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**NOISE GENERATED BY
QUIET ENGINE FANS
III - Fan C**

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SUMMARY

A significant effort within the NASA Quiet Engine Program was devoted to acoustical evaluation at the Lewis Research Center full-scale-fan noise test facility of a family of fans designed with low-noise features and built by the General Electric Company. This report, the last of a three-part series covering the three fans tested, documents the noise results obtained with fan C - a 1.6-pressure-ratio, 472-m/sec (1550-ft/sec) tip speed fan. The fan is described and some aerodynamic operating data are given. Far-field noise around the fan was measured over a range of operating conditions for a variety of configurations having different arrangements of sound-absorbing material in the flow ducts. Complete results of 1/3-octave band analysis of the data are presented in tabular form. Included also are acoustic power spectra and sideline perceived noise levels. Representative 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 was directed toward developing technology having direct application in the alleviation of noise from subsonic commercial aircraft. The most tangible results of the program were demonstrator high-bypass-ratio turbofan engines which, by the incorporation of such technology, were markedly quieter than then-available engines (ref. 1).

A significant effort within the Quiet Engine Program was devoted to acoustical and aerodynamic evaluation of a family of full-scale component fans. The designs of these fans were varied to develop a better understanding of the mechanisms of fan noise generation and to permit the selection ultimately of a minimum-noise design for incorporation in the Quiet Engine. Three such fans were built, each designed to meet propulsion

system requirements but varying significantly in aerodynamic design parameters which were considered to be noise related. In addition, all fans possessed 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 were letter designated as A, B, and C. All were designed and built by the General Electric Company. A comparative summary of their more pertinent design characteristics is given in table I. Of the three fans, fan C was the last to undergo an extensive acoustical test program at the Lewis Research Center. This report documents the more significant noise data obtained in that program. Results obtained with fans A and B are given in references 2 and 3.

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

FAN DESIGN CHARACTERISTICS

A complete discussion of the aerodynamic and mechanical design details of fan C is given in reference 4. Only a brief qualitative description is given here. Fan C, relative to the other fans in the program, was characterized generally as being a high-tip-speed, moderate-aspect-ratio fan with a low number of blades. The fan is illustrated in the cut-away view of the test assembly shown in figure 1. For testing purposes the fan was shaft-driven from the front as illustrated. All the fans were designed with sound-absorbing liners in the fan frame. Further discussion of the fan frame is given in the section TEST HARDWARE.

FAN PERFORMANCE

Extensive aerodynamic testing of the fan was conducted at the General Electric facilities in Lynn, Massachusetts; the detailed results are given in reference 5. A performance map based on fan bypass flow is given in figure 2. The constant-speed lines shown dashed are from the aerodynamic tests described in reference 5. For the tests at the noise facility, a minimal amount of aerodynamic instrumentation was used, from which the fan operating lines, shown in figure 2, were derived for the various nozzle areas employed as reported herein.

TEST HARDWARE

Cross sections of the hardware used for acoustical testing are shown in figure 3. The fan was run in a variety of configurations by using various combinations of the elements shown. Each configuration differed with regard (1) to the amount of acoustical treatment in the inlet, (2) the extent of active fan-frame treatment, (3) the amount of acoustical treatment in the bypass exhaust duct, and (4) the size of the bypass nozzle. The variations employed in each of these areas and the terminology used are explained in the next section.

Hardware Variables

Inlet. - The fan was run with three inlet conditions - "hard," "suppressed," and "treated wall." The hard inlet comprised a bellmouth and a 101.6-centimeter (40-in.) long cylindrical section mated to the fan frame. This is illustrated at the top in figure 3.

The suppressed inlet consisted of an acoustically treated cylindrical outer section and three treated straight cylindrical splitters which collectively constituted a bolt-on inlet suppressor. This is shown as the alternative inlet in figure 3. The details of this suppressor design have been reported in reference 6, which includes also a discussion of its use with another fan. Because of the difference in diameter between the fan C frame and the inlet suppressor, a short converging adapter was used to mate the two as illustrated in figure 3.

The treated-wall inlet consisted of the outer cylindrical portion only of the inlet suppressor, that is, the suppressor without the splitter rings.

Fan frame. - The fan was designed, as were all fans in the Quiet Engine Program, with sound-absorbing liners in the fan frame. The fan frame extended from a plane approximately 41 centimeters (16 in.) upstream of the fan rotor face to a plane approximately 61 centimeters (24 in.) downstream of the stator. The extent of the fan frame is noted in figure 3. Details of the fan-frame treatment, which was a multiple-degree-of-freedom resonator type, are given in reference 4. Fan-frame treatment existed also in the core passage walls near the stator. The fan was run with all fan-frame treatment functional, denoted as "fully treated," and with various sections of it deactivated by the use of adhesive aluminum tape. This was accomplished by first taping over all the fan-frame treatment, a configuration denoted as "fully taped," and by next removing the tape upstream of the rotor, then between the rotor and stator, and lastly, downstream of the stator. This resulted in two partially treated fan-frame configurations. The one with functional treatment upstream of the rotor only is denoted as "fore-rotor treated." The other, which had, in addition, functional treatment between the rotor and stator,

is denoted as "fore-stator treated." For all configurations, the fan-frame treatment in the core duct remained functional.

Bypass exhaust duct. - The fan was run with both "hard" and "suppressed" exhaust duct conditions. The "hard" exhaust condition refers to the bypass duct with no sound-absorbing treatment. Alternately, the suppressed condition employed treatment in the duct walls and a treated splitter. The arrangement and dimensions of the suppressor are given in figure 3.

Nozzles. - Three separate bypass exhaust duct nozzles were used. These are referred to as nominal, large, and small - corresponding to the three operating lines shown in figure 2. The nominal nozzle had an exit area of 0.995 square meter (1543 sq in.). The small and large nozzle areas deviated approximately 7 percent and 11 percent, respectively, from nominal. The core nozzle area was increased during the course of the test program to better simulate operation of the hub of the fan under engine conditions. But the change was insufficient to influence the aerodynamic data presented in figure 2.

The geometric variables of the nozzles which may relate to jet noise generation are given in table II. The bypass nozzle exit plane was upstream from that of the core. The axial distances between the bypass and core nozzle exit planes are also given in table II.

Core Duct

For all tests, the core flow was simply ducted aft through a nozzle of a size to cause the hub portion of the fan to operate as closely to engine conditions as possible. To reduce emission of internal noise from the core duct, a core suppressor was installed as illustrated in figure 3. The suppressor consisted of polyurethane foam held in place in the core duct outer wall by a perforated metal facing sheet and had an active area of 1.626 square meters (17.5 sq ft).

