24.9
10	-1.8	28.2	-0.1	28.9	3.7	35.2	7.2	22.7	13.4	24.4
11	-0.5	35.5	1.1	33.9	5.0	35.2	8.5	26.2	14.6	22.7
12	0.7	39.6	2.4	33.9	6.2	32.2	9.7	24.9	15.9	20.7
13	2.0	44.5	3.7	27.5	7.5	29.3	11.0	31.5	17.1	22.2
14	3.2	32.4	4.9	10.8	8.8	22.2	12.2	32.2	18.4	22.2
15	4.5	17.3	6.1	21.4	10.0	31.5	13.5	22.7	19.6	22.2
16	5.7	28.2	7.4	21.4	11.3	31.5	14.8	31.5	20.9	17.4
17	7.0	25.1	6.6	18.9	12.5	24.9	16.0	22.7	22.1	20.7

TABLE D-37

RECORD 239 WALL KULITE NONSTEADY PRESSURE PHASE TO STRAIN GAGE 3

SAMPLE NUMBER	% CHORD= TANGENTIAL (DEG.)	-55.4 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	-15.1 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	-3.6 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	9.4 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	22.2 PHASE (DEG.)
1	-32.3	5.0	-26.4	171.0	[illegible]	[illegible]	-22.9	153.0	-21.3	153.0
2	-29.8	189.0	-23.9	168.0	-22.4	18.0	-20.4	324.0	-18.8	288.0
3	-27.3	180.0	-21.4	54.0	-19.9	342.0	-17.9	297.0	-16.3	270.0
4	-24.8	180.0	-18.9	27.0	-17.4	270.0	-15.4	261.0	-13.7	279.0
5	-22.3	271.0	-16.4	288.0	-14.9	253.0	-12.9	261.0	-11.2	270.0
6	-19.7	144.0	-13.9	76.0	-12.4	38.0	-10.4	207.0	-8.8	342.0
7	-18.5	216.0	-12.6	36.0	-11.2	324.0	-9.1	27.0	-7.5	198.0
8	-17.2	208.0	-11.4	348.0	-9.9	207.0	-7.9	297.0	-6.2	0.0
9	-16.0	297.0	-10.1	27.0	-8.6	12.0	-6.6	351.0	-5.0	261.0
10	-14.7	236.0	-8.8	81.0	-7.4	324.0	-5.4	340.0	-3.7	342.0
11	-13.5	258.0	-7.6	283.0	-6.1	18.0	-4.1	333.0	-2.5	342.0
12	-12.2	221.0	-6.3	356.0	-4.9	5.0	-2.8	333.0	-1.2	340.0
13	-10.9	201.0	-5.1	315.0	-3.6	333.0	-1.6	324.0	0.1	342.0
14	-9.7	198.0	-3.8	333.0	-2.3	342.0	-0.3	285.0	1.3	279.0
15	-8.4	207.0	-2.5	324.0	-1.1	279.0	0.9	270.0	2.6	18.0
16	-7.2	311.0	-1.3	330.0	0.2	99.0	2.2	90.0	3.8	18.0
17	-5.9	236.0	-0.0	279.0	1.4	288.0	3.5	54.0	5.1	45.0

RECORD 239 WALL KULITE NONSTEADY PRESSURE PHASE TO STRAIN GAGE 3

SAMPLE NUMBER	% CHORD= TANGENTIAL (DEG.)	34.6 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	47.5 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	73.4 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	99.3 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	141.4 PHASE (DEG.)
1	-19.4	0.0	-17.7	261.0	-13.9	270.0	-10.4	288.0	-4.3	[illegible]
2	-16.9	193.0	-15.2	27.0	-11.4	279.0	-7.8	288.0	-1.7	324.0
3	-14.4	261.0	-12.7	270.0	-8.9	286.0	-5.3	307.0	0.8	351.0
4	-11.8	270.0	-10.2	279.0	-6.3	297.0	-2.9	315.0	3.3	12.0
5	-9.3	90.0	-7.7	270.0	-3.8	310.0	-0.3	333.0	5.8	20.0
6	-6.8	39.0	-5.1	333.0	-1.3	355.0	2.2	358.0	8.3	36.0
7	-5.5	270.0	-3.9	329.0	-0.1	342.0	3.4	0.0	9.6	45.0
8	-4.3	324.0	-2.6	333.0	1.2	351.0	4.7	5.0	10.8	54.0
9	-3.0	329.0	-1.4	333.0	2.5	0.0	6.0	20.0	12.1	63.0
10	-1.8	342.0	-0.1	342.0	3.7	9.0	7.2	27.0	13.4	81.0
11	-0.5	342.0	1.1	353.0	5.0	18.0	8.5	30.0	14.6	90.0
12	0.7	351.0	2.4	353.0	6.2	18.0	9.7	40.0	15.9	99.0
13	2.0	306.0	3.7	0.0	7.5	72.0	11.0	53.0	17.1	102.0
14	3.2	315.0	4.9	0.0	8.8	72.0	12.2	81.0	18.4	105.0
15	4.5	40.0	6.1	50.0	10.0	85.0	13.5	95.0	19.6	99.0
16	5.7	22.0	7.4	36.0	11.3	63.0	14.8	99.0	20.9	117.0
17	7.0	54.0	8.6	45.0	12.5	90.0	16.0	99.0	22.1	108.0

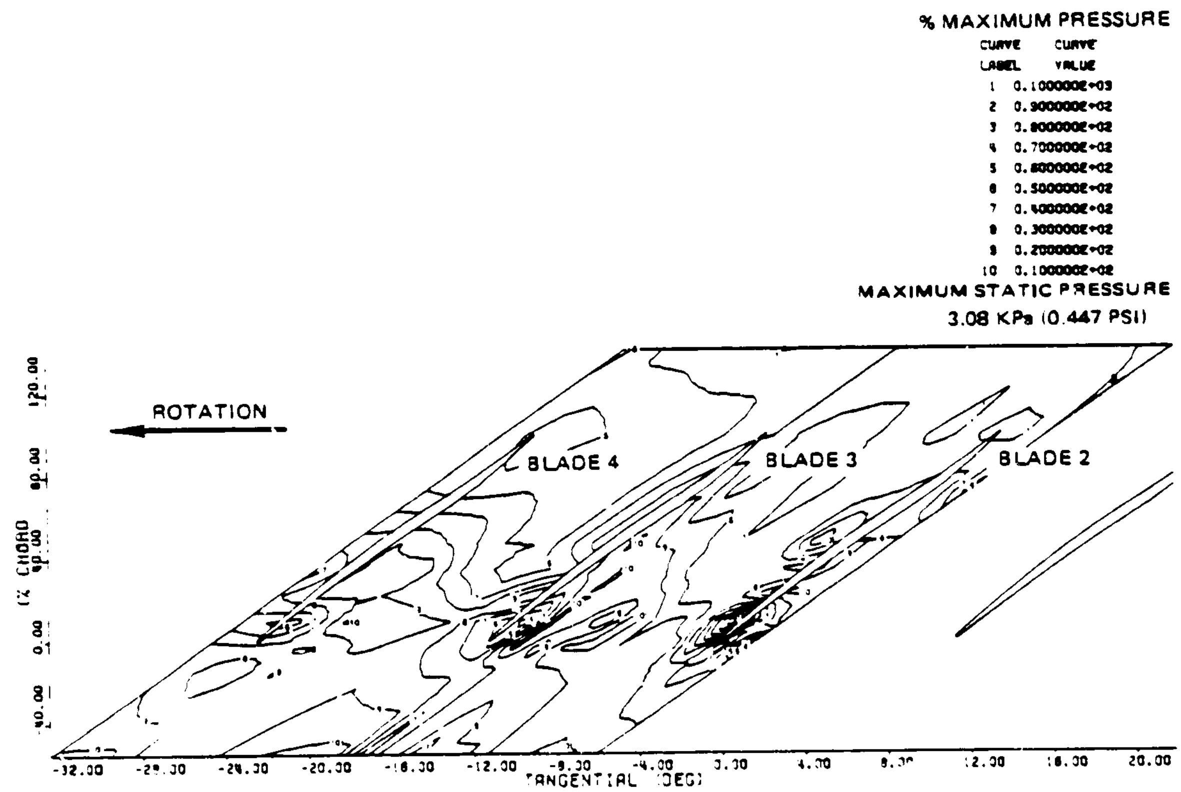

Figure D-22 Nonsteady Pressure Contours at Blade Tip; in Flutter, High Operating Line, 66 Percent Speed, 54.5 Percent Flow, Pressure Ratio 1.260

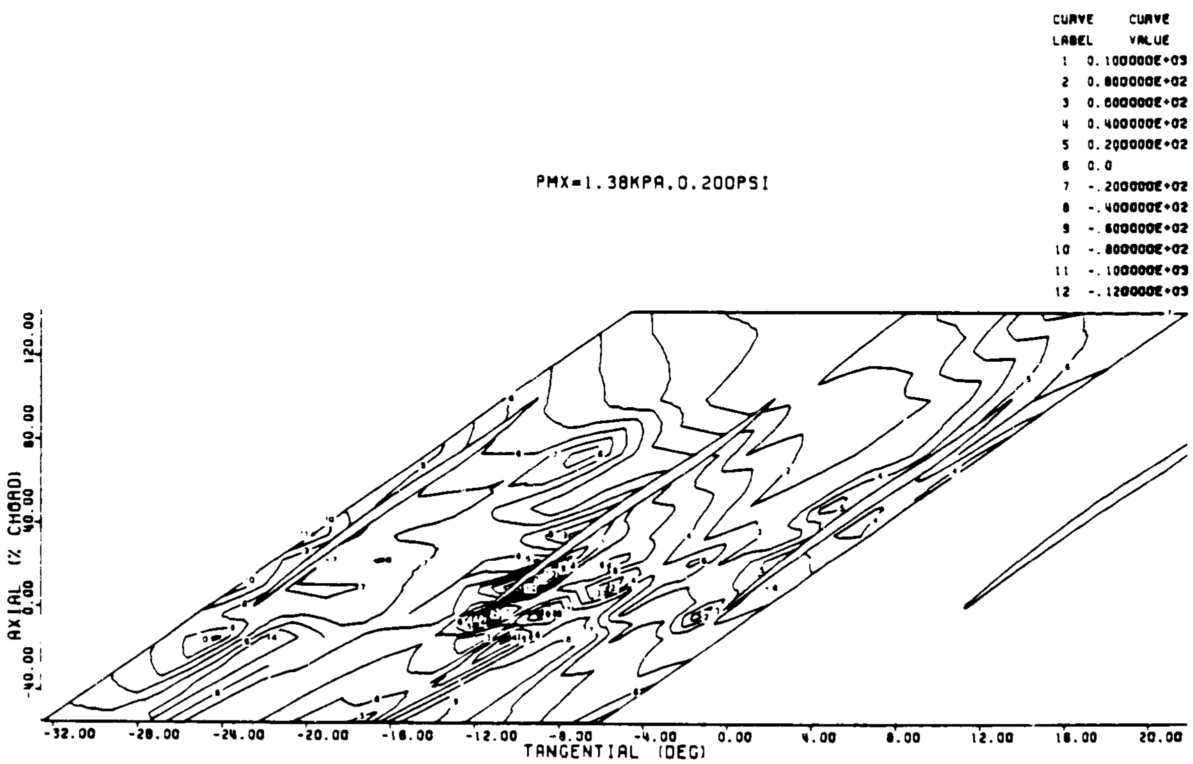

Figure D-23 Nonsteady Real Pressure Contours at Blade Tip; In Flutter, High Operating Line, 56 Percent Speed

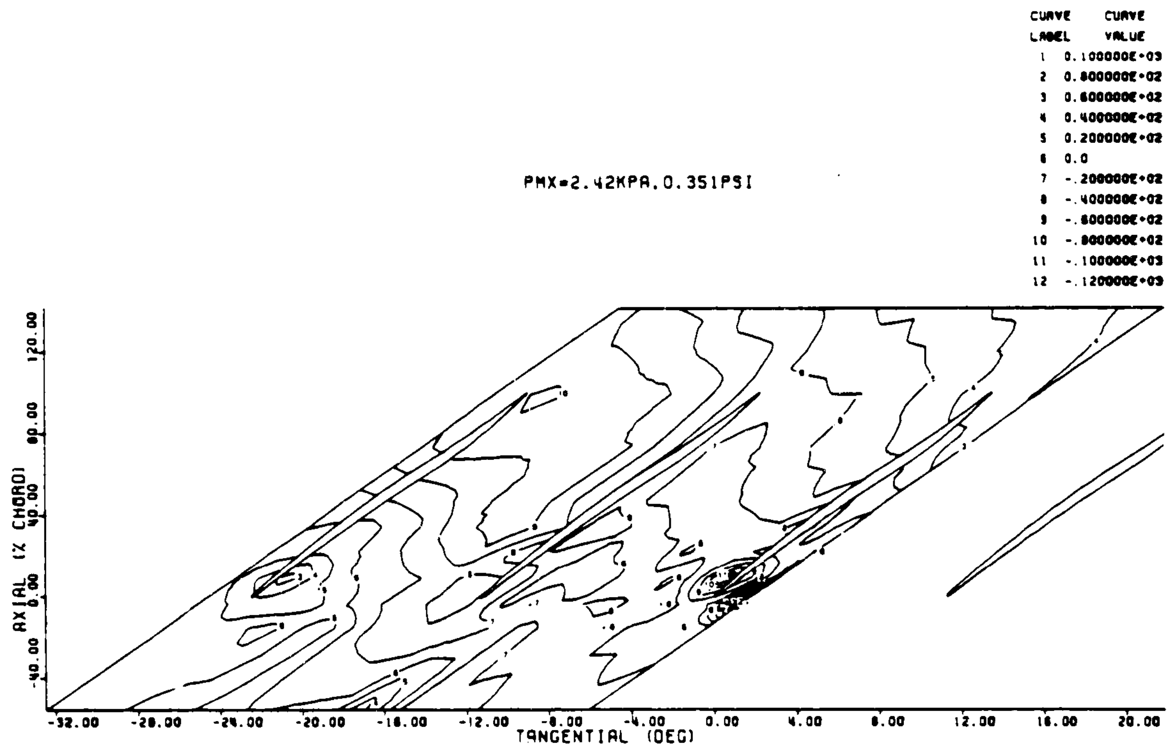

Figure D-24 Nonsteady Imaginary Pressure Contours at Blade Tip; In Flutter, High Operating Line, 66 Percent Speed

