PWA-4411

STUDY OF AERODYNAMIC NOISE IN LOW SUPERSONIC OPERATION OF AN AXIAL FLOW COMPRESSOR

by

R. A. Arnoldi

PRATT & WHITNEY AIRCRAFT DIVISION
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA Headquarters
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FINAL REPORT

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FOREWORD

This report describes the results of an investigation of aerodynamic noise in low supersonic operation of an axial flow compressor conducted by Pratt & Whitney Aircraft in accordance with National Aeronautics and Space Administration Contract NASW-2249 during the period 1 September 1971 through 5 March 1972.

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I. SUMMARY

A study of compressor noise is presented, based upon supersonic, part-speed operation of a high hub/tip ratio compressor designed for spanwise uniformity of aerodynamic conditions, having straight cylindrical inlet and exit passages for acoustic simplicity. Acoustic spectra taken in the acoustically-treated inlet plenum, are presented for five operating points at each of two speeds, corresponding to relative rotor tip Mach numbers of about 1.01 and 1.12 (60 and 67 percent design speed). These spectra are analyzed for low and high frequency broadband noise, blade passage frequency noise, combination tone noise and "haystack" noise (a very broad peak somewhat below blade passage frequency, which is occasionally observed in engines and fan test rigs). These types of noise are related to diffusion factor, total pressure ratio, and relative rotor tip Mach number. Auxiliary measurements of fluctuating wall static pressures and schlieren photographs of upstream shocks in the inlet are also presented and related to the acoustic and performance data.

II. INTRODUCTION

Basic aerodynamic performance and noise measurements were made in a single-stage research compressor designed for spanwise uniformity of flow conditions, to try to distinguish experimentally the relative contributions of various aerodynamic noise sources, which are characteristic of axial flow compressors in low supersonic operation. This study derives from a recently completed investigation under Contract NASW-1908, Reference 1, in which the generation of broadband noise by shock/turbulence interaction and the effect of stalled blade aerodynamics on noise production (broadband or otherwise) were treated.

The low hub/tip ratios of normal fans result in a wide spanwise range of aerodynamic conditions which greatly adds to the difficulty of exploring specific noise generating mechanisms. This spanwise range also causes undesirable complication of the acoustic properties of the annular inlet passage. The high hub/tip ratio (0.88) of the special compressor design which formed the basis for this program reduces this complication by providing greater spanwise uniformity. The initial phase of the rig testing program was utilized for those portions of a general noise evaluation which could be adequately accomplished at lower speeds than those provided by the ultimate design capability.

For this initial exploratory program, inlet plenum microphones and standard aerodynamic performance instrumentation were employed. In addition to the contracted program, studies were made using unsteady pressure fluctuation sensors and schlieren optics upstream of the rotor during the general shakedown run of the test compressor. Where applicable, the results of these studies are presented and used in the interpretation of the contracted data.

III APPARATUS AND PROCEDURES

A. TEST COMPRESSOR

The high hub/tip ratio test vehicle was designed to provide a simplified test geometry for the study of aerodynamic and aeroacoustic phenomena significant in the performance of advanced fans and compressors designed for high, supersonic tip speeds. The aerodynamic design parameters listed in Table I reflect this intention, and the rig geometry was chosen to provide as nearly as possible a spanwise uniformity of flow conditions. For the present contract, the test vehicle was run at 60 and 67 percent speed to give noise data in the low supersonic regime.

TABLE I
DESIGN SUMMARY FOR TEST COMPRESSOR

Stage Total Pressure Ratio	P_{TS} = 1.537
Stage Adiabatic Efficiency	η_S = 84.7%
Rotor Total Pressure Ratio	P_{TR} = 1.55
Rotor Adiabatic Efficiency	η_R = 86.5%
Rotor Tip Relative Mach Number	M_{TR} = 1.75
Corrected Tip Speed	$U_T/\sqrt{\theta}$ = 550 meters/sec (1800 fps)
Corrected Flow	W = 15 kg/sec (33 lbs/sec)
Specific Flow	W/A = 205 kg/m^2-sec (42.0 lbs/ft^2 - sec)
Hub-Tip Ratio	0.88
No. of Rotor Blades (MCA)	102
No. of Stator Vanes (Mod. NACA 65 Series)	130
Rotor Aspect Ratio	1.25
Rotor/Stator Axial Separation	2 rotor chord lengths
Rotor Blade Thickness/Chord Ratio	0.06 at base, 0.02 at tip
Rotor Chord	0.030 meters (1.20 inches)
Nominal Diameter of Flow Passage	0.656 meters (25.8 inches)

As shown in Figure 1, the flow passage has a constant annular cross-section which converges only slightly at the rotor. The advantages expected from this design configuration are as follows:

1. Any aeroacoustic mechanism will experience nearly identical flow conditions over the entire span of the passage.

2. The constant-area, cylindrical passages provide a simplified geometry amenable to analysis by available acoustic theories for propagation in ducts.

3. The use of schlieren optics, which average the refractive effects of flow density gradients over the span of the passage, is facilitated.

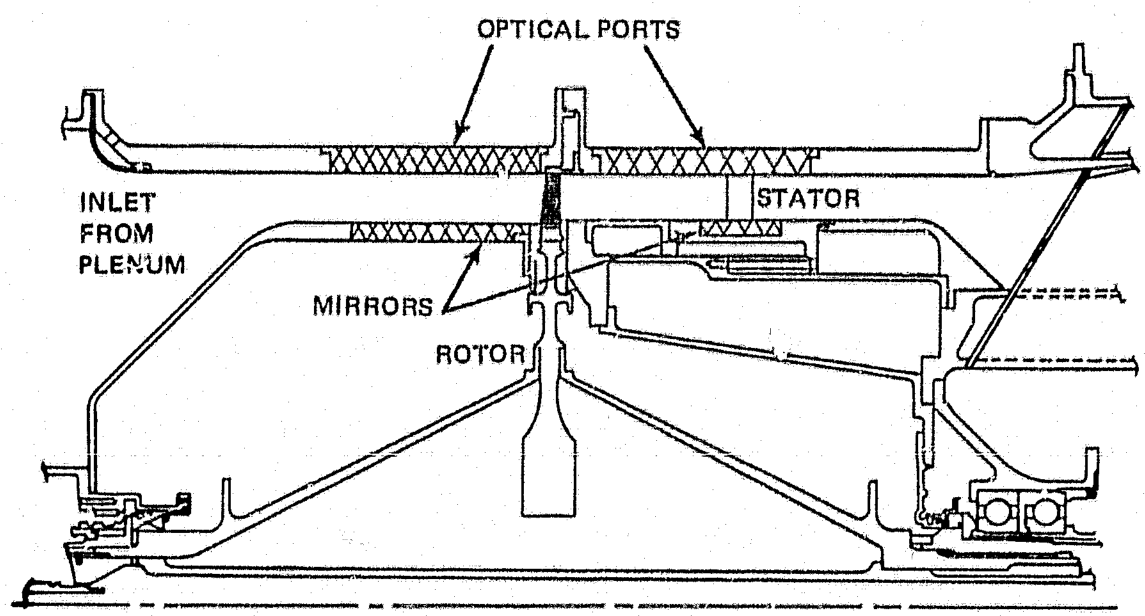

Figure 1 Design Configuration of Test Compressor

As shown in Figure 1, optical ports are provided upstream of the rotor and over the stator with mirrors on the inner body so that schlieren photographs can be made of the shock system within the inlet passage and of the flow phenomena at the stator. The air is provided from an inlet plenum having an acoustically-absorbent lining, in which an array of microphones measures noise levels considered equivalent to the acoustic far-field.

The stator vanes may be placed at either of two axial stations, two and four chord lengths downstream of the rotor. The two-chord position was selected for the present test. The rig can also be modified to accept a half-chord spacing between rotor and stator. Provisions have been made for boundary layer removal by means of a bleed on the outer wall, upstream of the optical port. This bleed was not operative during the present program.

B. INSTRUMENTATION AND CALIBRATION

The instrumentation used to obtain performance is shown in Figures 2 and 3. Radial distribution of pressure was measured at station 4 by two traversing cobra probes. The O.D. wall static pressure was measured at stations 6, 9, 9.5 and 12. Downstream of the stator (station 12), two 8-element wake rakes measured total pressure. At this axial location, total temperature was measured by an 11-element wake rake, divided such that 6 elements were at $\pi/3$ radians (60°) from the vertical and 5 elements were at 4.73 radians (271°). All traversing probe measurements were made at 9 radial locations defined by streamlines which pass through the station at the 5, 10, 15, 30, 50, 70, 85, 90, and 95 percent span locations.

Transducers were used to measure steady pressures on all probes and static pressure taps, and the results were recorded in millivolts by an automatic data-acquisition system. The pressures measured with this system were accurate to within 0 00304 meters Hg (0.012 in Hg). Total pressure probes were calibrated to obtain recovery as a function of Mach number.

Temperatures were measured with Chromel-Alumel type K thermocouples, and data were recorded in millivolts by the automatic data-acquisition system. All temperature-sensing elements and the lead wires were calibrated over their full operating temperature range. The temperature probes were calibrated to obtain recovery as a function of Mach number.

Forward radiated rotor noise was measured in the inlet plenum by means of five 0.00318 meter (one-eighth inch) diameter condenser microphones, Bruel & Kjaer-type 4138. The microphones were positioned inside the inlet plenum chamber along an arc of 0.914 meters (three-foot) radius. Five microphones were located at 0, $\pi/12$, $\pi/6$, $\pi/4$ and $\pi/3$ radians from the rig centerline and one microphone was traversed between 0 and $\pi/3$ radians. The interior walls of the plenum chamber were lined with sound-absorbing material to produce a nearly anechoic noise field. A schematic of the plenum microphone arrangement is shown in Figure 4. All data were recorded directly on magnetic tape; the system components exhibit satisfactory response to at least 100 kilohertz.

Forward radiated and aft radiated fluctuating pressure signals were measured in the annular passage by means of six quartz pressure transducers, Kistler Model 603A. The pressure transducers were mounted flush to the outer flowpath wall. Their positions are designated as K1, K2, K3 at distances of 0.164, 0.088 and 0.0117 meters forward of the rotor face, respectively; also, K4, K5, K6 at 0.140, 0.189 and 0.248 meters downstream of the rotor face (hence, downstream of the stator).

Transducer signals were routed through cables to a high frequency, low level noise data recording console which includes power supplies, signal conditioning equipment, calibration equipment, and a magnetic tape recorder. All noise signals were preserved on magnetic tape for future analysis; however, analysis of some data was performed "on line".

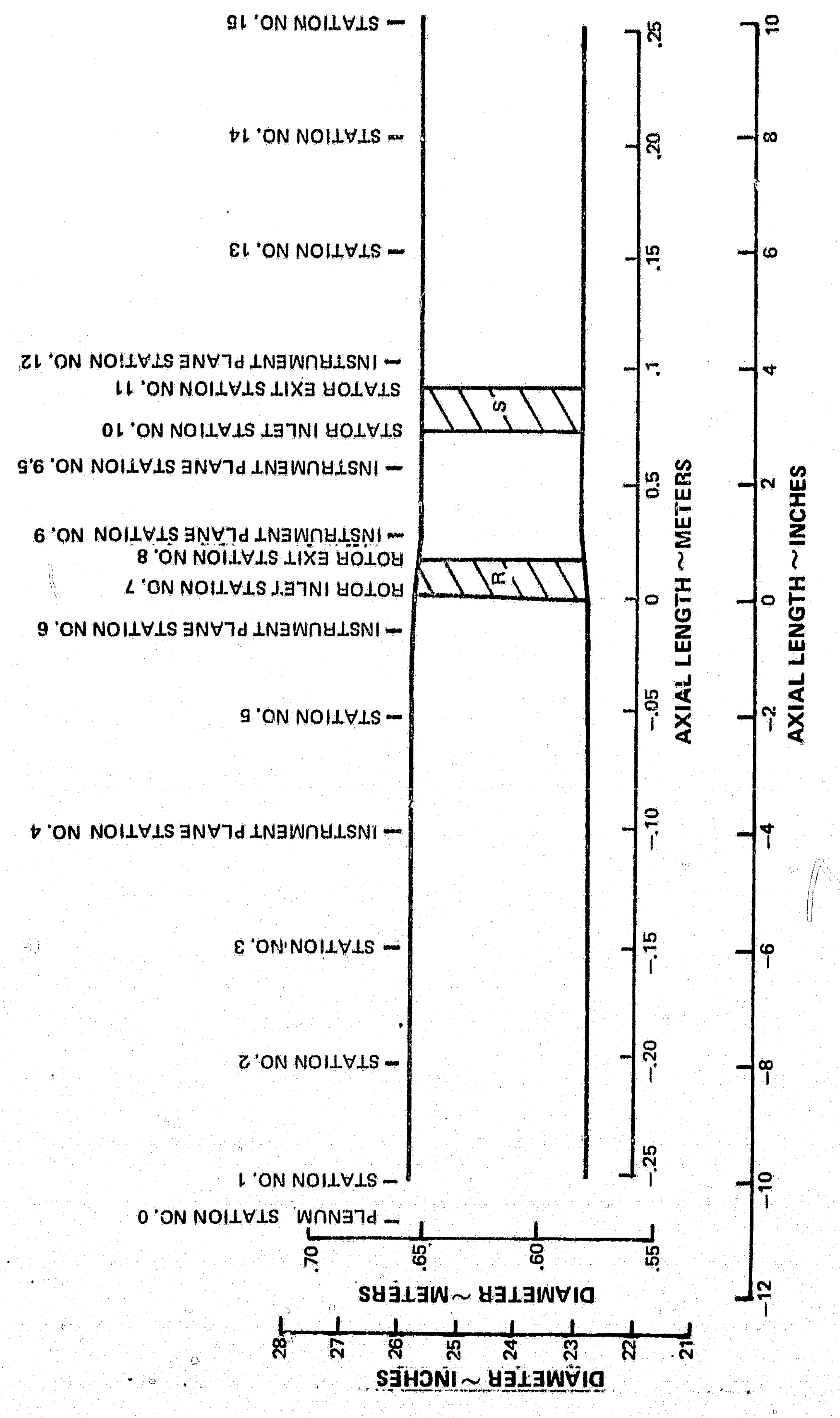

Figure 2 Axial Station Number Designation and Location of Instrumentation

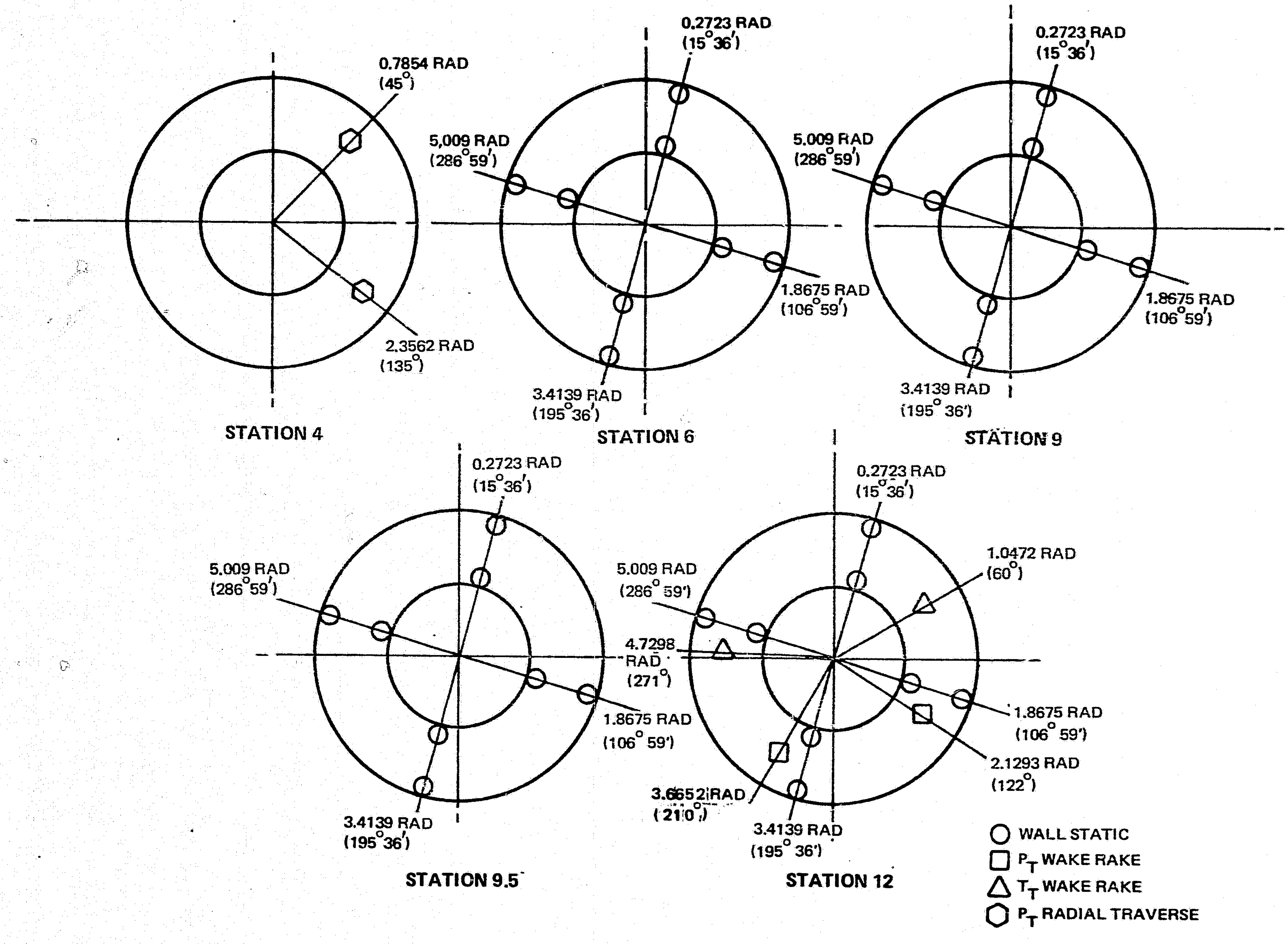

Figure 3 *Circumferintial Locations of Instrumentation, Viewer From Rear*

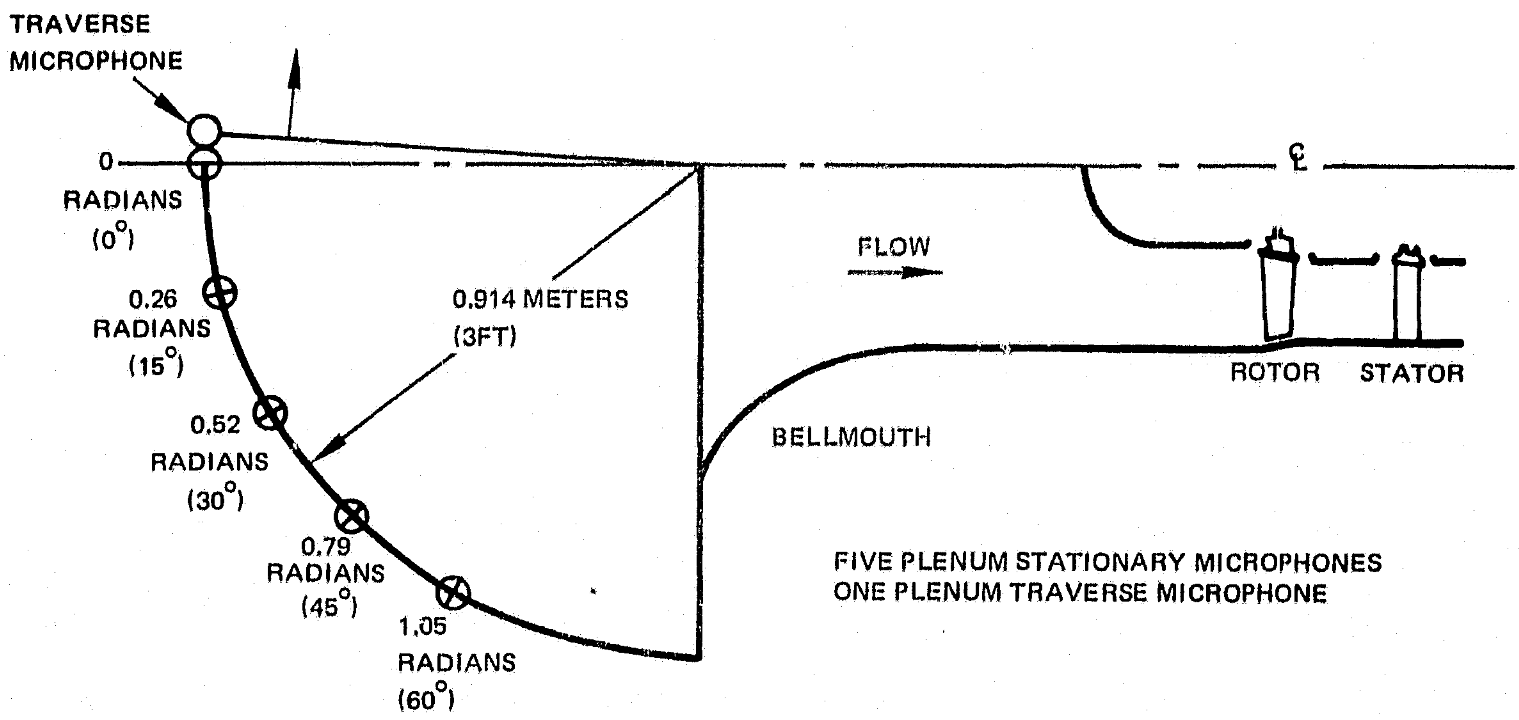

Figure 4 *Plenum Microphone Location*

The double-pass schlieren system, shown in Figure 5, was designed to allow visualization of the flow in the annular passage. The schlieren mirror is a 0.305 meter (12-inch) dia. f4 paraboloid. Both the light source and the knife edge are on the optical axis of the paraboloid; consequently, the system tends to be free of aberration. Only a 0.15 by 0.05 meter off-axis portion of the mirror is utilized for the test beam so that the effective angular aperture of the system is f8 in the plane of the long axis of the rectangle.

The test beam passes through a corresponding rectangular window in the outer wall of the inlet annulus (Figure 6) and radially through the test section. This window is 0.15 meter long by 0.05 meter wide, located just upstream of the rotor face. The three Kistler probes (K1, K2 and K3) just cover the region of this window (at a different circumferential station).

A mirror on the inner wall of the annulus reflects the beam back to the schlieren mirror producing a double-pass system. Both the window and mirror are high-quality, optical flats. They do not conform to the radius of curvature of the annulus walls but the flats depart less than 50 microns from the actual wall shape. A smooth transition from the flat to curved wall surface is used; therefore, this small difference is not expected to produce any significant disturbances in the flow field or in the resulting schlieren pictures. The return beam is intercepted by a beam splitter and directed toward the knife edge where the schlieren field is recorded with a 70mm camera placed behind the knife edge. The flow test region is imaged on the camera film plane. The light source, knife edge positioner, and cameras can all be remotely operated. To facilitate knife edge alignment, the schlieren field can be viewed on a video monitor while the knife edge is being positioned.

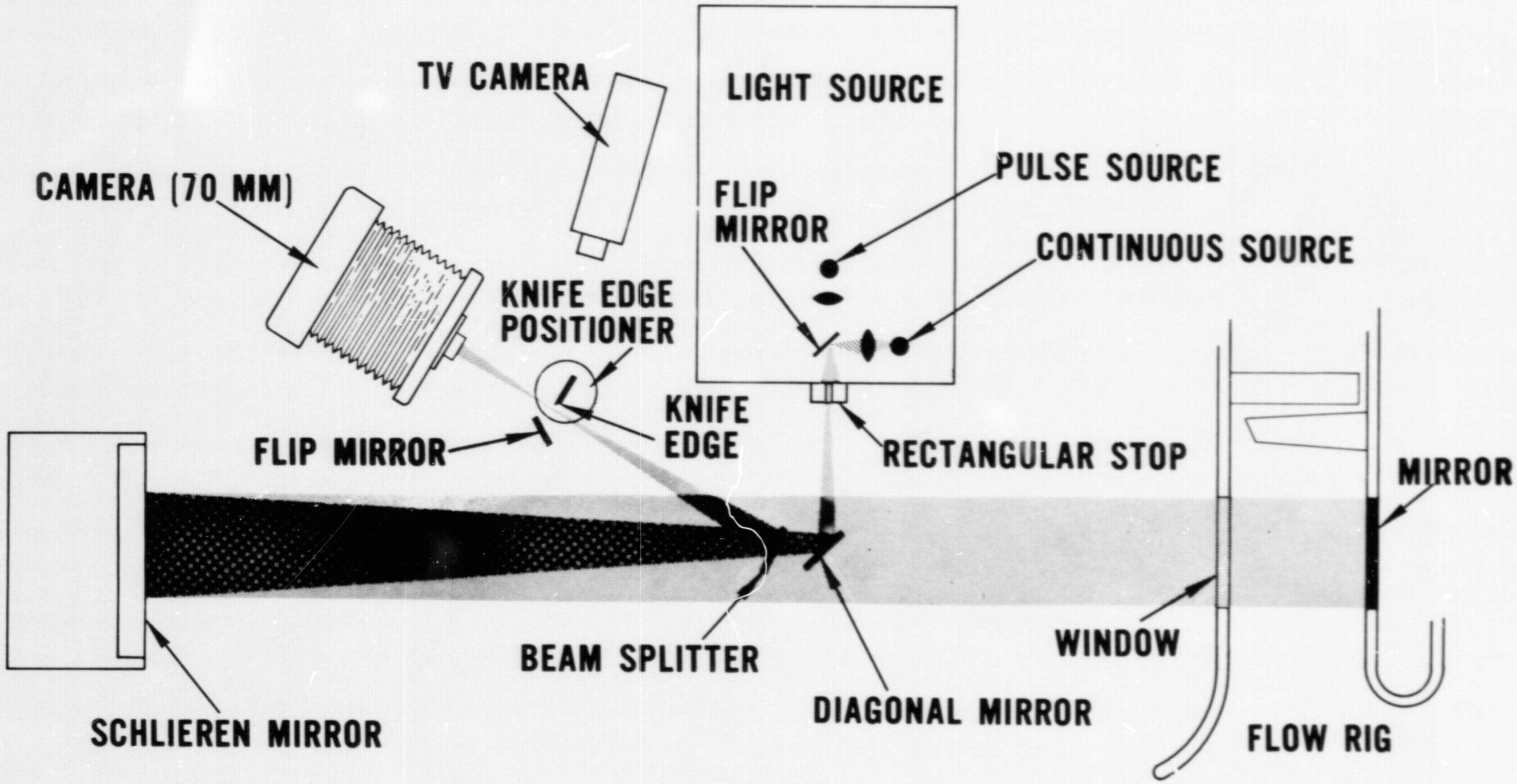

Figure 5 Double Pass Schlieren System

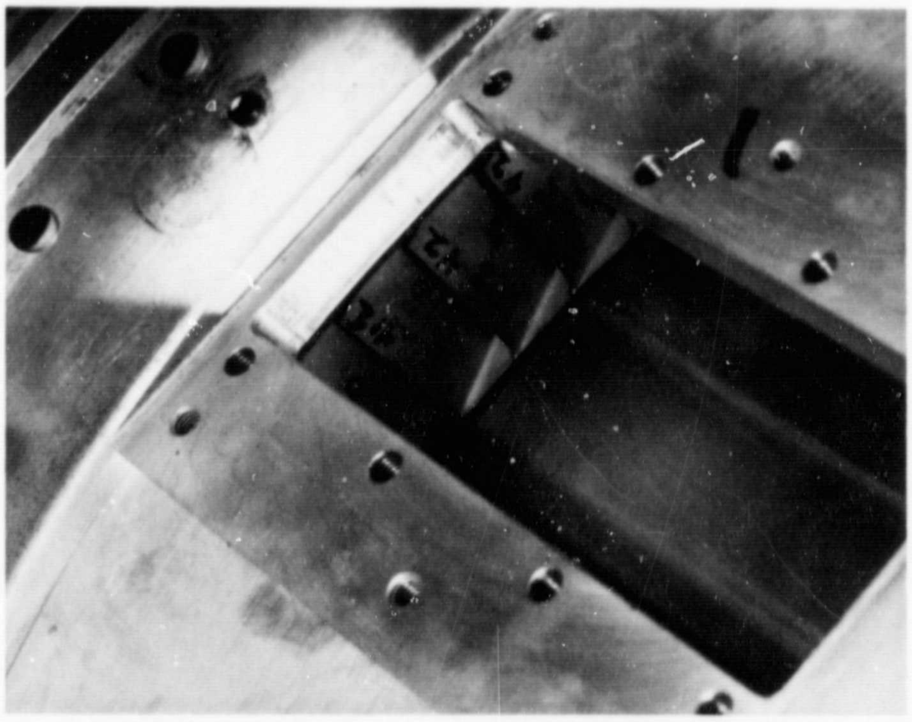

Figure 6 Port for Schlieren Photography Showing Rotor Blades (XPN-19922)

The light consists of two sources; first, a continuous mercury arc source for alignment and second, a pulsed-source for taking schlieren photographs of the high-speed flow. The pulse duration is 0.5 microsecond. A solenoid-operated mirror is used to select one or the other for illumination of the schlieren system.

The knife edge positioning assembly permits the knife edge to be remotely positioned axially and transverse to the optical axis. It also includes a solenoid-actuated "flip" mirror which intercepts the beam when it is desired to view the field on a closed-circuit TV monitor.

The camera film advance can be operated remotely, allowing many schlieren photographs to be taken without entering the test stand.

A similar rig window and mirror are situated downstream of the rotor over three elements of the stator vane array, to permit schlieren studies of the interaction of the rotor wake with the stator vanes. These were not used during the present program.

C. TEST PROCEDURE

The 60 percent design speed condition was chosen for this test on the basis that the relative inlet Mach number would be approximately unity or slightly supersonic, so that very weak upstream shock waves might be expected. The 67 percent design speed condition was chosen as an appropriate increment to the 60 percent condition, whereby shocks of slightly greater strength would be provided. The operating points on each speed line were chosen to cover the operating range between wide-open discharge throttle (minimum blade loading) and the throttle setting for maximum pressure rise compatible with reasonable blade stresses. In the low-speed case, this maximum throttle setting just avoided a stall instability; at the higher speed, high buffetting stresses provided the limit.

In addition to the contractually required performance and acoustic measurements made during the sponsored program, measurements were made of fluctuations in wall static pressure upstream and downstream of the rotor. Also, schlieren photographs of the upstream shock system were made at conditions corresponding to certain operating points on the higher speed line.

D. DATA ANALYSIS

Compressor performance details are obtained by input of certain test data into a standard Pratt & Whitney Aircraft streamline analysis computer program. This program requires the compressor inlet, rotor exit, and stator exit conditions to analyze a single-stage compressor. For this study, inlet conditions are assumed to be uniform and equal to the plenum values. The rotor exit spanwise distribution of total pressure is taken as the peak value of the circumferential values obtained by the stator exit wake rake in each of its radial positions. The rotor exit spanwise distribution of total temperature is taken as the mass average of the stator exit wake rake in each of its positions. The stator exit spanwise distribution of total pressure is taken as the mass average value of the wake rake at each radial position. To complete the definition of the system, a stator exit angle is required. This angle was not measured; instead, pure axial flow is assumed corresponding to the design value. This assumption is quite common and causes only slight error if it is within 0.15 radian of the true value.

The streamline analysis program also has provisions for the input of a blockage factor to account for boundary layer effects upon the flow area. An axial distribution of blockage was derived from an analytical model. Static pressures measured during the test indicated that the calculated amount of blockage is quite accurate.

The noise measured at the plenum microphones was reduced to a set of 64 Hz bandwidth spectra as presented in Appendix 4. These spectra are presented in the form of plots of sound pressure level versus frequency over a range of zero to 40,000 Hz. For convenience, five types of noise are distinguished - discrete tone noise at blade passage frequency, combination tone noise, broadband noise in the lower frequency range, broadband noise in the higher frequency range, and noise due to a "haystack" in the 10 - 12 KHz range. The noise was separated into these types so that different generation mechanisms could be considered. The sound pressure level associated with each type of noise was obtained from each spectrum by reading the level which seemed to be representative of the given noise type. Figure 7 is an example of how a typical spectrum was processed. The level of the blade passage frequency tone was read directly from the plot. The levels of the low frequency and high frequency broadband noise were chosen by constructing a straight horizontal line through the lowermost part of the plot in the appropriate frequency range. The level of the haystack noise was chosen as the peak level of a smooth curve drawn through the haystack. A combination tone noise figure could have been found by logarithmically summing the level of each individual tone, but a simpler method was to take the overall sound pressure level in the frequency band between 1 KHz and 9 KHz since combination tone dominates in this range. The representative level of each type of noise is shown on the typical spectrum in Figure 7 with the exception of the combination tone noise which was obtained electronically as just described. For purposes of comparing with performance parameters, the sound pressure level data from the five plenum microphones was reduced to a sound power level for each type of noise and for every condition by means of a numerical spacial integration.

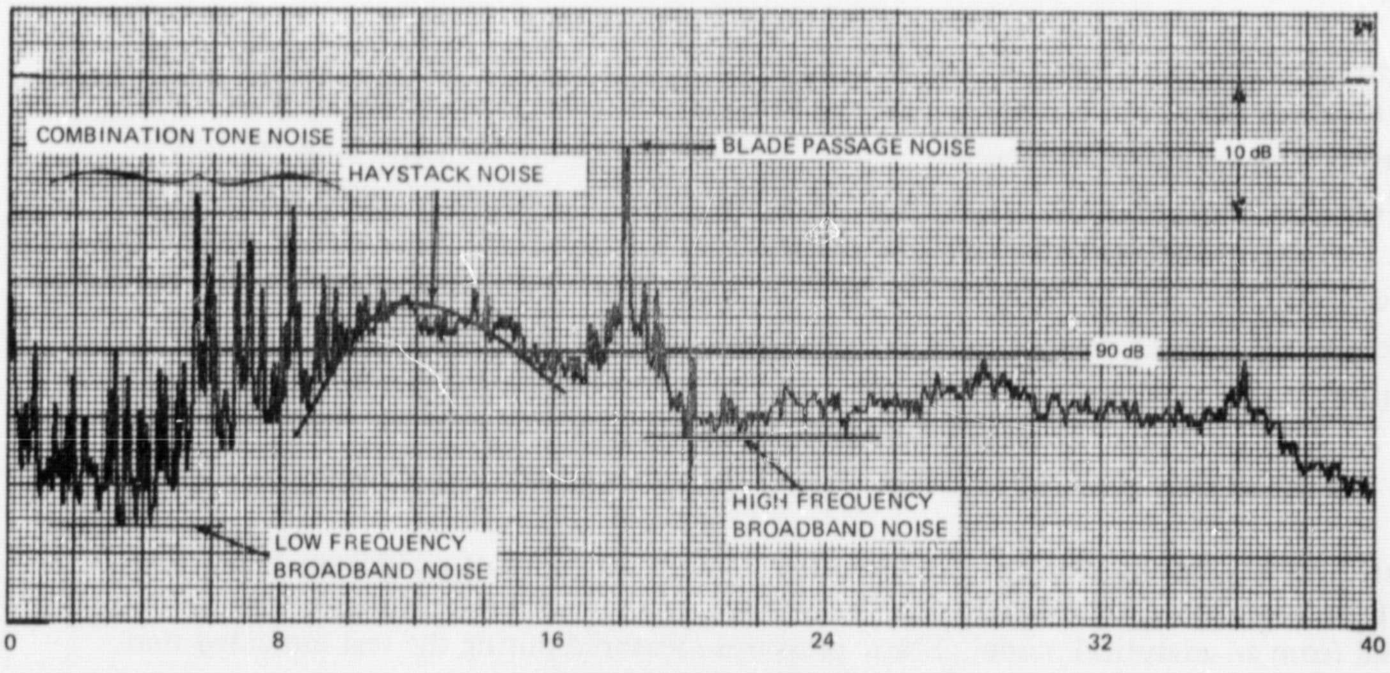

Figure 7 Typical Spectrum

IV. RESULTS AND DISCUSSION

A. RIG AERODYNAMIC PERFORMANCE

The characteristic performance curves at the two speeds at which noise measurements were made are shown in Figure 8. The test conditions of constant speed are designated 01, 02, etc., starting with wide-open discharge and proceeding toward stall. It is, therefore, convenient to desgnate test conditions at 60-01, 60-02, etc., and 67-01, 67-02 etc., along the two speed lines. Since certain of the aerodynamic parameters (D-factor, for example) are virtually independent of speed along an engine operating line or constant discharge throttle setting, three such lines are sketched on Figure 8. These lines are chosen so that a rough equivalence at constant throttle setting exists between 60-01 and 67-01, 60-02 and 67-03, also 60-03 and 67-05. The closest approach to stall is offered by conditions 60-04 and 60-05.