DATA ACQUIRED

The configurations for which acoustical data are being reported herein are described in table III. Each configuration was run at various speeds. For every test, far-field noise was measured and the results of these measurements constitute the substance of this report.

One of the tests involved wrapping the entire fan outer casing with acoustical damping material in order to modify the casing emission characteristics and thus gain some qualitative assessment of noise from that source. This is designated as the muffled casing

(see footnote c, table III). It was made by wrapping the fully suppressed configuration with 15.2 centimeters (6 in.) of open-cell polyurethane ether foam.

In some instances, in order to avoid the risk of incurring program delays because of impending inclement weather, aerodynamic and acoustical data were obtained simultaneously. This meant obtaining acoustical data while instrumentation rakes were protruding into the bypass jet stream at the nozzle exit. Such tests are so denoted by footnote a in table III. Results from previous tests with the other two fans in the program showed that such instrumentation had little or no effect on the data, and the compromise was well worth the potential delays avoided.

DATA ACQUISITION AND ANALYSIS

Test Site

The acoustical tests were conducted at the outdoor full-scale-fan noise test facility at the Lewis Research Center (fig. 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 placement of far-field microphones on a 30.5-meter- (100-ft-) 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 (100 ft) by 0.9 and 1.4 meters (3 and 4.5 ft), respectively, because of the presence of a sidewalk in the microphone field. The fan axis was 5.8 meters (19 ft) from the ground, and the microphones were all 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 herein, that the center of the microphone arc intersected the fan assembly axis near the nozzle exit plane. The actual distance of the center of the arc from the fan component, which is the more customary arc center, was 3.5 meters (11.7 ft) (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 center of the arc lies elsewhere.

Test Procedure

The instrumentation and data recording system had a flat 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 the early morning hours prior to sunrise, when weather conditions were calm and stable. No acoustical data were taken under conditions 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 to 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 by using a 1/3-octave band analyzer. 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. 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 rendered lossless (i. e. , the effect of atmospheric absorption was removed) by computing atmospheric absorption for the test conditions over the propagation path and adding it to the data.

Atmospheric absorption was computed by using continuous functions of frequency deduced from reference 7. The application procedures set forth in reference 7 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 used to obtain an integrated value of absorption for each 1/3-octave band.

For reference purposes and to permit extrapolation of data provided herein to other distances, standard-day atmospheric absorption values are 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 spectrum. However, the values are nominally those employed in the data adjustments and are sufficiently accurate for estimating noise projections to other distances.

The lossless data were adjusted to constant radius and acoustic power and directivity index calculations were made. No lossless directivity index data are presented herein, but they may be readily derived from the data (see the section DATA PRESENTATION). For acoustic 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 due to ground reflections.

Using lossless data, calculations of atmospheric absorption for a standard day of 15° C (59° F) 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.

A more thorough discussion of the material presented in this section and the computer programs employed are given in reference 8.

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 0 to 10 000 hertz. The narrow-band spectra were not adjusted in any way and represent 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, and considering the simple nature of the source, 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 (100-ft) arc which were obtained from the acoustical test program are presented in tabular form. Table III lists the fan configurations for which data are presented. The actual noise 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 noise data 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 (100-ft) radius. Overall sound pressure levels which were computed from the 1/3-octave band data are also given.

Using lossless data, calculations of acoustic power level (PWL) 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 (ref. 8). Radiation through polar areas for which no data were obtained was neglected. Acoustic power levels are presented in the tables referred to 10^{-13} watts (0.1 pW).

Each acoustic power level has associated with it an average 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 for lossless data and the table entries include standard-day atmospheric absorption, directivity index can be obtained by subtracting atmospheric absorption for 30.5 meters (100 ft) (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 (200 ft) from and parallel to the fan axis, and perceived noise levels in PNdB were computed in accordance with reference 9. These perceived noise levels are provided in the tables and permit a quick and practical comparison, among all the data, of the relative noise generated. In addition, sideline perceived noise levels are provided at 113 meters (370 ft) for the approach-speed case (60 percent of design speed) and at 305 meters (1000 ft) for the takeoff-speed case (90 percent of design speed). These distances typify aircraft altitudes at FAA-regulated noise certification locations (ref. 9), and the data indicate generally the community noise levels to be expected from the fan compared with FAA regulations. The data provided are for a single fan; the perceived noise levels for n fans may be approximated 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, un-suppressed and fully suppressed, are presented graphically to illustrate general features. These are configurations 305 and 309, for which data are presented in figures 6 and 7, respectively. Detailed comparisons of different configurations should be made by using the tabulated data. Graphical data presentations consist of standard-day 1/3-octave band sound pressure levels at a 30.5-meter (100-ft) 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 305 and 309 in figures 8 and 9, respectively.

CONCLUDING REMARKS

A program of noise tests with fan C was conducted at the Lewis Research Center. Fan C is characterized generally as having a high tip speed and 26 moderate-aspect-ratio blades. It is one of three full-scale fans built under the NASA Quiet Engine Program, each of which varies significantly in design characteristics which may be noise related.

Acoustical tests were conducted over a range of aerodynamic operating conditions and with various arrangements of sound-absorbing material. 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. The presentation of these results is part of a continuing program directed toward a better understanding of the mechanisms of fan noise generation and the alleviation of noise from turbofan propulsion systems.

Lewis Research Center,
National Aeronautics and Space Administration,
Cleveland, Ohio, November 11, 1975,
505-03.

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

Characteristic	Fan A	Fan B	Fan C
Corrected rotor tip speed, m/sec (ft/sec)	354 (1160)	354 (1160)	472 (1550)
Inlet hub/tip radius ratio	0.465	0.465	0.360
Rotor inlet tip diameter, m (in.)	1.86 (73.354)	1.86 (73.354)	1.73 (68.300)
Corrected airflow, kg/sec (lb/sec)	431 (950)	431 (950)	415 (915)
Inlet corrected specific flow, kg/sec/sq m (lb/sec/sq ft)	202 (41.3)	202 (41.3)	202 (41.3)
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

[Stator annulus exit area, 1.274 sq m (1974 sq in.).]