TABLE D-38

RECORD 220 WALL KULITE NONSTEADY PRESSURE AMPLITUDES
MAXIMUM PRESSURE SAMPLED = 5.02 KILOPASCALS = 0.728 PSI

SAMPLE NUMBER	% CHORD= -55.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -15.1 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= -3.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 9.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 22.2 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-32.8	3.0	-27.1	10.2	-25.5	50.1	-23.7	30.1	-21.8	13.5
2	-30.3	15.4	-24.6	9.5	-23.0	47.8	-21.2	100.0	-19.4	21.3
3	-27.8	19.5	-22.2	8.0	-20.5	30.2	-18.7	19.1	-16.8	6.7
4	-25.3	13.7	-19.6	12.5	-18.0	24.3	-16.2	19.1	-14.4	12.0
5	-22.8	10.2	-17.1	4.4	-15.5	26.5	-13.7	25.7	-11.9	25.5
6	-20.3	0.8	-14.6	10.0	-13.0	35.0	-11.2	40.7	-9.4	26.8
7	-19.1	12.2	-13.4	11.1	-11.8	60.2	-9.9	83.1	-8.1	26.8
8	-17.9	4.4	-12.1	12.5	-10.5	10.2	-8.7	41.6	-6.9	14.6
9	-16.6	19.5	-10.9	8.0	-9.2	14.4	-7.4	17.3	-5.6	3.0
10	-15.3	9.8	-9.7	8.9	-8.0	7.6	-6.2	16.3	-4.3	12.0
11	-14.1	12.0	-8.4	17.7	-6.8	10.4	-4.9	15.8	-3.1	10.7
12	-12.8	12.2	-7.1	3.6	-5.5	15.1	-3.7	12.0	-1.9	19.0
13	-11.6	7.7	-5.9	1.4	-4.3	13.5	-2.4	26.2	-0.6	15.8
14	-10.3	4.9	-4.6	5.6	-3.0	15.1	-1.2	30.2	0.6	16.5
15	-9.1	3.8	-3.4	4.9	-1.8	15.1	0.1	30.2	1.9	16.9
16	-7.8	6.2	-2.3	10.0	-0.5	25.7	1.3	67.6	3.1	16.9
17	-6.6	10.4	-0.9	14.4	0.7	19.1	2.6	7.8	4.4	23.9

RECORD 220 WALL KULITE NONSTEADY PRESSURE AMPLITUDES
MAXIMUM PRESSURE SAMPLED = 5.02 KILOPASCALS = 0.728 PSI

SAMPLE NUMBER	% CHORD= 34.6 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 47.5 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 73.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 99.3 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	% CHORD= 141.4 TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-20.1	16.5	-18.3	5.6	-14.6	8.8	-11.0	23.4	-5.1	19.0
2	-17.6	6.0	-15.8	13.5	-12.2	8.8	-6.5	22.8	-7.6	16.9
3	-15.1	8.5	-13.3	23.4	-9.7	11.1	-6.0	21.7	[illegible]	10.4
4	-12.6	21.3	-10.8	30.1	-7.1	8.4	-3.5	19.8	2.4	12.9
5	-10.1	25.0	-8.3	26.1	-4.7	7.0	-1.0	19.8	4.9	14.4
6	-7.6	16.9	-5.8	13.0	-2.1	6.7	1.5	15.8	7.4	15.1
7	-6.4	7.6	-4.5	10.4	-0.9	6.0	2.7	17.7	8.7	15.1
8	-5.1	9.5	-3.3	17.3	0.3	8.4	4.0	19.0	9.9	12.2
9	-3.9	2.7	-2.1	11.7	1.6	7.6	5.3	17.7	11.2	12.5
10	-2.6	12.0	-0.8	14.7	2.8	6.7	6.5	17.3	12.5	15.1
11	-1.4	15.1	0.5	18.5	4.1	6.3	7.7	17.7	13.7	12.0
12	-0.1	15.1	1.7	19.5	5.4	7.0	9.0	17.3	14.9	12.9
13	1.1	12.0	2.9	15.1	6.6	6.6	10.3	14.0	16.2	12.0
14	2.4	12.0	4.2	14.7	7.8	6.6	11.5	16.9	17.4	12.0
15	3.6	10.7	5.4	9.3	9.1	4.9	12.8	17.7	18.7	13.5
16	4.9	7.6	6.7	1.9	10.4	2.5	14.0	15.8	19.9	9.5
17	6.1	4.3	8.0	8.8	11.6	6.3	15.2	17.7	21.2	9.5

TABLE D-39

RECORD 220 WALL KULITE NONSTEADY PRESSURE PHASE TO STRAIN GAGE 3

SAMPLE NUMBER	% CHORD= TANGENTIAL (DEG.)	-55.4 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	-15.1 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	-3.6 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	9.4 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	22.2 PHASE (DEG.)
1	-32.8	63.0	-27.1	173.0	-25.5	208.0	-23.7	216.0	-21.8	216.0
2	-30.3	154.0	-24.6	193.0	-23.0	171.0	-21.2	162.0	-19.4	115.0
3	-27.8	149.0	-22.2	153.0	-20.5	338.0	-18.7	351.0	-16.8	207.0
4	-25.3	179.0	-19.6	131.0	-18.0	272.0	-16.2	297.0	-14.4	270.0
5	-22.8	193.0	-17.1	180.0	-15.5	279.0	-13.7	288.0	-11.9	297.0
6	-20.3	53.0	-14.6	288.0	-13.0	273.0	-11.2	270.0	-9.4	261.0
7	-19.1	45.0	-13.4	272.0	-11.8	234.0	-9.9	225.0	-8.1	198.0
8	-17.8	127.0	-12.1	261.0	-10.5	72.0	-8.7	189.0	-6.9	18.0
9	-16.6	203.0	-10.9	234.0	-9.2	27.0	-7.4	59.0	-5.6	131.0
10	-15.3	257.0	-9.7	201.0	-8.0	216.0	-6.2	135.0	-4.3	32.0
11	-14.1	241.0	-8.4	225.0	-6.8	20.0	-4.9	0.0	-3.1	36.0
12	-12.8	270.0	-7.1	234.0	-5.5	351.0	-3.7	45.0	-1.9	24.0
13	-11.6	256.0	-5.9	315.0	-4.3	0.0	-2.4	348.0	-0.6	27.0
14	-10.3	261.0	-4.6	0.0	-3.0	0.0	-1.2	351.0	0.6	18.0
15	-9.1	312.0	-3.4	0.0	-1.8	18.0	0.1	333.0	1.9	320.0
16	-7.8	270.0	-2.1	348.0	-0.5	342.0	1.3	288.0	3.1	297.0
17	-6.6	226.0	-0.9	342.0	0.7	99.0	2.6	333.0	4.4	53.0

RECORD 220 WALL KULITE NONSTEADY PRESSURE PHASE TO STRAIN GAGE 3

SAMPLE NUMBER	% CHORD= TANGENTIAL (DEG.)	34.6 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	47.5 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	73.4 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	99.3 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	141.4 PHASE (DEG.)
1	-20.1	225.0	-18.3	216.0	-14.6	259.0	-11.0	285.0	-5.1	360.0
2	-17.6	108.0	-15.8	288.0	-12.2	294.0	-8.5	301.0	-2.6	315.0
3	-15.1	272.0	-13.3	279.0	-9.7	296.0	-6.0	303.0	-0.0	333.0
4	-12.6	279.0	-10.8	288.0	-7.1	297.0	-3.5	315.0	2.4	0.0
5	-10.1	288.0	-8.3	289.0	-4.7	315.0	-1.0	333.0	4.9	9.0
6	-7.6	270.0	-5.8	265.0	-2.1	318.0	1.5	4.0	7.4	36.0
7	-6.4	162.0	-4.5	63.0	-0.9	351.0	2.7	18.0	8.7	36.0
8	-5.1	54.0	-3.3	5.0	0.3	0.0	4.0	12.0	9.9	45.0
9	-3.9	22.0	-2.1	9.0	1.6	351.0	5.3	18.0	11.2	45.0
10	-2.6	356.0	-0.8	9.0	2.8	9.0	6.5	18.0	12.5	56.0
11	-1.4	0.0	0.5	9.0	4.1	27.0	7.7	27.0	13.7	65.0
12	-0.1	9.0	1.7	0.0	5.4	27.0	9.0	36.0	14.9	81.0
13	1.1	0.0	2.9	0.0	6.6	36.0	10.3	53.0	16.2	90.0
14	2.4	9.0	4.2	5.0	7.8	27.0	11.5	63.0	17.4	95.0
15	3.6	351.0	5.4	333.0	9.1	27.0	12.8	85.0	18.7	90.0
16	4.9	279.0	6.7	144.0	10.4	83.0	14.0	95.0	19.9	108.0
17	6.1	45.0	8.0	40.0	11.6	95.0	15.2	99.0	21.2	95.0

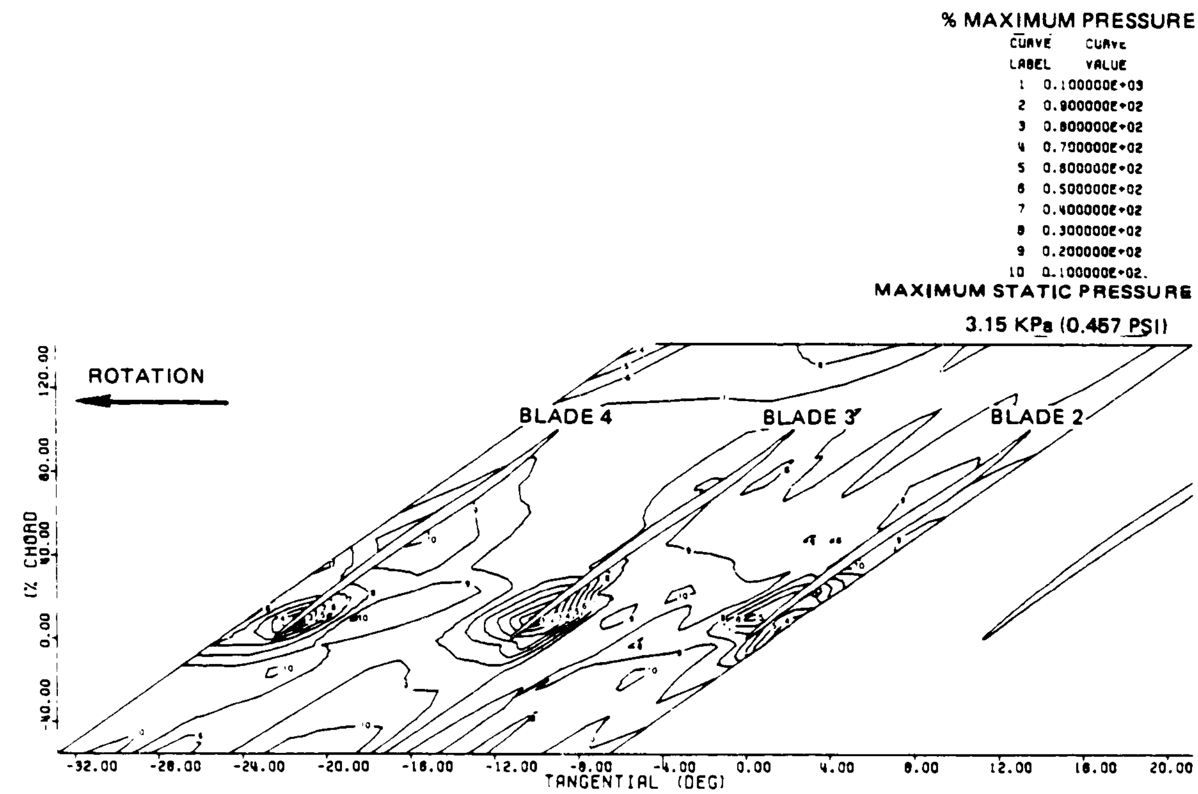

Figure D-25 Nonsteady Pressure Contours at Blade Tip; In Flutter, High Operating Line, 70 Percent Speed, 56.5 Percent Flow, Pressure Ratio 1.2978

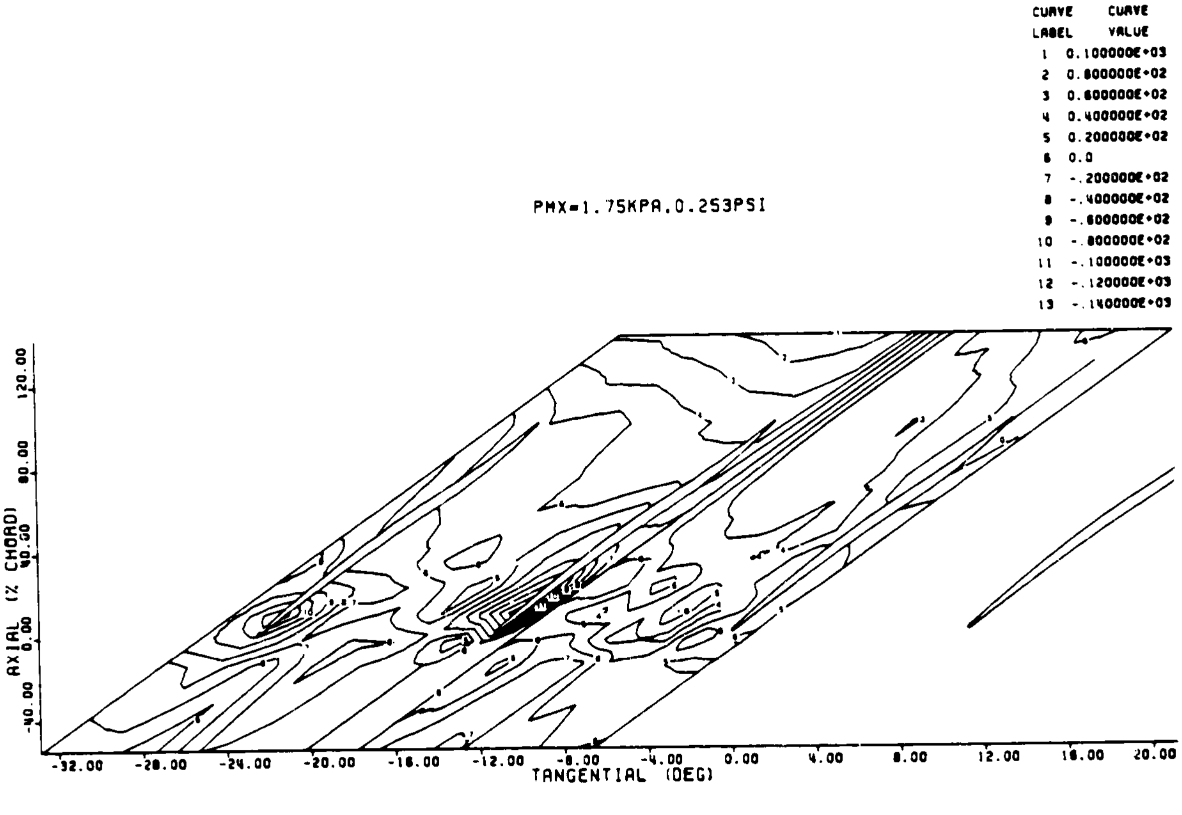

Figure D-26 Nonsteady Real Pressure Contours at Blade Tip; In Flutter, High Operating Line, 70 Percent Speed