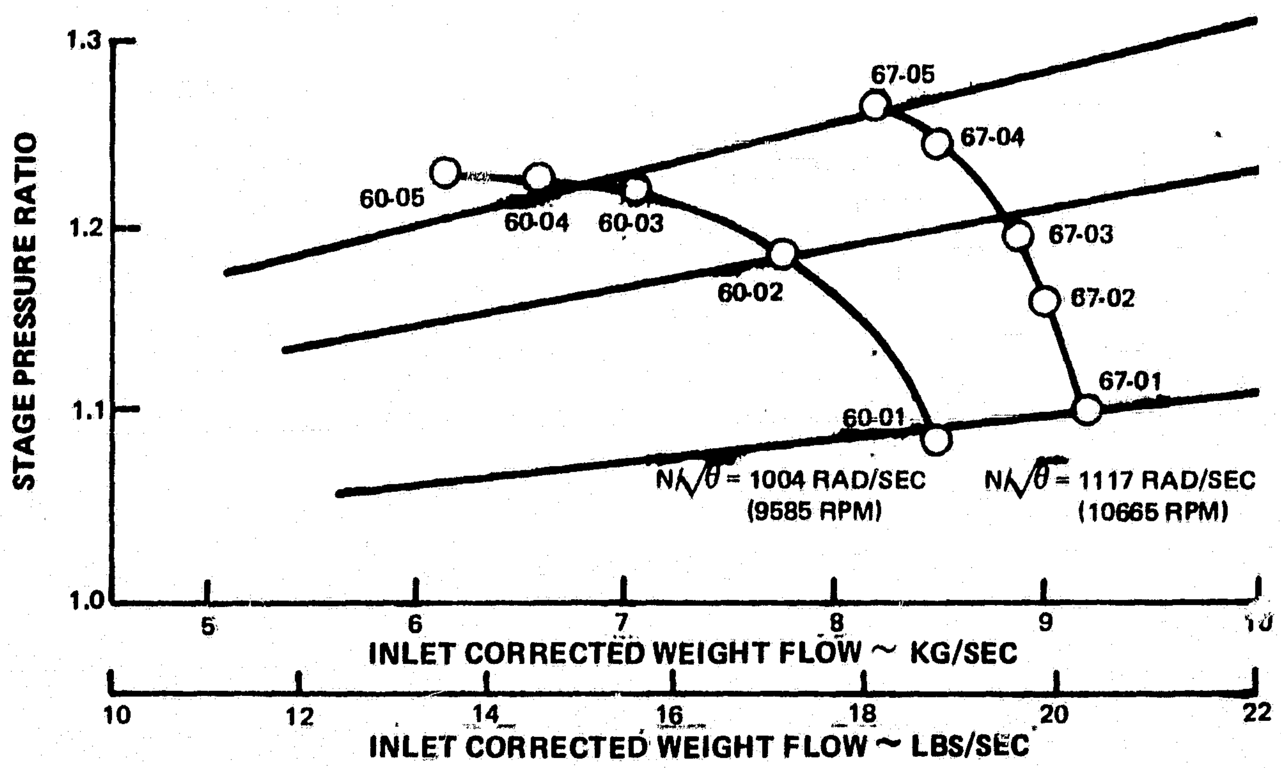

Figure 8   Overall Stage Performance

As explained in Section III, the spanwise uniformity of the flow is important to correlation of acoustic properties with aerodynamics. Examination of the blade element aerodynamic data tabulated in Appendix 3 shows good uniformity of the rotor relative inlet Mach number, which exhibits a spanwise variation less than ten percent at all points and varies only slightly along each speed line. The increase in rotor relative inlet Mach number between the two speed lines is also about ten percent, so that the spanwise average may be considered to increase by 0.1 between the 60 percent and 67 percent speed conditions. Likewise, good uniformity in aerodynamic loading has been achieved, with the exception of the inner 15 percent of blade span.

B. SCHLIEREN PHOTOGRAPHY AND UNSTEADY WALL PRESSURE MEASUREMENTS

During the general period of shakedown testing of the rig (and apart from the tests conducted under this contract) the provisions for schlieren photography and for unsteady wall pressure measurements described previously in Section IIIB were checked out for a limited number of operating conditions. Certain of the results which are pertinent to the present program are presented in this report as a convenience. In particular, examples of the schlieren photography are shown in Figure 9, and typical wave forms of the unsteady wall pressure traces are shown in Figures 10 through 13.

The exposure time (0.5 microsecond) is apparently quite satisfactory to avoid blurring of the shocks. The principal noteworthy features are:

- The sharp delineation of each shock indicates that its plane is substantially radial. It does not exhibit any of the distortion which might accompany spanwise variations in shock strength or flow velocity. The double image is due to distortion of the optical system by rig deflection during the test; this has since been corrected for subsequent tests.
- Close inspection of the schlieren photograph for the 67-05 condition shows circular traces which may be interpreted as pressure pulses caused by successive interaction of some convecting disturbance (possibly an isolated turbulence vortex carried by the stream) with the shocks as it is passed by them. There is also a hint of a background structure, possibly resulting from interaction of the boundary layer turbulence with the shocks.
- The shock wave pattern is nonuniform at all points along a speed line, indicating the presence of combination tone noise. By comparison, the pattern at 95 percent of design speed shows significantly more nonuniformity and indeed, the measured combination tone was significantly higher. This pattern was photographed during supplementary shakedown running at speeds above those of the contracted program.

The fluctuating wall pressures at stations K1 and K2 show wave forms which exhibit more complexity than the schlieren photographs. The spacing between consecutive shocks (sharp pressure rises) appears much more variable, in accordance with the schlieren photos for very high speeds.

For discussion of the role of shock/turbulence interaction in broadband noise production, a measure of the shock strength at upstream locations is needed. Pressure measurements taken a half-chord upstream of the rotor indicate small pressure rises across the discontinuities (corresponding to shock Mach numbers of 1.045 and 1.060) at the two speeds. The strength of the discontinuities does not vary appreciably as pressure is increased at either speed. However, when we consider the furthest upstream station, their strength doubles as both speed and back pressure are increased over the range used in the present study.

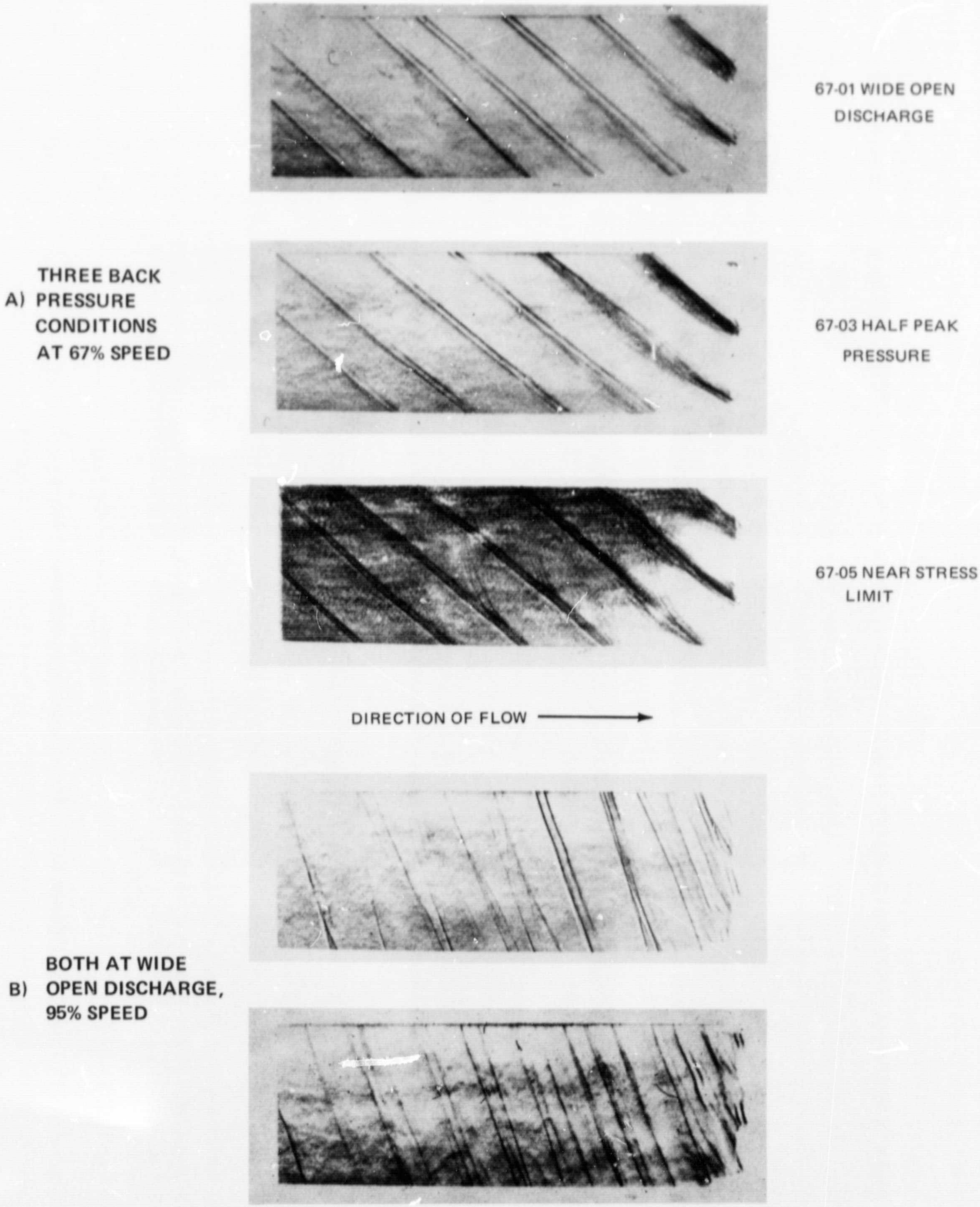

Figure 9 Effect on Shock System of Pressure Ratio and Speed

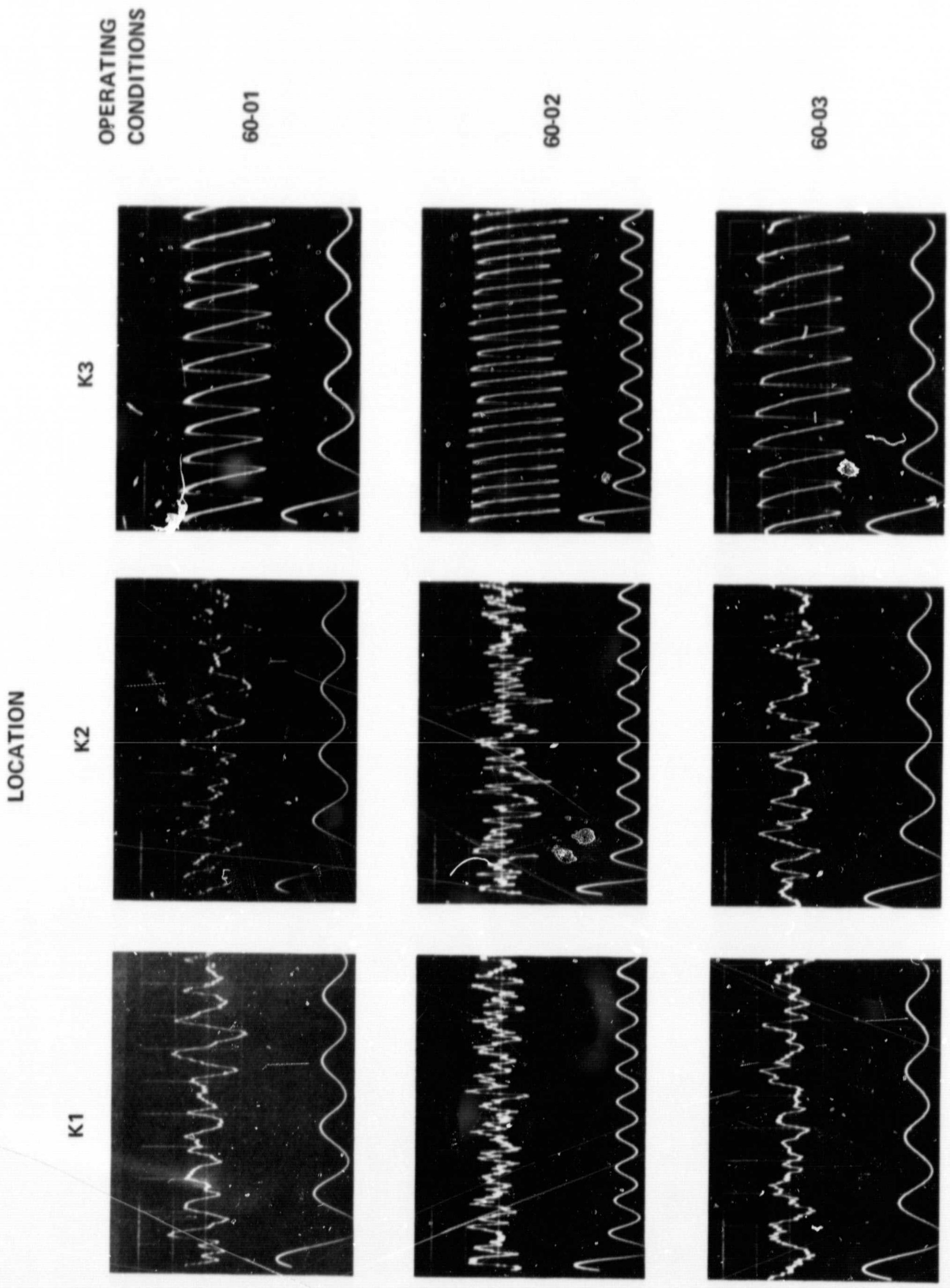

Figure 10 *Pressure Waveforms. Upstream of Rotor*

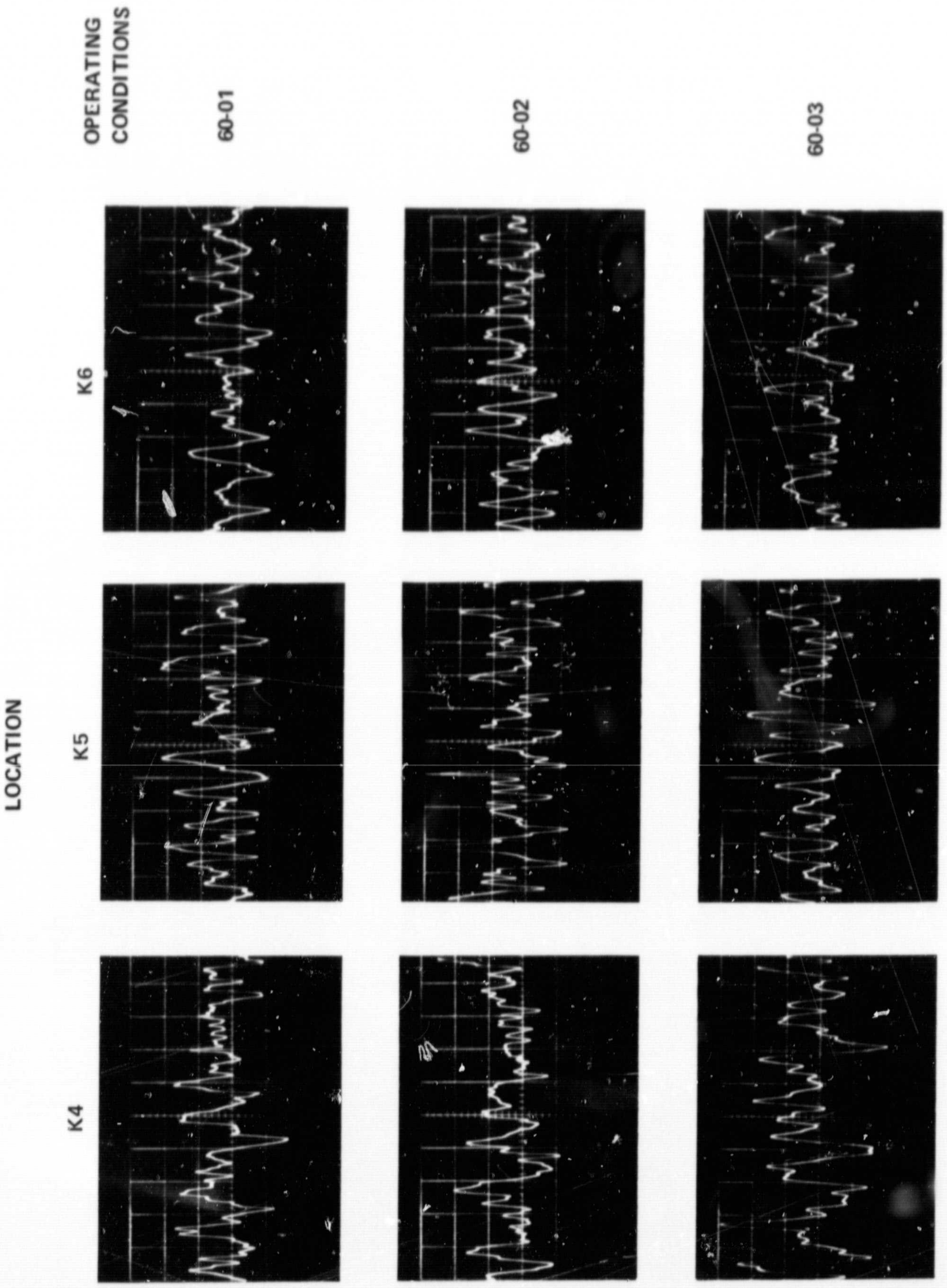

Figure 11 Pressure Waveforms Downstream of Rotor

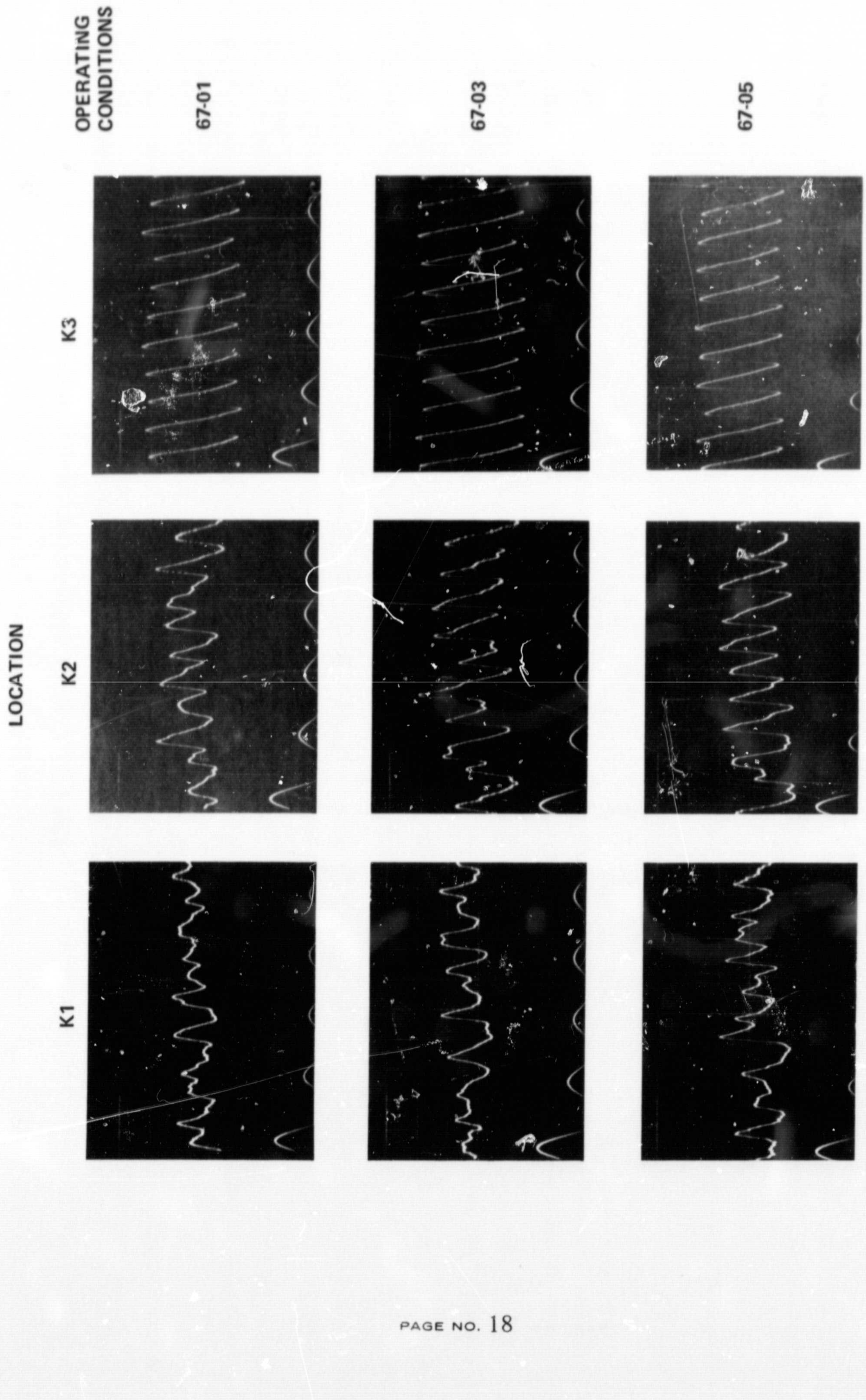

Figure 12 Pressure Waveforms Upstream of Rotor

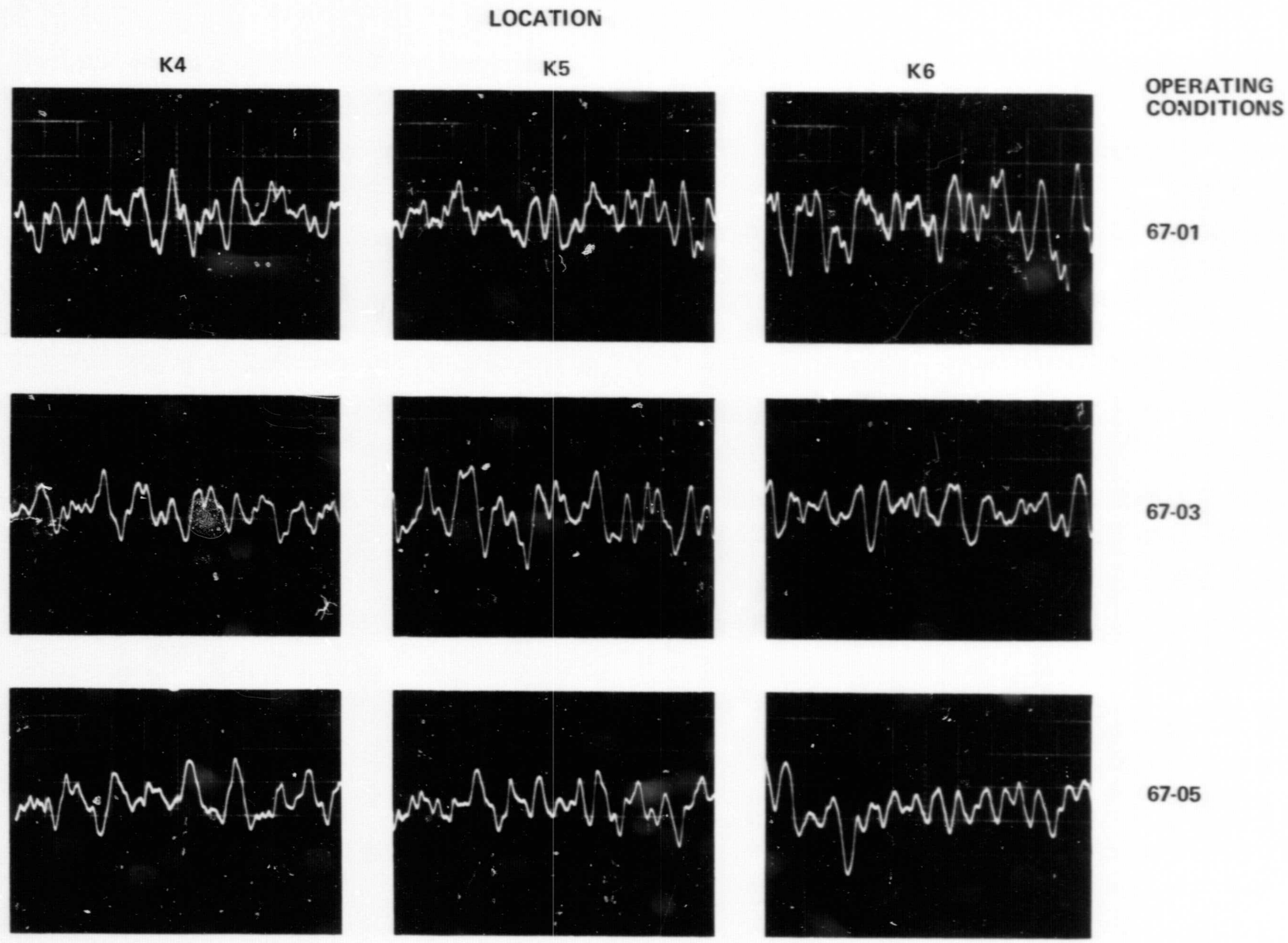

Figure 13 *Pressure Waveforms Downstream of Rotor*

The N-shaped waveform at the K3 position, close to the rotor face, deserves comment. Very close to the rotor leading edge, the expansion region which follows the bow wave does not occupy the entire interval prior to arrival of the next bow wave shock, so that the waveform is a spike followed by a constant pressure interval. With increasing distance upstream of the rotor, the expansion region spreads to fill the interval and thus creates an N-shaped wave. This has occurred prior to the K3 station, whereas similar locations (in terms of rotor chord lengths) on other fans show a slower development. The explanation is not known, but may lie in greater uniformity of flow in the present test compressor.

C. PRINCIPAL NOISE FEATURES

As explained in Section IIID, the spectral content of the noise picked up by the microphones in the inlet plenum can be categorized into five types: low frequency broadband, high frequency broadband, blade passage frequency, combination tone, and "haystack". Each is assigned a sound pressure level, and the weighted average of the contributions from the five fixed plenum microphones provides a sound power level for each noise type at every test condition.

Low Frequency Broadband Noise

Broadband noise levels in the low and the high frequency ranges were taken from the 64 Hz bandwidth spectra (Appendix 4) and inlet sound power level was calculated by the method described in Section IIID.

Figure 14 shows the sound pressure level of the low frequency broadband noise as a function of microphone angle for every operating point. This figure indicates the relative level and directivity pattern for each compressor operating point. The general rise in broadband sound pressure level as stall is approached at constant speed is clearly evident. The two stalled conditions, 60-04 and 60-05, show a significantly higher broadband sound pressure level. There is little change in noise with speed for equivalent throttle settings.

Aerodynamic performance parameters suitable for correlation with sound pressure and power levels of each noise type were chosen to identify the mechanisms of noise origin (an extensive discussion of the various mechanisms is given in Reference 2). Broadband noise may arise from random pressure fluctuations on airfoils as a consequence of boundary layer separation on the airfoils and so be related to aerodynamic loading (D-factor). It may also arise from blade interaction with external turbulence (wall boundary layer or free stream turbulence). While the airfoil D-factor is available as a measure of the approach to separation, that of the wall boundary layer is not available. However, the effect of the blade on the wall boundary layer may be estimated from the $\Delta p/q$ parameter (not listed in Appendix 3); values of this parameter are as follows:

Condition	01	02	03	04	05
$\Delta p/q$ at 60% speed	.10	.24	.26	.25	.24
$\Delta p/q$ at 67% speed	.10	.17	.21	.26	.26

None of these values are large, so that the wall boundary layer is not likely to separate due to blade passage.

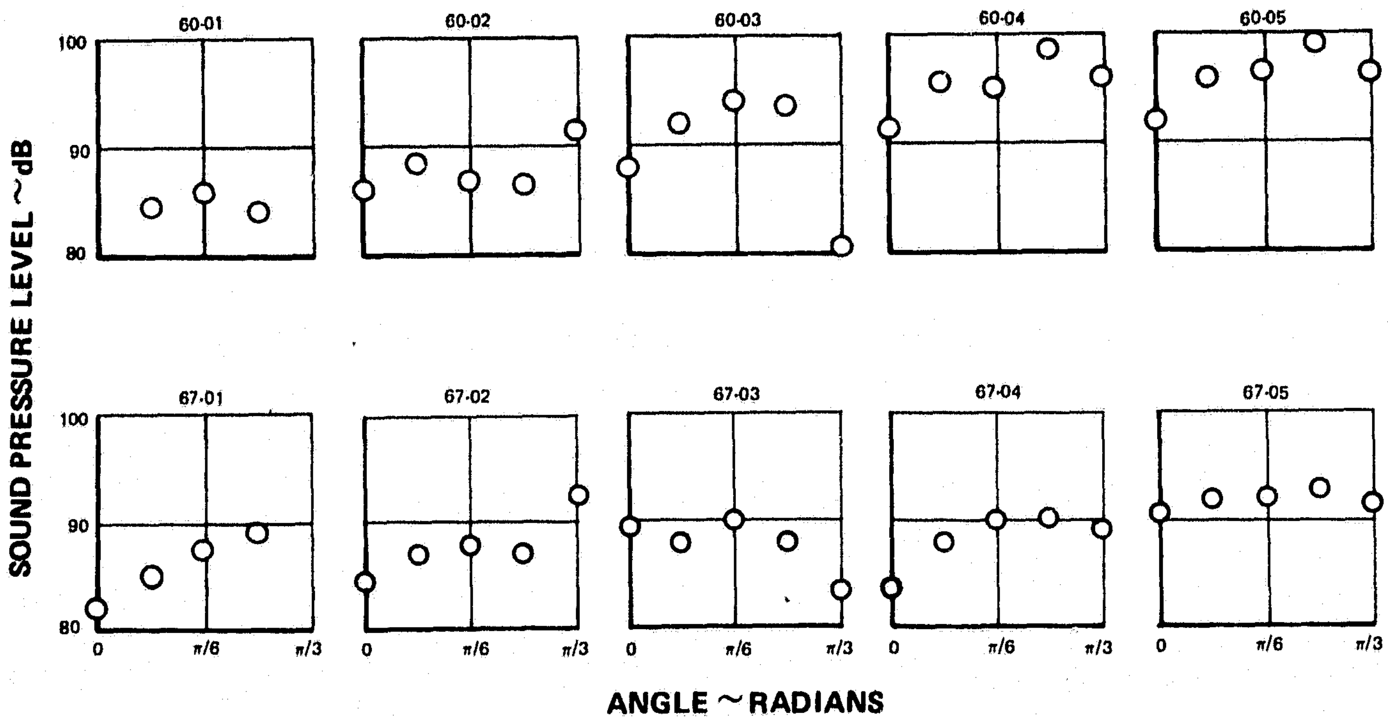

Figure 14 Low Frequency Broadband Noise

Broadband noise may also arise by interaction of the shock system upstream of the rotor with turbulence, either in the free stream or in the wall boundary layer. For the range of variables explored in the present tests, Reference 1 shows the noise level to be more strongly dependent on turbulence intensity and relative rotor inlet Mach number than on the shock strength (component of relative Mach number perpendicular to the shock). There is no available measure of the turbulence intensity in the passage, but there appears little reason to expect it to change with the test parameters. The rotor relative inlet Mach number (see Appendix 3) varies sharply between the speed lines (1.01 and 1.12 respectively at the tip), but remains nearly constant with rising back pressure.

The general rise in sound pressure level observed in Figure 14 is not consistent with this mechanism, and it appears more likely that the broadband noise is associated with increasing turbulence generated either by the approach to stall of the rotor blades or by the wall boundary layer interacting with the blade tip.

In order to correlate the noise data with performance parameters, the sound power level was plotted versus mean rotor diffusion factor (D factor) as shown in Figure 15. The good correlation between acoustic and aerodynamic parameters is evident.

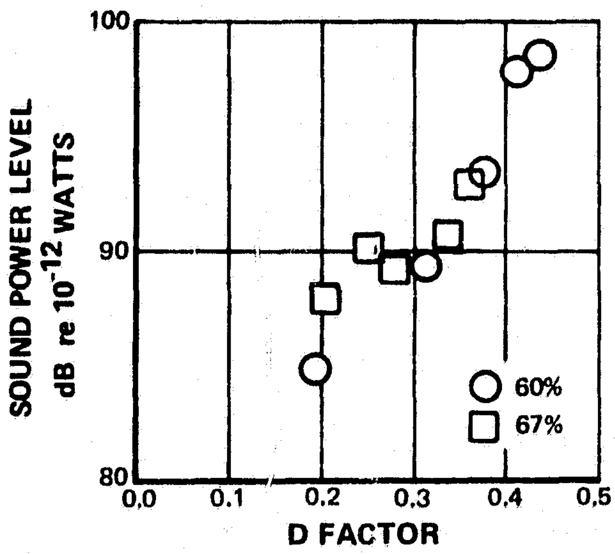

Figure 15
Low Frequency Broadband Noise
Versus D Factor

High Frequency Broadband Noise

The procedure described above was repeated for the high frequency broadband noise. Figure 16 shows the sound pressure level as a function of microphone angle for each operating point. Figure 17 shows the correlation of high frequency broadband noise with mean rotor diffusion factor. As with the low frequency broadband noise, the sound pressure level appears closely dependent upon D-factor.

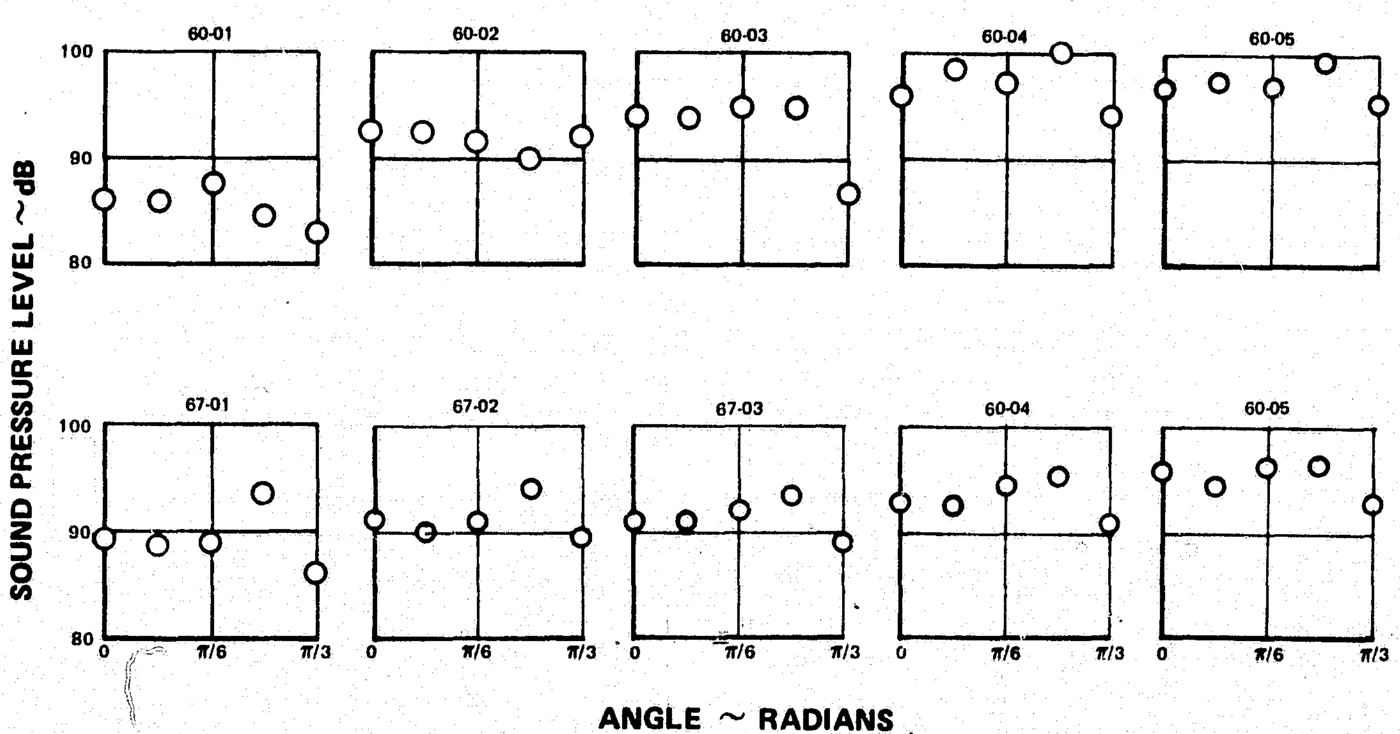

Figure 16 *High Frequency Broadband Noise*

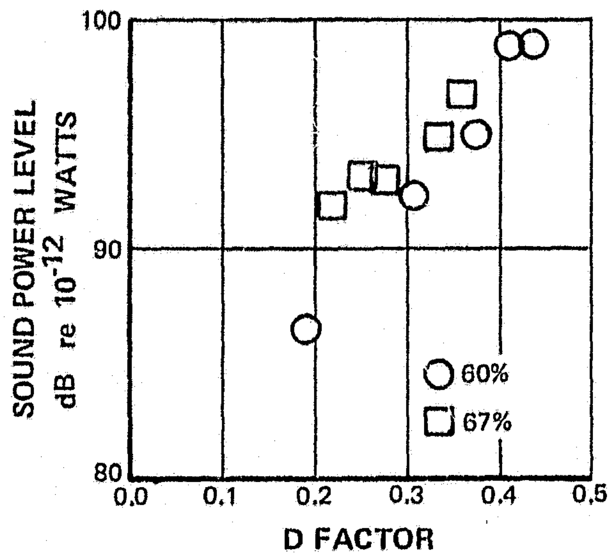

Figure 17
High Frequency Broadband Noise
Versus D Factor

Blade Passage Frequency Noise

The blade passage frequency tone levels as taken from the spectra are shown in Figure 18 as a function of microphone angle for each operating point. This data was also reduced to sound power level and plotted versus D-factor as shown in Figure 19. The blade passage frequency noise is independent of this parameter at the speeds investigated.