Dimension	Bypass nozzle			Core nozzle	
	Nominal	Large	Small	Before area adjustment	After area adjustment
Area, sq m (sq in.)	0.995(1543)	1.102(1708)	0.923(1430)	0.225(349)	0.250(387)
Outside diameter, m (in.)	1.594(62.77)	1.629(64.14)	1.562(61.51)	0.766(30.15)	0.787(31.00)
Annulus height, m (in.)	0.235(9.27)	0.258(10.15)	0.220(8.68)	0.109(4.30)	0.119(4.68)
Axial distance (bypass exit plane to core exit plane), m (in.):					
0.225-sq m (349-sq in.) core nozzle	0.574(22.6)	0.561(22.1)	0.569(22.4)	-----	-----
0.250-sq m (387-sq in.) core nozzle	0.493(19.4)	0.480(18.9)	0.488(19.2)	-----	-----

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

Configuration	Configuration description								Table
	Inlet	Fan frame	Exhaust	Bypass nozzle	Bypass area		Core area		
					sq m	sq in.	sq m	sq in.	
^a 302	Hard	Fully taped	Hard	Nominal	0.995	1543	0.225	349	V
303	↓	Fore-rotor treated	↓	↓	↓	↓	↓	↓	VI
304		Fore-stator treated							VII
^b 305	↓	Fully treated	↓	↓	↓	↓	↓	↓	VIII
^a 306		↓					.250	387	IX
^{a, c} 308	Suppressed		Suppressed				↓	↓	X
^{a, b} 309	Suppressed								XI
310	Treated wall								XII
311	Hard								XIII
312	↓			Large	1.102	1708			XIV
313	↓			Small	.923	1430			XV

^aAerodynamic measurement rakes in bypass jet flow.

^b1/3-Octave band and narrow-band data presented graphically (figs. 6 to 9).

^cMuffled casing.

TABLE IV. - STANDARD-DAY ATMOSPHERIC ABSORPTION

[Computed for a flat 1/3-octave band spectrum; temperature, 15° C (59° F); relative humidity, 70 percent.]

Band center frequency, Hz	Per 100 meters (300 ft)	Per 305 meters (1000 ft)	At 30.5 meters (100 ft)
	Attenuation, dB		
50	0.0	0.1	0.0
63	↓	↓	↓
80	↓	↓	↓
100	↓	↓	↓
125	.1	.2	↓
160	↓	.2	↓
200	↓	.3	↓
250	↓	.4	↓
315	.2	.5	↓
400	.2	.6	.1
500	.2	.7	↓
630	.3	.9	↓
800	.4	1.2	↓
1 000	.5	1.5	↓
1 250	.6	1.9	.2
1 600	.8	2.4	.2
2 000	1.0	3.1	.3
2 500	1.4	4.2	.4
3 150	1.8	5.6	.6
4 000	2.5	7.7	.8
5 000	3.6	11.0	1.1
6 300	5.1	15.6	1.6
8 000	7.4	22.5	2.2
10 000	10.6	32.2	3.2
12 500	15.1	46.0	4.6
16 000	21.4	65.2	6.5
20 000	30.3	92.4	9.2

TABLE V. - NOISE OF FAN C CONFIGURATION 302 (HARD INLET, FULLY TAPED FAN FRAME, HARD EXHAUST, NOMINAL NOZZLE,

RAKES) TEST PURPOSE - FAR-FIELD NOISE

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

(a) Percent of design speed, 60; fan physical speed, 3168 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	77.9	79.9	81.9	79.7	82.2	80.2	83.5	75.7	77.4	75.9	76.4	76.3	77.4	78.9	80.9	82.4	79.6	127.0
63	74.2	73.7	74.2	72.5	73.7	72.5	73.5	71.5	72.4	73.0	74.7	75.8	77.2	78.9	80.9	82.7	75.7	123.1
80	77.4	73.9	73.4	71.0	72.4	71.2	71.5	71.2	72.4	74.4	76.2	78.0	80.0	82.0	83.4	85.4	77.5	124.9
100	78.9	75.5	78.0	77.2	78.4	74.0	74.4	75.2	76.9	77.9	81.0	81.0	82.7	84.2	84.9	85.6	80.1	127.5
125	80.9	80.1	80.4	78.9	78.7	79.2	77.6	77.7	79.7	80.2	82.1	83.2	84.1	84.4	85.4	85.1	81.5	128.9
160	82.0	81.2	82.3	79.5	80.7	79.8	79.0	80.5	80.7	81.7	82.4	81.5	82.3	83.3	82.7	81.1	81.1	128.5
200	84.7	85.2	86.6	80.1	84.2	80.6	76.9	77.6	76.6	77.7	78.6	79.3	81.1	82.7	82.2	81.3	81.1	128.5
250	83.6	83.9	83.6	82.4	83.1	81.3	80.4	78.6	79.9	81.4	82.1	82.9	84.1	84.1	83.3	81.5	82.2	129.6
315	83.4	83.2	84.2	82.6	84.6	81.2	80.1	79.2	79.9	80.7	81.1	82.0	82.6	82.7	81.9	79.6	81.8	129.2
400	86.7	86.0	86.3	84.3	84.7	81.3	81.2	80.3	81.2	82.2	82.7	83.6	84.8	84.7	82.7	81.1	83.4	130.8
500	87.0	86.3	86.3	86.3	86.7	83.2	82.3	81.8	82.2	83.2	83.8	84.4	85.0	84.2	83.0	81.2	86.3	131.7
630	88.2	88.0	87.7	87.4	85.9	83.5	83.2	82.9	83.7	84.5	85.2	85.8	87.4	86.5	83.7	82.1	85.5	132.9
800	90.1	90.3	89.1	88.4	88.1	86.3	85.4	84.8	85.6	86.3	86.8	87.9	89.3	88.3	84.6	82.6	87.3	134.7
1000	93.3	91.8	91.6	91.1	90.5	88.1	87.3	85.8	86.8	87.4	88.3	89.7	91.3	89.9	86.1	84.0	89.3	136.7
1250	100.5	101.9	102.7	104.5	105.4	104.5	103.0	97.5	93.5	94.2	96.4	97.8	98.5	97.4	94.2	92.1	101.0	148.4
1600	97.3	98.1	99.3	100.1	101.0	99.6	97.8	93.5	90.6	91.3	93.5	94.6	96.8	94.0	91.1	89.4	96.9	144.3
2000	93.1	93.6	94.1	93.9	93.6	91.2	89.4	88.2	89.1	89.6	91.4	92.0	94.9	91.8	89.3	85.5	92.0	139.4
2500	96.7	96.9	98.7	99.9	99.7	97.7	95.0	91.4	91.2	91.7	92.4	93.3	95.4	94.9	91.5	87.9	96.0	143.4
3150	94.0	95.0	96.0	96.7	96.7	94.5	91.5	89.2	89.2	90.2	91.8	92.9	95.0	93.5	90.0	86.4	93.9	141.3
4000	94.5	96.0	97.8	99.6	99.5	96.8	93.5	90.6	91.1	91.3	93.1	93.8	95.6	93.6	91.1	87.7	95.9	143.3
5000	93.3	95.0	94.2	96.0	95.0	93.3	89.5	87.2	88.8	89.3	91.3	92.1	94.0	92.8	90.2	86.6	93.4	140.8
6300	92.2	93.0	93.5	94.2	93.5	91.5	86.8	84.1	86.1	86.3	88.9	89.2	90.9	89.6	87.6	83.2	91.7	139.1
8000	90.9	92.6	93.7	93.6	93.4	91.1	85.9	82.6	84.6	85.9	88.1	88.0	89.7	87.7	86.2	81.7	91.7	139.1
10000	89.8	91.5	91.8	92.0	91.6	90.5	84.1	79.8	81.9	82.6	85.6	85.8	87.5	85.3	83.6	78.6	90.9	138.3
12500	88.6	89.8	89.6	89.6	89.4	87.5	82.0	77.0	78.2	79.8	82.2	84.2	84.2	81.7	80.2	74.5	89.7	137.1
16000	87.4	86.7	88.5	86.7	87.4	83.7	80.5	72.6	74.7	74.9	77.3	77.5	79.3	77.4	77.0	71.1	88.9	136.3
20000	84.6	82.3	87.0	83.9	85.5	79.2	81.7	66.6	69.8	70.7	72.8	73.7	75.0	72.1	72.1	66.4	89.2	136.6
OVERALL	106.3	107.1	108.0	109.1	109.4	107.9	105.8	101.7	100.4	101.2	102.9	103.8	105.5	104.1	101.5	99.1	106.2	153.6