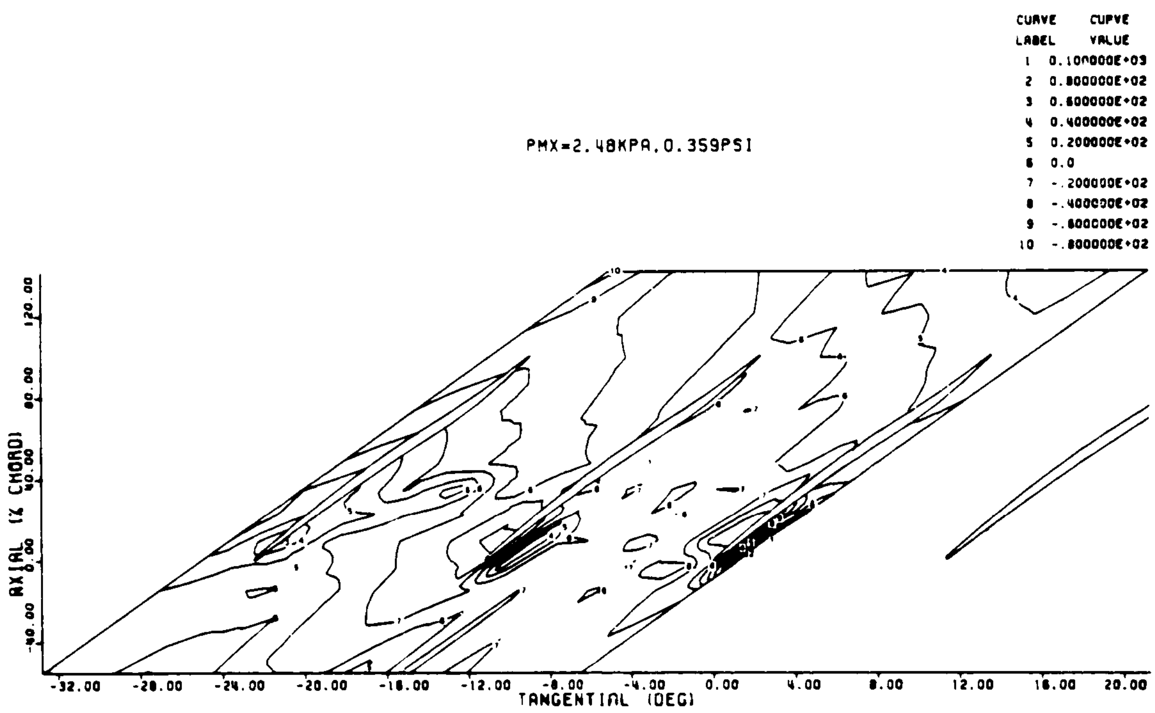

Figure D-27 Nonsteady Imaginary Pressure Contours at Blade Tip; In Flutter, High Operating Line, 70 Percent Speed

TABLE D-40

RECORD 105 WALL KULITE NONSTEADY PRESSURE AMPLITUDES

MAXIMUM PRESSURE SAMPLED = 3.08 KILOPASCALS = 0.447 PSI

SAMPLE	% CHORD=	-55.4	% CHORD=	-15.1	% CHORD=	-3.6	% CHORD=	9.4	% CHORD=	22.2
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-32.5	8.9	-26.7	22.4	-25.2	25.1	-23.2	44.7	-21.5	31.5
2	-30.0	6.7	-24.2	39.8	-22.7	25.1	-20.7	56.4	-19.0	15.9
3	-27.5	28.2	-21.7	19.5	-20.1	31.5	-18.2	8.9	-16.5	19.9
4	-25.0	22.4	-19.1	28.2	-17.6	17.9	-15.7	13.9	-14.0	25.1
5	-22.5	10.1	-16.6	22.4	-15.1	25.1	-13.1	19.9	-11.5	44.7
6	-20.0	5.6	-14.1	31.5	-12.6	39.8	-11.9	39.8	-9.0	30.5
7	-18.7	7.2	-12.9	31.5	-11.4	50.1	-9.4	63.3	-7.7	31.5
8	-17.4	44.7	-11.6	35.6	-10.1	7.2	-8.1	9.4	-6.5	10.1
9	-16.2	21.5	-10.4	22.4	-8.9	35.6	-6.9	15.9	-5.2	10.1
10	-14.9	44.7	-9.1	22.4	-7.6	8.1	-5.6	39.8	-3.9	14.1
11	-13.7	31.5	-7.8	19.9	-6.4	8.1	-4.4	4.5	-2.7	19.9
12	-12.4	31.5	-6.6	17.9	-5.1	19.9	-3.1	22.4	-1.4	35.6
13	-11.2	17.9	-5.3	10.1	-3.8	10.1	-1.9	17.9	-0.2	35.6
14	-9.9	12.5	-4.1	17.9	-2.6	11.2	-0.6	39.8	1.1	31.5
15	-8.6	7.2	-2.8	27.4	-1.3	50.1	0.6	100.0	2.3	10.1
16	-7.4	8.9	-1.6	35.6	-0.1	14.1	1.9	44.7	3.6	7.2
17	-6.1	15.9	-0.3	28.2	1.2	79.4	3.1	10.1	4.9	14.1

RECORD 105 WALL KULITE NONSTEADY PRESSURE AMPLITUDES

MAXIMUM PRESSURE SAMPLED = 3.08 KILOPASCALS = 0.447 PSI

SAMPLE	% CHORD=	34.6	% CHORD=	47.5	% CHORD=	73.4	% CHORD=	99.3	% CHORD=	141.4
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-19.6	44.7	-17.9	25.1	-14.2	49.9	-10.6	53.5	-4.5	62.9
2	-17.1	15.9	-15.4	19.9	-11.7	55.9	-8.1	67.3	-2.0	45.4
3	-14.6	11.2	-12.9	31.5	-9.1	51.0	-5.6	60.0	0.5	45.4
4	-12.1	44.7	-10.4	50.1	-6.6	55.9	-3.0	60.0	3.0	38.7
5	-9.6	56.4	-7.9	50.1	-4.1	49.9	-0.5	53.5	5.5	44.5
6	-7.1	44.7	-5.4	19.9	-1.6	22.4	2.0	42.5	8.0	44.5
7	-5.8	14.1	-4.1	7.8	-0.3	22.4	3.2	37.8	9.3	35.3
8	-4.6	8.9	-2.9	22.4	0.9	44.5	4.5	42.5	10.5	31.5
9	-3.3	15.9	-1.6	22.4	2.2	35.3	5.7	42.5	11.8	35.3
10	-2.1	22.4	-0.4	31.5	3.4	38.3	7.0	42.5	13.1	35.3
11	-0.8	39.8	0.9	39.8	4.7	44.5	8.2	37.8	14.3	35.3
12	0.4	35.6	2.2	31.5	5.9	36.9	9.5	37.8	15.6	25.3
13	1.7	34.0	3.4	35.3	7.2	31.5	10.7	42.5	16.3	37.8
14	2.9	39.8	4.7	2.9	8.4	35.3	12.0	37.8	18.1	35.3
15	4.2	44.7	5.9	19.9	9.7	26.2	13.2	42.5	19.3	33.8
16	5.4	19.9	7.2	19.9	10.9	25.1	14.5	42.5	20.6	28.6
17	6.7	19.7	8.4	17.7	12.2	55.9	15.7	30.0	21.8	25.1

TABLE D-41

RECORD 105 WALL KULITE NONSTEADY PRESSURE PHASE TO STRAIN GAGE 3

SAMPLE NUMBER	% CHORD= TANGENTIAL (DEG.)	-55.4 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	-15.1 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	-3.6 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	9.4 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	22.2 PHASE (DEG.)
1	-32.5	50.0	-26.7	153.0	-25.2	171.0	-23.2	163.0	-21.5	162.0
2	-30.0	34.0	-24.2	162.0	-22.7	114.0	-20.7	99.0	-19.0	124.0
3	-27.5	72.0	-21.7	338.0	-20.1	108.0	-18.2	158.0	-16.5	198.0
4	-25.0	144.0	-19.1	90.0	-17.6	188.0	-15.7	225.0	-14.0	252.0
5	-22.5	189.0	-16.6	230.0	-15.1	270.0	-13.1	270.0	-11.5	270.0
6	-20.0	45.0	-14.1	252.0	-12.6	255.0	-11.9	248.0	-9.0	347.0
7	-18.7	54.0	-12.9	236.0	-11.4	327.0	-9.4	208.0	-7.7	180.0
8	-17.4	72.0	-11.6	225.0	-10.1	36.0	-8.1	36.0	-6.5	304.0
9	-16.2	144.0	-10.4	339.0	-8.9	207.0	-6.9	18.0	-5.2	124.0
10	-14.9	216.0	-9.1	252.0	-7.6	193.0	-5.6	18.0	-3.9	315.0
11	-13.7	216.0	-7.8	207.0	-6.4	180.0	-4.4	279.0	-2.7	351.0
12	-12.4	236.0	-6.6	189.0	-5.1	9.0	-3.1	333.0	-1.4	279.0
13	-11.2	225.0	-5.3	0.0	-3.8	342.0	-1.9	9.0	-0.2	324.0
14	-9.9	250.0	-4.1	279.0	-2.6	0.0	-0.6	306.0	1.1	306.0
15	-8.6	279.0	-2.8	297.0	-1.3	333.0	0.6	279.0	2.3	279.0
16	-7.4	270.0	-1.6	297.0	0.1	298.0	1.9	270.0	3.6	342.0
17	-6.1	207.0	-0.3	306.0	1.2	81.0	3.1	72.0	4.9	0.0

RECORD 105 WALL KULITE NONSTEADY PRESSURE PHASE TO STRAIN GAGE 3

SAMPLE NUMBER	% CHORD= TANGENTIAL (DEG.)	34.6 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	47.5 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	73.4 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	99.3 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	141.4 PHASE (DEG.)
1	-19.6	181.0	-17.9	198.0	-14.2	243.0	-10.6	270.0	-4.5	292.0
2	-17.1	153.0	-15.4	236.0	-11.7	270.0	-8.1	279.0	-2.0	315.0
3	-14.6	243.0	-12.9	243.0	-9.1	270.0	-5.6	288.0	0.5	324.0
4	-12.1	261.0	-10.4	275.0	-6.6	243.0	-3.0	297.0	3.0	359.0
5	-9.6	261.0	-7.9	288.0	-4.1	287.0	-0.5	315.0	5.5	1.0
6	-7.1	225.0	-5.4	225.0	-1.6	324.0	2.0	351.0	8.0	21.0
7	-5.8	126.0	-4.1	333.0	-0.3	324.0	3.2	351.0	9.3	36.0
8	-4.6	75.0	-2.9	288.0	0.9	324.0	4.5	355.0	10.5	36.0
9	-3.3	315.0	-1.6	306.0	2.2	333.0	5.7	0.0	11.8	47.0
10	-2.1	315.0	-0.4	315.0	3.4	342.0	7.0	0.0	13.1	54.0
11	-0.8	315.0	0.9	333.0	4.7	0.0	8.2	9.0	14.3	85.0
12	0.4	310.0	2.2	342.0	5.9	9.0	9.5	18.0	15.6	95.0
13	1.7	324.0	3.4	351.0	7.2	9.0	10.7	36.0	16.8	90.0
14	2.9	333.0	4.7	342.0	8.4	27.0	12.0	54.0	18.1	99.0
15	4.2	290.0	5.9	315.0	9.7	55.0	13.2	81.0	19.3	99.0
16	5.4	18.0	7.2	23.0	10.9	90.0	14.5	90.0	20.6	108.0
17	6.7	333.0	8.4	27.0	12.2	63.0	15.7	81.0	21.8	108.0

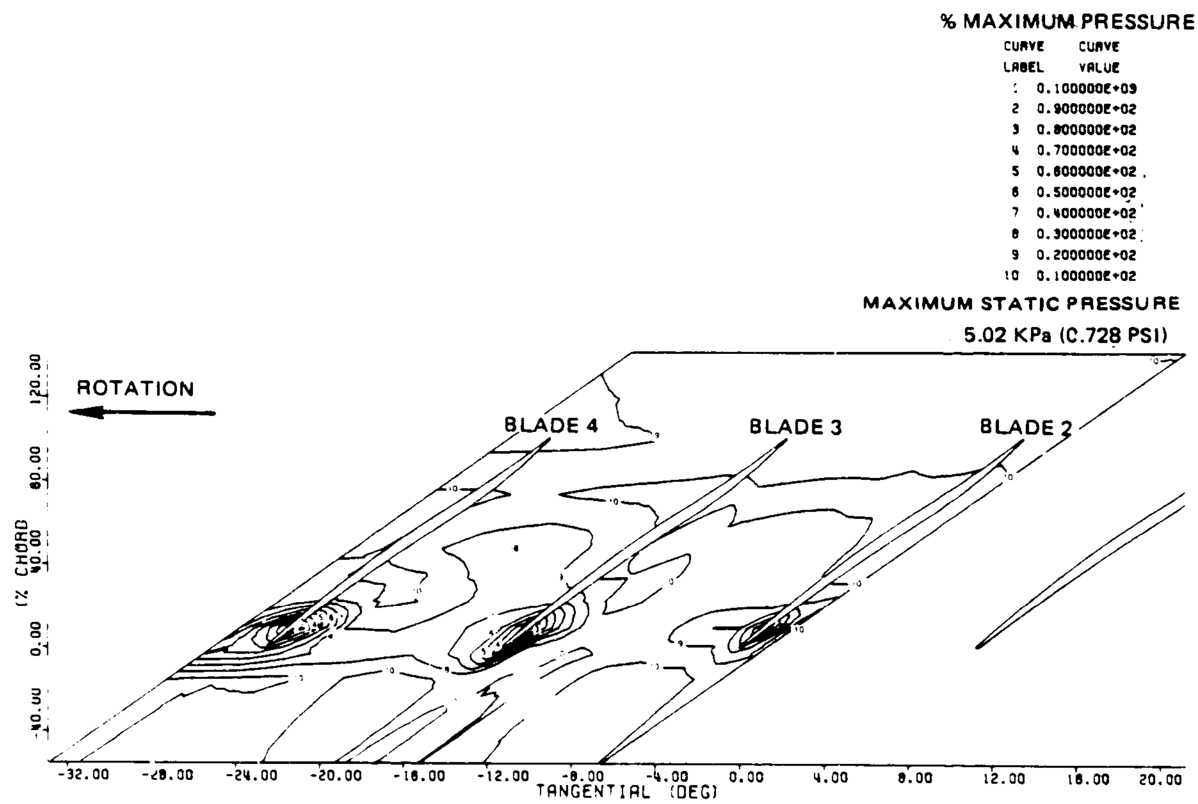

Figure D-28 Nonsteady Pressure Contours at Blade Tip; In Flutter, High Operating Line, 73 Percent Speed, 60 Percent Flow, Pressure Ratio 1.3317