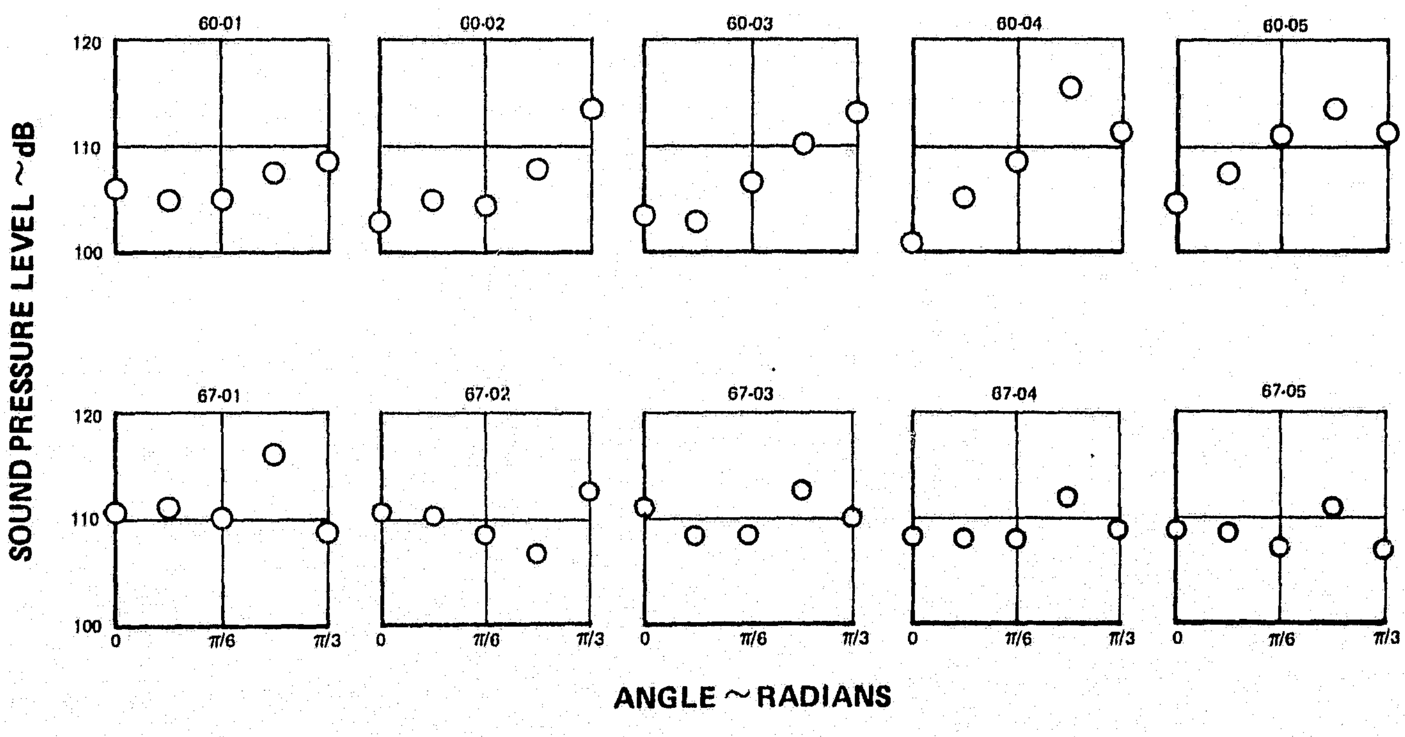

Figure 18 *Blade Passage Frequency Noise*

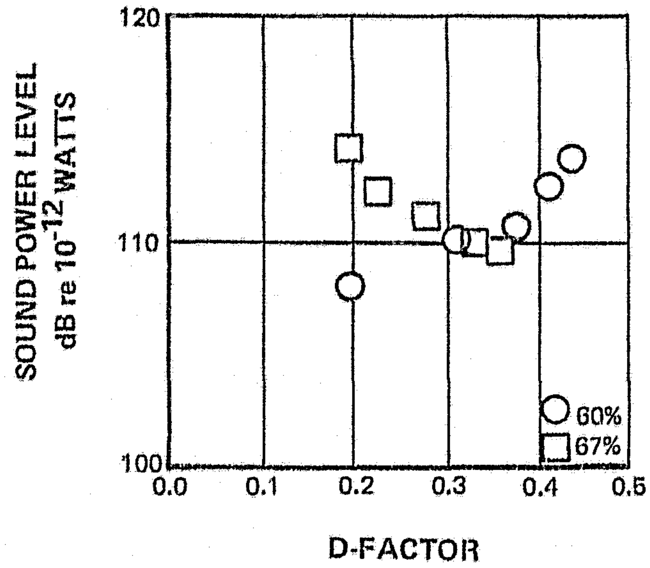

Figure 19
Blade Passage Frequency Noise
Versus D-Factor

The blade passage frequency noise is usually ascribed to interaction of the viscous wakes of the blades with the vanes. However, it is also caused by the interaction of blades with turbulence (an essential accompaniment to the broadband mechanism mentioned above) so that turbulence intensity and the condition of the wall boundary layer may influence its level.

Combination Tone Noise

The combination tone noise data for each supersonic operating point was taken to be the overall sound pressure level in the frequency band between 1KHz and 9 KHz. This data is shown in Figure 20 as a function of microphone angle. Since no combination tone noise was observed in the plenum at the lower speed, only the conditions along the 67 percent speed line are represented.

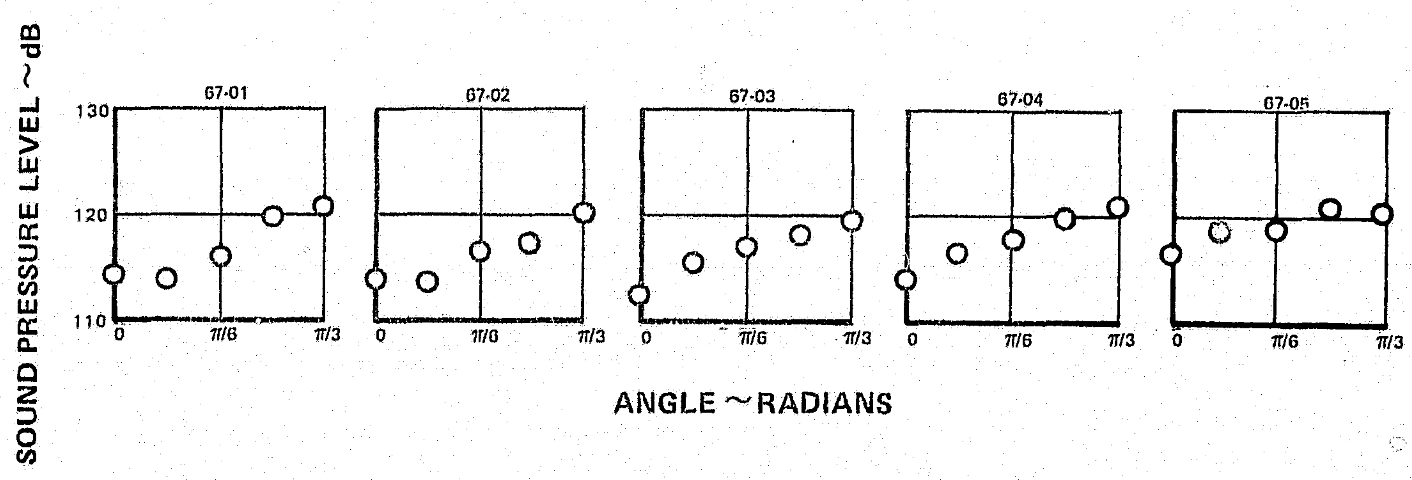

Figure 20 *Combination Tone Noise*

The combination tone noise is the result of individual differences between blade passages which result in lack of uniform spacing and strength of the decayed shock system upstream of the rotor (Reference 3). Proper physical interpretation requires use of the auxiliary wall pressure fluctuations and schlieren measurements made in the non-contractual studies.

To check the dependence of combination tone noise on operating point the sound pressure level was reduced to sound power level and plotted versus total pressure ratio as shown in Figure 21. The slight upward trend is not really significant. The combination tone level is essentially constant throughout.

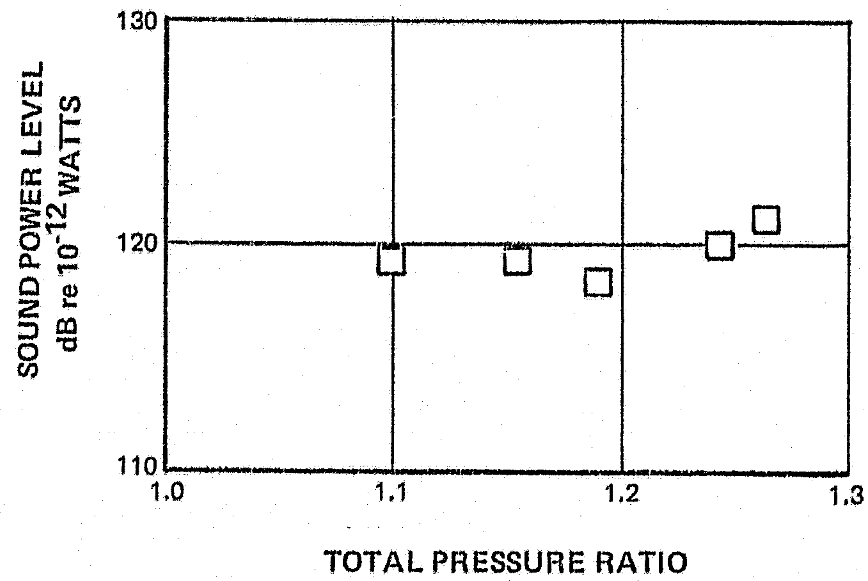

Figure 21
Combination Tone Noise
Versus Total Pressure Ratio
(67% Speed)

"Haystack" Noise

The "haystack" noise, observed occasionally during engine and fan rig tests, is not yet understood, and the mechanism is merely speculative. It was identified in Figure 7 as the hump in the spectrum at frequencies around 12 KHz. A possible aerodynamic mechanism producing the haystack noise is the interaction between turbulent eddies in the wall boundary layer and the rotating blades. If the wall boundary layer is in the transitional range between laminar and turbulent, the turbulent eddies are just forming and will provide a peaked spectrum in contrast to the normal spectrum of a fully turbulent layer. The maximum in the energy spectrum for transitional boundary layers occurs at a frequency proportional to the stream velocity divided by the boundary layer thickness; the coefficient of proportionality is the Strouhal number, ranging from 0.5 to 1.0 (see page 469 of Reference 4).

If the boundary layer oscillations which develop into turbulent eddies are sufficiently coherent circumferentially (transverse to their direction of propagation), the eddies will also be coherent. This frequency, with which each blade encounters an eddy, will thus correspond to the Strouhal frequency. The unsteady lift on each blade resulting from this interaction will, in turn, result in noise emitted from the blades, which contains a spectral peak at the Strouhal frequency.

This mechanism suggests a correlation with D-factor and with wall boundary layer condition. No modifications to the wall boundary layers were made and no traverses were taken, since this was beyond the scope of the present contract.

Figure 22 shows the experimental variation in the peak or mean frequency of the hump versus axial velocity entering the compressor. It may be seen that the frequency is directly proportional to upstream velocity. This agrees with the hypothesis outlined above if the upstream duct boundary layer thickness remains constant. With a theoretically calculated boundary layer thickness of about .0046 meter, a Strouhal number of 0.5 will give the straight line shown in Figure 22. In actuality, the boundary layer thickness varies slightly with the stream velocity, so the straight line shown is not a precise representation of constant Strouhal number. Qualitatively, however, it may be concluded that the eddy-blade interaction phenomenon may indeed be responsible for the observed hump in the spectra.

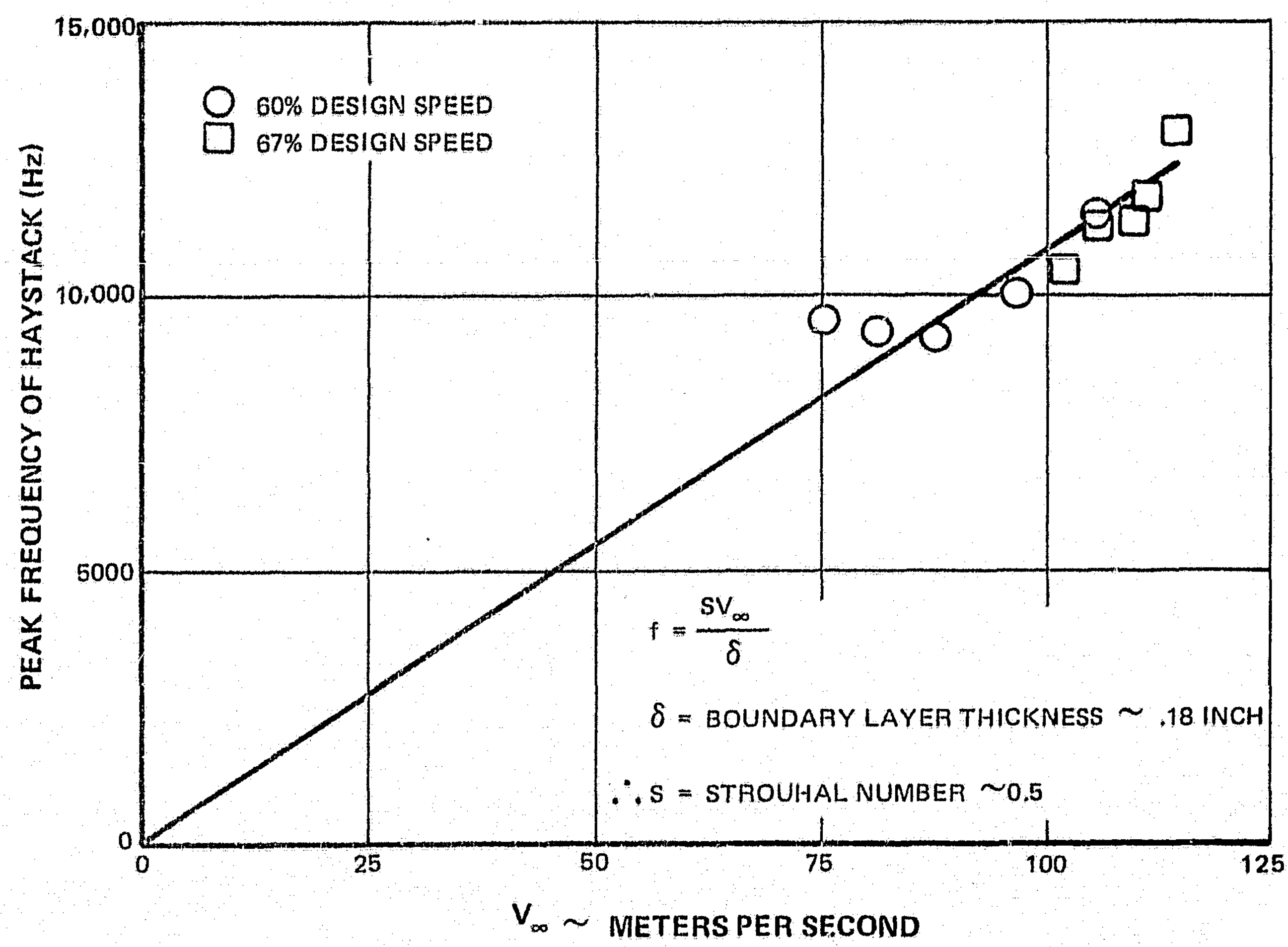

Figure 22 Haystack Noise Peak Frequency Versus Axial Velocity

Figures 23 and 24 show that, as the blade loading increases, the haystack noise also increases. An explanation for this (which is consistent with the eddy-blade interaction concept discussed above) is that increased blade loading is accompanied by a higher blade angle of attack. Thus, for the high-loading case, the eddies enter the rotor with a fairly large component normal to the blade, resulting in higher lift fluctuations and more noise.

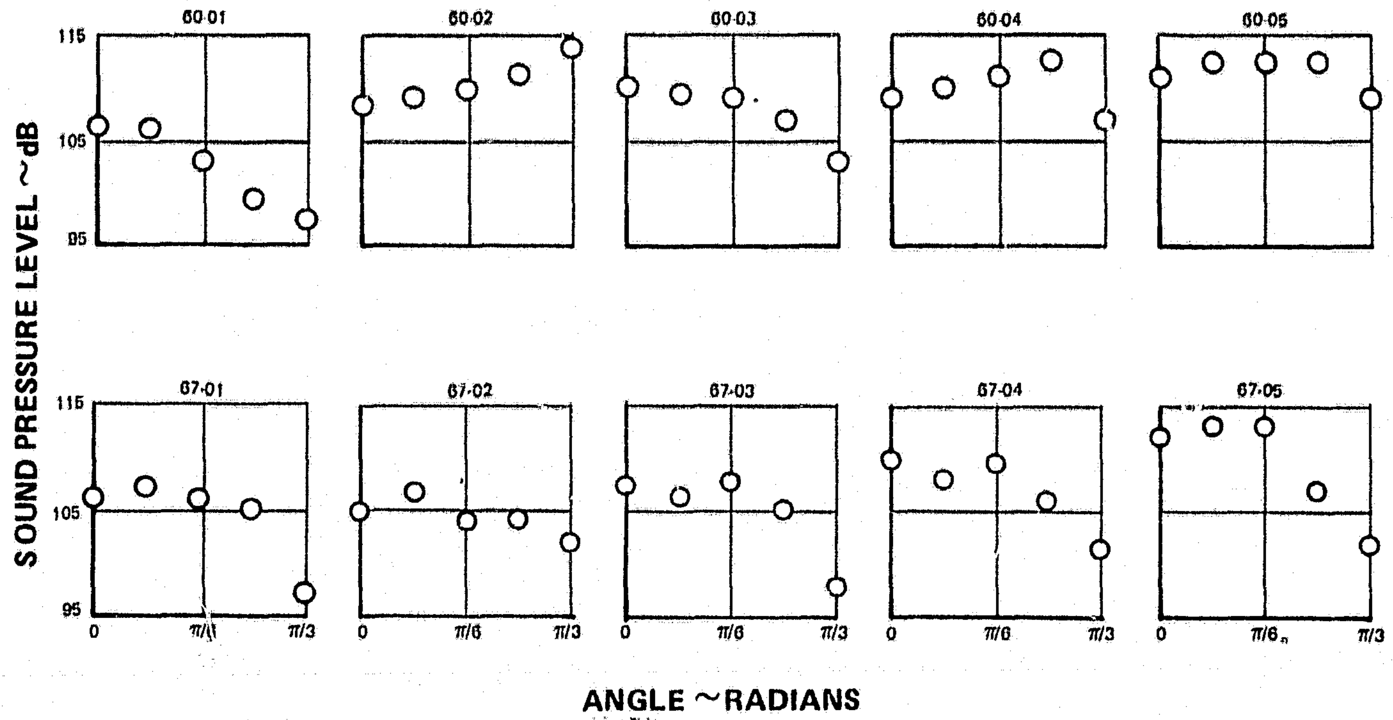

Figure 23 Haystack Noise

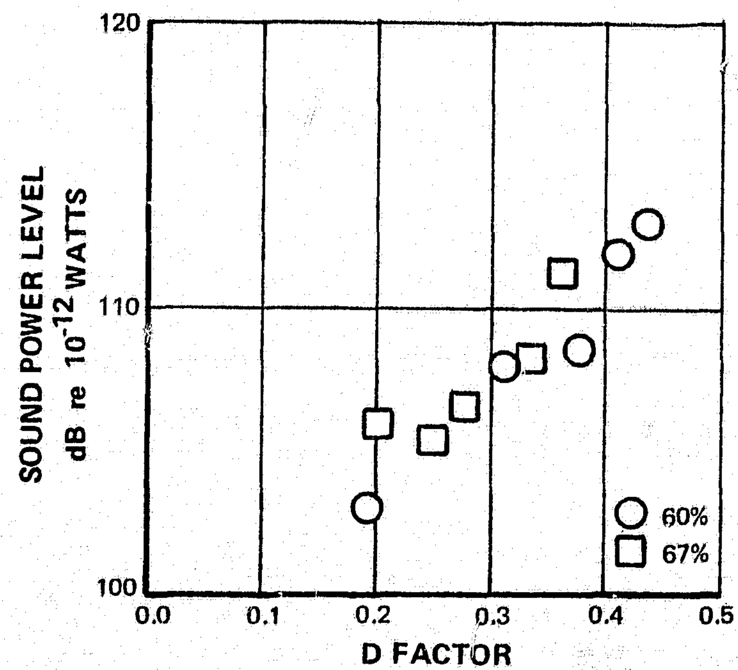

Figure 24
Haystack Noise Versus D Factor

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

1. The test vehicle showed satisfactory uniformity of aerodynamic conditions, and the plenum spectra exhibited the same acoustic phenomena as engines or test fans. Schlieren and fluctuating wall pressure measurements were successful and constituted valuable adjuncts to the plenum microphones in the interpretation of both acoustic and aerodynamic data.

2. Compressor broadband noise which forms the continuous base of the acoustic spectrum can arise from a variety of sources. From the completed exploratory program, it is only possible to draw some general conclusions and to hypothesize on the possible noise mechanisms.

   Broadband noise correlated well with blade loading as measured by D factor. Prominent among the mechanisms which depend on blade loading is unsteady blade lift associated with fluctuating blade boundary layer and vortex shedding. Another loading-dependent mechanism is the tip interaction with wall boundary layers having significant streamwise velocity fluctuations. It is difficult to determine which mechanism dominates, due to the limited testing carried out under this program.

   A mechanism involving shock-turbulence interaction was specifically examined as a possible source of broadband noise. At the relatively low supersonic speeds used here, this mechanism was found to play no discernable role in contributing to the broadband noise.

3. The blade passage frequency noise consists of a single tone and its harmonics, caused both by the propagation of the direct rotor field and by interaction of the rotating system (blades, wakes and attached shocks) with the non-rotating system (vanes, wall boundary layer, and nonuniformities of inflow). This noise increased slightly with blade loading at the lower speed but decreased at the higher speed, both variations remaining within reasonable bounds of experimental accuracy. Further exploration would be required to verify the systematic nature of these variations and to identify competing mechanisms, especially in view of the changing nature of acoustic propagation in the duct at near-sonic tip speeds.

4. The multiple harmonics of rotational frequency which appear in the noise spectrum at supersonic fan tip speeds are referred to as combination tone noise. These are ascribed to the deviations of individual blades from complete uniformity. In the present tests, these multiple harmonics were present in the duct pressure fluctuations at both speeds but appeared in the plenum noise spectra only at the higher speed. No significant change with operating conditions was evident.

5. A broad peak at 10-12 KHz was observed in the plenum spectra and termed "haystack" noise. Its amplitude increased with blade loading and speed, and its frequency increased proportionally with inlet velocity. This peak has also been observed in noise spectra of certain engines and test fans. A hypothesis is presented, ascribing this noise to rotor blade interaction with the wall boundary layer.

B. RECOMMENDATIONS

This test compressor provides a unique capability to explore aerodynamic noise mechanisms characteristic of engine and fan operation. This uniqueness lies in the spanwise uniformity of aerodynamic conditions even in the off-design operation, in the simplicity of the constant-annulus passage upstream and downstream of the rotor, and in the availability of optical and unsteady pressure instrumentation to supplement plenum noise measurements and steady performance data. Future programs should cover a much greater speed range than the one reported here and should exploit the capabilities for making these additional revealing measurements. Suggested specific topics for investigation include:

1. Modification of inlet boundary layer turbulence and its effect on reducing the "haystack" noise.

2. Exploration of the effects of inlet distortion and turbulence, and boundary layer modifications upon compressor broadband noise. Boundary layer suction is a design feature of the compressor.

3. Studies of the propagation of the blade-attached shock field causing combination tone noise in an essentially two-dimensional duct.

VI. REFERENCES

1. Arnoldi, R. A., *Aerodynamic Broadband Noise Mechanisms Applicable to Axial Compressors,* NASA CR-1743, March 1971.

2. Burdsall, E. A., Urban, R. H., *Fan-Compressor Noise: Prediction, Research and Reduction Studies,* Final Report FAA-RD-71-73, February 1971.

3. Pickett, G. F., *The Prediction of the Spectral Content of Combination Tone Noise,* AIAA Paper No. 71-730, June 14-18, 1971.

4. Schlichting, H., *Boundary Layer Theory,* 4th Edition, McGraw-Hill Book Company, 1960.

VII APPENDICES

APPENDIX 1
PERFORMANCE PARAMETERS

APPENDIX 1

PERFORMANCE PARAMETERS

a) Relative total temperature

$$T'_7 = t_7 \left[1 + \frac{\gamma - 1}{2} (M'_7)^2 \right]$$ (rotor in)

$$T'_8 = T'_7 + \left[\frac{(\omega r_7)^2 - (\omega r_8)^2}{\frac{2\gamma}{\gamma - 1} R g_c} \right]$$ (rotor out)

b) Incidence angle based on mean camber line

$$i_m = \beta'_7 - \beta'^*_7$$ (rotor)

$$i_m = \beta_{10} - \beta^*_{10}$$ (stator)

c) Deviation

$$\delta^\circ = \beta'_8 - \beta'^*_8$$ (rotor

$$\delta^\circ = \beta_{11} - \beta^*_{11}$$ (stator)

d) Diffusion factor

$$D = 1 - \frac{V'_8}{V'_7} + \frac{r_8 V_{\theta 8} - r_7 V_{\theta 7}}{(r_7 + r_8) \sigma V'_7}$$ (rotor)

$$D = 1 - \frac{V_{11}}{V_{10}} + \frac{r_{10} V_{\theta 10} - r_{11} V_{\theta 11}}{(r_{10} + r_{11}) \sigma V_{10}}$$ (stator)

e) Loss coefficient

$$\bar{\omega} = \frac{P'_7 \left[\frac{T'_8}{T'_7}\right]^{\frac{\gamma}{\gamma - 1}} - P'_8}{P'_7 - p_7} \qquad \text{(rotor)}$$

$$\bar{\omega} = \frac{P_{10} - P_{11}}{P_{10} - p_{10}} \qquad \text{(stator)}$$

f) Loss parameter

$$\frac{\bar{\omega} \cos \beta'_8}{2\sigma} \qquad \text{(rotor)}$$

$$\frac{\bar{\omega} \cos \beta_{11}}{2\sigma} \qquad \text{(stator)}$$

g) Polytropic efficiency

1) $$\eta_p = \frac{\frac{\gamma - 1}{\gamma} \ln \left[\frac{P_8}{P_7}\right]}{\ln \left[\frac{T_8}{T_0}\right]} \qquad \text{(rotor)}$$

2) $$\eta_p = \frac{\frac{\gamma - 1}{\gamma} \ln \left[\frac{p_{11}}{p_{10}}\right]}{\ln \left[\frac{t_{11}}{t_{10}}\right]} \qquad \text{(stator)}$$

h) Adiabatic efficiency

$$\eta_{ad} = \frac{\left[\dfrac{P_8}{P_7}\right]^{\frac{\gamma - 1}{\gamma}} - 1}{\left[\dfrac{T_{11}}{T_0}\right] - 1} \qquad \text{(rotor)}$$

$$\eta_{ad} = \frac{\left[\dfrac{P_{11}}{P_7}\right]^{\frac{\gamma - 1}{\gamma}} - 1}{\left[\dfrac{T_{11}}{T_0}\right] - 1} \qquad \text{(stator)}$$

APPENDIX 2
SYMBOLS

APPENDIX 2

SYMBOLS

A	–	area, m^2 (ft^2)
c	–	chord length, m (in)
D	–	diffusion factor
dB	–	decibel
f	–	frequency, Hz
g_c	–	conversion factor, $\frac{Kg - m}{N - sec^2}$ $(32.17 \frac{lbs\ ft}{lb\ sec^2})$
i_m	–	incidence angle, angle between inlet air direction and line tangent to blade mean camber line at leading edge, radians (degrees)
i_s	–	incidence angle, angle between inlet air direction and line tangent to blade suction surface at leading edge, radians (degrees)
M	–	Mach number
N	–	rotor speed, rpm – also Newton, Kg - m/sec^2
P	–	total pressure, N/sqm (psf)
Δ P	–	pressure rise $(P_{11}/P_o - 1)$
p	–	static pressure, N/sqm (psf)
r	–	radius, m (in)
R	–	gas constant for air, $\frac{N - m}{kg}$ °K $(\frac{ft - lb}{lbm}$ °R)
S	–	blade spacing, m (in)
SPL	–	sound pressure level (dB, 0.0002 dyne/cm^2)
T	–	total temperature, °K (°R)
t	–	static temperature, °K (°R)
t/c	–	thickness-to-chord ratio

SYMBOLS (Cont'd)

U	–	rotor speed, m/sec (ft/sec)
V	–	air velocity, m/sec (ft/sec)
Vm	–	meridional velocity $(Vr^2 + Vz^2)^{1/2}$, m/sec (ft/sec)
W	–	weight flow, Kg/sec (lbs/sec)
β	–	absolute air angle, $\cot^{-1}$ (Vm/Vθ), radians (degrees)
β'	–	relative air angle, $\cot^{-1}$ (Vm/θ'), radians (degrees)
γ	–	ratio of specific heats for air, 1.4
$\Delta\beta$	–	air turning angle, radians (degrees)
$\Delta\beta^*$	–	camber angle, radians (degrees)
δ	–	ratio of inlet total pressure to standard pressure of 1.01×10^5 N/m^2 (2116 lbs/ft^2)
δ°	–	deviation angle, angle between exit air direction and tangent to blade mean camber line at trailing edge, radians (degrees)
ϵ	–	angle between tangent to streamline projected on meridional plane and axial direction, radians (degrees)
η	–	efficiency, %
θ	–	ratio of inlet total temperature to standard temperature of 288.2°K (518.6°R)
ρ	–	mass density, Kg - sec^2/m^4 (lb-sec^2/ft^4)
σ	–	solidity, ratio of chord to spacing
ϖ	–	total pressure loss coefficient
ω	–	angular velocity of rotor, radians/sec

Superscripts:

'	–	relative to moving blades
*	–	designates blade metal angle

SYMBOLS (Cont'd)

Subscripts:

ad	–	adiabatic
p	–	polytropic or profile
r	–	radial direction
m	–	meridional direction (in z-r plane)
sh	–	shock
ss	–	suction surface
z	–	axial direction
θ	–	tangential direction
0	–	plenum chamber
7	–	station at rotor leading edge
8	–	station at rotor trailing edge
10	–	station at stator leading edge
11	–	station at stator trailing edge
12	–	instrument plane downstream of stator

APPENDIX 3
BLADE ELEMENT AND OVERALL AERODYNAMIC PERFORMANCE

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APPENDIX 3

BLADE-ELEMENT AND OVERALL AERODYNAMIC PERFORMANCE

TABLE 3-I
IDENTIFICATION OF BLADE-ELEMENT AND OVERALL PERFORMANCE TABLE HEADINGS

Span Diameters

Percent Span	Rotor Leading Edge		Rotor Trailing Edge		Stator Leading Edge		Stator Trailing Edge	
	meters	inches	meters	inches	meters	inches	meters	inches
5	0.5834	(22.97)	0.5852	(23.04)	0.5852	(23.04)	0.5852	(23.04)
10	0.5870	(23.11)	0.5887	(23.18)	0.5887	(23.18)	0.5887	(23.18)
15	0.5908	(23.26)	0.5921	(23.31)	0.5921	(23.31)	0.5921	(23.31)
30	0.6019	(23.70)	0.6027	(23.73)	0.6027	(23.73)	0.6027	(23.73)
50	0.6167	(24.28)	0.6167	(24.28)	0.6167	(24.28)	0.6167	(24.28)
70	0.6317	(24.87)	0.6309	(24.84)	0.6309	(24.84)	0.6309	(24.84)
85	0.6429	(25.31)	0.6414	(25.25)	0.6414	(25.25)	0.6414	(25.25)
90	0.6467	(25.46)	0.6449	(25.39)	0.6449	(25.39)	0.6449	(25.39)
95	0.6502	(25.60)	0.6485	(25.53)	0.6485	(25.53)	0.6485	(25.53)

TABLE 3-I (Cont'd)
IDENTIFICATION OF BLADE-ELEMENT AND OVERALL PERFORMANCE TABLE HEADINGS, SI UNITS

ROTOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
	ψ_7	ψ_8	V_7	V_8	V_{M7}	V_{M8}	$V_{\theta 7}$	$V_{\theta 8}$	β_7	β_8	M_7	M_8	U_7	U_8	M'_7	M'_8	V'_7	V'_8
5																		
10																		
15																		
30																		
50																		
70																		
85																		
90																		
95																		

%SPAN	INCS RADIAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	EFF-P TOT-ST	EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
	i_{s7}	i_{M7}	δ°_8	$\Delta\beta$	$\rho_7 V_{M7}$	$\rho_8 V_{M8}$	D	$\overline{\omega}_{SH}$	$\overline{\omega}$	$\frac{\overline{\omega}\cos\beta'_8}{2\sigma}$	$\frac{(\overline{\omega}-\overline{\omega}_{SH})\cos\beta'_9}{2\sigma}$	$\frac{P_8}{P_7}$	η_p	η_{AD}	β'_7	β'_8	$V'_{\theta 7}$	$V'_{\theta 8}$
5																		
10																		
15																		
30																		
50																		
70																		
85																		
90																		
95																		

TT/TT INLET	PT/PT INLET	EFF-A TOTAL	EFF-P TOTAL
$\frac{T_8}{T_0}$	$\frac{P_8}{P_0}$	η_{AD}	η_P

STATOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
	ψ_{10}	ψ_{11}	V_{10}	V_{11}	V_{M10}	V_{M11}	$V_{\theta 10}$	$V_{\theta 11}$	β_{10}	β_{11}	M_{10}	M_{11}	U_8	U_9	M'_{10}	M'_{11}	V'_{10}	V'_{11}
5																		
10																		
15																		
30																		
50																		
70																		
85																		
90																		
95																		

%SPAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	EFF-P TOT-ST	EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
	i_{M10}	δ°_{11}	$\Delta\beta$	$\rho_{10} V_{M10}$	$\rho_{11} V_{M11}$	D	$\overline{\omega}_{SH}$	$\overline{\omega}$	$\frac{\overline{\omega}\cos\beta'_{11}}{2\sigma}$	$\frac{(\overline{\omega}-\overline{\omega}_{SH})\cos\beta'_{11}}{2\sigma}$	$\frac{P_{11}}{P_{10}}$	η_p	η_{AD}	β'_{10}	β'_{11}	$V'_{\theta 10}$	$V'_{\theta 10}$
5																	
10																	
15																	
30																	
50																	
70																	
85																	
90																	
95																	

NCORR INLET RAD/SEC	WCORR INLET KG/SEC	TT/TT INLET	PT/PT INLET	EFF-A TOTAL CUM	EFF-P TOTAL CUM	WC/A1 KG/SEC SQM	PT/PT LOCAL
$\frac{N}{\sqrt{\theta}}$	$\frac{\omega\sqrt{\theta}}{\delta}$	$\frac{T_{11}}{T_0}$	$\frac{P_{11}}{P_0}$	η_{AD}	η_p	$\frac{\omega\sqrt{\theta}}{\delta A_{AN}}$	$\frac{P_{11}}{P_{10}}$

TABLE 3-I (Cont'd)
IDENTIFICATION OF BLADE-ELEMENT AND OVERALL PERFORMANCE TABLE HEADINGS, ENGLISH UNITS

ROTOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5																		
10																		
15																		
30	ψ_7	ψ_8	V_7	V_8	V_{M7}	V_{M8}	$V_{\theta 7}$	$V_{\theta 8}$	β_7	β_8	M_7	M_8	U_7	U_8	M'_7	M'_8	V'_7	V'_8
50																		
70																		
85																		
90																		
95																		

%SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	SEFF-P TOT-ST	SEFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5																		
10																		
15																		
30	i_{s7}	i_{M7}	δ°_8	$\Delta\beta$	$\rho_7 V_{M7}$	$\rho_8 V_{M8}$	D	$\bar{\omega}_{SH}$	$\bar{\omega}$	$\frac{\bar{\omega}\cos\beta'_8}{2\sigma}$	$\frac{(\bar{\omega}-\bar{\omega}_{SH})\cos\beta'_9}{2\sigma}$	$\frac{P_8}{P_7}$	η_p	η_{AD}	β_7	β_8	$V'_{\theta 7}$	$V'_{\theta 8}$
50																		
70																		
85																		
90																		
95																		

TT/TT INLET	PT/PT INLET	SEFF-A TOTAL	SEFF-P TOTAL
$\frac{T_8}{T_0}$	$\frac{P_8}{P_0}$	η_{AD}	η_P

STATOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5																		
10																		
15																		
30	ψ_{10}	ψ_{11}	V_{10}	V_{11}	V_{M10}	V_{M11}	$V_{\theta 10}$	$V_{\theta 11}$	β_{10}	β_{11}	M_{10}	M_{11}	U_8	U_9	M'_{10}	M'_{11}	V'_{10}	V'_{11}
50																		
70																		
85																		
90																		
95																		