SIDELINE PERCEIVED NOISE LEVELS

61 METERS	92.3	101.2	106.5	110.0	111.9	111.0	109.4	106.7	106.8	107.4	108.6	108.5	109.0	106.0	100.6	93.5
113 METERS	83.5	93.5	99.5	103.2	105.2	104.6	103.3	100.4	100.5	101.0	102.0	101.9	102.3	99.3	93.6	86.0

(b) Percent of design speed, 70; fan physical speed, 3696 rpm; fundamental blade passage frequency, 1601 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
50	80.5	76.0	79.3	77.2	80.5	77.3	78.0	77.7	79.0	79.5	80.2	81.6	82.2	84.0	86.7	88.0	81.2	128.6
63	86.3	82.1	80.3	87.1	84.1	80.8	78.8	78.6	77.1	78.3	82.1	82.2	84.0	85.1	87.8	89.0	83.2	130.6
80	76.8	76.0	78.1	74.5	79.1	76.0	75.3	75.8	78.0	79.6	81.8	83.4	86.3	88.1	90.8	92.2	83.7	131.1
100	78.6	76.8	79.8	76.6	80.1	77.8	78.4	79.3	81.6	83.1	85.1	86.4	88.4	89.9	91.9	92.7	85.5	132.9
125	85.5	85.1	89.3	82.8	84.6	85.0	84.5	84.3	85.5	86.5	87.0	88.9	89.8	91.5	93.0	91.4	87.8	135.2
160	81.8	82.7	84.2	82.3	83.8	83.3	83.5	83.2	85.0	85.2	86.0	86.8	87.0	88.0	88.7	87.7	85.4	132.8
200	84.0	84.7	84.2	81.7	84.5	82.4	82.7	81.7	81.9	82.4	83.7	85.1	86.5	87.9	88.7	86.9	84.5	131.9
250	87.2	88.7	88.4	88.6	85.9	85.6	83.6	83.6	86.1	87.2	88.4	88.6	88.9	89.6	89.1	87.9	87.4	134.8
315	86.8	85.5	87.3	85.3	86.0	84.0	84.7	83.5	84.8	84.8	85.8	86.9	87.7	88.0	87.7	85.7	85.9	133.3
400	90.1	89.0	89.6	90.0	88.0	85.3	86.0	84.0	86.6	87.8	87.5	88.2	88.8	88.8	87.6	87.0	87.8	135.2
500	90.7	89.3	89.8	90.7	90.3	88.0	87.3	84.8	86.2	86.8	87.7	88.4	90.3	89.3	88.2	86.0	88.5	135.9
630	93.0	92.7	93.2	91.5	91.7	88.0	88.0	87.9	88.2	89.7	89.9	90.6	91.0	89.9	89.2	87.9	90.2	137.6
800	94.1	92.8	92.8	92.6	92.5	91.1	89.5	88.1	89.5	90.6	91.5	92.1	93.0	91.3	88.8	87.2	91.3	138.7
1000	96.4	95.4	94.4	96.1	95.4	93.9	91.2	90.2	90.9	91.9	93.0	94.9	96.2	93.7	90.0	88.4	93.7	141.1
1250	97.8	97.5	97.0	97.5	96.5	94.5	93.0	91.2	92.0	93.0	93.8	94.9	95.8	93.0	90.8	88.6	94.7	142.1
1600	112.4	113.6	110.1	112.1	110.9	110.4	104.9	102.1	104.4	103.4	102.4	104.3	106.4	101.6	99.9	98.6	107.7	155.1
2000	99.0	99.3	98.2	99.0	98.5	98.0	94.2	93.2	94.2	94.7	96.0	97.3	99.2	94.7	92.5	90.6	96.9	144.3
2500	97.2	96.9	97.6	97.2	96.7	95.4	92.4	91.9	93.6	94.2	95.6	96.5	97.7	94.6	92.1	89.1	95.7	143.1
3150	102.8	103.8	104.3	106.6	106.1	104.6	100.6	97.8	97.6	97.1	99.0	100.1	100.5	98.3	95.6	93.4	102.4	149.8
4000	97.4	98.0	98.4	99.4	98.9	97.2	93.5	91.9	93.2	94.5	96.7	97.3	98.5	95.2	93.2	90.1	97.2	144.6
5000	100.7	101.0	100.4	102.4	101.5	100.7	95.7	92.5	94.9	95.4	97.2	97.6	99.5	97.2	94.9	92.0	99.5	146.9
6300	98.2	97.1	98.1	98.7	98.9	96.7	91.2	88.9	91.4	91.6	94.6	94.4	96.1	93.4	92.2	88.2	96.6	144.0
8000	95.7	96.4	97.2	97.4	97.7	95.2	90.4	87.4	90.1	91.7	94.2	93.7	94.7	91.9	90.4	86.7	96.2	143.6
10000	94.3	94.6	95.5	95.1	96.5	94.3	87.4	85.0	87.3	88.3	91.3	90.8	92.8	89.8	88.1	83.6	95.2	142.6
12500	91.8	92.1	92.8	92.0	94.4	91.2	83.7	81.5	83.7	84.7	87.8	87.5	89.3	85.7	84.7	78.9	93.6	141.0
16000	89.9	89.0	90.9	88.8	92.4	87.1	78.5	77.6	80.5	80.7	83.0	83.0	84.4	82.2	81.5	75.7	92.4	139.8
20000	87.2	84.4	89.8	85.1	91.1	82.0	73.8	72.3	75.2	75.8	78.1	78.9	80.3	76.5	76.6	71.1	92.5	139.9
OVERALL	114.1	115.0	112.9	114.5	113.7	112.7	108.0	105.6	107.3	107.1	107.9	109.0	110.5	107.4	106.0	104.4	111.1	158.5
SIDELINE PERCEIVED NOISE LEVELS																		
61 METERS	101.4	109.9	112.1	116.1	117.0	117.2	113.8	112.0	113.8	113.5	114.0	114.1	114.4	109.8	105.2	99.4		

