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NOISE GENERATED BY QUIET ENGINE FANS

I - Fan B

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SUMMARY

A significant effort within the NASA Quiet Engine Program is devoted to acoustical testing at the Lewis Research Center noise test facility of a family of full-scale fans designed and built by the General Electric Company. This report, part I of a multipart series covering all the fans tested, documents the noise results obtained with fan B. The fan is described and some aerodynamic operating data are given. Far-field noise around the fan was measured for a variety of configurations over a range of operating conditions. Complete results of 1/3-octave band analysis of the data are presented in tabular form. Included also are power spectra and sideline perceived noise levels. Some 1/3-octave band data are presented graphically, and sample graphs of continuous narrow-band spectra are also provided.

INTRODUCTION

The NASA Quiet Engine Program is directed towards developing technology which has direct application in the alleviation of noise from subsonic commercial aircraft. The most tangible result of the program will be a demonstration high-bypass-ratio turbofan engine which by the incorporation of such technology will be markedly quieter than currently available engines.

A significant effort within the Quiet Engine Program is devoted to aerodynamic and acoustical evaluation of a family of full-scale component fans. The designs of these fans have been chosen to develop a better understanding of the mechanisms of fan noise generation and to permit choosing ultimately a minimum-noise design for incorporation in the quite engine. Three such fans have been built, each being designed to meet propulsion system requirements but varying significantly in aerodynamic design parameters which are considered to be noise related. In addition, all fans possess the accepted low-noise features of being single stage, having no inlet guide vanes, having extended

rotor-stator spacing, and having an appropriate vane/blade ratio.

The three fans have been letter designated as A, B, and C. All three fans were designed and built by the General Electric Company. A comparative summary of their more pertinent design characteristics is given in table I. Of these, fan B is the first to have completed an extensive acoustical test program at Lewis Research Center. This report documents the more significant noise data obtained in that program.

Interpretation of the data is subject to the ultimate interests of the user; further, it is facilitated by a comparison of data among all fans tested, only one of which is being reported here. For these reasons and to expedite dissemination of the data, no attempt is made at interpretation from any point of view, but rather emphasis is placed on completeness and convenience of format for all potential users.

FAN B CHARACTERISTICS

A complete discussion of the aerodynamic and mechanical design details of fan B is given in reference 1. Only a brief description of the more apparent features of the design is given here, as well as some details peculiar to the acoustical test setup.

Fan B among the three fans in the program is characterized generally as being a low-speed, low-aspect-ratio fan with a low number of blades. Its design characteristics are given in table I. The blades are cantilevered and have no splitters, dampers, or tip shrouds. The fan flow is divided between the bypass duct and the core downstream of the fan component. An equal number of outlet guide vanes as in the bypass duct exist in the core duct but at less than two-chord spacing. A cutaway pictorial representation of a typical fan configuration for acoustical testing is shown in figure 1. The fan was shaft driven from the front, as illustrated. Also shown is acoustical treatment in the flow passages. The fan assemblies were designed with sound-absorbing liners within the fan frame proper, that is, confined in axial extent approximately from planes 41 centimeters upstream of the fan face to 61 centimeters downstream, as shown in figure 2. Details of the kind and extent of the treatment are given in reference 1.

For acoustical testing, the core flow was simply ducted aft and passed through a core nozzle sized to cause the hub portion of the fan to operate as closely to engine conditions as possible. To minimize emission of core-duct-generated noise, a core suppressor was installed as illustrated in figure 2. The suppressor consisted of 1.626 square meters of 5.1-centimeter-thick polyurethane foam held in place in the core duct outer wall by a perforated metal facing sheet of 23-percent open area. Since the core jet flow represented about one-fifth of the bypass flow and its velocity was also less, the noise from the core jet flow was presumed to make small contribution to the noise data compared with the bypass jet.

FAN B PERFORMANCE

Extensive aerodynamic testing of the fan was conducted elsewhere, and the detailed results are given in reference 2. A performance map based on fan bypass flow is given in figure 3. The constant speed lines shown are from the aerodynamic tests in reference 2. For the tests in the noise facility, a minimal amount of aerodynamic instrumentation was used, from which the fan operating lines were derived for the various nozzle areas employed. During the test program, small adjustments in nozzle areas were made which are discussed in the section Nozzles. However, such adjustments were sufficiently small so that precise delineation in figure 3 is not warranted and the operating lines reflect nominal performance of all the nozzles employed.

ACOUSTICAL TEST PROGRAM

Configurations

The fan was run in a variety of configurations which varied with regard to (1) the condition of the inlet, (2) the condition of the fan-frame treatment, (3) the condition of the bypass exhaust duct, and (4) the size of the bypass and core nozzles. The variations employed in each of these items and the terminology used are explained in the following sections.

Inlet. - The fan was run with the inlet in either a hard, a suppressed, or a taped condition. The hard inlet was comprised of a bellmouth and a 103-centimeter-long cylindrical inlet section mated to the fan frame. Alternately, an inlet suppressor employing three splitter rings was used in place of the straight section. The details of the inlet suppressor design have been reported in reference 3.

To appraise the effects of the inlet suppressor splitters as flow disturbance sources and hence noise generators, a test was conducted with the inlet suppressor installed but with the acoustical treatment taped over and rendered nonfunctional by means of adhesive-backed aluminum tape. This is referred to as the taped inlet suppressor.

Fan frame. - The fan was run with the frame treatment both functioning and deactivated by the use of aluminum tape, as for the inlet suppressor. These conditions were considered as being with or without fan-frame treatment and are referred to as soft and taped fan-frame conditions, respectively. Under all conditions, the fan-frame treatment in the core passage remained functional because of the lack of convenient access to that area for taping.

Exhaust duct. - The fan was run in both the hard and suppressed exhaust conditions. The hard exhaust condition refers to the bypass duct with no sound-absorbing

treatment. Alternately, a bypass exhaust duct suppressor with a splitter was employed. The arrangement and dimensions of the suppressor are given in figure 2. The absorbing material was comprised of 0.95-centimeter-thick aluminum hexagonal-cell honeycomb faced with 0.051-centimeter-thick perforated aluminum sheet with 8-percent open area in the walls and $4\frac{1}{2}$ percent in the splitter.

Nozzles. - Three separate bypass exhaust nozzles were used. These are generally referred to as nominal, large, and small. Preliminary fan runs were made for purposes of trimming the nozzles to size to ensure that the fan operating lines achieved during acoustical testing were as close as possible to those of aerodynamic tests which were conducted elsewhere. The nominal nozzle had an exit area of 1.188 square meters. The small and large nozzle areas deviated approximately 7 percent from nominal. The core nozzle area was also adjusted during the test program for fan performance considerations.

The geometric variables of the nozzles which relate to jet noise generation are given in table II. Data are given for the nozzles both before and after trimming. The bypass nozzle exit plane was situated upstream of that of the core. The axial distances between the two exit planes are also given in table II.

Data Acquired

A tabulation of the configurations for which acoustical data are being reported is given in table III. Each configuration was run at various speeds. For every test, far-field noise was measured. However, in some cases the principal reason for the test was different, such as to acquire aerodynamic data for purposes of trimming the nozzles or to acquire inlet-duct acoustic probe measurements. These are so denoted in table III. For example, acoustical data were taken during nozzle trim runs with the three nozzles, but these were tests of opportunity and did not yield regular sets of acoustical data at the usual speeds since the operating points were dictated by aerodynamic operating requirements. Nevertheless, these data are included here as they reflect effects of small nozzle changes at some speeds and give some insight to the repeatability of the data. In other cases, instrumentation was introduced into the air streams, and the far-field acoustical data are also included here as they afford the opportunity to investigate the effects caused by the instrumentation. No acoustical data obtained by means of probes are presented in this report.

The inlet acoustic probes, when employed, were 1.91 centimeters in diameter and projected radially into the inlet airstream a maximum of 36 centimeters. They were offset tangentially from one another to avoid wake interference. One probe was located 49 centimeters upstream of the fan face; the other was at 135 centimeters. Both were

employed simultaneously. The aerodynamic rakes, in the bypass exhaust stream only, consisted of multiple sensing elements protruding upstream from five radial airfoil struts which created a minimal disturbance of the flow.

DATA ACQUISITION AND ANALYSIS

Test Site

The acoustical tests were conducted at the outdoor full-scale-fan acoustic test facility at Lewis Research Center, shown in figure 4. A plan view of the area is given in figure 5. The facility abuts the 10- by 10-Foot Supersonic Wind Tunnel drive motor building and utilizes the wind tunnel drive motors as the fan prime mover through a speed-increasing gearbox. The fan pedestal was located sufficiently far from the building to permit far-field microphones on a 30.5-meter radius arc every 10°, from 10° to 160° with respect to the fan inlet axis. The 120° and 160° microphone distances were actually greater than 30.5 meters by 0.9 and 1.4 meters, respectively, because of the presence of a pedestrian walkway through the microphone field. The fan axis was 6.7 meters from the ground, and the microphones were in the same horizontal plane. The ground plane was asphalt pavement. The exterior wall of the drive building was treated with sound-absorbing material to minimize reflections to the microphone array. There were no other major reflecting surfaces in the near vicinity of the site.

It should be noted, for the data reported here, that the center of the microphone arc intersected the fan axis near the nozzle exit planes. The actual dimension of the center of the arc from the fan component, which is the more customary arc center, was 3.5 meters (see fig. 5). This situation resulted from the evolutionary process of developing the test facility and is not significant in itself. Care, however, should be exercised in making detailed comparisons of the data, particularly one-to-one angular comparisons, with data obtained from assemblies whose fan component is at the center of the arc.

Test Procedure

The instrumentation employed had a flat frequency response over the frequency range of interest (50 to 20 000 Hz). Prior to the set of tests for each configuration, a pistonphone signal was impressed on each far-field microphone for absolute calibration of each channel. Data signals were FM recorded from all channels simultaneously on magnetic tape. Air temperature, pressure, and relative humidity were logged before

and after testing; and wind velocity and direction were logged at each data point. To minimize problems with ambient noise and unfavorable wind conditions, tests were usually conducted in early morning hours prior to sunrise, when weather conditions were calm and stable. No acoustical data were taken under condition of fog or precipitation or with wind or gusts in excess of 5.1 meters per second (10 knots).

Corrected fan speeds were used which corresponded with 60, 70, 80, and 90 percent of standard-day cruise design speed. For this reason, the fan physical speeds employed varied from day to day with ambient temperature variations. The 60- and 90-percent speed points approximately represent fan operation for a four-engine aircraft at approach and takeoff conditions, respectively. Generally, the fan was run over the speed range three times, and three nonconsecutive 100-second noise samples for each speed were recorded.

One-Third-Octave Band Analysis

Data reduction system. - Each of the three samples for a given speed was reduced separately using a 1/3-octave band analyzer, and the resulting sound pressure levels were arithmetically averaged. The analysis system employed a 4-second averaging time and stepped sequentially through the angles from 10° to 160°. The 4-second averaging time was a compromise to accommodate all angles within a 100-second sample while preserving analyzer repeatability. All three-sample averages for each frequency and angle were examined statistically, and the standard deviations of the great bulk of the data were less than 1 decibel.

Adjustments to measured data. - Results of 1/3-octave band analysis yielded data taken under ambient conditions of the test day at the microphone locations. The data were referred back to the source (i.e., the effect of atmospheric absorption was removed) by computing atmospheric absorption for the test conditions over the propagation path and adjusting the data accordingly.

Atmospheric absorption was computed by using continuous frequency-dependent functions derived from reference 4. The application procedures set forth in reference 4 were not used, as they presuppose a spectrum typical of engine jet noise. In the present case, the general shape of the measured spectrum was accounted for and the 1/3-octave band attenuations were obtained by integrating the continuous absorption functions over each band.

For reference purposes, and to permit extrapolation of data provided here to other distances, a tabulation of standard-day atmospheric absorption values is given in table IV. These values are based on the assumption of a flat 1/3-octave band spectrum, and therefore are not precisely those computed for any real spectra. However, the

values are nominally those employed in the data adjustments and are sufficiently accurate for estimating noise projections to other distances.

The data referred to the source were adjusted to constant radius and acoustic power, and directivity index calculations were made. No directivity index data referred to the source are presented here, but they may be readily derived from the data (see the section DATA PRESENTATION). For power calculations, the sound pressure levels were presumed to be axisymmetric and were integrated over an enclosing hemisphere. Implicit in this procedure was that the ground plane was perfectly reflective in the sense that acoustic intensity was doubled in the far field. No account was made of signal interference effects at the microphones because of ground reflections.

Using data referred to the source, calculations of atmospheric absorption for a standard day of 15° C and 70-percent relative humidity were made and the data so adjusted to standard-day conditions. All tabulated sound pressure level data reported herein are adjusted to standard-day conditions.

Narrow-Band Analysis

Continuous narrow-band spectral analyses of the noise signals were also performed. The analysis system employed a 20-hertz constant-bandwidth filter over the frequency range from 0 to 10 000 hertz. The narrow-band spectra were not adjusted in any way and reflect the signals at the microphones under test-day conditions.

Narrow-band spectra constitute a highly detailed examination of the data and may reveal features which are otherwise not evident but which aid in understanding the noise-generating mechanisms. In this sense they reflect a specialized interest in the data and do not share in the wide practical utility of 1/3-octave band data. For this reason only a limited number of narrow-band spectra are presented herein as general information.

DATA PRESENTATION

Tabulations

All standard-day 1/3-octave band data on a 30.5-meter arc which were obtained from the acoustical test program are presented in tabular form. Table III lists the data presented. The actual data appear in tables V to XV inclusive in increasing order of configuration number. Each table is identified by configuration number and speed and contains descriptive information about the configuration.

The principal table entries are standard-day sound pressure levels (SPL referred to 0.00002 N/sq m) in each 1/3-octave band for each angle on a 30.5-meter radius. OVERALL sound pressure levels which were computed from the 1/3-octave band data are also given.

Using the data referred to the source, calculations of PWL (power level) were made by multiplying the sound intensity at each angle by its respective incremental area on the surface of a hemisphere and summing the increments of power so obtained. Radiation through axis areas for which no data were obtained was neglected. Power levels are presented in the tables referred to 10^{-13} watt (0.1 pW).

Each power level has associated with it an AVERAGE SPL (sound pressure level) which is the sound pressure level produced by a source emitting the same acoustic power but radiating uniformly in all directions. For the individual frequency bands, average sound pressure level may be used to quickly compute directivity index. Since average sound pressure level is referred to the source and the table entries include standard-day atmospheric absorption, directivity index is obtained by subtracting atmospheric absorption for 30.5 meters (table IV) from the average sound pressure level and subtracting the result from the table entries at all angles. Unfortunately, there is no direct way to compute the directivity index for the overall sound pressure levels by using the data provided.

For all cases, projections were made to a sideline 61 meters parallel to the fan axis, and perceived noise levels in PNdB were computed in accordance with reference 5. These perceived noise levels are also provided in the tables and permit a quick and practical comparison among all the noise data of the relative noise generated. In addition, sideline perceived noise levels are provided at 113 meters for the approach-speed case (60 percent) and at 305 meters for the takeoff case (90 percent). These distances typify FAA regulated noise certification distances (see ref. 5), and the data indicate generally the community noise levels to be expected from the fan compared with FAA regulations. Note that the data provided are for a single fan and that the perceived noise levels for n fans may be obtained very closely by adding 10 log n to the single fan values.

Graphical Data

One-third-octave band data. - For many configurations, the 1/3-octave band data are qualitatively similar. For this reason, data from only selected configurations are presented graphically to illustrate general features. Detailed comparisons may be made using the tabulated data. Configurations 101 to 108 are in this category; and, for these, the data of configuration 106 are presented in figure 6 as typical. Configurations 109 and 110 are significantly different, and the data from these are presented in figures 7

and 8, respectively. Graphical data presentations consist of standard-day 1/3-octave band sound pressure levels at a 30.5-meter radius for all angles and speeds.

Narrow-band data. - Because of their special nature, only representative samples of narrow-band spectra are presented to illustrate their general character. Spectra at or near the peak noise angles front and rear at 60- and 90-percent speeds have been selected. These are presented for configurations 106 and 110 in figures 9 and 10, respectively.

CONCLUDING REMARKS

Fan B has completed a program of noise tests at the Lewis Research Center. The fan is characterized generally as having a low tip speed and 26 low-aspect-ratio blades. It is one of three full-scale fans built under the NASA Quiet Engine Program, each of which varies signficantly in design characteristics which may be noise related. Acoustical tests were conducted over a range of aerodynamic operating conditions and with various arrangements of suppressive liners. Complete far-field noise results obtained in the tests are presented without interpretation. The data are presented in tabular form in a format intended to be useful to the majority of interested users. These results, and the results with the other full-scale fans in the program, should contribute measurably to a better understanding of the mechanisms of fan noise generation and aid in directing further efforts in the alleviation of noise from turbofan propulsion systems.

Lewis Research Center,
National Aeronautics and Space Administration,
Cleveland, Ohio, December 20, 1971,
762-73.

REFERENCES

1. Anon.: Experimental Quiet Engine Program. Vol. 1. Phase 1: Engine Design Report. General Electric Co. (NASA CR-72967), Mar. 15, 1970.
2. Giffen, R. G.: Experimental Quiet Engine Program - Aerodynamic and Aeromechanical Performance of Fan B. General Electric Company, Cincinnati, Ohio, August 1971. NASA CR-72993, 1971.
3. Rice, Edward J.; Feiler, Charles E.; and Acker, Loren W.: Acoustic and Aerodynamic Performance of a 6-Foot Diameter Fan for Turbofan Engines. III: Performance with Noise Suppressors. NASA TN D-6178, 1971.

4. Anon.: Standard Values of Atmospheric Absorption as a Function of Temperature and Humidity for Use in Evaluating Aircraft Flyover Noise. Aerospace Recommended Practice No. 866, SAE, Aug. 1964.

5. Anon.: Noise Standards: Aircraft Type Certification. Vol. III, Part 36 of Federal Aviation Regulations.

TABLE I. - DESIGN CHARACTERISTICS OF FANS A, B, AND C

Characteristic	Fan A	Fan B	Fan C
Corrected rotor tip speed, m/sec	354	354	472
Inlet hub/tip radius ratio	0.465	0.465	0.360
Rotor inlet tip diameter, m	1.86	1.86	1.73
Corrected airflow, kg/sec	431	431	415
Inlet corrected specific flow, kg/sec/sq m	202	202	202
Number of rotor chords axially separating rotor and outer outlet guide vanes	2.0	2.0	2.0
Number of rotor chords axially separating rotor and inner outlet guide vanes	1.25	1.25	1.25
Bypass-portion total pressure ratio	1.50	1.50	1.60
Hub-portion total pressure ratio	1.32	1.43	1.49
Bypass ratio	5.6	5.4	5.0
Rotor aspect ratio	2.32	1.71	2.09
Rotor solidity:			
Outside diameter	1.45	1.30	1.40
Inside diameter	2.50	2.16	2.45
Number of rotor blades	40	26	26
Number of outer outlet guide vanes	90	60	60
Number of inner outlet guide vanes	90	60	60

TABLE II. - NOZZLE GEOMETRY

(a) Before trimming

	Bypass nozzle			Core nozzle
	Nominal	Large	Small	
Area, sq m	1.163	1.232	1.090	0.354
Outside diameter, m	1.654	1.765	1.630	.861
Annulus height, m	.271	.276	.254	.161
Axial distance (bypass to core), m	.613	1.005	.655	-----

(b) After trimming

Area, sq m	1.188	1.268	1.103	0.319
Outside diameter, m	1.654	1.783	1.631	.861
Annulus height, m	.271	.283	.257	.141
Axial distance (bypass to core), m	.613	1.044	.642	-----

TABLE III. - ONE-THIRD-OCTAVE BAND FAR-FIELD NOISE DATA PRESENTED

Configuration	Configuration description						Purpose of test	Table
	Inlet	Fan frame	Exhaust	Bypass nozzle	Bypass area, sq m	Core area, sq m		
101	Hard	Soft	Hard	Large	1.232	0.354	Nozzle trim	V
102	↓	↓	↓	Small	1.090	↓	Nozzle trim	VI
103				Nominal	1.163		Nozzle trim	VII
104				Small	1.103		Far-field noise	VIII
105				Large	1.268		↓	IX
[a,b]106				Nominal	1.188	.319		X
107	Taped suppressor			↓	↓	↓		XI
108	Hard	Taped						XII
[a]109	Hard	Soft	Suppressor					XIII
109	Hard	Soft	Suppressor				Inlet duct noise, exhaust aerodynamic data	XIV
[a,b]110	Suppressor	Soft	Suppressor				Far-field noise	XV

[a]Data presented graphically also (figs. 6 to 8).

[b]Samples of narrow-band analysis also presented (figs. 10 and 11).

TABLE IV. - STANDARD-DAY ATMOSPHERIC ABSORPTION

[Computed for a flat 1/3-octave band spectrum; temperature, 15° C; relative humidity, 70 percent.]

Band center frequency, Hz	Per 100 meters	At 30.5 meters
	Attenuation, dB	
50	0	0
63	↓	↓
80	↓	↓
100	↓	↓
125	.1	↓
160	↓	↓
200	↓	↓
250	↓	↓
315	.2	.1
400	.2	↓
500	.2	↓
630	.3	↓
800	.4	↓
1 000	.5	.2
1 250	.6	.2
1 600	.8	.2
2 000	1.0	.3
2 500	1.4	.4
3 150	1.8	.5
4 000	2.5	.8
5 000	3.6	1.1
6 300	5.1	1.6
8 000	7.4	2.3
10 000	10.6	3.2
12 500	15.1	4.6
16 000	21.4	6.5
20 000	30.3	9.2

TABLE V. - NOISE OF FAN B CONFIGURATION 101 (HARD INLET, SOFT FAN FRAME, HARD EXHAUST, LARGE NOZZLE)

TEST PURPOSE - NOZZLE TRIM

[Data adjusted to standard day of 15°C and 70 percent relative humidity; SPL re 0.00002 N/m^2; PWL re 0.1 pW.]

(a) Percent speed, 60; fan physical speed, 2070 rpm; fundamental blade passage frequency, 897 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	72.8	71.9	70.9	71.3	70.9	72.1	73.8	75.8	73.8	76.9	77.8	76.7	75.3	77.4	78.6	79.0	75.5	122.9
63	75.8	73.9	70.4	69.8	72.3	73.4	73.8	75.3	75.6	75.8	76.8	75.7	76.4	78.1	78.3	80.1	75.7	123.1
80	74.8	72.6	69.0	69.0	69.8	71.1	71.8	74.3	74.0	75.3	77.1	77.7	78.5	80.5	81.3	81.5	76.3	123.7
100	73.7	74.5	73.5	76.0	75.8	76.8	74.2	76.0	77.0	78.0	80.8	80.4	81.2	82.2	82.2	82.2	78.8	126.2
125	74.9	76.6	76.8	76.1	75.3	75.6	76.6	77.8	78.3	79.3	81.1	80.0	80.1	81.8	82.3	81.2	79.0	126.4
160	75.8	77.1	77.4	76.4	76.1	76.9	77.6	77.8	77.9	79.8	80.1	79.0	78.4	80.3	79.8	78.5	78.4	125.8
200	77.2	77.8	76.3	75.8	74.8	74.8	75.2	75.0	75.2	77.5	77.0	77.3	78.2	78.8	79.0	77.4	76.7	124.1
250	77.6	80.1	77.8	77.0	75.8	75.0	75.3	76.1	77.8	79.6	80.6	80.0	80.3	81.0	80.1	77.8	78.6	126.0
315	78.3	79.3	78.0	78.3	78.2	77.2	77.7	78.0	79.3	79.7	80.5	79.8	80.0	80.0	79.0	77.7	79.0	126.4
400	79.6	79.9	77.6	77.4	76.4	76.6	76.8	77.9	78.9	79.6	82.1	82.0	82.1	81.4	79.3	77.0	79.7	127.1
500	79.0	78.9	78.2	77.5	77.2	76.7	76.9	77.7	78.5	79.5	80.9	81.0	81.5	80.9	78.4	76.1	79.2	126.6
630	80.0	80.0	79.6	78.5	77.1	76.6	77.3	77.5	79.1	80.3	82.3	82.6	82.8	81.1	77.5	75.5	80.0	127.4
800	94.0	94.3	92.5	93.3	90.7	86.5	84.0	84.0	83.6	84.0	86.5	86.6	88.8	89.8	86.2	83.5	88.7	136.1
1000	94.7	94.7	93.4	93.7	91.4	86.9	84.2	84.4	83.9	84.5	86.9	86.5	89.4	90.2	86.9	84.3	89.2	136.6
1250	83.5	83.7	82.7	81.5	79.8	77.3	76.5	77.7	79.3	80.0	82.8	83.4	84.7	83.5	80.2	76.9	81.5	128.9
1600	88.7	89.3	90.0	88.0	85.2	81.5	79.7	80.7	81.3	82.7	85.0	85.4	88.7	88.5	83.8	78.6	85.7	133.1
2000	91.0	91.3	91.8	90.2	87.5	83.5	81.3	81.8	82.7	84.2	86.5	86.6	90.0	90.7	86.2	80.4	87.6	135.0
2500	88.8	89.3	89.5	88.7	85.3	82.0	79.2	79.8	81.3	83.3	85.7	86.4	89.0	88.3	84.0	79.1	86.1	133.5
3150	88.1	88.3	88.4	87.8	84.9	80.4	78.1	78.8	81.1	82.9	85.3	87.1	89.4	88.4	84.1	78.5	86.0	133.4
4000	88.2	89.1	89.7	89.1	86.1	82.4	80.1	80.4	82.1	83.4	85.9	86.9	88.9	88.2	83.7	79.4	86.7	134.1
5000	88.7	89.5	89.5	89.5	86.4	82.2	78.0	78.3	81.5	83.2	86.4	87.5	89.5	88.4	84.0	80.0	87.2	134.6
6300	87.5	88.3	88.3	88.5	85.3	80.5	76.2	76.4	79.2	81.4	84.4	85.9	87.5	86.5	82.7	78.4	86.1	133.5
8000	87.2	88.2	87.8	88.0	84.4	80.2	74.9	74.7	77.9	79.9	83.1	83.6	85.2	84.2	80.9	76.5	85.6	133.0
10000	86.3	87.6	87.0	87.3	83.8	79.3	73.6	73.1	76.5	78.8	81.6	82.7	83.8	83.3	79.3	74.7	85.6	133.0
12500	85.1	86.6	85.3	85.8	82.8	78.8	71.8	71.6	75.1	76.8	80.1	80.7	82.1	82.3	78.3	74.0	85.6	133.0
16000	83.2	85.0	83.2	83.9	80.0	76.4	69.4	69.4	72.9	75.5	78.4	78.7	79.2	80.0	76.0	71.8	85.4	132.8
20000	81.9	83.0	80.9	81.5	77.9	73.9	66.8	67.7	70.9	73.0	75.8	76.0	75.9	77.5	72.9	68.9	85.8	133.2
OVERALL	101.3	101.7	101.2	101.0	98.2	94.5	92.3	92.8	93.7	95.1	97.4	97.9	99.8	99.7	96.4	93.5	98.7	146.2
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	86.3	95.0	99.2	101.3	100.5	98.4	97.1	98.0	99.7	100.9	102.8	102.8	103.6	101.2	94.9	86.5		
113 METERS	77.6	87.5	92.2	94.2	93.7	91.7	90.6	91.6	93.2	94.5	96.3	96.3	96.9	94.5	87.9	79.1		

TABLE V. - Concluded.

(b) Percent speed, 70; fan physical speed, 2473 rpm; fundamental blade passage frequency, 1071 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	75.6	74.4	75.1	76.3	75.8	77.4	78.4	76.8	78.3	79.9	82.6	80.0	82.3	82.4	83.9	86.3	80.2	127.6
63	73.0	76.4	74.2	73.9	74.0	74.9	75.5	75.5	76.5	78.4	81.7	80.0	82.7	83.5	85.0	86.4	79.9	127.3
80	79.1	75.4	74.3	74.1	74.4	79.1	75.8	75.8	77.4	80.1	82.6	82.0	85.1	85.4	87.9	89.1	81.9	129.3
100	76.0	76.4	74.4	75.4	75.2	76.5	78.4	79.5	80.9	82.7	83.7	84.1	86.5	88.0	89.4	89.6	83.5	130.9
125	79.1	79.7	79.1	79.6	79.2	80.7	81.6	82.1	82.9	83.6	84.2	85.3	86.6	87.4	88.6	87.6	84.0	131.4
160	79.6	80.9	80.6	80.6	80.9	81.1	81.7	81.7	82.7	82.2	83.4	83.3	85.1	85.4	86.2	86.0	83.0	130.4
200	81.3	81.5	81.5	81.0	79.3	79.3	79.8	79.5	80.1	81.0	81.6	83.0	84.6	85.3	85.6	84.2	82.0	129.4
250	81.1	81.6	80.8	80.8	79.4	79.4	79.8	81.3	82.1	83.3	84.6	84.9	85.9	86.4	85.8	84.5	83.2	130.6
315	81.8	82.9	80.6	81.6	80.6	80.8	81.6	82.3	83.6	83.4	84.4	84.7	86.1	85.6	84.8	82.5	83.4	130.8
400	82.2	82.3	81.2	81.0	80.3	80.5	81.0	81.7	83.2	84.3	85.8	86.1	86.5	85.7	84.2	82.4	83.8	131.2
500	82.0	82.5	82.0	82.0	80.7	80.7	80.8	82.2	83.7	83.8	84.8	85.6	86.7	85.0	83.3	81.2	83.6	131.0
630	82.4	83.9	83.7	82.4	81.1	81.2	81.9	82.6	84.4	84.7	86.4	86.5	87.2	84.4	82.4	80.5	84.3	131.7
800	85.7	86.2	85.9	85.1	83.6	83.2	82.7	82.9	84.6	85.2	87.7	88.5	89.6	85.4	83.1	81.3	85.8	133.2
1000	101.4	102.7	104.4	103.4	100.7	98.9	94.2	92.0	93.2	92.2	95.5	93.9	97.7	96.8	94.5	90.9	98.4	145.8
1250	94.8	96.3	97.1	95.8	92.8	90.8	86.4	85.6	87.4	87.1	89.9	90.0	92.1	90.9	87.9	85.0	91.6	139.0
1600	87.3	87.3	87.1	86.6	83.8	82.3	81.3	82.5	87.6	85.5	87.3	88.2	90.6	86.6	83.1	80.7	86.5	133.9
2000	96.0	97.0	97.7	98.3	94.8	91.2	88.0	87.8	88.8	90.3	91.0	92.6	96.2	93.7	88.7	85.4	93.6	141.0
2500	90.3	92.0	92.1	91.8	88.6	85.6	83.0	84.0	86.3	87.8	90.1	91.2	94.1	91.1	86.1	83.0	89.9	137.3
3150	92.6	94.6	95.0	94.8	92.5	88.8	85.1	85.3	87.8	89.0	91.1	92.9	95.5	90.1	87.6	84.7	92.0	139.4
4000	89.7	91.8	92.3	92.2	89.2	86.0	83.2	83.5	86.2	87.3	90.2	91.5	94.2	91.2	86.3	84.1	90.4	137.8
5000	90.0	92.0	92.7	92.7	89.8	86.8	84.3	84.8	87.5	88.7	91.2	92.0	93.8	91.3	86.8	85.5	91.2	138.6
6300	88.6	90.6	91.2	91.2	88.4	85.2	81.8	82.0	85.2	86.9	89.6	90.8	92.6	89.9	86.3	84.3	90.2	137.6
8000	87.9	89.7	90.5	90.9	87.7	84.4	80.2	80.5	84.0	86.2	88.7	89.4	91.0	88.7	84.9	83.8	89.8	137.2
10000	87.1	88.9	89.2	89.7	86.4	82.9	78.2	78.4	82.0	83.7	86.7	87.5	88.9	86.7	83.2	82.3	89.1	136.5
12500	85.7	87.4	87.6	88.1	85.2	81.9	76.6	76.5	80.4	81.9	84.7	85.3	86.7	85.4	81.6	81.6	88.8	136.2
16000	83.5	85.9	85.4	86.4	82.5	79.3	74.4	74.4	77.9	80.2	83.4	83.5	84.2	83.4	79.4	79.9	88.7	136.1
20000	81.7	83.4	83.1	83.9	79.8	76.1	71.8	72.4	75.9	77.5	80.8	81.3	81.3	80.5	76.3	77.1	88.9	136.3
OVERALL	104.9	106.2	107.3	106.8	104.0	101.7	98.2	97.7	99.6	100.1	102.4	102.9	105.3	103.3	101.0	99.5	103.8	151.2
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	90.0	99.3	104.0	106.7	105.7	104.2	102.3	102.9	105.4	106.2	107.8	108.1	109.2	104.4	98.7	92.2		

(c) Percent speed, 90; fan physical speed, 3180 rpm; fundamental blade passage frequency, 1378 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	85.2	81.4	82.6	84.2	84.7	83.6	84.6	85.9	84.9	85.4	90.1	86.5	89.9	92.4	93.2	95.1	88.2	135.6
63	81.4	82.7	81.7	81.4	82.1	81.7	82.6	82.7	83.4	84.9	89.4	88.0	90.4	94.1	95.7	97.8	89.1	136.5
80	81.6	82.7	80.6	80.6	81.4	81.4	82.1	83.4	85.4	87.6	91.4	90.6	93.2	96.6	98.4	100.1	91.4	138.8
100	86.3	86.1	84.1	85.3	84.6	85.6	86.3	87.3	89.4	91.1	92.9	93.2	95.8	98.2	100.1	100.0	93.2	140.6
125	86.7	85.8	86.5	86.3	87.0	87.8	89.3	89.7	91.2	92.0	93.7	94.2	95.5	97.5	99.5	97.9	93.2	140.6
160	87.6	87.8	88.3	88.1	89.4	89.4	90.3	90.3	91.4	91.3	92.6	92.0	94.4	96.4	96.4	95.5	92.2	139.6
200	87.6	88.1	88.4	87.9	87.6	87.4	87.3	86.9	88.6	89.6	91.6	92.2	94.3	96.2	96.1	94.8	91.3	138.7
250	85.8	87.3	87.5	87.6	87.0	87.1	87.8	89.1	90.5	91.8	93.1	94.1	95.5	97.2	96.3	94.7	92.3	139.7
315	85.4	86.3	87.3	87.4	87.4	88.3	89.1	89.9	90.8	91.6	92.9	93.5	94.6	96.2	94.8	92.8	91.8	139.2
400	86.4	87.1	88.6	88.6	88.2	88.6	88.6	89.7	91.1	92.6	93.9	94.7	95.2	95.9	94.2	92.3	92.3	139.7
500	87.0	87.7	89.0	89.9	88.2	88.5	88.9	89.7	91.0	91.7	93.5	93.9	94.7	94.9	92.9	90.9	91.8	139.2
630	87.9	91.2	91.6	90.7	90.7	89.9	90.1	90.4	91.9	93.2	94.9	95.2	94.6	93.9	91.7	89.9	92.6	140.0
800	90.6	90.6	92.4	92.4	92.1	90.9	91.4	90.9	92.3	93.9	96.1	96.4	95.4	94.2	92.1	89.8	93.5	140.9
1000	90.7	91.1	91.7	91.7	91.4	90.9	90.6	91.1	92.4	94.2	95.8	96.1	97.3	94.6	92.1	89.8	93.7	141.1
1250	102.8	105.2	107.2	106.0	107.7	105.2	100.2	97.8	98.8	99.0	98.7	101.6	99.3	98.7	95.5	94.1	102.8	150.2
1600	98.9	100.8	102.1	101.9	103.6	100.9	96.4	94.6	95.6	96.3	97.0	99.2	97.6	96.4	93.1	91.4	99.1	146.5
2000	93.5	94.9	95.7	95.9	95.7	92.8	91.5	91.5	93.4	95.0	97.0	97.5	97.9	94.9	91.7	88.9	95.3	142.7
2500	101.0	100.8	102.1	102.0	101.3	98.0	95.6	94.5	97.1	98.0	101.1	103.3	107.3	102.8	96.0	93.1	101.5	148.9
3150	98.1	97.9	98.9	99.3	98.9	96.1	93.6	93.3	96.1	96.9	100.1	101.4	104.8	101.4	96.8	92.5	99.7	147.1
4000	97.0	97.7	99.5	99.5	98.3	96.5	93.5	92.5	95.0	96.8	99.7	100.8	100.5	97.1	93.3	90.6	98.5	145.9
5000	94.3	96.0	97.0	97.8	96.3	94.5	92.6	92.6	95.1	96.8	99.5	100.6	101.3	97.2	93.8	90.8	98.3	145.7
6300	92.2	94.3	95.2	96.1	94.7	92.9	91.3	91.1	93.9	95.2	97.4	98.4	99.1	95.8	93.0	89.9	96.9	144.3
8000	91.2	93.2	93.7	94.7	93.1	91.4	89.6	88.9	91.9	93.1	96.1	96.8	96.6	94.2	90.6	87.4	95.8	143.2
10000	89.1	91.1	91.9	92.7	90.6	89.4	87.2	87.1	90.1	91.1	94.1	94.8	94.6	92.1	89.1	85.7	94.8	142.2
12500	86.7	88.9	89.0	90.0	88.0	87.0	84.3	84.2	88.2	89.4	92.0	92.6	92.5	91.1	87.9	84.2	94.1	141.5
16000	83.7	86.5	85.9	87.7	84.7	84.2	81.5	81.9	86.0	87.6	89.9	90.2	90.0	89.8	85.5	82.1	93.7	141.1
20000	81.2	83.8	82.9	85.1	81.6	81.1	78.6	80.0	83.4	84.9	87.3	87.7	87.1	87.0	82.9	79.4	93.7	141.1
OVERALL	108.3	109.6	111.1	110.8	111.3	109.0	106.0	105.2	107.0	108.1	110.2	111.4	112.8	110.9	109.2	108.2	110.4	157.8
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	95.3	104.2	109.6	112.2	113.6	112.5	111.3	111.1	113.4	114.3	116.4	117.0	118.0	113.4	107.3	100.4		
305 METERS	69.1	82.5	89.6	92.6	95.4	94.9	93.3	93.3	95.6	96.5	98.3	98.7	99.3	94.3	86.9	79.0		

TABLE VI. - NOISE OF FAN B CONFIGURATION 102 (HARD INLET, SOFT FAN FRAME, HARD EXHAUST, SMALL NOZZLE)

TEST PURPOSE - NOZZLE TRIM

[Data adjusted to standard day of 15° C and 70 percent relative humidity; SPL re 0.00002 N/m^2; PWL re 0.1 pW.]

(a) Percent speed, 82; fan physical speed, 2930 rpm; fundamental blade passage frequency, 1269 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	85.9	83.9	85.7	88.0	84.2	81.4	85.0	84.2	83.2	84.5	85.0	86.1	87.2	88.9	91.2	92.3	86.4	133.8
63	78.2	79.5	79.2	79.3	79.7	79.5	79.8	81.2	81.3	82.0	85.0	84.9	87.5	90.7	92.2	94.7	85.9	133.3
80	78.9	79.9	78.4	79.2	78.6	79.6	79.7	80.9	82.7	84.6	87.6	88.3	90.6	93.1	94.4	97.6	88.3	135.7
100	86.2	85.0	86.9	84.7	85.5	85.5	84.5	84.5	87.5	88.7	90.4	90.6	92.7	95.2	96.4	97.9	90.6	138.0
125	84.0	83.4	83.4	84.5	84.0	86.0	86.9	87.5	89.0	89.9	91.5	92.1	93.0	94.9	96.2	95.3	90.7	138.1
160	85.3	86.0	86.0	85.8	87.3	88.8	87.8	87.5	88.8	89.0	90.8	91.1	91.5	93.2	93.3	92.6	89.8	137.2
200	86.0	86.5	85.7	85.5	85.4	85.2	85.7	85.0	85.9	86.4	89.4	89.8	91.7	93.7	93.4	91.7	88.8	136.2
250	85.2	86.6	85.9	85.7	85.1	85.2	85.4	86.2	88.2	89.2	91.6	92.0	92.7	94.4	93.6	91.6	89.9	137.3
315	84.7	85.4	85.2	85.7	85.4	85.9	86.5	87.5	87.9	88.9	91.0	91.5	91.9	93.2	92.0	89.8	89.3	136.7
400	84.3	84.3	84.9	85.4	85.1	85.4	86.1	87.3	88.1	89.4	91.3	92.0	91.9	92.8	90.9	88.5	89.3	136.7
500	84.8	85.0	85.1	86.0	86.0	85.5	86.1	87.0	87.8	89.0	90.6	91.4	91.6	92.0	90.0	87.4	88.9	136.3
630	85.4	85.5	86.0	86.5	85.4	85.0	86.0	87.7	88.9	90.0	92.0	92.3	91.9	91.0	88.5	86.2	89.3	136.7
800	87.4	87.1	86.9	87.4	86.9	86.3	87.3	88.1	89.6	91.3	93.6	94.0	93.1	91.6	88.4	86.3	90.5	137.9
1000	90.7	92.2	92.0	92.4	90.5	87.9	87.5	89.4	90.8	92.2	93.3	94.1	95.0	92.3	89.0	86.7	91.9	139.3
1250	105.6	109.3	108.8	109.8	106.9	100.3	98.8	100.3	98.4	97.1	99.1	100.7	101.3	97.9	95.3	95.8	103.6	151.0
1600	91.4	92.9	93.2	93.9	91.2	87.6	87.3	88.6	90.3	91.1	93.4	93.9	93.8	91.3	87.6	85.5	91.7	139.1
2000	90.3	90.3	90.7	90.8	88.2	87.2	87.3	89.1	91.0	92.8	94.3	95.6	95.7	92.3	88.5	85.9	92.2	139.6
2500	101.7	101.0	102.0	103.7	100.0	98.0	93.2	92.5	94.8	97.7	98.3	103.8	103.5	99.8	93.2	90.3	100.2	147.6
3150	91.4	92.8	93.1	93.8	90.3	88.6	87.3	88.6	91.6	93.3	95.3	97.3	96.9	94.6	89.8	86.6	93.8	141.2
4000	95.5	98.0	99.7	100.4	96.4	94.9	91.0	89.7	91.7	93.7	95.5	97.3	97.2	94.5	89.5	87.0	96.4	143.8
5000	93.0	95.7	97.3	98.5	95.9	92.8	89.4	88.4	91.4	92.5	95.0	96.5	96.0	94.0	89.2	86.9	95.4	142.8
6300	90.0	93.4	95.0	96.1	93.4	90.5	87.5	87.4	90.2	91.5	93.4	94.6	94.4	92.2	87.9	84.9	93.9	141.3
8000	89.1	92.8	94.0	96.1	92.3	89.8	86.1	85.6	88.1	89.3	92.3	93.2	92.6	90.6	86.1	82.9	93.4	140.8
10000	88.3	91.3	92.9	94.2	90.4	87.9	83.6	83.7	86.9	87.6	91.1	91.7	91.4	89.8	85.4	81.4	92.9	140.3
12500	86.5	89.9	90.2	92.2	88.5	86.5	81.5	81.4	84.7	85.9	88.9	89.2	89.2	89.2	83.5	79.6	92.3	139.7
16000	84.2	87.9	87.5	89.9	85.8	83.8	79.0	79.0	82.9	84.0	86.7	87.5	87.5	86.2	81.9	78.0	92.0	139.4
20000	82.2	85.8	85.5	87.7	82.9	80.9	76.7	77.2	80.5	81.7	84.5	84.6	84.7	84.9	79.2	75.4	92.4	139.8
OVERALL	108.4	111.0	111.0	112.1	109.1	105.1	103.1	103.8	104.4	105.4	107.3	109.2	109.3	107.8	105.8	105.6	108.5	155.9
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	94.6	104.2	108.4	112.3	111.1	110.3	108.1	108.8	110.7	112.4	113.4	115.7	114.4	110.2	103.4	97.3		

(b) Percent speed, 70; fan physical speed, 2417 rpm; fundamental blade passage frequency, 1047 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	76.0	76.1	76.8	76.1	75.3	76.1	76.0	76.5	77.0	78.1	79.8	79.6	83.5	83.0	84.6	86.7	79.9	127.3
63	75.2	76.9	76.2	74.5	74.0	74.7	74.7	75.2	76.4	76.7	80.2	80.1	84.9	85.2	85.4	87.1	80.4	127.8
80	80.2	76.2	76.7	74.5	75.8	76.3	75.8	76.8	78.0	79.7	82.2	83.1	86.7	86.8	88.3	89.2	82.5	129.9
100	77.3	77.5	76.7	76.8	76.3	77.5	78.3	80.0	81.2	83.2	84.7	85.3	88.5	88.3	88.8	90.4	84.2	131.6
125	80.9	82.4	80.7	80.9	80.4	81.7	81.7	82.5	83.9	84.5	85.7	85.9	88.2	87.7	88.0	88.6	84.8	132.2
160	81.5	81.5	81.0	81.8	80.7	81.8	81.2	82.7	82.8	83.8	84.5	84.6	86.5	86.2	85.7	86.1	83.7	131.1
200	81.5	82.2	81.4	80.4	79.4	79.9	79.5	79.5	80.7	81.0	82.7	83.6	86.0	85.9	85.9	84.6	82.5	129.9
250	82.3	83.3	81.7	81.5	80.2	79.7	80.0	81.5	82.7	84.0	85.0	85.8	86.8	86.2	85.8	84.4	83.7	131.1
315	84.0	84.5	82.2	83.2	81.3	81.5	81.8	82.5	83.5	84.3	84.7	84.9	86.7	85.8	84.7	83.2	83.9	131.3
400	82.9	84.4	83.4	83.0	82.2	81.4	81.2	81.5	83.0	84.9	86.5	86.4	87.4	85.9	84.0	82.6	84.4	131.8
500	82.0	83.5	82.9	83.4	81.5	80.5	80.9	81.9	83.0	84.4	85.0	85.8	87.2	84.7	82.9	80.9	83.8	131.2
630	82.6	83.9	83.7	83.9	81.9	81.9	81.6	82.1	83.4	85.1	86.4	86.3	87.2	84.4	81.9	80.5	84.3	131.7
800	86.2	87.8	87.3	87.2	85.2	84.0	83.3	83.1	84.1	85.8	87.6	88.1	89.8	85.3	82.8	81.4	86.2	133.6
1000	99.9	103.9	105.2	105.9	102.8	99.8	96.6	91.6	92.7	95.7	93.9	95.2	98.9	94.9	92.2	91.0	99.6	147.0
1250	91.4	94.2	94.9	94.7	91.7	88.7	86.2	84.4	85.7	87.4	88.7	89.5	91.9	87.9	84.7	82.6	90.2	137.6
1600	86.7	88.5	88.2	88.3	84.7	82.3	81.3	82.3	84.3	85.8	87.7	88.8	90.8	86.0	82.2	79.9	86.6	134.0
2000	95.7	97.4	98.0	99.0	95.1	92.0	89.0	87.5	87.7	90.0	92.7	93.0	96.9	92.6	87.7	84.6	94.0	141.4
2500	88.2	90.7	90.4	90.9	87.9	84.6	82.7	83.2	85.9	87.2	89.7	91.4	94.4	90.2	84.9	81.5	89.4	136.8
3150	92.0	94.7	93.8	95.0	92.3	88.5	85.0	84.5	87.0	88.8	91.5	92.6	95.0	91.8	86.2	82.9	91.8	139.2
4000	89.3	91.9	91.5	92.6	89.1	86.0	83.3	83.1	86.0	87.6	90.1	91.1	93.8	90.8	85.6	82.2	90.2	137.6
5000	89.1	92.1	91.6	92.6	90.5	87.0	84.8	84.5	87.5	88.8	91.3	92.1	94.0	91.3	86.6	83.4	91.2	138.6
6300	87.6	90.9	89.8	91.6	89.1	85.6	82.7	82.2	85.6	87.3	90.3	90.5	92.4	90.4	85.9	82.2	90.3	137.7
8000	86.9	90.1	89.5	91.3	89.0	85.5	81.6	81.4	84.7	86.6	89.7	89.7	91.4	89.6	85.1	81.7	90.3	137.7
10000	86.0	89.2	88.7	90.7	87.7	84.7	80.5	80.2	83.4	85.2	88.0	88.2	89.8	87.9	84.0	80.3	90.0	137.4
12500	84.8	87.8	87.0	89.5	86.3	83.5	79.0	78.8	82.3	84.0	86.5	86.1	87.8	86.6	82.6	79.3	89.9	137.3
16000	82.2	85.9	84.4	87.1	83.7	80.7	76.6	76.9	80.2	81.7	83.7	83.9	85.0	84.9	79.9	77.6	89.4	136.8
20000	79.8	83.2	81.4	84.0	80.4	77.4	73.7	74.5	77.7	78.9	80.7	80.9	81.7	81.9	76.7	74.4	89.1	136.5
OVERALL	103.7	106.7	107.4	108.2	105.1	102.2	99.5	97.5	99.2	101.1	102.5	103.2	105.8	102.9	100.2	99.3	104.3	151.7
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	89.5	99.7	103.9	107.4	106.1	104.6	102.9	102.6	104.8	106.4	108.1	108.1	109.3	104.5	97.8	91.1		

TABLE VII. - NOISE OF FAN B CONFIGURATION 103 (HARD INLET, SOFT FAN FRAME, HARD EXHAUST, NOMINAL NOZZLE)

TEST PURPOSE - NOZZLE TRIM

[Data adjusted to standard day of 15° C and 70 percent relative humidity; SPL re 0.00002 N/m^2; PWL re 0.1 pW.]