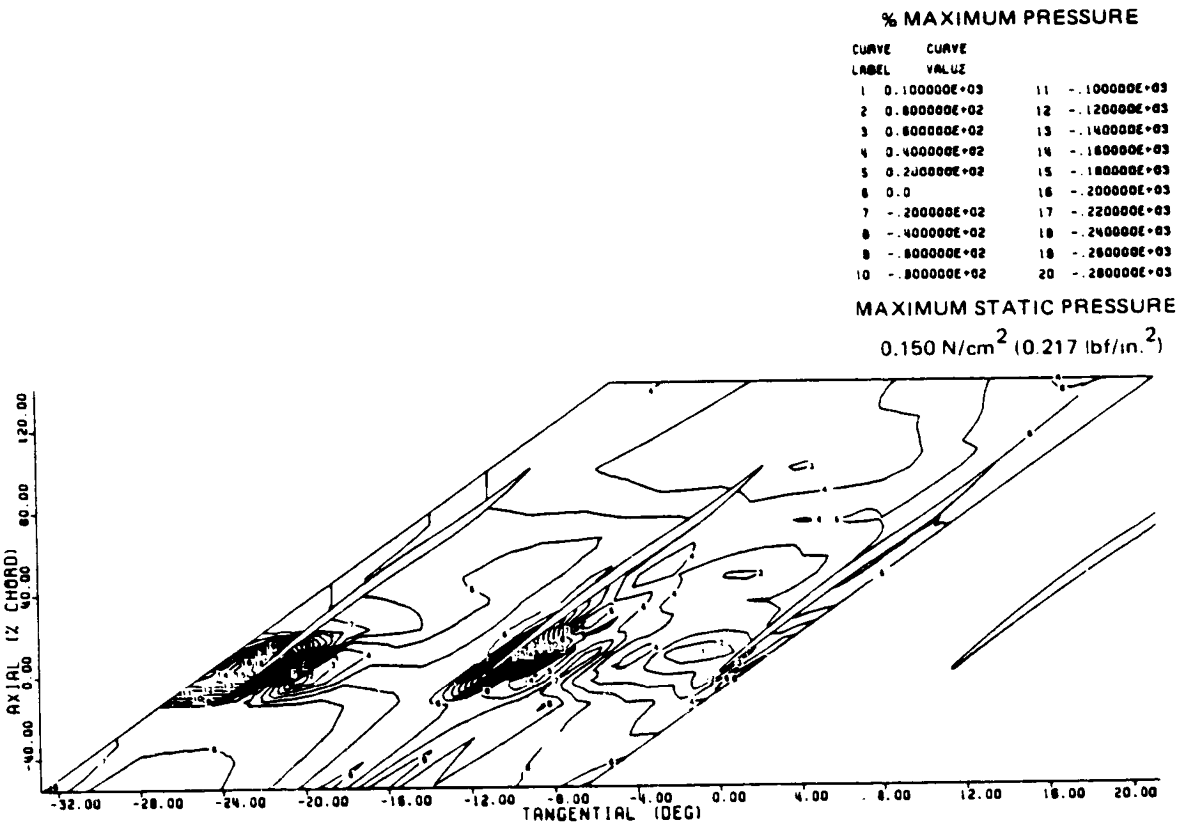

Figure D-29 Nonsteady Real Pressure Contours at Blade Tip; In Flutter, High Operating Line, 73 Percent Speed

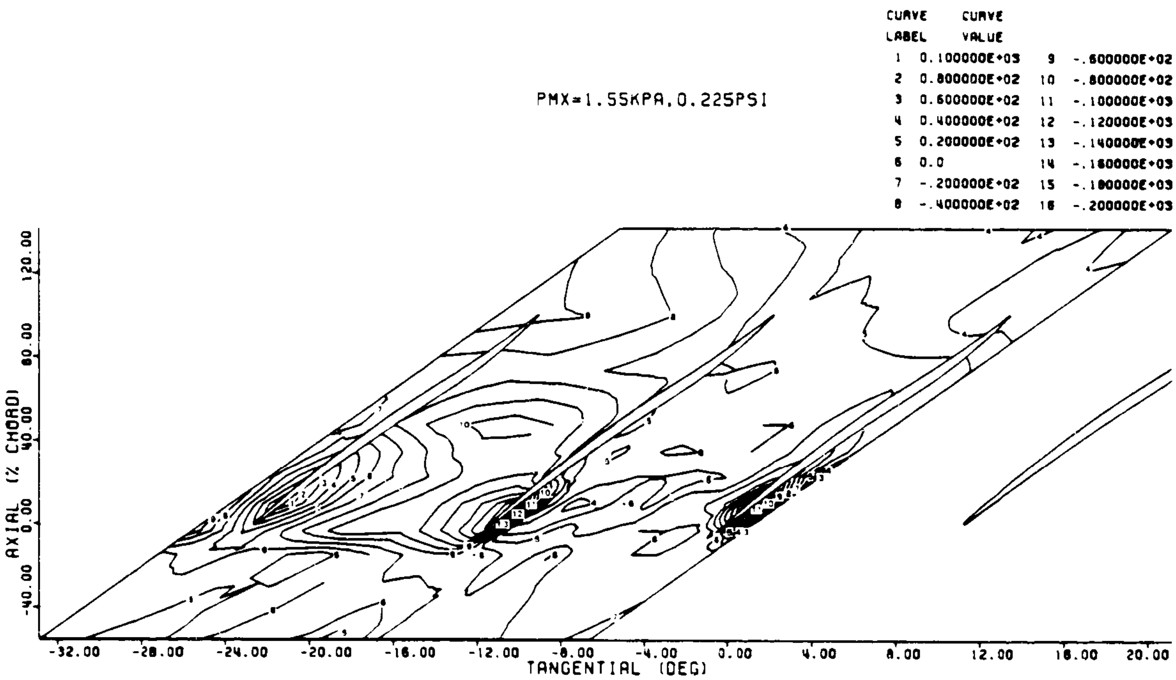

Figure D-30 Nonsteady Imaginary Pressure Contours at Blade Tip; In Flutter, High Operating Line, 73 Percent Speed

TABLE D-42

RECORD 199 WALL KULITE NONSTEADY PRESSURE AMPLITUDES
MAXIMUM PRESSURE SAMPLED = 3.15 KILOPASCALS = 0.457 PSI

SAMPLE	% CHORD= -55.4		% CHORD= -15.1		% CHORD= -3.6		% CHORD= 9.4		% CHORD= 22.2	
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-32.8	12.5	-27.2	16.2	-25.6	40.7	-23.7	28.2	-21.9	30.9
2	-30.3	7.7	-24.7	17.3	-23.0	38.9	-21.2	89.1	-19.4	35.4
3	-27.9	36.3	-22.1	7.4	-20.5	19.5	-18.7	9.0	-16.9	25.2
4	-25.4	24.5	-19.7	28.0	-18.0	24.5	-16.2	17.7	-14.4	10.1
5	-22.9	8.8	-17.2	15.5	-15.6	26.9	-13.7	25.2	-11.8	25.2
6	-20.3	2.2	-14.7	25.6	-13.1	34.6	-11.2	70.7	-9.4	56.2
7	-19.1	3.1	-13.4	25.6	-11.8	38.9	-9.9	100.0	-8.1	64.6
8	-17.8	21.9	-12.2	24.5	-10.5	54.9	-8.7	66.1	-6.9	14.2
9	-16.6	17.3	-10.9	15.5	-9.3	15.5	-7.5	14.2	-5.6	17.1
10	-15.4	27.0	-9.6	17.3	-8.0	10.9	-6.2	25.2	-4.4	15.8
11	-14.1	12.0	-8.4	21.9	-6.8	17.3	-5.0	14.2	-3.2	7.0
12	-12.9	24.5	-7.2	15.5	-5.5	30.9	-3.7	78.2	-1.9	12.3
13	-11.6	10.9	-5.9	10.9	-4.3	27.6	-2.5	14.2	-0.7	14.2
14	-10.3	13.8	-4.7	8.8	-3.1	24.5	-1.2	28.2	0.6	15.8
15	-9.1	5.5	-3.4	15.5	-1.8	15.5	0.0	63.0	1.9	44.6
16	-7.8	8.8	-2.0	27.6	-0.6	28.9	1.3	56.2	3.1	61.7
17	-6.6	4.4	-0.9	21.9	0.7	69.1	2.4	79.4	4.4	31.7

RECORD 199 WALL KULITE NONSTEADY PRESSURE AMPLITUDES
MAXIMUM PRESSURE SAMPLED = 3.15 KILOPASCALS = 0.457 PSI

SAMPLE	% CHORD= 34.6		% CHORD= 47.5		% CHORD= 73.4		% CHORD= 99.3		% CHORD= 141.4	
NUMBER	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE	TANGENTIAL (DEG.)	%MAXIMUM PRESSURE
1	-20.2	43.5	-18.3	24.5	-14.7	35.2	-11.0	37.0	-5.1	77.2
2	-17.7	18.6	-15.8	7.0	-12.2	23.9	-8.5	35.2	-2.6	49.9
3	-15.2	17.3	-13.3	17.3	-9.7	35.2	-6.0	35.2	-0.1	48.8
4	-12.6	33.[illegible]	-10.8	34.6	-7.2	35.2	-3.5	33.7	2.4	49.9
5	-10.2	38.7	-8.3	39.7	-4.7	35.2	-1.0	31.5	4.9	56.0
6	-7.7	30.6	-5.8	34.6	-2.2	18.6	1.5	28.0	7.4	49.9
7	-6.4	24.5	-4.6	10.9	-0.9	19.9	2.7	24.9	8.7	44.4
8	-5.2	12.3	-3.3	22.3	0.3	31.5	4.0	28.0	9.9	36.1
9	-3.9	17.3	-2.1	21.9	1.6	28.0	5.2	31.5	11.2	44.4
10	-2.7	15.5	-0.9	24.5	2.8	32.2	6.5	31.5	12.4	31.5
11	-1.4	16.6	0.4	27.6	4.1	24.9	7.7	28.0	13.6	35.2
12	-0.1	21.9	1.7	24.5	5.3	31.5	9.0	36.3	14.9	35.2
13	1.1	28.0	2.9	19.5	6.5	24.9	10.2	22.3	16.1	39.6
14	2.3	20.8	4.2	30.9	7.8	19.9	11.4	28.0	17.4	39.6
15	3.6	24.5	5.4	21.9	9.1	14.0	12.7	24.9	18.6	39.6
16	4.8	6.3	6.7	17.3	10.3	20.8	14.0	24.9	19.9	24.9
17	6.1	14.7	7.9	24.5	11.6	14.0	15.2	23.9	21.2	30.0

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TABLE D-43

RECORD 199 WALL KULITE NONSTEADY PRESSURE PHASE TO STRAIN GAGE 3

SAMPLE NUMBER	% CHORD= TANGENTIAL (DEG.)	-55.4 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	-15.1 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	-3.6 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	9.4 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	22.2 PHASE (DEG.)
1	-32.8	72.0	-27.2	108.0	-25.6	135.0	-23.7	180.0	-21.9	189.0
2	-30.3	45.0	-24.7	162.0	-23.0	162.0	-21.2	144.0	-19.4	144.0
3	-27.9	63.0	-22.1	342.0	-20.5	126.0	-18.7	220.0	-16.9	135.0
4	-25.4	117.0	-19.7	153.0	-18.0	198.0	-16.2	225.0	-14.4	225.0
5	-22.8	162.0	-17.2	238.0	-15.6	216.0	-13.7	297.0	-11.8	315.0
6	-20.3	270.0	-14.7	270.0	-13.1	307.0	-11.2	225.0	-9.4	234.0
7	-19.1	171.0	-13.4	261.0	-11.8	252.0	-9.9	216.0	-8.1	207.0
8	-17.8	90.0	-12.2	225.0	-10.5	45.0	-8.7	45.0	-6.9	9.0
9	-16.6	145.0	-10.9	348.0	-9.3	270.0	-7.5	9.0	-5.6	230.0
10	-15.4	225.0	-9.6	248.0	-8.0	225.0	-6.2	0.0	-4.4	297.0
11	-14.1	216.0	-8.4	216.0	-6.8	312.0	-5.0	324.0	-3.2	181.0
12	-12.9	243.0	-7.2	207.0	-5.5	342.0	-3.7	315.0	-1.9	0.0
13	-11.6	243.0	-5.9	9.0	-4.3	324.0	-2.5	270.0	-0.7	320.0
14	-10.3	243.0	-4.7	315.0	-3.1	9.0	-1.2	333.0	0.6	333.0
15	-9.1	279.0	-3.4	315.0	-1.8	135.0	0.0	288.0	1.9	279.0
16	-7.8	275.0	-2.0	297.0	-0.6	279.0	1.3	270.0	3.1	270.0
17	-6.6	252.0	-0.9	306.0	0.7	94.0	2.4	81.0	4.4	77.0

RECORD 199 WALL KULITE NONSTEADY PRESSURE PHASE TO STRAIN GAGE 3

SAMPLE NUMBER	% CHORD= TANGENTIAL (DEG.)	34.6 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	47.5 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	73.4 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	99.3 PHASE (DEG.)	% CHORD= TANGENTIAL (DEG.)	141.4 PHASE (DEG.)
1	-20.2	191.0	-18.3	216.0	-14.7	243.0	-11.0	261.0	-5.1	297.0
2	-17.7	99.0	-15.8	144.0	-12.2	284.0	-8.5	288.0	-2.6	315.0
3	-15.2	261.0	-13.3	279.0	-9.7	279.0	-6.0	279.0	-0.1	333.0
4	-12.6	54.0	-10.8	288.0	-7.2	288.0	-3.5	297.0	2.4	342.0
5	-10.2	270.0	-8.3	272.0	-4.7	306.0	-1.0	313.0	4.9	351.0
6	-7.7	225.0	-5.8	243.0	-2.2	315.0	1.5	351.0	7.4	18.0
7	-6.4	162.0	-4.6	261.0	-0.9	27.0	2.7	351.0	8.7	27.0
8	-5.2	279.0	-3.3	315.0	0.3	342.0	4.0	342.0	9.9	27.0
9	-3.9	270.0	-2.1	333.0	1.6	325.0	5.2	0.0	11.2	45.0
10	-2.7	342.0	-0.9	324.0	2.8	333.0	6.5	0.0	12.4	54.0
11	-1.4	18.0	0.4	333.0	4.1	0.0	7.7	9.0	13.6	54.0
12	-0.1	315.0	1.7	342.0	5.3	351.0	9.0	20.0	14.9	72.0
13	1.1	324.0	2.9	0.0	6.5	7.0	10.2	36.0	16.1	81.0
14	2.3	333.0	4.2	9.0	7.8	18.0	11.4	45.0	17.4	95.0
15	3.6	292.0	5.4	333.0	9.1	72.0	12.7	72.0	18.6	90.0
16	4.8	0.0	6.7	9.0	10.3	91.0	14.0	99.0	19.9	90.0
17	6.1	342.0	7.9	32.0	11.6	81.0	15.2	90.0	21.2	90.0