TABLE V. - Concluded.

(c) Percent of design speed, 80; fan physical speed, 4212 rpm; fundamental blade passage frequency, 1825 hertz.

FREQUENCY	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																AVERAGE SPL	POWER LEVEL (PWL)
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
50	84.3	80.1	80.6	80.6	81.1	82.8	82.8	81.9	83.3	83.4	84.1	85.5	87.1	89.3	91.8	93.7	85.8	133.2
63	83.8	82.0	86.7	83.2	81.7	83.3	81.0	82.0	84.0	83.2	84.3	86.1	88.0	90.3	92.8	94.7	86.7	134.1
80	85.5	82.5	86.5	82.5	80.8	82.3	80.5	82.2	84.7	84.8	86.7	89.1	91.2	93.5	96.0	98.5	89.3	136.7
100	86.7	81.2	80.5	80.8	81.5	83.5	83.3	85.0	87.0	88.0	90.0	91.6	93.3	96.0	98.2	98.2	91.0	138.4
125	88.2	85.2	86.2	85.5	86.0	87.8	87.8	89.7	90.7	91.8	92.6	93.8	95.7	97.8	96.9	96.9	91.7	139.1
160	88.3	87.5	88.6	87.5	88.3	89.3	88.6	89.0	90.0	89.8	90.8	91.4	92.5	93.8	94.8	93.5	90.7	138.1
200	88.5	88.5	87.5	86.6	86.0	87.1	86.0	86.3	86.8	87.3	88.6	90.7	93.1	94.3	94.5	92.7	89.7	137.1
250	92.0	89.5	89.4	91.9	87.5	89.4	90.9	88.7	89.2	91.7	93.5	95.3	94.0	95.0	95.2	93.6	92.2	139.6
315	91.1	90.2	90.4	92.4	89.2	90.9	91.7	89.9	89.9	91.2	93.2	94.5	93.7	94.4	93.6	92.3	92.1	139.5
400	92.1	91.1	91.0	91.6	90.3	89.3	88.5	88.3	89.8	90.0	91.0	92.5	93.1	93.5	92.6	91.2	91.1	138.5
500	98.3	95.3	96.0	98.1	97.6	96.8	91.8	90.8	95.3	92.3	92.3	95.9	95.8	94.1	96.0	94.8	95.3	142.7
630	98.6	101.1	101.6	101.1	103.6	101.1	94.6	95.8	98.1	95.3	94.1	96.7	95.6	95.0	92.6	92.5	98.6	146.0
800	100.8	104.1	109.6	106.8	109.3	107.1	105.5	102.9	104.3	101.9	100.9	99.9	98.6	98.6	95.3	95.3	104.7	152.1
1000	104.5	107.2	104.5	109.9	111.2	111.6	107.8	103.9	102.5	102.0	101.4	104.1	101.0	100.5	99.0	99.6	106.6	154.0
1250	104.7	106.7	107.2	108.4	110.8	111.5	109.8	104.8	102.2	99.7	99.0	101.3	100.4	99.2	97.5	97.9	106.6	154.0
1600	105.2	108.2	108.2	110.6	109.6	110.1	104.7	102.1	100.6	99.6	102.1	102.7	101.6	99.4	98.1	95.5	105.8	153.2
2000	109.2	113.5	112.7	114.5	113.2	113.7	108.3	106.3	103.3	103.5	107.2	107.1	105.7	103.5	103.0	100.1	109.9	157.3
2500	102.1	104.1	105.0	104.8	104.8	103.3	99.6	97.6	98.1	98.1	99.5	99.4	100.3	96.6	96.0	93.2	101.5	148.9
3150	102.6	104.6	104.9	105.6	105.4	104.3	99.9	98.6	98.9	99.6	100.9	101.5	101.9	97.9	97.3	94.0	102.6	150.0
4000	102.8	105.1	104.9	106.6	105.9	104.9	99.9	98.1	98.8	100.3	102.3	102.2	103.8	99.6	98.5	95.5	103.5	150.9
5000	100.8	102.8	101.8	103.6	102.3	102.5	97.1	95.6	98.3	98.3	100.3	100.6	101.8	98.1	97.1	94.4	101.4	148.8
6300	99.7	100.2	99.9	101.5	100.6	100.5	95.2	93.0	95.7	95.9	98.6	98.2	99.6	96.8	96.1	91.9	99.8	147.2
8000	97.7	99.2	99.5	99.9	100.1	99.2	94.7	92.2	94.9	96.4	99.1	98.4	98.9	95.0	94.9	90.5	99.8	147.2
10000	95.9	97.2	96.7	97.7	98.6	97.5	91.4	89.4	89.4	91.9	92.9	96.0	96.4	92.2	91.9	87.5	98.3	145.7
12500	94.1	94.7	93.9	95.1	96.6	94.9	87.6	86.2	87.8	89.7	92.6	91.3	93.3	88.5	88.5	82.8	96.8	144.2
16000	92.5	91.3	91.8	92.0	95.3	92.8	82.7	82.3	84.8	85.7	87.7	87.2	88.9	85.2	85.4	79.7	95.9	143.5
20000	88.5	86.2	89.5	88.9	94.7	89.7	79.2	76.7	79.9	81.0	83.7	83.5	85.9	79.9	80.5	74.8	96.1	143.5
OVERALL	114.7	117.6	117.7	119.1	119.2	119.2	115.3	112.3	111.7	111.1	112.8	113.3	113.0	111.0	110.6	109.3	115.9	163.3
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	102.2	113.2	117.0	121.0	122.2	123.4	119.6	118.1	117.3	117.1	119.1	118.6	117.1	113.1	110.1	103.8		