%SPAN	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	SEFF-P TOT-ST	SEFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5																	
10																	
15																	
30	i_{M10}	δ°_{11}	$\Delta\beta$	$\rho_{10} V_{M10}$	$\rho_{11} V_{M11}$	D	$\bar{\omega}_{SH}$	$\bar{\omega}$	$\frac{\bar{\omega}\cos\beta'_{11}}{2\sigma}$	$\frac{(\bar{\omega}-\bar{\omega}_{SH})\cos\beta'_{11}}{2\sigma}$	$\frac{P_{11}}{P_{10}}$	η_p	η_{AD}	β_{10}	β_{11}	$V'_{\theta 10}$	$V'_{\theta 11}$
50																	
70																	
85																	
90																	
95																	

NCORR INLET RPM	WCORR INLET LBM/SEC	TT/TT INLET	PT/PT INLET	SEFF-A TOTAL CUM	SEFF-P TOTAL CUM	WC1/A1 LBM/SEC SQFT	PT/PT LOCAL
$\frac{N}{\sqrt{\theta}}$	$\frac{\omega\sqrt{\theta}}{\delta}$	$\frac{T_{11}}{T_0}$	$\frac{P_{11}}{P_0}$	η_{AD}	η_p	$\frac{\omega\sqrt{\theta}}{\delta A_{AN}}$	$\frac{P_{11}}{P_{10}}$

TABLE 3-II
BLADE-ELEMENT AND OVERALL PERFORMANCE
60 PERCENT SPEED, POINT NUMBER 01, SI UNITS

ROTOR

SL %SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	.0470	.0262	103.0	124.3	103.0	94.9	.0	80.1	.0000	.7012	.3067	.3569	291.6	292.5	.9205	.6682	309.2	232.6
10	.0497	.0294	103.4	124.8	103.4	98.1	.0	77.0	.0000	.6653	.3078	.3589	293.4	294.2	.9262	.6857	311.1	238.4
15	.0475	.0301	103.8	125.6	103.8	103.3	.0	70.8	.0000	.6018	.3091	.3625	295.3	296.0	.9319	.7147	313.0	247.7
30	.0307	.0219	105.1	126.7	105.1	115.6	.0	51.7	.0000	.4201	.3131	.3688	300.9	301.2	.9491	.8009	318.7	275.1
50	-.0051	-.0016	106.0	124.7	106.0	117.3	.0	42.2	.0000	.3451	.3156	.3643	308.3	308.3	.9710	.8499	326.0	290.8
70	-.0453	-.0286	105.5	122.6	105.5	115.2	.0	42.2	.0000	.3513	.3141	.3581	315.8	315.3	.9914	.8653	332.9	296.3
85	-.0710	-.0430	104.4	113.7	104.4	105.5	.0	42.6	.0000	.3846	.3108	.3314	321.3	320.5	1.0060	.8661	337.9	297.3
90	-.0767	-.0453	104.0	109.2	104.0	100.6	.0	42.6	.0000	.4004	.3095	.3179	323.2	322.3	1.0108	.8650	339.5	297.2
95	-.0789	-.0443	103.6	108.3	103.6	99.7	.0	42.2	.0000	.4004	.3085	.3151	325.1	324.0	1.0157	.8699	341.2	298.9

%SPAN	INCS RADIAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.0820	.1268	.0917	.0803	23.53	21.42	.3243	.0000	.4122	.0000	.0497	1.0866	30.28	29.43	1.2312	1.1509	-291.6	-212.4
10	.0836	.1278	.0829	.0854	23.60	22.24	.3074	.0000	.3877	.0000	.0474	1.0889	32.05	31.19	1.2321	1.1467	-293.4	-217.3
15	.0843	.1280	.0722	.0917	23.69	23.57	.2764	.0000	.3909	.0000	.0425	1.0920	35.70	34.86	1.2327	1.1410	-295.3	-225.1
30	.0840	.1258	.0521	.0977	23.96	26.96	.1863	.0000	.1958	.0000	.0251	1.0988	51.04	50.34	1.2346	1.1370	-300.9	-249.6
50	.0803	.1145	.0461	.0842	24.19	27.61	.1489	.0000	.1303	.0000	.0164	1.0982	60.43	59.87	1.2397	1.1556	-308.3	-266.1
70	.0750	.0993	.0310	.0767	24.03	27.01	.1501	~~.0000~~	.1433	.0000	.0177	~~1.0929~~	~~56.04~~	55.46	~~1.2484~~	1.1717	-315.8	-273.1
85	.0680	.0857	.0466	.0485	23.81	24.54	.1607	.0000	.1784	.0000	.0205	1.0768	45.08	44.49	1.2567	1.2082	-321.3	-277.9
90	.0640	.0801	.0595	.0340	23.72	23.34	.1652	.0000	.1924	.0000	.0212	1.0682	40.39	39.83	1.2596	1.2256	-323.2	-279.7
95	.0592	.0727	.0593	.0315	23.65	23.10	.1641	.0000	.1945	.0000	.0212	1.0658	39.12	38.57	1.2622	1.2307	-325.1	-281.8

TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.0536	1.0899	46.46	47.14

STATOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	-.0078	-.0050	122.8	114.5	92.9	114.5	80.1	.0	.7119	.0000	.3527	.3282	292.5	292.5	.6657	.9006	231.8	319.1
10	-.0171	-.0097	123.9	116.4	96.9	116.4	77.0	.0	.6719	.0000	.3562	.3343	294.2	294.2	.6890	.9089	237.9	316.9
15	-.0230	-.0117	125.3	118.6	102.7	118.6	71.0	.0	.6058	.0000	.3614	.3420	296.0	296.0	.7135	.9196	247.3	318.9
30	-.0275	-.0129	128.1	122.8	117.2	122.8	51.7	.0	.4153	.0000	.3731	.3573	301.3	301.3	.8031	.9470	275.7	325.3
50	-.0210	-.0091	126.9	123.2	117.8	123.2	42.1	.0	.3379	.0000	.3712	.3601	308.3	308.3	.8537	.9703	291.9	332.0
70	-.0129	-.0046	123.1	119.8	~~115.6~~	~~119.8~~	~~42.2~~	~~.0~~	~~.3502~~	~~.0000~~	~~.3595~~	~~.3497~~	~~315.3~~	~~315.3~~	~~.8660~~	~~.9899~~	~~294.6~~	337.3
85	-.0085	-.0019	110.9	107.5	102.4	107.5	42.6	-.0	.3954	-.0000	.3230	.3129	320.6	320.6	.8627	.9891	296.3	338.2
90	-.0071	-.0011	105.6	102.0	96.6	102.0	42.6	-.0	.4198	-.0000	.3071	.2963	322.3	322.3	.8609	.9827	296.0	338.1
95	-.0054	-.0002	103.6	99.8	94.6	99.8	42.2	-.0	.4197	-.0000	.3012	.2901	324.1	324.1	.8696	.9854	297.9	339.1

%SPAN	INCH RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	-.0172	.1047	.7119	21.00	26.02	.3101	.0000	.0343	.0000	.0127	.9972	.00	.00	1.1587	1.1978	-212.4	-292.5
10	-.0501	.1007	.6719	21.97	26.55	.2923	.0000	.0267	.0000	.0100	.9978	.00	.00	1.1519	1.1991	-217.2	-294.2
15	-.1079	.0788	.6058	23.49	27.25	.2664	.0000	.0221	.0000	.0083	.9981	.00	.00	1.1429	1.1898	-225.0	-296.0
30	-.2732	.0958	.4153	27.28	28.72	.1960	.0000	.0250	.0000	.0095	.9977	.00	.00	1.1319	1.1839	-249.6	-301.3
50	-.3343	.0957	.3379	28.13	29.00	.1591	.0000	.0231	.0000	.0090	.9979	.00	.00	1.1480	1.1906	-266.2	-308.3
70	-.3206	.0984	.3502	27.10	28.09	.1639	.0000	.0367	.0000	.0147	.9969	~~.00~~	.00	1.1702	1.2076	-273.1	-315.3
85	-.2901	.1103	.3959	23.88	25.05	.1869	.0000	.0574	.0000	.0233	.9960	.00	.00	1.2179	1.2472	-278.0	-320.6
90	-.2798	.1171	.4148	22.49	23.70	.1992	.0000	.0706	.0000	.0289	.9955	.00	.00	1.2382	1.2644	-279.8	-322.3
95	-.2906	.1261	.4197	22.01	23.19	.2036	.0000	.0791	.0000	.0325	.9952	.00	.00	1.2470	1.2720	-281.9	-324.1

NCORR INLET RAD/SEC	WCORR INLET KG/SEC	TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC1/A1 KG/SEC SQM	PT/PT LOCAL
1003.51	8.473	1.0536	1.0868	44.87	45.54	117.99	.9971

TABLE 3-II (Cont'd)
BLADE-ELEMENT AND OVERALL PERFORMANCE
60 PERCENT SPEED, POINT NUMBER 01, ENGLISH UNITS

ROTOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	2.691	1.500	338.0	407.7	338.0	311.3	.0	262.7	.00	40.18	.3067	.3569	956.6	959.6	.9205	.6682	1014.6	763.2
10	2.850	1.686	339.2	409.4	339.2	321.9	.0	252.5	.00	38.12	.3078	.3589	962.7	965.3	.9262	.6857	1020.7	782.1
15	2.719	1.727	340.6	412.2	340.6	338.8	.0	232.4	.00	34.98	.3091	.3625	968.8	971.1	.9319	.7147	1027.0	812.7
30	1.758	1.255	344.9	415.6	344.9	379.3	.0	169.5	.00	24.07	.3131	.3688	987.1	988.3	.9491	.8009	1045.6	902.9
50	-.291	-.091	347.7	409.0	347.7	384.8	.0	138.4	.00	19.77	.3156	.3693	1011.5	1011.3	.9710	.8499	1069.6	954.0
70	-2.594	-1.640	346.0	402.4	346.0	377.8	.0	138.5	.00	20.13	.3141	.3581	1035.9	1034.3	.9914	.8653	1092.2	972.3
85	-4.067	-2.462	342.5	373.2	342.5	346.0	.0	139.7	.00	22.03	.3108	.3314	1054.2	1051.6	1.0060	.8661	1108.5	975.4
90	-4.393	-2.593	341.1	358.3	341.1	330.0	.0	139.7	.00	22.94	.3095	.3179	1060.3	1057.3	1.0108	.8650	1113.9	975.2
95	-4.522	-2.539	339.9	355.2	339.9	327.1	.0	138.5	.00	22.94	.3085	.3151	1066.4	1063.0	1.0157	.8699	1119.3	980.7

%SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	SEFF-P TOT-ST	SEFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	4.70	7.27	5.25	4.60	23.53	21.42	.3243	.0000	.4122	.0000	.0497	1.0866	30.28	29.43	70.54	65.94	-956.6	-696.9
10	4.79	7.32	4.75	4.89	23.60	22.24	.3074	.0000	.3877	.0000	.0474	1.0889	32.05	31.19	70.59	65.70	-962.7	-712.8
15	4.83	7.33	4.14	5.25	23.69	23.57	.2764	.0000	.3409	.0000	.0425	1.0920	35.70	34.86	70.63	65.37	-968.8	-738.6
30	4.81	7.21	2.98	5.60	23.96	26.96	.1863	.0000	.1958	.0000	.0261	1.0988	51.04	50.34	70.74	65.14	-987.1	-818.9
50	4.60	6.56	2.64	4.82	24.14	27.61	.1484	.0000	.1203	.0000	.0164	1.0982	60.43	59.87	71.03	66.21	-1011.5	-873.0
70	4.30	5.62	1.78	4.40	24.03	27.01	.1501	.0000	.1433	.0000	.0177	1.0929	56.09	55.45	71.53	67.13	-1035.9	-895.8
85	3.90	4.91	2.67	2.78	23.81	24.54	.1607	.0000	.1784	.0000	.0205	1.0761	45.08	44.49	72.00	69.22	-1054.2	-911.8
90	3.67	4.59	3.41	1.95	23.72	23.34	.1652	.0000	.1924	.0000	.0212	1.0682	40.39	39.83	72.17	70.22	-1060.3	-917.6
95	3.39	4.17	3.39	1.81	23.65	23.10	.1641	.0000	.1945	.0000	.0212	1.0658	39.12	38.57	72.32	70.51	-1066.4	-924.6

TT/TT INLET	PT/PT INLET	SEFF-A TOTAL CUM	SEFF-P TOTAL CUM
1.0636	1.0899	46.46	47.14

STATOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	-.446	-.286	402.9	375.5	304.9	375.5	262.8	.0	40.79	.00	.3527	.3282	959.6	959.6	.6657	.9006	760.6	1030.5
10	-.977	-.555	406.3	381.9	317.9	381.9	262.7	.0	38.50	.00	.3562	.3343	965.4	965.4	.6840	.9089	780.4	1038.2
15	-1.315	-.671	411.0	389.0	337.0	389.0	233.0	.0	34.71	.00	.3614	.3420	971.1	971.1	.7135	.9196	811.5	1046.1
30	-1.573	-.741	420.4	402.7	384.4	402.7	169.5	.0	23.80	.00	.3731	.3573	988.4	988.4	.8031	.9470	904.6	1067.3
50	-1.200	-.523	416.5	404.2	392.9	404.2	138.1	.0	19.36	.00	.3712	.3601	1011.4	1011.4	.8537	.9703	957.7	1089.2
70	-.737	-.262	403.9	393.1	379.4	393.1	138.6	.0	20.07	.00	.3596	.3497	1034.5	1034.5	.8660	.9844	972.9	1106.7
85	-.486	-.111	363.9	352.7	335.9	352.7	139.3	-.0	22.66	-.00	.3230	.3129	1051.8	1051.8	.8627	.9841	972.1	1109.5
90	-.406	-.063	346.4	334.5	317.1	334.5	139.6	-.0	23.77	-.00	.3071	.2963	1057.5	1057.5	.8609	.9827	971.1	1109.2
95	-.312	-.010	339.8	327.5	310.3	327.5	138.4	-.0	24.05	-.00	.3012	.2901	1063.3	1063.3	.8646	.9854	975.6	1112.6

%SPAN	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	SEFF-P TOT-ST	SEFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	-.99	6.00	40.79	21.00	26.02	.3101	.0000	.0343	.0000	.0127	.9972	.00	.00	66.39	68.63	-696.8	-959.6
10	-2.87	5.77	38.50	21.97	26.55	.2923	.0000	.0267	.0000	.0100	.9978	.00	.00	65.97	68.42	-712.7	-965.4
15	-6.18	5.66	34.71	23.44	27.25	.2664	.0000	.0221	.0000	.0083	.9981	.00	.00	65.49	68.17	-738.2	-971.1
30	-15.66	5.49	23.80	27.28	28.72	.1960	.0000	.0250	.0000	.0095	.9977	.00	.00	64.85	67.83	-818.9	-988.4
50	-19.15	5.49	19.36	28.13	29.00	.1591	.0000	.0231	.0000	.0090	.9979	.00	.00	65.78	68.22	-873.4	-1011.4
70	-18.37	5.64	20.07	27.10	28.09	.1639	.0000	.0367	.0000	.0147	.9969	.00	.00	67.05	69.19	-895.9	-1034.5
85	-16.62	6.32	22.66	23.88	25.05	.1869	.0000	.0574	.0000	.0233	.9960	.00	.00	69.78	71.46	-912.0	-1051.8
90	-16.03	6.71	23.77	22.49	23.70	.1992	.0000	.0706	.0000	.0289	.9955	.00	.00	70.94	72.45	-917.9	-1057.5
95	-16.65	7.22	24.05	22.01	23.19	.2036	.0000	.0771	.0000	.0325	.9952	.00	.00	71.45	72.88	-924.9	-1063.3

NCORR INLET RPM	WCORR INLET LBM/SEC	TT/TT INLET	PT/PT INLET	SEFF-A TOTAL CUM	SEFF-P TOTAL CUM	WC1/A1 LBM/SEC SQFT	PT/PT LOCAL
9583.	18.68	1.0536	1.0868	44.87	45.54	24.17	.9971

TABLE 3-III
BLADE-ELEMENT AND OVERALL PERFORMANCE
60 PERCENT SPEED, POINT NUMBER 02, SI UNITS

ROTOR

SA METRIC (SPECIAL)

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	.0521	.0290	91.6	125.6	91.6	75.1	.0	100.6	.0000	.9292	.2722	.3574	291.6	292.5	.9081	.5864	305.7	206.1
10	.0599	.0350	92.0	125.2	92.0	76.4	.0	99.2	.0000	.9146	.2732	.3562	293.5	294.3	.9138	.5963	307.6	209.5
15	.0631	.0398	92.5	124.8	92.5	78.8	.0	96.7	.0000	.8875	.2747	.3556	295.4	296.0	.9195	.6104	309.5	214.3
30	.0592	.0432	94.2	125.2	94.2	92.0	.0	84.7	.0000	.7440	.2800	.3583	300.9	301.3	.9372	.6739	315.3	235.4
50	.0236	.0229	96.3	127.2	96.3	104.9	.0	71.9	.0000	.6008	.2862	.3663	308.4	308.3	.9605	.7449	323.1	258.6
70	-.0264	-.0134	96.9	126.2	96.9	104.0	.0	71.5	.0000	.6020	.2880	.3631	315.8	315.3	.9822	.7628	330.3	265.1
85	-.0600	-.0349	96.3	119.8	96.3	95.8	.0	72.0	.0000	.6448	.2863	.3490	321.9	320.6	.9975	.7651	335.5	266.5
90	-.0683	-.0393	96.0	116.5	96.0	91.7	.0	71.9	.0000	.6648	.2854	.3392	323.3	322.3	1.0025	.7652	337.2	266.7
95	-.0745	-.0914	95.7	116.1	95.7	91.5	.0	71.5	.0000	.6635	.2845	.3330	325.1	324.1	1.0075	.7706	338.9	268.6

%SPAN	INCS RADIAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	SEFF-P TOT-ST	SEFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.1173	.1621	.1384	.0688	21.31	18.26	.4232	.0000	.3837	.0000	.0414	1.1832	49.25	48.01	1.2669	1.1976	-291.6	-191.4
10	.1190	.1631	.1340	.0694	21.37	18.59	.4147	.0000	.3735	.0000	.0405	1.1839	49.83	48.60	1.2672	1.1978	-293.5	-195.1
15	.1194	.1631	.1261	.0727	[illegible]	19.23	.4011	.0000	.3561	.0000	.0391	1.1849	51.00	49.79	1.2674	1.1947	-295.4	-199.3
30	.1172	.1590	.0848	[illegible]	[illegible]	22.78	.3352	.0000	.2662	.0000	.0316	1.1910	58.71	57.66	1.2674	1.1694	-300.9	-216.7
50	.1089	.1430	.0438	[illegible]	[illegible]	26.40	.2687	.0000	.1642	.0000	.0207	1.2010	70.41	69.62	1.2682	1.1532	-308.4	-236.4
70	.0995	.1239	.0266	[illegible]	[illegible]	26.17	.2663	.0000	.1677	.0000	.0209	1.2009	69.26	68.42	1.2732	1.1677	-315.8	-243.9
85	.0908	.1085	.0412	[illegible]	[illegible]	23.98	.2751	.0000	.1953	.0000	.0227	1.1889	63.98	63.07	1.2797	1.2031	-321.9	-248.6
90	.0869	.1025	.0538	.0622	[illegible]	22.91	.2782	.0000	.2056	.0000	.0230	1.1828	61.85	60.91	1.2821	1.2199	-323.3	-250.5
95	.0819	.0949	.0520	.0611	[illegible]	22.83	.2761	.0000	.2065	.0000	.0230	1.1815	61.41	60.47	1.2845	1.2239	-325.1	-252.6

TT/TT INLET	PT/PT INLET	SEFF-A TOTAL CUM	SEFF-P TOTAL CUM
1.0842	1.1929	61.37	62.34

STATOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	-.0098	-.0065	122.8	87.2	70.2	87.2	100.7	.0	.9619	.0000	.3491	.2464	292.5	292.5	.5810	.8629	204.3	305.3
10	-.0211	-.0127	122.7	88.0	72.1	88.0	99.2	.0	.9425	.0000	.3490	.2488	294.3	294.3	.5915	.8687	208.0	307.2
15	-.0308	-.0164	122.7	89.7	74.8	89.7	97.2	.0	.9148	.0000	.3493	.2541	296.1	296.1	.6049	.8763	212.5	309.4
30	-.0396	-.0195	124.6	97.4	90.9	97.4	85.1	.0	.7529	.0000	.3567	.2777	301.3	301.3	.6719	.9027	234.6	316.7
50	-.0321	-.0150	129.0	107.2	107.0	107.2	72.1	.0	.5928	.0000	.3717	.3076	308.4	308.4	.7472	.9368	259.4	326.5
70	-.0203	-.0086	128.3	107.8	106.6	107.8	71.4	-.0	.5905	-.0000	.3693	.3092	315.4	315.4	.7663	.9556	266.2	333.3
85	-.0130	-.0093	120.5	97.5	96.5	97.5	71.9	.0	.6916	.0000	.3456	.2789	320.6	320.6	.7661	.9586	266.8	335.2
90	-.0109	-.0028	116.4	92.6	91.5	92.6	71.9	.0	.6656	.0000	.3338	.2647	322.4	322.4	.7652	.9584	266.7	335.4
95	-.0071	-.0010	115.2	91.7	90.4	91.7	71.5	.0	.6690	.0000	.3305	.2619	324.2	324.2	.7697	.9624	268.4	336.9

%SPAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	SEFF-P TOT-ST	SEFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.2327	.1050	.9614	17.12	21.72	.5943	.0000	.1001	.0000	.0372	.9919	.00	.00	1.2200	1.2812	-191.9	-292.5
10	.2212	.1011	.9425	17.59	21.94	.5850	.0000	.0989	.0000	.0369	.9920	.00	.00	1.2169	1.2803	-195.1	-294.3
15	.2012	.0988	.9148	18.29	22.44	.5664	.0000	.0881	.0000	.0331	.9929	.00	.00	1.2113	1.2766	-198.9	-296.1
30	.0646	.0959	.7529	22.50	24.65	.4791	.0000	.0549	.0000	.0210	.9954	.00	.00	1.1733	1.2581	-216.3	-301.3
50	-.0793	.0957	.5928	26.87	27.44	.3876	.0006	.0336	.0000	.0131	.9969	.00	.00	1.1456	1.2363	-236.3	-308.4
70	~~-.0808~~	~~.0984~~	~~.6905~~	~~26.76~~	~~27.52~~	~~.3820~~	~~.0000~~	~~.0425~~	~~.0000~~	~~.0170~~	~~.9962~~	~~.00~~	~~.00~~	~~1.1590~~	~~1.2413~~	~~-244.0~~	~~-315.3~~
85	-.0436	.1101	.6916	24.13	24.74	.4329	.0000	.0798	.0000	.0324	.9937	.00	.00	1.2008	1.2756	-248.7	-320.6
90	-.0283	.1171	.6656	22.87	23.45	.4569	.0000	.0917	.0000	.0375	.9932	.00	.00	1.2206	1.2910	-260.6	-322.4
95	-.0908	.1261	.6690	22.58	23.21	.4593	.0000	.0936	.0000	.0385	.9932	.00	.00	1.2272	1.2952	-252.7	-324.2

NCORR INLET RAD/SEC	WCORR INLET KG/SEC	TT/TT INLET	PT/PT INLET	SEFF-A TOTAL CUM	SEFF-P TOTAL CUM	WC1/A1 KG/SEC SQM	PT/PT LOCAL
1003.67	7.749	1.0842	1.1864	59.44	60.43	100.91	-.9946

TABLE 3-III (Cont'd)
BLADE-ELEMENT AND OVERALL PERFORMANCE
60 PERCENT SPEED, POINT NUMBER 02, ENGLISH UNITS

ROTOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	2.984	1.659	300.6	412.1	300.6	246.6	.0	330.1	.00	53.24	.2722	.3574	956.8	959.8	.9081	.5869	1002.9	676.2
10	3.434	2.004	301.7	410.7	301.7	250.5	.0	325.4	.00	52.40	.2732	.3562	962.9	965.5	.9138	.5963	1009.1	687.4
15	3.615	2.281	303.3	409.6	303.3	258.4	.0	317.4	.00	50.85	.2747	.3556	969.0	971.3	.9195	.6109	1015.4	703.1
30	3.391	2.478	309.1	410.6	309.1	301.9	.0	277.7	.00	42.63	.2800	.3583	987.3	988.5	.9372	.6739	1034.6	722.3
50	1.354	1.310	315.9	417.3	315.9	344.1	.0	235.9	.00	34.43	.2862	.3662	1011.7	1011.5	.9605	.7449	1059.9	848.6
70	-1.526	-.767	317.8	414.0	317.8	341.2	.0	234.4	.00	34.49	.2830	.3631	1036.2	1034.5	.9822	.7628	1083.8	849.8
85	-3.440	-1.999	315.9	393.1	315.9	314.2	.0	236.1	.00	36.94	.2863	.3440	1054.5	1051.8	.9975	.7651	1100.8	874.2
90	-3.913	-2.254	315.0	382.2	315.0	300.8	.0	235.8	.00	38.09	.2854	.3342	1060.6	1057.5	1.0025	.7652	1106.3	875.1
95	-4.268	-2.373	314.0	380.8	314.0	300.0	.0	234.5	.00	38.02	.2845	.3330	1066.7	1063.3	1.0075	.7706	1111.9	881.4

%SPAN	INCS DEGREE	INCH DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	EFF-P TOT-ST	EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	6.72	9.29	7.93	3.94	21.31	18.26	.4232	.0000	.3537	.0000	.0414	1.1832	49.25	48.01	72.56	68.62	-956.8	-629.7
10	6.82	9.35	7.68	3.98	21.37	18.59	.4147	.0000	.3735	.0000	.0405	1.1839	49.83	48.60	72.60	68.63	-962.9	-640.2
15	6.84	9.39	7.23	4.17	21.48	19.23	.4011	.0000	.3561	.0000	.0391	1.1849	51.00	49.79	72.62	68.45	-969.0	-653.9
30	6.71	9.11	4.86	5.61	21.86	22.78	.3352	.0000	.2662	.0000	.0316	1.1910	58.71	57.66	72.62	67.00	-987.3	-710.8
50	6.24	8.20	2.51	6.59	22.30	26.40	.2687	.0000	.1642	.0000	.0207	1.2010	70.41	69.62	72.66	66.08	-1011.7	-775.7
70	5.70	7.10	1.53	6.04	22.42	26.17	.2663	.0000	.1677	.0000	.0209	1.2009	69.26	68.93	72.95	66.90	-1036.2	-800.1
85	5.20	6.22	2.36	4.39	22.30	23.98	.2751	.0000	.1953	.0000	.0227	1.1889	63.98	63.07	73.32	68.93	-1054.5	-815.7
90	4.95	5.87	3.09	3.57	22.24	22.91	.2782	.0000	.2056	.0000	.0230	1.1828	61.85	60.91	73.46	69.89	-1060.6	-821.8
95	4.66	5.44	2.98	3.50	22.18	22.83	.2761	.0000	.2065	.0000	.0230	1.1815	61.41	60.47	73.60	70.10	-1066.7	-828.7

TT/TT INLET	PT/PT INLET	EFF-A TOTAL CUM	EFF-P TOTAL CUM
1.0842	1.1929	61.37	62.34

STATOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	-.563	-.372	402.8	286.0	230.5	286.0	330.2	.0	55.09	.00	.3491	.2464	959.8	959.8	.5810	.8629	670.4	1001.5
10	-1.212	-.727	402.5	288.6	236.5	288.6	325.6	.0	54.00	.00	.3490	.2488	965.6	965.6	.5915	.8687	682.3	1007.8
15	-1.765	-.938	402.6	294.3	245.4	294.3	318.8	.0	52.41	.00	.3493	.2541	971.3	971.3	.6049	.8763	697.2	1014.9
30	-2.269	-1.115	408.9	319.7	298.2	319.7	279.1	.0	43.14	.00	.3567	.2777	988.6	988.6	.6714	.9027	769.6	1039.0
50	-1.836	-.858	423.4	351.7	351.1	351.7	236.4	.0	33.96	.00	.3717	.3076	1011.7	1011.7	.7472	.9368	851.0	1071.0
70	-1.162	-.491	420.9	353.8	349.6	353.8	234.3	-.0	33.83	-.00	.3693	.3092	1034.7	1034.7	.7463	.9556	873.4	1093.5
85	-.747	-.245	394.9	319.9	316.5	319.9	236.1	.0	36.76	.00	.3456	.2789	1052.0	1052.0	.7661	.9586	875.3	1099.7
90	-.593	-.159	381.8	303.9	300.3	303.9	235.7	.0	38.14	.00	.3338	.2647	1057.7	1057.7	.7652	.9589	875.1	1100.5
	-.405	-.058	378.1	300.8	296.6	300.8	234.5	.0	38.33	.00	.3305	.2619	1063.5	1063.5	.7697	.9624	880.5	1105.2

%SPAN	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	EFF-P TOT-ST	EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	13.33	6.01	55.09	17.12	21.72	.5943	.0000	.1001	.0000	.0372	.9919	.00	.00	69.90	73.41	-629.6	-959.8
10	12.67	5.80	54.00	17.59	21.94	.5850	.0000	.0989	.0000	.0369	.9920	.00	.00	69.72	73.36	-640.0	-965.6
15	11.53	5.66	52.41	18.29	22.44	.5664	.0000	.0881	.0000	.0331	.9929	.00	.00	69.40	73.15	-652.5	-971.3
30	3.70	5.49	43.14	22.50	24.65	.4791	.0000	.0549	.0000	.0210	.9954	.00	.00	67.23	72.09	-709.5	-988.6
50	-4.54	5.48	33.96	26.87	27.44	.3876	.0000	.0336	.0000	.0131	.9969	.00	.00	65.64	70.83	-775.2	-1011.7
70	-4.63	5.65	33.83	26.76	27.52	.3820	.0000	.0426	.0000	.0170	.9962	.00	.00	66.50	71.12	-800.4	-1034.7
85	-2.50	6.31	36.76	24.13	24.74	.4329	.0000	.0798	.0000	.0324	.9937	.00	.00	68.80	73.08	-815.9	-1052.0
90	-1.62	6.71	38.14	22.87	23.45	.4564	.0000	.0917	.0000	.0375	.9932	.00	.00	69.93	73.97	-822.0	-1057.7
95	-2.34	7.22	38.33	22.58	23.21	.4593	.0000	.0936	.0000	.0385	.9932	.00	.00	70.31	74.21	-829.0	-1063.5

NCORR INLET RPM	WCORR INLET LBM/SEC	TT/TT INLET	PT/PT INLET	EFF-A TOTAL CUM	EFF-P TOTAL CUM	WC1/A1 LBM/SEC SQFT	PT/PT LOCAL
9584.	17.07	1.0842	1.1864	59.44	60.43	20.67	.9946

TABLE 3-IV
BLADE-ELEMENT AND OVERALL PERFORMANCE
60 PERCENT SPEED, POINT NUMBER 03, SI UNITS

ROTOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	.0632	.0331	80.6	130.6	80.6	57.2	.0	117.3	.0000	1.1169	.2390	.3690	291.7	292.6	.8973	.5208	302.6	184.3
10	.0822	.0434	80.9	129.5	80.9	58.8	.0	115.3	.0000	1.0987	.2399	.3660	293.5	294.3	.9029	.5326	304.5	188.5
15	.0925	.0536	81.5	128.4	81.5	60.4	.0	113.3	.0000	1.0805	.2416	.3630	295.4	296.1	.9087	.5444	306.4	192.5
30	.0996	.0724	83.8	128.4	83.8	75.5	.0	103.8	.0000	.9426	.2488	.3645	301.0	301.3	.9269	.6000	312.4	211.4
50	.0658	.0591	87.3	132.5	87.3	95.5	.0	91.8	.0000	.7659	.2591	.3780	308.4	308.3	.9514	.6753	320.5	236.6
70	.0078	.0174	89.4	134.1	89.4	100.9	.0	88.3	.0000	.7193	.2653	.3831	315.9	315.4	.9756	.7097	328.3	248.4
85	-.0408	-.0193	89.6	130.4	89.6	96.5	.0	87.8	.0000	.7385	.2661	.3721	321.4	320.6	.9908	.7192	333.7	252.1
90	-.0547	-.0284	89.5	127.5	89.5	92.5	.0	87.7	.0000	.7568	.2658	.3634	323.3	322.4	.9961	.7192	335.5	252.3
95	-.0674	-.0361	89.3	126.7	89.3	91.8	.0	87.3	.0000	.7604	.2652	.3610	325.2	324.1	1.0012	.7239	337.2	254.0

%SPAN	INCS RADIAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	SEFF-P TOT-ST	SEFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.1524	.1973	.1962	.0458	19.03	14.04	.5056	.0000	.4537	.0000	.0416	1.2100	46.25	46.84	1.3012	1.2553	-291.7	-175.2
10	.1543	.1985	.1896	.0485	19.09	14.47	.4937	.0000	.4415	.0000	.0409	1.2097	48.72	47.32	1.3019	1.2534	-293.5	-179.0
15	.1545	.1982	.1831	.0502	19.22	14.89	.4821	.0000	.4293	.0000	.0402	1.2094	49.20	47.82	1.3017	1.2515	-295.4	-182.8
30	.1500	.1920	.1222	.0930	19.75	18.81	.4242	.0000	.3588	.0000	.0388	1.2157	53.97	52.48	1.2991	1.2061	-301.0	-197.5
50	.1363	.1706	.0466	.1395	20.50	24.25	.3508	.0000	.2542	.0000	.0319	1.2326	63.56	62.47	1.2950	1.1555	-308.4	-216.5
70	.1212	.1456	.0116	.1424	20.96	25.80	.3289	.0000	.2210	.0000	.0284	1.2420	66.89	65.86	1.2951	1.1527	-315.9	-227.0
85	.1098	.1274	.0156	.1208	21.01	24.64	.3296	.0000	.2309	.0000	.0285	1.2364	64.89	63.82	1.2989	1.1781	-321.4	-232.9
90	.1047	.1208	.0291	.1053	20.99	23.58	.3328	.0000	.2397	.0000	.0286	1.2309	63.26	62.16	1.3007	1.1954	-323.3	-234.7
95	.0995	.1130	.0298	.1016	20.94	23.38	.3312	.0000	.2412	.0000	.0285	1.2292	62.76	61.45	1.3027	1.2011	-325.2	-236.8

TT/TT INLET	PT/PT INLET	SEFF-A TOTAL CUM	SEFF-P TOTAL CUM
1.1026	1.2289	59.13	60.30

STATOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	-.0177	-.0130	127.3	67.3	48.7	67.3	117.5	.0	1.1773	.0000	.3594	.1883	292.6	292.6	.5130	.8400	131.7	300.2
10	-.0369	-.0256	126.5	67.7	50.9	67.7	115.7	.0	1.1558	.0000	.3572	.1894	294.3	294.3	.5247	.8457	185.8	302.0
15	-.0561	-.0345	125.6	68.4	53.1	68.4	113.8	.0	1.1344	.0000	.3550	.1918	296.1	296.1	.5363	.8517	189.8	303.9
30	-.0566	-.0253	126.6	76.9	71.0	76.9	104.7	.0	.9746	.0000	.3588	.2165	301.4	301.4	.5930	.8757	209.1	311.0
50	-.0407	-.0200	134.1	94.7	97.2	94.7	92.3	.0	.7600	.0000	.3828	.2686	308.4	308.4	.6761	.9144	236.9	322.6
70	-.0283	-.0129	138.1	104.7	106.2	104.7	88.4	.0	.6943	.0000	.3960	.2974	315.4	315.4	.7166	.9441	250.6	332.3
85	-.0166	-.0061	135.1	99.8	102.7	99.8	87.7	-.0	.7069	-.0000	.3858	.2832	320.7	320.7	.7273	.9529	254.6	335.9
90	-.0123	-.0038	131.6	95.8	98.2	95.8	87.6	-.0	.7287	.0000	.3764	.2717	322.9	322.4	.7269	.9536	254.5	336.9
95	-.0081	-.0015	130.1	94.7	96.4	94.7	87.3	.0	.7356	.0000	.3710	.2685	324.2	324.2	.7296	.9573	255.8	337.8

%SPAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	SEFF-P TOT-ST	SEFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.4494	.1053	1.1773	12.00	17.17	.8139	.0000	.1298	.0000	.0482	.9889	.00	.00	1.2995	1.3447	-175.0	-292.6
10	.4361	.1018	1.1558	12.55	17.28	.8064	.0000	.1278	.0000	.0477	.9892	.00	.00	1.2937	1.3449	-178.7	-294.3
15	.4229	.0988	1.1344	13.11	17.51	.7952	.0000	.1220	.0000	.0458	.9898	.00	.00	1.2878	1.3436	-182.3	-296.1
30	.2868	.0957	.9746	17.72	19.82	.7085	.0000	.0977	.0000	.0373	.9917	.00	.00	1.2243	1.3212	-196.7	-301.9
50	.0882	.0958	.7600	24.60	24.73	.5627	.0000	.0679	.0000	.0265	.9935	.00	.00	1.1481	1.2727	-216.0	-308.9
70	.0234	.0989	.6943	27.01	27.39	.4861	.0000	.0503	.0000	.0201	.9949	.00	.00	1.1339	1.2404	-227.0	-315.9
85	.0231	.1088	.7069	26.12	26.03	.5249	.0000	.0850	.0000	.0346	.9917	.00	.00	1.1556	1.2690	-233.0	-320.7
90	.0338	.1172	.7287	24.94	24.95	.5440	.0000	.0886	.0000	.0362	.9918	.00	.00	1.1796	1.2819	-234.8	-322.9
95	.0260	.1261	.7356	24.49	24.65	.5473	.0000	.0854	.0000	.0351	.9923	.00	.00	1.1892	1.2865	-236.9	-324.2