C-4

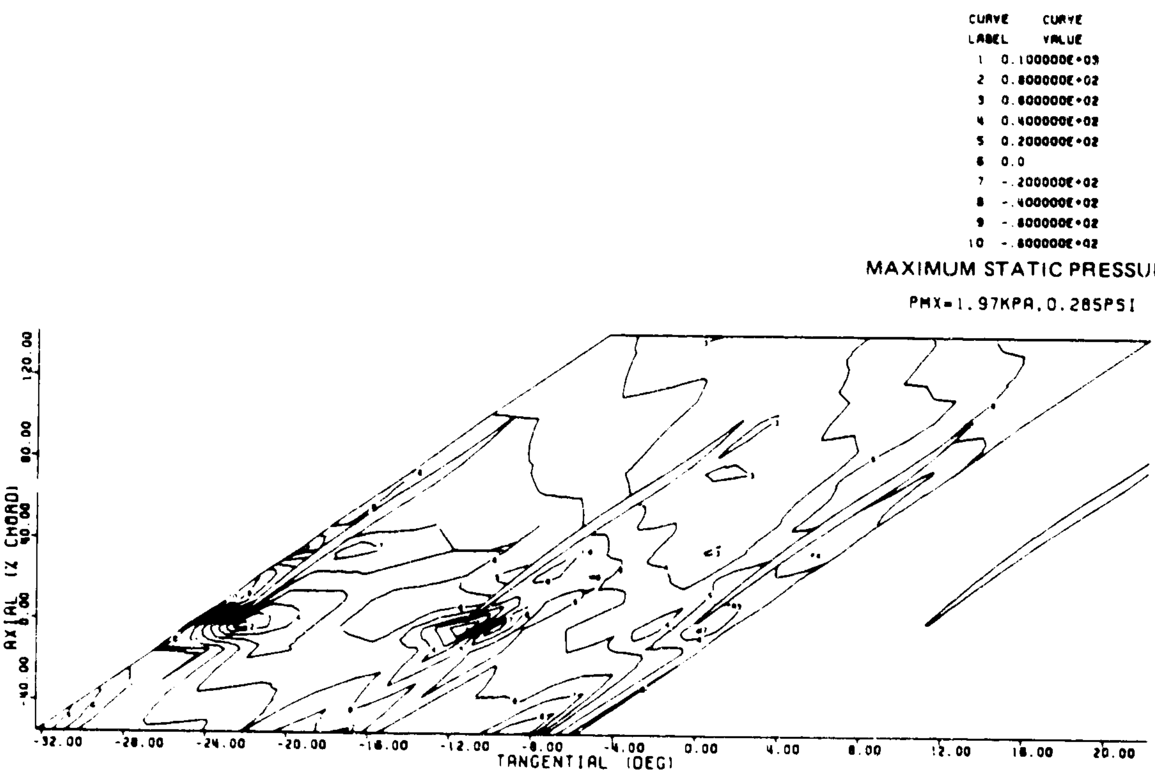

Figure D-31 Nonsteady Real Pressure Contours at Blade Tip; in Flutter, High Operating Line, 75 Percent Speed

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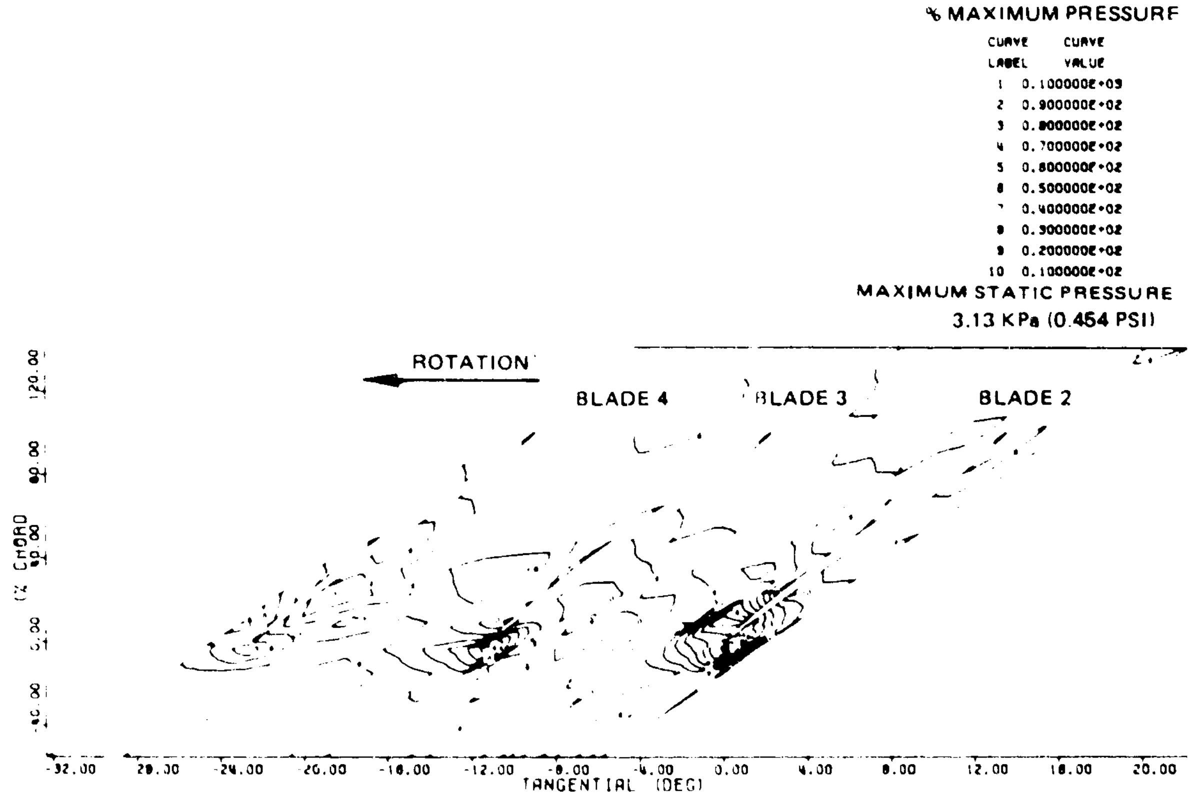

Figure D-32 Nonsteady Pressure Contours at Blade Tip; in Flutter, High Operating Line, 75 Percent Speed, 60.3 Percent Flow, Pressure Ratio 1.3369

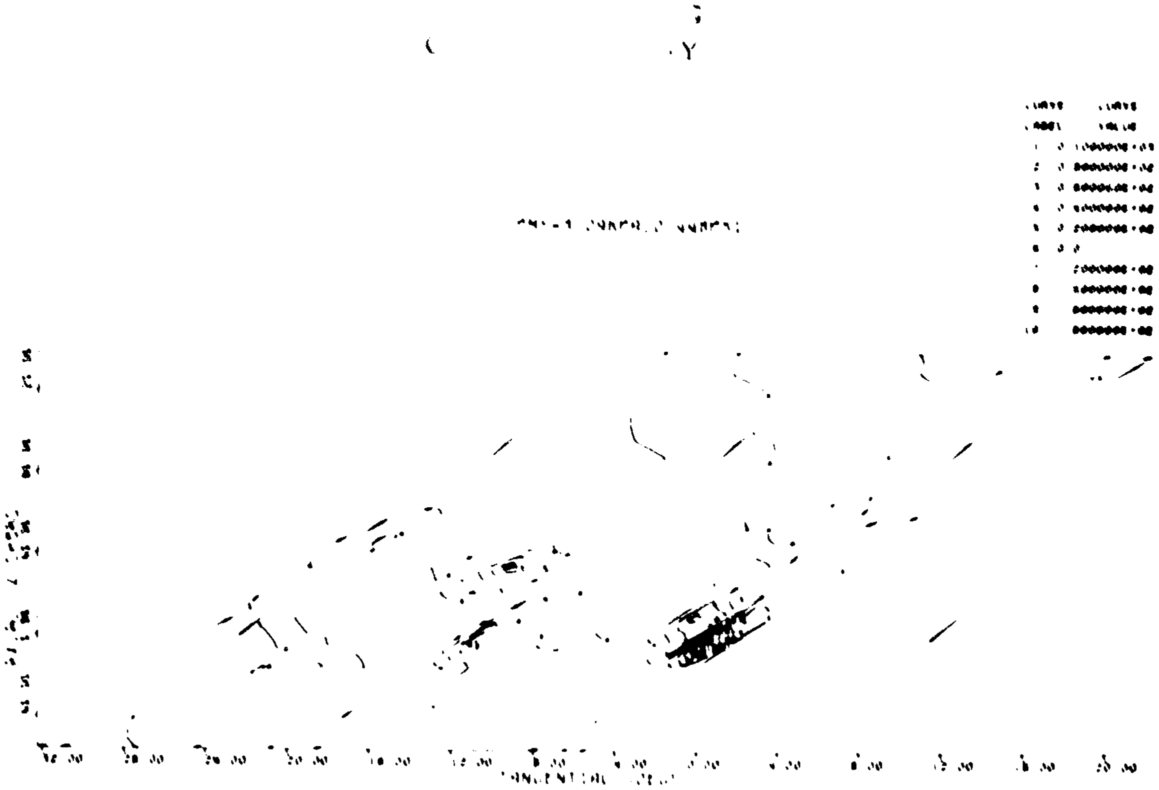

Figure D-33 Nonsteady Imaginary Pressure Contours at Blade Tip; In Flutter, High Operating Line, 75 Percent Speed

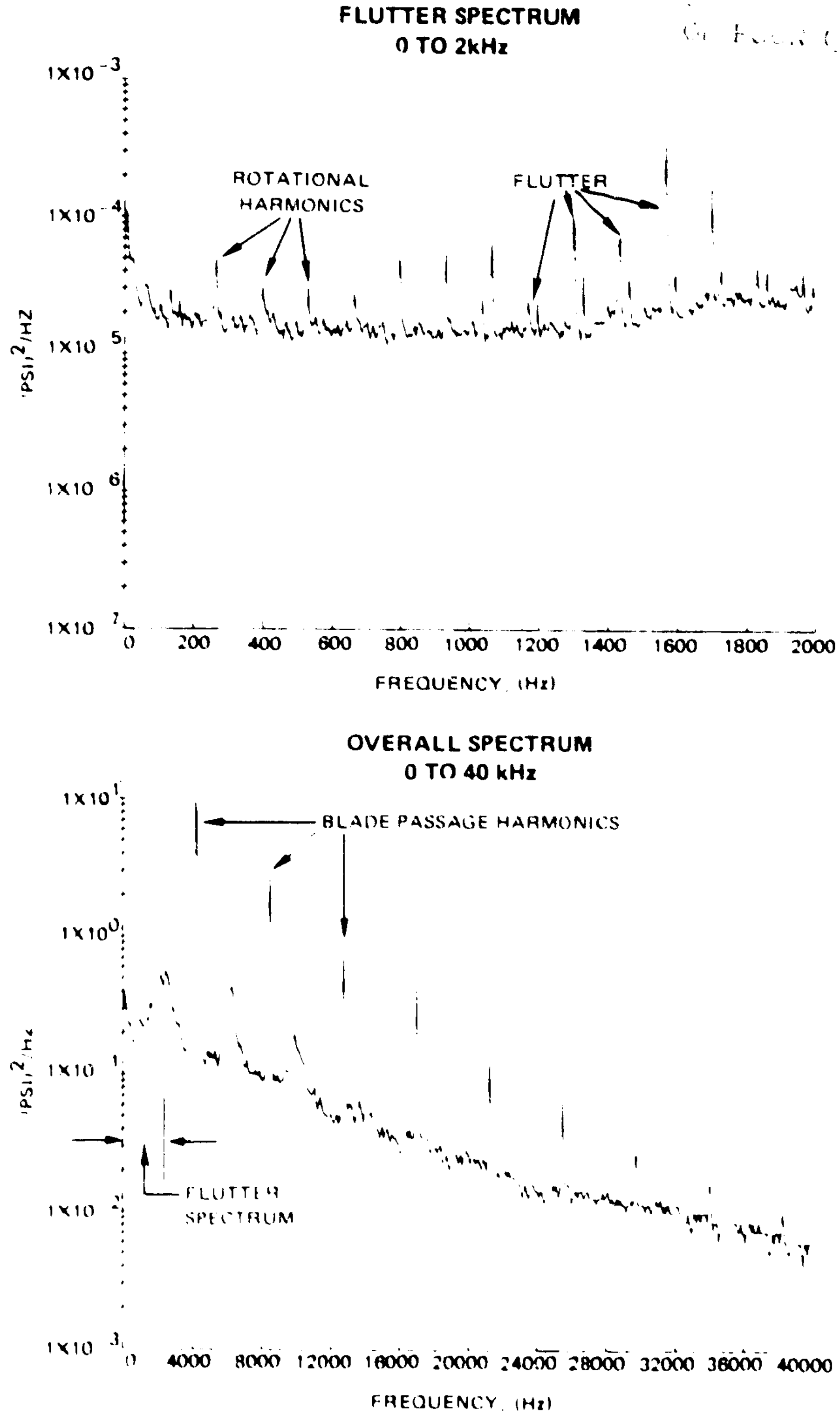

Figure D-34 Spectra of Vibratory Wall Pressure Showing Relationship of Flutter Frequencies to Harmonics of Rotor Steady Pressure Field

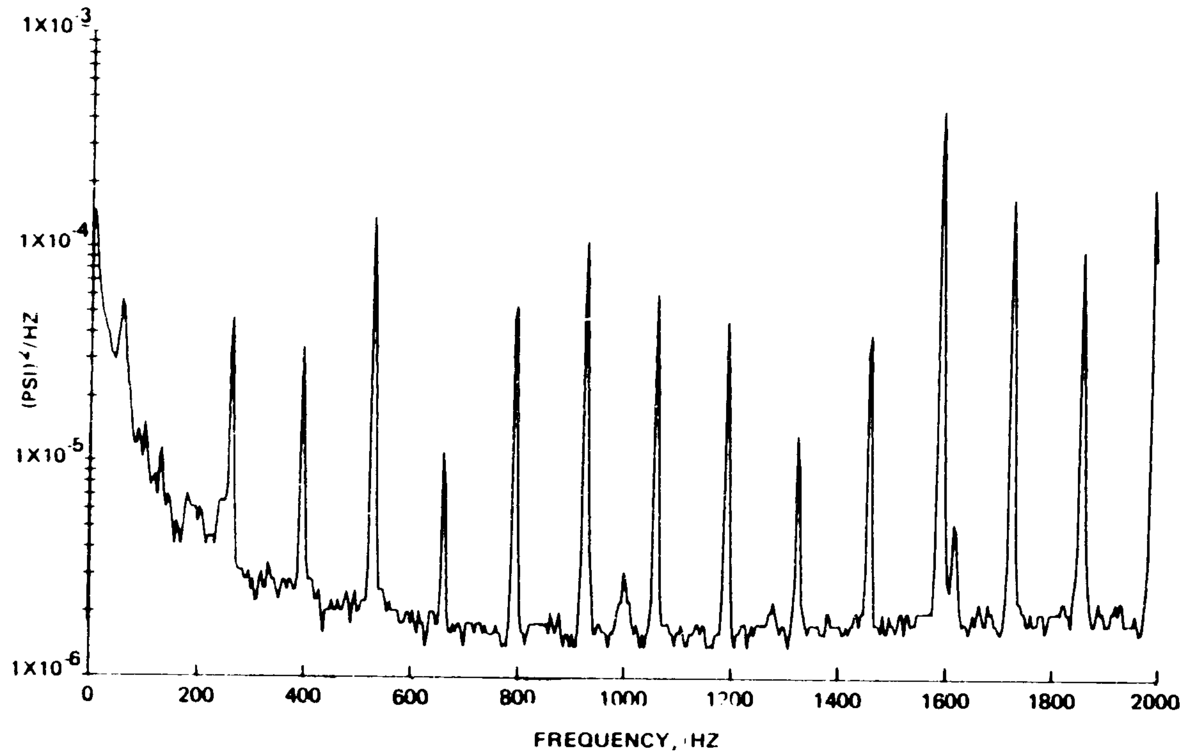

Figure D-35 Pressure Spectrum Experienced by Wall Sensor Caused by Spatial Harmonics of Steady Rotor Pressure Field (73 Percent of Speed, Out of Flutter)