(a) Percent speed, 70; fan physical speed, 2478 rpm; fundamental blade passage frequency, 1073 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	85.2	83.2	77.8	82.3	79.6	80.1	77.1	78.3	75.8	78.3	80.3	77.3	81.8	79.6	82.8	86.3	80.3	127.7
63	84.1	82.2	75.1	80.3	78.4	79.3	75.8	77.1	74.6	77.6	79.3	77.0	81.6	79.6	82.3	86.3	79.5	126.9
80	86.1	82.9	78.6	81.1	78.1	78.6	77.6	79.1	76.1	77.8	79.8	78.8	83.6	82.8	85.1	89.0	81.2	128.6
100	85.3	84.6	79.1	81.3	80.9	79.3	79.6	80.3	77.6	80.3	82.6	80.9	85.3	83.8	87.6	89.5	82.7	130.1
125	86.6	85.6	82.8	83.6	83.2	82.8	82.3	82.8	80.3	81.1	83.3	81.3	86.8	84.6	88.1	88.3	83.9	131.3
160	87.6	85.6	83.6	84.6	84.6	83.8	83.1	83.6	79.9	81.9	83.6	82.1	85.4	83.6	86.4	86.7	83.9	131.3
200	86.9	87.6	85.1	84.3	83.9	82.1	81.3	81.6	77.1	79.6	81.3	79.6	86.6	82.8	84.8	85.3	83.1	130.5
250	88.1	87.4	84.6	85.8	86.4	83.1	82.3	83.3	79.3	81.8	83.6	82.9	88.3	84.3	86.6	85.7	84.6	132.0
315	88.8	88.6	86.4	87.1	86.3	83.5	84.0	83.6	80.4	82.6	83.9	82.4	87.9	83.9	85.4	84.7	84.9	132.3
400	88.3	88.0	86.0	87.0	86.2	83.2	83.2	83.5	81.2	83.0	84.5	83.8	88.7	84.0	85.5	83.4	85.1	132.5
500	87.6	87.5	86.2	87.3	86.5	84.0	83.6	83.7	81.0	82.5	84.0	82.2	87.7	83.5	84.5	81.9	84.8	132.2
630	87.9	87.6	86.3	87.4	86.6	83.6	83.6	84.1	82.1	83.3	84.7	83.8	88.6	83.6	84.6	81.8	85.2	132.6
800	91.1	90.6	88.9	90.3	89.0	86.1	85.8	85.4	82.9	84.6	86.9	85.6	90.4	85.1	86.1	82.8	87.3	134.7
1000	102.7	104.6	103.6	105.7	102.9	99.1	97.3	93.6	88.6	90.6	92.9	91.6	99.5	92.6	93.9	89.7	99.3	146.7
1250	97.5	99.0	97.6	99.1	97.1	93.6	91.1	89.3	84.4	86.9	88.6	88.4	94.8	88.1	89.6	86.0	93.7	141.1
1600	92.1	92.7	90.5	91.7	89.6	86.7	84.7	85.4	82.5	85.3	87.0	86.5	91.8	84.8	85.2	82.1	88.2	135.6
2000	98.1	98.0	97.3	98.3	95.8	92.6	90.0	88.6	85.3	87.5	90.3	89.8	95.0	88.3	88.8	84.9	93.3	140.7
2500	93.7	94.4	93.4	94.7	92.6	88.9	86.1	86.4	84.1	86.4	88.6	89.2	94.7	87.9	87.6	83.0	90.8	138.2
3150	95.1	95.9	94.6	96.4	93.6	90.4	86.8	86.4	84.6	87.1	89.6	89.1	95.1	88.6	88.8	83.9	92.0	139.4
4000	93.9	94.5	93.7	94.4	92.2	88.7	85.2	85.4	83.1	85.4	88.1	87.4	93.7	87.6	87.6	82.8	90.7	138.1
5000	94.0	94.3	94.5	95.0	92.8	89.6	86.1	86.5	83.9	85.9	88.4	88.5	93.8	87.6	87.9	83.0	91.5	138.9
6300	93.1	93.5	93.1	94.0	91.6	88.0	84.4	84.0	82.1	84.5	86.9	86.8	92.5	86.7	86.7	82.1	90.7	138.1
8000	92.9	93.2	92.7	93.9	90.8	87.4	82.8	82.8	81.4	83.4	85.4	85.8	91.4	86.2	85.9	81.0	90.7	138.1
10000	92.2	92.6	92.1	93.2	89.9	86.4	81.0	80.9	79.9	82.0	84.5	83.9	89.5	84.4	84.2	79.5	90.6	138.0
12500	91.3	91.5	90.3	91.8	88.8	85.3	79.6	79.5	78.5	80.5	82.3	82.0	87.9	83.3	83.0	78.2	90.6	138.0
16000	89.4	89.7	88.5	90.4	86.3	83.3	77.3	77.7	76.5	78.8	80.3	80.8	85.2	81.3	81.3	76.6	90.6	138.0
20000	87.8	88.0	86.6	87.9	83.9	80.3	74.9	75.8	74.8	76.5	78.3	78.3	82.3	79.3	78.8	74.1	91.1	138.5
OVERALL	107.7	108.6	107.6	109.2	106.7	103.2	101.0	99.5	96.3	98.4	100.6	100.0	105.9	100.2	101.2	99.3	104.7	152.1
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	93.3	101.7	104.8	108.8	108.3	106.4	104.6	104.6	102.2	104.4	106.2	104.8	109.4	101.6	99.6	91.9		

(b) Percent speed, 75; fan physical speed, 2600 rpm; fundamental blade passage frequency, 1126 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	84.5	88.1	85.6	85.5	86.1	87.6	84.8	87.3	83.5	86.0	87.8	89.2	84.0	88.3	89.0	90.7	87.0	134.4
63	83.0	87.0	83.5	84.0	84.8	86.6	83.3	86.6	81.3	84.3	86.5	89.9	85.6	89.6	89.5	90.8	86.6	134.0
80	83.9	86.2	81.7	81.7	83.6	85.7	83.6	86.7	82.1	86.3	88.7	89.3	88.6	90.9	91.6	93.3	87.5	134.9
100	84.9	86.6	84.1	83.4	84.4	86.7	84.4	86.9	85.6	87.2	89.6	89.8	91.7	92.9	93.4	94.8	89.0	136.4
125	86.6	89.0	87.8	87.5	86.1	88.8	86.1	87.5	87.1	88.3	90.6	91.6	92.3	92.6	93.5	94.5	89.9	137.3
160	87.8	89.0	86.8	87.1	87.0	87.5	86.3	87.8	87.0	87.8	90.0	91.1	91.5	92.0	91.8	92.2	89.2	136.6
200	87.3	89.4	86.8	85.1	85.8	84.9	83.8	86.1	84.8	86.1	87.6	88.5	89.9	91.1	90.3	89.8	87.5	134.9
250	88.5	89.8	88.1	87.5	88.5	87.3	85.0	87.1	86.8	87.8	90.0	92.4	92.5	92.1	91.1	90.0	89.4	136.8
315	88.8	90.8	88.8	88.5	89.1	87.5	85.8	87.8	87.6	88.5	90.0	92.0	91.8	91.1	90.1	89.2	89.4	136.8
400	89.1	90.9	90.1	89.4	89.1	86.9	85.6	87.1	87.9	88.4	90.1	92.3	92.7	90.7	89.2	87.8	89.6	137.0
500	88.5	90.5	89.4	89.7	89.0	86.9	85.7	86.9	87.0	87.9	89.4	91.5	91.7	89.9	87.9	86.6	89.0	136.4
630	87.9	90.6	89.8	89.1	88.8	86.3	85.3	86.6	88.1	88.1	90.8	92.0	91.9	89.4	87.4	85.3	89.2	136.6
800	91.3	92.8	91.8	91.5	91.0	88.5	86.8	87.3	88.5	89.8	92.1	93.7	93.6	90.0	88.1	86.2	90.8	138.2
1000	100.4	102.9	103.9	104.1	102.9	99.6	96.3	95.1	94.4	94.1	96.6	97.8	98.9	94.9	92.1	90.6	99.3	146.7
1250	103.7	105.2	106.8	106.8	105.3	102.3	98.8	97.7	96.8	95.7	97.7	99.4	100.3	97.0	94.2	92.7	101.7	149.1
1600	92.6	94.9	94.6	94.1	92.9	90.1	86.6	87.9	89.1	90.3	92.4	95.0	93.9	89.6	87.1	85.2	92.0	139.4
2000	96.5	97.9	98.2	98.2	96.4	93.0	89.7	89.9	91.0	92.0	95.0	97.5	96.7	92.4	89.0	86.6	95.0	142.4
2500	97.0	98.6	99.0	99.5	97.6	94.3	90.6	89.5	90.8	92.1	95.6	97.6	97.3	93.0	89.6	86.7	95.8	143.2
3150	95.1	96.6	96.9	96.9	95.2	91.9	88.6	88.1	90.4	91.4	94.7	97.4	96.6	93.1	89.1	86.0	94.6	142.0
4000	93.5	95.1	94.6	94.9	93.2	90.2	86.4	86.6	89.1	89.9	93.1	95.4	95.1	91.6	87.9	85.0	93.0	140.4
5000	93.0	95.4	95.5	95.7	93.9	91.0	87.5	87.2	89.4	90.7	93.2	95.3	95.0	91.7	88.4	85.2	93.7	141.1
6300	91.8	93.7	93.7	94.3	92.1	89.2	86.0	85.3	87.7	88.5	91.9	93.9	93.4	90.6	87.4	83.8	92.6	140.0
8000	91.2	93.0	93.0	93.7	91.5	88.2	84.2	83.5	85.5	87.0	90.3	92.0	92.5	89.7	86.3	82.6	92.1	139.5
10000	90.3	91.3	92.1	92.3	90.1	86.8	82.1	81.6	83.4	85.3	88.3	90.0	90.1	87.8	84.9	81.1	91.4	138.8
12500	89.2	90.2	90.0	90.5	88.3	85.5	80.2	79.3	81.2	83.0	86.2	87.3	88.0	86.3	83.3	79.5	90.9	138.3
16000	87.4	88.8	88.1	88.9	85.7	82.9	77.8	77.4	78.9	81.1	83.7	85.3	85.1	85.4	81.6	77.7	90.8	138.2
20000	85.8	86.2	85.4	86.6	82.9	80.0	75.5	75.1	76.4	78.6	81.0	82.4	83.0	82.9	78.7	75.5	91.0	138.4
OVERALL	108.2	110.0	110.7	110.8	109.4	106.5	103.3	103.2	103.2	103.7	106.3	108.1	108.2	105.8	104.0	103.5	107.6	155.0
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	94.1	103.7	108.2	110.7	111.1	109.7	107.2	107.5	108.5	109.3	111.7	113.1	111.5	106.8	101.4	95.2		

TABLE VII. - Concluded.

(c) Percent speed, 85; fan physical speed, 3000 rpm; fundamental blade passage frequency, 1300 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	84.2	82.3	82.5	83.2	82.8	82.2	82.7	84.8	84.3	83.8	86.0	86.3	87.5	90.0	92.2	94.2	86.6	134.0
63	80.5	82.0	80.0	80.0	80.5	79.8	80.5	81.5	82.5	84.2	85.8	86.6	87.8	91.0	92.0	93.2	86.1	133.5
80	80.8	83.8	78.9	80.1	80.4	80.1	80.3	82.6	83.4	86.3	88.3	88.8	91.8	93.9	96.3	96.5	89.0	136.4
100	85.6	84.7	85.4	85.2	84.9	84.6	84.6	86.4	87.7	89.7	91.1	92.7	94.1	96.4	99.1	98.8	91.9	139.3
125	86.9	87.1	85.3	85.6	86.9	87.1	87.3	89.9	90.6	91.3	92.4	93.9	94.1	97.6	99.6	97.8	92.8	140.2
160	88.4	88.2	87.6	87.4	87.9	88.7	88.7	89.7	91.2	91.1	92.1	92.7	93.2	96.1	96.4	95.5	91.8	139.2
200	88.2	88.4	85.9	86.1	85.9	86.6	85.9	87.1	87.9	88.7	89.9	91.3	93.1	94.6	95.1	93.1	90.1	137.5
250	87.8	88.4	86.9	86.9	86.9	87.4	87.4	88.8	90.4	90.8	91.9	93.5	95.1	96.1	96.1	93.8	91.7	139.1
315	88.5	88.7	86.9	87.4	88.0	87.9	88.5	89.7	90.7	91.4	91.7	93.5	94.5	95.2	93.9	92.3	91.4	138.8
400	87.9	87.9	86.3	86.9	87.9	87.9	87.9	88.8	90.3	91.3	92.4	94.4	94.9	94.8	93.6	91.2	91.5	138.9
500	88.0	88.2	86.7	87.8	88.5	88.0	88.2	89.3	90.5	91.3	92.0	93.8	94.5	94.3	91.7	90.1	91.2	138.6
630	89.0	88.8	88.7	88.0	88.3	87.7	88.0	89.5	90.8	91.8	93.5	94.4	94.3	93.3	90.8	88.5	91.4	138.8
800	90.9	90.5	88.5	89.5	89.9	88.9	89.4	90.4	91.4	93.5	95.0	96.0	95.0	93.7	90.5	88.7	92.5	139.9
1000	94.3	95.2	93.7	93.8	93.7	92.0	91.3	91.5	92.7	94.2	95.2	96.4	96.7	94.3	91.0	89.2	94.1	141.5
1250	108.0	109.8	111.0	111.1	110.6	109.5	105.0	102.6	101.6	101.4	103.8	104.0	103.3	100.8	97.9	97.8	106.7	154.1
1600	97.2	98.5	97.7	97.5	97.3	95.7	92.9	92.5	92.9	94.2	95.9	97.1	96.4	93.5	90.2	89.3	95.6	143.0
2000	93.8	93.9	92.6	92.8	92.3	91.0	90.1	91.3	93.3	94.8	96.1	97.6	97.0	94.5	90.1	88.7	94.3	141.7
2500	102.1	103.4	104.5	104.8	105.1	102.3	98.4	96.6	97.1	99.6	101.4	103.1	103.1	103.1	95.1	93.5	102.2	149.6
3150	94.7	95.4	95.0	95.7	95.0	93.2	91.5	91.7	94.0	95.4	97.7	99.5	99.0	96.5	91.9	89.1	96.3	143.7
4000	99.0	99.6	100.5	101.6	100.3	98.3	95.0	93.1	94.6	95.5	98.5	100.1	98.8	95.6	91.5	88.7	98.7	146.1
5000	95.7	96.7	97.7	98.6	97.4	95.9	92.7	91.9	93.6	94.8	97.6	98.6	97.9	96.1	91.4	88.6	97.2	144.6
6300	93.0	94.6	95.5	96.7	95.3	94.0	90.8	90.3	92.1	93.1	95.6	96.7	96.1	93.8	89.6	87.0	95.7	143.1
8000	92.4	93.0	94.5	95.9	93.5	92.4	89.5	88.7	90.2	91.7	93.8	94.6	94.4	92.2	88.0	85.1	94.8	142.2
10000	90.4	91.7	93.1	94.2	92.7	90.9	87.2	87.2	88.6	89.6	92.1	93.0	93.4	90.7	86.9	83.4	94.3	141.7
12500	88.1	89.6	90.6	91.4	89.8	88.1	84.4	84.7	86.1	87.7	89.9	90.4	91.2	89.4	85.2	82.1	93.3	140.7
16000	85.5	87.0	87.5	89.2	86.6	85.7	81.5	82.0	83.7	85.5	87.3	88.4	88.2	87.7	82.8	79.8	92.7	140.1
20000	83.2	84.7	84.6	86.5	84.0	82.4	78.6	79.5	81.1	83.0	84.6	86.1	85.6	85.0	80.0	77.3	92.8	140.2
OVERALL	110.7	112.1	113.0	113.3	112.8	111.4	107.7	106.4	106.9	107.9	109.8	111.0	110.7	109.9	108.1	107.0	110.8	158.2
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	96.6	105.7	110.4	113.5	115.1	114.4	112.3	111.9	112.9	114.5	115.9	116.5	115.2	112.8	105.4	99.7		

(d) Percent speed, 90; fan physical speed, 3186 rpm; fundamental blade passage frequency, 1380 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	88.4	84.3	83.8	82.3	83.8	84.1	84.9	86.6	86.8	86.8	87.4	88.4	89.9	92.4	94.4	96.2	88.7	136.1
63	84.8	84.6	83.1	81.4	82.8	82.4	83.6	83.9	84.8	84.9	87.4	88.0	90.6	92.3	94.3	96.5	88.3	135.7
80	85.3	85.3	81.3	81.4	82.6	82.4	83.1	83.6	85.9	87.8	89.3	91.2	93.4	96.3	98.3	99.1	91.1	138.5
100	88.1	86.4	84.6	85.9	85.4	86.1	86.2	87.7	90.1	91.4	92.6	94.2	96.2	98.9	101.1	101.1	93.9	141.3
125	89.6	87.8	87.3	87.4	88.8	88.8	89.9	90.8	92.8	92.8	94.8	95.5	96.9	100.1	100.9	100.1	94.8	142.2
160	89.9	89.9	89.2	89.2	90.2	89.9	90.5	91.7	92.7	92.9	94.0	94.8	96.0	98.2	98.7	98.1	93.9	141.3
200	90.3	89.5	88.1	88.3	88.6	88.3	88.5	88.8	90.8	90.5	92.0	93.5	95.5	97.5	97.6	96.0	92.5	139.9
250	89.8	89.6	88.9	88.9	88.3	88.1	89.6	90.4	92.6	92.6	94.1	95.5	97.4	98.9	98.9	96.5	94.0	141.4
315	89.9	89.2	88.1	89.1	89.1	88.7	90.1	91.2	92.6	92.7	94.2	95.5	96.9	98.1	96.9	94.3	93.5	140.9
400	90.3	89.1	89.3	89.8	89.8	89.5	89.6	90.8	92.5	93.3	94.5	96.1	97.1	98.0	96.0	93.5	93.7	141.1
500	90.5	89.5	89.8	91.0	90.7	89.7	89.5	91.0	92.5	92.8	94.3	95.6	96.3	96.3	94.8	91.9	93.2	140.6
630	90.9	91.2	91.1	91.2	90.9	89.2	89.6	91.4	92.9	93.4	95.6	95.8	96.2	95.7	93.6	90.8	93.4	140.8
800	93.1	92.9	93.4	93.9	93.3	91.6	91.3	92.1	93.3	94.9	96.9	97.7	97.3	95.8	93.6	91.2	94.7	142.1
1000	94.4	94.8	94.4	93.8	93.9	92.1	91.6	92.6	94.4	95.2	97.1	97.3	98.7	96.3	93.7	91.0	95.3	142.7
1250	106.6	108.0	109.1	108.3	108.0	106.0	101.3	100.6	100.3	99.1	101.8	102.6	101.8	98.6	96.6	96.0	104.3	151.7
1600	104.1	105.1	105.2	104.4	104.1	102.6	97.7	97.2	97.4	96.9	99.2	100.0	99.9	96.6	94.6	92.8	101.0	148.4
2000	96.0	96.0	96.0	96.0	95.7	93.7	92.9	93.2	95.2	95.9	98.0	98.8	99.0	95.7	92.9	89.8	96.3	143.7
2500	102.6	103.1	103.8	103.4	103.3	100.6	97.1	96.1	98.1	100.4	101.6	102.9	103.9	102.4	95.3	92.5	101.7	149.1
3150	100.2	100.6	101.1	101.1	100.4	98.1	95.6	94.7	96.6	98.4	100.7	101.7	102.7	101.0	95.6	92.2	100.1	147.5
4000	99.7	100.2	101.2	100.7	100.2	97.5	95.5	94.0	95.5	97.2	101.0	100.5	100.0	96.2	93.0	90.3	99.3	146.7
5000	96.8	97.3	98.5	98.5	97.8	95.5	93.3	93.0	94.6	96.3	99.6	100.0	100.3	96.7	93.0	89.5	98.3	145.7
6300	95.1	96.3	97.0	97.1	96.1	94.0	92.1	92.0	93.5	94.9	97.2	98.1	98.9	95.6	92.6	88.8	97.2	144.6
8000	93.9	94.9	95.6	95.9	94.8	92.9	90.3	90.3	91.6	93.1	95.6	96.1	96.8	93.9	90.6	86.8	96.2	143.6
10000	91.8	93.0	93.8	93.8	92.8	90.7	88.0	88.5	89.5	91.3	93.7	94.3	95.0	92.2	89.5	85.0	95.3	142.7
12500	89.9	90.7	91.1	91.1	90.1	88.4	85.1	86.2	87.6	89.3	91.6	91.9	93.3	90.9	87.6	83.6	94.5	141.9
16000	87.3	88.5	88.2	88.5	86.8	85.7	82.5	83.3	85.2	87.2	88.8	89.7	90.5	89.1	86.0	81.6	93.9	141.3
20000	85.3	85.5	85.5	86.0	83.8	82.3	79.8	80.8	82.8	84.7	86.3	87.2	87.3	88.1	83.0	79.3	94.1	141.5
OVERALL	111.5	112.4	113.0	112.5	112.2	110.2	107.1	106.9	108.1	108.8	111.0	111.8	112.4	111.4	110.1	109.0	111.3	158.7
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	97.8	106.5	111.2	113.6	115.1	114.2	112.5	112.6	114.4	115.7	117.1	117.2	116.8	113.5	107.3	100.7		
305 METERS	72.7	85.1	91.3	94.3	96.4	96.0	94.6	94.9	96.7	97.9	99.1	99.0	98.2	94.6	87.4	80.2		

TABLE VIII. - NOISE OF FAN B CONFIGURATION 104 (HARD INLET, SOFT FAN FRAME, HARD EXHAUST, SMALL NOZZLE)

TEST PURPOSE - FAR-FIELD NOISE

[Data adjusted to standard day of 15° C and 70 percent relative humidity; SPL re 0.00002 N/m^2; PWL re 0.1 pW.]

(a) Percent speed, 60; fan physical speed, 2089 rpm; fundamental blade passage frequency, 905 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	78.7	75.2	77.9	74.2	73.9	75.9	74.1	76.9	76.2	76.1	78.9	76.7	79.7	79.1	82.6	82.3	77.7	125.1
63	79.2	76.6	77.1	72.1	72.6	74.7	72.7	76.4	75.1	75.1	77.6	76.8	79.6	80.6	83.2	82.4	77.5	124.9
80	78.0	77.2	76.0	72.2	71.8	73.7	71.5	76.0	75.2	76.5	79.0	79.6	82.2	82.5	85.0	84.7	78.9	126.3
100	80.9	80.0	79.5	77.7	76.5	76.5	76.9	78.4	78.9	80.0	81.7	82.5	84.2	84.4	86.4	85.9	81.3	128.7
125	82.2	83.5	82.5	80.7	79.5	78.4	78.9	79.9	80.5	81.4	82.7	83.1	84.5	85.0	86.5	84.7	82.3	129.7
160	82.6	82.6	80.7	80.6	79.2	78.1	79.2	79.4	80.2	80.1	82.2	82.0	82.4	83.2	84.2	83.1	81.2	128.6
200	82.9	83.3	81.3	79.8	77.1	76.4	76.9	77.4	77.4	78.8	80.1	80.8	82.1	82.9	83.6	81.3	80.1	127.5
250	84.4	85.2	83.9	82.9	80.6	79.6	79.2	80.2	80.7	82.4	83.6	84.0	84.9	84.7	84.6	81.6	82.7	130.1
315	85.1	86.0	84.5	84.0	81.0	79.5	79.5	80.5	80.8	82.0	82.8	83.4	84.3	83.6	83.1	81.0	82.5	129.9
400	85.3	86.7	85.3	84.3	81.7	79.3	79.3	79.8	81.3	83.5	85.0	84.8	86.0	84.7	83.0	80.2	83.5	130.9
500	85.4	86.7	85.0	84.5	81.7	80.0	80.0	80.7	81.9	82.9	83.9	84.5	86.2	84.5	82.2	79.4	83.4	130.8
630	85.3	87.0	86.0	84.8	82.5	80.0	80.5	80.7	82.7	83.8	85.3	85.8	87.0	85.0	81.8	78.7	84.1	131.5
800	92.6	93.4	93.9	94.9	93.2	89.2	87.2	86.1	86.4	87.6	89.4	90.2	90.9	89.6	85.6	83.4	90.4	137.8
1000	95.8	95.9	96.8	98.3	96.4	92.3	89.8	88.6	87.9	89.3	91.4	91.9	92.4	91.6	87.6	85.5	93.0	140.4
1250	88.2	89.3	88.8	87.3	84.7	81.7	80.8	81.5	82.7	84.7	86.2	87.6	89.2	86.7	83.3	79.4	85.9	133.3
1600	90.0	91.5	91.0	89.7	86.5	83.7	80.7	81.4	82.9	85.0	86.7	88.1	90.7	86.5	83.4	79.1	87.1	134.5
2000	92.0	93.5	93.4	92.7	89.9	86.2	82.5	82.5	83.9	86.4	88.9	89.8	92.5	89.4	85.2	81.0	89.4	136.8
2500	90.0	91.7	91.0	90.7	87.5	83.8	80.7	81.2	83.3	85.7	88.0	89.1	91.5	88.2	84.5	80.1	88.0	135.4
3150	90.5	91.8	91.1	91.6	88.0	84.1	80.5	80.1	82.5	85.0	87.3	89.4	91.0	87.8	84.6	79.9	88.2	135.6
4000	90.8	92.3	91.6	92.1	88.8	85.1	81.6	81.1	82.9	84.4	87.1	88.5	90.4	87.7	84.6	80.4	88.5	135.9
5000	91.5	93.0	91.9	92.9	89.9	86.4	81.0	81.2	83.0	84.7	87.7	89.0	90.7	88.4	85.5	81.2	89.4	136.8
6300	90.8	92.3	91.1	92.6	88.9	85.4	79.4	79.3	81.1	83.3	86.4	87.4	89.4	86.8	84.4	79.9	88.9	136.3
8000	90.9	92.6	91.6	92.6	89.1	85.4	78.9	78.9	80.4	82.0	85.2	86.2	87.7	85.7	82.9	79.0	89.2	136.6
10000	90.7	92.2	91.2	92.7	88.9	85.5	78.2	78.5	79.2	81.0	84.0	85.2	86.5	84.9	82.2	77.9	89.7	137.1
12500	89.7	91.1	90.2	91.9	87.9	84.9	77.1	77.9	78.8	80.3	83.3	84.1	85.1	84.3	81.2	77.4	90.2	137.6
16000	87.6	89.8	88.4	89.9	85.6	83.1	74.9	76.4	77.3	78.8	81.4	82.1	82.8	82.4	78.9	75.6	90.2	137.6
20000	85.5	87.3	86.0	87.4	82.2	80.4	72.3	74.9	74.6	75.8	78.3	79.3	80.3	79.9	76.1	72.2	90.3	137.7
OVERALL	103.4	104.5	104.0	104.7	101.9	98.5	95.4	95.4	96.1	97.8	99.9	100.8	102.4	100.5	98.4	95.8	101.8	149.2
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	88.5	98.1	101.8	104.7	103.6	101.6	99.4	99.8	101.4	103.2	104.9	105.5	105.9	101.6	96.3	88.3		
113 METERS	79.9	90.6	94.9	97.8	96.8	94.9	92.8	93.4	95.0	96.8	98.5	99.0	99.3	94.8	89.2	80.8		

(b) Percent speed, 70; fan physical speed, 2432 rpm; fundamental blade passage frequency , 1053 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	81.8	77.6	76.5	77.8	77.0	77.6	77.1	77.5	77.5	79.6	80.5	81.4	84.0	83.8	86.0	87.0	80.9	128.3
63	80.2	77.2	74.7	76.0	75.5	75.8	75.8	76.0	76.8	78.3	79.3	81.2	85.2	84.3	87.7	87.2	81.0	128.4
80	81.5	78.5	76.8	76.5	75.8	76.0	75.5	77.3	78.0	80.3	81.8	83.7	87.2	87.8	90.5	90.0	83.4	130.8
100	82.1	79.6	77.8	78.1	78.0	78.6	78.6	80.0	82.1	83.5	85.0	85.5	88.8	89.8	91.8	90.5	85.2	132.6
125	83.7	83.8	82.7	82.7	82.2	82.0	82.3	83.2	84.3	85.7	86.5	86.9	89.0	89.0	91.5	89.7	86.1	133.5
160	84.6	85.0	82.1	83.0	83.0	83.6	82.8	83.0	84.0	84.6	85.5	85.6	87.8	86.8	89.1	87.4	85.1	132.5
200	84.9	86.4	83.9	83.6	81.2	80.6	80.6	80.9	81.2	82.1	83.7	84.3	86.9	87.4	88.7	86.4	84.1	131.5
250	87.0	86.8	85.2	86.4	85.0	83.2	82.7	82.9	83.5	85.0	87.0	86.8	88.7	87.8	88.8	85.9	85.9	133.3
315	87.8	87.5	86.2	86.7	84.2	82.5	82.3	82.8	83.7	85.0	86.3	85.8	87.8	87.3	87.8	84.4	85.5	132.9
400	87.7	87.5	86.2	86.3	84.3	83.2	82.3	83.5	84.5	85.7	87.3	87.6	89.0	87.3	86.8	83.7	86.1	133.5
500	86.5	87.2	86.0	86.7	84.9	83.9	82.9	83.5	84.5	85.7	86.7	87.3	89.7	87.0	86.2	82.4	86.1	133.5
630	86.4	87.4	86.5	87.2	84.9	83.0	82.5	84.0	85.2	86.3	88.0	88.1	89.8	86.3	85.5	81.7	86.4	133.8
800	90.2	90.7	89.0	90.3	87.8	86.0	85.0	85.8	86.7	87.8	90.2	90.6	92.2	88.2	86.3	82.9	88.7	136.1
1000	95.6	103.9	103.1	106.6	101.4	98.1	93.4	94.2	93.1	93.4	95.6	95.2	100.1	95.1	92.4	91.0	99.2	146.6
1250	93.7	95.9	95.2	97.1	92.9	89.7	87.4	87.2	87.6	88.7	91.6	91.9	94.1	90.2	87.6	84.8	92.0	139.4
1600	91.1	91.8	90.6	91.5	88.5	86.0	84.1	85.5	86.5	88.1	90.1	90.9	92.8	88.3	85.8	82.0	89.2	136.6
2000	96.6	97.3	97.0	98.6	94.3	91.3	88.0	87.6	88.3	90.5	93.0	94.1	96.1	91.6	88.3	84.2	93.7	141.1
2500	92.7	93.6	92.6	94.1	90.9	87.4	84.7	85.2	87.4	89.2	92.6	93.2	95.7	90.6	87.4	83.2	91.5	138.9
3150	94.1	95.3	95.1	97.0	93.1	89.3	85.3	85.3	87.8	89.6	92.4	93.7	95.8	91.1	87.9	83.6	92.8	140.2
4000	93.9	95.2	94.2	95.7	92.2	88.4	84.7	84.2	86.4	88.0	91.2	92.0	93.9	90.0	87.4	82.5	91.8	139.2
5000	94.0	95.5	95.0	96.5	93.1	90.0	85.8	85.6	87.6	89.0	92.0	92.3	94.3	90.6	87.8	83.8	92.8	140.2
6300	93.7	94.7	94.2	96.1	92.4	88.5	84.2	83.3	85.7	87.4	90.9	91.2	92.7	89.4	86.9	82.4	92.3	139.7
8000	93.7	94.9	93.9	96.2	92.7	89.0	83.3	82.5	85.1	86.8	90.1	90.3	91.8	88.8	86.5	82.3	92.7	140.1
10000	93.3	94.5	94.0	95.5	92.0	88.3	82.5	81.5	83.6	85.5	88.6	88.8	90.4	87.8	85.1	80.8	92.8	140.2
12500	92.7	93.6	92.6	94.9	91.2	87.6	81.7	80.7	83.1	84.6	87.4	87.3	89.1	87.2	83.9	80.1	93.3	140.7
16000	90.6	92.5	90.6	92.7	88.7	85.7	79.6	79.4	81.7	82.9	85.7	85.4	87.1	85.6	82.1	78.3	93.3	140.7
20000	88.6	90.3	87.9	90.0	85.9	82.7	76.7	77.3	79.0	80.6	82.9	83.4	84.0	83.0	79.2	75.5	93.4	140.8
OVERALL	106.3	108.2	107.4	109.9	105.6	102.5	98.9	99.2	100.0	101.3	103.8	104.2	106.7	103.3	102.3	100.0	105.6	153.0
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	91.8	101.1	104.8	109.2	107.5	105.6	103.2	103.8	105.7	107.1	109.3	109.2	110.2	104.6	99.9	92.0		

TABLE VIII. - Concluded.

(c) Percent speed, 80; fan physical speed, 2780 rpm; fundamental blade passage frequency, 1204 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	84.3	82.5	82.0	84.1	81.0	82.8	83.5	82.0	83.6	84.0	86.5	84.9	87.6	89.6	91.3	92.7	86.0	133.4
63	80.4	80.6	78.9	81.1	79.9	80.1	79.6	80.1	80.9	83.1	85.1	84.8	88.7	90.9	92.7	92.9	85.9	133.3
80	81.3	81.6	78.3	80.4	78.8	79.6	78.8	80.3	83.1	84.8	87.4	88.0	90.9	93.3	96.1	95.5	88.3	135.7
100	85.1	84.5	82.8	83.0	82.5	83.0	82.8	83.5	86.3	88.3	90.6	91.4	93.6	95.3	97.3	96.7	90.5	137.9
125	85.2	85.4	85.1	85.2	85.2	85.9	85.9	86.7	88.6	89.7	91.7	91.7	93.6	94.7	97.4	95.1	90.9	138.3
160	86.0	86.5	85.6	85.6	86.1	86.5	86.6	87.0	88.3	89.3	90.5	90.5	91.6	93.0	94.1	92.2	89.5	136.9
200	86.1	86.6	85.6	85.3	84.6	84.5	84.5	83.8	85.6	87.1	89.5	89.7	91.6	92.8	94.8	92.0	88.8	136.2
250	87.8	87.9	86.9	86.6	85.9	85.9	85.1	86.1	88.1	88.9	91.3	92.4	93.1	93.6	94.3	91.5	90.0	137.4
315	87.5	88.8	87.0	87.0	86.5	86.0	86.0	86.8	88.0	89.2	91.0	90.8	92.5	92.7	93.0	90.1	89.5	136.9
400	86.7	87.9	87.1	86.9	86.6	86.4	85.4	86.1	87.9	89.4	91.2	91.8	92.2	92.4	92.2	88.6	89.5	136.9
500	87.2	89.0	88.2	88.0	86.8	86.7	85.7	86.7	88.5	89.8	90.8	91.6	92.2	91.7	91.3	87.4	89.5	136.9
630	87.4	88.9	88.0	88.2	87.2	86.0	86.0	86.9	88.7	90.4	92.0	91.8	92.0	90.7	90.4	86.4	89.6	137.0
800	90.0	91.0	90.3	91.3	91.5	88.8	87.6	87.6	89.3	91.6	93.0	93.2	93.6	91.5	90.5	86.7	91.1	138.5
1000	95.5	97.8	98.0	97.3	96.6	94.3	91.0	90.5	91.5	93.5	94.5	95.1	96.3	92.5	91.3	87.5	94.7	142.1
1250	106.2	109.5	110.0	109.0	108.5	106.2	101.7	98.5	98.9	100.5	100.0	101.1	101.5	98.4	97.2	94.3	104.6	152.0
1600	92.0	93.8	92.9	92.5	91.1	88.9	87.1	87.8	89.3	92.0	93.1	93.9	94.6	90.6	88.8	85.2	91.7	139.1
2000	93.7	94.5	94.2	93.8	91.8	89.8	87.5	88.3	91.0	93.5	95.1	96.1	96.8	92.7	90.3	86.1	93.4	140.8
2500	100.9	101.4	101.9	101.9	100.9	98.1	93.8	92.1	93.6	96.1	97.9	100.0	101.6	99.6	95.6	89.8	99.1	146.5
3150	94.2	95.2	94.5	95.5	93.4	91.0	87.9	87.9	91.0	93.5	96.0	96.8	97.5	93.0	90.7	86.3	94.4	141.8
4000	96.0	97.3	97.7	98.2	96.3	94.0	89.3	88.2	90.8	92.8	95.2	95.8	96.8	92.8	90.3	86.3	95.3	142.7
5000	95.0	96.5	97.1	98.3	96.3	93.5	89.1	88.5	91.3	93.1	95.3	95.8	96.5	93.6	90.5	86.4	95.5	142.9
6300	92.7	94.5	95.1	96.7	94.3	92.0	87.6	86.6	90.0	92.0	94.2	94.0	94.5	91.4	89.3	85.1	94.3	141.7
8000	92.0	93.9	93.9	96.2	94.0	91.4	86.2	85.5	88.5	90.4	92.9	92.9	93.7	90.2	88.0	84.0	94.0	141.4
10000	90.6	92.8	92.3	94.8	92.3	89.9	84.6	84.1	87.1	89.3	91.1	91.6	92.1	90.1	87.1	82.8	93.6	141.0
12500	89.1	91.5	90.3	93.5	91.0	89.1	83.0	82.8	85.8	87.1	89.3	89.5	90.1	88.5	85.5	81.3	93.4	140.8
16000	86.9	90.0	88.2	91.5	88.0	87.2	80.9	80.9	83.9	85.7	87.4	87.2	87.9	87.4	83.2	79.8	93.3	140.7
20000	84.3	87.6	85.3	88.8	84.8	84.1	77.6	79.1	81.3	82.8	84.0	84.4	84.8	84.3	80.3	76.2	93.1	140.5
OVERALL	109.2	111.6	111.9	111.6	110.6	108.4	104.4	102.8	104.4	106.2	107.6	108.3	109.3	107.5	107.1	104.8	108.9	156.3
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	95.1	105.1	109.3	111.7	112.4	111.5	108.7	108.0	110.1	112.1	113.4	113.7	113.7	109.9	105.1	96.9		

(d) *Percent speed, 90; fan physical speed, 3127 rpm;* fundamental blade passage frequency, 1355 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	87.8	82.8	86.0	84.6	85.0	84.8	85.3	84.5	86.6	86.8	87.8	87.9	90.8	92.5	96.0	96.2	89.1	136.5
63	83.7	84.1	83.0	83.5	82.8	83.0	82.8	83.5	84.3	86.0	88.2	89.1	92.2	93.8	96.8	98.1	89.7	137.1
80	83.9	85.1	82.2	84.0	82.9	83.0	82.7	83.7	86.0	88.5	90.9	92.3	95.2	97.5	100.2	100.4	92.5	139.9
100	87.0	88.4	86.2	87.9	85.7	86.9	86.7	87.7	90.2	92.0	94.0	94.8	97.0	99.4	102.4	101.6	94.7	142.1
125	88.6	88.6	87.6	88.7	88.1	88.7	89.4	90.2	92.1	93.2	94.7	96.0	97.2	99.1	101.7	99.8	94.8	142.2
160	88.9	89.9	89.2	90.0	90.0	90.4	90.5	91.2	92.0	92.9	93.9	94.6	96.0	97.7	99.4	97.4	93.8	141.2
200	89.4	89.9	88.1	88.7	87.9	88.2	87.7	88.7	89.2	90.7	92.7	93.8	96.4	97.7	99.2	96.6	93.0	140.4
250	87.9	89.2	87.4	89.6	88.1	87.9	89.1	89.3	91.6	92.9	94.8	95.9	97.1	98.3	99.6	96.2	93.9	141.3
315	87.6	88.4	87.9	88.9	88.9	89.4	89.7	90.1	91.6	92.7	93.7	95.2	96.4	97.6	98.2	94.3	93.3	140.7
400	88.1	89.0	89.0	89.8	89.5	89.6	89.5	90.5	91.5	93.1	94.6	96.1	96.6	97.3	97.0	93.2	93.5	140.9
500	88.4	90.0	88.6	90.4	89.7	89.6	88.9	90.1	91.7	93.1	94.2	95.3	96.1	96.2	95.7	91.8	93.0	140.4
630	89.5	91.7	90.3	91.3	89.8	89.6	89.5	90.1	92.0	93.8	95.3	95.9	96.0	95.0	95.0	90.9	93.2	140.6
800	91.4	92.8	92.0	92.9	92.0	91.5	90.9	91.0	92.2	94.5	96.7	97.6	96.7	95.5	95.0	90.8	94.3	141.7
1000	93.2	95.5	93.7	94.9	93.7	92.2	91.4	91.5	93.7	95.5	96.7	97.5	97.9	95.9	94.9	90.8	95.1	142.5
1250	107.3	110.1	110.3	109.8	109.3	106.5	102.5	99.6	99.3	99.8	101.5	101.6	102.8	98.3	99.0	95.7	105.2	152.6
1600	101.0	103.3	102.6	102.6	101.8	99.3	95.5	94.1	95.0	96.0	97.6	98.4	98.8	95.3	94.6	91.2	98.9	146.3
2000	94.2	95.9	94.7	95.7	93.9	93.2	91.0	91.7	93.2	95.2	97.2	98.2	98.2	94.9	93.5	89.0	95.4	142.8
2500	103.2	104.7	103.5	104.2	104.7	103.2	98.5	96.3	96.7	98.7	101.0	102.4	104.2	100.8	97.3	92.6	102.0	149.4
3150	97.8	98.9	98.1	99.1	98.9	97.1	93.6	92.6	94.4	96.3	98.8	100.4	101.3	97.8	95.4	90.7	98.3	145.7
4000	99.2	100.7	100.8	101.7	100.8	98.5	95.2	93.5	95.3	96.3	98.5	99.8	99.2	95.3	93.5	89.5	99.0	146.4
5000	98.2	98.3	98.4	99.7	98.5	96.9	93.5	92.4	94.4	96.2	98.2	100.0	99.9	96.0	93.7	89.5	98.3	145.7
6300	95.0	97.0	96.9	98.5	97.1	95.1	92.1	91.3	93.0	94.3	97.1	97.7	97.9	94.8	92.6	88.4	97.2	144.6
8000	93.7	96.0	95.3	97.3	96.2	94.2	91.2	90.7	92.2	93.3	95.7	96.0	96.5	93.3	91.3	87.1	96.6	144.0
10000	92.0	94.6	94.0	95.5	94.4	92.2	89.7	89.5	90.9	91.9	94.0	94.9	94.9	92.2	90.2	85.9	96.1	143.5
12500	90.0	92.4	91.5	94.2	92.2	90.5	87.7	88.0	89.5	90.2	92.0	92.9	93.0	91.0	88.5	84.7	95.7	143.1
16000	86.9	90.1	89.1	91.8	89.6	88.1	86.3	86.5	87.6	89.0	89.9	90.8	91.1	89.8	86.6	82.5	95.6	143.0
20000	84.4	87.3	86.3	88.9	86.4	85.7	84.2	85.4	85.2	85.9	86.9	88.0	87.8	87.4	83.8	79.7	95.6	143.0
OVERALL	111.1	113.3	113.0	113.2	112.7	110.6	107.3	106.0	107.1	108.5	110.4	111.4	112.2	110.8	111.3	109.2	111.4	158.8
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	97.3	107.4	110.7	114.1	115.7	115.4	112.9	112.1	113.3	114.8	116.4	116.8	116.7	112.5	108.4	100.6		
305 METERS	72.3	86.2	91.4	95.0	96.9	97.1	94.9	94.3	95.5	97.0	98.5	98.6	98.1	93.5	88.9	80.0		

TABLE IX. - NOISE OF FAN B CONFIGURATION 105 (HARD INLET, SOFT FAN FRAME, HARD EXHAUST, LARGE NOZZLE)

TEST PURPOSE - FAR-FIELD NOISE

[Data adjusted to standard day of 15° C and 70 percent relative humidity; SPL re 0.00002 N/m^2; PWL re 0.1 pW.]