(d) Percent of design speed, 90; fan physical speed, 4738 rpm; fundamental blade passage frequency, 2053 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	84.9	82.4	84.9	84.0	84.5	85.2	85.5	86.9	86.7	88.4	89.4	89.1	90.7	92.7	95.0	97.6	89.5	136.9
63	82.6	83.8	83.3	83.8	84.1	83.6	84.3	84.1	85.5	86.6	88.6	88.7	91.5	94.0	96.6	98.8	89.9	137.3
80	88.9	86.2	90.0	88.9	88.5	87.5	88.2	87.7	88.4	89.2	91.7	91.8	94.9	97.0	100.5	102.6	93.5	140.9
100	85.3	83.8	85.5	84.8	85.3	86.3	86.8	88.6	90.3	91.8	94.3	95.1	97.1	99.6	102.1	103.3	95.0	142.4
125	90.0	88.9	90.0	89.6	89.9	90.5	91.2	92.2	93.5	94.4	96.2	96.8	98.4	100.5	101.9	101.9	96.0	143.4
160	91.4	90.2	92.4	93.7	92.5	93.5	94.0	94.2	95.4	94.7	96.2	96.1	97.2	99.0	99.4	99.8	95.7	143.1
200	89.0	90.3	90.5	91.3	91.0	90.7	90.8	90.8	91.2	92.2	93.0	94.3	96.3	98.0	99.3	98.7	93.9	141.3
250	90.6	95.0	94.1	96.8	94.8	94.1	92.0	91.8	93.3	93.8	96.3	97.1	99.1	99.6	100.3	99.7	96.2	143.6
315	97.7	96.2	103.7	100.2	99.4	96.2	94.9	94.4	94.7	95.6	96.9	98.2	99.1	100.7	100.9	100.9	98.4	145.8
400	96.3	98.9	99.8	105.3	105.6	104.1	102.8	100.4	100.3	99.6	99.4	99.2	99.3	99.3	99.6	98.3	101.7	149.1
500	103.0	107.0	111.5	115.3	115.5	112.8	111.3	107.8	105.0	107.1	105.6	107.9	102.1	105.6	102.3	103.5	110.2	157.6
630	104.1	106.6	108.1	110.1	110.0	108.6	107.0	102.1	101.1	103.8	102.6	104.2	100.8	101.8	101.0	100.7	105.9	153.3
800	103.3	106.0	110.2	111.7	114.8	113.7	113.7	107.5	108.0	103.5	103.5	103.6	101.3	100.3	102.2	101.9	109.7	157.1
1000	104.1	104.9	107.0	107.7	110.7	110.5	107.5	101.5	102.0	100.4	99.7	100.8	100.4	99.5	99.9	98.6	105.6	153.0
1250	107.2	106.5	108.7	109.7	110.5	111.5	108.8	103.2	103.8	102.5	101.2	102.3	101.2	100.5	100.8	99.0	106.8	154.2
1600	104.8	105.4	105.1	106.8	106.8	107.8	104.4	100.9	100.8	99.8	99.3	99.7	100.3	98.9	98.6	97.3	103.6	151.0
2000	108.5	110.4	109.2	109.0	109.4	109.0	107.0	104.2	106.0	105.5	106.5	107.8	108.4	105.4	105.0	102.6	107.7	155.1
2500	104.3	105.3	106.2	106.0	105.5	106.2	103.5	99.5	100.3	100.0	100.3	100.9	101.5	99.5	99.8	97.2	103.3	150.7
3150	102.9	103.9	104.8	104.8	105.0	104.3	103.0	99.1	100.1	100.5	101.0	101.6	101.6	99.1	98.6	96.2	102.8	150.2
4000	102.8	103.8	104.1	104.9	105.4	104.3	103.4	100.6	101.9	102.8	104.1	104.4	105.4	102.3	102.9	98.8	104.4	151.8
5000	101.2	102.7	102.2	103.4	102.9	102.7	101.1	97.6	99.1	99.9	100.2	100.5	101.2	98.9	99.6	96.2	102.0	149.4
6300	99.8	100.1	100.5	101.1	101.0	100.8	99.0	96.2	97.8	99.8	100.2	100.5	101.7	98.8	99.8	95.6	101.4	148.8
8000	97.6	98.3	99.5	99.8	100.8	100.1	98.5	95.6	97.3	99.8	100.3	100.6	101.3	98.1	98.3	94.4	101.5	148.9
10000	95.4	96.1	97.0	97.9	98.9	98.4	96.9	93.2	95.0	96.4	97.7	97.5	99.2	95.9	96.2	91.7	100.2	147.6
12500	92.4	93.6	93.7	94.9	96.1	95.8	94.8	90.8	91.7	94.2	94.5	94.7	96.5	92.8	93.8	88.0	98.8	146.2
16000	89.8	90.6	90.8	92.5	94.0	93.3	92.5	87.5	88.8	89.7	91.1	90.9	92.3	89.6	90.5	85.3	97.7	145.1
20000	85.1	85.9	87.1	88.8	91.9	90.1	91.4	84.5	84.8	86.1	86.8	87.4	88.4	85.1	85.9	81.0	97.3	144.7
OVERALL	115.6	117.0	118.7	120.3	121.3	120.3	118.8	114.4	114.4	114.4	115.4	115.0	114.2	114.4	113.7		117.7	165.1

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE	
61 METERS	102.7 112.2 116.6 119.7 121.9 122.6 121.6 118.9 120.1 119.9 120.1 120.1 119.2 115.7 113.3 107.5
305 METERS	76.5 90.8 97.2 102.1 104.5 105.1 104.7 101.7 102.9 102.5 102.5 102.4 101.0 97.3 93.9 86.9

TABLE VI. - NOISE OF FAN C CONFIGURATION 303 (HARD INLET, FORE-ROTOR-TREATED 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/sq m; PWL re 0.1 picowatt.]