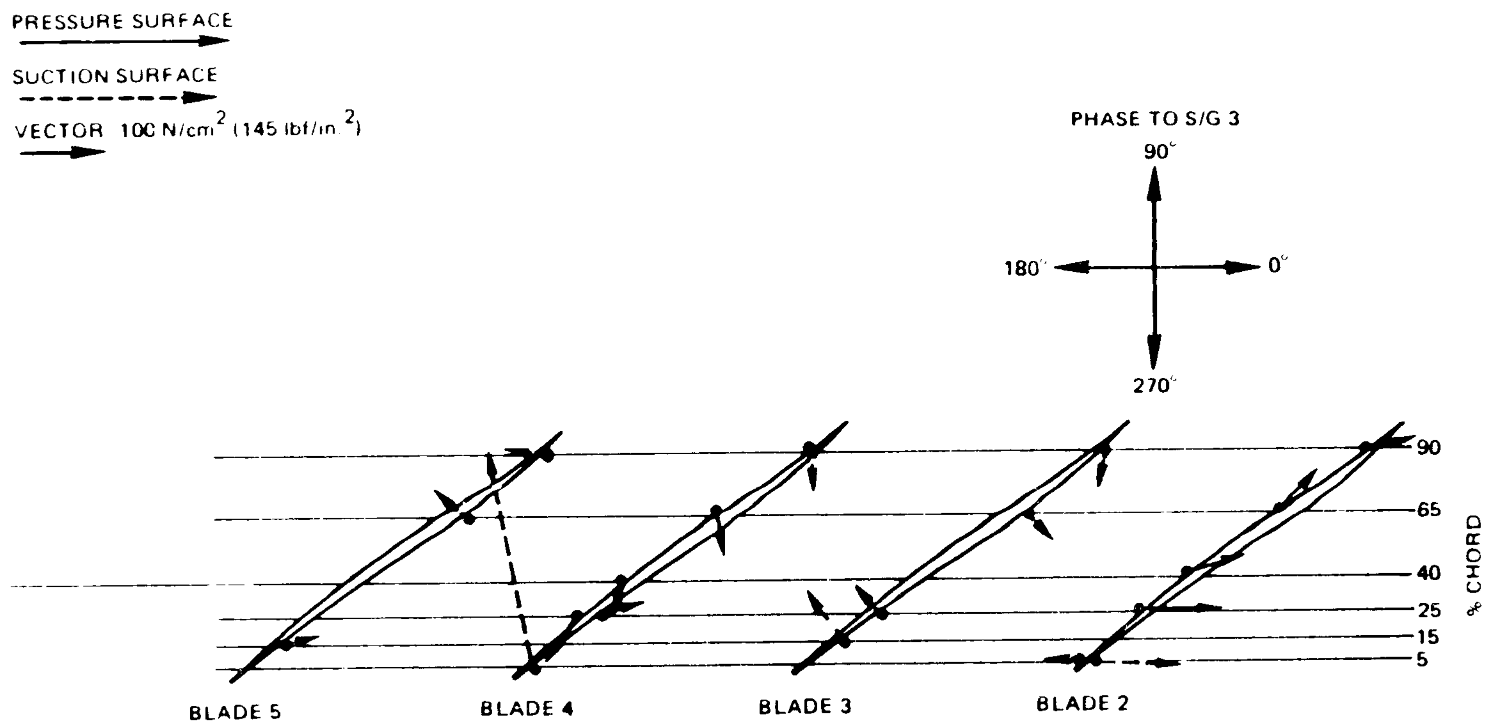

Figure D-36 Local Oscillating Pressures on Blade Surfaces at 67 Percent Speed (Vector Plot of Real Versus Imaginary With Origin on Point of Application)

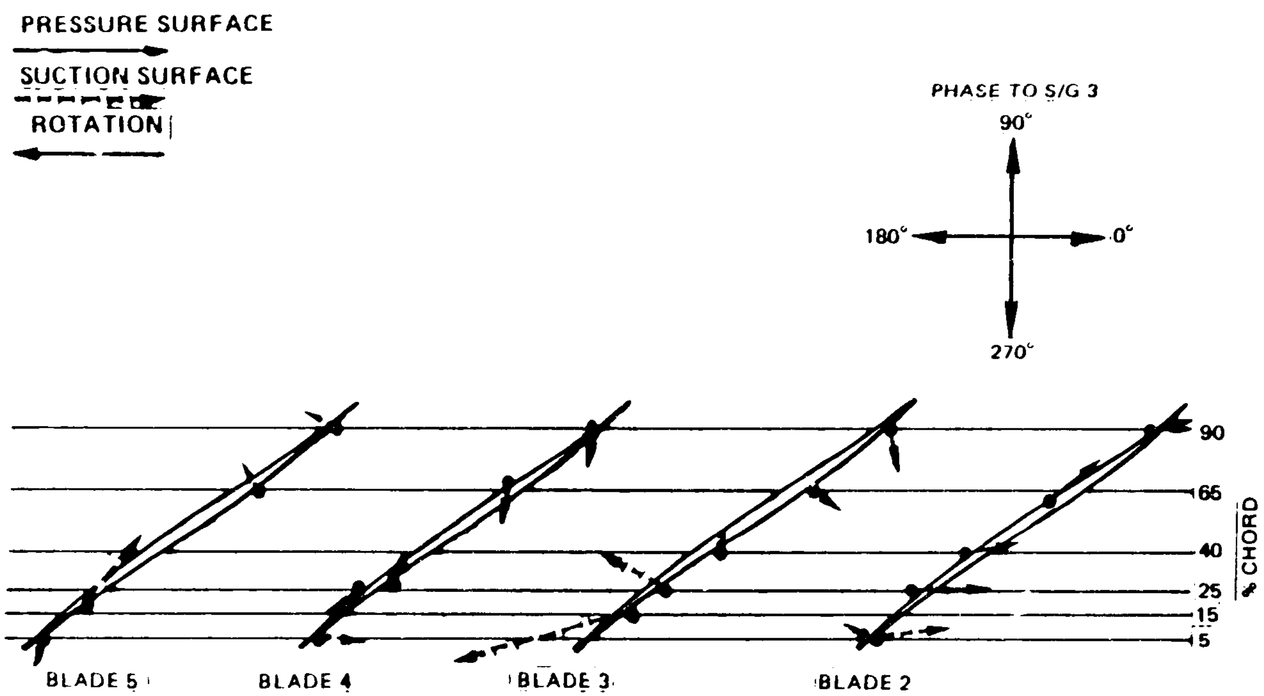

Figure D-37 Local Oscillating Pressures on Blade Surfaces at 73 Percent Speed (Vector Plot of Real Versus Imaginary With Origin on Point of Application)

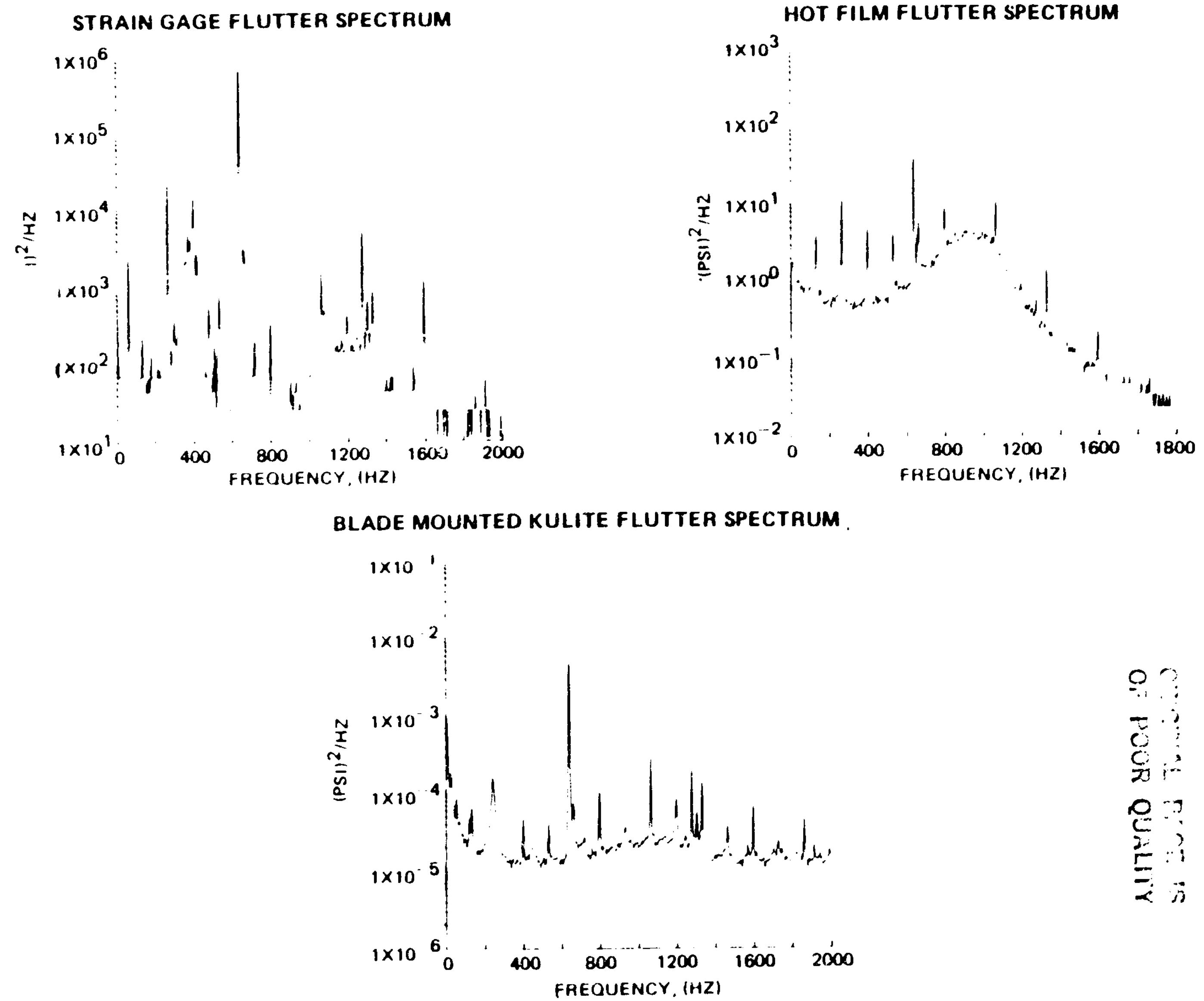

Figure D-38 Comparison of Flutter Spectra From Three Types of Sensors on Same Blade; 73 Percent Speed, 638 Hz Flutter Frequency

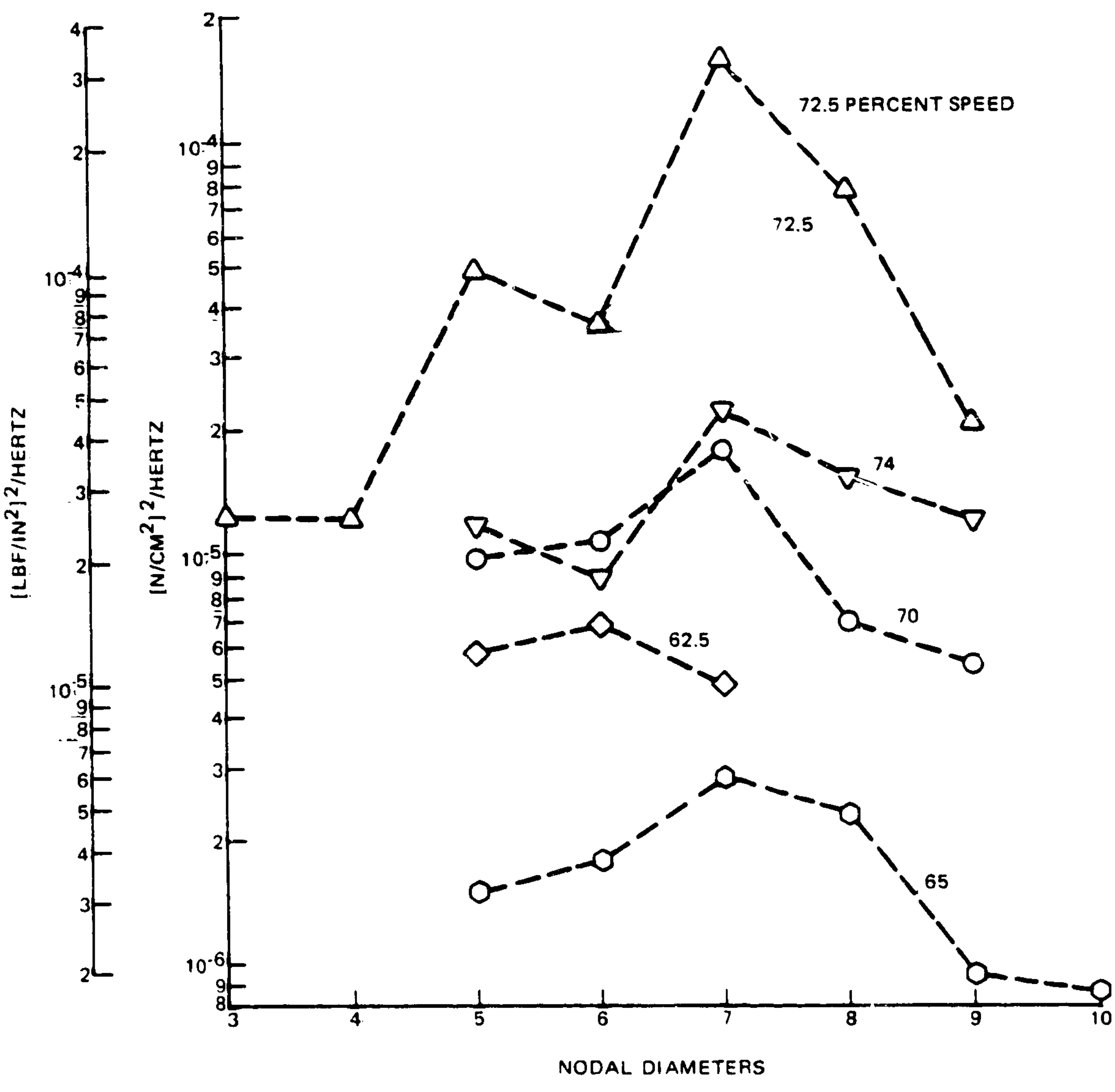

Figure D-39 Spectral Comparison of Vibratory Rotor Pressure Amplitudes in Terms of Distribution Among Spatial Harmonics (Stationary Sensor Over Path of Blade Trailing Edge)