(a) Percent speed, 60; fan physical speed, 2072 rpm; fundamental blade passage frequency, 897 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	74.1	73.8	71.0	71.1	70.3	71.5	71.8	72.8	73.8	73.3	79.0	75.4	77.3	77.8	78.5	80.2	75.3	122.7
63	76.3	72.8	71.6	69.5	70.6	72.1	70.5	70.1	73.1	73.6	78.1	75.4	79.3	80.1	79.6	81.2	75.8	123.2
80	72.7	72.5	70.3	69.3	69.8	71.2	69.8	71.3	73.7	75.2	79.7	77.6	79.8	82.2	82.2	83.4	77.2	124.6
100	76.6	75.0	75.5	74.0	74.8	75.8	74.5	75.6	77.3	78.5	80.1	80.9	82.3	83.5	83.3	83.7	79.3	126.7
125	78.5	76.9	77.8	76.5	76.0	77.3	77.1	78.1	78.6	80.0	81.3	80.7	81.5	83.1	82.8	82.5	79.8	127.2
160	78.5	77.4	77.0	76.2	77.0	77.7	77.4	78.2	78.9	79.2	79.9	79.8	79.9	81.4	80.5	79.9	78.9	126.3
200	78.5	78.3	77.1	75.6	75.5	75.0	74.8	75.0	75.8	76.8	78.1	78.6	79.3	80.6	79.6	79.0	77.4	124.8
250	80.0	78.9	78.4	77.4	76.7	76.0	75.9	76.9	78.9	80.2	81.0	81.1	81.4	81.7	80.2	79.1	79.3	126.7
315	81.0	79.2	79.2	78.3	78.5	77.5	78.2	78.5	79.8	80.0	81.0	80.6	81.0	81.2	79.3	77.9	79.6	127.0
400	80.8	80.1	78.6	77.8	77.3	77.1	77.1	77.6	78.8	80.6	82.5	82.6	82.8	81.5	78.6	77.4	80.1	127.5
500	80.3	79.7	79.2	78.3	77.3	76.8	77.2	78.2	79.3	79.8	81.5	81.8	82.8	81.0	78.2	76.1	79.8	127.2
630	81.4	80.6	80.6	79.6	78.3	77.3	77.9	77.9	79.6	80.8	83.1	82.7	83.9	80.6	77.4	75.7	80.6	128.0
800	92.4	90.0	93.5	92.4	92.9	87.7	86.2	83.9	84.4	85.5	88.2	88.0	88.7	86.2	82.9	81.9	88.8	136.2
1000	94.9	95.4	94.4	93.9	93.7	88.6	87.2	84.4	84.7	85.7	88.9	88.8	89.7	87.9	83.9	82.6	90.1	137.5
1250	85.2	87.6	83.6	82.2	80.7	77.7	77.7	77.8	79.8	81.1	83.3	84.4	86.1	83.8	79.3	76.3	82.5	129.9
1600	86.4	86.9	89.4	87.5	85.7	81.5	80.2	80.0	81.3	84.2	86.5	86.8	89.2	86.0	81.7	78.3	85.6	133.0
2000	90.7	91.4	91.9	90.2	88.0	83.4	81.7	81.0	82.5	86.2	88.5	88.0	90.9	89.0	84.7	80.4	87.9	135.3
2500	87.9	88.1	88.7	88.2	85.2	81.4	79.0	80.0	82.4	84.4	86.0	87.6	90.0	88.0	82.9	78.4	86.2	133.6
3150	87.5	88.2	88.4	87.5	85.4	81.0	78.5	79.7	81.4	83.5	85.9	88.0	90.2	88.2	83.4	78.6	86.3	133.7
4000	87.6	88.8	88.7	88.2	86.6	82.7	80.2	80.4	82.1	83.4	86.1	87.7	90.4	87.7	83.1	79.3	86.8	134.2
5000	88.1	88.8	89.3	89.4	87.8	83.6	79.8	79.9	81.9	83.9	87.3	88.6	91.1	88.9	84.6	80.4	87.9	135.3
6300	87.3	87.5	88.1	89.1	87.0	82.4	78.1	77.7	80.3	82.4	85.6	87.0	89.2	87.0	83.1	79.2	87.0	134.4
8000	86.8	86.9	88.1	88.5	86.8	82.1	77.4	76.9	79.5	81.2	84.5	85.5	87.0	85.9	81.9	77.8	86.7	134.1
10000	86.3	85.6	87.5	87.8	86.5	81.6	76.5	75.8	78.3	80.5	83.5	84.1	85.8	84.6	80.8	77.1	86.8	134.2
12500	85.3	83.7	86.3	87.5	85.5	81.5	75.8	75.0	77.7	79.3	82.0	82.6	84.5	83.5	79.8	76.5	87.2	134.6
16000	83.4	81.4	83.9	85.6	83.1	78.9	73.9	73.3	75.8	77.8	79.4	80.4	81.4	81.1	77.1	74.3	86.8	134.2
20000	81.6	78.8	81.4	82.7	79.6	76.2	71.4	71.9	73.4	74.8	76.8	77.5	78.1	78.3	74.0	71.2	86.7	134.1
OVERALL	101.1	100.9	101.4	100.9	99.9	95.6	93.6	92.9	94.3	96.0	98.5	99.0	100.9	99.2	95.8	94.0	99.4	146.8
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	86.3	94.7	99.3	100.9	101.3	99.0	97.7	98.2	100.0	101.6	103.6	103.9	104.6	101.0	94.3	86.6		
113 METERS	77.7	87.3	92.3	94.2	94.5	92.3	91.2	91.7	93.6	95.3	97.2	97.3	97.9	94.1	87.0	79.2		

(b) Percent speed, 70; fan physical speed, 2417 rpm; fundamental blade passage frequency, 1047 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	76.0	76.1	76.8	76.1	75.3	76.1	76.0	76.5	77.0	78.1	79.8	79.6	83.5	83.0	84.6	86.7	79.9	127.3
63	75.2	76.9	76.2	74.5	74.0	74.7	74.7	75.2	76.4	76.7	80.2	80.1	84.9	85.2	85.4	87.1	80.4	127.8
80	80.2	76.2	76.7	74.5	75.8	76.3	75.8	76.8	78.0	79.7	82.2	83.1	86.7	86.8	88.3	89.2	82.5	129.9
100	77.3	77.5	76.7	76.8	76.3	77.5	78.3	80.0	81.2	83.2	84.7	85.3	88.5	88.3	88.8	90.4	84.2	131.6
125	80.9	82.4	80.7	80.9	80.4	81.7	81.7	82.5	83.9	84.5	85.7	85.9	88.2	87.7	88.0	88.6	84.8	132.2
160	81.5	81.5	81.0	81.8	80.7	81.8	81.2	82.7	82.8	83.8	84.5	84.6	86.5	86.2	85.7	86.1	83.7	131.1
200	81.5	82.2	81.4	80.4	79.4	79.9	79.5	79.5	80.7	81.0	82.7	83.6	86.0	85.9	85.9	84.6	82.5	129.9
250	82.3	83.3	81.7	81.5	80.2	79.7	80.0	81.5	82.7	84.0	85.0	85.8	86.8	86.2	85.8	84.4	83.7	131.1
315	84.0	84.5	82.2	83.2	81.3	81.5	81.8	82.5	83.5	84.3	84.7	84.9	86.7	85.8	84.7	83.2	83.9	131.3
400	82.9	84.4	83.4	83.0	82.2	81.4	81.2	81.5	83.0	84.9	86.5	86.4	87.4	85.9	84.0	82.6	84.4	131.8
500	82.0	83.5	82.9	83.4	81.5	80.5	80.9	81.9	83.0	84.4	85.0	85.8	87.2	84.7	82.9	80.9	83.8	131.2
630	82.6	83.9	83.7	83.9	81.9	81.9	81.6	82.1	83.4	85.1	86.4	86.3	87.2	84.4	81.9	80.5	84.3	131.7
800	86.2	87.8	87.3	87.2	85.2	84.0	83.3	83.1	84.1	85.8	87.6	88.1	89.8	85.3	82.8	81.4	86.2	133.6
1000	95.9	103.9	105.2	105.9	102.8	99.8	96.6	91.6	92.7	95.7	93.9	95.2	98.9	94.9	92.2	91.0	99.6	147.0
1250	91.4	94.2	94.9	94.7	91.7	88.7	86.2	84.4	85.7	87.4	88.7	89.5	91.9	87.9	84.7	82.6	90.2	137.6
1600	86.7	88.5	88.2	88.3	84.7	82.3	81.3	82.3	84.3	85.8	87.7	88.8	90.8	86.0	82.2	79.9	86.6	134.0
2000	95.7	97.4	98.0	99.0	95.1	92.0	89.0	87.5	87.7	90.0	92.7	93.0	96.9	92.6	87.7	84.6	94.0	141.4
2500	88.2	90.7	90.4	90.9	87.9	84.6	82.7	83.2	85.9	87.2	89.7	91.4	94.4	90.2	84.9	81.5	89.4	136.8
3150	92.0	94.7	93.8	95.0	92.3	88.5	85.0	84.5	87.0	88.8	91.5	92.6	95.0	91.8	86.2	82.9	91.8	139.2
4000	89.3	91.9	91.5	92.6	89.1	86.0	83.3	83.1	86.0	87.6	90.1	91.1	93.8	90.8	85.6	82.2	90.2	137.6
5000	89.1	92.1	91.6	92.6	90.5	87.0	84.8	84.5	87.5	88.8	91.3	92.1	94.0	91.3	86.6	83.4	91.2	138.6
6300	87.6	90.9	89.8	91.6	89.1	85.6	82.7	82.2	85.6	87.3	90.3	90.5	92.4	90.4	85.9	82.2	90.3	137.7
8000	86.9	90.1	89.5	91.3	89.0	85.5	81.6	81.4	84.7	86.6	89.7	89.7	91.4	89.6	85.1	81.7	90.3	137.7
10000	86.0	89.2	88.7	90.7	87.7	84.7	80.5	80.2	83.4	85.2	88.0	88.2	89.8	87.9	84.0	80.3	90.0	137.4
12500	84.8	87.8	87.0	89.5	86.3	83.5	79.0	78.8	82.3	84.0	86.5	86.1	87.8	86.6	82.6	79.3	89.9	137.3
16000	82.2	85.9	84.4	87.1	83.7	80.7	76.6	76.9	80.2	81.7	83.7	83.9	85.0	84.9	79.9	77.6	89.4	136.8
20000	79.8	83.2	81.4	84.0	80.4	77.4	73.7	74.5	77.7	78.9	80.7	80.9	81.7	81.9	76.7	74.4	89.1	136.5
OVERALL	103.7	106.7	107.4	108.2	105.1	102.2	99.5	97.5	99.2	101.1	102.5	103.2	105.8	102.9	100.2	99.3	104.3	151.7
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	89.5	99.7	103.9	107.4	106.1	104.6	102.9	102.6	104.8	106.4	108.1	108.1	109.3	104.5	97.8	91.1		

TABLE IX. - Concluded.

(c) Percent speed, 80; fan physical speed, 2762 rpm; fundamental blade passage frequency, 1196 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	85.8	80.1	79.1	85.1	84.4	82.8	82.3	84.3	81.8	82.8	87.9	84.5	86.4	88.9	89.9	91.0	85.6	133.0
63	78.5	78.1	78.1	77.8	78.1	78.0	78.1	79.0	79.5	81.0	86.1	85.0	87.8	89.6	90.6	92.7	84.9	132.3
80	78.6	78.8	76.3	77.5	77.1	78.0	78.1	79.6	81.5	83.5	87.8	87.5	90.0	91.8	93.6	94.7	87.0	134.4
100	81.1	82.0	80.6	80.5	80.0	81.6	81.8	84.0	85.8	87.3	89.1	90.4	92.5	93.5	94.1	94.8	88.8	136.2
125	83.8	83.4	83.4	83.6	84.3	85.4	84.8	85.8	87.6	87.6	89.9	90.2	91.6	92.9	93.9	92.8	88.9	136.3
160	84.0	84.5	84.3	84.6	85.5	85.5	85.6	86.6	86.5	87.5	89.1	89.1	90.8	92.1	91.5	91.2	88.2	135.6
200	84.6	84.3	84.3	83.6	83.6	83.8	82.8	84.1	84.1	85.8	87.9	88.0	90.1	91.6	91.6	89.8	87.1	134.5
250	84.0	84.3	84.6	84.3	83.5	84.8	84.0	85.3	86.5	88.0	89.3	90.4	90.8	92.1	91.6	89.5	88.1	135.5
315	84.7	85.4	83.6	84.7	84.2	84.6	85.2	85.9	86.4	87.7	89.1	89.5	90.7	91.2	90.1	87.6	87.7	135.1
400	84.8	86.8	86.6	86.9	85.1	85.1	84.1	85.4	86.8	88.4	90.4	90.7	91.3	90.8	89.3	86.6	88.3	135.7
500	87.3	91.0	91.3	91.7	88.3	85.5	84.8	86.0	87.3	88.5	90.2	90.1	90.5	90.0	88.3	85.6	89.0	136.4
630	86.2	86.1	86.6	87.9	86.4	85.7	85.4	86.9	87.6	88.9	91.2	90.8	90.9	89.1	87.4	84.8	88.5	135.9
800	87.6	87.6	87.1	87.8	86.6	86.3	86.1	86.6	87.5	89.6	91.5	91.9	92.5	89.6	87.1	85.0	89.1	136.5
1000	95.7	99.3	95.8	97.5	95.5	93.0	90.7	89.5	89.7	92.0	92.5	93.1	95.1	91.0	88.3	86.2	93.7	141.1
1250	106.7	111.4	106.7	109.6	107.6	104.4	100.9	98.2	97.1	99.9	97.7	99.7	100.6	95.4	95.6	93.1	103.9	151.3
1600	85.7	91.3	90.0	90.2	88.3	86.7	85.2	86.5	87.5	89.7	91.3	92.3	93.5	89.5	86.3	83.6	89.8	137.2
2000	91.4	92.2	91.9	91.7	89.9	88.0	86.5	87.5	89.0	91.5	94.2	95.0	96.9	92.5	88.0	84.6	92.2	139.6
2500	98.7	100.2	99.5	100.7	98.4	96.5	92.2	92.5	92.2	95.7	97.7	99.0	105.0	100.2	92.7	89.3	98.9	146.3
3150	92.2	93.8	93.1	93.4	92.3	89.6	87.3	87.6	89.8	92.1	94.8	96.6	97.4	93.4	88.6	85.6	93.5	140.9
4000	93.4	95.4	94.9	95.6	94.3	91.6	87.8	87.8	89.8	91.9	94.9	95.9	96.9	93.8	89.3	86.0	94.2	141.6
5000	92.8	94.4	95.3	96.6	95.0	91.8	89.0	88.8	90.6	92.3	95.3	95.7	97.4	95.6	90.1	87.1	95.0	142.4
6300	90.6	92.1	92.9	94.8	92.9	90.3	87.5	87.1	88.5	91.0	93.8	94.1	94.9	92.7	88.3	85.7	93.5	140.9
8000	89.2	91.7	91.4	94.2	91.9	89.7	86.5	86.0	87.7	90.0	93.0	93.0	93.7	91.7	87.5	84.3	93.2	140.6
10000	87.7	89.9	90.0	92.4	90.7	88.4	84.9	84.7	86.2	88.7	91.4	91.5	92.0	90.5	86.7	83.3	92.7	140.1
12500	85.8	88.2	88.0	91.0	89.2	86.8	83.2	83.2	85.2	86.5	89.3	89.1	90.0	89.0	85.0	82.1	92.3	139.7
16000	83.4	86.0	85.4	88.5	86.0	83.9	80.9	81.4	83.0	84.6	87.4	87.2	87.5	87.0	82.2	79.7	91.9	139.3
20000	80.0	83.0	81.7	84.7	82.5	80.5	77.5	78.9	80.2	82.3	84.2	84.2	84.4	84.4	79.5	76.9	91.5	138.9
OVERALL	108.6	112.5	109.1	111.4	109.4	106.6	103.6	102.6	102.9	105.2	106.6	107.5	109.7	106.9	104.7	103.5	108.1	155.5
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	94.3	105.3	106.6	111.1	111.1	109.8	107.8	108.0	108.7	111.2	112.8	112.9	115.1	109.9	102.7	95.9		

(d) Percent speed, 90; fan physical speed, 3107 rpm; fundamental blade passage frequency, 1346 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	87.3	81.4	85.1	85.3	83.1	83.4	83.6	87.3	85.4	86.1	88.3	87.4	89.3	91.8	93.4	95.7	88.2	135.6
63	82.0	83.0	81.3	81.3	81.1	82.3	82.1	83.3	83.1	85.0	87.3	87.9	91.3	93.8	95.3	97.3	88.8	136.2
80	82.0	83.0	79.7	81.2	81.2	81.7	82.0	83.4	85.2	87.4	89.7	91.8	93.9	96.4	98.0	99.6	91.2	138.6
100	87.0	87.0	84.5	86.0	85.7	87.8	87.8	87.5	88.8	91.2	93.0	93.8	96.2	98.0	99.5	99.7	93.2	140.6
125	87.3	86.3	86.2	86.8	87.7	88.5	89.2	90.2	91.0	92.2	93.8	94.1	95.7	97.3	98.3	98.2	93.1	140.5
160	88.0	88.0	88.1	90.0	90.3	91.0	89.8	91.3	91.0	91.6	92.5	93.1	94.1	96.1	96.8	96.2	92.5	139.9
200	87.7	88.2	87.3	87.5	87.5	87.2	87.3	88.0	88.3	89.3	91.5	92.4	94.3	96.0	96.3	94.9	91.3	138.7
250	88.6	87.2	87.1	88.1	87.1	87.6	87.9	89.1	90.4	91.9	93.4	94.1	95.4	96.6	96.1	94.8	92.2	139.6
315	87.1	86.7	87.2	88.2	88.2	87.9	88.9	89.9	90.6	91.6	93.1	93.8	95.1	95.9	94.9	92.8	91.9	139.3
400	87.8	87.8	88.3	89.0	88.8	88.8	88.7	89.5	90.8	92.2	94.5	94.6	95.0	95.1	94.1	91.9	92.2	139.6
500	89.9	89.6	89.4	90.4	90.6	89.7	89.9	90.4	91.1	91.7	93.4	93.7	94.7	94.2	92.9	90.4	92.0	139.4
630	89.5	91.0	91.7	93.4	91.9	91.2	90.0	90.2	91.5	93.0	94.9	94.8	95.0	93.4	92.2	89.4	92.8	140.2
800	92.5	92.3	93.1	94.8	92.5	91.6	91.0	90.8	92.0	93.6	95.8	96.4	95.8	94.1	92.0	89.5	93.7	141.1
1000	92.3	92.7	93.0	93.5	92.5	91.3	91.0	91.0	92.8	94.0	95.8	96.1	97.5	94.6	91.8	89.2	94.0	141.4
1250	105.1	107.4	108.1	108.3	106.6	105.3	102.9	99.8	100.8	99.4	101.1	100.9	102.8	98.8	96.6	94.8	103.8	151.2
1600	97.7	99.0	99.5	99.8	98.4	96.7	94.9	93.4	94.5	94.9	96.7	97.1	98.2	94.7	92.0	89.4	96.8	144.2
2000	98.4	96.2	96.5	97.5	97.2	95.0	93.2	92.4	93.9	95.2	97.7	97.6	98.4	94.7	91.7	88.8	96.1	143.5
2500	103.6	102.6	103.0	103.1	102.3	99.8	97.6	95.6	99.0	99.0	102.3	103.7	108.3	104.3	95.3	93.2	102.6	150.0
3150	97.3	97.1	97.4	98.2	97.6	95.7	93.9	93.1	95.4	96.4	99.7	100.8	102.8	99.8	94.9	91.7	98.6	146.0
4000	97.5	97.6	98.0	99.8	97.8	95.8	94.5	93.5	95.8	96.6	99.8	100.1	100.8	96.8	93.1	90.4	98.4	145.8
5000	98.5	96.6	96.8	98.3	97.5	95.8	94.0	93.5	95.5	97.0	99.8	100.3	102.5	97.6	93.5	91.1	98.8	146.2
6300	93.7	94.1	94.7	96.9	95.0	93.5	91.9	91.8	93.8	94.7	97.9	97.8	98.5	96.2	92.3	89.7	96.9	144.3
8000	92.3	93.8	93.6	96.0	94.0	92.1	91.0	90.6	92.6	93.6	96.5	96.6	97.5	94.5	91.3	88.9	96.4	143.8
10000	90.7	91.9	91.7	94.2	92.0	90.2	88.7	89.4	91.4	92.5	94.9	95.0	95.5	93.4	90.1	87.2	95.8	143.2
12500	88.2	89.7	89.2	92.2	89.5	88.5	86.7	87.7	90.0	90.9	93.0	93.0	93.7	92.5	89.0	86.2	95.4	142.8
16000	84.8	87.0	86.1	89.1	86.6	85.8	84.0	85.8	88.0	89.2	91.0	90.8	91.1	90.7	86.6	83.8	95.0	142.4
20000	81.9	84.0	82.5	85.7	82.7	82.2	81.0	83.3	85.4	86.2	87.8	87.5	87.8	88.0	83.5	80.9	94.6	142.0
OVERALL	109.8	110.8	111.2	111.9	110.5	109.0	107.2	106.0	107.6	108.2	110.6	111.1	113.3	110.9	108.9	108.1	110.7	158.1
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	97.1	105.3	109.8	113.1	113.9	113.3	112.5	111.9	114.3	114.7	117.0	117.0	118.7	113.9	106.4	100.3		
305 METERS	70.9	83.9	89.9	93.9	95.2	95.1	94.5	94.1	96.5	96.8	99.0	98.7	100.0	94.7	86.5	79.0		

TABLE X. - NOISE OF FAN B CONFIGURATION 106 (HARD INLET, SOFT FAN FRAME, HARD EXHAUST, NOMINAL NOZZLE)

TEST PURPOSE - FAR-FIELD NOISE

[Data adjusted to standard day of 15° C and 70 percent relative humidity; SPL re 0.00002 N/m^2; PWL re 0.1 pW.]

(a) Percent speed, 60; fan physical speed, 2135 rpm; fundamental blade passage frequency, 925 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	73.7	74.5	75.1	71.4	72.2	71.6	72.1	73.2	73.3	73.7	77.2	76.2	81.1	78.2	79.6	81.0	76.1	123.5
63	71.7	74.2	76.6	69.6	71.2	70.7	71.1	71.7	72.8	72.4	76.6	75.7	77.5	79.6	80.6	81.8	75.6	123.0
80	72.5	71.9	71.2	70.2	72.4	71.9	72.2	73.0	73.8	75.0	78.0	78.1	82.2	82.0	83.2	84.2	77.8	125.2
100	74.2	74.7	75.1	73.2	74.4	74.4	74.7	75.6	76.8	78.4	79.9	81.1	83.9	83.9	84.7	85.1	79.8	127.2
125	77.1	77.0	76.8	77.1	76.9	76.6	77.3	78.1	78.8	80.3	81.8	82.0	84.3	83.3	84.6	83.5	80.6	128.0
160	76.9	77.2	77.4	77.1	77.6	77.7	77.6	78.6	79.3	79.9	80.9	81.0	82.6	81.4	81.7	80.3	79.7	127.1
200	77.9	77.4	76.9	76.6	76.2	74.9	75.2	75.7	75.8	76.6	78.2	78.8	82.2	80.9	81.2	79.5	78.1	125.5
250	79.0	78.7	78.5	78.6	77.8	76.6	76.5	77.0	77.9	79.6	81.3	81.7	84.3	82.1	82.1	79.3	80.0	127.4
315	79.4	79.7	79.9	78.7	78.4	76.9	77.2	78.1	77.8	78.7	80.7	81.1	83.4	81.6	80.9	77.9	79.7	127.1
400	80.5	80.3	80.0	79.2	78.0	76.7	76.5	77.9	79.0	80.5	82.4	83.1	85.2	82.0	80.7	77.6	80.8	128.2
500	80.9	80.4	79.7	79.7	78.9	76.9	77.1	78.7	79.1	79.7	81.6	82.8	85.6	81.6	79.6	76.6	80.7	128.1
630	80.8	80.8	80.8	80.3	78.9	76.9	76.9	78.4	79.6	80.6	82.8	83.9	86.4	81.6	79.1	76.3	81.3	128.7
800	88.8	90.0	91.1	90.6	88.9	83.9	82.9	82.3	82.8	83.8	85.8	87.5	89.3	84.9	81.9	79.8	86.8	134.2
1000	96.3	97.7	99.1	99.0	96.3	91.0	90.3	88.1	88.1	88.0	90.5	92.1	93.8	90.6	86.8	85.4	93.5	140.9
1250	84.6	84.6	84.6	84.4	82.6	79.6	78.3	79.8	80.3	82.3	84.8	86.2	89.5	84.6	80.4	77.0	84.0	131.4
1600	86.8	87.0	87.1	86.1	84.1	80.1	78.3	79.9	81.3	83.3	84.9	87.0	90.4	84.8	80.6	77.0	85.0	132.4
2000	91.0	92.2	93.3	92.2	90.2	84.5	82.0	82.8	84.3	86.0	88.3	89.1	94.7	89.7	84.7	80.1	89.5	136.9
2500	87.6	87.9	88.3	88.4	86.1	81.8	78.8	80.6	82.2	84.4	87.3	89.1	92.1	86.9	82.8	78.0	86.9	134.3
3150	89.0	89.3	89.4	89.7	87.2	82.2	79.7	80.2	81.8	84.7	86.9	89.5	92.9	88.0	83.4	78.8	87.8	135.2
4000	88.6	89.6	90.6	90.8	88.6	84.5	82.5	82.3	83.5	84.3	87.5	88.8	92.1	87.3	83.5	79.6	88.3	135.7
5000	89.0	89.9	91.0	91.5	89.3	84.6	82.6	82.1	83.9	85.0	88.5	89.3	92.5	87.8	84.1	80.4	89.1	136.5
6300	88.7	89.0	89.3	90.5	87.8	82.8	78.7	78.2	80.6	82.2	85.9	87.1	90.6	85.9	82.6	77.1	87.7	135.1
8000	88.3	88.8	89.3	90.0	87.6	82.5	76.9	76.0	78.3	79.8	83.0	84.6	87.5	83.7	79.8	75.2	87.0	134.4
10000	88.1	88.4	88.4	89.5	86.9	81.6	75.3	74.4	77.2	78.4	81.4	83.0	85.9	82.1	78.8	72.9	87.0	134.4
12500	86.9	86.9	86.9	88.6	85.9	80.7	73.5	72.5	75.4	76.7	80.0	81.0	84.2	81.4	77.5	71.9	87.1	134.5
16000	85.1	84.9	84.7	86.7	83.7	78.7	71.0	70.7	73.5	74.9	78.2	79.4	81.9	79.2	74.9	70.0	87.0	134.4
20000	83.6	83.1	82.7	84.1	81.1	75.8	68.5	68.9	71.2	72.9	76.1	76.9	79.0	77.4	72.3	67.2	87.4	134.8
OVERALL	101.4	102.2	103.1	103.2	100.8	96.1	94.4	94.0	94.9	96.1	98.7	100.0	103.1	99.1	96.4	94.3	100.4	147.8
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	86.2	95.4	100.3	102.8	102.6	99.9	98.8	99.4	100.8	102.1	104.1	105.0	107.0	100.8	94.6	86.6		
113 METERS	77.8	87.9	93.4	95.8	95.9	93.1	92.2	92.9	94.3	95.7	97.6	98.5	100.3	93.9	87.4	79.2		

(b) Percent speed, 70; fan physical speed, 2498 rpm; fundamental blade passage frequency, 1082 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	78.2	80.0	81.7	77.2	76.9	76.9	77.2	78.5	78.0	79.2	80.0	80.6	84.7	84.0	85.4	86.9	81.0	128.4
63	74.9	79.0	83.2	74.5	74.9	75.2	75.2	75.9	76.5	78.0	79.9	79.9	82.3	84.9	86.7	86.2	80.5	127.9
80	79.9	79.4	78.7	75.9	77.4	77.6	78.1	78.9	78.1	80.2	81.9	83.5	87.6	88.1	89.1	89.6	83.3	130.7
100	78.4	77.4	76.4	76.6	76.2	77.6	78.4	79.7	81.4	82.9	84.4	85.8	89.7	89.2	91.1	90.9	85.0	132.4
125	81.6	80.8	79.9	80.6	80.4	81.7	81.9	82.6	84.6	85.1	86.4	86.6	89.7	89.9	90.9	89.3	85.9	133.3
160	82.1	82.1	82.1	81.3	82.1	82.8	82.6	83.4	84.1	84.4	85.3	85.5	87.9	87.9	88.8	86.5	84.9	132.3
200	83.9	82.4	80.9	80.6	81.2	79.7	80.2	80.7	80.7	81.6	82.9	84.5	87.9	86.9	87.2	84.3	83.4	130.8
250	84.6	83.1	81.6	82.2	82.1	81.6	81.4	81.9	82.6	83.6	85.6	86.3	89.6	88.2	88.1	84.8	84.9	132.3
315	82.7	82.1	81.4	82.4	81.9	81.9	82.4	82.9	83.2	83.4	85.1	86.0	88.9	87.2	86.6	83.1	84.5	131.9
400	83.5	82.5	81.5	82.0	82.0	81.7	82.0	82.4	83.5	84.2	85.7	86.6	89.9	87.2	85.9	82.4	84.9	132.3
500	83.9	83.2	82.5	83.7	82.9	81.9	82.2	82.4	82.7	83.9	85.4	86.1	89.7	86.4	84.7	81.1	84.7	132.1
630	83.7	83.7	83.7	84.2	82.5	81.4	82.0	82.0	83.0	84.0	86.0	86.6	90.2	85.9	83.7	80.6	84.9	132.3
800	86.8	86.1	85.5	85.6	85.0	83.6	84.0	83.6	84.6	85.5	87.3	88.7	92.0	87.0	84.3	80.9	86.6	134.0
1000	100.4	101.4	102.4	103.9	102.7	100.7	97.1	92.8	91.0	93.0	95.2	95.4	102.3	95.8	91.2	89.9	99.1	146.5
1250	95.6	95.8	96.0	97.3	96.3	94.3	91.1	88.0	87.5	88.8	91.1	91.9	97.3	91.6	87.5	85.0	93.5	140.9
1600	90.4	88.9	87.4	87.6	86.2	84.1	83.4	84.2	84.7	86.6	88.6	90.3	93.1	86.9	83.6	80.3	87.8	135.2
2000	96.8	96.5	96.1	97.5	95.6	92.1	89.5	88.6	89.0	91.0	93.3	94.2	99.0	92.3	87.5	84.0	94.2	141.6
2500	91.6	91.4	91.1	92.6	91.1	87.6	85.9	85.6	87.1	88.9	91.9	93.7	97.1	91.1	86.4	82.2	91.5	138.9
3150	92.6	93.0	93.3	95.1	93.9	89.8	87.1	86.1	86.9	89.4	92.3	94.6	97.8	92.1	87.3	83.2	92.9	140.3
4000	91.2	91.5	91.7	93.2	91.0	87.4	85.1	84.6	86.2	87.7	90.7	92.3	95.9	90.5	85.9	81.3	91.2	138.6
5000	91.2	91.9	92.5	94.0	92.5	89.9	87.9	87.2	88.5	89.5	92.2	93.2	96.0	91.5	87.2	83.9	92.6	140.0
6300	90.5	90.9	91.2	93.2	91.4	88.1	85.1	84.3	86.3	87.1	90.4	91.8	94.6	89.9	86.3	81.4	91.5	138.9
8000	89.7	90.3	90.9	92.1	90.5	86.8	82.5	81.8	83.6	85.2	88.3	89.4	92.8	87.8	83.8	79.6	90.6	138.0
10000	89.0	89.6	90.2	92.0	89.5	85.0	80.5	79.6	81.6	83.1	86.1	87.2	90.3	86.1	82.5	77.3	90.1	137.5
12500	88.3	88.5	88.6	90.8	88.0	84.0	78.8	77.8	79.3	81.1	84.4	85.1	88.6	85.0	80.6	75.7	90.0	137.4
16000	86.6	86.6	86.6	89.0	85.6	82.0	76.3	75.6	77.8	79.0	81.8	83.2	86.1	83.1	77.9	73.6	89.8	137.2
20000	84.9	84.6	84.2	86.3	82.6	78.9	73.4	73.5	75.5	76.5	78.8	80.7	83.3	80.6	75.3	70.7	89.9	137.3
OVERALL	105.2	105.6	106.0	107.5	106.0	103.6	100.8	98.8	99.2	100.7	103.0	104.2	108.4	103.5	101.2	99.2	104.8	152.2
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	91.0	99.0	103.1	107.0	107.5	106.0	104.4	104.0	105.0	106.6	108.7	109.5	111.8	105.1	98.9	91.2		

TABLE X. - Concluded.

(c) Percent speed, 80; fan physical speed, 2855 rpm; fundamental blade passage frequency, 1237 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	85.2	86.3	85.2	86.5	82.5	81.7	83.2	84.2	82.7	84.2	87.5	84.7	87.7	88.7	90.7	92.1	86.2	133.6
63	78.7	83.9	80.4	79.7	80.7	80.2	79.7	80.4	80.7	82.2	85.4	84.9	89.0	89.9	91.4	92.3	85.5	132.9
80	80.4	80.8	78.4	80.4	79.9	81.2	80.2	81.2	82.7	84.4	87.7	88.7	91.9	92.7	94.7	95.3	88.1	135.5
100	87.0	86.1	83.5	83.8	83.0	84.5	83.8	85.8	87.0	87.8	90.3	91.8	94.5	95.3	97.3	96.9	90.8	138.2
125	84.9	84.9	83.7	84.7	84.7	85.9	85.9	87.2	88.2	89.7	91.4	92.0	93.7	94.9	95.9	94.6	90.6	138.0
160	85.0	85.7	85.0	85.8	86.5	87.3	87.3	87.5	88.5	89.5	89.5	90.3	92.3	93.3	93.5	91.4	89.5	136.9
200	85.2	85.6	84.2	85.5	84.5	85.0	85.2	85.0	85.5	86.5	88.5	89.0	92.5	92.7	93.2	90.8	88.4	135.8
250	85.3	85.9	85.0	85.5	84.8	85.8	84.8	85.8	87.3	88.3	90.5	91.3	93.8	93.5	93.5	91.1	89.5	136.9
315	85.2	85.1	83.7	84.7	85.5	85.5	86.2	86.5	87.2	88.2	90.2	90.7	93.0	93.0	92.2	88.8	89.0	136.4
400	85.9	85.8	84.2	84.7	85.4	85.7	85.7	85.9	87.2	88.2	90.4	91.5	93.4	92.4	91.2	87.6	89.1	136.5
500	85.7	86.4	84.4	85.7	85.7	85.4	84.9	85.7	87.2	87.9	89.4	90.9	92.4	90.9	89.7	86.3	88.4	135.8
630	85.2	86.4	84.4	85.4	85.7	84.2	84.9	85.7	86.9	87.9	90.4	90.7	92.2	90.2	88.7	85.0	88.2	135.6
800	87.7	88.0	85.5	86.7	87.0	86.2	86.0	86.5	87.5	89.7	91.5	92.2	93.0	90.7	88.7	85.4	89.3	136.7
1000	93.4	93.8	91.7	93.9	93.7	89.9	88.2	88.2	89.4	90.9	92.4	93.4	95.2	91.4	88.9	85.6	92.0	139.4
1250	108.0	108.8	106.5	109.3	109.0	103.3	99.8	98.5	97.0	99.5	100.8	100.8	102.0	97.8	95.3	92.2	103.9	151.3
1600	90.8	91.5	89.1	90.8	90.8	87.3	86.6	87.1	88.6	89.9	91.6	93.6	94.4	90.1	87.1	83.5	90.6	138.0
2000	90.8	91.3	89.3	90.3	90.8	87.8	87.3	88.3	90.0	91.5	94.0	95.0	96.3	92.0	88.5	84.7	92.0	139.4
2500	100.1	100.9	99.6	100.6	103.1	96.9	92.9	91.6	93.9	95.6	100.1	100.9	102.1	99.6	93.4	88.5	99.3	146.7
3150	91.4	92.5	90.8	92.5	92.4	89.3	87.5	88.3	91.0	92.5	95.3	97.1	98.3	93.6	89.5	85.2	93.8	141.2
4000	94.5	96.9	96.0	98.5	97.8	93.8	89.7	89.0	90.7	92.2	95.7	97.8	98.0	94.0	89.7	85.9	95.8	143.2
5000	92.5	95.1	94.8	97.0	97.0	92.5	89.0	89.3	91.0	92.3	95.3	96.3	97.3	94.8	89.8	85.8	95.3	142.7
6300	90.2	92.9	92.7	95.2	95.0	91.1	89.7	89.2	90.6	91.1	94.9	94.8	96.0	92.0	89.4	85.4	94.4	141.8
8000	88.7	91.2	90.9	93.9	93.4	89.7	86.7	86.7	88.2	89.2	92.2	93.1	93.7	90.7	87.4	82.7	93.1	140.5
10000	87.1	89.5	89.4	92.1	91.4	87.4	83.9	83.9	86.4	87.4	89.9	90.8	91.9	90.7	85.1	80.5	92.2	139.6
12500	85.5	87.5	87.0	90.0	89.2	85.7	81.5	81.0	84.2	84.7	88.0	88.2	89.5	88.0	83.0	78.2	91.3	138.7
16000	82.7	84.8	84.5	87.7	85.9	82.4	78.4	79.0	81.5	82.5	84.9	86.0	86.4	86.4	80.2	75.8	90.6	138.0
20000	80.9	82.5	81.7	84.4	82.4	79.2	75.7	76.5	78.7	80.0	82.2	83.5	83.7	87.1	77.2	73.1	91.0	138.4
OVERALL	109.6	110.5	108.7	111.1	111.1	106.1	103.3	102.8	103.5	105.1	107.6	108.4	109.7	107.5	105.9	104.1	108.3	155.7
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	95.2	103.9	106.1	110.9	113.2	109.9	108.0	108.0	109.8	111.2	114.0	114.1	114.2	109.9	103.5	95.8		

(d) Percent speed, 90; fan physical speed, 3209 rpm; fundamental blade passage frequency, 1390 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	88.5	87.5	86.5	87.5	84.5	85.0	86.5	86.1	86.3	86.8	87.5	88.5	92.0	92.6	94.8	96.3	89.3	136.7
63	83.7	83.5	83.2	82.8	83.3	83.5	83.8	84.2	84.7	85.7	87.5	88.8	91.1	93.7	96.0	97.4	89.2	136.6
80	83.7	82.1	80.5	82.3	82.7	82.7	82.7	84.0	85.7	87.5	89.7	91.7	95.5	96.7	99.7	100.5	92.1	139.5
100	87.0	85.6	84.2	85.2	85.2	86.0	86.7	88.2	89.4	91.5	93.4	94.6	98.0	99.5	101.4	101.2	94.4	141.8
125	89.0	87.9	86.7	87.7	87.7	88.3	89.2	90.8	91.7	92.7	94.5	95.1	98.3	99.3	101.0	99.2	94.6	142.0
160	88.8	88.8	88.7	89.0	90.2	91.0	90.2	91.7	91.8	92.7	93.3	94.7	96.8	97.2	99.0	95.9	93.6	141.0
200	89.2	88.7	88.2	88.0	88.5	88.2	88.7	89.5	89.7	89.7	92.2	93.4	96.8	97.2	97.7	94.5	92.5	139.9
250	88.1	87.8	87.3	88.1	87.3	88.0	88.3	89.5	90.8	92.0	94.0	94.9	98.0	98.0	98.3	95.2	93.4	140.8
315	87.5	87.3	87.0	87.8	88.2	88.8	89.2	90.5	91.2	91.8	93.0	94.8	97.3	97.2	97.0	93.4	92.9	140.3
400	88.3	88.2	88.0	88.1	88.5	88.8	89.5	90.5	91.0	92.1	93.8	94.7	97.6	96.6	96.1	92.2	93.0	140.4
500	88.7	88.6	88.5	89.5	88.7	88.7	89.5	90.3	91.3	91.7	93.0	94.4	97.2	95.3	94.5	91.1	92.5	139.9
630	90.4	90.6	90.9	90.5	90.0	89.2	90.2	90.2	90.9	92.2	94.4	94.8	96.9	94.9	93.4	89.6	92.7	140.1
800	92.5	92.6	92.7	92.2	91.0	91.3	91.3	91.3	91.8	93.5	95.2	95.9	97.8	94.7	93.3	89.4	93.7	141.1
1000	92.7	92.6	92.2	91.9	92.2	91.1	90.9	91.7	92.5	94.2	95.0	96.3	98.4	95.1	93.6	89.6	94.1	141.5
1250	104.9	105.9	106.9	106.8	106.6	105.1	102.1	99.3	99.1	99.9	99.1	100.0	102.6	97.4	96.1	94.3	103.0	150.4
1600	103.0	103.9	104.7	104.4	104.0	102.7	100.0	97.7	97.4	97.7	97.5	98.8	100.9	96.0	94.5	92.6	100.9	148.3
2000	94.9	95.4	95.8	95.9	95.3	94.2	93.1	91.9	93.1	95.1	96.9	97.4	99.6	94.6	92.4	88.8	95.7	143.1
2500	102.1	102.1	102.0	102.5	102.5	98.5	96.3	96.1	96.6	99.5	101.5	102.4	107.1	99.8	96.1	92.4	101.5	148.9
3150	100.4	100.4	100.2	101.2	100.7	96.9	95.2	94.9	96.1	98.7	100.7	101.7	106.2	99.7	96.7	92.3	100.7	148.1
4000	98.4	99.9	100.3	100.1	99.8	96.9	95.6	93.9	95.9	97.8	100.4	100.2	101.4	95.6	93.4	89.5	99.2	146.6
5000	95.8	96.3	96.8	97.3	96.6	95.5	93.1	92.5	94.5	96.3	99.1	100.3	102.0	95.6	93.1	88.9	98.2	145.6
6300	94.6	95.3	95.9	96.9	96.3	94.4	93.3	92.6	94.1	95.3	97.9	98.7	100.9	95.4	93.1	88.8	97.8	145.2
8000	93.1	93.9	94.5	95.5	94.5	93.1	91.1	90.8	92.1	93.5	96.1	96.5	98.0	93.1	90.5	86.7	96.4	143.8
10000	91.1	91.8	92.4	93.4	92.1	90.5	88.9	88.7	90.1	91.2	93.9	94.3	96.2	91.4	89.2	84.2	95.3	142.7
12500	88.9	89.3	89.7	91.1	89.6	87.9	86.0	86.2	87.9	89.4	91.7	91.9	94.4	89.9	87.4	82.3	94.5	141.9
16000	86.1	86.2	86.4	88.1	86.4	84.7	82.7	83.6	85.4	87.1	89.1	89.6	91.6	87.9	84.6	80.0	93.7	141.1
20000	83.4	83.7	84.0	85.2	83.2	81.4	79.7	81.2	82.6	84.2	86.1	87.0	88.7	86.5	81.4	77.0	93.7	141.1
OVERALL	110.5	111.1	111.6	111.7	111.4	109.6	107.6	106.5	107.2	108.7	110.3	111.2	114.1	110.5	110.3	108.6	111.0	158.4
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	97.0	105.5	109.8	112.9	114.4	113.3	112.4	112.4	113.5	115.3	116.7	116.7	118.9	112.3	107.8	100.3		
305 METERS	71.3	83.8	90.0	93.5	95.6	95.7	94.9	94.7	95.6	97.4	98.5	98.4	100.3	93.0	87.8	79.4		

TABLE XI. - NOISE OF FAN B CONFIGURATION 107 (TAPED INLET SUPPRESSOR, SOFT FAN FRAME, HARD EXHAUST, NOMINAL NOZZLE)

TEST PURPOSE - FAR-FIELD NOISE

[Data adjusted to standard day of 15° C and 70 percent relative humidity; SPL re 0.00002 N/m^2; PWL re 0.1 pW.]