(a) Percent of design speed, 60; fan physical speed, 3150 rpm; fundamental blade passage frequency, 1365 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
50	79.7	81.0	78.0	83.2	78.8	81.0	82.3	76.7	80.2	78.3	77.3	78.6	79.2	80.0	81.2	83.4	80.1	127.5
63	72.4	73.4	72.7	75.1	75.7	75.7	73.2	74.9	75.7	76.4	76.8	79.4	79.4	79.7	81.6	82.6	77.0	124.4
80	73.6	74.3	74.1	74.5	77.6	76.0	75.8	74.1	76.5	76.5	78.1	78.6	82.5	82.3	84.3	85.4	79.0	126.4
100	80.7	77.5	79.8	81.2	83.0	80.0	79.3	78.0	79.5	80.3	82.0	82.3	84.3	84.8	86.3	86.7	82.1	129.5
125	79.7	80.0	79.5	80.4	80.0	78.5	79.5	79.4	81.4	81.9	82.5	83.6	84.5	84.7	85.9	85.9	82.3	129.7
160	81.8	81.8	82.5	82.2	83.7	82.2	79.3	81.2	81.8	81.8	82.7	82.9	83.0	83.0	84.0	84.4	82.4	129.8
200	84.5	85.0	86.4	84.5	84.0	81.0	79.0	78.5	78.4	79.4	79.2	79.8	82.2	83.0	83.2	82.7	81.9	129.3
250	84.2	84.3	82.8	82.8	82.7	80.8	79.7	78.2	80.0	80.8	81.5	82.6	83.8	84.2	83.5	81.7	82.0	129.4
315	83.1	83.9	82.3	82.3	81.6	79.8	80.3	79.3	80.4	81.4	81.3	82.6	82.8	83.3	82.6	81.0	81.6	129.0
400	85.2	85.8	84.7	83.5	83.2	79.7	79.7	79.5	81.3	82.7	82.5	83.9	85.2	84.3	82.8	80.5	82.9	130.3
500	86.3	86.3	85.7	85.5	84.3	81.2	80.5	81.3	81.7	83.3	83.7	84.9	85.2	84.8	83.3	80.6	83.8	131.2
630	88.0	88.0	86.8	86.3	84.5	82.1	81.0	81.6	82.8	84.5	85.5	86.4	87.5	87.0	84.1	82.0	85.1	132.5
800	89.9	90.0	88.0	87.7	86.7	84.5	83.7	83.5	85.0	86.4	87.4	88.6	90.0	88.9	85.0	83.3	87.1	134.5
1000	91.0	91.3	90.3	89.1	87.8	85.5	85.0	85.3	87.0	88.3	89.1	90.7	91.3	90.3	86.5	84.5	88.8	136.2
1250	93.4	97.9	99.5	98.2	100.5	96.5	92.7	90.4	91.4	92.9	94.0	96.1	96.9	95.5	90.9	88.1	96.1	143.5
1600	94.6	94.4	94.9	94.2	95.4	91.1	87.9	87.6	89.4	91.2	92.1	93.3	94.7	92.6	88.7	85.8	92.5	139.9
2000	91.2	92.3	91.5	90.8	88.3	86.5	85.3	86.5	89.3	90.8	92.2	93.6	94.7	91.8	88.5	84.9	91.0	138.4
2500	94.5	96.0	94.8	95.0	94.0	89.6	86.5	87.0	90.1	92.6	92.3	94.1	96.0	94.1	90.3	85.2	93.1	140.5
3150	91.9	93.6	93.1	92.6	90.9	87.1	84.2	85.4	88.7	91.2	92.1	94.0	95.1	92.9	89.6	84.6	91.9	139.3
4000	93.0	94.5	95.3	96.0	93.0	90.2	85.5	86.0	90.3	92.7	94.2	95.8	96.5	93.8	90.0	85.6	93.9	141.3
5000	92.5	94.2	92.7	93.3	90.8	88.2	83.2	84.2	88.7	89.5	91.0	92.6	94.2	92.7	89.3	83.6	91.9	139.3
6300	91.9	92.4	92.2	92.0	89.9	87.4	81.0	81.4	86.1	87.0	88.9	89.8	91.6	89.6	87.1	80.9	90.4	137.8
8000	90.4	92.3	92.3	91.6	90.0	87.3	80.2	80.1	84.7	86.4	88.1	89.3	90.6	88.2	84.9	80.4	90.5	137.9
10000	89.8	91.7	91.0	90.6	89.0	87.0	78.4	77.9	82.8	83.8	85.6	86.7	89.1	86.1	83.5	77.5	90.0	137.4
12500	88.1	89.9	88.6	88.6	87.1	84.4	75.2	74.7	78.7	81.0	82.3	83.3	85.8	82.5	80.3	74.8	88.8	136.2
16000	85.9	86.9	85.7	85.7	83.0	80.8	69.4	69.3	75.3	76.3	77.4	78.5	80.1	78.6	77.0	70.6	87.0	134.4
20000	81.5	81.7	81.8	81.8	79.0	74.9	64.6	64.2	69.4	71.2	72.4	74.3	75.5	72.9	72.1	64.6	85.2	132.6
OVERALL	104.9	105.3	105.3	104.9	104.6	101.2	97.9	97.4	99.9	101.6	102.6	104.1	105.4	103.6	100.6	97.9	103.6	151.0

DISTANCE

SIDELINE PERCEIVED NOISE LEVELS

61 METERS	90.6	100.1	103.9	106.8	107.1	105.3	102.6	103.2	106.6	108.3	109.0	109.7	109.4	105.6	99.8	91.8
113 METERS	82.2	92.4	96.6	99.6	100.5	98.6	96.3	97.0	100.1	101.8	102.4	103.0	102.6	98.9	92.8	84.3

(b) Percent of design speed, 70; fan physical speed, 3675 rpm; fundamental blade passage frequency, 1592 hertz.