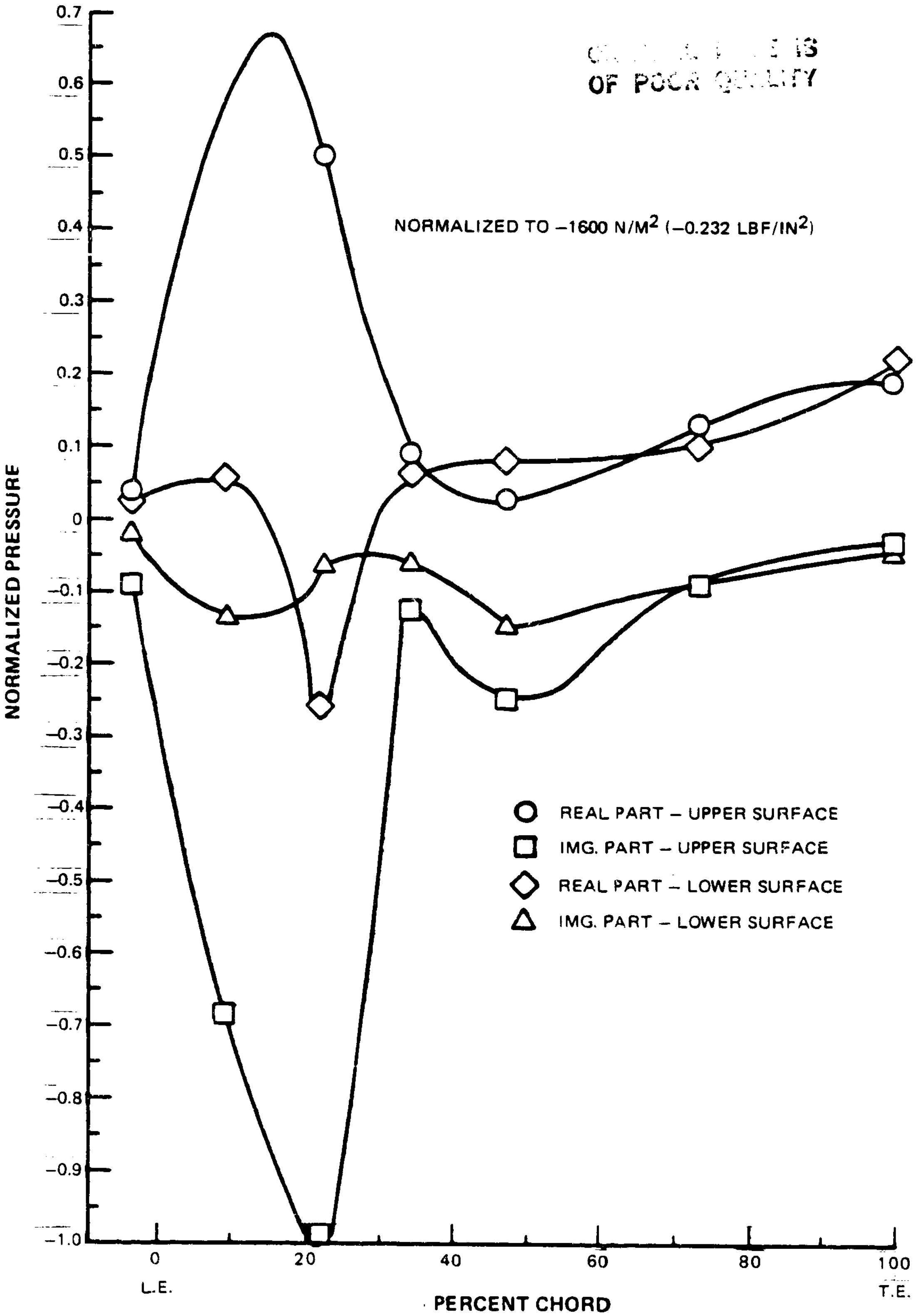

Figure D-40 Complex Pressures Used in Damping Calculations, Five Nodal Diameters

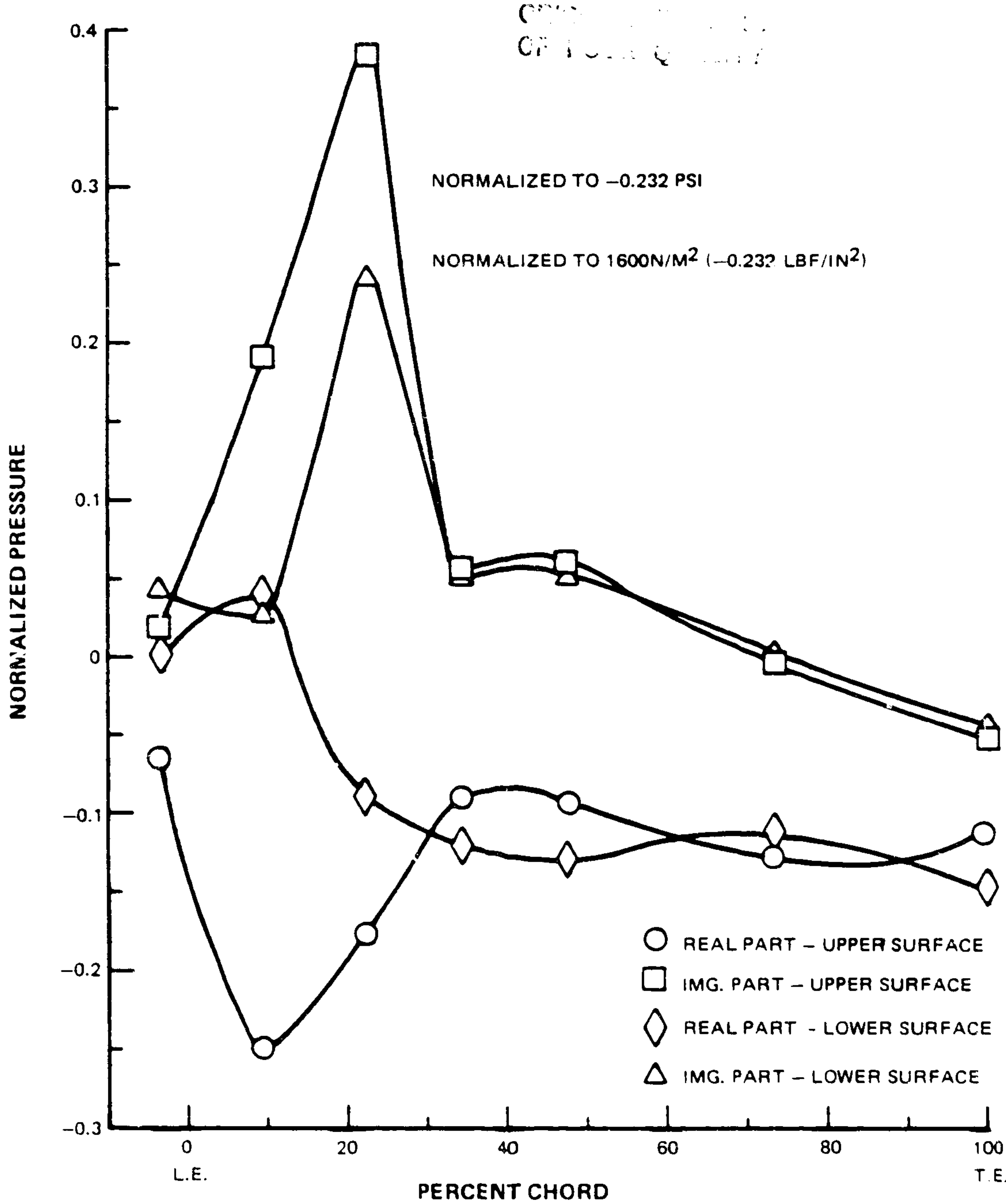

Figure D-41 Complex Pressures Used in Damping Calculations, Seven Nodal Diameters

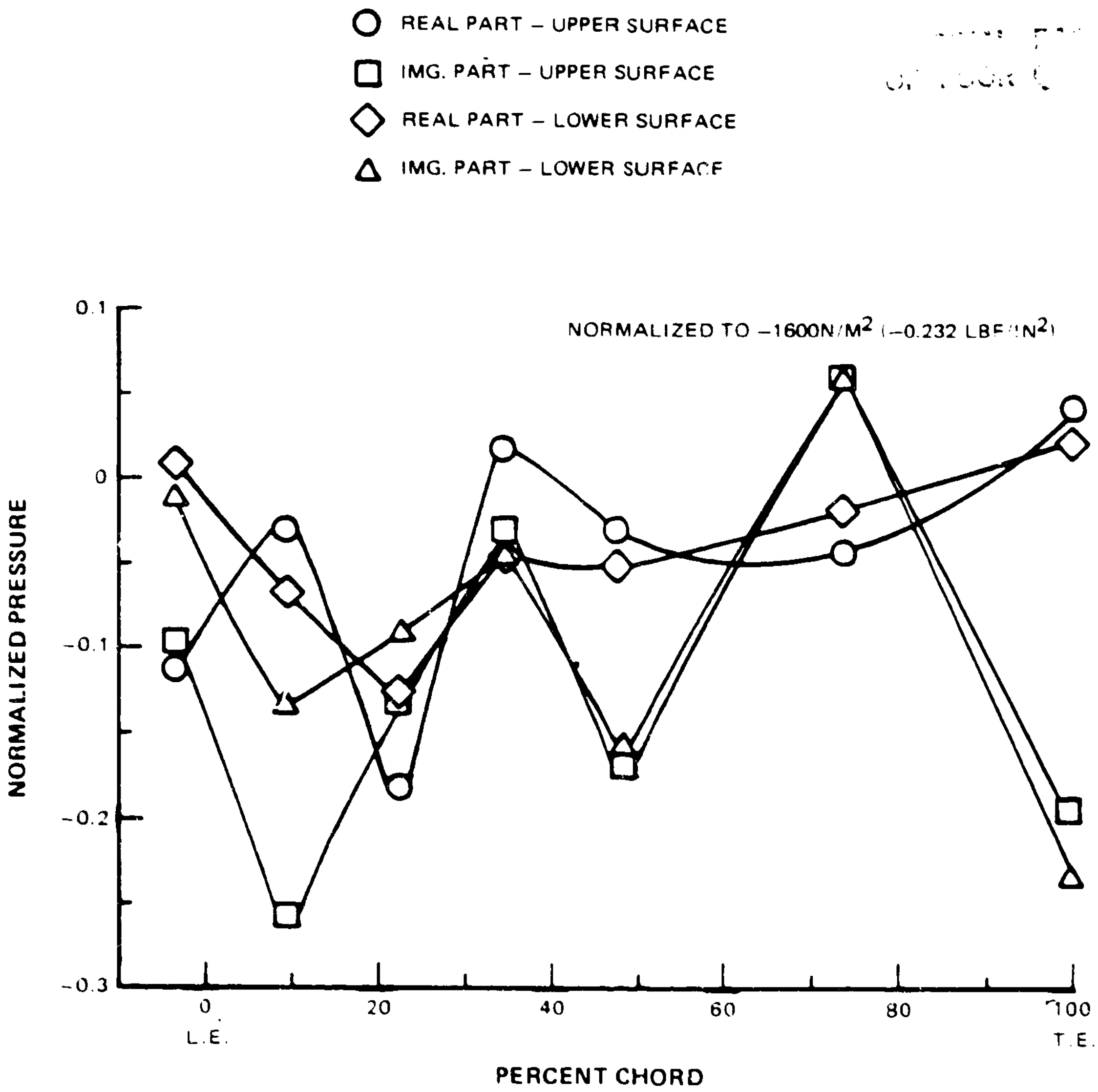

Figure D-42 Complex Pressures Used in Damping Calculations, Nine Nodal Diameters

APPENDIX E

HOT FILM DATA

TABLE E-1

BLADE MOUNTED HOT FILMS
(Amplitude and Phase)

Blade	Position (Percent Chord)	Surface	66% Speed Amplitude	66% Speed Phase	73% Speed Amplitude	73% Speed Phase	75% Speed Amplitude	75% Speed Phase
20	5	concave	1.0	252	1.0	255	-	267
	40		1.0	317	0.37	359	-	314
	5	convex	0.11	186	0.55	359	0.41	184
	40		0.13	134	0.14	134	0.42	141
21	5	convex	-	-	-	-	-	-
	15		0.63	150	0.16	127	0.63	147
	25		0.28	114	1.0	96	0.28	-
	40		1.0	80	-	104	1.0	114
	65		0.35	68	0.17	146	0.35	137
	90		0.65	207	0.18	135	0.63	138
22	5	concave	1.0	83	1.0	49	1.0	90
	40		0.07	293	0.31	234	0.22	105
	5	convex	-	173	-	45	-	16
	40		0.08	94	0.17	104	0.25	65
23	5	convex	0.65	166	0.7	339	0.28	67
	15		0.44	329	0.31	95	1.0	179
	25		0.07	88	1.0	307	0.81	48
	40		1.0	289	0.26	297	0.66	48
	65		0.62	327	0.17	31	0.50	352
	90		0.98	103	0.28	86	0.60	285

Phase is relative to strain gage on blade 3.

Amplitude is ratio to local maximum for each blade.