(a) Percent speed, 60; fan physical speed, 2126 rpm; fundamental blade passage frequency, 921 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	72.5	72.0	74.3	74.3	71.5	71.3	77.3	72.7	73.7	73.2	75.2	75.9	78.0	77.5	80.2	80.9	75.7	123.1
63	71.0	72.7	73.7	73.2	70.8	71.0	75.5	71.0	72.2	73.0	74.5	75.9	78.3	78.0	80.5	80.4	75.3	122.7
80	70.5	73.3	73.0	72.0	71.5	71.6	75.3	72.6	73.0	75.0	76.5	77.7	80.8	81.5	83.0	82.7	77.2	124.6
100	72.5	74.3	74.7	74.0	72.0	74.0	77.2	75.5	76.5	78.5	78.7	80.3	82.2	82.8	85.5	84.2	79.3	126.7
125	75.1	77.2	77.7	77.1	75.9	76.9	81.1	78.6	79.6	80.3	81.1	81.3	82.4	83.1	84.6	83.4	80.5	127.9
160	77.0	79.5	79.5	78.7	78.0	79.0	82.0	79.4	78.8	79.5	80.8	80.8	81.4	81.0	83.2	81.7	80.3	127.7
200	76.5	78.8	78.8	77.0	75.8	76.3	78.8	76.5	77.0	77.5	78.7	79.1	80.5	80.2	82.2	79.7	78.5	125.9
250	75.6	80.1	80.1	78.2	77.2	77.4	81.2	78.1	79.8	80.3	81.8	81.7	82.7	81.9	83.1	80.3	80.5	127.9
315	77.0	80.0	80.2	79.4	79.2	79.0	82.0	79.2	79.8	80.0	82.3	81.8	82.0	81.5	81.9	79.3	80.7	128.1
400	78.5	81.8	81.6	79.6	79.1	78.3	82.0	79.3	80.7	82.0	84.0	83.5	84.5	83.1	82.1	79.2	81.9	129.3
500	78.5	81.7	81.7	80.7	79.8	79.5	83.2	80.5	81.5	81.5	84.0	83.3	84.7	83.2	81.7	79.4	82.2	129.6
630	80.0	83.4	83.4	81.5	80.4	79.9	83.7	81.4	82.5	82.0	84.5	84.3	86.0	83.5	81.2	78.9	83.0	130.4
800	87.6	91.4	91.9	88.6	87.1	85.9	87.7	84.4	85.3	86.3	88.8	89.0	89.9	88.6	85.1	81.6	88.0	135.4
1000	94.1	97.4	97.9	94.7	93.4	91.4	91.2	87.2	89.3	89.6	93.3	94.5	93.7	94.4	90.9	86.1	93.1	140.5
1250	83.5	86.9	86.5	85.0	83.4	81.9	85.1	81.9	83.0	83.6	86.8	86.1	88.4	86.4	83.0	79.6	85.2	132.6
1600	85.7	88.9	88.9	87.2	84.5	82.7	84.7	81.2	82.2	83.7	86.4	86.5	89.2	86.5	83.4	78.8	85.8	133.2
2000	90.1	94.1	93.5	93.0	88.8	86.3	87.5	83.5	84.1	86.1	88.7	89.1	92.5	91.5	87.3	82.1	89.7	137.1
2500	86.8	89.8	89.6	88.0	85.6	83.5	84.8	81.5	83.0	84.3	87.8	88.2	90.6	88.1	85.1	79.5	87.1	134.5
3150	86.9	89.7	90.2	89.2	86.1	83.2	84.9	81.2	82.6	84.1	88.1	88.9	91.1	88.6	85.9	80.3	87.7	135.1
4000	88.1	89.8	89.9	89.6	86.8	84.3	85.4	81.3	82.8	83.8	87.6	88.4	90.1	87.9	85.1	80.9	87.7	135.1
5000	88.9	89.8	90.2	90.0	87.7	84.7	85.2	81.5	83.1	84.1	87.8	88.8	90.3	88.7	86.7	81.1	88.4	135.8
6300	88.2	88.7	88.6	89.3	85.6	82.5	83.2	78.7	81.0	82.0	86.0	86.2	88.2	86.4	84.4	78.9	87.0	134.4
8000	88.5	88.1	88.0	88.8	85.0	82.1	81.7	77.2	78.7	79.5	83.0	83.9	85.3	83.8	82.2	76.9	86.2	133.6
10000	89.4	89.8	89.1	89.8	86.0	82.8	81.6	75.9	77.7	77.7	81.7	82.2	83.4	82.1	80.4	75.2	87.3	134.7
12500	89.3	87.2	86.3	87.5	83.4	80.7	79.7	73.9	76.6	76.4	79.9	80.2	81.9	80.7	78.7	73.4	86.6	134.0
16000	89.6	84.6	82.9	84.0	79.5	76.3	75.9	71.6	74.1	74.1	77.3	77.8	78.9	78.7	76.0	71.0	85.8	133.2
20000	90.2	82.5	80.7	80.9	76.9	73.6	73.5	68.7	71.7	71.5	74.2	75.6	76.7	75.6	72.7	68.0	86.7	134.1
OVERALL	101.0	102.7	102.8	101.5	98.9	96.9	98.1	94.5	95.9	96.7	99.8	100.3	101.7	100.5	98.4	94.9	100.3	147.7
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	85.1	96.7	100.7	102.5	101.3	100.5	102.8	95.6	101.1	102.1	105.0	104.7	105.3	101.8	96.8	88.0		
113 METERS	76.3	89.2	93.7	95.8	94.7	94.0	96.5	93.3	94.8	95.7	98.6	98.2	98.7	95.2	89.6	80.7		

(b) Percent speed, 90; fan physical speed, 3189 rpm; fundamental blade passage frequency, 1381 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	80.3	80.3	83.5	83.7	84.0	84.3	87.7	84.5	86.5	85.7	86.2	87.1	91.2	90.5	94.8	95.4	88.3	135.7
63	82.2	82.2	82.0	81.3	81.2	82.0	85.7	82.8	85.5	85.0	86.7	87.6	90.7	92.0	95.0	95.9	88.2	135.6
80	83.6	83.6	81.3	80.3	80.4	81.6	84.9	82.8	88.4	87.1	89.3	90.0	93.8	94.6	97.6	99.2	90.7	138.1
100	81.8	81.8	84.0	84.7	85.2	85.2	88.5	87.2	91.5	90.7	92.7	92.9	96.0	96.8	100.7	100.0	93.2	140.6
125	85.3	85.3	86.2	87.0	87.2	88.2	92.2	90.7	92.5	92.8	94.0	94.8	96.8	97.2	99.7	98.4	93.8	141.2
160	87.4	87.4	88.9	89.1	89.4	89.6	93.4	90.1	91.6	92.6	92.4	93.4	95.4	95.6	97.4	95.2	92.8	140.2
200	87.7	87.7	88.2	87.7	87.2	87.2	90.7	87.8	91.2	89.8	91.3	92.1	94.8	95.7	97.7	94.2	91.8	139.2
250	87.8	87.8	88.6	89.3	87.6	88.1	92.1	89.8	93.5	92.1	93.5	94.6	96.1	96.8	97.5	94.2	93.1	140.5
315	87.3	87.3	88.2	88.8	88.5	89.2	93.2	90.2	92.8	92.3	93.2	93.9	95.2	95.8	95.7	93.0	92.6	140.0
400	87.7	87.7	88.7	89.4	88.4	88.2	92.5	89.9	93.4	92.7	94.4	94.6	95.7	95.4	95.4	92.4	92.9	140.3
500	87.9	87.9	89.4	89.5	89.5	89.0	93.2	90.0	93.2	92.7	94.2	94.8	95.5	94.4	94.0	91.3	92.8	140.2
630	90.1	90.1	91.6	91.9	91.1	90.6	94.9	91.9	94.3	93.4	95.3	95.2	95.9	93.9	93.6	90.8	93.7	141.1
800	91.4	91.4	93.4	91.6	90.9	91.6	95.6	92.6	95.4	95.1	96.4	96.9	97.1	94.4	93.6	91.5	94.7	142.1
1000	94.1	94.1	94.9	93.9	92.3	91.6	95.8	93.4	96.4	95.4	97.1	97.4	97.9	94.9	93.7	91.8	95.5	142.9
1250	106.5	106.5	106.5	103.2	99.2	97.8	100.7	96.3	99.0	98.0	101.0	100.9	103.3	97.5	96.0	92.9	101.3	148.7
1600	102.9	103.0	103.3	100.3	96.3	95.3	98.1	94.0	97.0	96.1	99.0	99.4	101.3	96.1	94.5	91.5	98.8	146.2
2000	94.9	95.0	95.4	95.0	93.0	92.0	96.3	92.8	97.1	96.5	98.8	99.1	99.5	95.1	93.1	90.4	96.6	144.0
2500	101.8	101.8	100.6	100.8	99.3	96.9	100.1	94.9	99.9	97.9	101.4	103.0	104.8	98.3	95.6	93.7	100.7	148.1
3150	99.6	99.5	98.5	99.0	97.0	95.0	98.2	93.7	99.4	97.2	100.2	101.3	103.3	98.2	96.4	92.9	99.5	146.9
4000	99.3	99.3	98.9	99.5	96.0	94.3	96.7	93.5	99.9	97.0	100.7	100.2	100.3	95.3	93.5	90.8	98.9	146.3
5000	96.8	96.8	97.0	98.0	94.6	93.0	95.8	92.3	98.3	96.1	99.6	100.0	101.2	96.2	93.8	90.5	98.4	145.8
6300	95.3	95.3	95.7	97.3	94.0	93.0	95.8	92.1	97.4	95.3	98.8	98.4	99.5	95.5	94.0	90.5	97.9	145.3
8000	93.8	93.8	93.6	95.6	92.1	90.6	93.1	89.9	94.9	93.8	96.6	96.3	96.4	93.1	91.3	88.2	96.3	143.7
10000	91.7	91.7	91.7	93.5	89.7	88.3	91.0	87.8	93.0	91.2	94.2	94.4	94.7	91.0	89.7	86.0	95.2	142.6
12500	90.5	90.5	90.0	92.8	88.8	87.0	88.9	85.9	91.0	89.3	91.8	91.7	92.6	89.1	87.6	84.1	94.7	142.1
16000	90.4	90.4	89.2	92.5	89.2	86.8	87.5	84.0	89.6	87.1	88.8	89.3	89.8	87.3	85.1	81.8	95.1	142.5
20000	86.9	86.8	85.5	87.6	84.1	82.1	84.0	81.0	89.0	84.0	86.2	86.3	87.0	84.8	81.9	78.4	94.7	142.1
OVERALL	110.9	111.0	110.9	109.9	107.1	105.9	109.1	105.5	109.7	108.3	110.9	111.3	112.8	109.5	109.7	108.1	110.4	157.9
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	96.7	105.2	109.0	111.6	111.4	111.1	115.2	111.5	116.5	114.5	116.9	117.0	117.2	111.2	107.6	100.7		
305 METERS	71.7	83.5	89.3	91.9	92.6	92.8	97.3	93.8	98.4	96.7	98.9	98.7	98.6	91.9	87.3	79.3		

TABLE XII. - NOISE OF FAN B CONFIGURATION 108 (HARD INLET, TAPED FAN FRAME, HARD EXHAUST, NOMINAL NOZZLE)

TEST PURPOSE - FAR-FIELD NOISE

[Data adjusted to standard day of 15° C and 70 percent relative humidity; SPL re 0.00002 N/m^2; PWL re 0.1 pW.]

(a) Percent speed, 60; fan physical speed, 2130 rpm; fundamental blade passage frequency, 923 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	72.4	69.6	72.3	71.3	71.9	70.9	71.3	72.8	72.8	73.1	74.6	76.2	76.3	76.8	79.3	79.7	74.5	121.9
63	71.0	72.0	70.7	69.5	69.9	71.2	71.4	71.4	71.5	73.3	74.0	75.1	77.3	77.8	79.5	80.1	74.4	121.8
80	71.9	71.2	69.6	69.9	69.9	71.4	69.7	70.9	72.1	74.3	76.1	77.5	79.6	80.8	82.6	82.2	76.3	123.7
100	74.6	74.3	77.1	72.3	72.1	76.6	75.9	74.3	75.1	77.3	78.8	80.0	82.1	82.3	84.3	83.2	78.8	126.2
125	75.7	76.1	76.2	75.4	75.2	75.1	76.2	76.6	77.6	78.8	80.8	80.3	81.8	82.8	83.3	81.9	79.2	126.6
160	76.3	77.1	77.1	75.9	76.1	76.6	76.8	77.3	78.1	78.3	80.1	79.5	79.6	80.8	80.8	78.5	78.4	125.8
200	76.8	77.6	76.8	75.1	75.4	74.3	74.9	74.8	74.8	76.1	77.1	78.2	79.1	80.1	80.6	78.2	77.0	124.4
250	78.6	80.1	78.4	76.8	75.9	75.4	75.1	75.8	76.8	77.6	80.1	80.5	80.8	81.6	81.3	78.2	78.6	126.0
315	79.4	80.2	79.4	78.2	76.7	76.1	76.1	75.9	76.8	78.1	80.1	80.8	80.8	80.8	79.8	77.7	78.7	126.1
400	80.3	81.0	81.0	78.5	77.3	76.0	75.8	76.3	78.2	79.5	81.6	82.7	82.2	81.2	79.7	76.6	79.8	127.2
500	81.2	81.9	81.4	80.2	77.7	76.4	76.2	77.2	78.8	79.3	81.0	81.6	82.8	81.3	79.0	75.9	79.9	127.3
630	82.1	82.9	83.4	80.9	79.1	76.9	76.4	77.7	79.3	80.1	82.1	83.3	83.8	81.1	78.8	75.7	80.8	128.2
800	90.0	91.3	91.5	89.6	87.5	83.6	82.0	82.1	83.6	84.6	87.1	87.4	88.1	86.9	82.1	79.8	86.8	134.2
1000	96.2	98.4	98.4	96.7	94.6	89.4	86.6	87.2	89.5	90.2	92.5	92.0	93.5	93.5	87.7	85.1	93.0	140.4
1250	86.4	88.1	88.9	87.3	84.8	81.6	80.6	82.0	83.0	84.0	87.3	87.7	88.3	86.0	82.0	78.4	85.7	133.1
1600	88.6	89.6	90.3	89.1	87.3	83.8	82.1	83.6	84.4	86.2	88.9	89.9	90.7	88.2	83.2	79.6	87.6	135.0
2000	92.1	94.1	94.6	93.6	91.7	87.2	85.4	86.1	87.8	89.1	92.1	92.0	94.1	93.8	87.1	82.2	91.4	138.8
2500	89.1	90.9	91.1	91.1	88.9	85.1	82.4	83.1	84.7	86.5	89.5	91.4	91.7	88.9	83.5	80.2	88.8	136.2
3150	89.3	91.0	91.3	91.6	88.8	84.3	81.8	82.6	84.7	86.2	89.5	90.9	91.7	89.5	84.0	80.9	89.0	136.4
4000	88.8	90.9	91.6	91.8	89.3	84.6	82.3	82.9	84.5	85.3	88.5	90.2	90.3	88.3	84.0	80.7	88.8	136.2
5000	88.3	90.8	91.3	92.2	88.7	84.7	81.3	82.0	83.9	84.9	88.4	90.0	90.7	88.4	84.2	80.9	89.0	136.4
6300	88.1	89.6	90.5	91.3	87.5	82.8	78.4	78.9	81.3	83.0	86.0	87.9	88.3	86.5	82.3	78.7	87.8	135.2
8000	87.3	89.5	90.2	90.8	87.1	82.7	76.9	76.9	80.0	81.0	84.2	86.5	87.0	84.7	81.0	78.1	87.6	135.0
10000	87.2	89.0	89.3	90.3	85.8	81.8	75.4	75.6	78.8	79.5	82.8	84.8	85.3	83.5	79.8	76.9	87.5	134.9
12500	87.2	88.5	88.8	89.3	84.8	81.1	74.5	73.6	76.5	78.0	81.2	83.4	83.5	82.5	78.5	75.6	87.9	135.3
16000	85.6	87.0	87.0	87.8	83.1	78.9	72.3	72.0	75.0	76.2	78.9	81.3	81.4	80.2	76.2	73.9	88.0	135.4
20000	83.2	84.5	84.8	85.3	80.1	76.3	69.4	69.1	71.8	73.6	75.8	78.1	78.6	77.3	73.7	70.4	88.1	135.5
OVERALL	101.6	103.5	103.8	103.2	100.6	96.4	93.9	94.6	96.3	97.4	100.2	101.1	102.0	100.8	96.7	94.1	100.9	148.3
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	87.0	97.0	101.6	103.7	103.1	100.5	99.2	100.3	102.1	103.2	105.7	106.1	105.6	102.7	95.3	87.7		
113 METERS	78.3	89.5	94.6	96.8	96.6	94.1	93.0	94.1	96.0	97.0	99.4	99.6	99.1	96.2	88.4	80.1		

(b) Percent speed, 70; fan physical speed, 2486 rpm; fundamental blade passage frequency, 1077 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	76.1	74.1	75.6	75.8	75.4	75.6	76.6	77.8	77.4	77.6	79.6	82.2	80.9	82.6	85.1	86.2	79.8	127.2
63	73.7	75.8	75.3	74.5	74.5	75.0	75.3	75.3	75.5	77.0	79.0	80.8	81.7	83.7	86.3	86.3	79.7	127.1
80	76.7	79.2	78.0	75.0	75.8	76.0	74.7	76.5	77.2	78.7	82.2	84.1	85.0	86.5	88.7	89.3	82.3	129.7
100	76.1	76.1	76.3	75.3	74.8	76.5	77.1	79.1	80.8	82.3	84.6	85.6	87.0	88.5	89.8	89.8	83.9	131.3
125	80.0	80.0	80.6	78.8	79.5	80.5	81.1	81.8	83.1	84.1	86.0	86.7	87.6	87.6	90.1	88.3	84.8	132.2
160	79.8	80.4	81.6	80.1	80.8	81.1	81.6	82.3	82.9	83.3	84.4	85.5	85.4	86.1	86.9	85.5	83.6	131.0
200	81.1	80.8	81.1	80.1	79.3	79.3	79.6	79.6	80.1	80.6	82.1	84.2	85.0	85.5	86.8	84.5	82.3	129.7
250	81.6	81.9	82.9	80.9	79.9	79.1	79.6	80.6	81.9	82.6	84.9	86.0	86.4	86.1	86.9	84.5	83.5	130.9
315	82.1	82.6	83.1	81.3	81.0	80.0	81.0	81.1	82.1	82.8	84.5	85.6	85.8	85.6	85.5	83.0	83.3	130.7
400	82.6	83.1	83.8	81.8	81.3	80.4	80.8	81.4	82.6	83.8	85.6	86.7	86.4	85.8	84.8	82.0	83.9	131.3
500	83.5	83.8	84.5	82.8	82.1	81.1	81.0	81.5	82.3	83.0	85.0	86.6	86.5	85.1	83.6	80.8	83.8	131.2
630	83.8	84.8	85.7	83.8	82.5	80.5	80.7	81.3	82.8	83.7	86.2	86.9	87.0	84.5	83.0	80.0	84.2	131.6
800	86.9	87.6	88.4	86.4	85.8	83.9	83.3	83.6	84.6	85.3	88.1	89.5	89.4	85.9	83.4	81.1	86.5	133.9
1000	97.5	100.5	102.7	99.9	99.7	97.4	93.0	92.3	92.1	92.5	95.6	95.6	99.5	95.6	89.5	91.5	97.1	144.5
1250	92.0	94.8	96.5	94.5	93.6	91.1	87.6	87.5	88.3	89.1	92.1	92.6	94.3	90.8	86.1	85.2	92.0	139.4
1600	89.0	89.8	90.7	90.3	89.0	86.2	85.3	86.2	87.5	88.8	91.5	92.1	92.8	88.2	84.3	81.9	89.5	136.9
2000	93.9	96.2	98.7	98.7	95.7	92.7	90.4	90.9	92.1	92.6	94.7	96.2	96.4	94.2	88.2	84.7	94.9	142.3
2500	90.6	92.5	94.3	94.3	92.3	89.1	86.9	87.8	89.5	90.6	93.3	95.1	95.1	91.5	86.6	83.2	92.3	139.7
3150	92.5	94.3	95.3	96.0	94.5	90.5	87.3	88.0	89.8	91.0	94.3	96.0	95.3	92.0	87.3	83.8	93.5	140.9
4000	91.0	92.8	93.3	93.8	92.0	88.1	85.5	85.8	88.3	89.0	92.5	94.1	93.8	90.8	85.8	82.5	91.8	139.2
5000	90.8	93.3	94.1	94.6	92.5	89.3	87.0	86.8	89.1	89.6	93.3	94.5	94.0	90.8	86.6	83.8	92.7	140.1
6300	89.7	91.7	92.9	94.1	91.1	87.6	84.0	84.0	87.2	87.6	91.7	92.7	92.1	89.6	85.4	81.9	91.6	139.0
8000	89.7	91.4	93.1	93.9	90.7	87.2	82.1	82.7	85.5	86.7	89.6	91.5	91.3	88.7	84.3	80.4	91.5	138.9
10000	89.3	91.0	92.0	93.0	89.6	86.0	80.5	80.6	83.5	85.1	88.0	89.5	89.5	86.8	83.1	79.2	91.1	138.5
12500	89.4	90.0	91.3	92.3	88.3	85.0	79.0	78.7	82.2	83.1	86.3	88.3	88.0	85.7	81.8	77.9	91.4	138.8
16000	87.7	88.7	89.9	90.5	86.7	83.0	76.9	77.4	79.9	81.0	83.9	85.9	85.7	83.5	79.5	76.3	91.4	138.8
20000	85.6	86.6	87.5	87.6	83.7	79.7	74.5	74.4	77.1	78.4	80.7	82.6	82.5	80.7	76.9	73.0	91.3	138.7
OVERALL	103.5	105.6	107.3	106.6	104.8	102.0	99.0	99.1	100.5	101.3	104.1	105.3	106.0	103.3	100.6	99.3	104.7	152.0
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	88.9	99.2	105.1	107.5	107.6	105.7	104.1	105.0	106.8	107.6	110.1	110.7	109.4	104.8	98.5	91.6		

TABLE XII. - Concluded.

(c) Percent speed, 80; fan physical speed, 2841 rpm; fundamental blade passage frequency, 1231 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	82.4	80.2	81.2	81.4	80.0	83.4	83.2	82.0	82.0	82.7	84.0	84.9	85.9	87.4	89.0	91.7	84.6	132.0
63	78.1	80.1	79.7	77.7	78.9	77.7	78.7	78.7	80.1	81.1	83.2	85.3	86.7	88.4	90.7	91.9	84.3	131.7
80	78.7	80.3	77.8	77.3	77.5	77.8	77.8	79.0	80.7	83.5	85.5	87.4	90.0	91.5	93.5	94.6	86.7	134.1
100	84.4	83.1	82.6	80.3	80.8	81.9	82.3	83.1	85.3	87.3	89.4	91.0	91.8	93.8	95.6	96.3	89.3	136.7
125	83.0	82.5	83.2	82.2	83.2	84.2	84.7	86.0	87.7	88.2	90.5	91.3	92.0	93.5	95.3	94.1	89.5	136.9
160	84.2	84.6	84.9	84.6	84.7	85.7	86.4	86.4	87.6	87.9	89.4	90.3	89.9	92.1	92.6	91.6	88.5	135.9
200	84.7	84.6	85.4	84.1	83.4	83.7	83.9	83.7	84.4	85.1	87.4	89.3	90.4	91.2	92.1	90.3	87.3	134.7
250	84.4	84.6	86.3	85.6	85.3	84.1	83.9	84.8	86.3	87.6	89.9	90.7	90.9	92.4	92.3	90.1	88.4	135.8
315	84.1	84.7	84.6	84.1	83.7	83.6	84.9	85.1	86.4	87.4	89.4	90.2	90.6	91.2	91.2	88.6	87.8	135.2
400	85.4	85.3	86.4	83.9	84.1	84.4	84.1	84.9	86.1	87.4	89.4	90.9	90.6	90.8	90.6	87.0	87.9	135.3
500	84.2	84.4	85.4	84.4	84.1	84.1	84.2	85.1	86.2	87.1	89.2	90.5	90.4	90.2	89.1	85.8	87.5	134.9
630	84.9	85.1	85.9	84.9	84.3	83.4	84.1	84.6	86.6	87.4	89.9	90.4	90.1	88.9	87.9	84.5	87.4	134.8
800	87.5	87.1	88.3	88.0	86.5	85.5	85.8	86.1	87.3	89.0	91.0	92.6	91.6	89.5	87.6	84.7	88.9	136.3
1000	90.6	93.5	95.0	94.3	93.0	89.5	89.1	88.0	89.5	91.0	92.3	93.4	94.0	90.6	88.1	85.2	91.9	139.3
1250	103.1	108.4	109.2	108.9	108.1	102.6	102.1	97.9	99.4	101.7	100.2	101.8	102.2	98.4	95.4	92.1	104.0	151.4
1600	85.0	90.8	92.0	91.0	90.0	87.3	86.7	87.2	88.9	90.4	92.2	93.8	93.2	89.7	86.7	83.9	90.6	138.0
2000	90.1	90.9	91.9	91.2	89.9	87.6	87.7	88.5	90.9	92.4	94.7	96.0	95.5	91.0	87.5	84.8	92.3	139.7
2500	96.7	100.2	100.1	101.7	100.6	95.7	93.7	92.1	97.1	97.7	98.9	101.3	100.2	95.6	91.4	88.3	98.7	146.1
3150	89.9	92.0	92.4	92.7	91.4	88.2	87.5	88.7	91.7	92.7	95.5	97.2	96.2	91.9	87.9	85.0	93.4	140.8
4000	92.5	95.3	96.2	97.7	96.5	92.3	89.5	89.8	92.7	93.0	96.8	98.5	96.6	93.7	89.2	86.0	95.6	143.0
5000	90.8	93.4	95.5	96.1	94.3	91.3	89.0	89.3	92.3	92.6	95.5	97.5	95.8	92.8	88.8	86.0	94.8	142.2
6300	88.7	91.6	93.7	95.1	92.8	90.4	88.1	88.0	91.1	91.7	95.1	95.8	94.4	91.7	88.1	85.4	94.1	141.5
8000	87.7	90.6	92.7	94.6	91.2	89.2	86.1	86.2	89.4	90.9	93.4	94.8	93.7	91.1	86.9	83.6	93.6	141.0
10000	86.7	89.3	91.3	92.8	89.5	87.2	83.5	84.1	87.2	88.8	91.7	93.2	92.3	89.7	86.0	82.1	92.9	140.3
12500	85.6	88.0	90.0	91.6	88.3	86.0	81.6	82.3	86.1	87.3	89.8	91.2	90.9	88.5	84.8	80.8	92.8	140.2
16000	83.6	85.8	87.8	89.3	85.8	83.6	79.4	80.4	83.6	85.1	87.4	89.1	88.4	86.3	82.4	78.7	92.4	139.8
20000	81.0	83.1	85.0	85.6	82.3	79.9	76.5	77.1	80.3	81.6	83.9	85.8	85.1	83.5	79.1	75.4	91.8	139.2
OVERALL	105.8	110.0	110.8	110.9	109.9	105.3	104.4	102.4	104.8	106.1	107.4	109.0	108.5	106.2	105.0	103.7	108.2	155.6
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	91.8	103.2	108.1	110.6	111.3	108.8	108.6	107.9	111.5	112.2	113.5	114.6	112.6	107.7	102.3	95.6		

(d) Percent speed, 90; fan physical speed, 3196 rpm; fundamental blade passage frequency, 1384 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	86.2	80.7	83.4	83.6	82.7	85.1	84.6	86.2	85.4	85.7	87.7	88.6	89.6	90.7	92.7	95.9	88.0	135.4
63	82.0	83.5	82.7	82.2	82.2	82.5	82.2	83.0	83.8	84.0	86.8	89.1	90.7	92.2	93.7	96.6	88.1	135.5
80	82.6	83.4	81.2	81.2	81.9	81.2	81.7	82.7	84.7	85.9	89.6	91.6	93.7	95.2	97.6	100.4	91.0	138.4
100	84.6	82.9	84.6	83.9	84.2	85.2	85.9	87.1	89.2	90.1	93.1	94.3	96.2	97.4	99.6	99.9	93.0	140.4
125	87.5	85.2	86.9	86.5	86.4	87.7	88.2	89.9	91.5	91.9	94.4	95.9	96.2	97.2	99.9	98.4	93.6	141.0
160	87.0	88.2	89.0	88.0	89.2	89.2	90.0	90.7	91.5	91.4	93.2	94.3	94.7	96.0	96.9	95.1	92.5	139.9
200	87.9	88.6	88.6	87.9	87.4	87.6	87.6	88.2	89.2	88.9	91.6	93.3	94.2	95.6	96.6	94.2	91.4	138.8
250	86.9	87.7	89.1	88.2	87.1	86.9	87.6	88.9	90.4	90.9	93.7	95.0	95.7	96.6	97.4	94.5	92.5	139.9
315	86.1	87.1	88.4	88.2	88.1	87.6	88.6	89.7	90.7	90.7	93.1	94.8	95.2	95.9	96.1	93.0	92.1	139.5
400	86.8	87.3	88.7	88.0	87.7	88.0	88.3	89.0	90.3	91.0	93.5	95.1	95.2	95.5	94.8	91.4	92.0	139.4
500	87.2	88.3	89.3	88.7	88.7	87.7	88.0	89.0	90.3	90.5	92.7	94.6	94.5	94.7	93.5	89.9	91.5	138.9
630	88.4	89.9	90.3	90.8	88.8	88.3	88.3	88.9	90.6	91.3	93.9	95.0	94.6	93.6	92.1	88.5	91.8	139.2
800	90.6	91.4	91.9	90.9	89.9	90.1	90.1	89.9	91.4	92.6	95.3	96.7	95.4	93.4	92.1	88.7	92.9	140.3
1000	91.1	92.0	92.5	91.0	90.5	90.0	89.4	90.4	92.4	93.1	95.4	96.7	96.8	94.1	91.9	88.6	93.4	140.8
1250	101.9	104.9	106.6	104.6	104.2	100.7	97.1	96.9	98.1	100.6	103.1	103.0	100.6	97.5	94.7	90.6	101.8	149.2
1600	99.2	102.4	103.4	101.7	101.4	98.1	94.6	94.6	96.1	98.3	100.6	101.2	98.8	95.2	92.7	89.1	99.3	146.7
2000	92.4	93.1	94.3	93.4	92.6	91.8	91.0	91.6	93.5	94.5	97.6	97.9	97.1	93.5	90.7	87.1	94.7	142.1
2500	96.4	98.9	99.2	99.1	98.6	96.2	93.7	93.2	97.1	97.4	101.4	104.0	102.1	96.0	92.5	88.9	99.3	146.7
3150	94.7	97.1	97.4	97.1	96.4	94.1	92.4	92.4	95.7	96.6	100.4	102.4	101.7	96.6	93.1	89.4	98.3	145.7
4000	93.4	95.1	96.2	97.2	94.7	92.9	92.2	93.1	94.9	96.6	100.7	102.1	99.1	94.7	91.5	88.7	97.8	145.2
5000	92.2	93.3	94.3	94.7	93.2	91.9	90.7	91.7	94.5	95.5	98.8	100.3	98.7	94.2	91.2	87.9	96.7	144.1
6300	91.1	93.0	94.3	95.0	93.2	92.2	90.8	91.5	94.5	95.7	98.5	99.3	97.6	94.0	91.0	88.3	96.8	144.2
8000	89.9	92.1	93.3	94.3	91.8	90.6	89.4	90.1	92.9	94.3	97.3	98.2	96.6	93.3	90.0	87.2	96.2	143.6
10000	88.9	90.6	91.9	92.9	90.1	88.9	87.4	88.6	91.4	92.7	95.6	96.6	95.4	92.0	89.0	85.4	95.7	143.1
12500	87.6	89.3	90.3	91.1	88.5	87.3	85.8	87.0	90.0	90.8	94.0	95.3	94.0	91.0	88.0	84.7	95.6	143.0
16000	85.3	87.1	88.1	88.8	85.6	84.8	83.1	84.6	87.8	88.6	91.4	92.9	91.9	89.2	85.7	82.2	95.2	142.6
20000	82.1	83.9	84.4	85.1	82.4	81.1	79.9	81.4	84.3	85.4	87.7	89.3	88.6	86.6	83.1	78.9	94.5	141.9
OVERALL	107.0	109.2	110.4	109.4	108.6	106.3	104.5	104.9	107.0	108.2	111.2	112.4	111.2	109.1	108.7	107.7	109.9	157.3
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	93.1	103.2	108.2	110.2	111.3	110.7	109.8	110.7	113.4	114.0	116.9	117.9	115.5	110.2	105.4	98.4		
305 METERS	68.5	82.2	88.9	91.2	93.0	92.4	91.9	92.6	95.5	96.1	98.8	99.6	96.6	90.8	85.5	78.0		

TABLE XIII. - NOISE OF FAN B CONFIGURATION 109 (HARD INLET, SOFT FAN FRAME, EXHAUST SUPPRESSOR, NOMINAL NOZZLE)

TEST PURPOSE - FAR-FIELD NOISE

[Data adjusted to standard day of 15° C and 70 percent relative humidity; SPL re 0.00002 N/m^2; PWL re 0.1 pW.]

(a) Percent speed, 60; fan physical speed, 2122 rpm; fundamental blade passage frequency, 919 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	84.4	79.9	81.0	79.0	75.7	76.9	76.7	77.0	80.0	75.4	78.5	79.1	80.5	81.5	83.9	85.3	79.7	127.1
63	83.9	78.9	79.4	78.1	74.1	75.9	75.1	75.3	79.6	74.6	77.8	79.0	80.3	82.4	83.6	85.1	79.2	126.6
80	82.6	79.9	79.4	77.1	74.2	75.2	75.4	75.6	78.9	76.2	79.1	80.1	81.6	83.6	85.4	86.6	80.0	127.4
100	82.9	82.1	81.1	79.1	76.7	78.7	77.6	77.1	80.6	78.7	81.2	82.0	83.7	85.6	86.7	86.8	81.7	129.1
125	84.4	84.2	83.7	81.1	79.4	78.9	79.4	78.6	81.4	80.4	82.7	82.8	83.4	84.7	85.9	86.1	82.3	129.7
160	85.4	83.9	83.6	81.6	79.4	78.8	79.4	79.1	81.3	80.1	81.6	81.9	81.8	82.8	83.8	84.0	81.5	128.9
200	84.4	85.4	83.2	79.4	77.4	77.4	77.4	76.7	78.6	77.2	79.2	80.3	81.2	82.6	82.6	82.4	80.2	127.6
250	85.7	86.0	84.7	82.3	80.3	79.5	79.0	78.7	81.2	81.2	83.0	83.4	83.8	84.7	84.0	82.5	82.4	129.8
315	86.1	86.1	85.6	83.0	81.1	80.0	79.3	79.6	81.5	81.0	82.0	82.7	82.8	83.3	82.6	81.0	82.2	129.6
400	86.5	86.8	85.8	83.5	82.0	79.2	78.3	78.3	80.2	80.7	82.3	83.1	83.8	83.8	81.8	80.4	82.4	129.8
500	85.8	86.8	85.8	83.9	81.9	79.6	78.6	78.3	80.6	80.1	82.1	82.4	83.4	83.3	81.1	79.2	82.2	129.6
630	85.6	86.9	86.4	84.3	82.3	79.4	78.1	77.8	80.1	79.8	81.6	81.4	82.9	82.6	80.3	77.8	82.0	129.4
800	92.1	92.9	93.6	92.6	90.8	87.1	85.3	82.6	82.8	81.8	83.4	82.5	84.6	83.9	82.1	81.0	87.6	135.0
1000	96.7	97.7	98.9	98.2	96.5	92.7	90.9	87.5	86.7	85.4	86.2	84.8	86.4	86.0	84.5	84.3	92.6	140.0
1250	88.7	90.0	89.9	87.7	85.2	82.0	79.8	78.9	80.0	79.2	80.4	80.8	82.0	82.5	79.5	77.6	83.8	131.2
1600	89.7	91.2	90.9	88.9	85.9	82.4	79.7	78.2	78.9	78.0	79.2	80.0	81.9	81.5	78.7	76.1	84.3	131.7
2000	92.5	95.3	95.5	92.8	90.6	86.5	83.0	80.3	80.1	79.3	80.5	82.4	84.3	84.5	81.0	78.6	88.2	135.6
2500	89.8	91.1	91.4	90.3	87.1	82.4	78.9	76.6	77.3	76.9	77.9	79.5	81.4	80.9	77.4	75.3	84.8	132.2
3150	90.3	91.6	92.0	91.0	87.6	83.0	78.8	76.5	77.5	76.8	78.5	79.8	81.0	81.1	78.0	75.6	85.5	132.9
4000	89.9	92.3	92.4	91.3	88.6	84.9	82.3	79.9	81.8	80.8	82.1	82.6	83.3	82.4	79.9	77.9	86.8	134.2
5000	90.8	92.3	92.5	92.0	89.3	84.6	80.9	78.2	79.2	78.9	81.1	82.6	83.8	83.1	80.1	77.6	87.2	134.6
6300	89.6	91.4	91.7	91.1	87.7	83.4	77.5	73.5	74.4	74.6	77.1	79.5	81.5	81.2	78.2	75.3	86.3	133.7
8000	90.0	91.6	91.4	90.8	87.4	82.9	76.8	73.5	74.3	74.5	77.5	79.5	80.4	80.1	77.4	74.6	86.8	134.2
10000	89.8	91.5	91.4	91.0	87.1	82.8	76.7	75.9	78.1	76.9	79.1	80.7	80.7	79.9	77.4	73.8	87.9	135.3
12500	89.7	90.7	91.2	90.7	86.7	82.6	76.6	75.6	78.3	77.7	80.4	82.0	82.2	82.0	78.5	74.5	89.2	136.6
16000	87.7	89.2	89.2	88.9	84.4	80.7	75.2	75.8	78.2	78.8	80.0	82.0	81.5	81.5	77.5	73.7	89.6	137.0
20000	85.3	87.0	86.8	85.8	81.8	78.2	73.0	74.4	76.7	76.7	78.0	79.7	79.1	79.1	75.4	71.3	89.9	137.3
OVERALL	103.5	104.8	105.1	103.9	101.4	97.7	95.3	93.3	94.6	93.7	95.3	95.9	97.0	97.2	96.3	95.9	100.5	147.9
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	88.9	98.9	103.1	104.1	103.3	101.0	99.2	97.7	99.4	98.3	99.4	99.3	99.2	97.1	92.3	86.3		
113 METERS	80.4	91.4	96.2	97.2	96.7	94.4	92.7	91.2	92.9	91.9	92.9	92.7	92.4	90.5	85.4	79.1		

(b) Percent speed, 70; fan physical speed, 2476 rpm; fundamental blade passage frequency, 1072 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	84.2	81.8	83.3	80.0	79.2	79.8	79.0	80.0	80.8	81.7	81.2	81.6	83.3	84.7	86.5	88.4	82.3	129.7
63	82.2	81.7	81.7	79.2	78.5	79.3	78.3	77.7	79.8	79.3	81.3	82.8	84.2	85.5	87.8	88.7	82.3	129.7
80	83.0	81.7	80.8	77.8	78.8	80.2	78.0	77.7	80.2	80.8	83.0	84.3	86.3	88.7	90.7	91.5	84.2	131.6
100	84.1	82.6	82.2	81.6	79.6	80.7	80.2	81.1	83.7	84.1	86.1	87.3	88.6	90.6	92.1	92.3	86.2	133.6
125	85.8	86.2	85.7	85.2	82.7	83.7	82.7	83.5	86.7	86.0	87.2	88.6	88.5	90.2	91.3	91.1	87.0	134.4
160	87.3	86.4	85.6	85.6	83.3	83.1	83.3	83.4	85.6	85.1	86.4	86.4	87.1	88.3	88.9	89.1	85.9	133.3
200	88.8	87.3	86.0	84.2	81.8	81.5	81.5	81.8	83.2	82.7	84.2	84.8	86.3	87.5	88.8	87.4	84.7	132.1
250	88.0	88.0	87.4	87.9	85.2	83.5	82.2	83.2	84.8	85.7	87.2	86.9	88.3	89.0	89.3	87.1	86.5	133.9
315	88.6	88.8	88.5	87.6	84.8	83.5	83.1	83.8	85.0	85.6	86.5	86.9	87.1	87.8	87.8	85.8	86.2	133.6
400	88.9	89.2	88.7	88.5	85.9	83.7	82.4	82.9	84.2	84.9	86.5	87.3	88.0	87.9	87.4	84.9	86.4	133.8
500	88.3	89.8	88.8	89.1	86.3	84.6	83.4	82.9	84.8	84.8	86.3	86.5	87.4	86.8	85.9	83.8	86.3	133.7
630	87.8	89.3	89.2	88.2	86.2	83.7	82.2	81.7	83.8	84.5	85.7	85.4	86.8	86.3	85.2	82.7	85.7	133.1
800	91.0	92.0	91.7	91.2	88.3	85.8	83.7	83.2	84.0	84.3	85.7	85.9	87.5	86.5	85.3	83.1	87.2	134.6
1000	101.7	104.5	104.7	105.7	103.3	101.0	97.0	93.6	92.9	92.4	91.6	91.0	92.1	91.1	91.7	90.1	99.4	146.8
1250	98.6	99.3	99.3	99.8	96.4	94.1	89.9	87.3	87.1	86.9	86.9	86.7	88.6	87.1	86.6	85.3	93.5	140.9
1600	92.0	93.2	93.4	92.7	89.0	85.9	82.9	82.0	83.4	83.0	83.9	84.5	85.9	84.2	82.9	80.6	87.5	134.9
2000	97.0	98.3	99.3	99.8	96.2	92.8	88.5	85.3	85.3	84.8	85.8	86.6	88.7	86.5	85.0	83.1	93.2	140.6
2500	93.3	94.8	95.5	95.5	92.0	88.3	84.3	82.0	82.2	82.2	83.5	85.0	86.3	84.5	82.3	80.1	89.5	136.9
3150	93.9	95.6	96.4	96.8	93.9	89.9	84.9	81.9	81.9	81.8	83.8	84.6	85.8	84.4	82.4	80.4	90.7	138.1
4000	92.6	94.4	94.8	95.3	92.1	88.1	83.1	80.6	81.6	81.5	83.3	84.6	85.6	84.6	81.8	79.1	89.5	136.9
5000	92.8	95.3	95.8	95.8	93.1	90.1	87.5	85.0	86.0	85.1	87.3	87.6	87.6	86.1	84.0	82.1	91.3	138.7
6300	92.1	94.1	94.5	95.1	91.6	87.9	83.3	80.2	81.2	80.7	83.0	84.5	85.2	84.3	81.8	79.1	90.0	137.4
8000	92.2	93.7	94.3	94.8	91.3	87.3	81.7	78.4	79.3	79.8	82.5	83.9	84.3	83.6	81.4	78.2	90.3	137.7
10000	92.0	93.5	94.1	94.8	91.1	87.1	80.6	78.2	79.2	79.9	82.4	83.6	83.2	82.7	80.1	76.9	91.0	138.4
12500	91.7	93.0	93.9	94.5	90.5	86.9	80.7	79.3	80.6	81.3	83.6	84.4	84.1	83.8	80.5	77.2	92.3	139.7
16000	90.1	91.6	91.9	92.6	88.6	85.4	79.4	78.7	79.9	81.2	83.0	84.4	83.5	83.2	79.9	76.3	92.7	140.1
20000	87.9	89.4	89.4	89.6	86.0	82.8	77.5	77.7	78.9	79.7	81.2	82.2	81.2	81.2	77.5	74.4	93.0	140.4
OVERALL	106.9	108.9	109.2	109.8	106.9	104.2	100.4	98.2	98.9	98.8	99.8	100.3	101.2	101.2	101.3	100.6	105.0	152.4
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	92.5	102.1	106.7	109.6	108.3	106.7	103.9	102.1	103.2	102.7	103.9	103.6	103.1	100.5	96.8	91.0		

TABLE XIII. - Concluded.