NCORR INLET RAD/SEC	WCORR INLET KG/SEC	TT/TT INLET	PT/PT INLET	SEFF-A TOTAL CUM	SEFF-P TOTAL CUM	WC1/A1 KG/SEC SQM
1003.61	7.051	1.1026	1.2188	56.69	57.89	93.42

	PT/PT LOCAL
1	.9918

TABLE 3-IV (Cont'd)
BLADE-ELEMENT AND OVERALL PERFORMANCE
60 PERCENT SPEED, POINT NUMBER 03, ENGLISH UNITS

ROTOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	3.620	1.899	264.5	428.5	264.5	187.7	.0	385.0	.00	63.99	.2390	.3690	956.9	959.9	.8973	.5208	992.8	604.8
10	4.707	2.484	265.4	424.8	265.4	193.0	.0	378.3	.00	62.95	.2399	.3660	963.0	965.6	.9029	.5326	998.9	618.2
15	5.302	3.069	267.3	421.2	267.3	198.3	.0	371.6	.00	61.91	.2416	.3630	969.1	971.4	.9087	.5444	1005.3	631.7
30	5.706	4.150	275.1	421.4	275.1	247.6	.0	340.7	.00	54.00	.2488	.3645	987.4	988.6	.9269	.6000	1025.0	693.7
50	3.772	3.389	286.4	434.6	286.4	313.3	.0	301.3	.00	43.88	.2591	.3780	1011.8	1011.6	.9514	.6753	1051.6	776.4
70	.450	.998	293.2	439.9	293.2	330.9	.0	289.8	.00	41.22	.2653	.3831	1036.3	1034.6	.9746	.7097	1076.9	815.0
85	-2.339	-1.106	294.0	427.9	294.0	316.5	.0	287.9	.00	42.31	.2661	.3721	1054.6	1051.9	.9908	.7192	1094.8	827.0
90	-3.135	-1.630	293.6	418.1	293.6	303.5	.0	287.6	.00	43.48	.2658	.3634	1060.7	1057.6	.9961	.7192	1100.6	827.7
95	-3.864	-2.071	293.0	415.5	293.0	301.1	.0	286.4	.00	43.57	.2652	.3610	1066.8	1063.4	1.0012	.7239	1106.3	833.3

%SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	8.73	11.30	11.24	2.62	19.03	14.04	.5056	.0000	.4537	.0000	.0416	1.2100	48.25	46.84	74.55	71.93	-956.9	-574.9
10	8.84	11.37	10.87	2.78	19.09	14.47	.4937	.0000	.4415	.0000	.0409	1.2097	48.72	47.32	74.59	71.82	-963.0	-587.3
15	8.85	11.36	10.49	2.88	19.22	14.89	.4821	.0000	.4293	.0000	.0402	1.2094	49.20	47.81	74.58	71.71	-969.1	-599.8
30	8.59	11.00	7.00	5.33	19.75	18.81	.4242	.0000	.3588	.0000	.0388	1.2157	53.97	52.68	74.43	69.10	-987.4	-648.0
50	7.81	9.77	2.67	7.99	20.50	24.25	.3508	.0000	.2542	.0000	.0319	1.2326	63.56	62.97	74.20	66.20	-1011.8	-710.4
70	6.94	8.34	.66	8.16	20.96	25.80	.3289	.0000	.2210	.0000	.0286	1.2420	66.89	65.86	74.20	66.04	-1036.3	-744.8
85	6.29	7.30	.89	6.92	21.01	24.64	.3296	.0000	.2304	.0000	.0285	1.2364	64.89	63.82	74.42	67.50	-1054.6	-764.0
90	6.00	6.92	1.67	6.03	20.99	23.58	.3328	.0000	.2397	.0000	.0286	1.2309	63.26	62.16	74.53	68.49	-1060.7	-770.0
95	5.70	6.47	1.71	5.82	20.94	23.38	.3312	.0000	.2412	.0000	.0285	1.2292	62.76	61.65	74.64	68.82	-1066.8	-777.0

TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.1026	1.2289	59.13	60.30

STATOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	-1.615	-.743	417.7	220.8	159.9	220.8	385.6	.0	67.45	.00	.3594	.1883	959.9	959.9	.5130	.8400	596.2	985.0
10	-2.119	-1.469	415.0	222.0	167.0	222.0	379.5	.0	66.22	.00	.3572	.1894	965.7	965.7	.5247	.8457	609.5	990.8
15	-3.219	-1.975	412.2	224.6	179.1	224.6	373.5	.0	65.00	.00	.3550	.1918	971.4	971.4	.5363	.8517	622.8	997.1
30	-3.292	-1.451	415.2	252.2	233.1	252.2	343.4	.0	55.84	.00	.3588	.2165	988.7	988.7	.5930	.8757	686.1	1020.5
50	-2.334	-1.194	440.0	310.9	318.9	310.9	303.0	.0	43.55	.00	.3828	.2686	1011.8	1011.8	.6761	.9144	777.2	1058.5
70	-1.624	-.737	453.2	343.4	348.3	343.4	290.0	-.0	39.78	.00	.3950	.2974	1039.8	1039.8	.7166	.9491	822.3	1090.3
85	-.952	-.352	443.1	327.5	337.0	327.5	287.7	-.0	40.50	-.00	.3858	.2832	1052.1	1052.1	.7273	.9529	835.5	1101.9
90	-.707	-.220	431.9	314.4	322.2	314.4	287.5	-.0	41.75	.00	.3756	.2717	1057.9	1057.9	.7264	.9536	835.1	1103.6
95	-.462	-.088	426.7	310.8	316.4	310.8	286.3	.0	42.14	.00	.3710	.2685	1063.6	1063.6	.7296	.9573	839.2	1108.1

%SPAN	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	25.75	6.03	67.45	12.00	17.17	.8139	.0000	.1298	.0000	.0482	.9889	.00	.00	74.46	77.04	-574.3	-959.9
10	24.99	5.83	66.22	12.55	17.28	.8069	.0000	.1276	.0000	.0477	.9892	.00	.00	74.12	77.05	-586.1	-965.7
15	24.23	5.66	65.00	13.11	17.51	.7952	.0000	.1220	.0000	.0458	.9898	.00	.00	73.79	76.99	-598.0	-971.4
30	16.43	5.48	55.84	17.72	19.82	.7085	.0000	.0977	.0000	.0373	.9917	.00	.00	70.15	75.70	-645.3	-988.7
50	5.05	5.49	43.55	24.60	24.73	.5627	.0000	.0679	.0000	.0265	.9935	.00	.00	65.78	72.92	-708.8	-1011.8
70	1.34	5.67	39.78	27.01	27.39	.4981	.0000	.0503	.0000	.0201	.9949	.00	.00	64.94	71.64	-744.9	-1039.8
85	1.32	6.23	40.50	26.12	26.03	.5249	.0000	.0850	.0000	.0346	.9917	.00	.00	66.21	72.71	-764.4	-1052.1
90	1.94	6.72	41.75	24.94	24.95	.5440	.0000	.0886	.0000	.0362	.9918	.00	.00	67.30	73.45	-770.4	-1057.9
95	1.49	7.23	42.14	24.49	24.65	.5973	.0000	.0854	.0000	.0351	.9923	.00	.00	67.85	73.71	-777.3	-1063.6

NCORR INLET RPM	WCORR INLET LBM/SEC	TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC1/A1 LBM/SEC SQFT	PT/PT LOCAL
9584.	15.54	1.1026	1.2188	56.69	57.39	19.13	.9918

TABLE 3-V
BLADE-ELEMENT AND OVERALL PERFORMANCE
60 PERCENT SPEED, POINT NUMBER 04, SI UNITS

ROTOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	.0678	.0344	73.6	133.5	73.6	50.2	.0	123.7	.0000	1.1855	.2181	.3763	291.9	292.8	.8917	.4970	301.1	176.4
10	.0914	.0460	73.9	132.1	73.9	50.3	.0	122.2	.0000	1.1802	.2188	.3724	293.8	294.6	.8973	.5061	302.9	179.6
15	.1067	.0575	74.4	130.7	74.4	50.4	.0	120.6	.0000	1.1749	.2205	.3685	295.6	296.3	.9031	.5152	304.9	182.8
30	.1233	.0864	77.0	130.6	77.0	65.8	.0	112.7	.0000	1.0426	.2281	.3690	301.2	301.6	.9213	.5659	310.9	200.0
50	.0919	.0809	81.0	134.4	81.0	87.0	.0	102.3	.0000	.8662	.2402	.3815	308.7	308.6	.9462	.6358	319.1	223.9
70	.0307	.0394	83.9	138.4	83.9	97.4	.0	98.3	.0000	.7898	.2468	.3937	316.1	315.6	.9701	.6775	327.1	238.2
85	-.0264	-.0059	84.7	137.3	84.7	97.6	.0	96.5	.0000	.7799	.2512	.3904	321.7	320.9	.9869	.6959	332.7	244.7
90	-.0445	-.0190	84.7	134.5	84.7	93.9	.0	96.3	.0000	.7984	.2512	.3823	323.6	322.6	.9922	.6964	334.5	245.0
95	-.0621	-.0314	84.6	133.5	84.6	92.9	.0	95.9	.0000	.8017	.2509	.3793	325.4	324.4	.9975	.7006	336.2	246.6

%SPAN	INCS RADIAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	EFF-P TOT-ST	EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.1752	.2200	.2230	.0416	17.54	12.32	.5358	.0000	.4894	.0000	.0912	1.2159	47.03	45.55	1.3237	1.2821	-291.9	-169.1
10	.1771	.2214	.2230	.0377	17.60	12.37	.5271	.0000	.4811	.0000	.0900	1.2150	47.15	45.68	1.3245	1.2867	-293.8	-172.4
15	.1774	.2213	.2229	.0329	17.72	12.42	.5186	.0000	.4728	.0000	.0389	1.2191	47.28	45.81	1.3242	1.2913	-295.6	-175.7
30	.1724	.2145	.1526	.0845	18.30	16.36	.4664	.0000	.4132	.0000	.0411	1.2199	50.80	49.40	1.3206	1.2361	-301.2	-188.9
50	.1561	.1905	.0636	.1423	19.20	22.02	.3979	.0000	.3202	.0000	.0386	1.2370	58.30	57.03	1.3141	1.1718	-308.7	-206.3
70	.1377	.1621	.0089	.1621	19.84	24.91	.3674	.0000	.2725	.0000	.0355	1.2534	62.95	61.76	1.3114	1.1493	-316.1	-217.3
85	.1241	.1417	-.0022	.1529	20.02	25.01	.3582	.0000	.2633	.0000	.0340	1.2594	63.28	62.09	1.3134	1.1605	-321.7	-224.4
90	.1186	.1347	.0111	.1372	20.02	24.03	.3610	.0000	.2710	.0000	.0336	1.2494	61.95	60.74	1.3148	1.1776	-323.6	-226.3
95	.1132	.1267	.0134	.1318	19.99	23.75	.3597	.0000	.2728	.0000	.0336	1.2475	61.44	60.22	1.3165	1.1847	-325.4	-228.5

TT/TT INLET	PT/PT INLET	EFF-A TOTAL CUM	EFF-P TOTAL CUM
1.1122	1.2393	56.35	57.65

STATOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	-.0203	-.0156	130.8	58.2	41.7	58.2	123.9	.0	1.2457	.0000	.3682	.1622	292.8	292.8	.4900	.8320	174.0	298.5
10	-.0420	-.0309	129.6	58.1	42.3	58.1	122.5	.0	1.2379	.0000	.3651	.1620	294.6	294.6	.4991	.8371	177.2	300.3
15	-.0637	-.0455	128.5	58.1	42.9	58.1	121.1	.0	1.2300	.0000	.3619	.1621	296.3	296.3	.5082	.8423	180.4	302.0
30	-.0765	-.0338	128.7	66.4	59.1	66.4	113.9	.0	1.0928	.0000	.3633	.1861	301.6	301.6	.5562	.8648	197.0	308.9
50	-.0472	-.0224	135.7	84.5	88.1	84.5	103.1	.0	.8645	.0000	.3853	.2380	308.6	308.6	.6350	.9011	223.6	320.0
70	-.0324	-.0152	143.0	100.7	103.8	100.7	98.4	.0	.7587	.0000	.4073	.2844	315.7	315.7	.6857	.9359	240.8	331.4
85	-.0183	-.0072	143.7	101.2	106.6	101.2	96.4	.0	.7355	.0000	.4093	.2858	320.9	320.9	.7079	.9506	248.5	336.5
90	-.0132	-.0045	140.7	98.2	102.6	98.2	96.3	.0	.7538	.0000	.4004	.2773	322.7	322.7	.7075	.9522	248.6	337.3
95	-.0084	-.0018	139.0	97.2	100.5	97.2	95.9	.0	.7619	.0000	.3953	.2792	324.5	324.5	.7102	.9559	249.7	338.7

%SPAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	EFF-P TOT-ST	EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.5181	.1054	1.2457	10.28	14.96	.9067	.0000	.1279	.0000	.0975	.9886	.00	.00	1.3285	1.3746	-168.9	-292.8
10	.5187	.1020	1.2379	10.44	14.94	.9045	.0000	.1259	.0000	.0970	.9889	.00	.00	1.3296	1.3761	-172.1	-294.6
15	.5193	.0988	1.2300	10.59	14.96	.9013	.0000	.1231	.0000	.0962	.9893	.00	.00	1.3306	1.3772	-175.2	-296.3
30	.4052	.0957	1.0928	14.70	17.22	.8213	.0000	.1058	.0000	.0904	.9908	.00	.00	1.2675	1.3590	-187.7	-301.6
50	.1928	.0957	.8645	22.20	22.12	.6740	.0000	.0938	.0000	.0366	.9909	.00	.00	1.1664	1.3035	-205.5	-308.6
70	.0879	.0985	.7587	26.37	26.46	.5709	.0000	.0718	.0000	.0287	.9923	.00	.00	1.1251	1.2620	-217.3	-315.7
85	.0519	.1081	.7355	27.13	26.56	.5688	.0000	.1008	.0000	.0410	.9890	.00	.00	1.1277	1.2654	-224.5	-320.9
90	.0585	.1171	.7538	26.09	25.75	.5819	.0000	.0977	.0000	.0399	.9898	.00	.00	1.1455	1.2753	-226.5	-322.7
95	.0524	.1261	.7619	25.56	25.96	.5849	.0000	.0923	.0000	.0379	.9906	.00	.00	1.1563	1.2798	-228.5	-324.5

NCORR INLET RAD/SEC	WCORR INLET KG/SEC	TT/TT INLET	PT/PT INLET	EFF-A TOTAL CUM	EFF-P TOTAL CUM	WC1/A1 KG/SEC SQM	PT/PT LOCAL
1004.30	6.566	1.1122	1.2266	53.56	54.88	89.55	.9897

TABLE 3-V (Cont'd)

BLADE-ELEMENT AND OVERALL PERFORMANCE
60 PERCENT SPEED, POINT NUMBER 04, ENGLISH UNITS

ROTOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	3.884	1.974	241.5	438.1	241.5	164.6	.0	406.0	.00	67.92	.2181	.3763	957.7	960.7	.8917	.4970	987.7	578.6
10	5.235	2.633	242.3	433.5	242.3	165.0	.0	400.9	.00	67.62	.2188	.3724	963.8	966.4	.8973	.5061	993.8	589.1
15	6.116	3.293	244.2	428.9	244.2	165.4	.0	395.8	.00	67.32	.2205	.3685	969.9	972.2	.9031	.5152	1000.2	599.7
30	7.062	4.952	252.6	428.4	252.6	215.8	.0	369.7	.00	59.74	.2281	.3690	988.3	989.5	.9213	.5654	1020.0	656.3
50	5.266	4.637	265.8	440.8	265.8	285.5	.0	335.7	.00	49.63	.2402	.3815	1012.7	1012.5	.9462	.6358	1047.0	734.6
70	1.760	2.256	275.2	454.1	275.2	319.7	.0	322.5	.00	45.25	.2488	.3937	1037.1	1035.5	.9701	.6775	1073.0	781.4
85	-1.514	-.339	277.8	450.3	277.8	320.2	.0	316.6	.00	44.68	.2512	.3904	1055.5	1052.8	.9869	.6959	1091.4	802.8
90	-2.548	-1.091	277.9	441.3	277.9	308.0	.0	316.0	.00	45.76	.2512	.3823	1061.6	1058.5	.9922	.6969	1097.3	803.9
95	-3.555	-1.802	277.5	438.0	277.5	304.6	.0	314.8	.00	45.94	.2509	.3793	1067.7	1064.3	.9975	.7006	1103.1	809.1

%SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	SEFF-P TOT-ST	SEFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	10.04	12.61	12.77	2.38	17.54	12.32	.5358	.0000	.4894	.0005	.0412	1.2159	47.03	45.55	75.85	73.46	-957.7	-554.7
10	10.15	12.69	12.77	2.16	17.60	12.37	.5271	.0000	.4811	.0000	.0400	1.2150	47.15	45.64	75.89	73.72	-963.8	-565.6
15	10.17	12.68	12.77	1.88	17.72	12.42	.5186	.0000	.4728	.0000	.0389	1.2141	47.28	45.81	75.87	73.99	-969.9	-576.4
30	9.88	12.29	8.75	4.84	18.30	16.36	.4664	.0000	.4132	.0000	.0411	1.2199	50.80	49.40	75.67	70.82	-988.3	-619.7
50	8.95	10.92	3.64	8.16	19.20	22.02	.3979	.0000	.3202	.0000	.0386	1.2370	58.30	57.03	75.29	67.14	-1012.7	-676.8
70	7.89	9.29	.51	9.29	19.84	24.91	.3674	.0000	.2726	.0000	.0365	1.2534	62.95	61.76	75.14	65.85	-1037.1	-713.0
85	7.11	8.12	-.13	8.76	20.02	25.01	.3582	.0000	.2433	.0000	.0340	1.2544	63.28	62.09	75.25	66.49	-1055.5	-736.1
90	6.80	7.72	.63	7.86	20.02	24.03	.3610	.0000	.2710	.0000	.0338	1.2494	61.95	60.74	75.33	67.47	-1061.6	-742.5
95	6.49	7.26	.77	7.55	19.99	23.75	.3597	.0000	.2728	.0000	.0336	1.2475	61.44	60.22	75.43	67.86	-1067.7	-749.5

TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.1122	1.2393	56.35	57.65

STATOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	-1.161	-.895	429.0	190.9	136.9	190.9	406.5	.0	71.37	.00	.3682	.1622	960.7	960.7	.4900	.8320	570.9	979.5
10	-2.406	-1.773	425.3	190.6	138.8	190.6	401.9	.0	70.92	.00	.3651	.1620	966.5	966.5	.4991	.8371	581.4	985.1
15	-3.652	-2.609	421.5	190.6	140.8	190.6	397.3	.0	70.47	.00	.3619	.1621	972.2	972.2	.5082	.8423	591.9	990.7
30	-4.385	-1.936	422.1	218.0	193.8	218.0	373.6	.0	62.62	.00	.3633	.1861	989.5	989.5	.5562	.8648	646.2	1013.3
50	-2.703	-1.286	445.2	277.3	288.9	277.3	338.3	.0	49.53	.00	.3853	.2380	1012.6	1012.6	.6350	.9011	733.7	1049.9
70	-1.854	-.873	469.3	330.4	340.6	330.4	322.8	.0	43.47	.00	.4073	.2849	1035.7	1035.7	.6857	.9358	790.1	1087.1
85	-1.048	-.413	471.5	331.9	349.6	331.9	316.3	.0	42.14	.00	.4093	.2858	1053.0	1053.0	.7079	.9506	815.4	1104.1
90	-.758	-.255	461.5	322.3	336.5	322.3	315.8	.0	43.19	.00	.4004	.2773	1058.7	1058.7	.7075	.9522	815.7	1106.7
95	-.481	-.104	455.9	318.8	329.9	318.8	314.7	.0	43.65	.00	.3953	.2742	1064.5	1064.5	.7102	.9559	819.2	1111.2

%SPAN	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	SEFF-P TOT-ST	SEFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	29.68	6.04	71.37	10.28	14.96	.9067	.0000	.1279	.0000	.0475	.9886	.00	.00	76.12	78.76	-554.2	-960.7
10	29.72	5.85	70.92	10.44	14.94	.9045	.0000	.1259	.0000	.0470	.9889	.00	.00	76.18	78.84	-564.6	-966.5
15	29.76	5.66	70.47	10.59	14.96	.9013	.0000	.1231	.0000	.0462	.9893	.00	.00	76.24	78.91	-575.0	-972.2
30	23.21	5.48	62.62	14.70	17.22	.8213	.0000	.1058	.0000	.0404	.9908	.00	.00	72.62	77.58	-616.0	-989.5
50	11.05	5.48	49.53	22.20	22.12	.6740	.0000	.0938	.0000	.0366	.9909	.00	.00	66.83	74.68	-674.3	-1012.6
70	5.03	5.64	43.47	26.37	26.46	.5709	.0000	.0718	.0000	.0287	.9923	.00	.00	64.47	72.31	-712.9	-1035.7
85	2.97	6.19	42.14	27.13	26.56	.5688	.0000	.1008	.0000	.0410	.9890	.00	.00	64.61	72.50	-736.6	-1053.0
90	3.35	6.71	43.19	26.09	25.75	.5814	.0000	.0977	.0000	.0399	.9878	.00	.00	65.63	73.07	-742.9	-1058.7
95	3.00	7.23	43.65	25.56	25.46	.5844	.0000	.0923	.0000	.0379	.9906	.00	.00	66.25	73.33	-749.8	-1064.5

NCORR INLET RPM	WCORR INLET LBM/SEC	TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC1/A1 LBM/SEC SQFT	PT/PT LOCAL
9590.	14.48	1.1122	1.2266	53.56	54.88	18.34	.9897

TABLE 3-VI
BLADE-ELEMENT AND OVERALL PERFORMANCE
60 PERCENT SPEED, POINT NUMBER 05, SI UNITS

ROTOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	.0733	.0360	67.6	135.2	67.6	43.3	.0	128.1	.0000	1.2444	.2000	.3802	292.0	292.5	.8867	.4793	299.8	170.4
10	.1024	.0490	67.8	133.8	67.8	43.8	.0	126.4	.0000	1.2372	.2007	.3763	293.9	294.7	.8922	.4890	301.6	173.3
15	.1212	.0620	68.4	132.4	68.4	48.2	.0	124.8	.0000	1.2300	.2024	.3723	295.8	296.5	.8980	.4986	303.6	177.3
30	.1422	.0955	71.1	132.1	71.1	58.7	.0	118.1	.0000	1.1097	.2103	.3722	301.3	301.7	.9162	.5436	309.6	192.9
50	.1127	.0978	75.4	135.5	75.4	79.6	.0	109.6	.0000	.9428	.2233	.3833	308.8	308.7	.9412	.6066	317.9	214.5
70	.0479	.0568	78.8	141.0	78.8	94.2	.0	104.9	.0000	.8389	.2334	.3997	316.3	315.8	.9654	.6548	325.9	231.0
85	-.0157	.0050	79.9	141.7	79.9	97.3	.0	103.0	.0000	.9138	.2368	.4018	321.8	321.0	.9825	.6770	331.6	238.8
90	-.0369	-.0115	80.0	139.0	80.0	94.1	.0	102.3	.0000	.9274	.2371	.3941	323.7	322.8	.9879	.6793	333.4	239.7
95	-.0580	-.0276	80.0	137.8	80.0	92.9	.0	101.7	.0000	.9311	.2369	.3903	325.6	324.5	.9932	.6839	335.2	241.4

%SPAN	INCS RADIAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.1949	.2398	.2545	.0296	16.22	10.63	.5578	.0000	.5178	.0000	.0385	1.2173	45.84	44.32	1.3432	1.3137	-292.0	-164.8
10	.1970	.2413	.2524	.0278	16.27	10.75	.5481	.0000	.5088	.0000	.0380	1.2164	45.97	44.46	1.3439	1.3161	-293.9	-168.3
15	.1974	.2413	.2503	.0249	16.40	10.88	.5386	.0000	.4998	.0000	.0372	1.2155	46.11	44.61	1.3435	1.3186	-295.8	-171.7
30	.1920	.2391	.1794	.0767	17.00	14.56	.4924	.0000	.4485	.0000	.0411	1.2209	48.86	47.40	1.3393	1.2626	-301.3	-183.7
50	.1740	.2085	.0831	.1405	18.00	20.06	.4321	.0000	.3693	.0000	.0424	1.2374	54.74	53.36	1.3313	1.1907	-308.8	-199.1
70	.1531	.1776	.0104	.1761	18.76	24.04	.3937	.0000	.3106	.0000	.0403	1.2580	60.18	58.88	1.3266	1.1506	-316.3	-210.9
85	.1380	.1556	-.0117	.1763	19.02	24.92	.3805	.0000	.2931	.0000	.0387	1.2639	61.51	60.22	1.3273	1.1510	-321.8	-218.0
90	.1321	.1482	.0006	.1612	19.04	24.09	.3809	.0000	.2971	.0000	.0380	1.2592	60.59	59.29	1.3284	1.1672	-323.7	-220.4
95	.1265	.1401	.0046	.1541	19.03	23.76	.3791	.0000	.2979	.0000	.0375	1.2569	60.13	58.83	1.3293	1.1759	-325.6	-222.8

TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.1185	1.2439	58.37	55.70

STATOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	-.0229	-.0185	132.9	51.2	34.4	51.2	128.3	-.0	1.3082	-.0000	.3733	.1423	292.9	292.9	.4727	.4262	168.2	297.4
10	-.0473	-.0367	131.7	50.9	35.3	50.9	126.8	-.0	1.2987	-.0000	.3701	.1416	294.7	294.7	.4822	.4313	171.6	299.1
15	-.0717	-.0549	130.5	50.7	36.2	50.7	125.3	-.0	1.2892	-.0000	.3668	.1409	296.5	296.5	.4916	.4363	174.5	300.8
30	-.0975	-.0415	129.9	59.0	50.0	59.0	119.3	.0	1.1753	.0000	.3658	.1644	301.7	301.7	.5332	.4575	189.4	307.4
50	-.0571	-.0265	136.6	77.2	80.6	77.2	110.2	-.0	.9401	.0000	.3863	.2162	308.8	308.8	.6062	.4917	214.3	318.3
70	-.0393	-.0187	145.5	96.5	100.6	96.5	105.1	.0	.8076	.0000	.4128	.2714	315.8	315.8	.6626	.5284	233.5	330.2
85	-.0217	-.0089	148.5	100.1	107.0	100.1	102.9	.0	.7661	.0000	.4217	.2817	321.1	321.1	.6301	.5462	243.0	336.3
90	-.0155	-.0056	146.3	98.0	104.5	98.0	102.3	.0	.7752	.0000	.4152	.2756	322.8	322.8	.5927	.5489	244.0	337.4
95	-.0094	-.0024	144.3	97.0	102.4	97.0	101.7	.0	.7822	.0000	.4095	.2728	324.6	324.6	.5960	.5527	245.3	338.8

%SPAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.5809	.1055	1.3082	8.47	13.21	.5728	.0000	.1230	.0000	.0456	.9867	.00	.00	1.3647	1.3977	-164.7	-292.9
10	.5802	.1022	1.2987	8.70	13.15	.9724	.0000	.1219	.0000	.0455	.9850	.00	.00	1.3636	1.3996	-167.9	-294.7
15	.5795	.0990	1.2892	8.92	13.09	.9717	.0000	.1201	.0000	.0453	.9853	.00	.00	1.3624	1.4015	-171.1	-296.5
30	.4883	.0956	1.1753	12.39	15.31	.8985	.0000	.1037	.0000	.0395	.9908	.00	.00	1.3057	1.3779	-182.4	-301.7
50	.2683	.0957	.9401	20.22	20.18	.7502	.0000	.1039	.0000	.0406	.9898	.00	.00	1.1858	1.3259	-198.6	-308.8
70	.1365	.0984	.8076	25.47	25.38	.6253	.0000	.0887	.0000	.0355	.9902	.00	.00	1.1256	1.2742	-210.7	-315.8
85	.0815	.1081	.7661	27.18	26.33	.6074	.0000	.1185	.0000	.0482	.9864	.00	.00	1.1148	1.2685	-218.1	-321.1
90	.0798	.1171	.7752	26.54	25.74	.6161	.0000	.1182	.0000	.0483	.9868	.00	.00	1.1283	1.2761	-220.5	-322.8
95	.0728	.1261	.7822	26.00	25.47	.6176	.0000	.1100	.0000	.0452	.9880	.00	.00	1.1402	1.2804	-222.5	-324.6

NCORR INLET RAD/SEC	WCORR INLET KG/SEC	TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC1/A1 KG/SEC SQM	PT/PT LOCAL
1004.07	6.128	1.1195	1.2288	53.17	52.57	86.31	.9878

TABLE 3-VI (Cont'd)
BLADE-ELEMENT AND OVERALL PERFORMANCE
60 PERCENT SPEED, POINT NUMBER 05, ENGLISH UNITS

ROTOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VØ-1 FT/SEC	VØ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	4.193	2.060	221.5	443.1	221.5	142.1	.0	420.3	.00	71.30	.2000	.3802	958.1	961.1	1.4867	.4793	983.5	559.2
10	5.865	2.807	222.6	439.0	222.6	143.6	.0	414.8	.00	70.89	.2007	.3763	964.2	966.9	.4922	.4890	989.6	570.4
15	6.545	3.553	224.4	434.3	224.4	145.1	.0	409.3	.00	70.46	.2024	.3723	970.3	972.6	1.4580	.4986	996.0	581.7
30	8.145	5.470	233.1	433.2	233.1	192.5	.0	387.3	.00	63.58	.2103	.3722	988.7	989.9	.5162	.5436	1015.4	632.8
50	6.457	3.601	247.4	444.6	247.4	261.2	.0	359.6	.00	54.02	.2233	.3833	1013.1	1012.9	.5412	.6066	1042.3	703.7
70	2.746	3.256	258.5	462.6	258.5	309.1	.0	344.1	.00	48.07	.2334	.3997	1037.6	1035.9	.5654	.6548	1069.3	757.7
85	-.897	.289	262.3	464.9	262.3	319.2	.0	337.9	.00	46.63	.2368	.4018	1055.9	1053.2	.5825	.6770	1088.0	783.3
90	-2.112	-.657	262.6	456.2	262.6	308.8	.0	335.8	.00	47.41	.2371	.3941	1062.0	1059.0	.5879	.6793	1094.0	786.4
95	-3.326	-1.581	262.4	451.3	262.4	304.6	.0	333.8	.00	47.62	.2369	.3903	1068.1	1064.7	.5932	.6839	1099.9	791.8

%SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P 101-ST	%EFF-A 101-ST	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC
5	11.17	13.74	14.58	1.70	16.22	10.53	.5528	.0000	.5128	.0000	.0385	1.2173	45.84	44.32	76.56	75.27	-958.1	-540.8
10	11.29	13.83	14.46	1.59	16.27	10.7[illegible]	.5481	.0000	.5088	.0000	.0380	1.2164	45.57	44.46	77.00	75.41	-964.2	-552.1
15	11.31	13.83	14.36	1.42	16.40	10.8[illegible]	.5786	.0000	.4998	.0000	.0372	1.2155	46.11	44.61	76.98	75.55	-970.3	-563.3
30	11.00	13.41	10.28	4.39	17.00	14.56	.4924	.0000	.4485	.0000	.0411	1.2209	48.86	47.40	76.73	72.34	-988.7	-602.6
50	9.97	11.94	4.76	8.05	18.00	20.06	.4321	.0000	.3693	.0000	.0424	1.2374	54.74	53.36	76.28	68.22	-1013.1	-653.3
70	8.77	10.18	.59	10.89	18.76	24.04	.3937	.0000	.3106	.0000	.0403	1.2580	60.18	58.88	76.01	65.92	-1037.6	-691.8
85	7.91	8.92	-.67	10.10	19.02	24.92	.3805	.0000	.2931	.0000	.0387	1.2635	61.51	60.22	76.05	65.55	-1055.5	-715.3
90	7.57	8.49	.04	9.24	19.04	24.05	.3809	.0000	.2971	.0000	.0380	1.2592	60.59	59.29	76.11	66.88	-1062.0	-723.2
95	7.25	8.03	.26	8.43	19.03	23.76	.3791	.0000	.2979	.0000	.0375	1.2565	60.13	58.83	76.20	67.37	-1068.1	-730.9

TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.1155	1.2439	54.32	55.70

STATOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VØ-1 FT/SEC	VØ-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	-1.313	-1.060	435.5	168.0	113.0	168.0	420.5	-.0	74.95	-.00	.3733	.1423	961.1	961.1	.4727	.4262	551.3	975.7
10	-2.711	-2.104	432.0	167.1	115.9	167.1	416.1	-.0	74.41	-.00	.3701	.1416	966.9	966.9	.4822	.4313	562.9	981.2
15	-4.109	-3.147	428.1	166.2	118.8	166.2	411.2	-.0	73.87	-.00	.3668	.1409	972.6	972.6	.4916	.4363	573.8	986.8
30	-5.587	-2.377	426.2	193.4	163.9	193.4	391.5	.0	67.34	.00	.3658	.1644	990.0	990.0	.5332	.4575	621.3	1008.7
50	-3.271	-1.516	448.2	253.2	264.3	253.2	361.5	-.0	53.86	.00	.3853	.2162	1013.0	1013.0	.6062	.4917	703.2	1044.3
70	-2.252	-1.070	477.3	316.7	330.0	316.7	344.8	.0	46.27	.00	.4128	.2714	1036.1	1036.1	1.6626	.5284	766.1	1083.4
85	-1.246	-.510	487.1	328.5	351.0	328.5	337.7	.0	43.90	.00	.4217	.2817	1053.4	1053.4	.6901	.5462	797.1	1103.5
90	-.886	-.319	479.9	321.9	342.8	321.5	335.8	.0	44.41	.00	.4152	.2756	1059.2	1059.2	.6927	.5489	800.6	1106.9
95	-.541	-.135	473.5	318.2	335.3	318.2	333.7	.0	44.82	.00	.4095	.2728	1065.0	1065.0	1.6960	.5527	804.7	1111.5

%SPAN	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P 101-ST	%EFF-A 101-ST	B'-1 DEGREE	B'-2 DEGREE	VØ'-1 FT/SEC	VØ'-2 FT/SEC
5	33.28	6.04	74.95	8.47	13.[illegible]	.9728	.0000	.1230	.0000	.0456	.9887	.00	.00	78.15	80.08	-540.6	-961.1
10	33.24	5.66	74.41	8.70	13.15	.9724	.0000	.1219	.0000	.0455	.9850	.00	.00	78.13	80.19	-550.8	-966.9
15	33.20	5.67	73.87	8.92	13.09	.9737	.0000	.1207	.0000	.0453	.9853	.00	.00	78.06	80.30	-561.4	-972.6
30	27.98	5.46	67.34	12.39	15.31	.8965	.0000	.1037	.0000	.0395	.9908	.00	.00	74.81	78.95	-598.4	-990.0
50	15.37	5.48	53.86	20.22	20.18	.7502	.0000	.1039	.0000	.0406	.9858	.00	.00	67.94	75.97	-651.5	-1013.0
70	7.82	5.64	46.27	25.47	25.38	.6253	.0000	.0887	.0000	.0355	.9902	.00	.00	64.49	73.01	-691.4	-1036.1
85	4.69	5.19	43.90	27.28	26.33	.6074	.0000	.1185	.0000	.0482	.9864	.00	.00	63.88	72.68	-715.7	-1053.4
90	4.57	6.71	44.41	26.54	25.74	.6161	.0000	.1182	.0000	.0483	.9868	.00	.00	64.65	73.12	-723.4	-1059.2
95	4.17	7.23	44.82	26.00	25.47	.6106	.0000	.1100	.0000	.0452	.9880	.00	.00	65.33	73.36	-731.2	-1065.0

NCORR INLET RPM	WCORR INLET LBM/SEC	TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC1/A1 LBM/SEC SQFT	PT/PT LOCAL
9588.	13.51	1.1185	1.2288	51.17	52.57	17.68	.9878