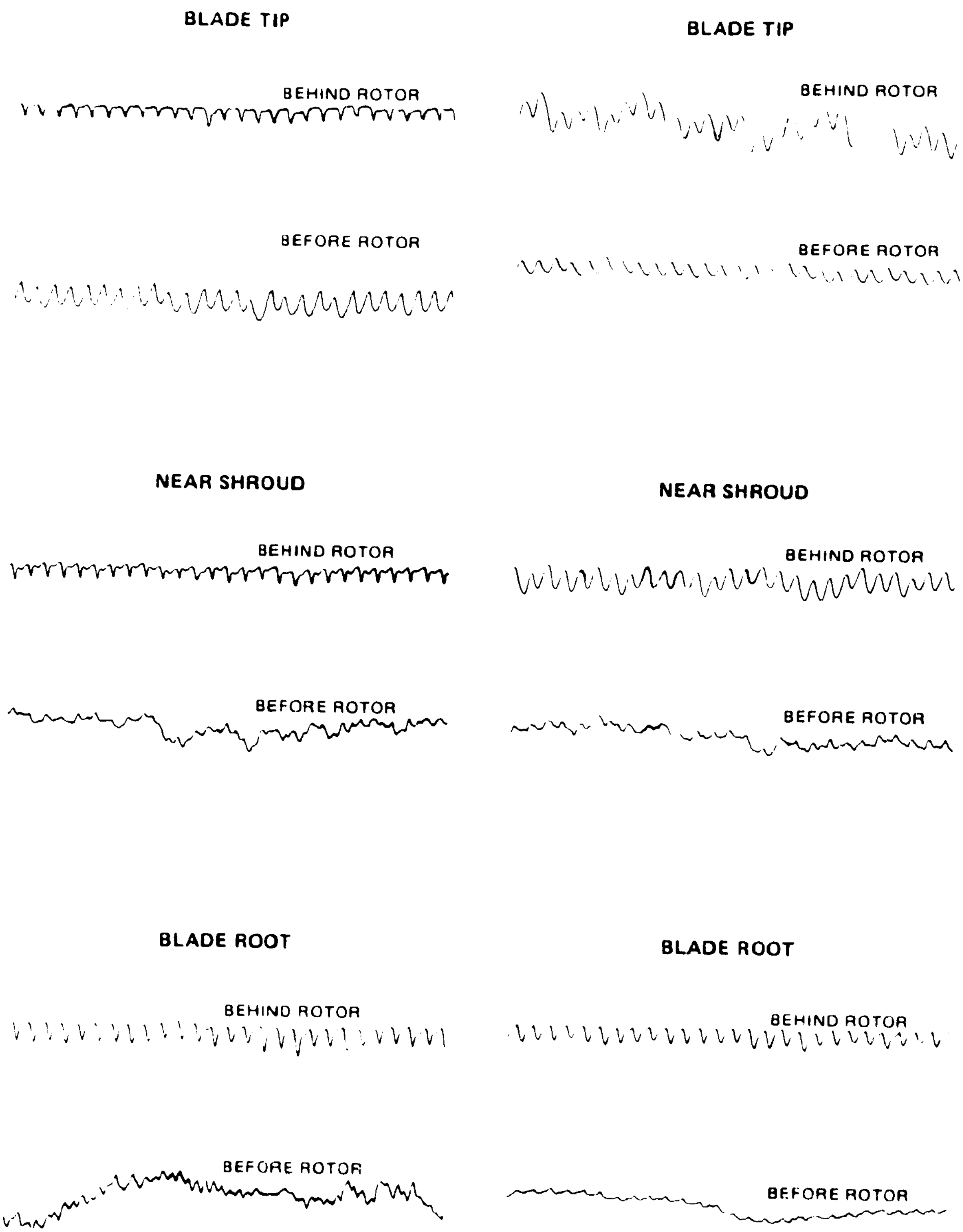

Figure E-1 Signal Enhanced Wave Forms of Hot Film Probes at 73 Percent Speed (Noncalibrated Amplitudes)

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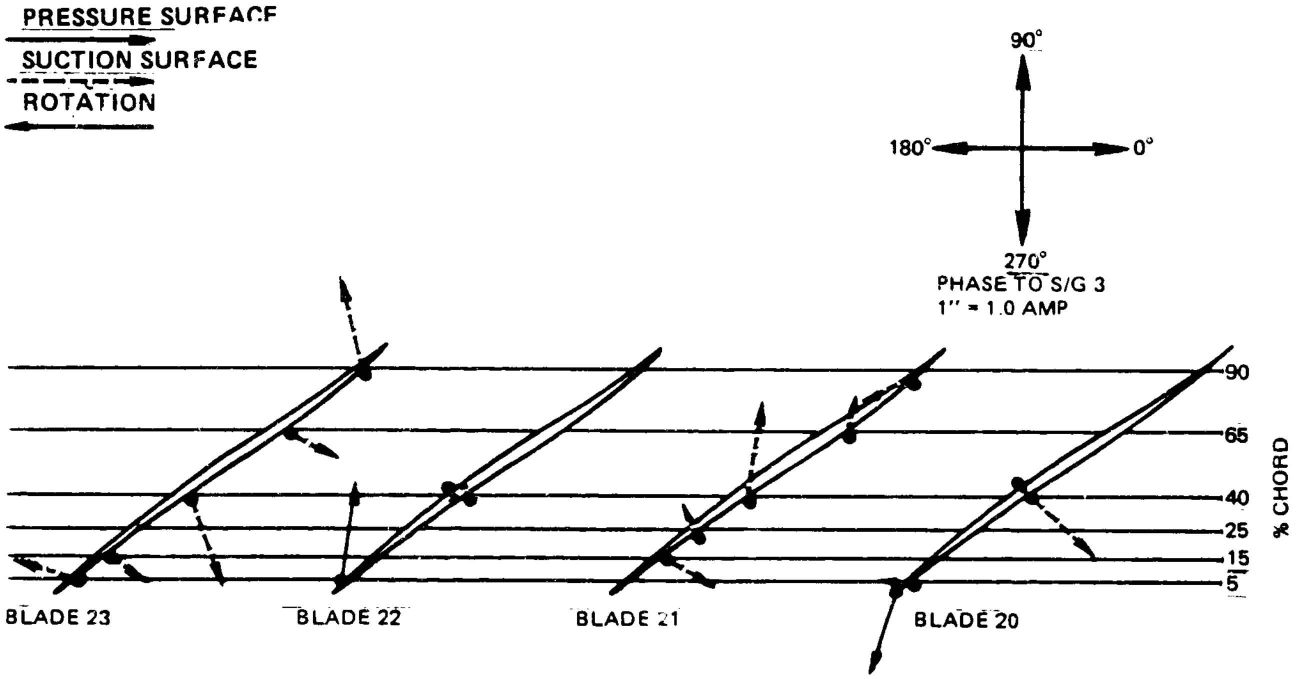

Figure E-2 Local Oscillating Hot Film Signals on Blade Surfaces at 67 Percent Speed (Vector Plot of Real Versus Imaginary With Origin on the Point of Application)

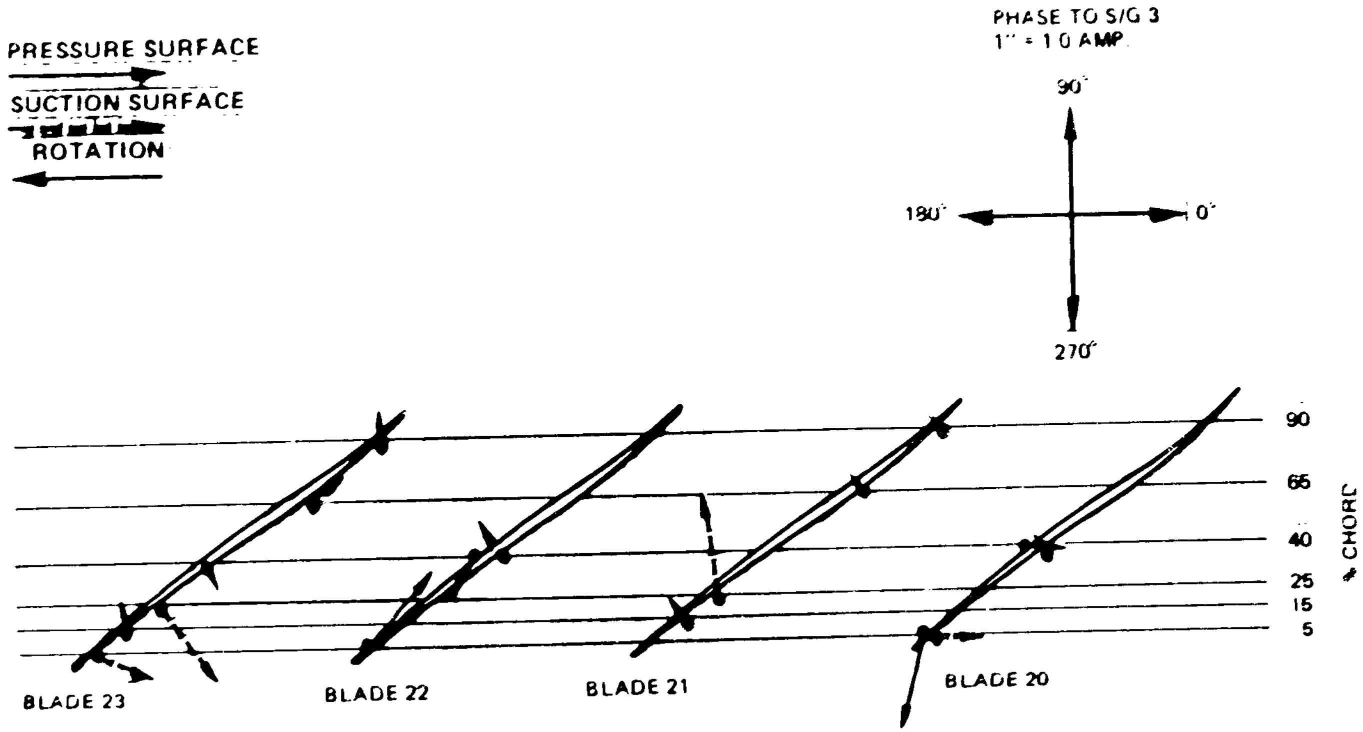

Figure E-3 Local Oscillating Hot Film Signals on Blade Surfaces at 72 Percent Speed (Vector Plot of Real Versus Imaginary With Origin on the Point of Application)

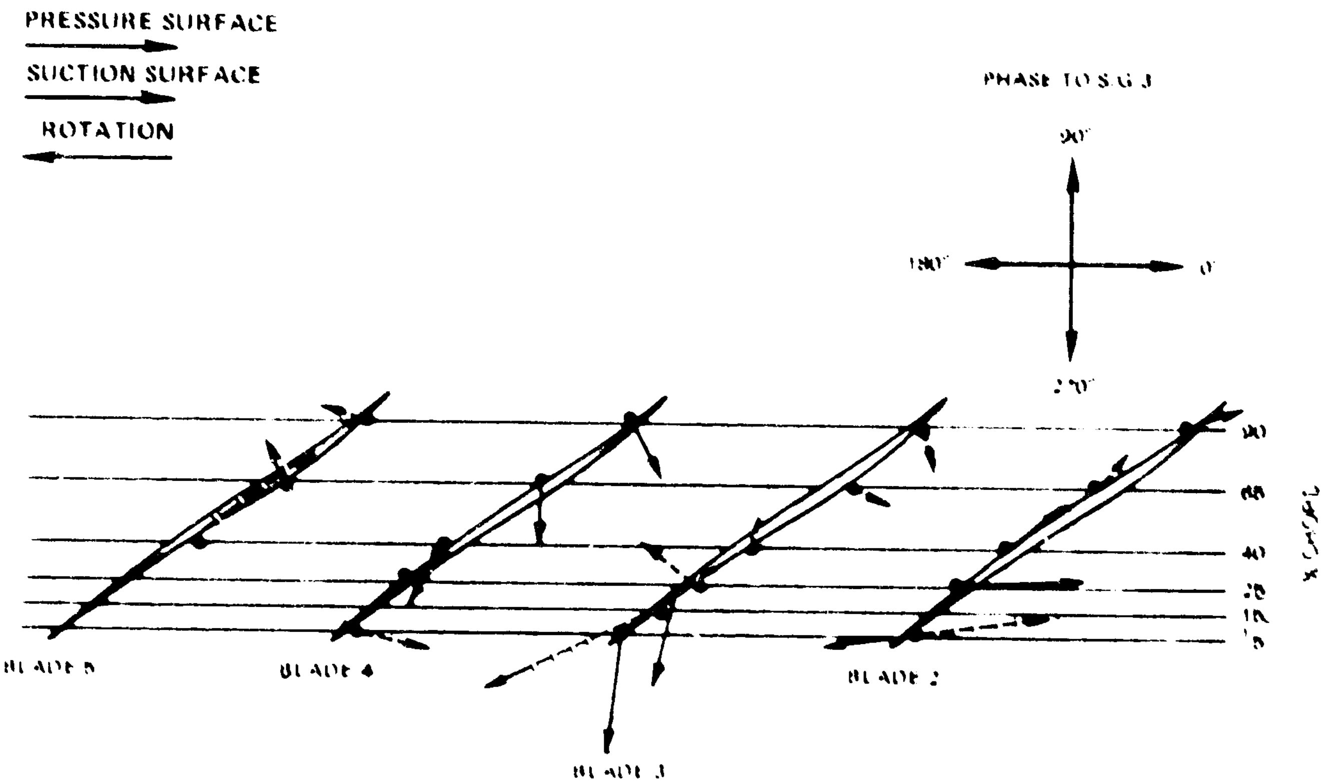

Figure F-4 Local Oscillating Hot Film Signals on Blade Surface at 75 Percent Speed Shown as Vectors (Vector Plot of Real Versus Imaginary With Origin on Point of Application)

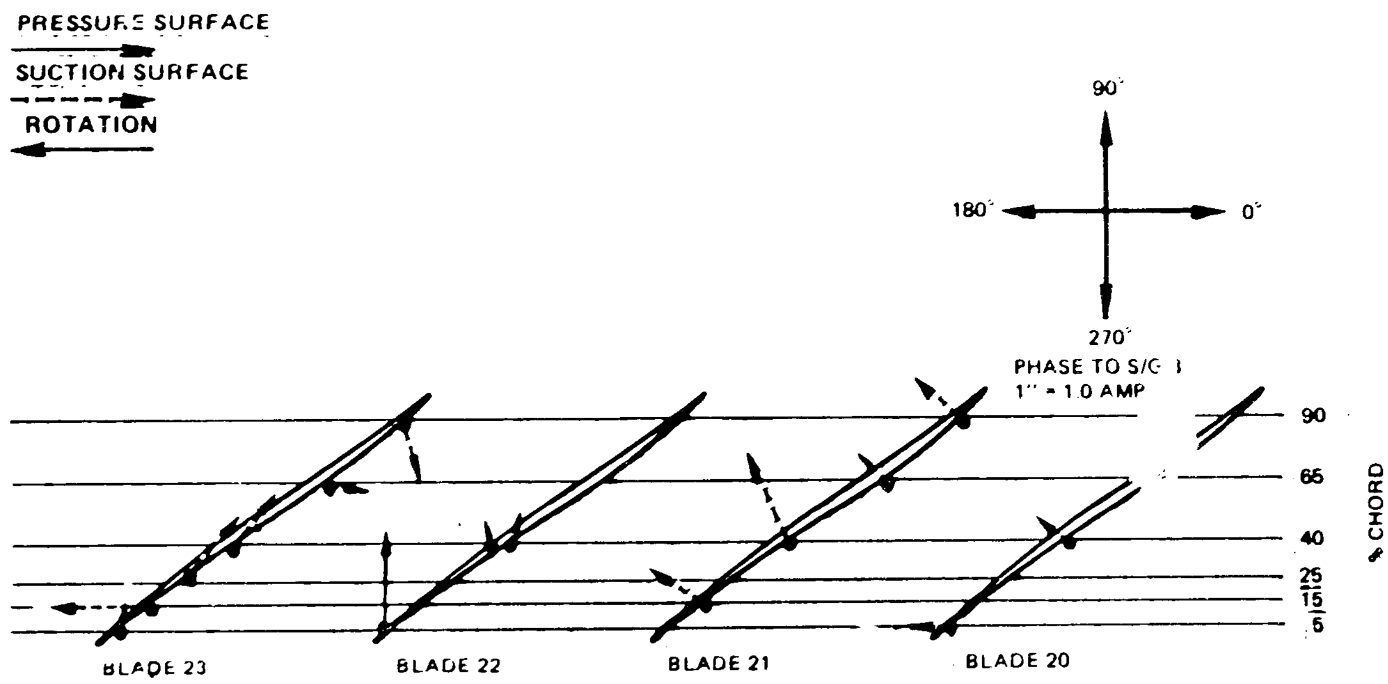

Figure E-5 Local Oscillating Velocities on Blade Surfaces at 75 Percent Speed (Vector Plot of Real Versus Imaginary With Origin on the Point of Application)