(c) Percent speed, 80; fan physical speed, 2829 rpm; fundamental blade passage frequency, 1225 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	81.5	86.3	83.3	87.8	85.6	85.8	84.5	86.6	84.5	85.3	86.3	85.7	87.5	90.1	91.6	93.8	87.3	134.7
63	82.3	82.5	81.2	81.3	80.7	82.5	80.7	82.2	83.5	82.7	85.2	85.6	88.8	91.3	93.0	94.2	86.6	134.0
80	82.5	82.7	79.3	79.8	80.8	81.7	80.5	82.7	85.5	85.2	87.3	88.8	91.5	93.3	95.0	96.0	88.5	135.9
100	85.8	85.8	84.0	82.5	82.5	84.0	84.5	86.0	89.0	88.3	91.0	92.2	93.6	95.8	96.6	97.3	90.9	138.3
125	86.5	86.3	86.3	85.3	85.8	86.0	87.1	88.5	89.6	89.5	91.5	92.9	93.6	95.5	97.3	95.7	91.3	138.7
160	86.7	87.3	87.7	86.2	87.0	87.5	88.0	88.5	90.0	89.0	91.2	91.8	92.5	93.8	95.0	93.7	90.5	137.9
200	87.0	88.4	87.0	86.4	85.5	85.5	86.5	86.4	87.4	87.0	89.0	90.3	92.0	93.2	93.9	92.2	89.2	136.6
250	87.5	88.5	87.3	88.0	86.5	86.0	87.2	86.5	89.7	88.8	91.0	91.9	93.5	94.3	94.7	92.1	90.4	137.8
315	87.3	88.5	87.5	87.7	87.0	86.8	87.3	87.5	88.8	89.0	90.5	91.3	92.2	93.0	93.0	90.2	89.7	137.1
400	88.1	88.6	88.1	87.5	87.1	86.3	86.6	86.3	87.8	88.0	90.1	91.4	92.6	92.8	92.1	89.2	89.5	136.9
500	87.0	89.2	88.3	88.2	87.0	86.0	87.0	86.5	87.8	87.8	90.0	90.6	92.0	91.7	91.2	87.9	89.1	136.5
630	87.5	88.7	88.7	88.0	87.2	85.7	86.0	85.3	87.0	87.2	89.2	89.7	90.8	90.7	89.8	86.2	88.3	135.7
800	90.9	91.3	90.8	91.6	89.6	87.6	87.4	86.4	87.9	87.8	89.6	90.5	91.9	90.9	89.9	86.3	89.6	137.0
1000	95.7	98.2	98.4	98.7	96.2	93.5	91.5	89.2	89.5	88.5	90.2	91.1	92.9	91.4	90.0	87.1	93.7	141.1
1250	108.0	110.5	111.5	111.8	109.0	106.3	103.8	99.5	98.8	96.5	95.5	96.2	98.0	96.5	95.3	94.3	105.4	152.8
1600	92.9	95.2	95.2	94.6	91.9	89.2	87.9	86.6	87.2	86.6	88.1	88.5	90.7	88.2	87.1	84.3	90.4	137.8
2000	93.0	94.5	94.7	94.4	91.9	88.7	87.0	86.0	87.3	87.0	89.2	89.8	91.3	89.2	87.0	84.3	90.5	137.9
2500	100.7	101.9	102.2	103.2	101.1	98.2	94.7	90.4	90.0	89.0	91.1	93.5	95.6	91.2	89.2	86.6	97.5	144.9
3150	93.3	95.1	95.0	95.6	93.1	89.6	86.6	84.1	85.3	85.0	88.0	88.8	90.4	87.8	85.8	82.6	90.8	138.2
4000	96.5	98.6	98.1	99.3	96.6	94.1	90.1	85.6	85.5	85.0	88.0	88.9	89.8	88.1	86.0	82.8	93.8	141.2
5000	94.5	96.5	97.2	98.7	96.0	93.0	89.8	86.5	87.4	86.7	89.4	89.5	90.0	88.3	86.4	84.0	93.5	140.9
6300	92.4	94.2	95.2	96.8	94.3	91.6	88.6	86.2	87.4	86.5	88.8	88.7	89.3	87.5	86.0	83.7	92.5	139.9
8000	91.1	92.9	93.9	95.8	93.3	90.3	86.2	82.9	83.6	83.9	86.9	87.3	87.9	86.4	84.3	81.0	91.7	139.1
10000	90.0	91.8	93.0	94.3	91.0	89.0	84.0	81.5	82.5	83.4	86.2	86.8	87.2	85.5	83.2	79.8	91.4	138.8
12500	88.9	90.6	91.5	93.6	90.1	87.5	83.2	81.4	82.8	83.6	86.3	86.2	86.7	85.6	82.4	79.4	92.0	139.4
16000	86.9	88.4	89.2	91.2	87.5	85.4	81.1	80.2	82.2	82.8	85.3	85.3	85.6	84.7	80.7	77.8	92.1	139.5
20000	83.9	85.9	86.5	87.5	84.3	82.4	78.9	78.6	80.5	81.3	83.1	83.3	83.3	82.8	78.6	75.8	92.2	139.6
OVERALL	110.2	112.4	113.1	113.6	110.9	108.3	105.9	102.9	103.3	102.3	103.9	104.7	106.1	106.0	106.1	105.1	108.6	156.0
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	96.0	105.8	110.3	113.4	112.6	111.4	110.0	107.5	107.9	106.7	108.3	108.8	109.2	105.4	101.7	95.7		

(d) Percent of speed, 90; fan physical speed, 3170 rpm; fundamental blade passage frequency, 1373 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	85.8	84.8	87.2	88.3	86.5	87.3	86.8	87.7	88.7	88.3	89.2	89.1	91.3	92.8	95.2	97.5	90.1	137.5
63	87.2	84.7	84.5	85.3	84.7	84.8	85.3	86.2	86.8	87.2	89.3	88.9	92.7	94.0	96.7	98.1	90.2	137.6
80	86.3	84.8	83.7	85.2	83.8	84.3	84.5	86.3	88.0	88.5	91.5	92.6	95.3	97.0	99.3	101.2	92.6	140.0
100	88.1	87.5	86.6	87.6	87.1	88.5	88.6	90.3	91.6	92.8	95.0	95.5	98.0	99.8	101.5	101.3	95.0	142.4
125	89.1	88.4	89.4	89.1	89.3	89.8	90.4	92.1	93.6	93.8	95.6	96.4	97.8	98.9	101.8	100.5	95.3	142.7
160	90.0	90.2	90.8	90.7	91.2	91.3	92.0	92.7	93.8	93.7	94.5	95.3	96.7	97.7	99.2	98.9	94.5	141.9
200	90.5	90.7	90.2	90.2	89.3	89.7	89.8	89.8	91.3	91.7	93.2	94.1	96.2	97.5	98.5	97.0	93.3	140.7
250	90.0	90.1	89.6	91.0	89.6	89.5	90.1	90.6	93.1	93.3	95.3	95.7	97.8	98.5	98.8	96.5	94.3	141.7
315	89.5	89.3	89.8	91.5	90.0	90.2	90.5	91.7	93.0	93.2	94.5	95.4	97.2	97.5	97.5	94.4	93.8	141.2
400	90.4	90.4	91.0	90.7	90.5	89.4	90.2	90.7	92.2	92.9	94.5	95.5	96.9	97.2	96.5	93.9	93.6	141.0
500	90.4	91.1	91.7	91.9	90.6	90.1	89.6	90.7	92.4	92.1	94.4	94.8	96.4	96.1	95.2	92.6	93.2	140.6
630	90.9	92.9	92.1	92.3	91.6	90.3	89.6	90.6	91.6	91.8	93.9	94.2	95.8	95.1	93.9	91.1	92.8	140.2
800	93.4	94.4	95.6	94.9	93.4	92.7	90.9	91.6	92.4	92.6	94.2	95.0	96.2	95.6	94.1	91.0	93.9	141.3
1000	94.5	96.2	96.5	96.5	94.2	92.5	91.5	91.9	92.5	92.5	94.5	95.2	97.1	95.6	94.0	90.7	94.5	141.9
1250	107.1	110.6	111.3	110.1	109.3	106.4	103.1	101.1	100.3	97.1	98.6	98.2	99.1	96.9	95.6	94.3	105.2	152.6
1600	103.0	105.9	106.2	105.4	104.4	101.7	98.5	96.7	96.2	93.7	95.2	95.3	96.4	93.9	92.9	90.8	100.6	148.0
2000	95.8	96.9	97.3	97.8	95.8	94.6	92.6	91.3	91.9	91.4	93.9	94.4	95.1	93.1	91.1	88.2	94.5	141.9
2500	103.5	103.8	104.1	104.1	102.5	100.6	97.3	94.3	93.0	93.1	95.6	97.9	98.3	93.8	91.6	89.1	99.6	147.0
3150	100.2	100.5	100.7	101.5	99.3	97.3	94.3	91.8	91.3	91.3	93.7	95.3	96.2	93.7	90.8	88.1	97.0	144.4
4000	99.2	100.9	101.4	101.9	99.7	97.7	94.1	91.0	90.0	89.7	92.1	93.5	93.5	91.2	89.2	86.5	97.0	144.4
5000	96.4	98.4	98.7	99.6	97.2	95.1	92.4	89.4	89.3	90.0	92.3	93.3	93.3	91.1	88.9	86.3	95.4	142.8
6300	94.7	97.4	97.6	98.7	96.4	94.2	92.2	89.6	90.6	90.7	92.7	92.6	92.2	90.7	88.6	86.4	95.3	142.7
8000	93.9	96.1	96.8	97.6	94.9	92.8	90.4	88.1	88.3	88.6	90.6	91.1	91.1	89.4	87.6	85.2	94.5	141.9
10000	92.4	94.5	95.0	96.0	93.2	90.7	88.5	86.4	87.4	88.1	89.9	90.3	90.6	88.7	86.4	83.3	94.1	141.5
12500	91.1	92.8	93.6	94.5	91.5	89.1	86.6	86.2	86.8	87.8	89.7	89.8	90.0	88.8	85.8	82.5	94.4	141.8
16000	88.3	89.9	90.9	91.8	88.8	86.8	84.5	84.5	85.6	86.9	88.1	89.2	88.8	87.8	84.3	80.9	94.4	141.8
20000	85.4	87.0	87.7	88.2	85.3	83.7	82.0	82.6	84.1	84.6	86.0	87.0	86.4	85.4	82.1	78.8	94.5	141.9
OVERALL	111.6	113.9	114.4	114.0	112.7	110.3	107.7	106.5	106.7	106.1	108.0	108.6	109.9	109.6	110.1	109.3	110.8	158.2
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	98.1	107.5	112.0	114.7	114.9	114.4	112.7	111.3	111.2	111.0	112.7	113.1	112.8	109.0	105.2	99.1		
305 METERS	73.0	86.9	92.9	95.8	96.9	96.4	94.9	94.1	94.3	93.4	95.0	95.2	94.6	90.4	86.7	80.0		

TABLE XIV. - NOISE OF FAN B CONFIGURATION 109 (HARD INLET, SOFT FAN FRAME, EXHAUST SUPPRESSOR, NOMINAL NOZZLE)

TEST PURPOSE - INLET DUCT NOISE; EXHAUST AERODYNAMIC DATA

[Data adjusted to standard day of 15° C and 70 percent relative humidity; SPL re 0.00002 N/m^2; PWL re 0.1 pW.]

(a) Percent speed, 60; fan physical speed, 2111 rpm; fundamental blade passage frequency, 914 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	84.7	78.3	75.3	82.5	79.8	76.7	75.3	75.3	78.8	78.7	82.5	79.9	80.5	81.2	83.3	82.7	80.0	127.4
63	83.5	78.0	74.1	81.0	79.0	75.3	75.6	75.8	77.8	77.3	82.0	79.1	80.6	81.6	83.6	82.5	79.5	126.9
80	83.3	77.7	74.0	80.2	77.7	76.2	74.7	74.8	77.8	77.7	82.0	79.8	82.0	82.3	84.7	84.6	79.9	127.3
100	84.5	80.0	78.5	80.5	79.3	79.8	77.5	77.6	80.1	79.6	82.6	82.2	83.5	84.3	86.1	85.5	81.6	129.0
125	85.7	83.5	82.2	81.9	82.4	80.2	80.0	79.7	81.9	80.4	82.4	82.3	83.9	84.7	85.9	84.1	82.4	129.8
160	86.9	83.4	81.9	81.5	81.7	80.2	80.5	80.4	81.7	80.4	81.4	81.6	82.4	82.2	83.4	82.7	81.7	129.1
200	85.0	84.0	81.8	79.3	79.5	78.5	78.3	78.7	79.3	77.8	80.5	80.1	81.8	82.2	82.5	81.2	80.4	127.8
250	86.4	85.0	83.7	81.5	82.4	81.4	79.5	80.7	81.9	81.0	82.7	82.9	85.0	84.7	83.2	81.6	82.6	130.0
315	86.7	85.0	84.2	82.2	82.9	82.0	80.4	81.0	81.7	81.0	81.9	82.6	83.5	83.5	82.5	80.2	82.4	129.8
400	87.0	85.7	84.7	82.5	83.4	81.4	79.4	79.7	81.2	81.0	82.5	82.6	84.2	83.7	82.4	80.6	82.6	130.0
500	86.6	85.6	84.6	82.6	83.3	81.5	80.1	80.6	82.0	81.6	82.6	82.9	83.6	83.8	81.8	80.2	82.7	130.1
630	86.3	85.8	85.1	83.5	83.5	81.5	80.5	81.0	82.1	81.1	82.3	81.9	83.1	83.0	81.3	79.4	82.6	130.0
800	92.6	92.7	92.9	93.7	92.2	88.4	85.6	84.7	84.7	83.4	83.9	83.5	84.9	84.5	82.7	81.6	88.3	135.7
1000	96.3	96.6	97.4	99.1	96.3	92.9	89.4	87.9	87.3	85.4	86.1	85.9	86.8	86.4	85.3	84.0	92.4	139.8
1250	89.4	89.7	88.9	86.9	86.2	83.9	81.7	81.1	81.9	80.9	82.1	81.8	82.4	83.1	80.9	78.6	84.3	131.7
1600	90.2	90.9	90.7	88.9	86.7	82.6	80.7	79.2	80.1	79.7	80.9	81.3	81.6	81.7	79.1	77.1	84.6	132.0
2000	92.6	94.4	94.4	93.1	90.6	86.1	82.9	80.4	80.8	80.4	82.1	82.7	83.6	84.1	80.9	79.2	87.9	135.3
2500	89.9	91.1	91.3	90.1	87.6	83.1	79.3	77.8	78.6	77.9	79.9	80.2	81.3	80.9	78.1	76.2	85.0	132.4
3150	90.6	91.3	91.6	91.1	88.1	83.3	79.1	77.0	77.8	77.5	79.6	80.3	81.3	81.1	78.5	76.1	85.6	133.0
4000	90.0	91.5	91.9	91.2	88.7	83.9	79.7	77.5	78.4	78.0	80.4	81.2	81.7	81.5	79.0	77.0	86.1	133.5
5000	90.9	92.4	92.5	92.0	89.7	84.2	79.3	77.3	77.5	77.5	80.7	81.8	82.9	82.7	80.0	77.2	87.1	134.5
6300	90.0	91.2	91.9	91.0	88.5	83.5	77.4	74.9	75.2	75.5	78.0	79.5	81.2	81.0	78.5	76.1	86.5	133.9
8000	90.0	91.2	91.7	91.0	88.2	83.0	77.0	74.4	75.2	75.7	78.2	79.1	79.9	80.0	78.1	75.4	87.0	134.4
10000	89.6	90.8	91.3	90.6	87.8	82.1	76.8	75.7	76.5	77.2	79.0	79.8	80.2	79.9	77.1	74.6	87.6	135.0
12500	89.2	90.0	90.4	89.9	87.2	81.9	76.7	75.7	76.8	77.3	80.7	80.3	81.7	80.8	77.8	75.1	88.6	136.0
16000	87.4	88.5	88.7	88.4	85.4	80.5	75.1	75.5	77.5	77.5	80.6	80.8	81.1	81.5	77.5	74.7	89.3	136.7
20000	86.1	86.7	87.3	85.9	82.5	78.1	73.9	74.1	76.4	76.8	78.4	79.1	78.9	79.6	75.2	73.6	90.1	137.5
OVERALL	103.7	104.1	104.3	104.2	101.9	98.1	95.1	94.2	95.0	94.2	96.0	95.9	97.0	97.1	96.3	94.9	100.4	147.8
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	89.2	98.2	102.3	104.2	103.9	101.1	98.6	97.6	98.5	97.8	99.4	99.0	98.6	96.9	92.3	86.4		
113 METERS	80.7	90.7	95.3	97.4	97.3	94.7	92.4	91.4	92.3	91.6	92.9	92.4	92.1	90.3	85.5	79.2		

(b) Percent speed, 80; fan physical speed, 2818 rpm; fundamental blade passage frequency, 1221 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	82.5	81.0	87.4	86.9	87.9	83.9	82.2	86.7	84.2	83.0	85.2	84.4	86.5	88.2	89.9	91.4	86.2	133.6
63	80.0	79.1	79.0	80.3	80.6	79.8	80.0	80.6	80.8	81.8	84.6	85.2	88.1	90.0	91.1	91.7	85.1	132.5
80	80.5	79.8	79.0	80.5	80.6	81.0	80.5	81.6	82.1	83.5	86.5	88.4	90.8	92.1	93.8	94.7	87.4	134.8
100	83.4	84.4	83.9	84.4	84.9	85.9	84.9	86.0	86.5	87.9	90.0	91.1	92.9	94.7	96.2	96.4	90.2	137.6
125	84.9	83.4	85.9	85.9	86.2	87.0	87.0	87.2	88.5	89.2	91.0	91.8	92.7	94.5	95.9	94.9	90.5	137.9
160	85.8	85.1	86.3	86.8	87.0	86.8	87.1	87.3	88.3	88.6	90.1	90.4	91.1	92.6	93.0	92.5	89.3	136.7
200	87.1	86.1	86.6	86.1	85.6	85.1	85.3	84.6	86.1	86.1	88.3	89.4	91.3	92.3	92.8	91.0	88.3	135.7
250	86.0	86.5	87.0	87.9	87.2	87.0	87.5	86.9	88.5	88.9	90.9	92.0	92.7	93.4	92.9	91.4	89.9	137.3
315	86.3	85.8	87.5	87.7	87.2	86.5	86.8	87.0	87.8	88.2	90.3	90.6	91.7	92.0	91.2	89.5	89.0	136.4
400	88.6	87.8	90.3	88.5	87.6	86.6	86.5	86.8	87.8	88.6	90.8	91.4	91.8	91.8	91.3	89.2	89.5	136.9
500	85.8	86.9	88.1	88.1	87.3	86.3	86.6	86.8	87.3	88.1	90.1	90.0	91.4	90.6	90.1	87.8	88.7	136.1
630	86.5	87.0	88.8	89.2	88.2	87.7	87.8	88.0	88.3	88.5	90.2	89.9	91.0	90.5	90.0	87.7	89.1	136.5
800	90.1	89.6	91.1	91.7	91.4	88.9	87.9	88.7	89.2	89.4	90.2	90.5	91.6	90.7	89.6	87.4	90.1	137.5
1000	94.5	97.2	98.3	98.3	96.8	93.6	91.6	90.5	90.3	90.5	91.5	91.4	92.3	91.5	90.1	88.0	93.8	141.2
1250	106.3	110.8	110.4	110.3	108.8	105.4	102.4	100.1	96.8	94.8	96.4	96.2	96.4	95.6	95.1	94.2	104.6	152.0
1600	91.8	93.0	94.8	94.3	92.0	89.8	88.2	88.0	88.3	88.4	89.4	89.5	90.2	88.5	87.2	85.2	90.5	137.9
2000	92.7	92.8	95.0	94.8	92.5	89.3	87.8	87.1	88.5	88.6	90.0	90.1	91.0	89.8	87.5	85.4	90.9	138.3
2500	99.5	101.4	102.9	103.5	101.5	96.9	94.4	90.4	90.0	90.2	91.5	93.0	94.2	91.4	89.0	87.1	97.5	144.9
3150	93.0	94.1	95.5	95.6	93.3	89.5	87.0	85.5	85.8	87.0	88.8	89.3	89.6	88.8	86.6	83.7	91.0	138.4
4000	95.5	97.2	99.0	99.2	96.9	92.9	89.0	86.2	85.7	86.4	88.7	89.0	89.4	88.2	86.2	83.8	93.7	141.1
5000	94.1	95.6	97.7	99.2	96.4	92.9	89.3	87.3	87.6	87.9	89.8	89.7	90.3	89.1	86.8	84.7	93.8	141.2
6300	91.5	93.6	95.8	96.8	94.3	91.3	88.1	86.3	86.6	86.6	88.8	88.1	89.0	88.4	85.7	83.7	92.4	139.8
8000	90.1	92.4	94.6	95.4	92.9	89.3	85.7	83.9	83.7	84.4	86.6	87.0	87.3	87.3	84.1	81.6	91.5	138.9
10000	88.8	90.6	92.6	93.8	91.6	87.9	83.6	82.4	83.0	83.6	85.5	85.7	86.3	85.8	82.8	79.7	91.0	138.4
12500	87.7	89.0	91.2	92.3	90.0	86.2	82.2	81.4	82.5	83.5	85.2	85.0	85.9	85.3	81.4	79.0	91.2	138.6
16000	85.2	87.2	88.9	90.4	87.5	84.9	80.8	81.0	82.5	83.3	84.5	84.5	86.9	80.5	78.0	91.8	139.2	
20000	83.0	84.7	86.5	87.8	84.6	82.5	79.2	79.4	81.6	81.9	82.5	82.8	82.9	83.6	78.5	76.2	92.3	139.7
OVERALL	108.8	112.2	112.5	112.6	110.9	107.6	105.0	103.4	102.5	102.4	104.1	104.4	105.3	105.3	105.2	104.3	108.1	155.5
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	94.7	105.3	110.0	112.8	112.8	110.9	109.2	108.1	107.3	107.4	108.6	108.5	108.3	105.3	101.3	95.7		

TABLE XIV. - Concluded.

(c) Percent speed, 90; fan physical speed, 3167 rpm; fundamental blade passage frequency, 1372 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
50	81.6	84.0	87.3	88.0	86.5	85.8	85.1	86.3	87.0	86.3	90.3	87.9	90.5	92.1	94.6	97.0	89.4	136.8
63	83.3	83.2	83.7	82.8	83.5	83.8	81.8	84.5	85.8	85.5	90.3	88.8	91.3	93.5	96.0	97.7	89.5	136.9
80	82.5	83.5	81.5	81.8	83.0	82.6	82.5	84.3	87.0	87.6	91.0	91.1	94.1	97.3	99.0	100.3	91.9	139.3
100	86.8	86.3	86.0	85.8	85.8	88.2	87.5	89.3	90.8	91.5	93.5	94.6	97.2	99.2	100.8	100.9	94.2	141.6
125	88.2	87.0	88.5	88.5	88.0	89.7	89.7	90.9	93.4	93.4	94.5	95.6	97.2	98.7	101.0	99.9	94.7	142.1
160	89.7	89.2	89.9	89.9	90.1	91.2	90.6	91.1	93.6	92.6	94.1	95.0	95.7	97.7	98.9	97.9	93.9	141.3
200	89.9	89.2	89.4	88.7	87.7	88.0	88.2	88.7	91.0	90.7	92.4	93.5	95.7	96.9	98.0	96.9	92.6	140.0
250	88.8	88.3	89.3	91.0	88.0	89.0	90.7	90.5	92.5	92.8	94.2	95.8	96.7	98.0	98.3	96.6	93.8	141.2
315	88.5	88.2	89.5	90.7	89.5	90.0	90.5	90.7	92.7	92.7	93.7	94.8	96.2	97.5	96.7	94.9	93.3	140.7
400	89.5	88.7	90.5	90.5	89.5	89.5	89.5	90.5	92.3	92.3	93.8	95.1	95.8	96.7	96.3	93.9	93.1	140.5
500	90.0	89.3	91.3	92.3	90.8	90.1	90.0	90.6	93.0	92.0	93.6	94.4	95.8	95.6	94.5	92.5	92.9	140.3
630	90.7	92.1	92.6	93.4	92.9	91.7	91.2	91.7	92.9	92.2	93.4	94.5	95.2	94.7	94.6	91.6	93.2	140.6
800	92.2	92.7	94.9	95.0	94.2	92.7	92.5	92.7	94.0	93.2	94.0	94.8	95.9	95.2	94.4	91.9	94.1	141.5
1000	94.0	94.7	95.7	95.9	94.7	93.2	92.5	92.5	94.4	93.5	94.6	95.4	96.3	95.3	94.5	91.7	94.6	142.0
1250	107.1	108.5	110.5	109.3	108.3	105.6	102.3	100.8	99.3	97.8	96.8	97.2	98.6	96.6	96.3	95.5	104.3	151.7
1600	102.7	103.9	105.4	104.5	103.4	101.0	97.9	96.4	95.5	94.4	94.2	95.2	95.9	94.1	93.6	92.0	99.8	147.2
2000	95.3	95.5	97.2	97.5	96.5	94.8	92.8	92.2	93.3	92.8	94.0	94.5	95.2	94.0	92.5	89.6	94.8	142.2
2500	103.0	102.4	103.9	103.7	104.0	101.4	96.8	94.5	94.2	93.3	95.2	98.0	97.7	94.3	92.7	89.9	99.7	147.1
3150	99.2	99.1	100.2	100.4	100.1	97.7	93.9	92.1	91.9	92.1	93.4	95.0	95.9	93.6	91.9	88.7	96.8	144.2
4000	99.4	99.4	100.7	101.6	100.2	98.4	94.9	90.9	91.1	90.7	92.4	92.9	93.1	91.9	90.4	87.7	97.0	144.4
5000	96.4	97.2	98.6	98.7	98.2	95.6	92.9	90.3	90.6	90.3	92.6	93.1	93.1	92.1	90.1	87.6	95.5	142.9
6300	94.7	95.6	97.4	97.6	96.5	94.2	91.6	89.4	90.2	89.4	91.9	91.4	91.6	90.9	88.9	86.8	94.7	142.1
8000	93.4	94.5	96.5	95.8	95.2	92.9	90.0	88.7	88.7	88.2	90.0	90.4	90.2	89.9	87.4	85.8	94.0	141.4
10000	91.8	92.6	94.6	94.5	93.6	91.1	88.0	87.2	88.2	87.5	89.0	89.2	89.5	89.0	86.3	84.3	93.6	141.0
12500	89.9	90.7	92.7	92.9	91.7	89.1	86.4	86.1	87.8	86.9	88.8	88.2	89.1	89.1	84.9	83.8	93.7	141.1
16000	86.7	88.5	90.4	90.5	89.0	87.4	84.5	85.0	87.7	86.5	87.6	87.8	87.5	88.3	83.8	83.5	94.1	141.5
20000	84.2	86.1	88.0	87.9	86.0	85.1	82.6	84.0	87.6	85.5	86.0	86.9	85.5	87.3	82.0	83.1	95.2	142.6
OVERALL	111.3	112.1	113.8	113.2	112.4	110.1	107.4	106.3	106.8	106.1	107.3	108.2	109.3	109.5	109.8	109.1	110.3	157.7
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	97.6	105.9	111.6	114.1	115.6	114.7	112.4	111.3	111.9	111.1	112.2	112.9	112.1	109.0	105.6	99.6		
305 METERS	72.6	85.0	92.3	95.1	96.8	96.5	94.5	94.0	94.4	93.6	94.5	95.1	94.0	90.4	86.6	80.2		

TABLE XV. - NOISE OF FAN B CONFIGURATION 110 (INLET SUPPRESSOR, SOFT FAN FRAME, EXHAUST SUPPRESSOR, NOMINAL NOZZLE)

TEST PURPOSE - FAR-FIELD NOISE

[Data adjusted to standard day of 15° C and 70 percent relative humidity; SPL re 0.00002 N/m^2; PWL re 0.1 pW.]

(a) Percent speed, 60; fan physical speed, 2098 rpm; fundamental blade passage frequency, 909 hertz.

FREQUENCY	ANGLE, DEG															AVERAGE SPL	POWER LEVEL (PWL)
	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																
50	78.8	79.7	75.7	75.3	82.5	84.2	84.5	81.7	83.8	89.5	82.9	84.5	89.0	89.5	88.4	85.1	132.4
63	78.4	79.0	75.9	74.4	81.5	83.2	82.9	80.2	81.5	88.4	82.6	84.0	87.5	88.0	87.2	83.9	131.2
80	78.1	78.1	74.8	74.3	80.1	82.3	81.9	79.3	80.8	87.9	81.5	84.3	88.4	87.6	87.5	83.6	130.9
100	77.9	77.4	75.6	76.3	79.8	82.6	82.4	79.8	80.8	86.4	82.7	84.8	87.6	87.8	87.8	83.4	130.7
125	78.9	79.1	78.3	77.8	80.8	82.6	82.1	80.1	80.3	84.6	82.8	84.4	86.4	86.3	85.6	82.8	130.1
160	78.8	78.7	78.0	77.8	79.5	81.5	80.8	79.5	79.7	82.2	81.1	82.7	85.0	84.5	83.7	81.4	128.7
200	78.5	78.0	77.0	76.7	79.2	79.5	79.0	77.2	77.2	82.0	79.5	81.7	83.9	82.9	81.8	80.1	127.4
250	80.6	78.7	78.2	77.7	79.9	80.1	79.7	79.6	79.6	83.2	82.3	83.6	84.2	83.1	81.8	81.3	128.6
315	79.5	78.8	78.1	78.3	80.0	79.5	80.0	79.1	79.3	81.6	81.1	82.8	83.3	82.0	80.7	80.6	127.9
400	79.7	78.6	77.7	77.2	78.9	77.9	77.9	78.1	79.4	82.1	81.8	83.2	83.1	81.4	79.6	80.3	127.6
500	78.8	77.5	77.0	76.6	77.5	77.0	77.5	78.1	79.0	81.3	80.7	82.6	83.0	80.5	77.7	79.6	126.9
630	78.0	77.2	76.2	75.7	76.5	76.0	76.2	77.3	78.3	81.0	80.3	82.2	81.7	78.8	75.9	78.8	126.1
800	82.0	80.2	77.8	76.7	77.8	76.7	77.2	78.0	79.2	80.9	80.9	82.6	83.3	80.0	76.7	79.9	127.2
1000	84.2	82.7	79.6	77.9	78.9	77.7	78.1	79.1	79.9	82.2	82.2	83.6	84.4	81.6	77.8	81.2	128.5
1250	76.5	74.8	74.0	74.2	74.3	75.0	75.7	76.5	77.3	78.8	78.8	81.0	81.3	77.3	73.9	77.6	124.9
1600	79.0	76.8	76.2	74.6	74.0	74.3	74.6	75.5	76.3	78.5	77.8	80.5	80.3	76.7	72.7	77.3	124.6
2000	79.0	78.0	75.3	74.3	73.3	73.3	74.0	75.0	76.0	78.5	80.1	82.0	83.0	78.8	73.7	78.2	125.5
2500	77.6	75.7	73.2	72.2	71.5	71.8	71.7	73.3	74.2	77.3	77.5	80.2	79.7	75.2	71.4	76.1	123.4
3150	80.2	78.2	75.5	73.7	72.7	72.5	72.2	73.5	74.7	77.0	77.8	80.0	80.3	76.3	72.3	77.0	124.3
4000	83.4	82.9	80.7	78.9	78.2	78.4	78.2	78.9	79.0	80.7	80.9	81.9	81.9	78.7	76.0	80.9	128.2
5000	86.0	84.8	81.8	78.8	77.3	76.6	75.5	76.6	77.3	79.8	80.5	82.5	81.5	79.0	75.6	81.2	128.5
6300	86.4	85.9	82.7	78.9	76.4	72.8	71.3	72.5	73.3	76.7	78.3	80.0	82.0	77.3	73.7	80.9	128.2
8000	87.8	87.1	84.0	79.8	78.0	74.1	72.6	73.6	74.3	77.6	78.6	79.4	80.6	76.6	72.9	82.4	129.7
10000	90.5	90.0	87.9	83.9	81.7	76.7	76.2	77.5	77.4	79.5	79.9	79.7	79.3	76.5	73.2	86.1	133.4
12500	88.7	89.1	87.1	83.2	81.8	76.5	76.3	77.7	78.3	81.0	80.7	80.7	81.2	76.6	73.2	87.0	134.3
16000	87.0	87.2	85.2	81.3	80.0	75.2	76.0	77.9	78.9	80.2	80.6	80.0	81.0	75.9	72.3	87.7	135.0
20000	84.8	84.3	82.5	78.5	77.3	73.2	74.4	75.2	76.2	80.5	78.5	77.3	78.0	73.5	70.0	88.1	135.4
OVERALL	97.8	97.3	95.1	92.5	93.2	93.2	93.1	92.3	93.2	97.3	95.1	96.6	98.3	97.1	96.0	97.1	144.4
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																
81 METERS	89.0	92.7	93.5	93.7	95.0	95.7	96.0	96.5	96.9	99.1	97.9	98.2	96.9	91.5	84.5		
113 METERS	80.4	84.9	86.2	86.7	88.3	89.1	89.5	90.0	90.4	92.6	91.2	91.4	90.1	84.2	76.7		

TABLE XV. - Continued.

(b) Percent speed, 70; fan physical speed, 2455 rpm; fundamental blade passage frequency, 1063 hertz.

FREQUENCY	ANGLE, DEG															AVERAGE SPL	POWER LEVEL (PWL)
	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																
50	81.2	75.9	76.7	75.9	77.9	79.6	82.7	83.6	86.2	87.4	86.7	86.4	87.6	85.6	88.4	84.5	131.8
63	80.1	75.3	75.8	75.3	76.4	78.1	81.6	81.9	85.3	86.3	85.5	86.9	87.9	86.9	88.1	84.0	131.3
80	80.3	75.3	74.8	75.5	76.7	76.6	80.3	81.8	85.1	86.3	85.2	88.3	89.3	88.1	89.2	84.5	131.8
100	79.9	75.8	76.1	75.6	76.9	77.9	81.4	82.3	85.1	86.1	86.0	88.6	89.8	90.3	90.0	85.1	132.4
125	81.7	81.0	79.5	79.8	79.8	80.7	83.3	84.2	85.8	86.8	86.3	89.2	88.8	88.8	88.4	85.5	132.8
160	81.2	80.5	80.0	80.4	81.4	81.0	82.7	83.7	84.5	85.5	84.6	87.9	87.4	86.9	86.3	84.4	131.7
200	81.0	79.8	79.2	79.3	79.6	78.5	80.5	81.3	82.3	84.5	83.7	87.0	87.0	86.2	85.2	83.2	130.5
250	82.7	80.4	79.9	79.6	79.9	79.9	81.1	82.6	83.9	85.1	85.7	87.9	87.2	87.1	85.1	84.1	131.4
315	81.8	80.5	80.2	80.2	80.6	80.0	81.5	82.5	83.8	85.0	85.3	87.3	86.3	85.7	83.1	83.7	131.0
400	81.7	80.4	79.6	79.7	79.6	79.6	80.4	82.2	83.7	84.9	85.7	87.1	86.4	85.1	83.0	83.5	130.8
500	80.9	79.8	79.3	79.3	79.2	79.6	80.6	81.9	82.9	84.3	85.0	86.9	85.9	83.9	81.2	82.9	130.3
630	80.3	79.3	78.6	78.3	78.2	78.6	79.3	81.5	82.5	84.1	84.4	86.3	85.8	83.1	79.7	82.4	129.7
800	81.3	79.5	78.8	79.3	79.0	79.3	80.2	81.3	82.3	83.8	84.8	87.7	85.7	82.9	79.9	82.9	130.2
1000	88.7	86.7	85.1	83.2	84.1	83.9	82.4	83.1	84.6	87.7	87.5	88.6	88.4	84.4	82.5	86.0	133.3
1250	83.0	81.0	79.5	79.0	79.9	79.4	80.0	81.2	81.9	83.2	84.5	86.5	85.7	81.7	78.9	82.6	129.9
1600	79.7	78.2	77.6	76.9	77.2	77.7	78.9	80.2	80.7	81.9	82.5	84.9	83.2	79.9	76.8	80.9	128.2
2000	82.3	80.2	78.8	77.5	77.5	77.8	78.8	80.7	80.8	83.3	84.9	86.3	85.8	81.7	77.4	82.3	129.6
2500	80.6	78.3	77.1	75.9	75.7	76.4	76.7	78.2	79.0	81.7	83.3	85.4	84.2	79.4	75.6	80.8	128.1
3150	84.5	82.2	79.9	77.0	76.3	76.2	76.5	78.3	79.0	82.0	83.1	84.8	84.0	79.8	76.1	81.3	128.7
4000	85.0	83.5	81.5	78.5	78.3	77.7	77.9	79.0	79.3	82.3	83.8	85.3	84.0	80.2	76.5	82.2	129.6
5000	88.2	87.7	86.4	84.2	83.9	84.2	83.5	83.7	83.5	86.3	86.5	87.0	85.5	82.7	80.0	86.3	133.6
6300	88.6	86.9	85.6	81.6	79.5	77.6	77.4	78.2	78.5	81.5	83.4	84.9	83.6	79.9	76.4	84.0	131.3
8000	89.4	88.2	86.0	81.5	79.3	76.7	76.5	77.3	78.2	81.7	83.2	83.5	83.7	79.5	75.7	84.8	132.1
10000	90.9	90.6	88.7	84.4	82.0	78.3	77.9	78.1	78.6	82.1	82.8	82.8	82.4	78.1	74.6	87.2	134.5
12500	93.0	92.3	91.6	87.5	85.5	80.8	79.3	79.8	80.5	83.0	83.4	83.1	83.0	78.1	75.4	90.6	137.9
16000	89.3	88.9	87.7	83.6	81.7	78.1	78.2	79.4	80.5	82.9	83.8	82.5	83.7	77.4	74.1	89.9	137.2
20000	86.8	86.3	85.0	81.1	79.0	76.5	77.4	78.3	79.0	80.8	81.9	80.6	81.1	74.8	72.1	90.4	137.7
OVERALL	100.2	99.1	97.9	95.1	94.5	93.8	94.7	95.7	97.1	98.8	99.1	100.8	100.5	98.8	98.1	99.6	147.0
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																
61 METERS	91.4	94.9	96.6	96.7	97.8	98.6	99.3	100.3	100.8	102.6	102.3	102.4	99.8	94.1	87.2		

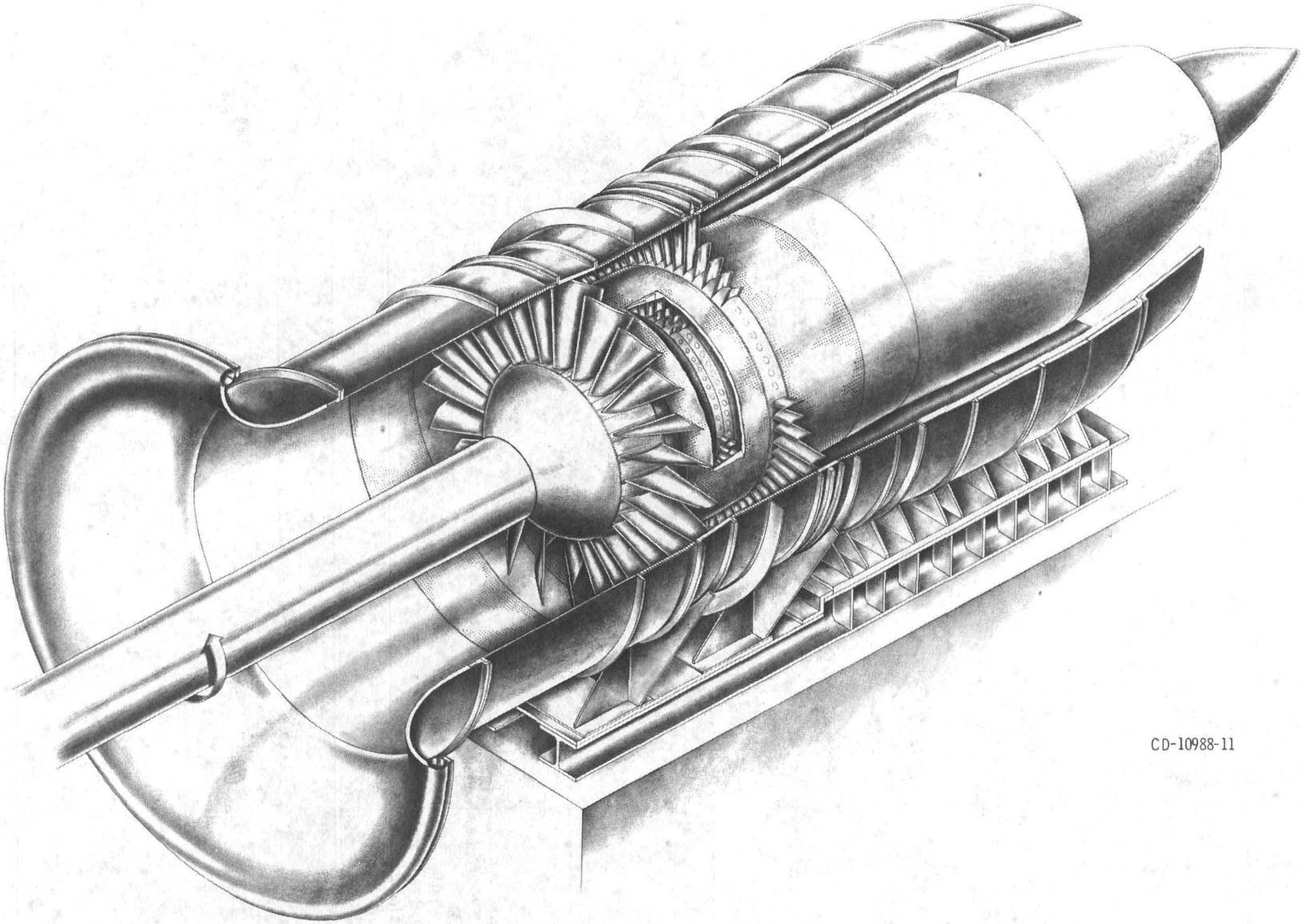
(c) Percent speed, 80; fan physical speed, 2806 rpm; fundamental blade passage frequency, 1215 hertz.

FREQUENCY	ANGLE, DEG															AVERAGE SPL	POWER LEVEL (PWL)
	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																
50	82.5	81.3	82.5	82.3	83.8	83.3	85.3	84.0	85.8	89.2	88.9	89.5	91.2	93.9	92.4	87.7	135.0
63	81.7	80.0	80.6	78.8	81.0	80.0	82.7	81.5	83.5	88.8	87.6	90.0	91.5	92.3	93.2	86.9	134.2
80	81.0	78.2	78.2	77.2	79.5	78.7	82.2	81.5	84.0	88.5	88.4	92.0	93.3	94.5	94.9	88.1	135.4
100	83.3	80.3	79.5	79.3	81.3	81.5	84.5	85.0	87.0	88.7	90.3	92.9	94.0	96.7	96.2	89.6	136.9
125	83.2	81.9	82.2	83.2	83.9	84.7	86.2	86.6	89.2	90.1	91.0	92.8	93.8	94.8	93.6	89.6	136.9
160	83.9	83.7	83.4	84.9	85.7	85.9	86.9	87.6	87.9	89.1	89.9	90.9	92.4	93.1	92.2	88.8	136.1
200	83.9	83.4	83.4	83.4	84.2	83.4	84.4	84.4	85.2	87.3	88.4	91.4	92.1	92.8	90.7	87.7	135.0
250	84.5	83.0	83.2	83.0	84.0	83.5	85.5	86.6	87.5	89.6	90.4	92.3	92.6	92.6	90.2	88.6	135.9
315	83.5	82.5	83.0	83.5	84.7	84.2	85.7	86.7	87.2	88.8	89.2	91.0	92.0	91.5	88.4	87.9	135.2
400	83.0	82.7	83.5	83.5	84.2	83.5	84.7	85.8	87.2	88.5	89.6	91.2	91.3	90.8	87.4	87.6	134.9
500	82.5	82.5	82.7	83.0	84.2	83.7	84.7	86.0	86.5	88.3	88.6	90.7	90.5	89.2	85.7	87.0	134.3
630	82.3	82.3	82.3	82.3	82.8	82.8	83.8	85.7	86.3	87.9	88.5	90.2	89.4	87.9	84.5	86.4	133.7
800	83.1	82.3	82.6	83.1	84.2	83.9	84.4	85.6	86.9	88.5	89.1	91.0	89.6	87.5	84.7	86.9	134.2
1000	84.3	84.8	83.3	83.1	84.1	83.8	84.8	85.9	86.3	88.4	89.3	91.4	89.9	87.6	84.5	87.2	134.5
1250	92.0	95.5	90.3	86.3	87.0	87.3	85.5	87.8	88.0	90.4	90.4	93.4	91.3	88.1	85.7	90.1	137.4
1600	82.3	81.8	81.6	81.8	82.3	82.8	83.8	85.2	85.3	87.2	87.6	89.2	87.3	84.8	81.9	85.6	132.9
2000	82.6	81.8	81.3	81.6	82.1	82.3	83.8	85.1	85.8	87.9	88.8	90.1	88.1	85.2	82.1	86.1	133.4
2500	86.4	84.9	84.3	83.0	82.3	82.5	83.5	84.8	85.8	88.9	90.4	93.1	89.9	85.8	81.5	87.7	135.0
3150	84.8	83.6	81.6	80.6	80.6	80.3	81.3	83.2	83.8	86.7	88.1	88.8	87.2	84.3	80.5	85.3	132.6
4000	87.3	85.8	84.1	82.1	81.6	80.3	81.3	82.6	83.3	86.7	87.7	89.2	87.2	83.9	80.4	85.8	133.1
5000	89.0	89.2	88.4	86.4	86.4	85.4	85.5	86.2	86.7	89.2	89.7	89.7	87.9	85.2	82.4	88.7	136.0
6300	86.4	88.6	88.6	86.1	85.6	84.4	84.1	85.0	84.9	87.5	87.8	88.8	87.0	84.3	81.5	88.1	135.4
8000	86.3	87.8	87.1	84.3	84.1	81.6	81.8	82.9	83.3	86.4	86.9	87.1	85.8	82.8	79.4	87.4	134.7
10000	86.4	88.2	86.9	84.4	83.4	79.9	80.4	82.0	82.4	85.8	86.0	86.3	84.3	81.3	77.7	87.7	135.1
12500	92.1	92.1	91.4	88.8	87.4	82.9	82.6	82.9	82.9	86.4	85.9	86.4	84.7	80.5	77.6	91.6	138.9
16000	90.8	90.0	89.5	87.5	86.3	82.0	81.5	82.4	82.5	84.9	85.7	86.1	84.2	79.2	76.9	92.2	139.5
20000	83.9	83.9	83.4	81.2	79.9	77.9	79.3	80.8	81.1	83.3	83.7	83.4	82.1	77.1	74.4	90.9	138.2
OVERALL	100.8	101.1	99.7	98.2	98.4	97.5	98.4	99.3	100.2	102.5	103.0	104.8	104.6	104.6	103.3	102.7	150.0
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																
61 METERS	93.1	97.8	99.4	100.0	101.6	101.8	102.9	104.0	104.5	106.6	106.8	107.5	104.1	99.3	92.3		

TABLE XV. - Concluded.

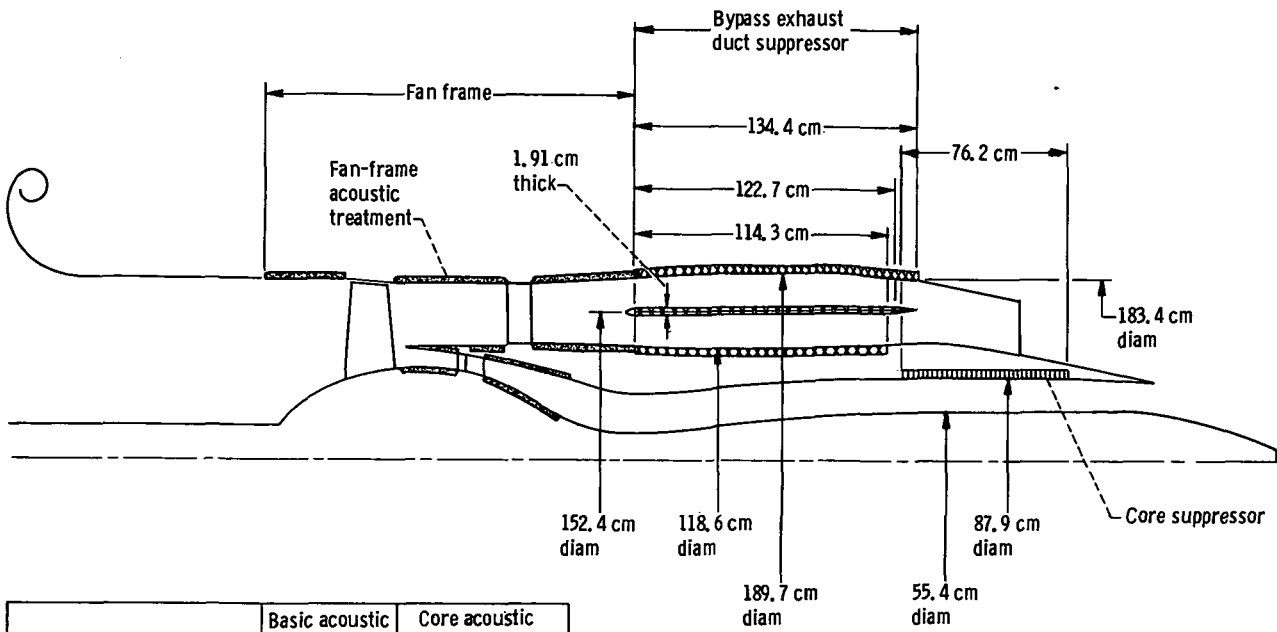
(d) Percent speed, 90; fan physical speed, 3157 rpm; fundamental blade passage frequency, 1368 hertz.