TABLE 3-VII
BLADE-ELEMENT AND OVERALL PERFORMANCE
67 PERCENT SPEED, POINT NUMBER 01, SI UNITS

ROTOR

% SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	.0447	.0298	113.5	141.8	113.5	110.4	.0	88.6	.0000	.6772	.3385	.4051	324.6	325.6	1.0257	.7468	343.9	261.3
10	.0451	.0266	113.9	142.1	113.9	113.5	.0	85.5	.0000	.6460	.3397	.4068	326.7	327.6	1.0320	.7650	346.0	267.3
15	.0413	.0257	114.3	142.7	114.3	118.6	.0	78.7	.0000	.5853	.3410	.4058	328.8	329.5	1.0383	.7969	348.1	277.4
30	.0210	.0141	115.5	141.5	115.5	128.6	.0	58.9	.0000	.4294	.3445	.4104	335.0	335.4	1.0572	.8844	359.3	304.9
50	-.0151	-.0100	115.8	135.6	115.8	126.3	.0	49.4	.0000	.3731	.3456	.3946	343.3	343.2	1.0810	.9305	362.3	319.7
70	-.0508	-.0329	114.8	132.7	114.8	122.7	.0	50.4	.0000	.3858	.3426	.3853	351.5	351.0	1.1033	.9430	369.8	324.7
85	-.0724	-.0440	113.5	125.8	113.5	114.7	.0	51.5	.0000	.4228	.3386	.3643	357.8	356.8	1.1194	.9449	375.3	326.2
90	-.0773	-.0456	113.1	122.3	113.1	110.8	.0	51.7	.0000	.4362	.3372	.3538	359.8	358.8	1.1248	.9450	377.2	326.5
95	-.0792	-.0445	112.7	121.1	112.7	109.7	.0	51.3	.0000	.4372	.3360	.3503	361.9	360.7	1.1303	.9501	379.0	328.4

% SPAN	INCS RADIAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.0853	.1301	.0755	.0998	25.45	24.36	.3165	.0000	.4237	.0000	.0529	1.1055	30.96	29.51	1.2365	1.1347	-324.5	-236.9
10	.0869	.1310	.0687	.1029	25.53	25.15	.3009	.0000	.4007	.0000	.0506	1.1120	32.59	31.54	1.2354	1.1325	-326.7	-242.0
15	.0877	.1314	.0606	.1068	25.61	26.50	.2706	.0000	.3541	.0000	.0453	1.1153	36.08	35.06	1.2362	1.1294	-328.8	-250.8
30	.0881	.1299	.0504	.1036	25.84	29.42	.1901	.0000	.2225	.0000	.0286	1.1153	48.41	47.52	1.2389	1.1353	-335.0	-276.5
50	.0861	.1302	.0553	.0806	25.91	29.10	.1599	.0000	.1746	.0000	.0215	1.1106	52.21	51.44	1.2454	1.1648	-343.3	-293.8
70	.0817	.1061	.0427	.0719	25.71	29.09	.1654	.0000	.1972	.0000	.0237	1.1020	46.45	45.62	1.2551	1.1832	-351.5	-300.6
85	.0748	.0926	.0499	.0521	25.45	26.02	.1753	.0000	.2298	.0000	.0261	1.0963	38.08	37.32	1.2635	1.2114	-357.8	-305.3
90	.0708	.0870	.0584	.0418	25.36	25.06	.1787	.0000	.2413	.0000	.0266	1.0792	34.81	34.08	1.2664	1.2245	-359.8	-307.1
95	.0660	.0795	.0587	.0388	25.28	24.76	.1778	.0000	.2436	.0000	.0266	1.0760	33.54	32.83	1.2690	1.2302	-361.9	-309.5

TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.0656	1.1049	41.52	42.39

STATOR

% SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	-.0069	-.0044	141.4	131.2	109.9	131.2	88.8	.0	.6795	.0000	.4041	.3740	325.6	325.6	.7462	1.0009	261.1	351.1
10	-.0152	-.0085	142.4	133.3	113.7	133.3	85.5	.0	.6450	.0000	.4074	.3807	327.6	327.6	.7654	1.0104	267.4	353.7
15	-.0203	-.0103	143.5	135.1	119.5	135.1	78.7	.0	.5828	.0000	.4122	.3878	329.5	329.5	.7984	1.0223	277.9	356.2
30	-.0248	-.0115	143.8	137.1	131.2	137.1	58.8	.0	.4210	.0000	.4133	.3975	335.4	335.4	.8887	1.0507	306.2	362.3
50	-.0189	-.0080	137.9	132.7	128.8	132.7	49.3	.0	.3652	.0000	.4016	.3858	343.2	343.2	.9346	1.0703	321.0	368.0
70	-.0121	-.0042	132.3	127.5	122.3	127.5	50.5	.0	.3918	.0000	.3842	.3700	351.1	351.1	.9423	1.0836	324.5	373.5
85	-.0082	-.0018	121.8	115.9	110.3	115.9	51.6	.0	.4382	.0000	.3526	.3350	356.9	356.9	.9399	1.0850	324.7	375.3
90	-.0067	-.0010	117.4	111.0	105.4	111.0	51.6	.0	.4556	.0000	.3394	.3204	358.9	358.9	.9392	1.0848	324.8	375.6
95	-.0053	-.0001	115.0	108.9	103.0	108.9	51.2	.0	.4619	.0000	.3324	.3144	360.8	360.8	.9430	1.0881	326.3	376.9

% SPAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	-.0897	.1047	.6795	24.27	29.19	.3055	.0000	.0337	.0000	.0125	.9964	.00	.00	1.1364	1.1879	-236.5	-325.6
10	-.0774	.1007	.6450	25.20	29.77	.2884	.0000	.0241	.0000	.0090	.9974	.00	.00	1.1316	1.1845	-242.1	-327.6
15	-.1309	.0989	.5828	26.69	30.45	.2644	.0000	.0207	.0000	.0078	.9977	.00	.00	1.1264	1.1818	-250.9	-329.5
30	-.2675	.0957	.4210	29.93	31.50	.2028	.0000	.0192	.0000	.0073	.9978	.00	.00	1.1279	1.1828	-276.6	-335.4
50	-.3069	.0958	.3652	29.61	30.61	.1777	.0000	.0205	.0000	.0080	.9978	.00	.00	1.1578	1.2020	-294.0	-343.2
70	-.2791	.0984	.3918	27.99	29.25	.1887	.0000	.0333	.0000	.0133	.9968	.00	.00	1.1844	1.2223	-300.5	-351.1
85	-.2475	.1104	.4382	25.11	26.38	.2230	.0000	.0682	.0000	.0277	.9944	.00	.00	1.2241	1.2569	-305.3	-356.9
90	-.2393	.1171	.4556	23.95	25.20	.2345	.0000	.0838	.0000	.0342	.9936	.00	.00	1.2403	1.2709	-307.2	-358.9
95	-.2485	.1261	.4619	23.38	24.72	.2361	.0000	.0846	.0000	.0348	.9938	.00	.00	1.2497	1.2776	-309.6	-360.8

NCORR INLET RAD/SEC	WCORR INLET KG/SEC	TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC1/A1 KG/SEC SQM	PT/PT LOCAL
1117.18	9.178	1.0696	1.1014	40.16	41.02	326.89	.9968

TABLE 3-VII (Cont'd)
BLADE-ELEMENT AND OVERALL PERFORMANCE
67 PERCENT SPEED, POINT NUMBER 01, ENGLISH UNITS

ROTOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	2.559	1.418	372.3	465.1	372.3	362.3	.0	291.2	.00	39.80	.3385	.4051	1065.0	1068.4	1.0257	.7468	1128.2	857.4
10	2.585	1.523	373.6	466.3	373.6	372.3	.0	280.6	.00	37.01	.3397	.4068	1071.8	1074.8	1.0320	.7650	1135.1	877.1
15	2.365	1.472	375.1	468.1	375.1	389.0	.0	258.2	.00	33.59	.3410	.4098	1078.6	1081.2	1.0383	.7969	1142.0	910.2
30	1.204	.807	378.8	464.3	378.8	421.9	.0	193.3	.00	24.61	.3445	.4104	1099.0	1100.4	1.0572	.8844	1162.5	1000.4
50	-.866	-.571	380.0	444.9	380.0	414.3	.0	162.2	.00	21.38	.3456	.3946	1126.2	1125.9	1.0810	.9305	1188.5	1049.0
70	-2.909	-1.884	376.7	435.3	376.7	402.6	.0	165.4	.00	22.33	.3426	.3853	1153.4	1151.5	1.1033	.9430	1213.3	1065.2
85	-4.151	-2.519	372.4	412.6	372.4	376.3	.0	169.1	.00	24.23	.3386	.3643	1173.7	1170.7	1.1154	.9449	1231.4	1070.1
90	-4.429	-2.613	370.9	401.1	370.9	363.6	.0	169.5	.00	24.99	.3372	.3538	1180.5	1177.1	1.1248	.9450	1237.4	1071.2
95	-4.537	-2.550	369.6	397.2	369.6	359.9	.0	168.2	.00	25.05	.3360	.3503	1187.3	1183.5	1.1303	.9501	1243.5	1077.3

%SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	4.89	7.45	4.32	5.72	25.45	24.36	.3165	.0000	.4237	.0000	.0525	1.1095	30.96	29.91	70.73	65.01	-1065.0	-777.1
10	4.98	7.50	3.94	5.90	25.53	25.15	.3009	.0000	.4007	.0000	.0506	1.1120	32.59	31.59	70.78	64.89	-1071.8	-794.1
15	5.02	7.53	3.47	6.12	25.61	26.50	.2706	.0000	.3541	.0000	.0453	1.1153	36.08	35.06	70.83	64.71	-1078.6	-822.9
30	5.05	7.44	2.89	5.93	25.84	29.42	.1901	.0000	.2225	.0000	.0286	1.1193	48.41	47.52	70.96	65.05	-1099.0	-907.0
50	4.93	6.89	3.17	4.62	25.91	29.10	.1599	.0000	.1746	.0000	.0215	1.1106	52.21	51.44	71.36	66.74	-1126.2	-963.7
70	4.68	6.08	2.45	4.12	25.71	28.09	.1654	.0000	.1972	.0000	.0237	1.1020	46.41	45.62	71.91	67.79	-1153.4	-986.2
85	4.29	5.31	2.86	2.99	25.45	26.02	.1753	.0000	.2298	.0000	.0261	1.0863	38.08	37.32	72.39	69.41	-1173.7	-1001.6
90	4.06	4.98	3.35	2.40	25.36	25.06	.1783	.0000	.2413	.0000	.0266	1.0792	34.81	34.08	72.56	70.16	-1180.5	-1007.7
95	3.78	4.55	3.36	2.22	25.28	24.76	.1778	.0000	.2436	.0000	.0266	1.0760	33.54	32.83	72.71	70.48	-1187.3	-1015.4

TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.0696	1.1049	41.52	42.39

STATOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	-.393	-.252	464.0	430.3	360.7	430.3	291.2	.0	38.93	.00	.4041	.3740	1068.4	1068.4	1.7462	1.0009	856.8	1151.8
10	-.871	-.486	467.1	437.2	373.2	437.2	280.6	.0	36.95	.00	.4074	.3807	1074.8	1074.8	.7654	1.0104	877.4	1160.3
15	-1.162	-.590	470.8	443.2	392.1	443.2	258.2	.0	33.39	.00	.4122	.3878	1081.2	1081.2	.7984	1.0223	911.7	1168.5
30	-1.422	-.658	471.8	449.8	430.4	449.8	192.8	.0	24.12	.00	.4123	.3975	1100.4	1100.4	.8887	1.0507	1004.5	1188.8
50	-1.083	-.457	452.4	435.2	422.6	435.2	161.6	.0	20.93	.00	.4036	.3958	1126.1	1126.1	.9346	1.0703	1053.0	1207.3
70	-.695	-.240	434.0	418.4	401.1	418.4	165.7	.0	22.45	.00	.3842	.3700	1151.7	1151.7	.9423	1.0836	1064.5	1225.4
85	-.468	-.104	399.7	380.1	362.0	380.1	169.2	.0	25.11	.00	.3526	.3350	1171.0	1171.5	.9399	1.0850	1065.3	1231.3
90	-.387	-.057	385.1	364.0	345.8	364.0	169.4	.0	26.10	.00	.3394	.3204	1177.4	1177.4	.9392	1.0848	1065.7	1232.4
95	-.362	-.007	377.3	357.3	337.8	357.3	168.1	.0	26.46	.00	.3324	.3144	1183.8	1183.9	.9430	1.0881	1070.5	1236.6

%SPAN	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	-2.85	6.00	38.93	24.27	29.19	.3055	.0000	.0337	.0000	.0125	.9964	.00	.00	65.11	68.06	-777.1	-1068.4
10	-4.43	5.77	36.95	25.20	29.77	.2984	.0000	.0241	.0000	.0090	.9974	.00	.00	64.83	67.86	-794.1	-1074.8
15	-7.50	5.67	33.39	26.69	30.45	.2644	.0000	.0207	.0000	.0078	.9977	.00	.00	64.54	67.71	-823.0	-1081.2
30	-15.33	5.48	24.12	29.93	31.50	.2028	.0000	.0192	.0000	.0073	.9978	.00	.00	64.63	67.77	-907.6	-1100.4
50	-17.59	5.49	20.93	29.61	30.61	.1777	.0000	.0205	.0000	.0080	.9978	.00	.00	66.34	68.87	-964.5	-1126.1
70	-15.99	5.64	22.45	27.99	29.25	.1887	.0000	.0333	.0000	.0133	.9968	.00	.00	67.86	70.03	-986.0	-1151.7
85	-14.18	6.32	25.11	25.11	26.38	.2210	.0000	.0682	.0000	.0277	.9944	.00	.00	70.13	72.02	-1001.7	-1171.0
90	-13.71	6.71	26.10	23.95	25.20	.2345	.0000	.0838	.0000	.0342	.9936	.00	.00	71.06	72.82	-1008.0	-1177.4
95	-14.24	7.22	26.46	23.38	24.72	.2361	.0000	.0846	.0000	.0348	.9938	.00	.00	71.60	73.20	-1015.7	-1183.8

NCORR INLET RPM	WCORR INLET LBM/SEC	TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC1/A1 LBM/SEC SQFT	PT/PT LOCAL
10668.	20.23	1.0696	1.1014	40.16	41.02	25.99	.9968

TABLE 3-VIII
BLADE-ELEMENT AND OVERALL PERFORMANCE
67 PERCENT SPEED, POINT NUMBER 02, SI UNITS

ROTOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	.0456	.0253	110.1	139.0	110.1	101.1	.0	95.3	.0000	.7557	.3277	.3551	324.6	325.6	1.0205	.7354	342.4	251.6
10	.0470	.0277	110.4	138.4	110.4	102.0	.0	93.5	.0000	.7422	.3290	.3937	326.7	327.6	1.0271	.7264	344.9	255.3
15	.0453	.0283	110.9	138.9	110.9	105.7	.0	89.1	.0000	.7007	.3303	.3945	328.8	329.5	1.0335	.7489	347.0	262.6
30	.0316	.0225	112.2	138.8	112.2	117.3	.0	74.1	.0000	.5635	.3344	.3988	335.0	335.4	1.0526	.8226	353.3	286.4
50	-.0033	-.0001	113.2	137.2	113.2	122.4	.0	63.0	.0000	.4753	.3374	.3976	343.3	343.2	1.0772	.8827	361.5	305.8
70	-.0446	-.0281	112.7	134.9	112.7	118.8	.0	63.0	.0000	.4877	.3360	.3876	351.5	351.0	1.1001	.8979	369.2	311.5
85	-.0638	-.0420	111.6	126.9	111.6	109.4	.0	64.3	.0000	.5324	.3325	.3648	357.8	356.8	1.1165	.8976	374.8	312.3
90	-.0754	-.0444	111.2	123.2	111.2	104.8	.0	64.8	.0000	.5536	.3312	.3537	359.8	358.8	1.1219	.8959	376.6	312.1
95	-.0782	-.0439	110.8	122.6	110.8	104.3	.0	64.6	.0030	.5544	.3301	.3519	361.9	360.7	1.1274	.9011	378.5	314.0

%SPAN	INCS RADIAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P 1OT-ST	%EFF-A 1OT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.0948	.1395	.0979	.0868	24.82	23.36	.3484	.0000	.3871	.0000	.0460	1.1624	41.96	40.70	1.2439	1.1571	-324.6	-230.3
10	.0963	.1404	.0961	.0849	24.89	23.61	.3404	.0000	.3758	.0000	.0446	1.1630	42.62	41.36	1.2448	1.1599	-326.7	-234.0
15	.0971	.1408	.0880	.0887	24.98	24.61	.3200	.0000	.3459	.0000	.0416	1.1652	44.95	43.72	1.2455	1.1568	-328.8	-240.4
30	.0968	.1386	.0638	.0988	25.25	27.82	.2503	.0000	.2433	.0000	.0303	1.1719	54.67	53.62	1.2475	1.1487	-335.0	-261.3
50	.0928	.1269	.0493	.0934	25.45	29.41	.2084	.0000	.1701	.0000	.0212	1.1741	63.27	62.39	1.2522	1.1588	-343.3	-280.2
70	.0870	.1113	.0389	.0808	25.35	28.41	.2105	.0000	.1860	.0000	.0226	1.1665	59.39	58.47	1.2604	1.1796	-351.5	-288.0
85	.0796	.0974	.0514	.0554	25.13	25.93	.2220	.0000	.2215	.0000	.0251	1.1499	51.55	50.95	1.2684	1.2130	-357.8	-292.5
90	.0755	.0916	.0622	.0428	25.04	24.77	.2270	.0000	.2356	.0000	.0251	1.1424	48.93	47.92	1.2711	1.2283	-359.8	-294.0
95	.0706	.0841	.0608	.0414	24.97	24.60	.2260	.0000	.2375	.0000	.0258	1.1402	48.15	47.15	1.2737	1.2323	-361.9	-296.2

TT/TI INLET	PT/PI INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.0844	1.1641	52.58	53.61

STATOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	-.0064	-.0042	137.6	117.4	99.2	117.4	95.3	.0	.7655	.0000	.3911	.3323	325.6	325.6	.7129	.9601	250.4	346.1
10	-.0144	-.0082	137.5	118.0	100.7	118.0	93.6	.0	.7484	.0000	.3911	.3343	327.6	327.6	1.7248	.9866	254.8	348.2
15	-.0199	-.0103	138.1	120.2	105.1	120.2	89.2	.0	.7043	.0000	.3938	.3417	329.5	329.5	.7478	.9973	262.3	350.8
30	-.0272	-.0130	140.1	125.9	118.8	125.5	74.1	.0	.5581	.0000	.4025	.3598	335.4	335.4	.8246	1.0264	287.0	358.1
50	-.0231	-.0101	139.9	127.3	124.9	127.3	62.9	.0	.4664	.0000	.4041	.3668	343.2	343.2	1.8865	1.0548	306.9	366.1
70	-.0153	-.0057	135.0	122.8	119.3	122.8	63.0	.0	.4861	.0000	.3890	.3532	351.1	351.1	.8986	1.0693	311.7	371.9
85	-.0105	-.0028	124.4	109.8	106.4	109.8	64.4	.0	.5453	.0000	.3574	.3145	356.9	356.5	.8942	1.0697	311.3	373.5
90	-.0087	-.0018	119.9	104.3	100.9	104.3	64.8	.0	.5706	.0000	.3440	.2984	358.9	358.9	.8918	1.0689	310.9	373.7
95	-.0062	-.0005	118.3	102.7	99.2	102.7	64.6	.0	.5772	.0000	.3392	.2935	360.8	360.8	.8958	1.0726	312.4	375.2

%SPAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P 1OT-ST	%EFF-A 1OT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.0364	.1047	.7655	22.94	27.59	.4039	.0000	.0487	.0000	.0181	.9951	.00	.00	1.1643	1.2248	-230.3	-325.6
10	.0262	.1007	.7484	23.35	27.78	.3951	.0000	.0465	.0000	.0174	.9953	.00	.00	1.1643	1.2251	-234.0	-327.6
15	-.0094	.0989	.7043	24.48	28.46	.3724	.0000	.0335	.0000	.0126	.9966	.00	.00	1.1588	1.2211	-240.3	-329.5
30	-.1305	.0959	.5581	28.13	30.19	.3062	.0000	.0172	.0000	.0066	.9982	.00	.00	1.1441	1.2127	-261.3	-335.4
50	-.2057	.0957	.4664	29.94	30.89	.2658	.0000	.0196	.0000	.0077	.9979	.00	.00	1.1515	1.2156	-280.3	-343.2
70	-.1847	.0984	.4861	28.52	29.64	.2757	.0000	.0331	.0000	.0132	.9967	.00	.00	1.1780	1.2342	-288.0	-351.1
85	-.1402	.1103	.5453	25.27	26.28	.3279	.0000	.0774	.0000	.0314	.9935	.00	.00	1.2220	1.2723	-292.5	-356.5
90	-.1239	.1171	.5706	23.92	24.89	.3510	.0000	.0967	.0000	.0395	.9924	.00	.00	1.2401	1.2879	-294.1	-358.9
95	-.1330	.1261	.5772	23.49	24.47	.3566	.0000	.1024	.0000	.0421	.9922	.00	.00	1.2478	1.2536	-296.3	-360.8

NCORR INLET RAD/SEC	WCORR INLET KG/SEC	TT/TI INLET	PT/PI INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC1/A1 KG/SEC SQM	PT/PI LOCAL
1116.34	8.985	1.0844	1.1597	51.25	52.29	118.76	.9962

TABLE 3-VIII (Cont'd)
BLADE-ELEMENT AND OVERALL PERFORMANCE
67 PERCENT SPEED, POINT NUMBER 02, ENGLISH UNITS

ROTOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	2.512	1.451	361.1	455.9	361.1	331.7	.0	312.6	.00	43.30	.3278	.3951	1065.0	1068.4	1.0209	.7154	1124.6	825.3
10	2.691	1.588	362.3	454.0	362.3	334.6	.0	306.9	.00	42.52	.3290	.3937	1071.8	1074.8	1.0271	.7264	1131.4	837.6
15	2.593	1.624	363.8	454.4	363.8	346.8	.0	292.4	.00	40.15	.3303	.3949	1078.6	1081.2	1.0335	.7489	1138.3	861.6
30	1.812	1.289	368.2	455.5	368.2	384.9	.0	243.2	.00	32.29	.3344	.3988	1099.0	1100.4	1.0526	.8226	1159.0	939.6
50	-.190	-.007	371.5	451.8	371.5	401.7	.0	206.7	.00	27.23	.3374	.3976	1126.2	1125.9	1.0772	.8827	1185.9	1003.2
70	-2.554	-1.610	369.9	441.1	369.9	389.7	.0	206.7	.00	27.94	.3360	.3876	1153.4	1151.5	1.1001	.8979	1211.2	1022.1
85	-3.997	-2.409	366.2	416.4	366.2	358.9	.0	211.1	.00	30.50	.3325	.3648	1173.7	1170.7	1.1165	.8976	1229.5	1024.7
90	-4.322	-2.543	364.8	404.3	364.8	344.0	.0	212.6	.00	31.72	.3312	.3537	1180.5	1177.1	1.1219	.8959	1235.6	1024.1
95	-4.482	-2.514	363.6	402.3	363.6	342.1	.0	211.8	.00	31.77	.3301	.3519	1187.3	1183.5	1.1274	.9011	1241.7	1030.2

%SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	5.43	7.99	5.61	4.97	24.82	23.36	.3484	.0000	.3871	.0000	.0460	1.1628	41.96	40.70	71.27	66.30	-1065.0	-755.7
10	5.52	8.05	5.50	4.87	24.89	23.61	.3404	.0000	.3758	.0000	.0448	1.1630	42.62	41.36	71.32	66.45	-1071.8	-767.9
15	5.56	8.06	5.04	5.08	24.98	24.61	.3200	.0000	.3459	.0000	.0416	1.1652	44.95	43.72	71.36	66.28	-1078.6	-788.7
30	5.55	7.94	3.66	5.66	25.25	27.82	.2503	.0000	.2433	.0000	.0303	1.1719	54.67	53.62	71.40	65.82	-1099.0	-857.1
50	5.32	7.27	2.82	5.35	25.45	29.41	.2084	.0000	.1701	.0000	.0212	1.1741	63.27	62.39	71.75	66.39	-1126.2	-919.2
70	4.98	6.38	2.23	4.63	25.35	28.41	.2105	.0050	.1860	.0000	.0226	1.1665	59.39	58.47	72.22	67.59	-1153.4	-944.8
85	4.56	5.58	2.94	3.17	25.13	25.93	.2220	.0000	.2215	.0000	.0251	1.1499	51.95	50.95	72.67	69.50	-1173.7	-959.7
90	4.33	5.25	3.56	2.45	25.04	24.77	.2270	.0000	.2356	.0000	.0257	1.1424	48.93	47.92	72.83	70.37	-1180.5	-964.6
95	4.05	4.82	3.49	2.37	24.97	24.60	.2280	.0000	.2379	.0000	.0258	1.1402	48.15	47.15	72.98	70.60	-1187.3	-971.7

TT/TI INLET	PT/PI INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.0844	1.1641	52.58	53.61

STATOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	-.369	-.243	451.3	385.1	325.3	385.1	312.7	.0	43.86	.00	.3911	.3323	1068.4	1068.4	.7129	.9801	822.8	1135.7
10	-.823	-.468	451.1	387.1	330.5	387.1	306.9	.0	42.88	.00	.3911	.3343	1074.8	1074.8	.7248	.9866	836.0	1142.4
15	-1.138	-.593	453.2	394.4	344.8	394.4	292.8	.0	40.36	.00	.3938	.3417	1081.2	1081.2	.7478	.9971	860.6	1150.9
30	-1.556	-.746	459.6	411.9	389.7	411.9	243.2	.0	31.97	.00	.4025	.3598	1100.4	1100.4	.8246	1.0264	941.6	1175.0
50	-1.322	-.579	459.0	417.7	409.9	417.7	206.4	.0	26.72	.00	.4041	.3668	1126.1	1126.1	.8865	1.0548	1006.9	1201.1
70	-.877	-.324	442.8	403.0	391.5	403.0	206.9	.0	27.85	.00	.3890	.3532	1151.7	1151.7	.8986	1.0693	1022.8	1220.2
85	-.604	-.163	408.2	360.3	349.1	360.3	211.3	.0	31.25	.00	.3579	.3145	1171.0	1171.0	.8942	1.0697	1021.4	1225.3
90	-.496	-.104	393.5	342.3	331.2	342.3	212.6	.0	32.69	.00	.3440	.2984	1177.4	1177.4	.8918	1.0689	1020.1	1226.1
95	-.357	-.030	388.2	336.8	325.3	336.8	211.8	.0	33.07	.00	.3392	.2935	1183.8	1183.8	.8958	1.0726	1025.0	1230.8

%SPAN	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	2.08	6.00	43.86	22.94	27.59	.4039	.0000	.0487	.0000	.0181	.9951	.00	.00	66.71	70.18	-755.7	-1068.4
10	1.50	5.77	42.88	23.35	27.78	.3961	.0000	.0465	.0000	.0174	.9953	.00	.00	66.71	70.19	-767.8	-1074.8
15	-.54	5.66	40.36	24.48	28.46	.3724	.0000	.0335	.0000	.0126	.9966	.00	.00	66.40	69.96	-788.4	-1081.2
30	-7.48	5.49	31.97	28.13	30.19	.3082	.0000	.0172	.0000	.0066	.9982	.00	.00	65.55	69.46	-857.2	-1100.4
50	-11.79	5.49	26.72	29.94	30.89	.2658	.0000	.0196	.0000	.0077	.9979	.00	.00	65.99	69.65	-919.7	-1126.1
70	-10.58	5.64	27.85	28.52	29.64	.2767	.0000	.0331	.0000	.0132	.9967	.00	.00	67.43	70.71	-944.9	-1151.7
85	-8.03	6.32	31.25	25.27	26.28	.3279	.0000	.0774	.0000	.0314	.9935	.00	.00	70.01	72.90	-959.7	-1171.0
90	-7.10	6.71	32.69	23.92	24.89	.3510	.0000	.0967	.0000	.0395	.9924	.00	.00	71.06	73.79	-964.8	-1177.4
95	-7.62	7.22	33.07	23.49	24.47	.3566	.0000	.1024	.0000	.0421	.9922	.00	.00	71.49	74.12	-972.0	-1183.8

NCORR INLET RPM	WCORR INLET LBM/SEC	TT/TI INLET	PT/PI INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WCI/AI LBM/SEC SQFT	PT/PI LOCAL
10660.	19.81	1.0844	1.1537	51.25	52.29	24.32	.9962

TABLE 3-IX
BLADE-ELEMENT AND OVERALL PERFORMANCE
67 PERCENT SPEED, POINT NUMBER 03, SI UNITS

ROTOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	.0461	.0257	107.8	136.9	107.8	95.9	.0	97.6	.0000	.7945	.3210	.3887	324.7	325.7	1.0187	.7025	342.1	247.4
10	.0480	.0285	108.2	136.6	108.2	97.2	.0	96.0	.0000	.7794	.3222	.3881	326.7	327.6	1.0250	.7136	344.2	251.2
15	.0471	.0297	108.6	136.6	108.6	100.2	.0	92.7	.0000	.7466	.3236	.3888	328.8	329.6	1.0314	.7319	346.3	257.2
30	.0363	.0262	110.0	137.5	110.0	110.7	.0	81.4	.0000	.6339	.3279	.3933	335.0	335.4	1.0506	.7928	352.6	277.1
50	.0022	.0047	111.3	138.9	111.3	119.1	.0	71.4	.0000	.5401	.3317	.3993	343.3	343.7	1.0755	.8532	360.9	296.8
70	-.0418	-.0258	111.1	136.7	111.1	116.4	.0	71.5	.0000	.5509	.3310	.3923	351.6	351.0	1.0987	.8692	368.7	302.8
85	-.0691	-.0415	110.0	128.7	110.0	106.1	.0	72.8	.0000	.6025	.3278	.3684	357.8	356.9	1.1152	.8678	374.3	303.2
90	-.0751	-.0441	109.6	124.9	109.6	101.1	.0	73.2	.0000	.6267	.3265	.3569	359.9	358.8	1.1207	.8659	376.2	303.0
95	-.0781	-.0438	109.2	124.4	109.2	100.7	.0	73.0	.0000	.6275	.3254	.3554	361.9	360.8	1.1262	.8711	378.1	304.9

%SPAN	INCS RADIAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.1011	.1458	.1136	.0774	24.39	22.75	.3634	.0000	.3589	.0000	.0811	1.1928	48.00	46.68	1.2502	1.1728	-324.7	-228.0
10	.1026	.1467	.1098	.0774	24.46	23.11	.3533	.0000	.3478	.0000	.0400	1.1939	48.77	47.46	1.2511	1.1736	-326.7	-231.6
15	.1033	.1470	.1019	.0810	24.55	23.94	.3374	.0000	.3251	.0000	.0379	1.1959	50.61	49.34	1.2517	1.1707	-328.8	-236.9
30	.1028	.1446	.0749	.0937	24.84	26.84	.2844	.0000	.2455	.0000	.0299	1.2033	58.27	57.16	1.2534	1.1597	-335.0	-254.0
50	.0979	.1320	.0483	.0995	25.09	29.25	.2393	.0000	.1732	.0000	.0217	1.2110	66.86	65.95	1.2573	1.1578	-343.3	-271.8
70	.0913	.1156	.0353	.0887	25.05	28.50	.2405	.0000	.1868	.0000	.0229	1.2061	63.92	62.95	1.2648	1.1761	-351.6	-279.5
85	.0837	.1015	.0518	.0591	24.83	25.74	.2527	.0000	.2232	.0000	.0252	1.1888	57.05	55.97	1.2725	1.2134	-357.8	-284.0
90	.0795	.0957	.0644	.0447	24.75	24.46	.2578	.0000	.2373	.0000	.0257	1.1809	54.30	53.20	1.2751	1.2304	-359.9	-285.6
95	.0746	.0881	.0627	.0435	24.68	24.32	.2566	.0000	.2395	.0000	.0258	1.1791	53.67	52.56	1.2777	1.2341	-361.9	-287.7

TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.0930	1.1997	57.41	58.50

STATOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	-.0054	-.0037	135.1	108.5	93.3	108.5	97.7	.0	.8084	.0000	.3834	.3065	325.7	325.7	.6993	.9695	246.4	343.3
10	-.0123	-.0071	135.3	109.6	95.3	109.6	96.0	.0	.7894	.0000	.3842	.3097	327.6	327.6	.7113	.9764	250.4	345.5
15	-.0172	-.0091	135.8	111.8	99.0	111.8	92.8	.0	.7537	.0000	.3864	.3166	329.6	329.6	.7301	.9858	256.6	348.0
30	-.0239	-.0118	138.3	118.3	111.7	118.3	81.4	.0	.6303	.0000	.3957	.3373	335.4	335.4	.7940	1.0140	277.5	355.7
50	-.0209	-.0093	140.9	123.9	121.5	123.9	71.3	.0	.5309	.0000	.4053	.3550	343.3	343.3	.8567	1.0460	297.8	364.9
70	-.0140	-.0051	137.5	120.5	117.4	120.5	71.6	.0	.5475	.0000	.3947	.3446	351.1	351.1	.8704	1.0618	303.2	371.2
85	-.0096	-.0024	126.8	106.8	103.7	106.8	72.9	-.0	.6139	-.0000	.3627	.3044	356.9	356.5	.8652	1.0619	302.5	372.6
90	-.0079	-.0015	122.3	101.1	97.9	101.1	73.2	-.0	.6422	-.0000	.3492	.2877	358.9	358.9	.8626	1.0611	302.0	372.9
95	-.0059	-.0004	120.9	99.7	96.3	99.7	73.0	-.0	.6489	-.0000	.3451	.2837	360.9	360.9	.8667	1.0650	303.5	374.4

%SPAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.0793	.1048	.8084	22.18	26.31	.4651	.0000	.0650	.0000	.0241	.9937	.00	.00	1.1825	1.2492	-228.0	-325.7
10	.0673	.1008	.7894	22.69	26.61	.4591	.0000	.0616	.0000	.0230	.9940	.00	.00	1.1806	1.2480	-231.6	-327.6
15	.0399	.0989	.7537	23.65	27.25	.4338	.0000	.0495	.0000	.0186	.9952	.00	.00	1.1751	1.2439	-236.8	-329.6
30	-.0584	.0958	.6303	27.04	29.20	.3695	.0000	.0268	.0000	.0102	.9973	.00	.00	1.1567	1.2317	-254.0	-335.4
50	-.1412	.0957	.5309	29.77	30.86	.3190	.0000	.0223	.0000	.0087	.9976	.00	.00	1.1506	1.2245	-271.9	-343.3
70	-.1233	.0984	.5475	28.70	29.86	.3321	.0000	.0419	.0000	.0158	.9957	.00	.00	1.1732	1.2403	-279.5	-351.1
85	-.0716	.1103	.6139	25.20	26.25	.3914	.0000	.0856	.0000	.0348	.9925	.00	.00	1.2209	1.2801	-284.1	-356.5
90	-.0523	.1171	.6422	23.74	24.78	.4178	.0000	.1035	.0000	.0423	.9916	.00	.00	1.2406	1.2962	-285.7	-358.9
95	-.0613	.1261	.6489	23.34	24.43	.4231	.0000	.1078	.0000	.0443	.9915	.00	.00	1.2475	1.3011	-287.8	-360.9

NCORR INLET RAD/SEC	WCORR INLET KG/SEC	TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC1/A1 KG/SEC SQM	PT/PT LOCAL
1116.85	8.850	1.0930	1.1941	55.88	56.99	114.03	.9953

TABLE 3-IX (Cont'd)
BLADE-ELEMENT AND OVERALL PERFORMANCE
67 PERCENT SPEED, POINT NUMBER 03, ENGLISH UNITS

ROTOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	2.642	1.472	353.7	449.0	353.7	314.5	.0	320.3	.00	45.52	.3210	.3887	1065.1	1066.4	1.0187	.7025	1122.3	811.5
10	2.760	1.631	354.9	448.1	354.9	318.8	.0	314.9	.00	44.65	.3222	.3881	1071.5	1074.8	1.0250	.7136	1129.2	824.0
15	2.696	1.701	356.4	448.3	356.4	328.8	.0	304.1	.00	42.77	.3236	.3888	1078.7	1081.2	1.0314	.7319	1136.1	843.8
30	2.077	1.501	361.0	451.1	361.0	363.3	.0	267.0	.00	36.32	.3279	.3933	1099.1	1100.4	1.0506	.7928	1156.9	909.2
50	.124	.269	365.2	455.7	365.2	390.8	.0	234.3	.00	30.94	.3317	.3953	1126.3	1126.0	1.0755	.8532	1184.0	973.6
70	-2.396	-1.480	364.4	448.3	364.4	382.0	.0	234.7	.00	31.56	.3310	.3923	1153.5	1151.6	1.0987	.8692	1209.7	993.4
85	-3.957	-2.378	361.0	422.3	361.0	348.0	.0	239.0	.00	34.52	.3278	.3644	1173.8	1170.8	1.1152	.8678	1228.1	994.9
90	-4.302	-2.529	359.6	409.7	359.6	331.8	.0	240.3	.00	35.91	.3265	.3569	1180.6	1177.2	1.1207	.8659	1234.2	994.0
95	-4.473	-2.507	358.4	408.1	358.4	330.4	.0	239.6	.00	35.95	.3254	.3554	1187.4	1183.6	1.1262	.8711	1240.3	1000.2

%SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	%EFF-P 1D1-ST	%EFF-A 1D1-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	5.79	8.35	6.51	4.43	24.39	22.75	.3634	.0000	.3589	.0000	.0411	1.1928	48.00	46.68	71.63	67.20	-1065.1	-748.1
10	5.88	8.41	6.29	4.44	24.46	23.11	.3533	.0000	.3478	.0000	.0400	1.1939	48.77	47.46	71.68	67.24	-1071.9	-759.9
15	5.92	8.42	5.84	4.69	24.55	23.94	.3374	.0000	.3251	.0000	.0379	1.1959	50.61	49.34	71.72	67.08	-1078.7	-777.1
30	5.89	8.29	4.29	5.37	24.84	26.84	.2844	.0000	.2455	.0000	.0299	1.2033	58.27	57.16	71.82	66.45	-1099.1	-833.4
50	5.61	7.56	2.77	5.70	25.09	29.25	.2393	.0000	.1732	.0000	.0217	1.2110	66.86	65.95	72.04	66.34	-1126.3	-891.8
70	5.23	6.63	2.02	5.08	25.05	28.50	.2405	.0000	.1868	.0000	.0229	1.2061	63.92	62.95	72.47	67.38	-1153.5	-917.0
85	4.80	5.81	2.97	3.38	24.83	25.74	.2527	.0000	.2232	.0000	.0252	1.1888	57.05	55.97	72.91	69.52	-1173.8	-931.9
90	4.56	5.48	3.69	2.56	24.75	24.46	.2578	.0000	.2373	.0000	.0257	1.1809	54.30	53.20	73.06	70.50	-1180.6	-937.0
95	4.28	5.05	3.59	2.49	24.68	24.32	.2566	.0000	.2395	.0000	.0258	1.1791	53.67	52.56	73.20	70.71	-1187.4	-944.0

TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.0930	1.1997	57.41	58.50

STATOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	-.309	-.213	443.2	356.0	306.0	356.0	320.4	-.0	46.32	-.00	.3834	.3065	1068.5	1068.5	.6993	.9695	808.2	1126.2
10	-.703	-.409	443.8	359.5	312.5	359.5	315.0	.0	45.23	.00	.3842	.3097	1074.9	1074.9	.7113	.9764	821.6	1133.4
15	-.983	-.524	445.6	366.6	324.6	366.6	304.5	.0	43.18	.00	.3864	.3166	1081.3	1081.3	.7301	.9858	841.9	1141.8
30	-1.370	-.674	453.7	388.2	366.4	388.2	267.2	.0	36.11	.00	.3957	.3373	1100.5	1100.5	.7940	1.0140	910.3	1167.0
50	-1.196	-.536	462.3	406.4	398.7	406.4	234.1	.0	30.42	.00	.4053	.3550	1126.2	1126.2	.8567	1.0460	977.1	1197.3
70	-.804	-.295	451.1	395.2	385.1	395.2	234.8	.0	31.37	.00	.3947	.3445	1151.8	1151.8	.8704	1.0638	994.6	1217.8
85	-.550	-.139	416.0	350.4	340.2	350.4	239.1	-.0	35.17	-.00	.3627	.3044	1171.1	1171.1	.8652	1.0619	992.5	1222.6
90	-.453	-.084	401.1	331.7	321.2	331.7	240.2	-.0	36.80	-.00	.3492	.2877	1177.5	1177.5	.8626	1.0611	990.8	1223.3
95	-.335	-.021	396.5	327.2	315.5	327.2	239.6	-.0	37.18	-.00	.3451	.2837	1183.9	1183.9	.8667	1.0650	995.8	1228.3

%SPAN	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	%EFF-P 1D1-ST	%EFF-A 1D1-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	4.56	6.00	46.32	22.18	26.31	.4651	.0000	.0650	.0000	.0241	.9937	.00	.00	67.75	71.57	-748.1	-1058.5
10	3.86	5.78	45.23	22.69	26.61	.4551	.0000	.0616	.0000	.0230	.9940	.00	.00	67.64	71.51	-759.8	-1074.9
15	2.29	5.66	43.18	23.65	27.25	.4338	.0000	.0495	.0000	.0186	.9952	.00	.00	67.33	71.27	-776.8	-1081.3
30	-3.35	5.49	36.11	27.04	29.20	.3695	.0000	.0268	.0000	.0102	.9973	.00	.00	66.27	70.57	-833.3	-1100.5
50	-8.09	5.49	30.42	29.77	30.86	.3190	.0000	.0223	.0000	.0087	.9976	.00	.00	65.92	70.16	-892.1	-1126.2
70	-7.07	5.64	31.37	28.70	29.86	.3321	.0000	.0419	.0000	.0168	.9957	.00	.00	67.22	71.06	-917.0	-1151.8
85	-4.11	6.32	35.17	25.20	26.25	.3914	.0000	.0856	.0000	.0348	.9925	.00	.00	69.95	73.34	-932.0	-1171.1
90	-2.99	6.71	36.80	23.74	24.78	.4128	.0000	.1035	.0000	.0423	.9916	.00	.00	71.08	74.27	-937.3	-1177.5
95	-3.51	7.22	37.18	23.34	24.43	.4231	.0000	.1078	.0000	.0443	.9915	.00	.00	71.50	74.55	-944.3	-1183.9

NCORR INLET RPM	WCORR INLET LBM/SEC	TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC1/A1 LBM/SEC SQFT
10665.	19.51	1.0930	1.1941	55.88	56.59	23.36

PT/PT LOCAL
.9953

TABLE 3-X
BLADE-ELEMENT AND OVERALL PERFORMANCE
67 PERCENT SPEED, POINT NUMBER 04, SI UNITS

ROTOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	.0544	.0303	100.6	138.6	100.6	78.2	.0	114.4	.0000	.9714	.2992	.3904	324.7	325.7	1.0108	.6344	339.5	225.2
10	.0646	.0377	101.0	138.6	101.0	80.4	.0	112.9	.0000	.9518	.3003	.3905	326.7	327.6	1.0171	.6461	342.0	229.3
15	.0683	.0439	101.6	138.8	101.6	83.6	.0	110.6	.0000	.9240	.3021	.3913	328.8	329.6	1.0236	.6609	344.1	234.3
30	.0639	.0479	103.7	140.7	103.7	99.8	.0	99.0	.0000	.7815	.3085	.3931	335.0	335.4	1.0436	.7277	350.7	256.6
50	.0277	.0272	106.2	143.1	106.2	113.1	.0	87.6	.0000	.6599	.3162	.4081	343.3	343.2	1.0698	.7972	359.3	279.5
70	-.0246	-.0110	107.1	143.3	107.1	114.0	.0	86.8	.0000	.6505	.3188	.4084	351.6	351.0	1.0943	.8203	367.5	287.8
85	-.0612	-.0356	106.5	137.3	106.5	104.5	.0	89.0	.0000	.7059	.3170	.3900	357.8	356.9	1.1114	.8170	373.3	287.6
90	-.0699	-.0405	106.1	133.7	106.1	99.1	.0	89.8	.0000	.7366	.3160	.3792	359.9	358.8	1.1170	.8130	375.2	286.7
95	-.0755	-.0420	105.8	132.9	105.8	98.3	.0	89.4	.0000	.7383	.3149	.3767	361.9	360.8	1.1225	.8183	377.1	288.6

%SPAN	INCS RADIAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.1213	.1661	.1573	.0539	23.01	18.97	.4370	.0000	.4032	.0000	.0413	1.2361	49.67	48.15	1.2703	1.2165	-324.7	-211.2
10	.1230	.1671	.1489	.0586	23.09	19.56	.4276	.0000	.3921	.0000	.0408	1.2379	50.38	48.87	1.2711	1.2127	-326.7	-214.8
15	.1233	.1670	.1379	.0648	23.21	20.39	.4152	.0000	.3763	.0000	.0401	1.2401	51.48	49.59	1.2712	1.2064	-328.8	-218.9
30	.1205	.1624	.0868	.0993	23.65	24.76	.3542	.0000	.2924	.0000	.0346	1.2515	58.61	57.28	1.2707	[illegible]	-335.0	-236.4
50	.1115	.1456	.0447	.1167	24.17	28.55	.2980	.0000	.2058	.0000	.0259	1.2652	67.55	66.46	1.2707	1.1541	-343.3	-255.6
70	.1015	.1258	.0223	.1118	24.34	29.81	.2920	.0000	.2027	.0000	.0256	1.2686	67.47	66.36	1.2752	1.1634	-351.6	-264.3
85	.0927	.1104	.0372	.0926	24.22	26.20	.3065	.0000	.2350	.0000	.0281	1.2551	61.96	60.73	1.2816	1.1990	-357.8	-267.9
90	.0883	.1044	.0520	.0660	24.15	24.75	.3136	.0000	.2555	.0000	.0287	1.2474	59.42	58.14	1.2840	1.2180	-359.9	-269.0
95	.0833	.0968	.0519	.0631	24.08	24.53	.3120	.0000	.2574	.0000	.0286	1.2451	58.87	57.59	1.2864	1.2233	-361.9	-271.3

TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.1122	1.2559	59.96	61.22

STATOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	-.0089	-.0060	135.4	88.5	72.1	88.5	114.5	.0	1.0090	.0000	.3809	.2471	325.7	325.7	.6281	.9422	223.2	337.5
10	-.0193	-.0117	135.7	89.0	75.0	89.0	113.0	.0	.9846	.0000	.3820	.2486	327.6	327.6	.6404	.9483	227.4	339.5
15	-.0287	-.0148	136.1	90.7	78.4	90.7	111.2	.0	.9568	.0000	.3834	.2537	329.6	329.6	.6535	.9562	232.1	341.8
30	-.0284	-.0141	140.0	101.4	98.3	101.4	99.5	.0	.7918	.0000	.3970	.2855	335.4	335.4	.7246	.9867	255.6	350.5
50	-.0183	-.0090	145.2	115.9	115.7	115.9	87.8	.0	.6491	.0000	.4143	.3288	343.3	343.3	.8002	1.0275	280.5	362.3
70	-.0099	-.0039	145.9	118.9	117.4	118.9	86.7	-.0	.6364	.0000	.4162	.3371	351.1	352.1	.8249	1.0510	289.2	370.7
85	-.0057	-.0009	138.4	108.5	106.0	108.5	88.9	.0	.6991	.0000	.3933	.3065	356.5	356.5	.8150	1.0538	288.3	373.1
90	-.0046	-.0001	134.1	102.9	99.6	102.9	89.8	.0	.7337	.0000	.3804	.2902	358.9	358.9	.8138	1.0527	286.9	373.4
95	-.0042	.0003	132.5	101.9	97.8	101.9	89.4	.0	.7406	.0000	.3757	.2873	360.9	360.9	.8181	1.0571	288.5	375.0

%SPAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.2804	.1051	1.0090	17.55	22.21	.6600	.0000	.1191	.0000	.0442	.9887	.00	.00	1.2422	1.3054	-211.2	-325.7
10	.2635	.1014	.9846	18.30	22.36	.6548	.0000	.1286	.0000	.0480	.9877	.00	.00	1.2348	1.3055	-214.7	-327.6
15	.2433	.0938	.9568	19.16	22.84	.6403	.0000	.1267	.0000	.0476	.9878	.00	.00	1.2264	1.3023	-218.4	-329.6
30	.1032	.0958	.7918	24.38	25.84	.5477	.0000	.1005	.0000	.0384	.9897	.00	.00	1.1761	1.2774	-235.9	-335.4
50	-.0233	.0957	.6491	29.10	29.95	.4329	.0000	.0425	.0000	.0166	.9953	.00	.00	1.1457	1.2451	-255.5	-343.3
70	-.0351	.0988	.6364	29.56	30.67	.4231	.0000	.0428	.0000	.0171	.9952	.00	.00	1.1530	1.2483	-264.4	-351.1
85	.0139	.1099	.6991	26.54	27.77	.4724	.0000	.0772	.0000	.0314	.9922	.00	.00	1.1943	1.2757	-268.0	-356.9
90	.0399	.1171	.7337	24.87	26.24	.5064	.0000	.0896	.0000	.0366	.9915	.00	.00	1.2162	1.2915	-269.1	-358.9
95	.0307	.1261	.7406	24.42	25.97	.5084	.0000	.0857	.0000	.0352	.9920	.00	.00	1.2245	1.2956	-271.4	-360.9

NCORR INLET RAD/SEC	WCORR INLET KG/SEC	TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC1/A1 KG/SEC SQM	PT/PT LOCAL
1116.86	8.457	1.1122	1.2456	57.77	59.05	106.42	.9919

TABLE 3-X (Cont'd)
BLADE-ELEMENT AND OVERALL PERFORMANCE
67 PERCENT SPEED, POINT NUMBER 04, ENGLISH UNITS

ROTOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	3.118	1.736	330.1	454.8	330.1	256.5	.0	375.4	.00	55.66	.2992	.3904	1065.1	1068.4	1.0108	.6344	1115.1	739.0
10	3.702	2.158	331.2	454.7	331.2	263.8	.0	370.3	.00	54.54	.3003	.3905	1071.9	1074.8	1.0171	.6461	1121.9	752.3
15	3.915	2.514	333.2	455.2	333.2	274.2	.0	363.0	.00	52.94	.3021	.3913	1078.7	1081.2	1.0236	.6609	1129.0	768.8
30	3.663	2.747	340.2	461.7	340.2	327.6	.0	324.9	.00	44.78	.3085	.3992	1099.1	1100.4	1.0436	.7277	1150.5	841.9
50	1.587	1.557	348.5	469.5	348.5	371.2	.0	287.4	.00	37.75	.3162	.4081	1126.3	1126.0	1.0658	.7972	1179.0	917.1
70	-1.408	-.632	351.2	470.1	351.2	374.1	.0	284.7	.00	37.27	.3188	.4084	1153.5	1151.7	1.0943	.8203	1205.8	944.2
85	-3.504	-2.038	349.3	450.4	349.3	342.8	.0	291.8	.00	40.45	.3170	.3900	1173.8	1170.5	1.1114	.8170	1224.7	943.6
90	-4.005	-2.321	348.2	438.7	348.2	325.0	.0	294.7	.00	42.20	.3160	.3792	1180.6	1177.3	1.1170	.8130	1230.9	940.5
95	-4.324	-2.407	347.1	435.9	347.1	322.4	.0	293.4	.00	42.30	.3149	.3767	1187.4	1183.7	1.1225	.8193	1237.1	946.8

%SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	6.95	9.52	9.01	3.09	23.01	18.97	.4370	.0000	.4032	.0000	.0413	1.2361	45.57	48.15	72.78	63.70	-1065.1	-633.0
10	7.05	9.58	8.53	3.35	23.09	19.56	.4276	.0000	.3921	.0000	.0408	1.2378	50.38	48.87	72.83	69.48	-1071.9	-704.6
15	7.06	9.57	7.90	3.71	23.21	20.39	.4152	.0000	.3763	.0000	.0401	1.2401	51.48	49.99	72.84	69.12	-1078.7	-718.3
30	6.90	9.30	4.97	5.69	23.65	24.76	.3582	.0000	.2924	.0000	.0346	1.2515	58.61	57.28	72.80	67.11	-1099.1	-775.5
50	6.39	8.34	2.56	6.68	24.17	28.55	.2980	.0000	.2058	.0000	.0259	1.2652	67.55	66.46	72.81	66.12	-1126.3	-838.6
70	5.82	7.21	1.28	6.40	24.34	28.81	.2920	.0000	.2027	.0000	.0256	1.2686	67.47	66.36	73.06	66.66	-1153.5	-867.0
85	5.31	6.33	2.13	4.73	24.22	26.20	.3085	.0000	.2390	.0000	.0281	1.2551	61.96	60.73	73.43	68.70	-1173.8	-879.0
90	5.06	5.98	2.98	3.78	24.15	24.75	.3136	.0000	.2555	.0000	.0287	1.2474	59.42	58.14	73.57	69.79	-1180.6	-882.6
95	4.77	5.55	2.97	3.62	24.08	24.53	.3120	.0000	.2574	.0000	.0286	1.2451	58.87	57.59	73.71	70.09	-1187.4	-890.2

TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.1122	1.2558	59.96	61.22

STATOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	-.510	-.342	444.1	290.4	236.5	290.4	375.6	.0	57.81	.00	.3809	.2471	1068.5	1068.5	1.6281	.9422	732.2	1107.2
10	-1.106	-.668	445.1	292.0	246.1	292.0	370.6	.0	56.41	.00	.3820	.2486	1074.9	1074.9	1.6404	.9483	746.1	1113.8
15	-1.646	-.848	446.5	297.6	257.2	297.6	364.7	.0	54.82	.00	.3834	.2537	1081.3	1081.3	1.6539	.9562	761.3	1121.5
30	-1.626	-.808	459.5	332.6	322.3	332.6	326.5	.0	45.37	.00	.3970	.2855	1100.5	1100.5	.7246	.9867	838.6	1149.8
50	-1.047	-.518	476.4	380.4	379.5	380.4	287.9	.0	37.19	.00	.4143	.3288	1126.2	1126.2	.8002	1.0275	920.2	1188.7
70	-.569	-.226	478.8	390.0	385.0	390.0	284.5	-.0	36.46	.00	.4162	.3371	1151.8	1151.8	.8249	1.0510	949.0	1216.1
85	-.326	-.054	454.1	356.0	367.7	356.0	231.8	.0	40.05	.00	.3933	.3065	1171.1	1171.1	.8120	1.0538	945.7	1224.1
90	-.261	-.008	440.1	337.7	326.8	337.7	294.7	.0	42.04	.00	.3804	.2902	1177.5	1177.5	.8138	1.0527	941.4	1225.0
95	-.239	.018	434.8	334.3	320.9	334.3	283.3	.0	42.43	.00	.3757	.2873	1183.9	1183.9	.8181	1.0571	946.7	1230.2

%SPAN	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	16.06	6.02	57.81	17.55	22.21	.6600	.0000	.1131	.0000	.0442	.9887	.00	.00	71.17	74.79	-692.9	-1068.5
10	15.09	5.81	56.41	18.30	22.36	.6548	.0000	.1286	.0000	.0480	.9877	.00	.00	70.75	74.80	-704.3	-1074.9
15	13.94	5.66	54.82	19.16	22.84	.6403	.0000	.1267	.0000	.0476	.9878	.00	.00	70.27	74.61	-716.6	-1081.3
30	5.91	5.49	45.37	24.38	25.84	.5477	.0000	.1005	.0000	.0384	.9897	.00	.00	67.39	73.19	-774.0	-1100.5
50	-1.33	5.49	37.19	29.10	29.95	.4379	.0000	.0425	.0000	.0166	.9953	.00	.00	65.64	71.34	-838.3	-1126.2
70	-2.01	5.66	36.46	29.56	30.67	.4231	.0000	.0428	.0000	.0171	.9952	.00	.00	66.06	71.29	-867.3	-1151.8
85	.80	6.30	40.05	26.54	27.77	.4774	.0000	.0772	.0000	.0314	.9922	.00	.00	68.83	73.09	-879.3	-1171.1
90	2.28	6.71	42.04	24.87	26.24	.5064	.0000	.0896	.0000	.0366	.9915	.00	.00	69.69	74.00	-882.8	-1177.5
95	1.76	7.22	42.43	24.92	25.97	.5084	.0000	.0857	.0000	.0352	.9920	.00	.00	70.18	74.23	-890.6	-1183.9

NCORR INLET RPM	WCORR INLET LBM/SEC	TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC1/A1 LBM/SEC SQFT	PT/PT LOCAL
10665.	18.64	1.1122	1.2456	57.77	59.05	21.80	.9979

TABLE 3-XI
BLADE-ELEMENT AND OVERALL PERFORMANCE
67 PERCENT SPEED, POINT NUMBER 05, SI UNITS

ROTOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	.0575	.0314	95.7	141.6	95.7	72.7	.0	121.5	.0000	1.0313	.2846	.3978	324.7	325.7	1.0064	.6090	338.5	216.8
10	.0707	.0399	96.1	140.6	96.1	73.7	.0	119.7	.0000	1.0186	.2857	.3952	326.8	327.6	1.0126	.6199	340.6	220.6
15	.0776	.0481	96.7	139.7	96.7	75.2	.0	117.9	.0000	1.0029	.2875	.3923	328.8	329.6	1.0191	.6315	342.8	224.8
30	.0798	.0589	99.1	140.6	99.1	90.2	.0	107.7	.0000	.6741	.2946	.3910	335.0	335.5	1.0393	.6919	349.4	245.0
50	.0400	.0443	102.3	145.9	102.3	109.1	.0	96.9	.0000	.7259	.3044	.4145	343.3	343.3	1.0662	.7654	358.2	265.5
70	-.0070	.0047	104.0	147.7	104.0	113.4	.0	94.7	.0000	.6960	.3097	.4197	351.6	351.1	1.0917	.7964	366.7	280.3
85	-.0505	-.0270	103.9	143.2	103.9	106.0	.0	96.2	.0000	.7375	.3094	.4059	357.8	356.9	1.1053	.7975	372.6	281.4
90	-.0621	-.0343	103.7	139.9	103.7	100.9	.0	96.8	.0000	.7645	.3087	.3957	359.9	358.9	1.1150	.7947	374.5	280.9
95	-.0314	-.0391	103.4	138.9	103.4	100.0	.0	96.4	.0000	.7674	.3079	.3929	362.0	360.8	1.1207	.7995	376.5	282.7

%SPAN	INCS RADIAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P 1OT-ST	%EFF-A 1OT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.1351	.1795	.1694	.0554	22.08	17.76	.4659	.0000	.4265	.0000	.0423	1.2516	49.67	48.07	1.2840	1.2286	-324.7	-204.2
10	.1368	.1810	.1662	.0549	22.15	18.05	.4568	.0000	.4171	.0000	.0414	1.2516	50.08	48.49	1.2448	1.2299	-326.8	-207.9
15	.1371	.1808	.1615	.0549	22.28	18.44	.4470	.0000	.4060	.0000	.0405	1.2519	50.62	49.04	1.2848	1.2299	-328.8	-211.8
30	.1336	.1755	.1099	.0891	22.77	22.43	.3924	.0000	.3351	.0000	.0374	1.2611	55.95	54.49	1.2833	1.1542	-335.0	-227.8
50	.1222	.1565	.0446	.1274	23.45	27.67	.3319	.0000	.2439	.0000	.0307	1.2826	64.90	63.65	1.2813	1.1538	-343.3	-246.4
70	.1093	.1337	.0133	.1287	23.81	28.90	.3178	.0000	.2239	.0000	.0288	1.2923	66.87	65.66	1.2832	1.1544	-351.6	-256.3
85	.0991	.1168	.0224	.1037	23.79	26.85	.3281	.0000	.2503	.0000	.0305	1.2831	63.02	61.70	1.2881	1.1845	-357.8	-260.7
90	.0944	.1105	.0371	.0871	23.74	25.52	.3340	.0000	.2643	.0000	.0309	1.2757	60.93	59.57	1.2902	1.2032	-359.9	-262.1
95	.0893	.1026	.0379	.0832	23.69	25.25	.3327	.0000	.2666	.0000	.0308	1.2732	60.34	58.97	1.2925	1.2093	-362.0	-264.4

TT/T1 INLET	PT/PT INLET	%EFF-A TOTAL COM	%EFF-P TOTAL COM
1.1218	1.2754	59.14	60.51

STATOR

%SPAN	EPSI-1 RADIAN	EPSI-2 RADIAN	V-1 M/SEC	V-2 M/SEC	VM-1 M/SEC	VM-2 M/SEC	VO-1 M/SEC	VO-2 M/SEC	B-1 RADIAN	B-2 RADIAN	M-1	M-2	U-1 M/SEC	U-2 M/SEC	M'-1	M'-2	V'-1 M/SEC	V'-2 M/SEC
5	-.0108	-.0074	137.9	80.4	64.9	80.4	121.6	.0	1.0800	.0000	.3871	.2236	325.7	325.7	.6013	.9327	214.2	335.5
10	-.0232	-.0144	137.2	80.8	66.6	80.8	119.9	.0	1.0633	.0000	.3853	.2248	327.7	327.7	.6126	.9388	218.2	337.5
15	-.0355	-.0189	136.6	81.8	68.3	81.8	118.2	.0	1.0466	.0000	.3836	.2278	329.6	329.6	.6240	.9457	222.2	339.6
30	-.0342	-.0160	138.7	91.0	86.4	91.0	108.3	.0	.8978	.0000	.3914	.2549	335.5	335.5	.6650	.9732	243.1	347.6
50	-.0237	-.0119	147.6	109.8	111.3	109.8	97.0	.0	.7170	.0000	.4155	.3095	343.3	343.3	.7675	1.0163	270.3	360.4
70	-.0136	-.0060	151.2	117.5	117.9	117.5	94.7	.0	.6765	.0000	.4300	.3318	351.1	351.1	.8027	1.0454	282.3	370.3
85	-.0072	-.0018	146.4	110.8	110.3	110.8	96.2	-.0	.7376	-.0000	.4150	.3120	357.0	357.0	.8031	1.0524	283.2	373.8
90	-.0055	-.0007	142.4	106.1	104.5	106.1	96.7	-.0	.7472	-.0000	.4031	.2983	358.9	358.9	.7992	1.0522	282.3	374.3
95	-.0046	.0000	140.6	104.9	102.4	104.9	96.4	-.0	.7554	-.0000	.3980	.2949	360.9	360.9	.8026	1.0562	283.6	375.8

%SPAN	INCM RADIAN	DEV RADIAN	TURN RADIAN	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/PT1	%EFF-P 1OT-ST	%EFF-A 1OT-ST	B'-1 RADIAN	B'-2 RADIAN	VO'-1 M/SEC	VO'-2 M/SEC
5	.3576	.1052	1.0800	15.93	20.47	.7441	.0000	.1193	.0000	.0443	.9863	.00	.00	1.2678	1.3287	-204.1	-335.7
10	.3426	.1016	1.0633	16.37	20.59	.7373	.0000	.1181	.0000	.0441	.9865	.00	.00	1.2645	1.3290	-207.8	-327.7
15	.3336	.0988	1.0466	16.81	20.88	.7261	.0000	.1115	.0000	.0415	.9892	.00	.00	1.2581	1.3275	-211.4	-329.6
30	.2094	.0957	.8978	21.51	23.47	.6420	.0000	.0883	.0000	.0337	.9912	.00	.00	1.2076	1.3060	-227.2	-335.5
50	.0447	.0958	.7170	28.13	28.67	.5134	.0000	.0577	.0000	.0226	.9934	.00	.00	1.1465	1.2613	-246.3	-343.3
70	.0050	.0989	.6765	29.92	30.74	.4781	.0000	.0507	.0000	.0203	.9940	.00	.00	1.1355	1.2474	-256.5	-351.1
85	.0331	.1052	.7376	27.88	28.80	.5099	.0000	.0774	.0000	.0315	.9913	.00	.00	1.1708	1.2698	-260.8	-357.0
90	.0528	.1173	.7472	26.34	27.49	.5325	.0000	.0817	.0000	.0334	.9913	.00	.00	1.1917	1.2834	-262.2	-358.9
95	.0458	.1261	.7554	25.81	27.17	.5356	.0000	.0776	.0000	.0319	.9920	.00	.00	1.2034	1.2878	-264.5	-360.9

WCORR INLET RAD/SEC	WCORR INLET KG/SEC	TT/T1 INLET	PT/PT INLET	%EFF-A TOTAL COM	%EFF-P TOTAL COM	WC1/A1 KG/SEC SQM
1117.46	8.175	1.1218	1.2645	56.97	58.37	102.95

PT/PT LOCAL
.9914

TABLE 3-XI (Cont'd)
BLADE-ELEMENT AND OVERALL PERFORMANCE
67 PERCENT SPEED, POINT NUMBER 05, ENGLISH UNITS

ROTOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	3.292	1.801	314.1	464.6	314.1	238.6	.0	358.6	.00	59.09	.2846	.3978	1065.2	1068.6	1.0064	.6050	1110.6	711.2
10	4.051	2.289	315.2	461.4	315.2	241.9	.0	392.8	.00	59.36	.2857	.3952	1072.0	1075.0	1.0126	.6159	1117.4	723.8
15	4.444	2.754	317.2	458.5	317.2	246.6	.0	386.4	.00	57.46	.2875	.3923	1078.8	1081.4	1.0191	.6319	1124.5	737.4
30	4.570	3.373	325.0	461.2	325.0	295.8	.0	353.3	.00	50.08	.2946	.3970	1099.2	1100.6	1.0393	.6919	1146.2	803.8
50	2.752	2.536	335.6	478.8	335.6	358.1	.0	317.8	.00	41.59	.3044	.4145	1126.4	1126.2	1.0662	.7654	1175.3	884.1
70	-.399	.267	341.3	484.6	341.3	371.9	.0	310.7	.00	39.88	.3097	.4197	1153.6	1151.9	1.0917	.7964	1203.0	919.6
85	-2.395	-1.543	340.9	470.0	340.9	347.9	.0	315.8	.00	42.26	.3094	.4059	1174.0	1171.0	1.1093	.7975	1222.5	923.4
90	-3.559	-1.967	340.2	458.8	340.2	331.2	.0	317.5	.00	43.80	.3087	.3957	1180.8	1177.4	1.1150	.7947	1228.8	921.5
95	-4.091	-2.238	339.3	455.7	339.3	328.0	.0	316.4	.00	43.97	.3079	.3925	1187.5	1183.8	1.1207	.7995	1235.1	927.3

%SPAN	INCS DEGREE	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	7.74	10.31	9.71	3.17	22.08	17.76	.4659	.0000	.4269	.0000	.0423	1.2516	49.67	48.07	73.57	70.40	-1065.2	-670.0
10	7.84	10.37	9.52	3.14	22.15	18.05	.4568	.0000	.4171	.0000	.0414	1.2516	50.08	48.49	73.61	70.47	-1072.0	-682.2
15	7.85	10.36	9.25	3.14	22.28	18.44	.4470	.0000	.4060	.0000	.0405	1.2519	50.62	49.04	73.61	70.47	-1078.8	-694.9
30	7.65	10.06	6.30	5.11	22.77	22.43	.3924	.0000	.3351	.0000	.0374	1.2611	55.95	54.49	73.53	68.42	-1099.2	-747.3
50	7.00	8.96	2.56	7.30	23.45	27.67	.3319	.0000	.2439	.0000	.0307	1.2826	64.90	63.65	73.41	66.31	-1126.4	-808.4
70	6.26	7.66	.76	7.38	23.81	28.90	.3174	.0000	.2239	.0000	.0288	1.2923	66.87	65.65	73.52	66.15	-1153.6	-841.0
85	5.69	6.69	1.28	5.94	23.79	26.89	.3281	.0000	.2503	.0000	.0305	1.2831	63.02	61.70	73.80	67.87	-1174.0	-855.2
90	5.41	6.33	2.12	4.99	23.74	25.52	.3340	.0000	.2643	.0000	.0309	1.2757	60.93	59.57	73.93	68.54	-1180.8	-859.9
95	5.12	5.89	2.17	4.77	23.69	25.25	.3327	.0000	.2666	.0000	.0308	1.2732	60.34	58.57	74.05	69.29	-1187.5	-867.4

TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM
1.1218	1.2754	59.14	60.91

STATOR

%SPAN	EPSI-1 DEGREE	EPSI-2 DEGREE	V-1 FT/SEC	V-2 FT/SEC	VM-1 FT/SEC	VM-2 FT/SEC	VO-1 FT/SEC	VO-2 FT/SEC	B-1 DEGREE	B-2 DEGREE	M-1	M-2	U-1 FT/SEC	U-2 FT/SEC	M'-1	M'-2	V'-1 FT/SEC	V'-2 FT/SEC
5	-.631	-.421	452.4	263.8	213.1	263.8	398.5	.0	61.88	.00	.3870	.2236	1068.6	1068.6	.6013	.9327	702.8	1100.7
10	-1.328	-.826	450.2	265.1	218.7	265.1	393.6	.0	60.92	.00	.3853	.2248	1075.0	1075.0	.6126	.9388	715.8	1107.2
15	-2.034	-1.084	448.0	268.4	224.2	268.4	387.9	.0	59.97	.00	.3836	.2278	1081.4	1081.4	.6240	.9457	728.5	1114.2
30	-1.962	-.919	455.0	298.7	283.6	298.7	355.3	.0	51.44	.00	.3914	.2549	1100.6	1100.6	.6860	.9732	797.5	1140.6
50	-1.355	-.679	484.4	360.2	365.1	360.2	318.3	.0	41.08	.00	.4135	.3095	1126.3	1126.3	.7673	1.0163	886.7	1182.5
70	-.780	-.343	496.0	385.6	386.9	385.6	310.5	.0	38.76	.00	.4300	.3318	1152.0	1152.0	.8027	1.0454	926.1	1214.8
85	-.412	-.105	480.2	363.6	361.8	363.6	315.5	-.0	41.12	-.00	.4150	.3120	1171.2	1171.2	.8031	1.0524	929.2	1226.4
90	-.317	-.042	467.1	348.1	342.7	348.1	317.3	-.0	42.81	-.00	.4031	.2983	1177.6	1177.6	.7992	1.0522	926.1	1228.0
95	-.263	.002	461.4	344.2	335.9	344.2	316.3	-.0	43.28	-.00	.3980	.2949	1184.0	1184.0	.8026	1.0562	930.5	1233.1

%SPAN	INCM DEGREE	DEV DEGREE	TURN DEGREE	RHOVM-1	RHOVM-2	D-FAC	OMEGA-B SHOCK	OMEGA-B TOTAL	LOSS-P PROFILE	LOSS-P TOTAL	PT2/ PT1	%EFF-P TOT-ST	%EFF-A TOT-ST	B'-1 DEGREE	B'-2 DEGREE	VO'-1 FT/SEC	VO'-2 FT/SEC
5	20.14	5.03	61.88	15.93	20.47	.7481	.0000	.1193	.0000	.0443	.9883	.00	.00	72.36	76.13	-665.7	-1068.6
10	19.63	5.82	60.92	16.37	20.59	.7373	.0000	.1181	.0000	.0441	.9885	.00	.00	72.22	76.15	-681.6	-1075.0
15	19.11	5.66	59.97	16.81	20.88	.7261	.0000	.1115	.0000	.0419	.9892	.00	.00	72.09	76.06	-692.5	-1081.4
30	12.00	5.48	51.44	21.51	23.47	.6420	.0000	.0883	.0000	.0331	.9912	.00	.00	69.19	74.83	-745.3	-1100.6
50	2.56	5.49	41.08	28.13	28.67	.5134	.0000	.0577	.0000	.0226	.9934	.00	.00	65.69	72.27	-808.0	-1126.3
70	.29	5.67	38.76	29.92	30.74	.4731	.0000	.0507	.0000	.0203	.9940	.00	.00	65.31	71.49	-841.4	-1152.0
85	1.89	6.26	41.12	27.88	28.80	.5099	.0000	.0774	.0000	.0315	.9913	.00	.00	67.08	72.75	-855.7	-1171.2
90	3.02	6.72	42.81	26.34	27.49	.5325	.0000	.0817	.0000	.0334	.9913	.00	.00	68.28	73.53	-860.3	-1177.6
95	2.62	7.23	43.28	25.81	27.17	.5356	.0000	.0776	.0000	.0319	.9920	.00	.00	68.84	73.75	-867.7	-1184.0

NCORR INLET RPM	WCORR INLET LBM/SEC	TT/TT INLET	PT/PT INLET	%EFF-A TOTAL CUM	%EFF-P TOTAL CUM	WC3/A3 LBM/SEC SQFT	PT/PT LOCAL
10671.	18.03	1.1218	1.2645	56.97	58.37	21.09	.9914