FREQUENCY	ANGLE, DEG															AVERAGE SPL	POWER LEVEL (PWL)
	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																
50	80.5	84.0	83.7	82.4	86.0	86.7	87.0	85.9	87.2	90.5	88.5	90.0	92.9	95.5	95.9	89.3	136.6
63	81.8	82.0	81.3	81.1	83.1	84.5	84.6	84.3	85.0	90.5	89.1	91.6	93.8	96.0	96.2	89.3	136.6
80	81.8	80.0	79.8	80.3	81.5	82.5	84.3	84.8	86.6	90.8	91.4	93.6	95.6	98.5	99.0	91.1	138.4
100	84.0	83.5	82.5	82.5	85.0	85.9	87.4	88.9	90.5	92.7	94.6	96.5	98.2	101.0	100.1	93.5	140.9
125	84.8	85.3	85.9	86.9	87.9	88.3	89.8	90.8	92.6	93.8	94.7	96.1	97.9	99.6	98.3	93.6	140.9
160	87.2	87.2	87.2	88.2	89.6	89.7	90.2	91.6	91.9	93.1	93.5	94.7	96.4	96.9	96.1	92.6	139.9
200	86.9	87.3	86.9	87.6	87.8	87.6	87.6	88.3	89.8	91.6	92.5	94.8	96.6	97.3	95.2	91.8	139.1
250	86.6	86.7	86.1	86.9	87.1	87.4	88.2	89.7	92.1	93.2	94.1	95.6	97.1	97.6	94.8	92.5	139.8
315	85.7	85.7	86.7	87.3	88.2	88.7	89.7	90.8	91.5	92.7	93.9	95.7	96.0	96.5	93.0	92.2	139.5
400	85.6	85.9	86.8	87.1	87.8	87.8	88.8	89.8	91.1	92.9	93.9	95.3	95.9	95.4	91.8	91.8	139.1
500	85.7	86.2	86.0	87.2	87.7	87.9	88.7	89.9	91.2	92.4	93.1	94.7	94.9	93.9	90.6	91.2	138.5
630	85.1	85.9	86.4	86.1	87.1	87.3	88.4	89.4	90.9	91.8	93.2	94.6	94.3	92.9	88.8	90.8	138.1
800	86.5	86.1	86.1	87.3	87.8	87.8	88.6	89.8	91.3	92.4	93.7	95.1	94.1	92.3	88.6	91.1	138.4
1000	86.6	86.5	86.5	87.5	88.1	88.0	88.8	89.8	91.1	92.5	94.2	95.3	94.1	92.6	88.7	91.4	138.7
1250	92.1	91.9	90.3	90.1	88.9	89.4	89.4	89.9	91.1	92.8	95.0	96.9	94.1	91.8	88.7	92.4	139.7
1600	87.9	87.4	86.6	86.9	87.3	86.9	88.3	89.0	90.0	91.3	92.7	93.8	91.8	89.8	86.7	90.2	137.5
2000	85.5	84.7	85.2	85.2	86.2	86.7	88.0	89.2	90.5	92.2	93.0	93.4	92.4	89.9	86.3	90.2	137.5
2500	89.2	87.7	86.8	86.4	86.3	85.9	87.4	88.8	89.9	93.6	96.6	96.4	92.8	89.3	85.7	91.9	139.2
3150	87.7	86.4	85.7	84.7	85.0	84.7	86.2	87.7	88.8	91.7	93.8	94.2	92.5	89.3	85.6	90.3	137.6
4000	89.3	88.1	87.1	85.6	85.4	84.6	85.4	86.6	87.9	90.9	92.1	92.2	89.9	87.6	84.2	89.4	136.7
5000	89.9	89.6	88.6	86.8	87.1	85.8	86.9	87.9	89.1	92.1	92.5	92.4	90.6	87.9	84.2	90.6	137.9
6300	90.5	90.7	91.0	89.2	89.7	88.5	88.2	89.7	89.3	91.8	91.3	90.8	89.7	87.3	84.7	91.5	138.8
8000	90.6	89.7	89.4	87.2	87.5	86.0	86.2	86.9	87.6	89.9	90.1	89.6	88.2	86.1	83.2	90.5	137.8
10000	89.9	89.2	88.2	85.9	86.2	83.8	85.0	85.8	87.0	89.9	89.7	89.5	87.7	84.8	81.5	90.8	138.1
12500	91.1	91.2	90.2	87.7	87.0	83.8	85.0	85.8	87.1	89.4	88.8	88.9	87.1	83.7	80.5	92.5	139.8
16000	93.1	93.1	93.3	90.3	88.6	85.1	84.8	85.5	86.6	88.8	88.2	87.1	86.3	82.6	79.4	95.2	142.5
20000	86.3	86.1	86.0	83.7	82.7	80.6	82.7	83.2	84.6	86.9	86.2	84.9	86.7	80.6	77.2	93.8	141.1
OVERALL	102.5	102.2	101.9	101.1	101.5	101.1	101.9	102.9	104.2	106.1	107.2	108.3	108.4	108.8	107.3	106.1	153.4
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																
61 METERS	95.6	99.2	101.5	102.7	104.5	104.9	106.3	107.6	108.6	110.8	111.7	111.0	107.8	103.6	96.5		
305 METERS	73.4	78.6	81.7	84.0	86.0	86.9	88.6	90.0	91.0	93.0	93.8	92.8	89.1	85.2	77.7		



CD-10988-11

Figure 1. - Cutaway view of fan assembly.



	Basic acoustic treatment		Core acoustic treatment
	Walls	Splitter	
Facing sheet thickness, cm	0.051	0.051	0.076
Hole diam, cm	0.127	0.127	0.318
Open area, percent	8	4.5	23
Hexagonal cell honeycomb thickness (nominal), cm	0.95	0.95	----------
Material	-----	-----	Scottfelt # SF3-900
Backing depth, cm	3.71	0.787	5.08

Figure 2. - Arrangement of flow passages and sound-absorbing surfaces.

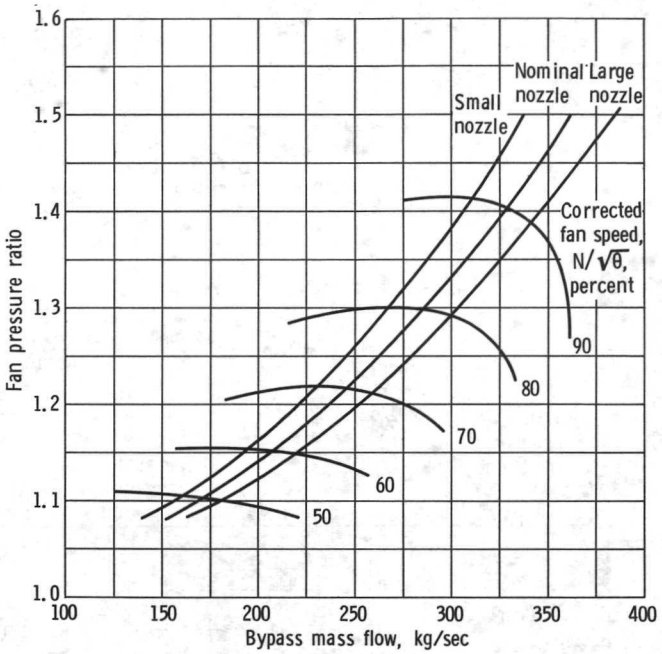


Figure 3. - Fan performance map for acoustical tests.

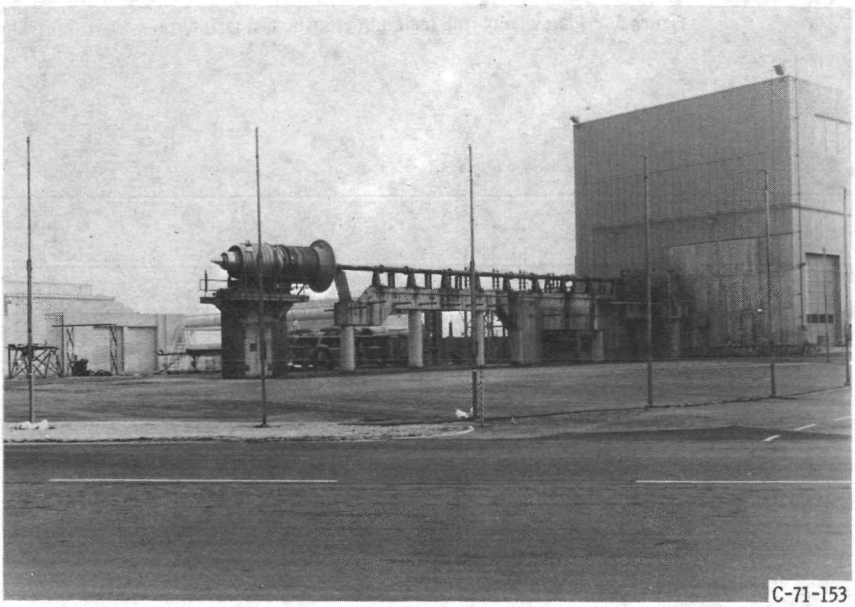


Figure 4. - Fill-scale-fan acoustic test facility.

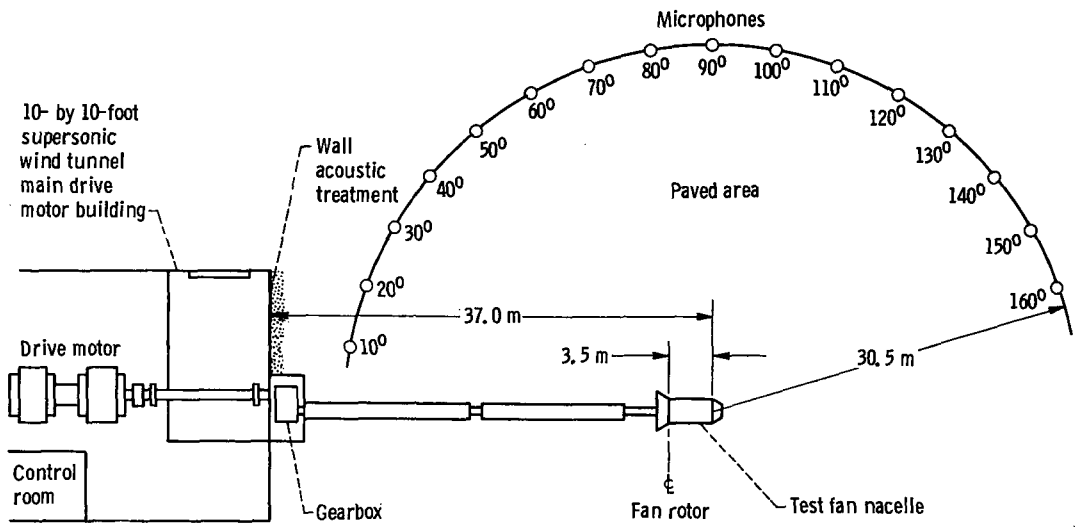
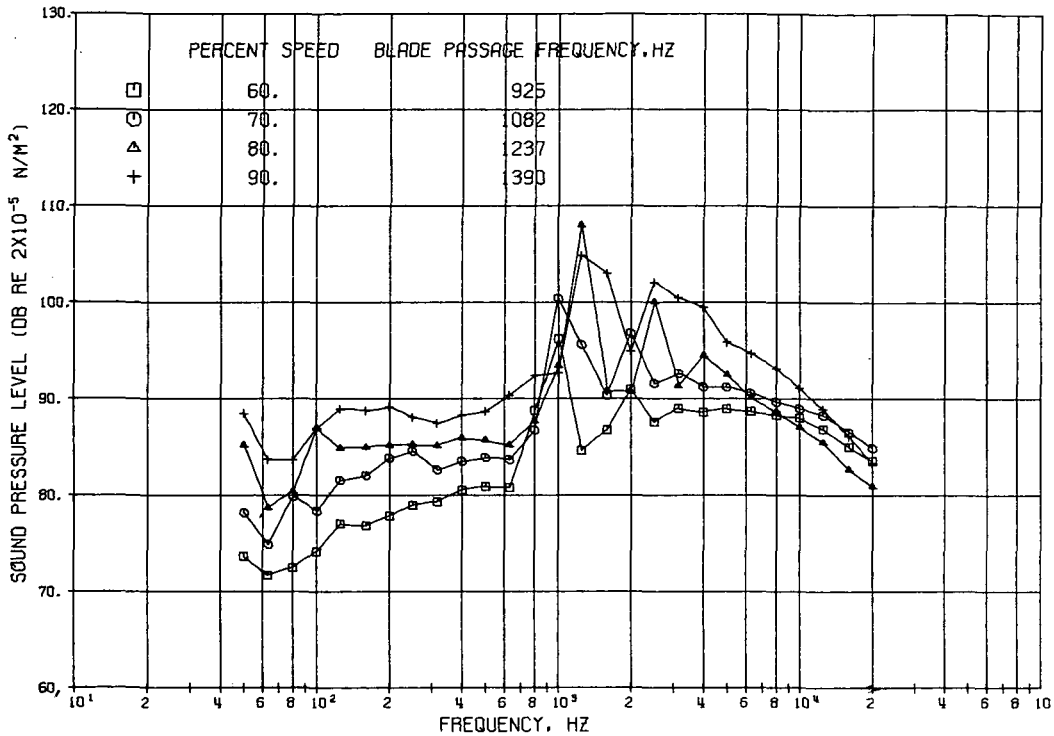
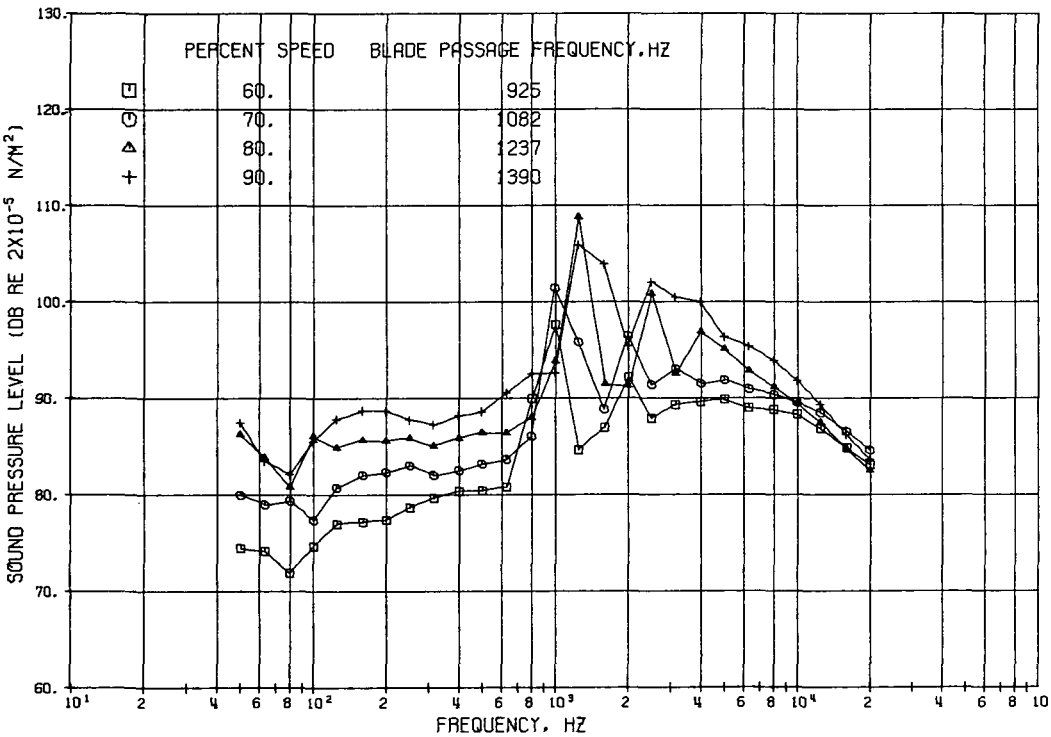


Figure 5. - Plan view of full-scale-fan acoustic test facility.

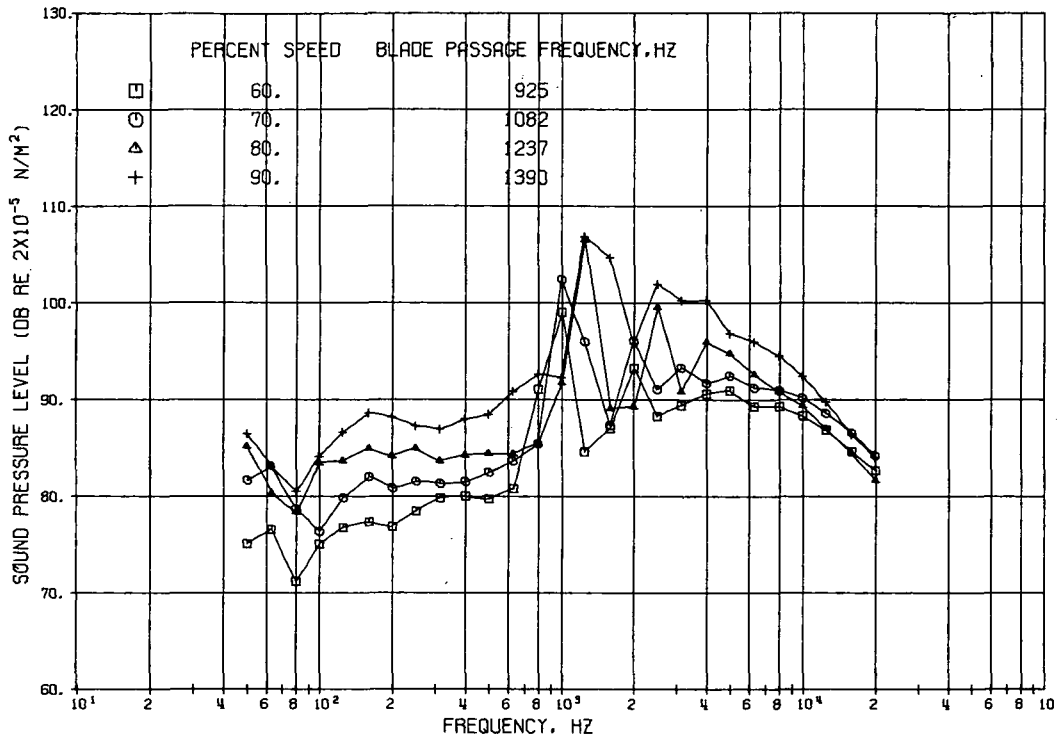


(a) 10^{0}.

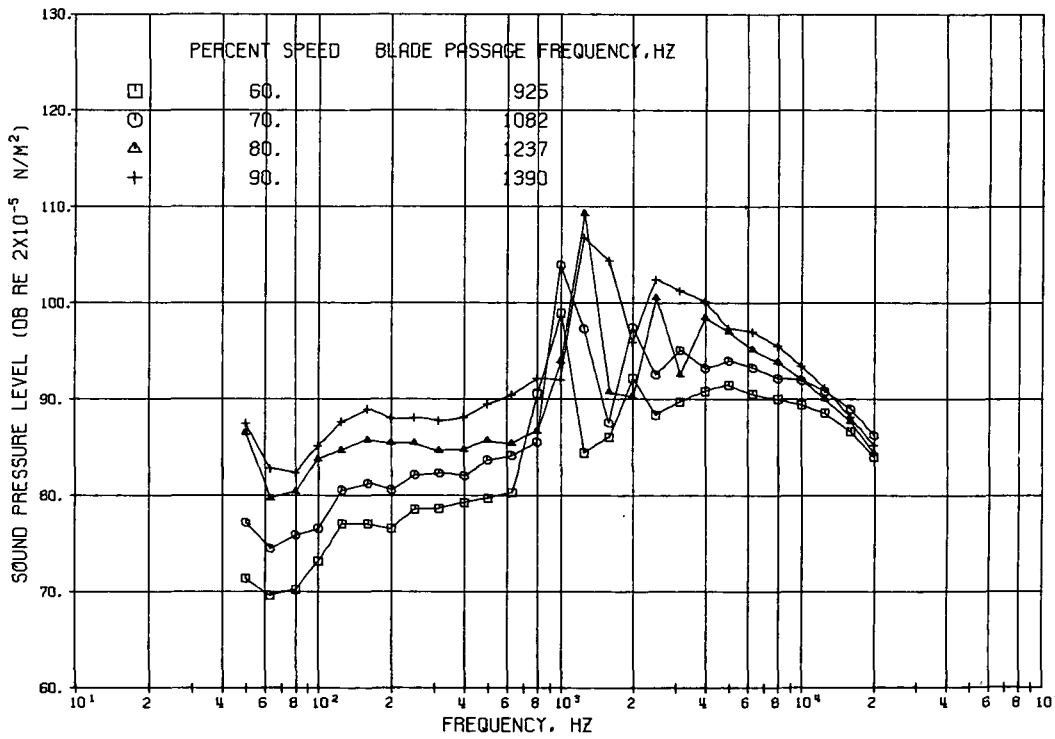


(b) 20^{0}.

Figure 6. - Standard-day 1/3-octave band spectra on 30.5-meter radius at each angle. Configuration 106: hard inlet, soft fan frame, hard exhaust, and nominal nozzle.

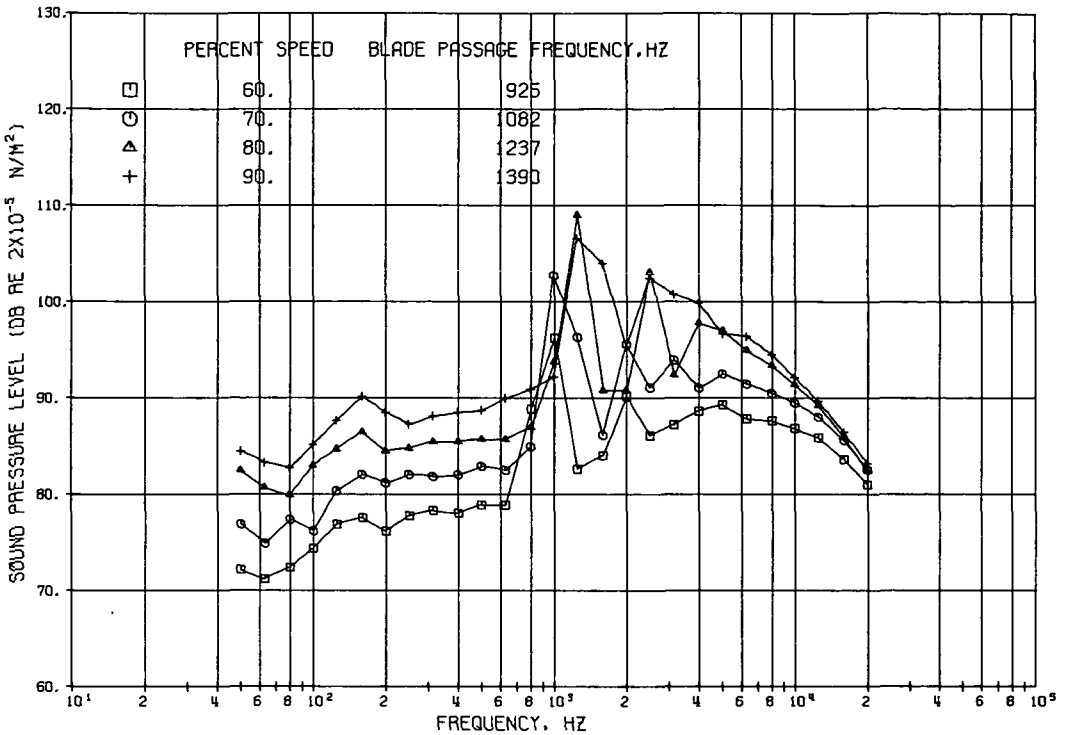


(c) 30°

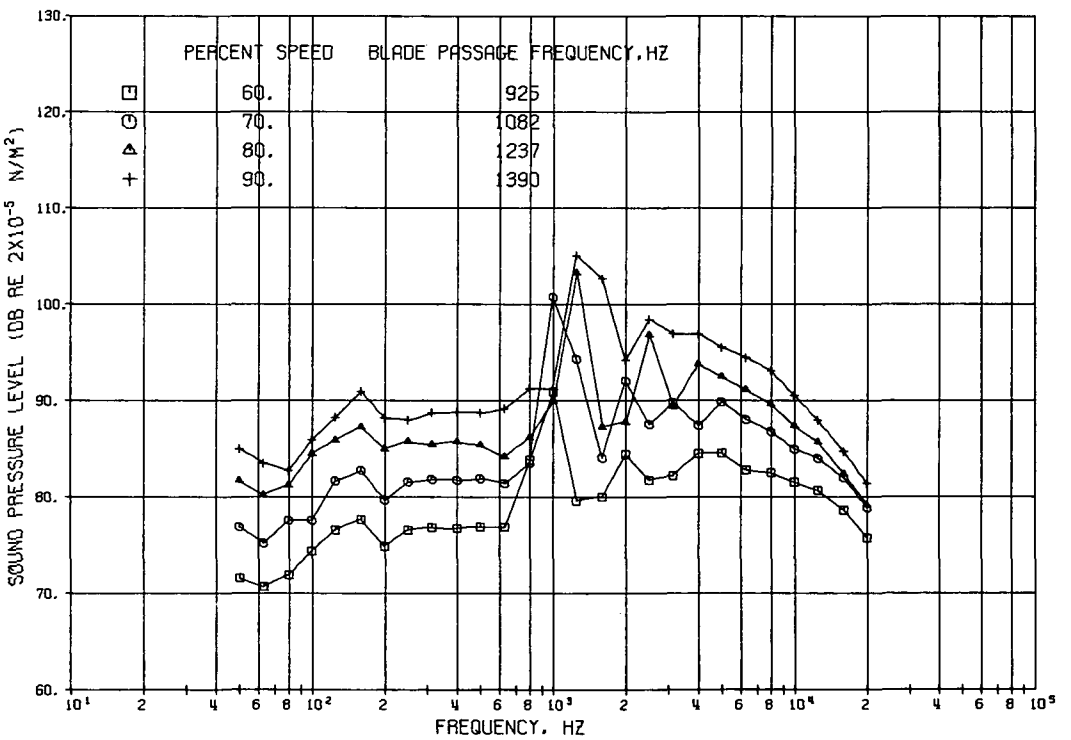


(d) 40°.

Figure 6. - Continued.

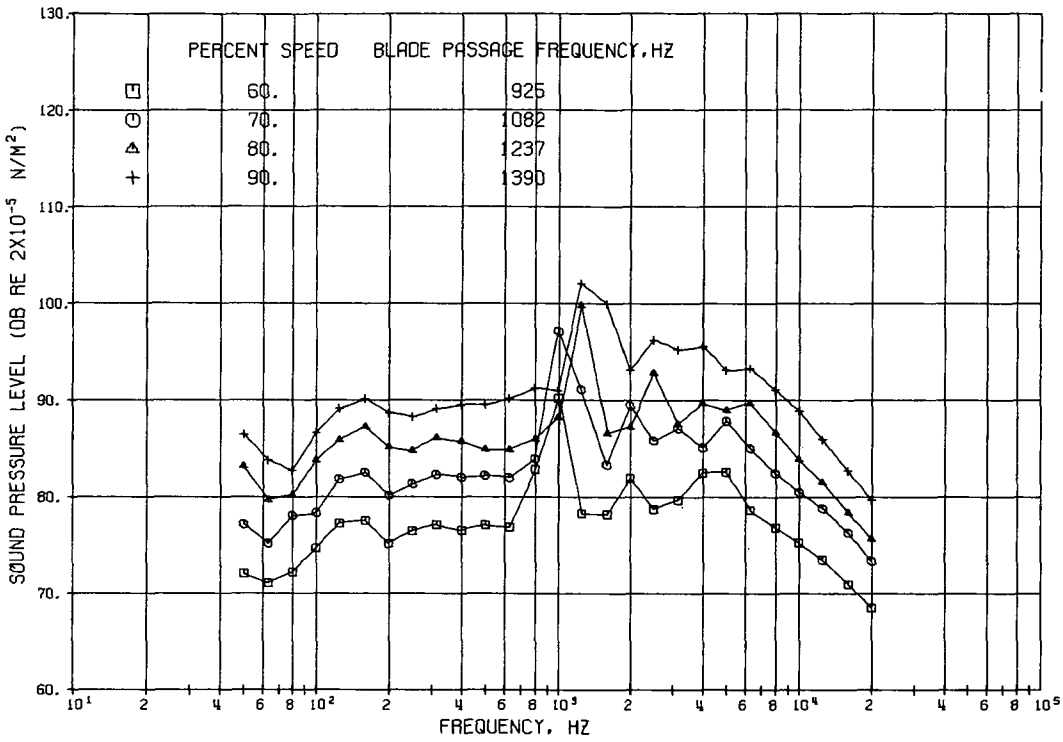


(e) 50°.

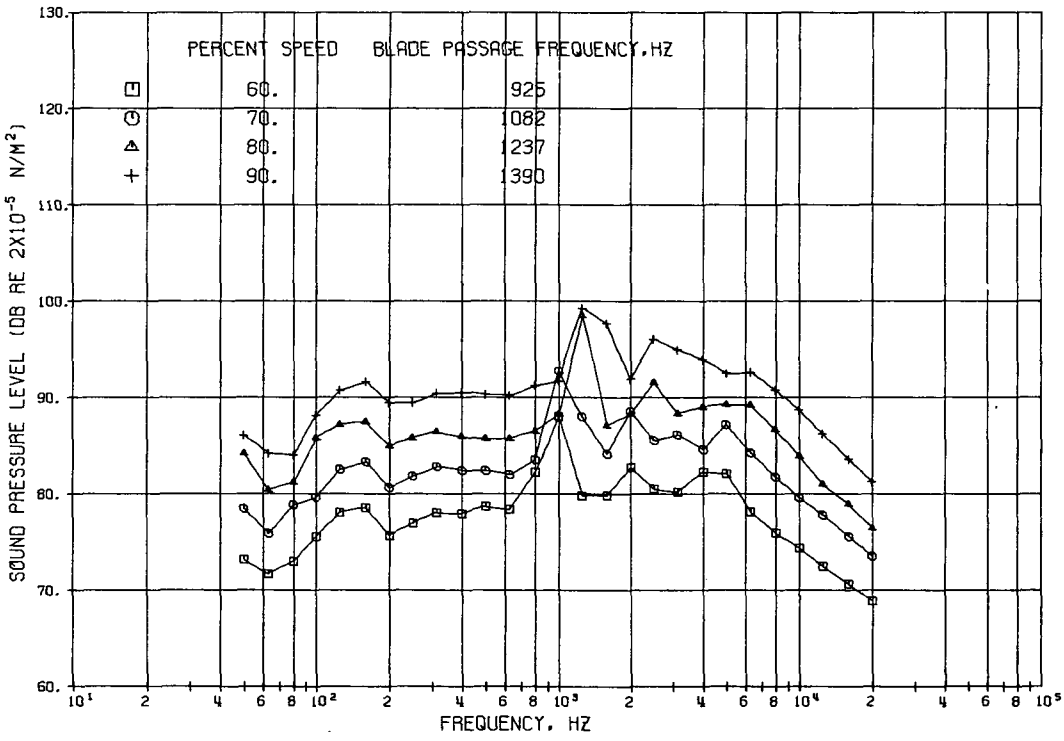


(f) 60°.

Figure 6. - Continued.

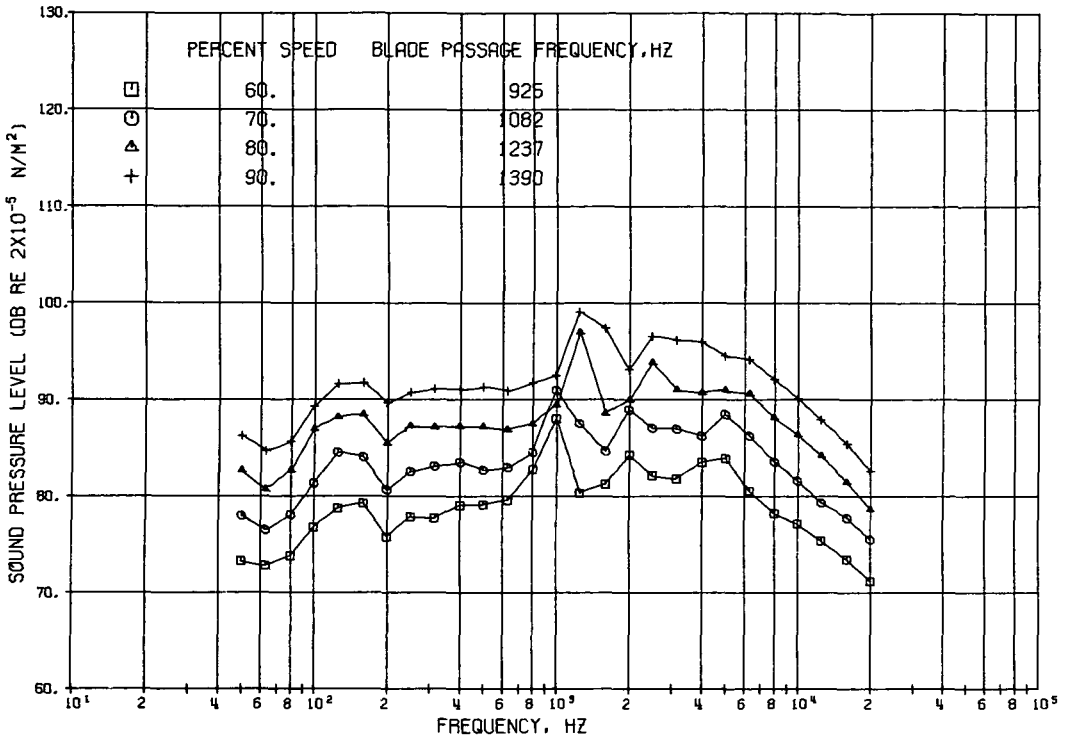


(g) 70°.

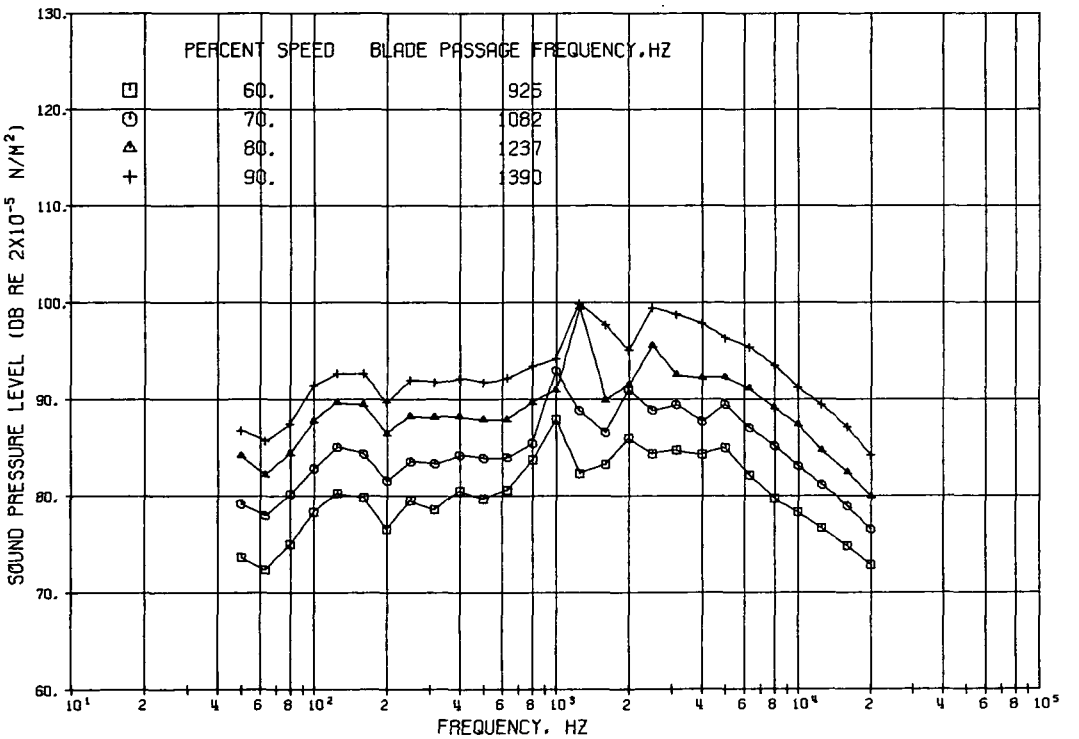


(h) 80°.

Figure 6. - Continued.

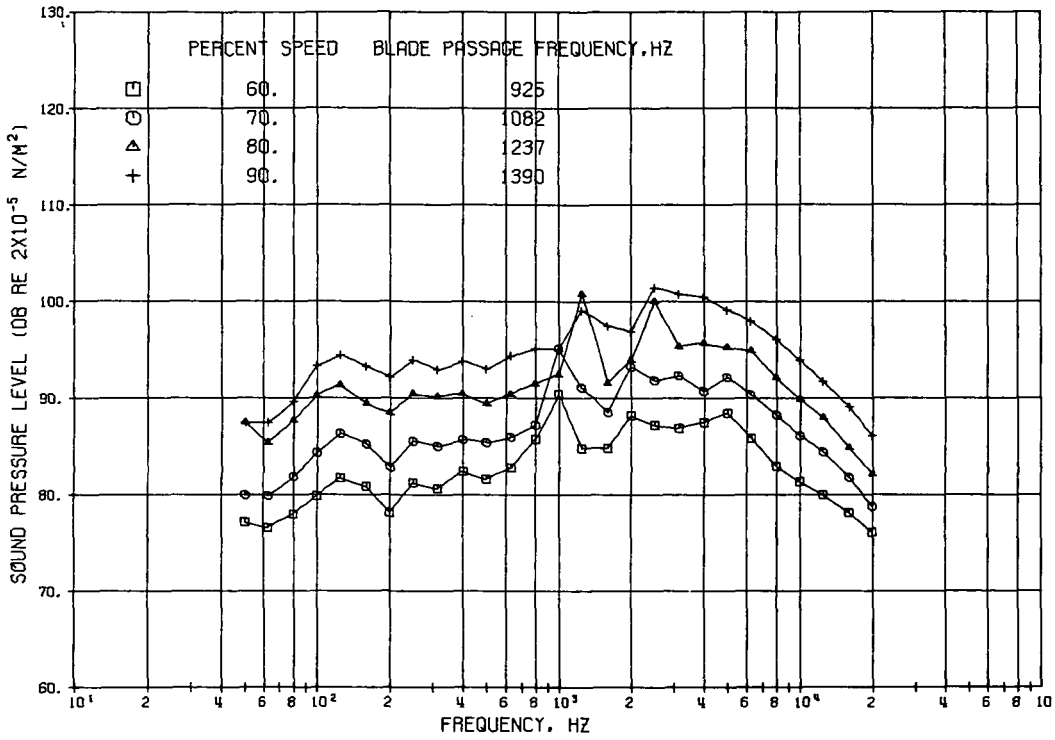


(i) 90°.

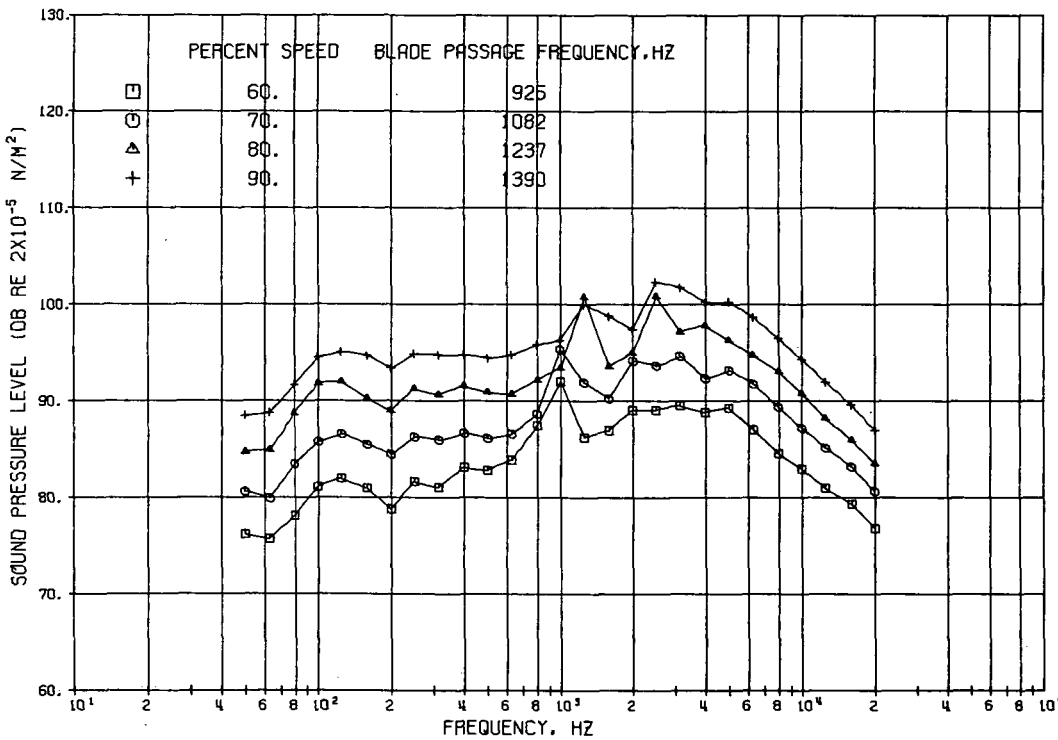


(j) 100°.

Figure 6. - Continued.

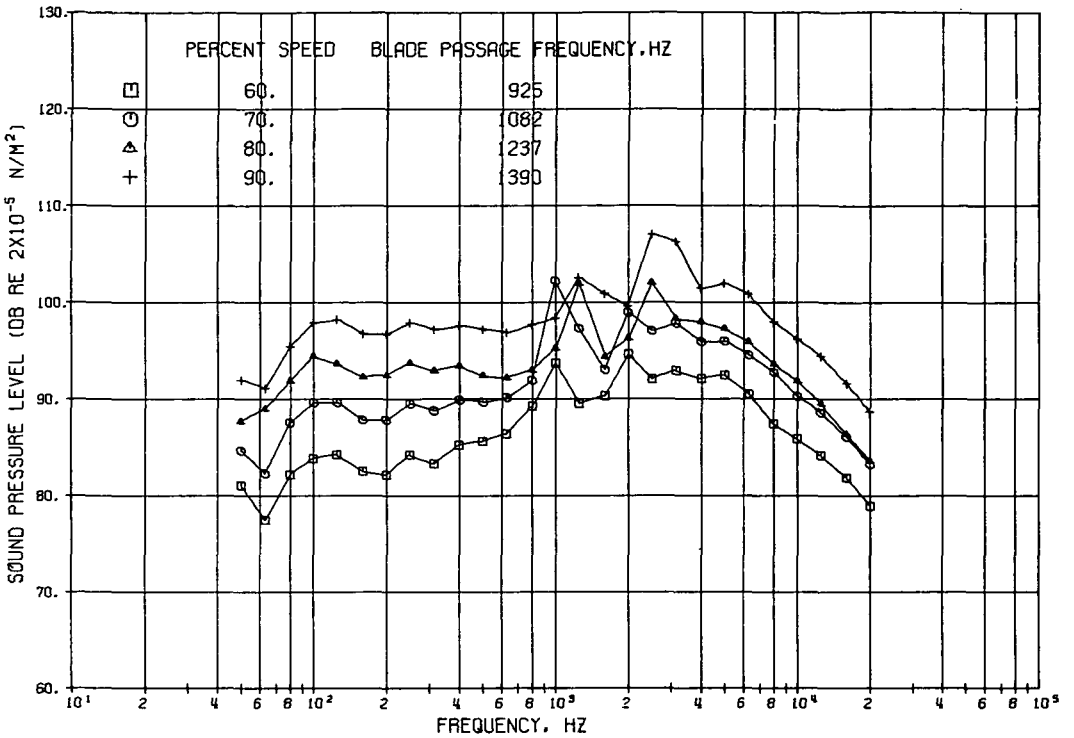


(k) 110^0.

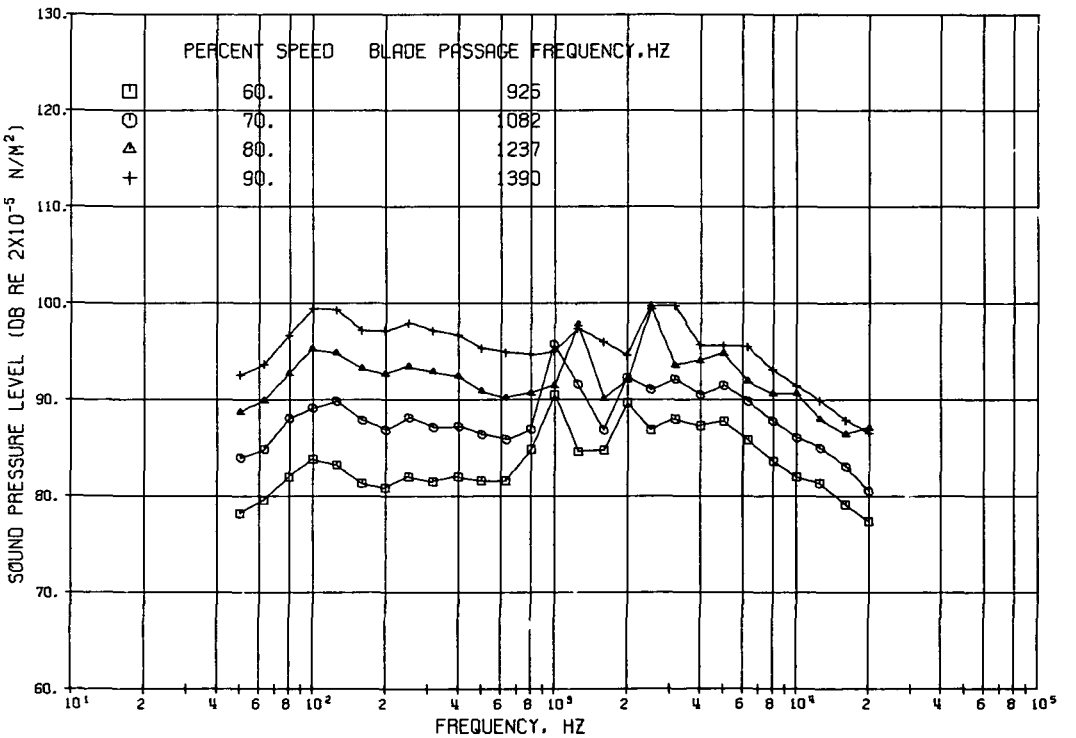


(l) 120^0.

Figure 6. - Continued.

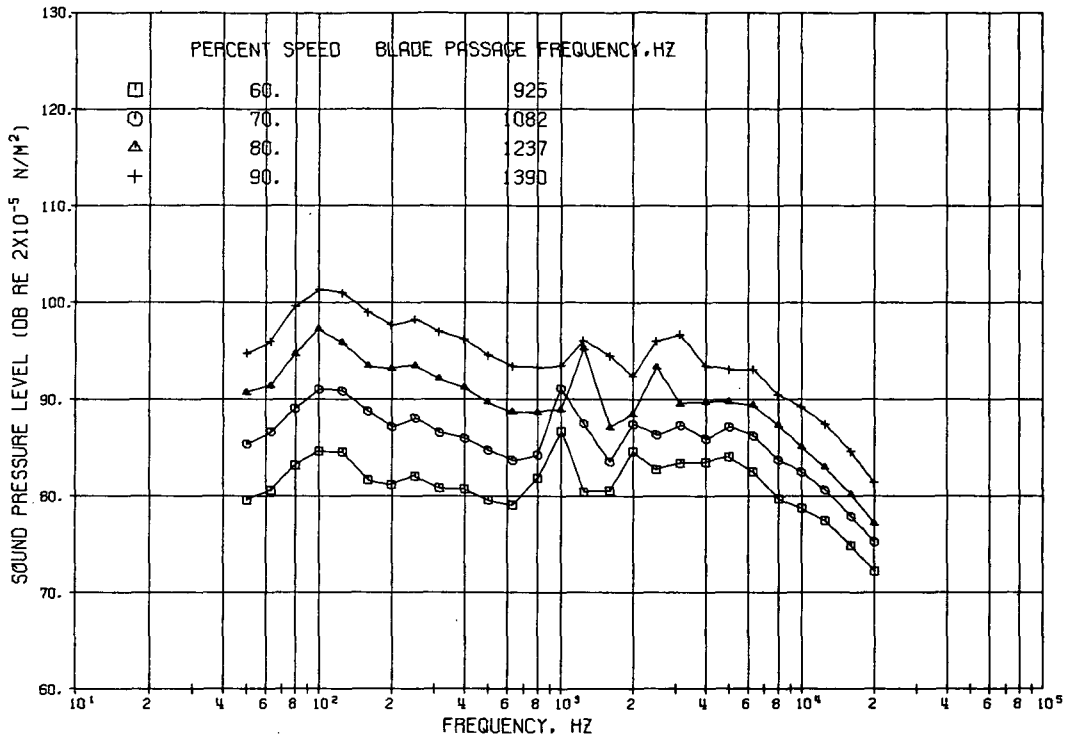


(m) 130°.

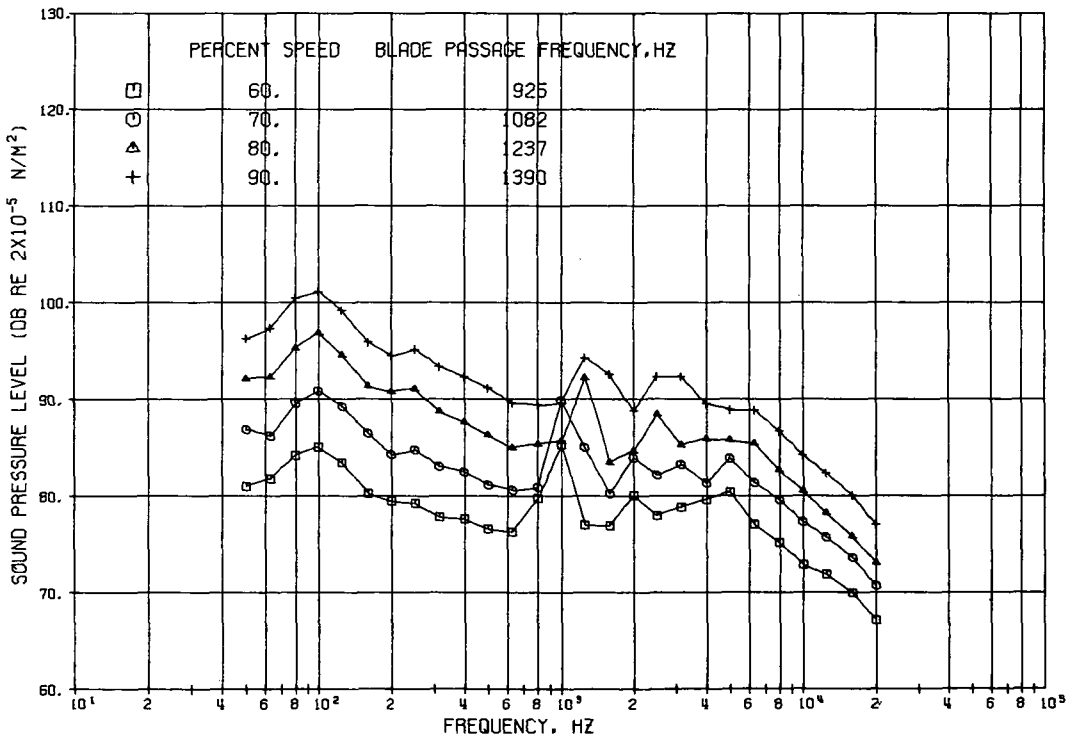


(n) 140°.

Figure 6. - Continued.

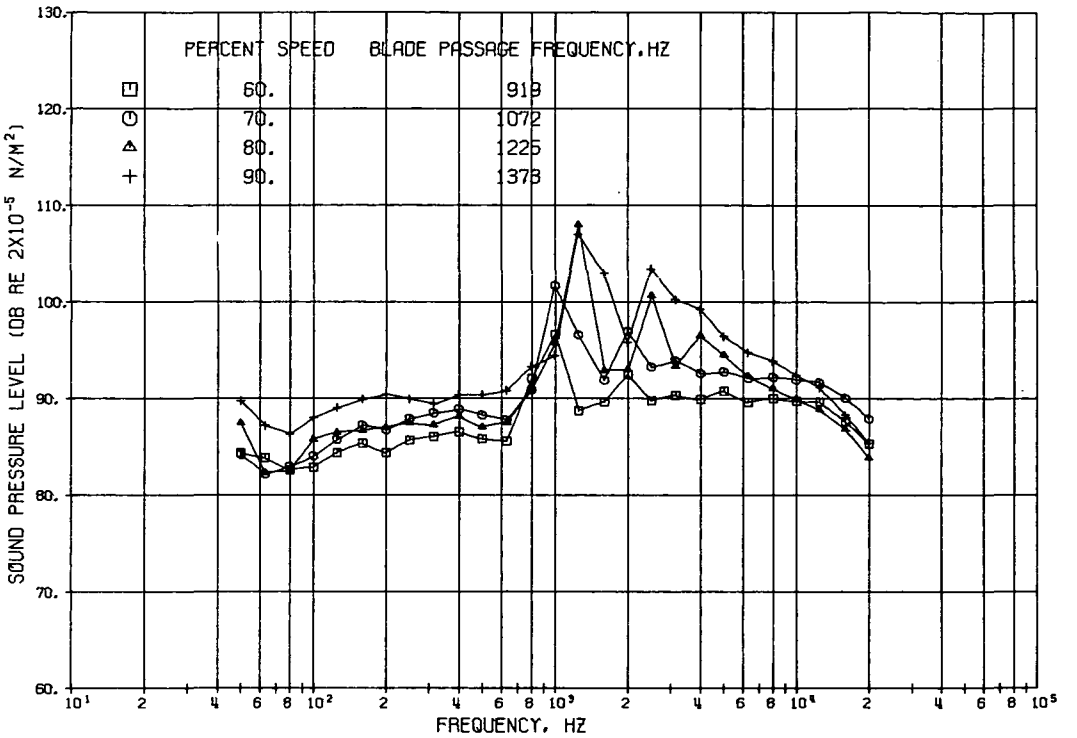


(o) 150°.

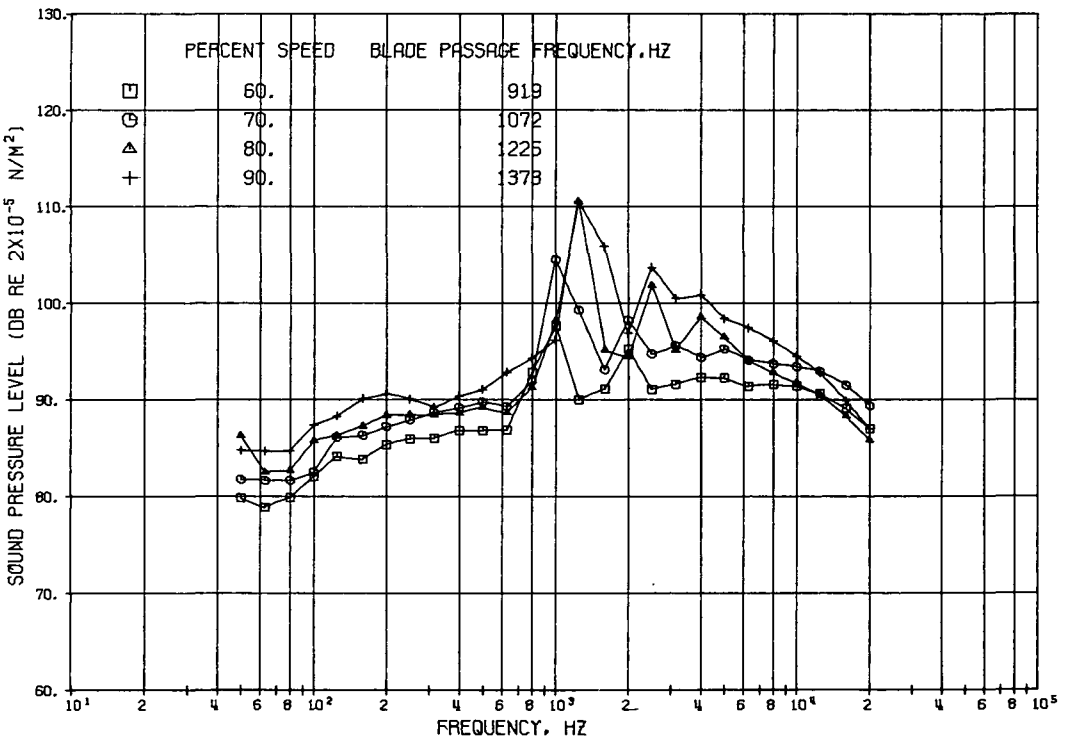


(p) 160°.

Figure 6. - Concluded.

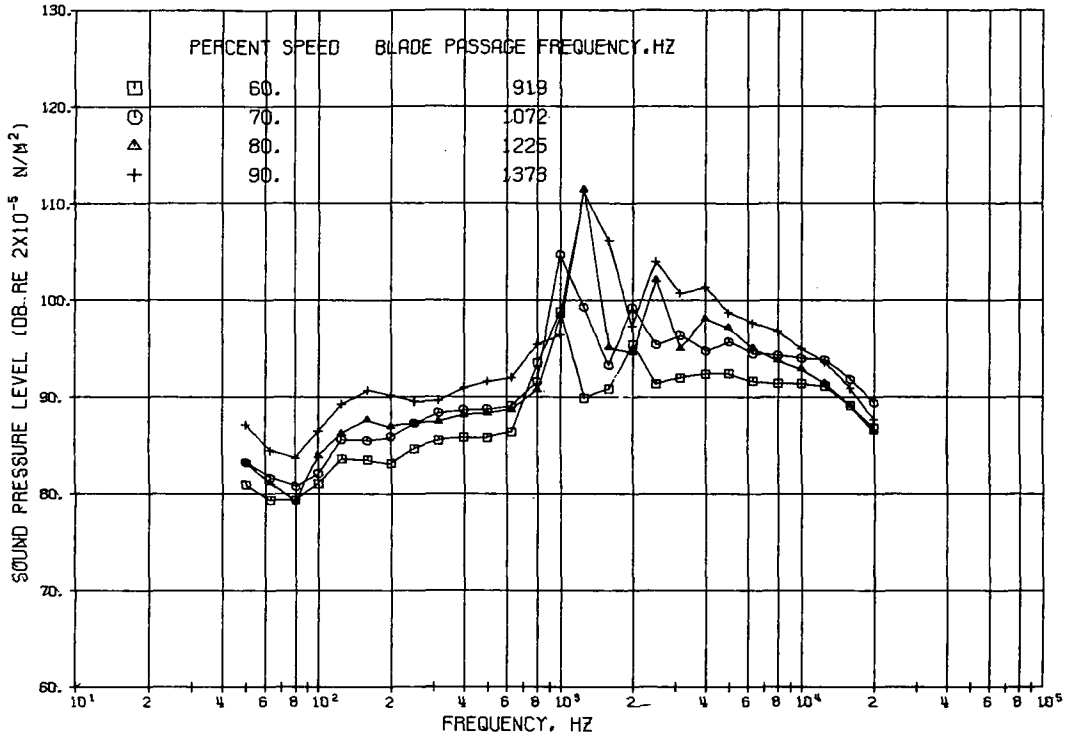


(a) 10^0.

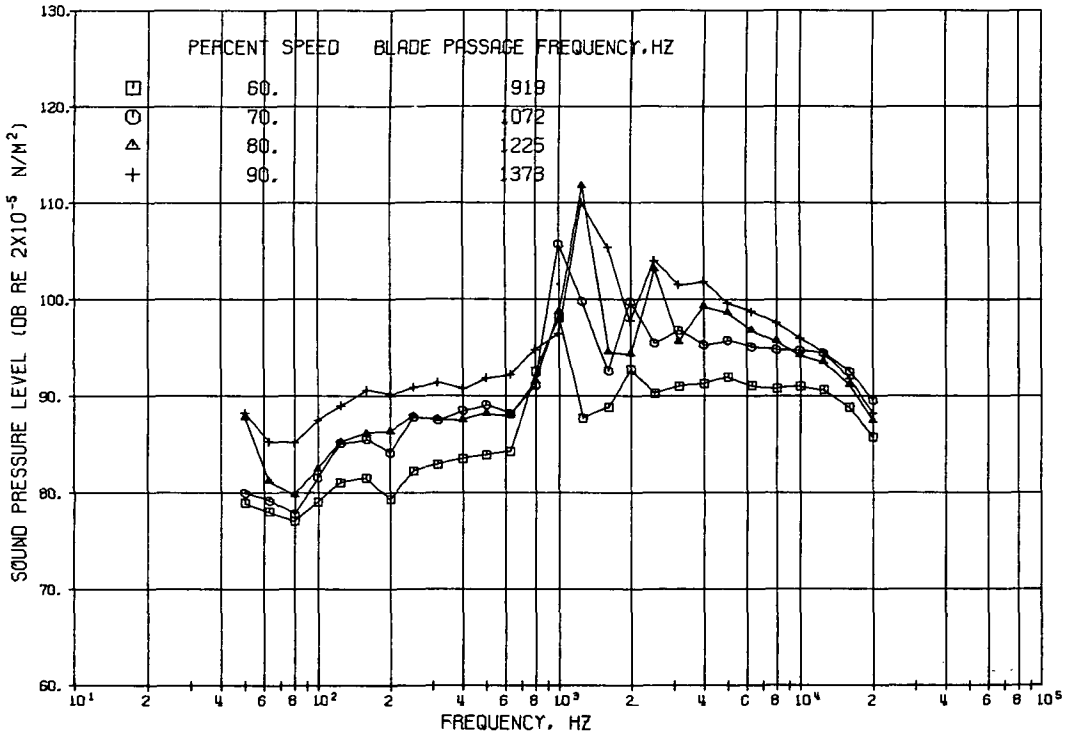


(b) 20^0.

Figure 7. - Standard-day 1/3-octave band spectra on 30.5-meter radius at each angle. Configuration 109: hard inlet, soft fan frame, exhaust suppressor, nominal nozzle.

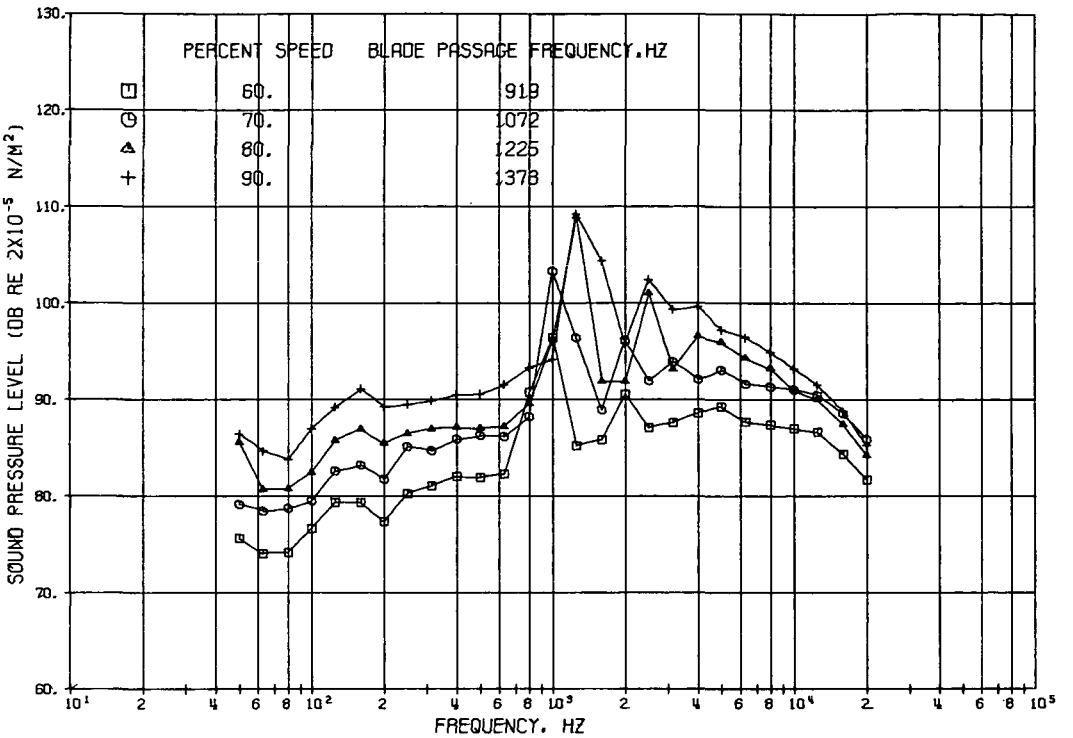


(c) 30°.

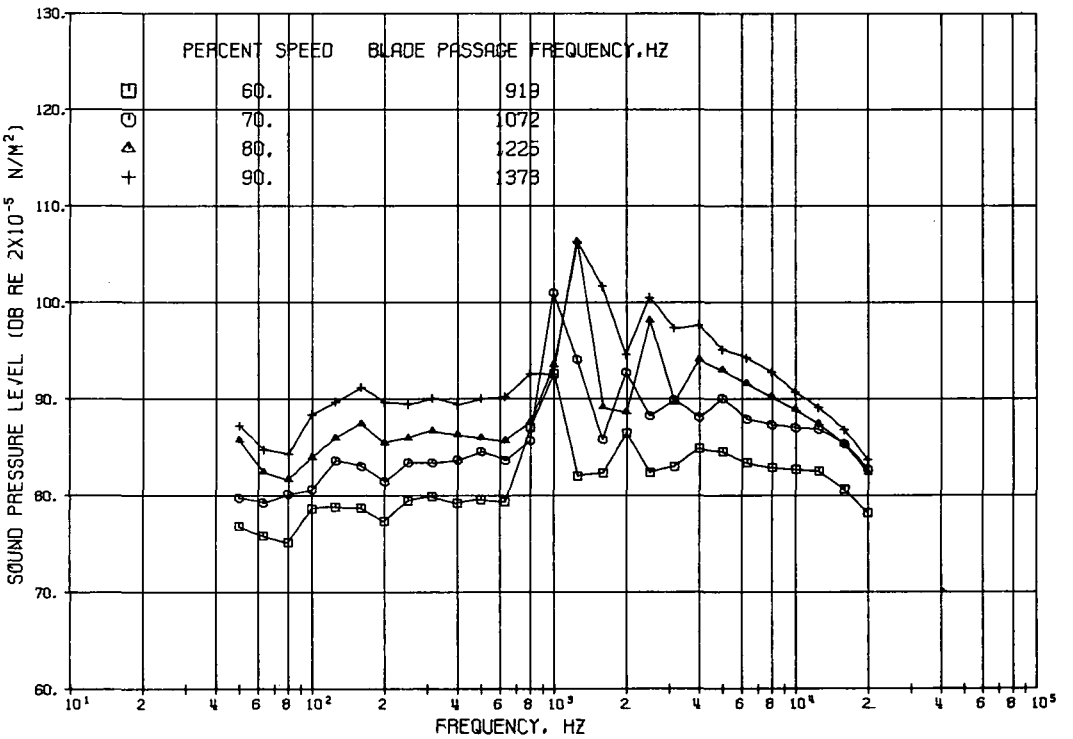


(d) 40°.

Figure 7. - Continued.

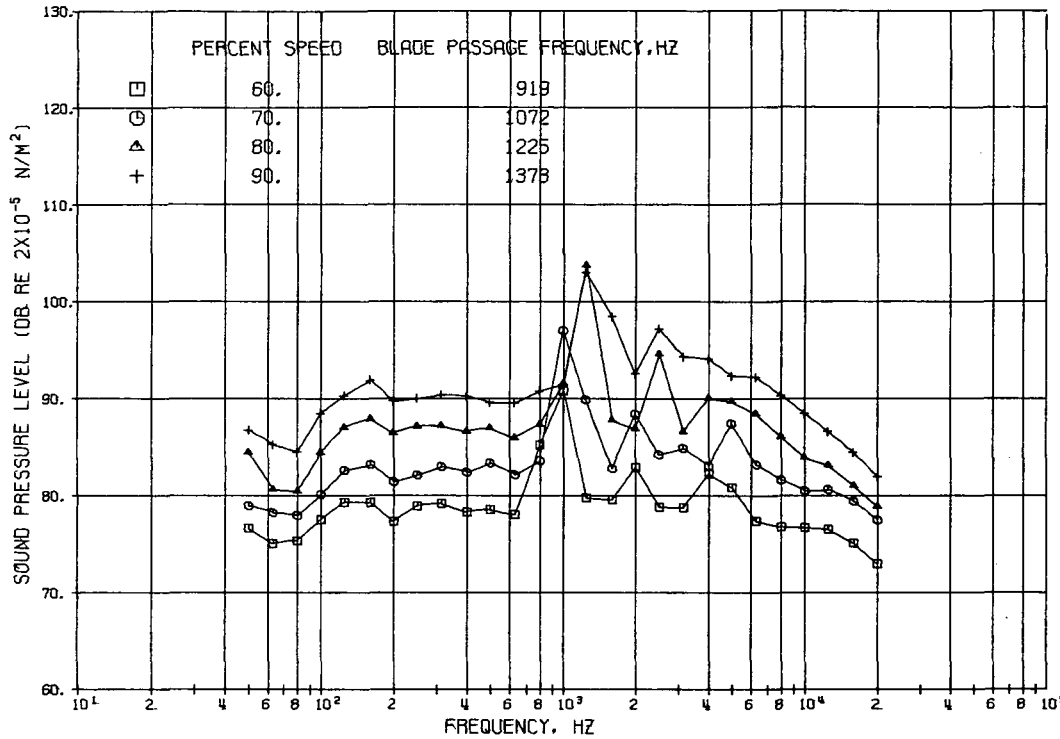


(e) 50°.

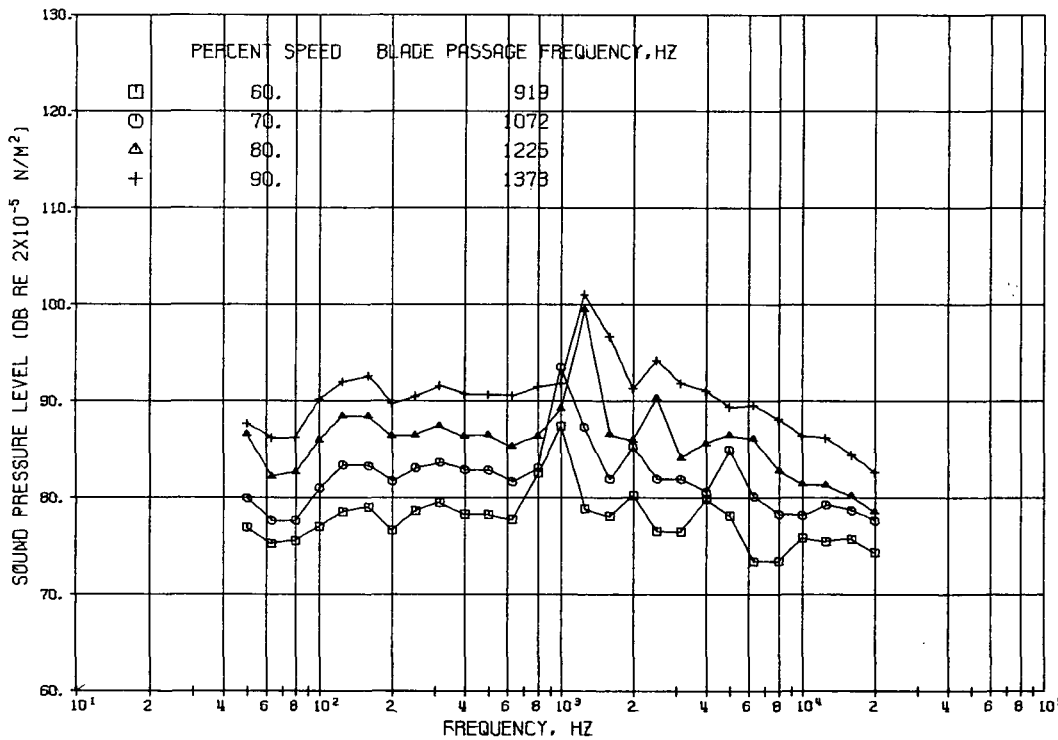


(f) 60°.

Figure 7. - Continued.

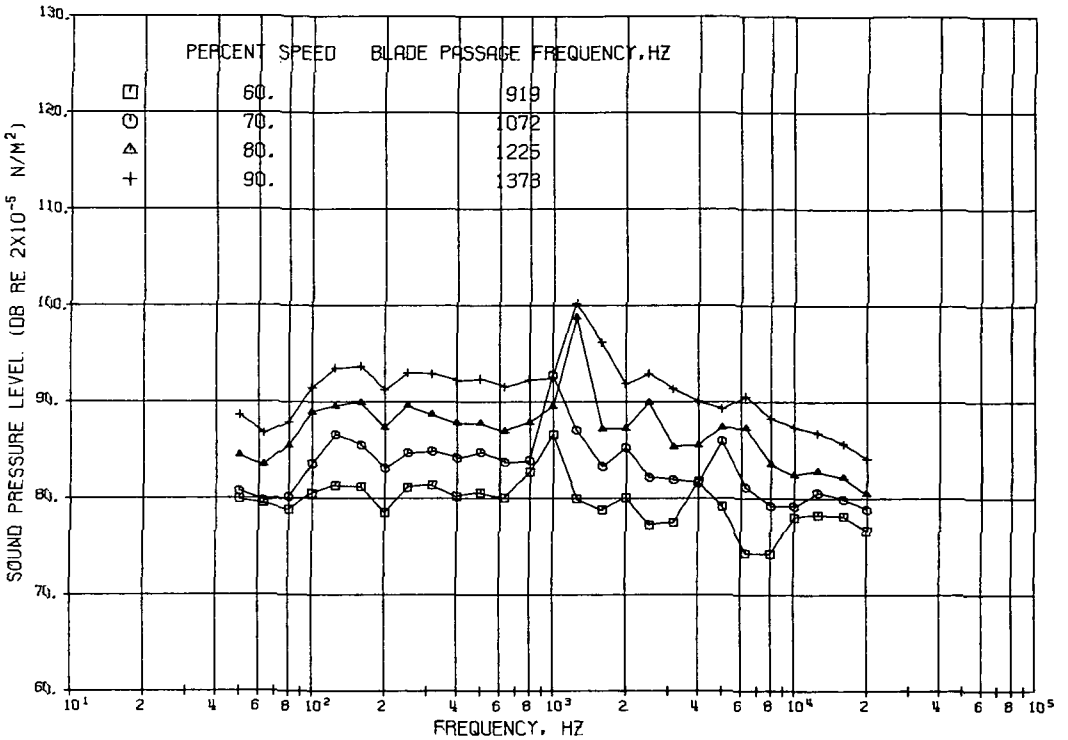


(g) 70^0.

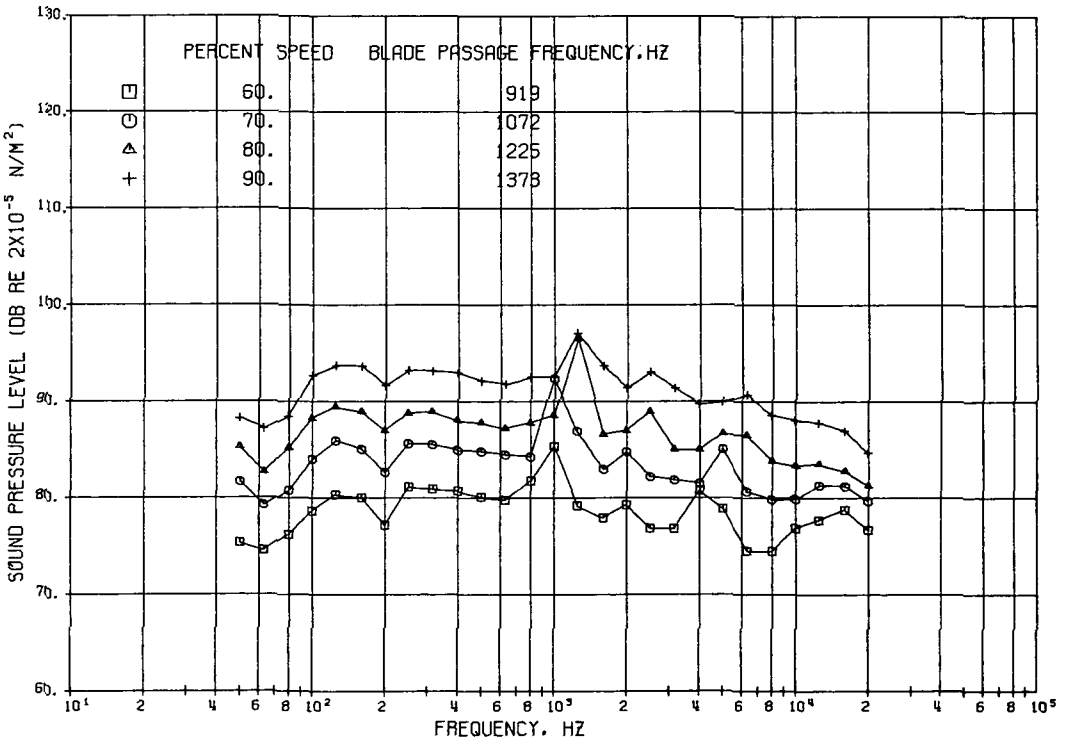


(h) 80^0.

Figure 7. - Continued.

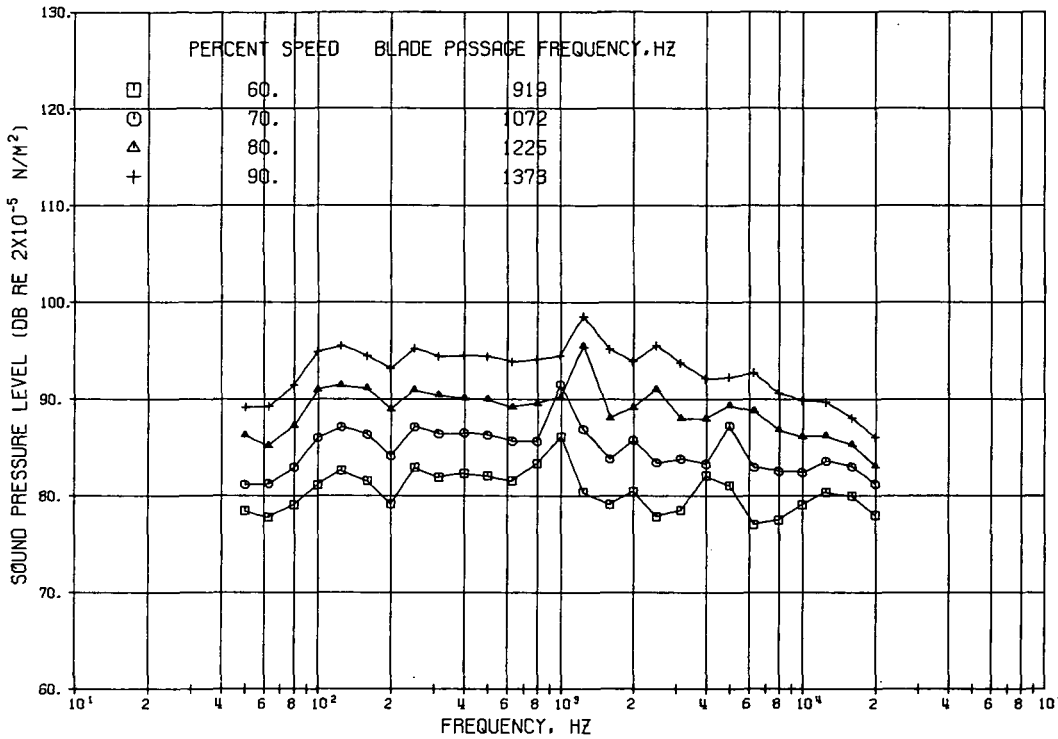


(i) 90°.

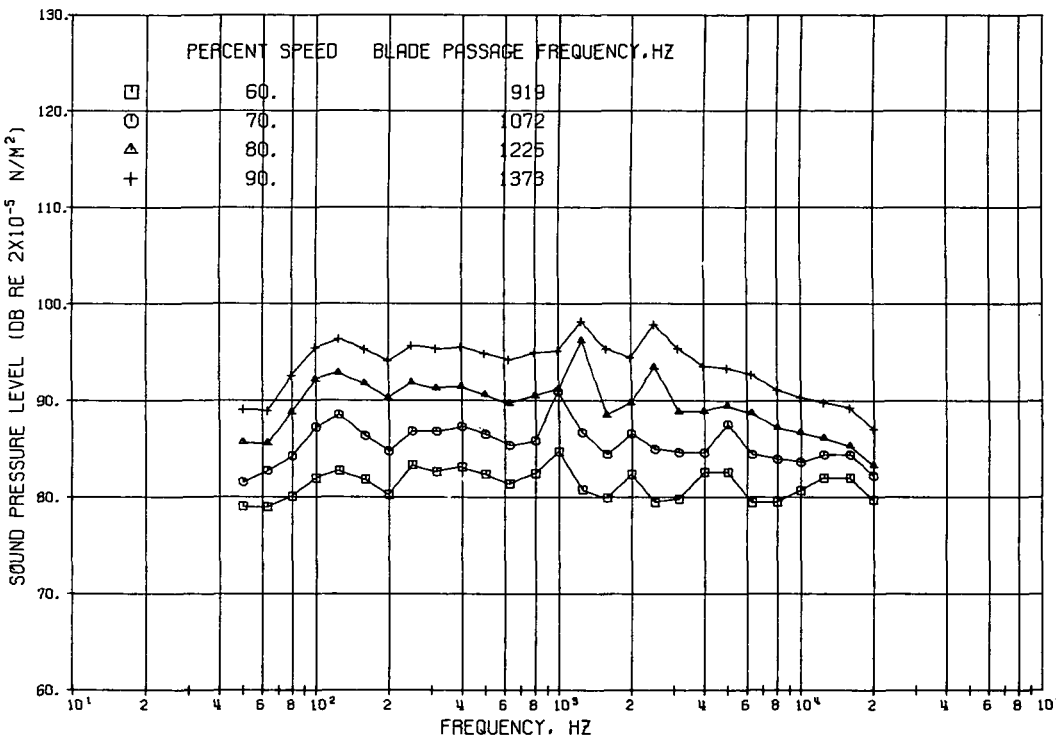


(j) 100°.

Figure 7. - Continued.

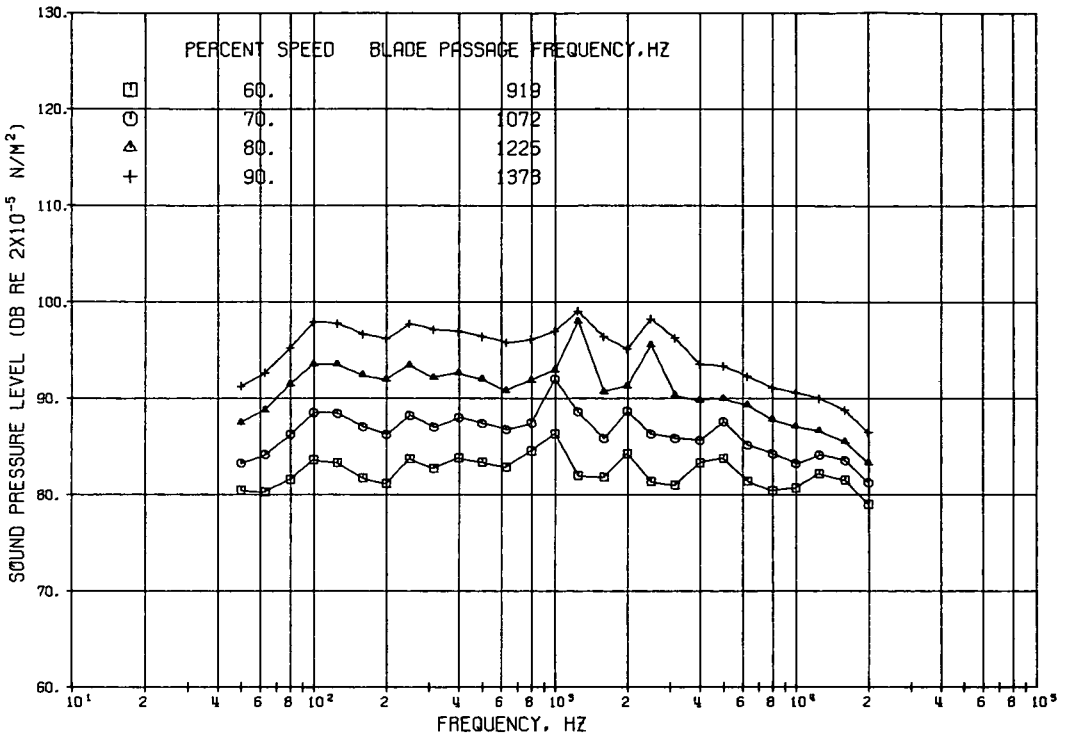


(k) 110°.

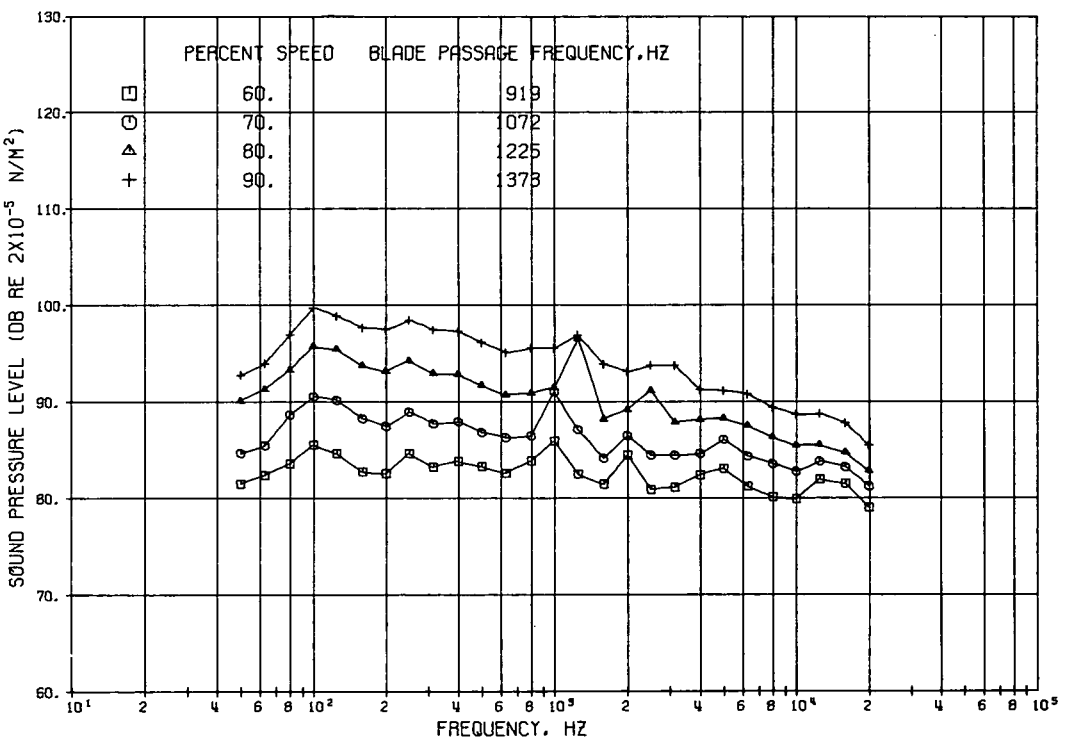


(l) 120°.

Figure 7. - Continued.

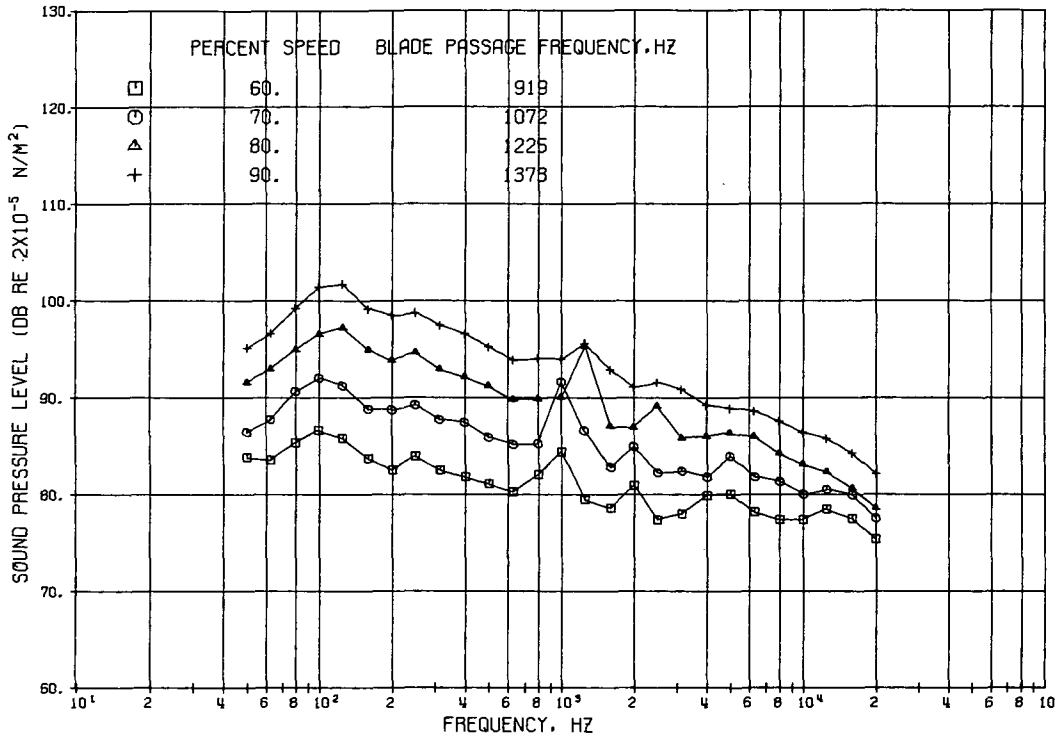


(m) 130°.

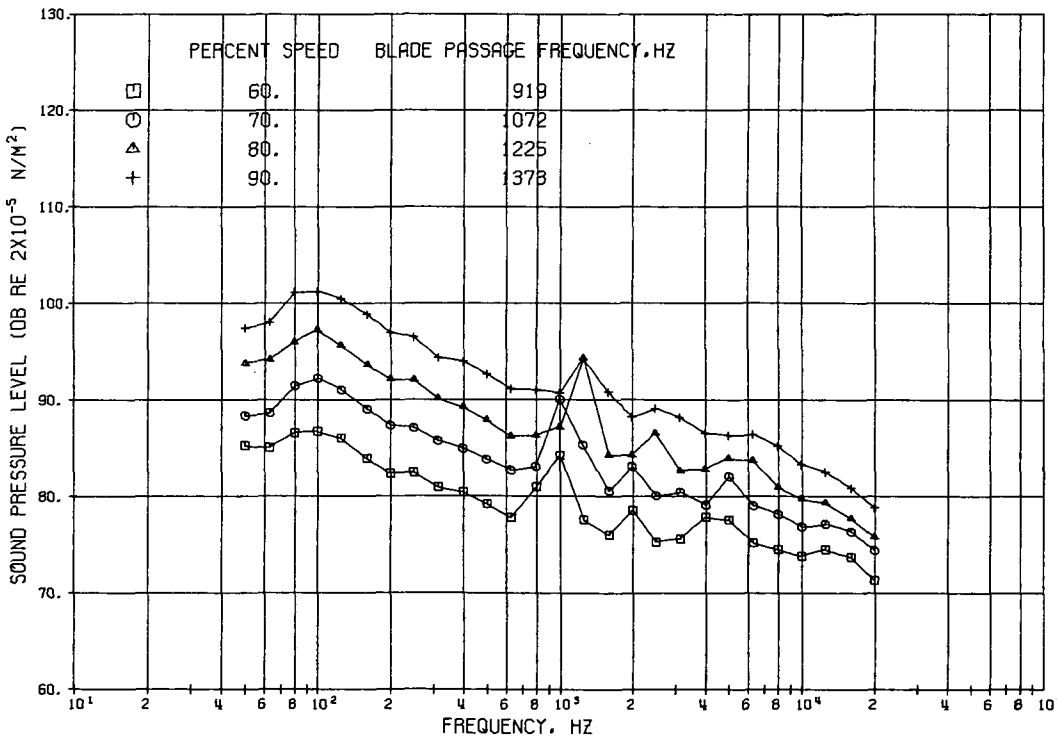


(n) 140°.

Figure 7. - Continued.