APPENDIX 4
PLENUM NOISE SPECTRA

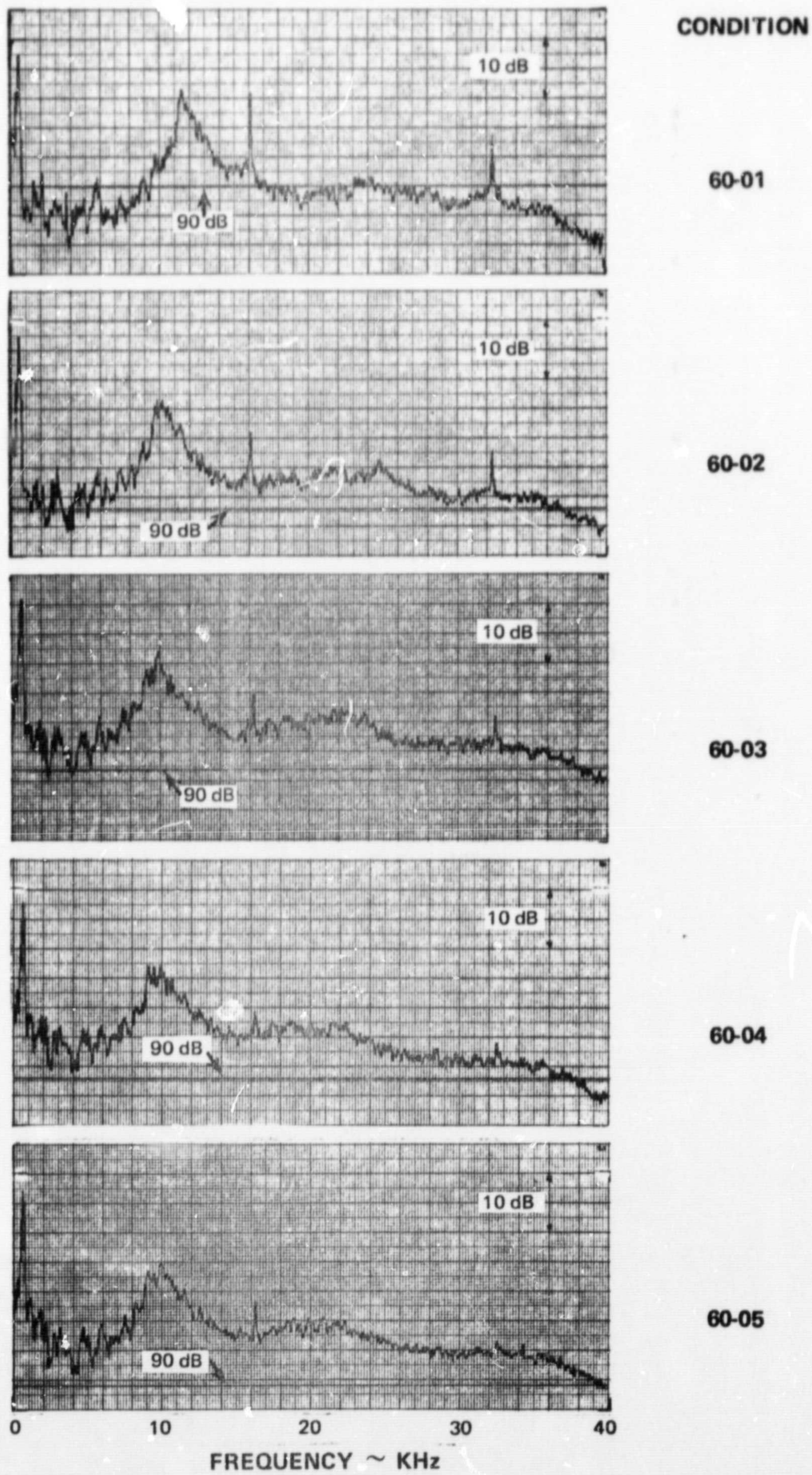

Figure 4-1 Plenum Microphones at 0.0 Radians (0°), Position, Corrected Rotor Speed 9600 RPM

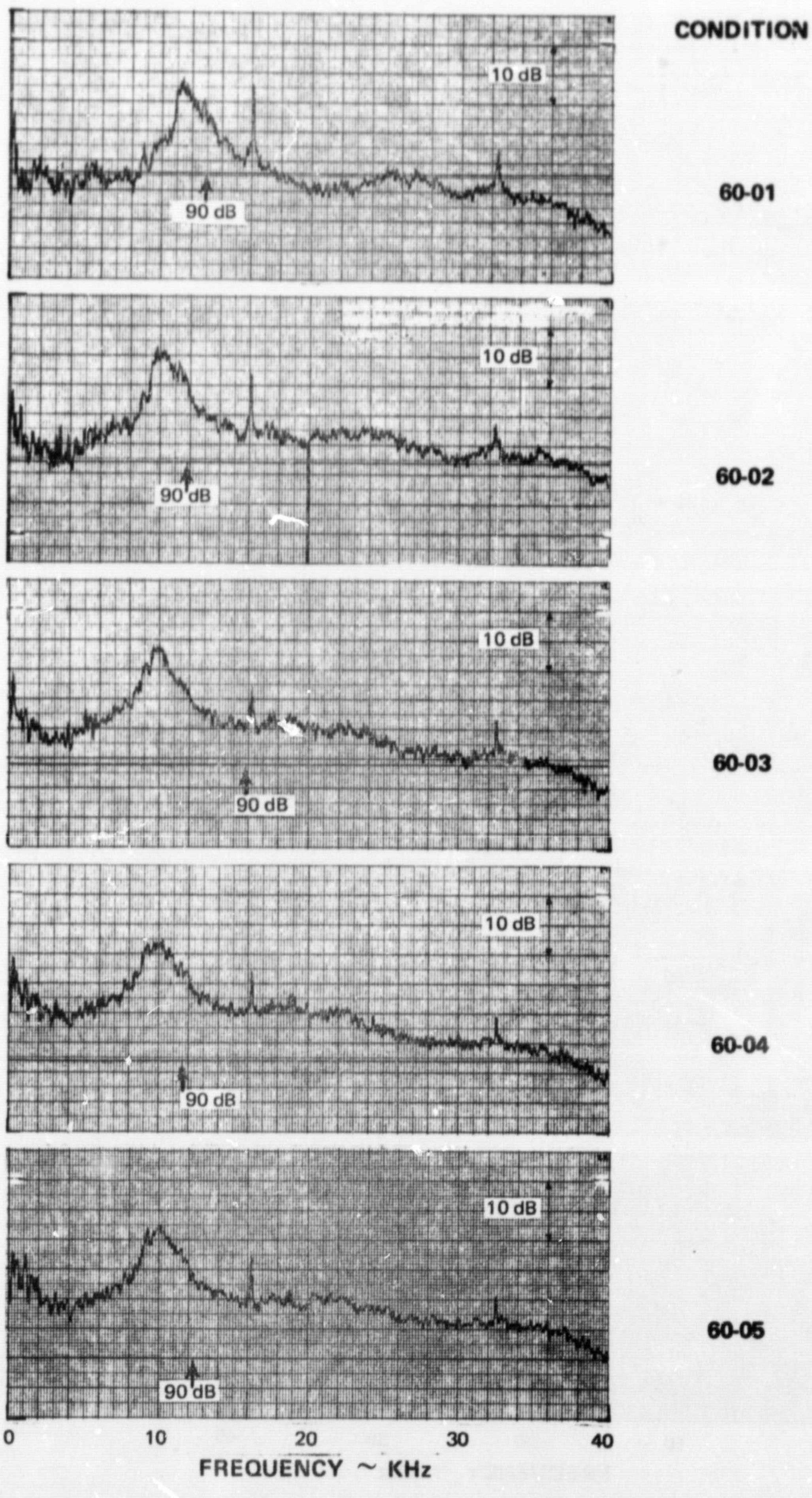

Figure 4-2 Plenum Microphones at 0.26 Radians (15°) Position, Corrected Rotor Speed 9600 RPM

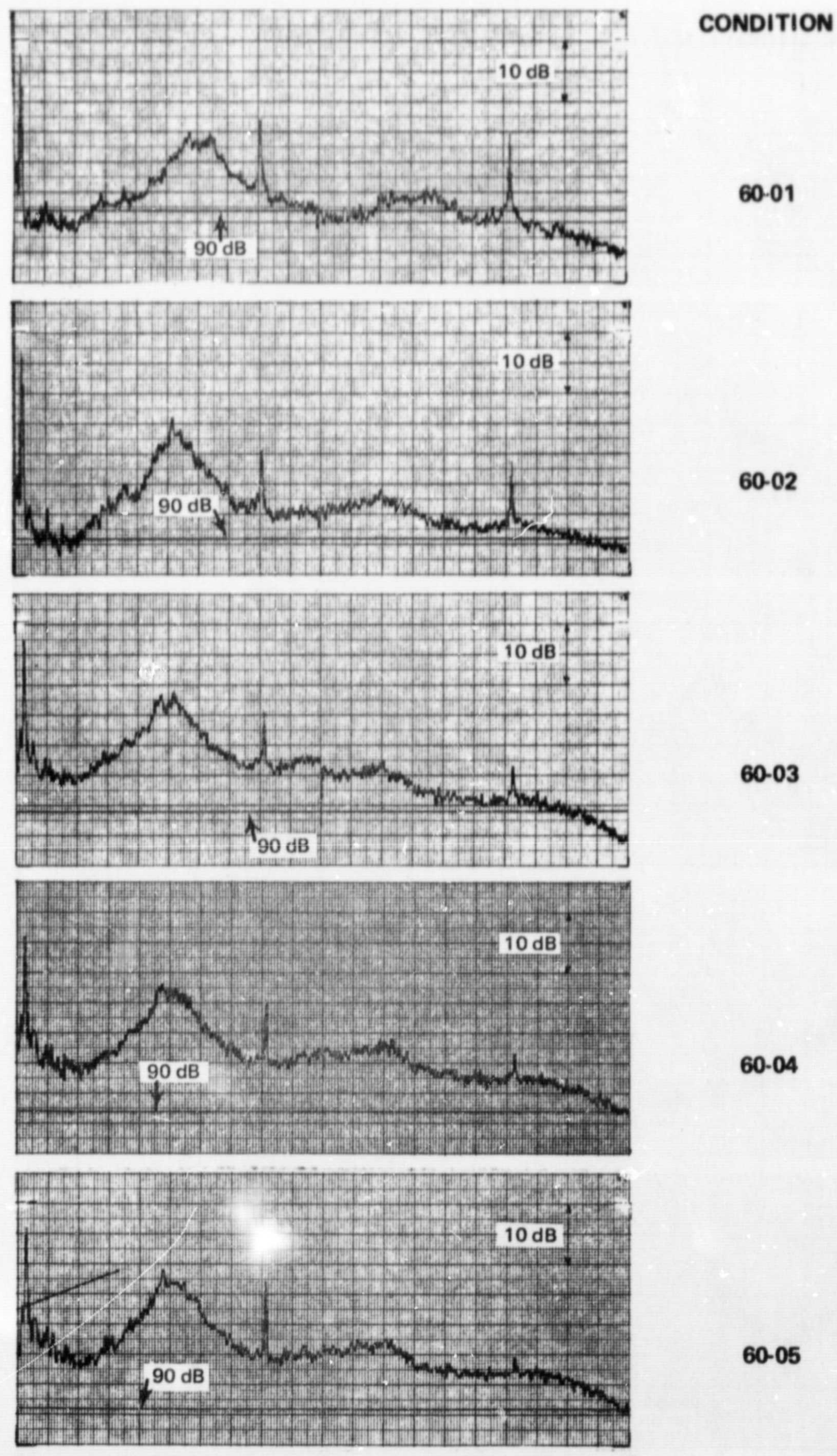

Figure 4-3 Plenum Microphones at 0.52 Radians (30°) Position, Corrected Rotor Speed 9600 RPM

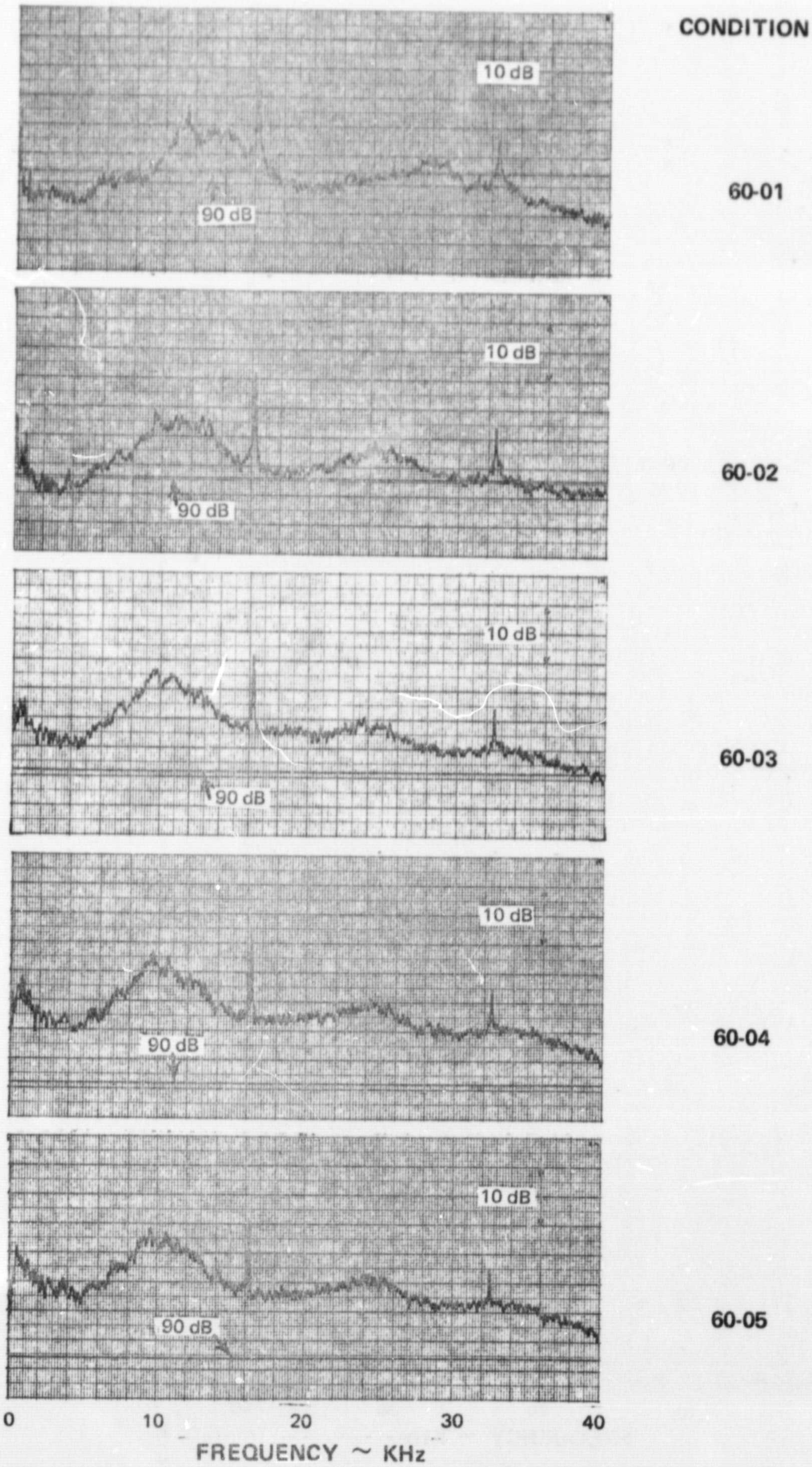

Figure 4-4 Plenum Microphones at 0.78 Radians (45°) Position, Corrected Rotor Speed 9600 RPM

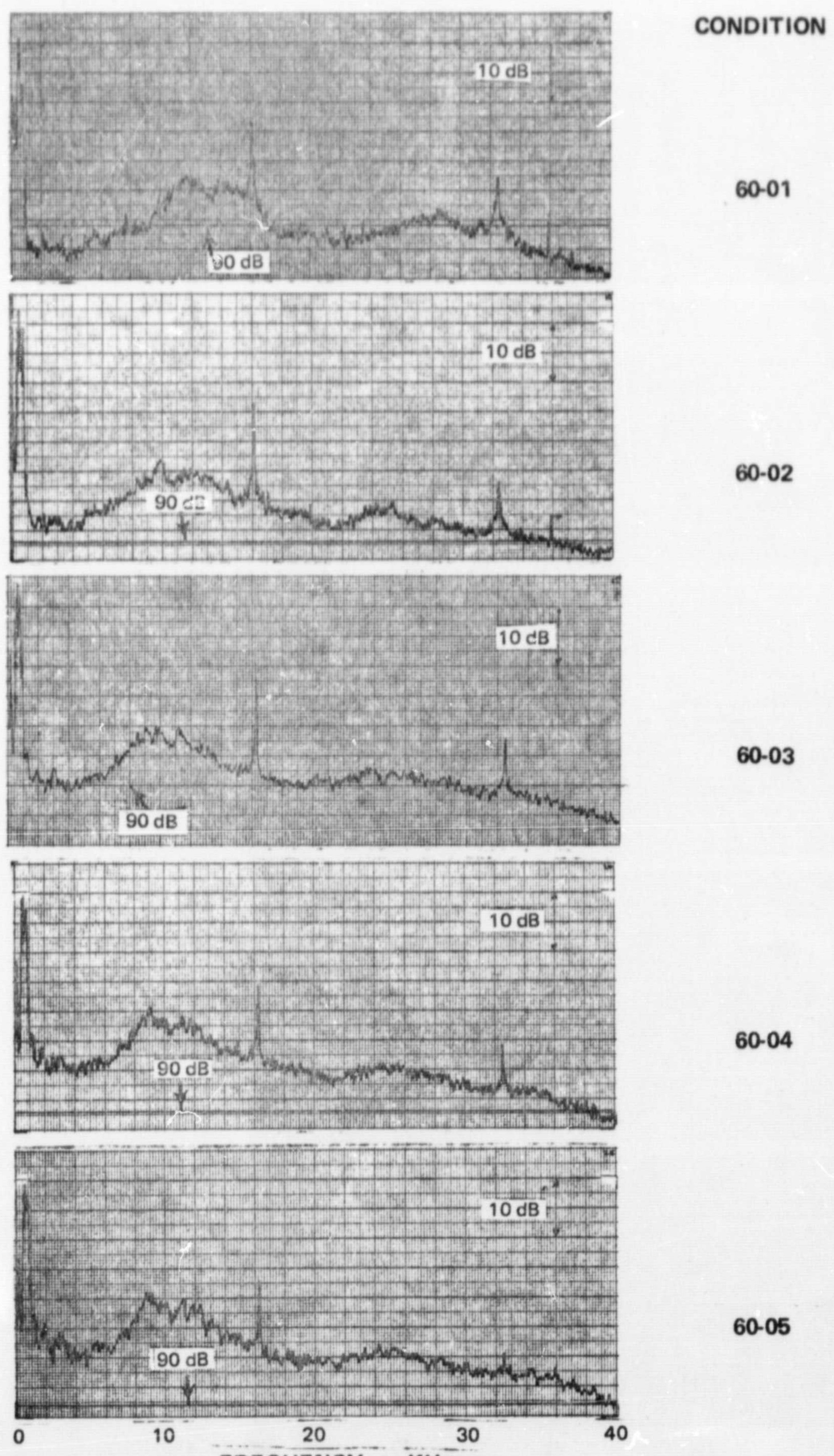

Figure 4-5 *Plenum Microphones at 1.05 Radians (60°) Position, Corrected Rotor Speed 9600 RPM*

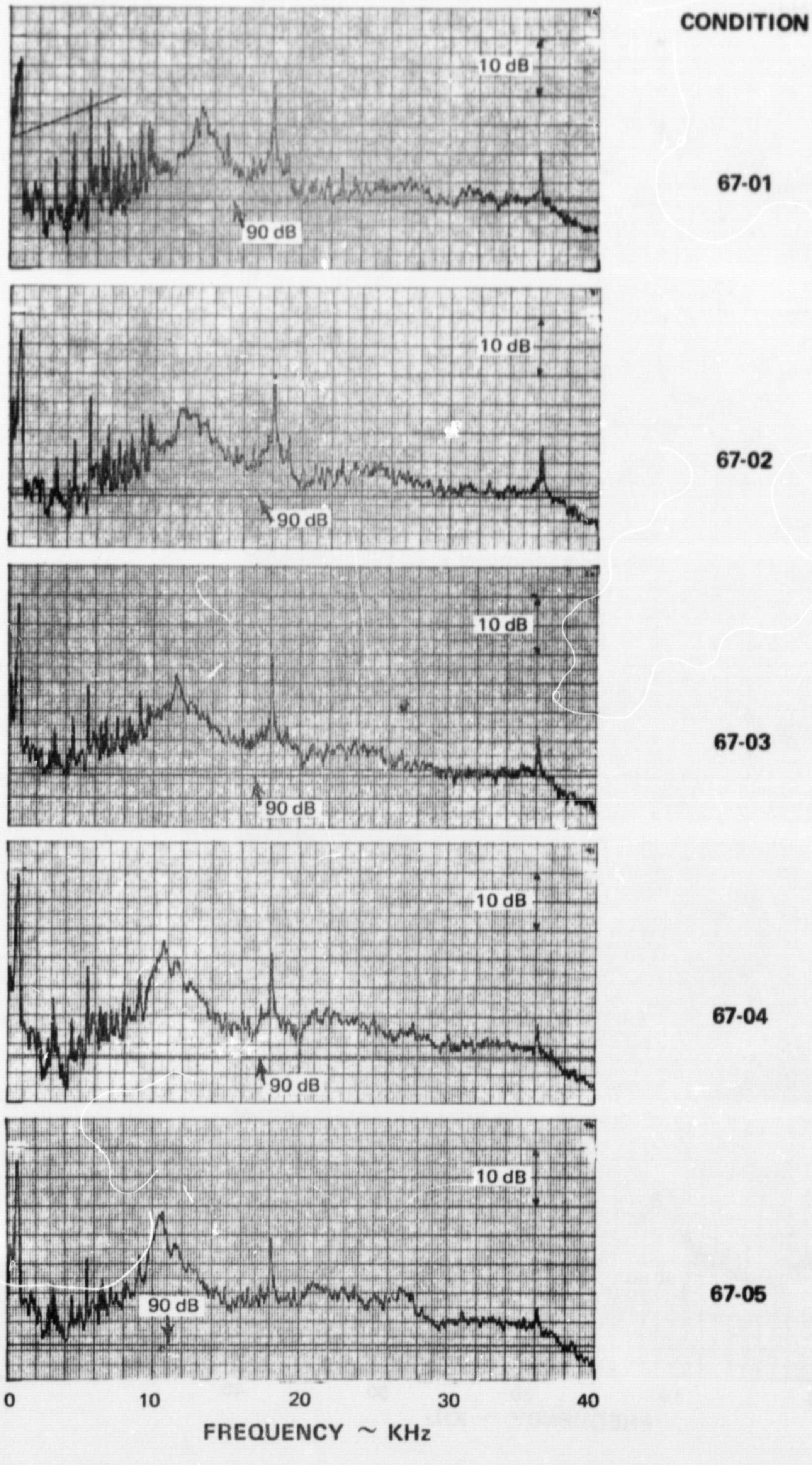

Figure 4-6 Plenum Microphones at 0 Radians (0°) Position, Corrected Rotor Speed 10,720 RPM

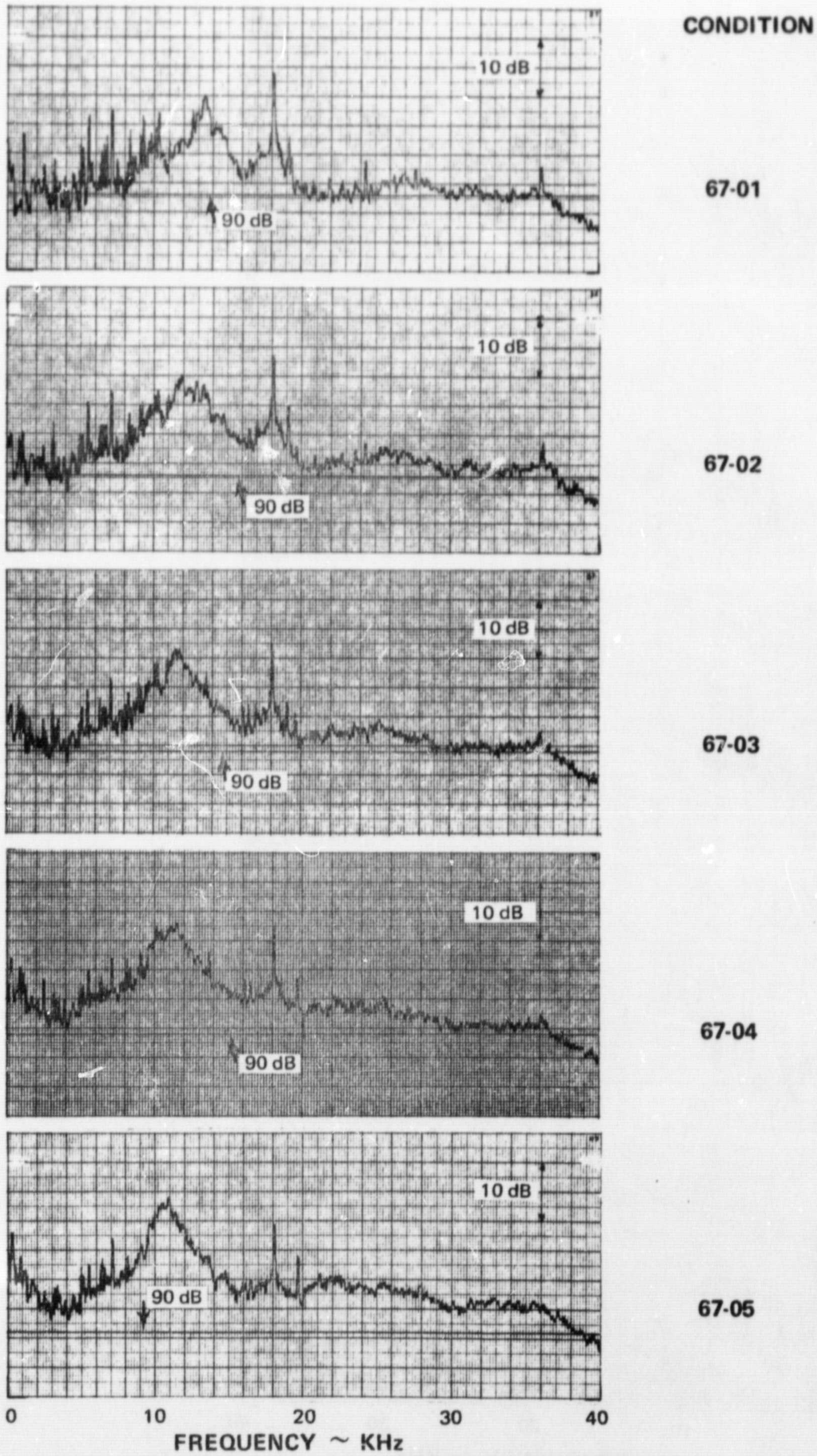

Figure 4-7 Plenum Microphones at 0.26 Radians (15°) Position, Corrected Rotor Speed 10,720 RPM

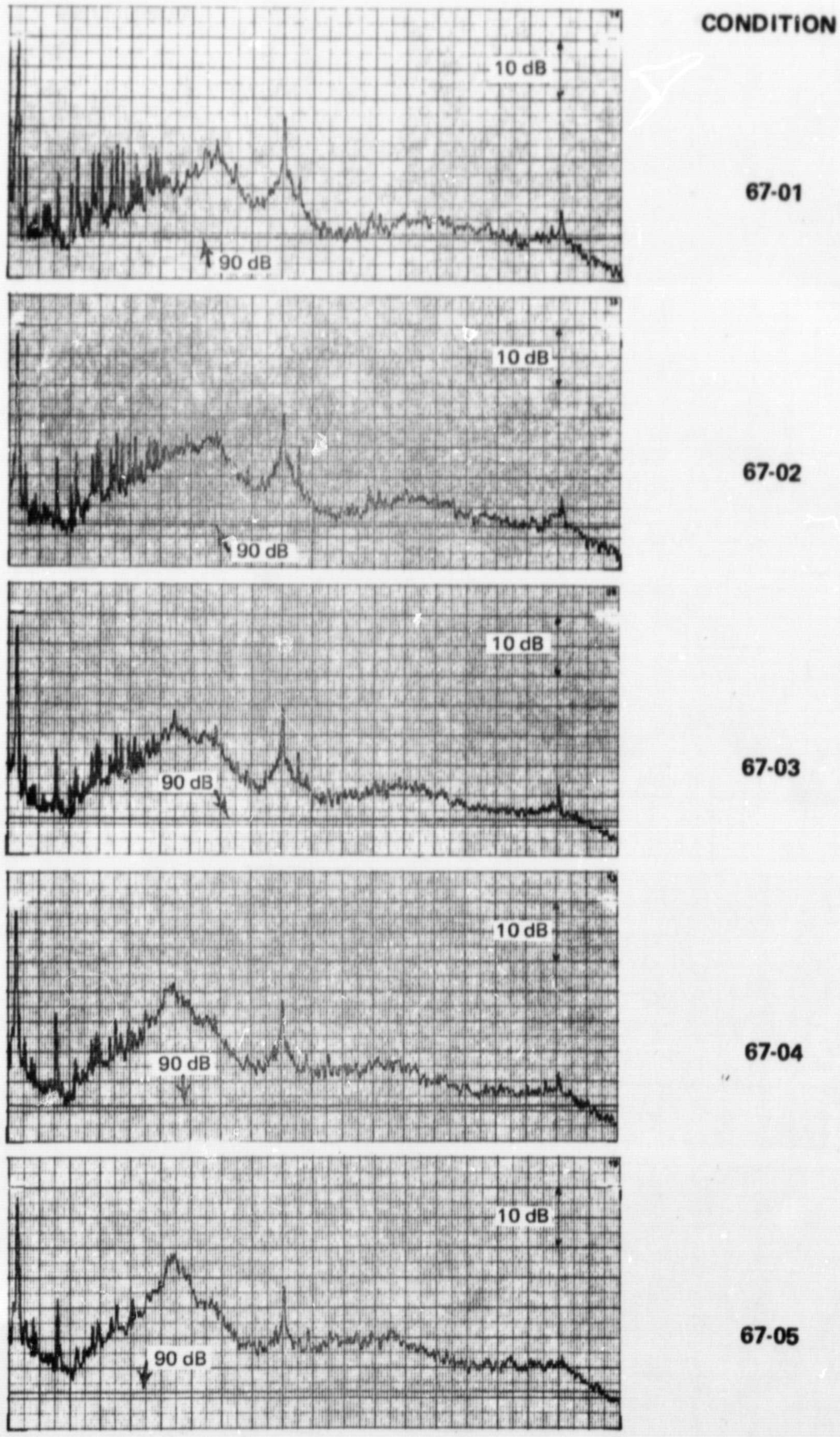

Figure 4-8 Plenum Microphones at 0.52 Radians (30°) Position, Corrected Rotor Speed 10,720 RPM

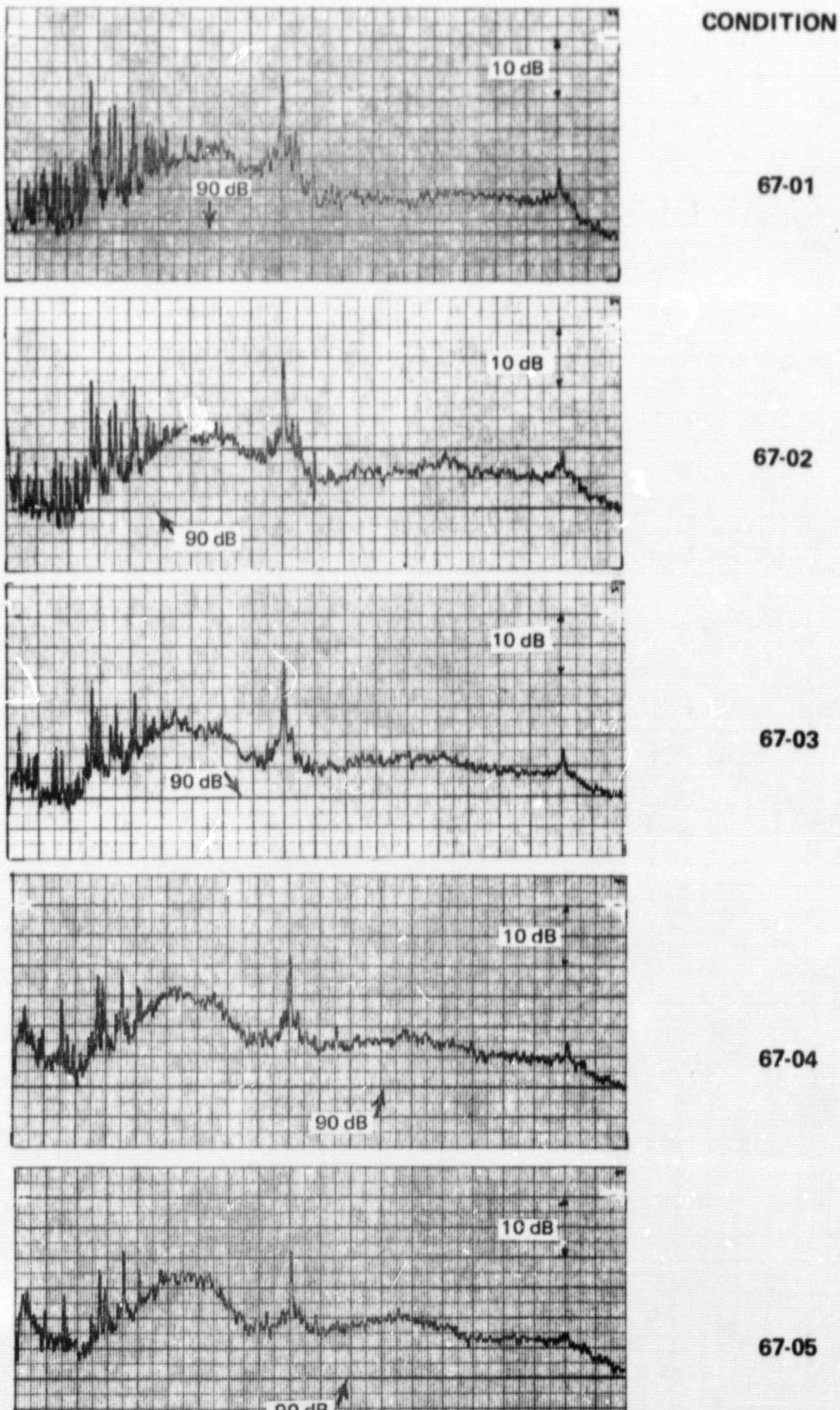

Figure 4-9 Plenum Microphones at 0.78 Radians (45°) Position, Corrected Rotor Speed 10,720 RPM

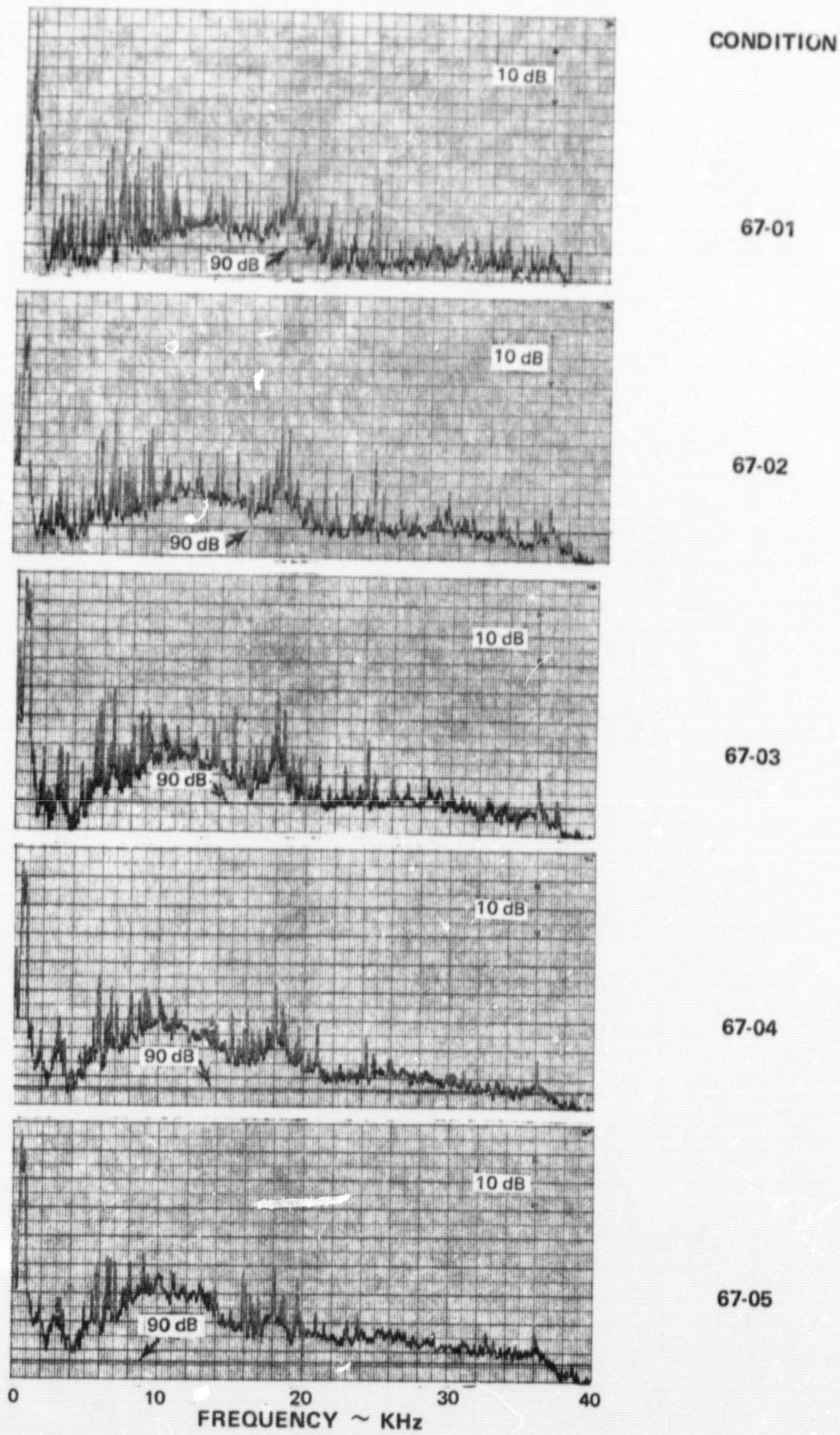

Figure 4-10 Plenum Microphones at 1.05 Radians (60°) Position, Corrected Rotor Speed 10,720 RPM