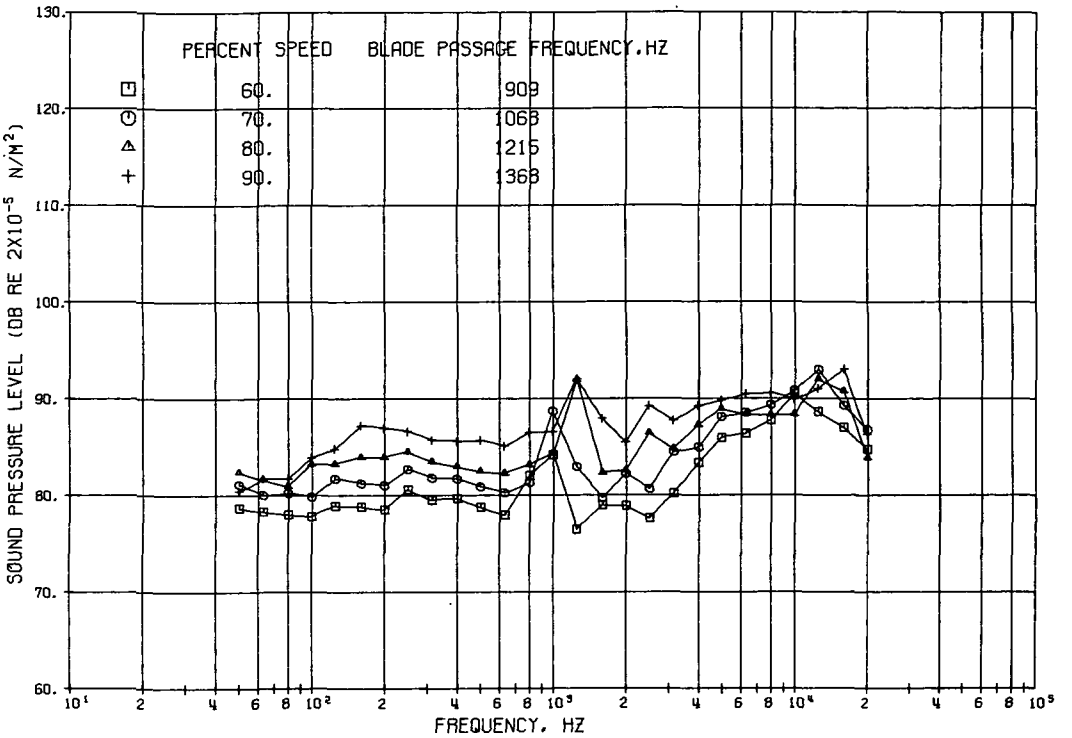


(o) 150°.

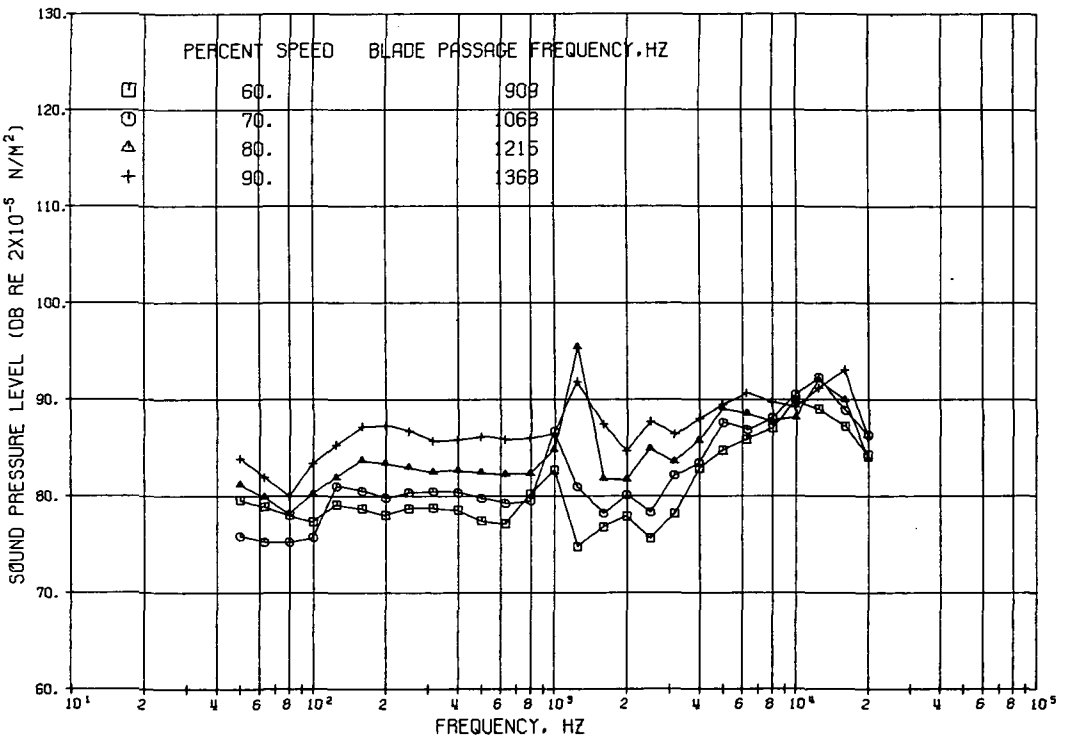


(p) 160°.

Figure 7. - Concluded.

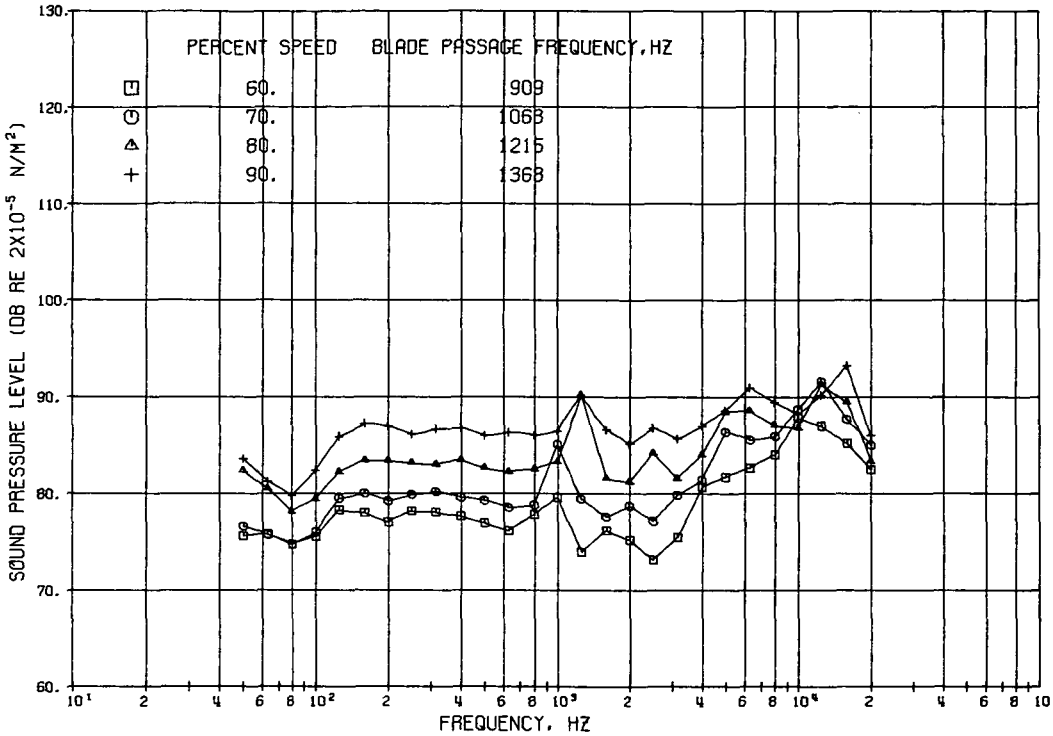


(a) 20°.

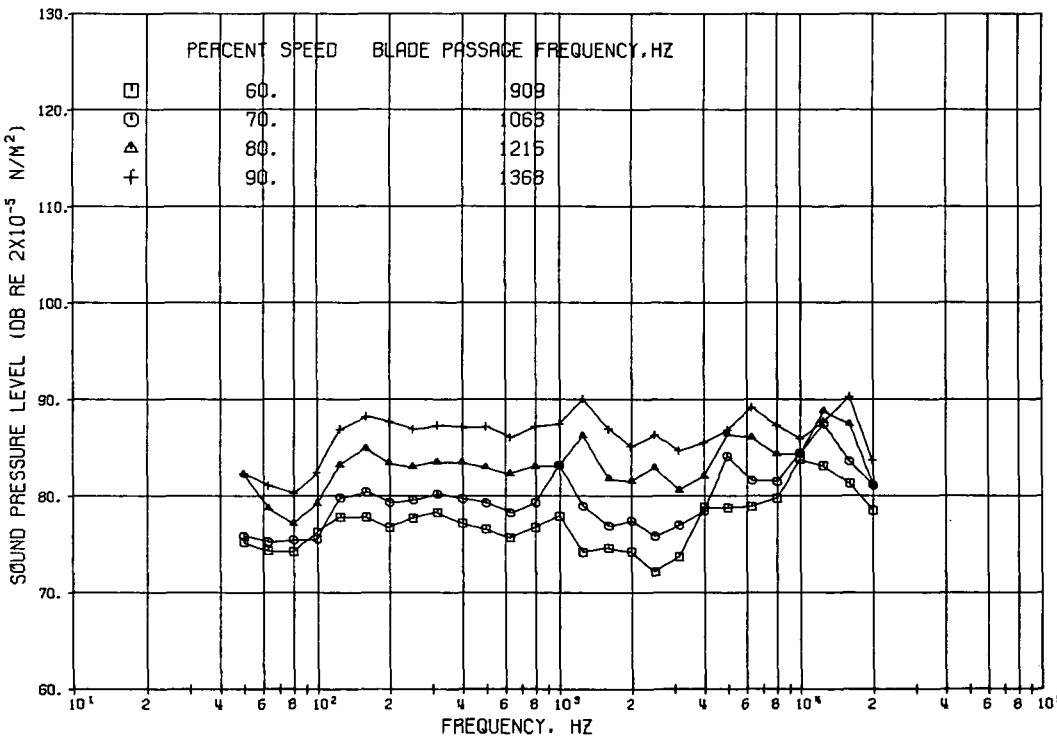


(b) 30°.

Figure 8. - Standard-day 1/3-octave band spectra on 30.5-meter radius at each angle. Configuration 110: Inlet suppressor, soft fan frame, exhaust suppressor, nominal nozzle.

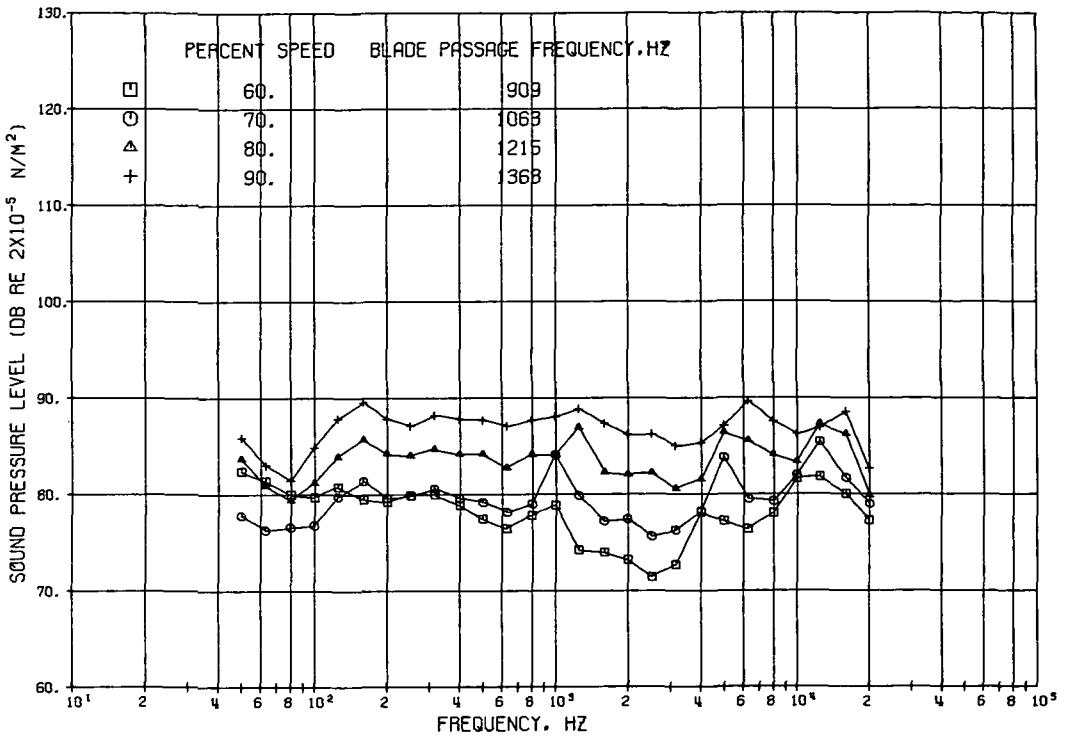


(c) 40°.

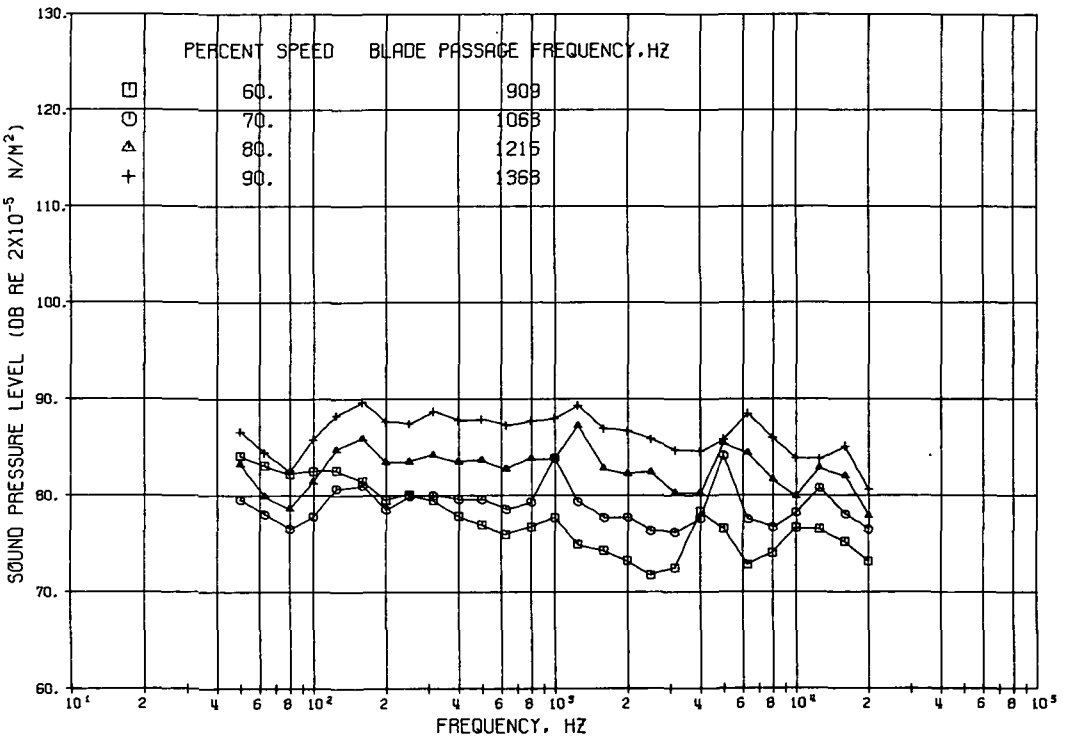


(d) 50°.

Figure 8. - Continued.

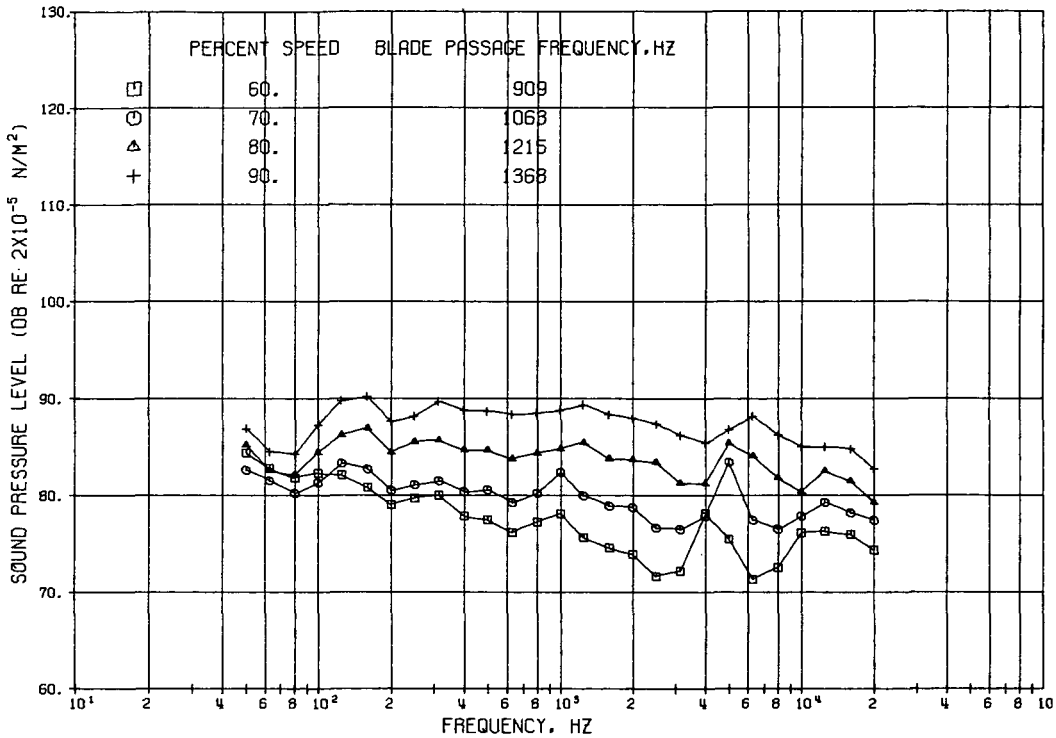


(e) 60°.

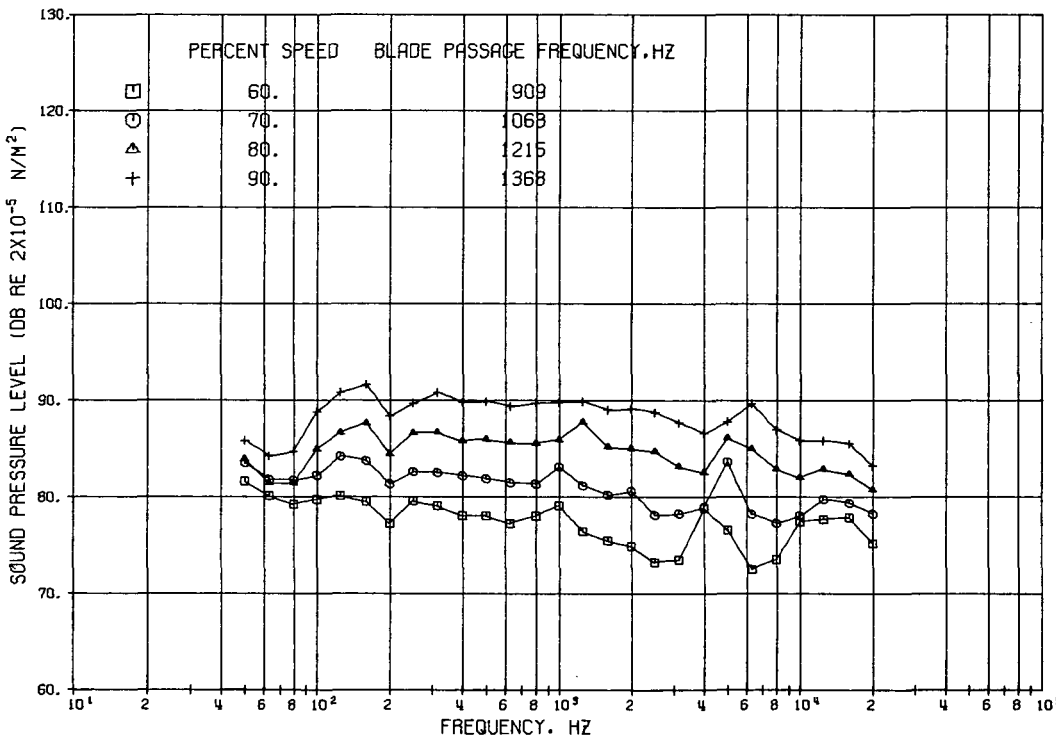


(f) 70°.

Figure 8. - Continued.

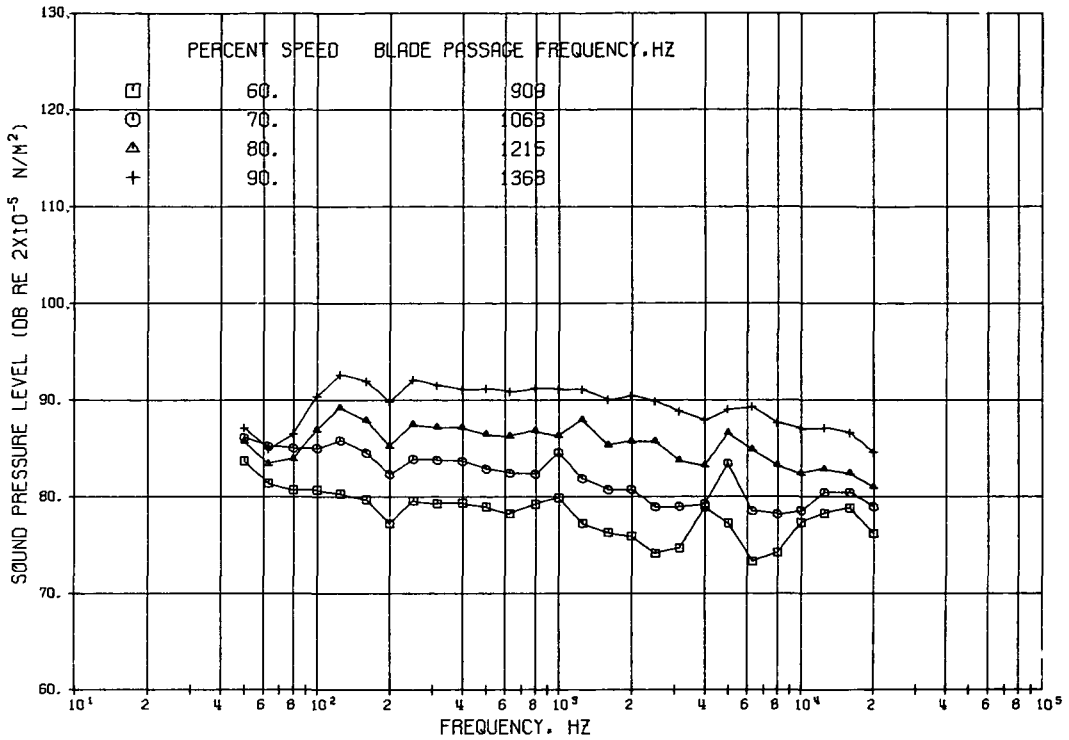


(g) 80°.

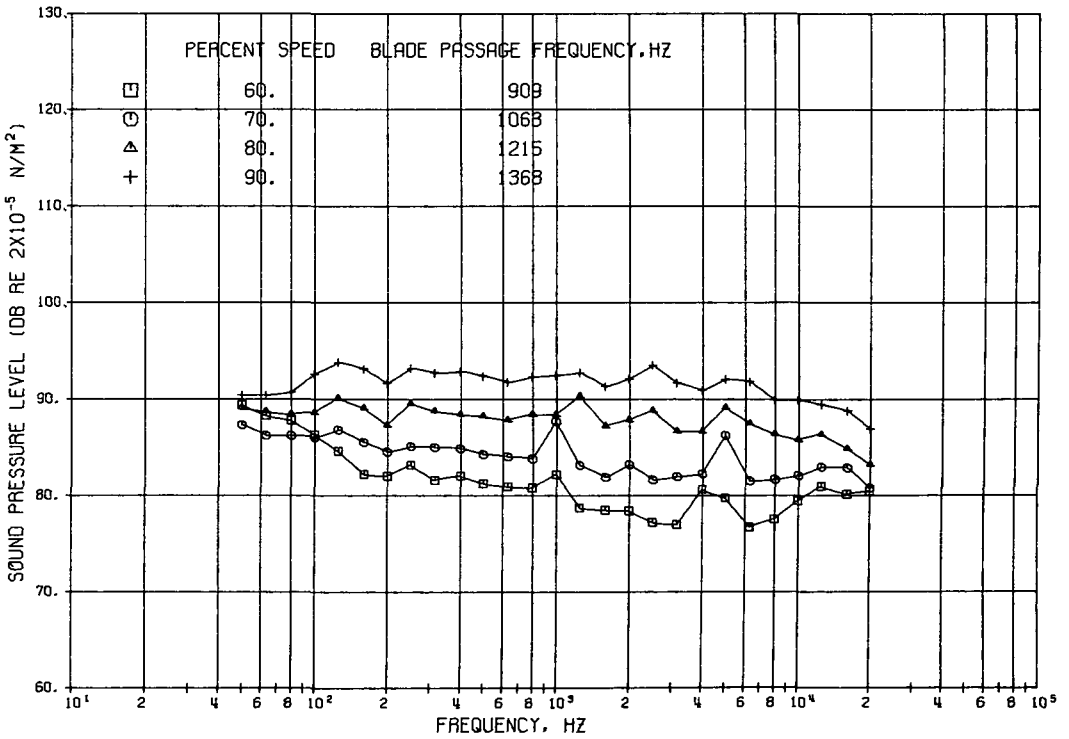


(h) 90°.

Figure 8. - Continued.

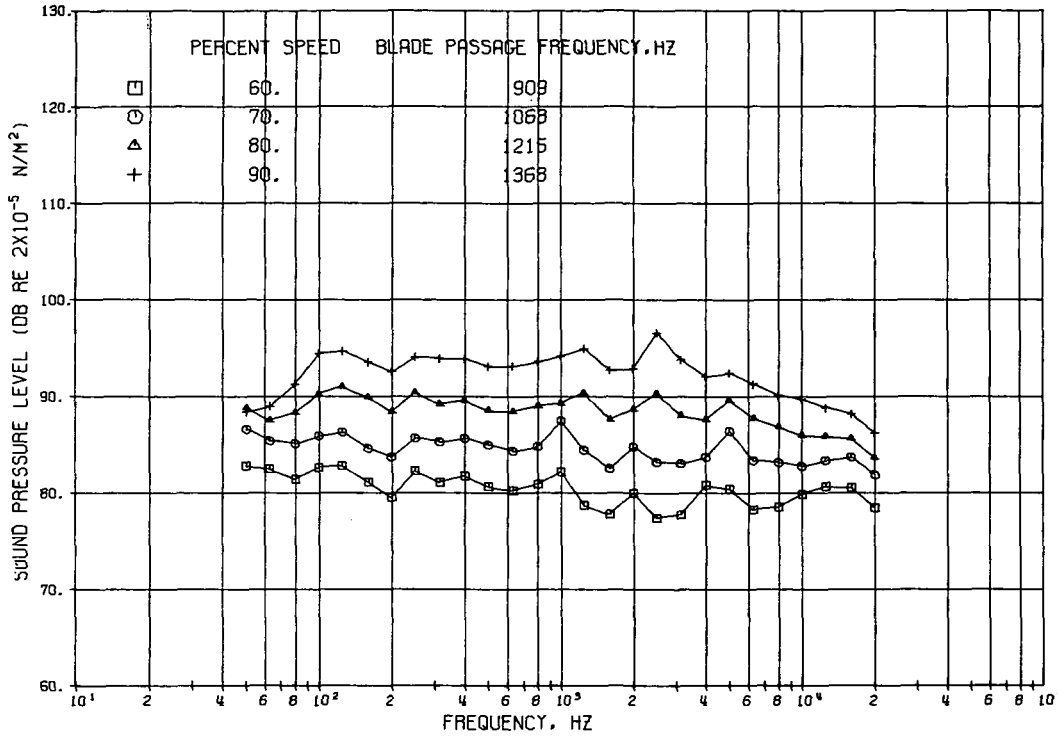


(i) 100^0.

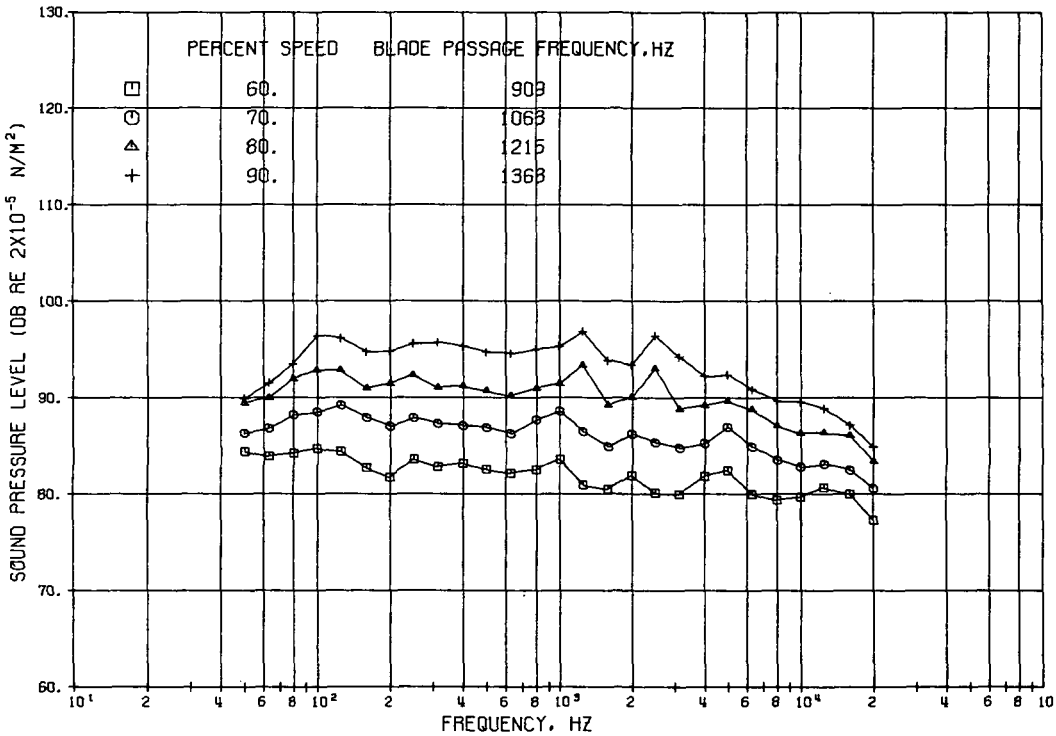


(j) 110^0.

Figure 8. - Continued.

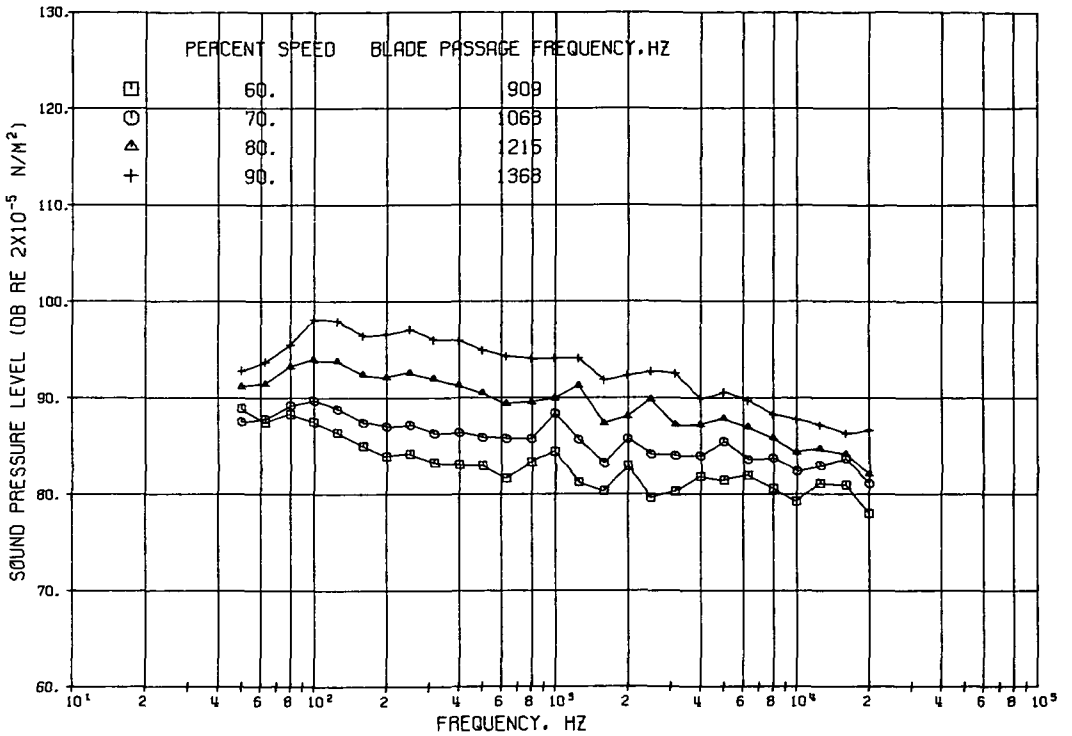


(k) 120°.

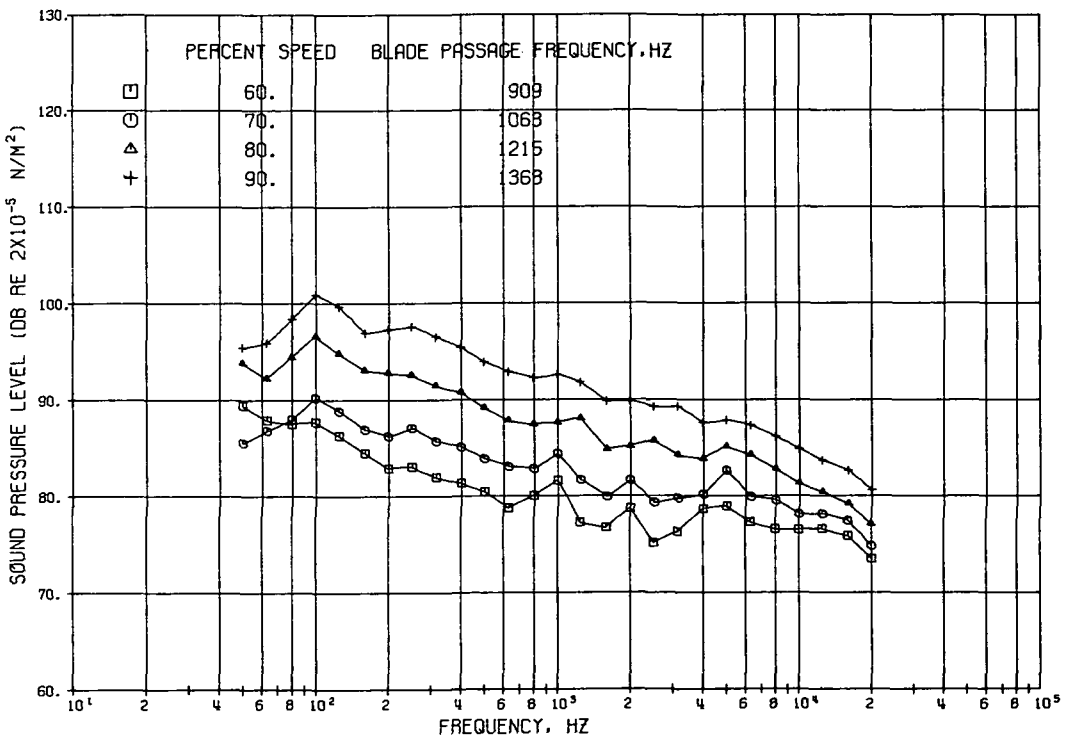


(l) 130°.

Figure 8. - Continued.

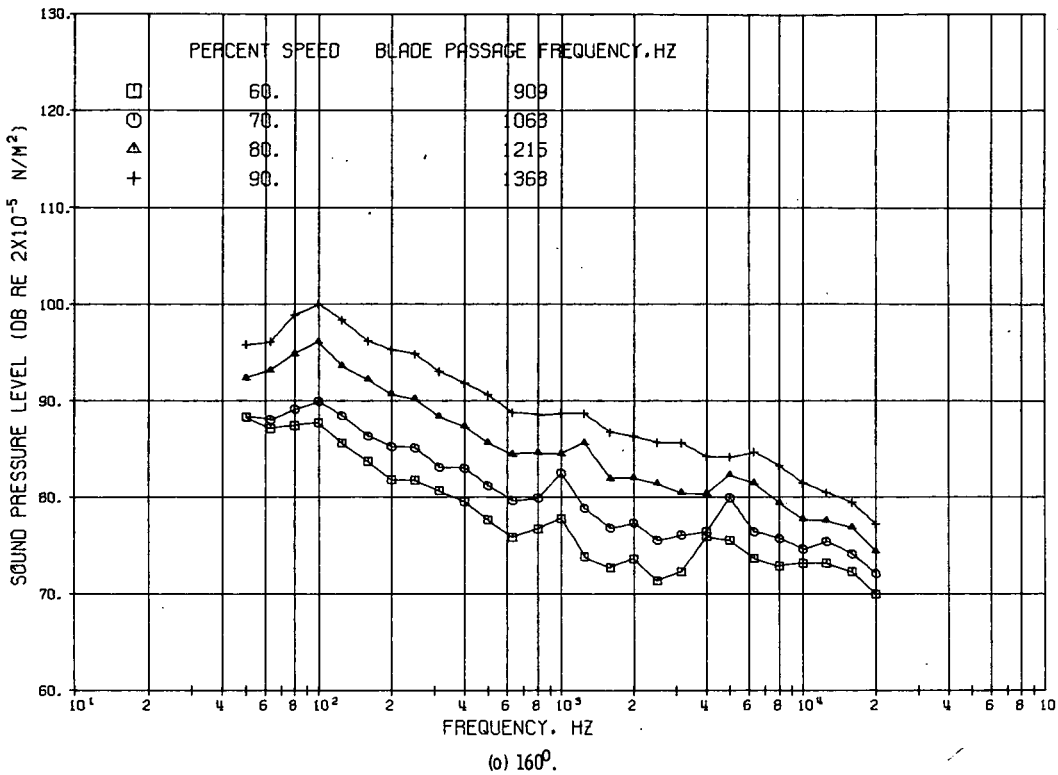


(m) 140°.



(n) 150°.

Figure 8. - Continued.



(o) 160°.

Figure 8. - Concluded.

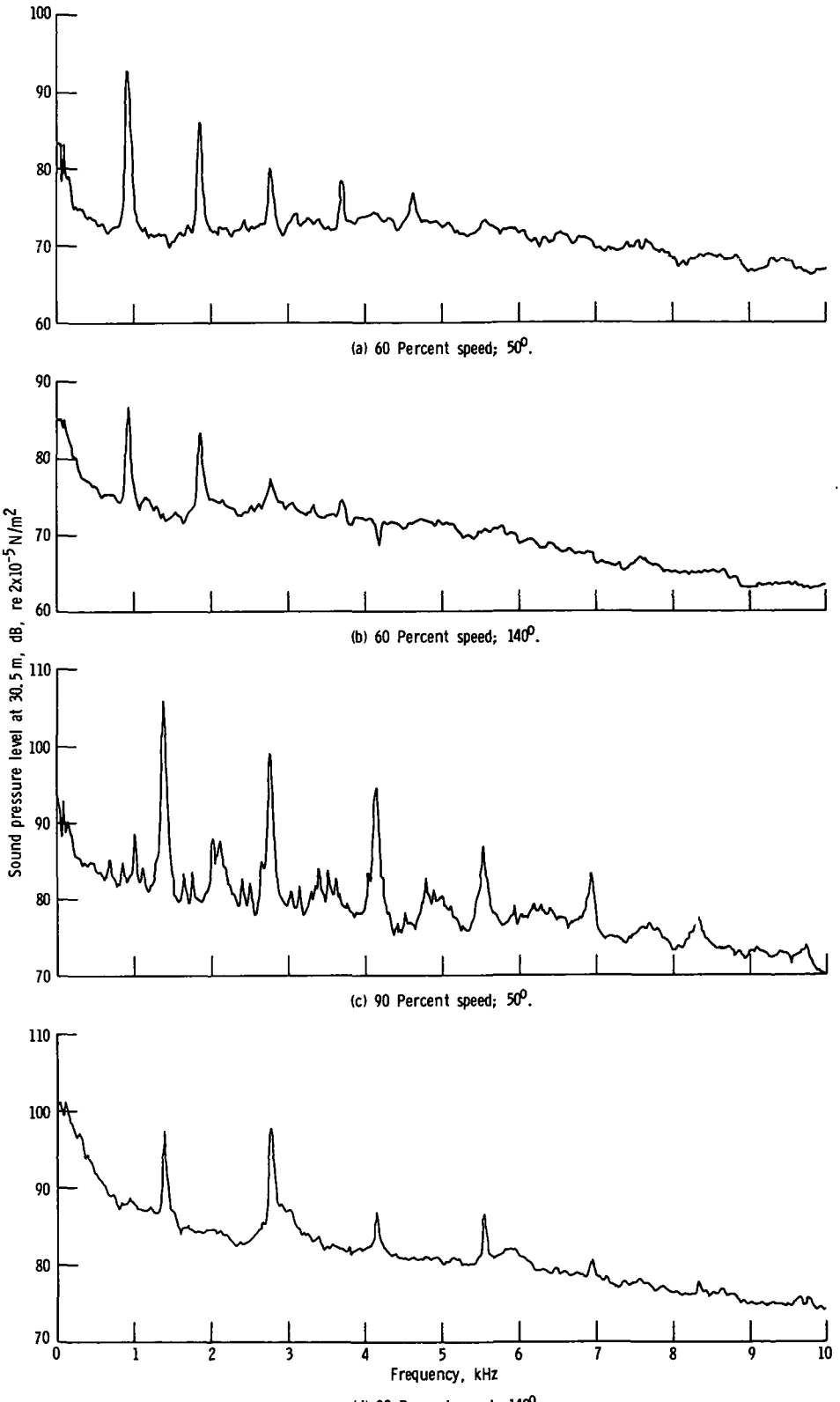
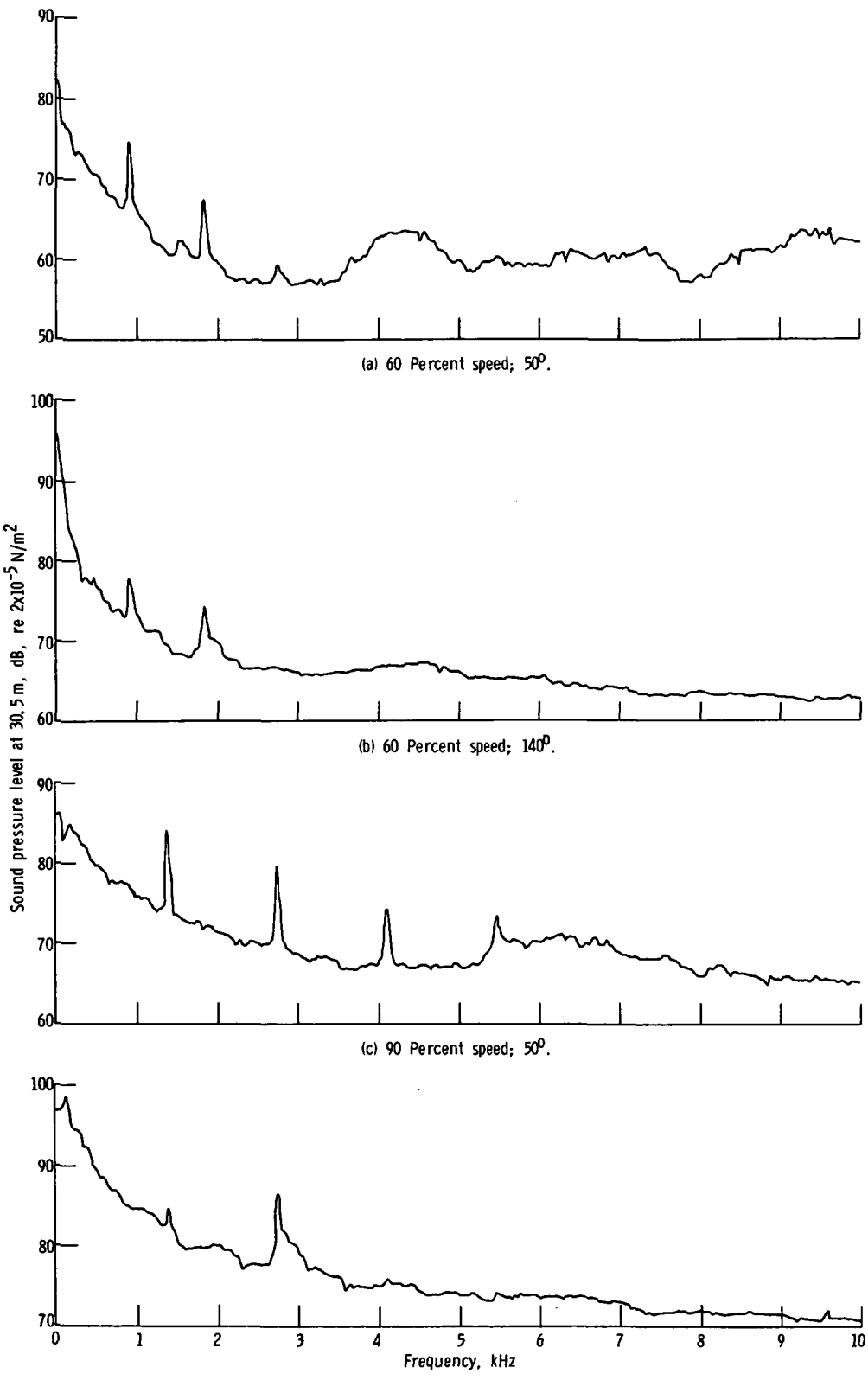


Figure 9. - Continuous 20-hertz constant bandwidth spectra at peak noise angles of 50° and 140° for configuration 106 (hard inlet, soft fan frame, hard exhaust, nominal nozzle).



(a) 60 Percent speed; 50°.

(b) 60 Percent speed; 140°.

(c) 90 Percent speed; 50°.

(d) 90 Percent speed; 140°.

Figure 10. - Continuous 20-hertz constant bandwidth spectra at peak noise angles of 50° and 140° for configuration 110 (inlet suppressor, soft fan frame, exhaust suppressor, nominal nozzle).

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—NATIONAL AERONAUTICS AND SPACE ACT OF 1958

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