FREQUENCY	ANGLE, DEG											AVERAGE SPL	POWER LEVEL (PWL)				
	10	20	30	40	50	60	70	80	90	100	110			120	130	140	150
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																
50	78.3	76.0	77.8	77.3	77.2	78.5	78.7	79.0	79.7	80.5	80.3	82.6	83.7	85.2	87.0	89.4	81.9
63	84.7	84.2	86.3	85.5	81.3	84.0	82.7	84.0	80.8	83.3	86.8	82.4	87.8	86.5	87.7	90.0	85.1
80	76.3	76.3	74.8	74.8	75.8	75.6	76.5	77.0	78.0	80.0	82.0	84.2	86.6	88.6	90.5	91.8	83.7
100	78.1	78.0	76.8	76.8	78.1	80.0	79.6	80.1	81.8	83.6	85.3	87.6	88.6	91.0	92.6	93.2	86.1
125	87.7	86.7	85.0	85.0	87.9	87.9	87.0	85.7	86.7	86.7	86.2	88.0	88.0	89.0	93.4	92.7	88.6
160	82.0	82.9	83.5	83.2	83.2	83.5	84.0	84.2	85.7	86.4	86.4	88.0	88.0	89.0	89.9	89.3	86.2
200	83.8	84.8	84.0	82.5	82.5	81.8	82.1	82.3	83.3	84.8	85.3	85.5	87.5	88.5	89.3	88.3	85.1
250	86.5	86.8	86.0	85.2	85.2	83.5	81.7	82.7	84.2	85.5	86.3	88.8	88.8	89.7	89.5	87.4	86.4
315	86.9	86.6	85.6	85.4	83.7	83.6	83.9	84.2	85.4	86.1	86.7	87.5	88.6	88.7	88.4	85.8	86.2
400	88.6	90.6	90.1	92.4	86.4	86.1	85.6	86.6	85.6	88.6	87.4	89.7	91.4	89.4	88.1	87.3	88.7
500	90.4	90.2	89.2	89.2	87.9	84.9	86.1	85.6	85.7	86.7	87.7	88.8	90.6	89.6	87.9	85.3	88.0
630	92.2	92.5	92.9	90.9	91.5	90.2	86.2	86.7	88.5	89.2	90.2	91.4	91.9	91.5	88.5	86.1	90.3
800	92.2	92.3	91.2	90.8	90.2	89.8	87.3	87.5	88.3	89.8	91.5	92.2	94.2	92.0	88.8	86.5	90.7
1000	93.8	94.5	93.6	95.7	93.4	91.7	90.7	91.8	91.2	92.3	93.8	94.8	96.8	94.3	90.3	86.9	93.5
1250	94.9	95.7	95.5	96.7	94.9	91.7	91.4	90.5	92.5	92.7	94.2	95.5	96.2	93.4	90.0	87.7	94.0
1600	105.4	105.4	108.7	113.6	108.6	105.4	102.9	100.1	100.1	101.9	104.3	101.7	100.9	97.7	96.8	96.8	105.7
2000	95.2	96.0	96.2	97.7	94.8	92.8	90.7	91.8	93.3	94.7	96.2	97.4	98.2	94.0	90.7	88.2	95.3
2500	94.8	95.8	95.5	94.8	93.6	92.0	89.3	90.4	93.6	94.8	95.6	96.5	97.9	94.1	90.8	86.9	94.7
3150	100.2	102.7	103.0	102.7	102.0	99.2	94.5	93.3	95.5	97.3	98.5	100.6	102.7	103.3	99.5	91.8	100.6
4000	95.8	97.1	97.1	96.6	95.6	93.5	89.6	90.5	93.7	95.3	96.8	98.3	99.2	95.0	91.5	87.6	96.3
5000	99.4	100.4	98.4	100.2	98.7	96.7	91.7	90.9	94.7	95.9	98.2	99.2	102.6	98.1	94.7	90.2	98.9
6300	96.2	96.3	96.7	96.6	95.6	93.9	87.6	87.4	91.8	92.4	94.4	95.1	97.2	93.2	91.1	85.1	95.5
8000	93.5	95.4	96.5	95.7	95.0	93.4	86.3	86.0	90.2	92.0	93.7	95.0	96.2	91.7	89.2	84.5	95.4
10000	92.5	94.5	94.1	94.4	93.4	92.1	84.2	83.9	88.2	89.4	91.8	92.6	94.4	90.1	87.3	82.0	94.6
12500	90.4	92.0	91.3	91.5	90.8	89.1	80.4	80.8	84.3	86.6	88.1	89.2	91.4	86.8	84.2	79.3	92.9
16000	87.7	88.9	87.7	88.5	86.7	84.9	74.6	75.4	80.6	81.9	83.3	84.6	86.3	83.3	81.4	74.9	90.8
20000	83.2	83.6	83.9	84.2	82.7	78.9	69.6	69.9	74.2	76.8	78.3	80.2	81.5	77.6	76.5	69.0	88.8
OVERALL	109.4	110.2	111.5	114.7	111.0	108.3	105.3	103.9	105.4	106.6	107.9	109.5	110.3	108.5	105.9	103.5	109.7

SIDELINE PERCEIVED NOISE LEVELS

61 METERS	96.6	105.4	110.7	116.1	114.5	113.2	111.2	110.3	111.7	113.1	113.9	114.7	115.0	112.3	106.6	98.1
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TABLE VI. - Concluded.

FREQUENCY	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																AVERAGE SPL	POWER LEVEL (PWL)
	ANGLE, DEG																	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
50	32.7	80.4	81.4	80.6	81.4	82.4	82.7	82.7	84.1	84.2	86.2	86.7	87.7	89.9	92.9	94.4	86.6	134.0
63	86.7	83.4	86.9	82.2	82.7	81.4	83.1	83.2	85.4	86.1	85.7	87.8	88.7	90.9	93.6	95.4	87.6	135.0
80	85.8	82.8	85.8	80.8	81.5	80.8	81.8	82.5	85.0	85.8	86.8	89.8	91.5	94.7	96.7	98.7	89.8	137.2
100	82.7	81.9	81.4	81.4	81.0	82.5	82.5	84.7	86.9	88.7	90.4	92.5	94.5	96.7	99.2	99.4	91.8	139.2
125	86.9	85.9	86.4	85.4	86.1	87.4	87.1	88.6	89.2	91.2	92.9	94.0	95.1	97.1	99.2	98.3	92.7	140.1
160	86.6	87.6	88.1	87.4	88.4	88.6	88.4	89.9	90.1	91.3	91.4	93.2	93.8	94.9	95.8	94.8	91.5	138.9
200	87.7	90.0	88.2	86.9	86.9	86.9	86.7	86.7	87.2	88.7	89.4	91.4	93.2	94.4	95.7	93.7	90.3	137.7
250	89.0	93.5	89.9	93.0	91.4	88.5	90.2	88.2	90.9	91.2	93.7	95.6	94.7	95.7	96.2	94.4	92.6	140.0
315	89.5	91.2	91.9	91.0	91.0	88.7	90.7	89.5	91.2	91.5	93.0	94.6	94.5	94.7	94.7	92.8	92.3	139.7
400	90.3	89.8	93.2	92.8	92.0	89.2	89.2	88.3	92.0	90.8	91.7	94.2	94.0	94.5	93.5	90.7	92.1	139.5
500	95.8	95.8	101.8	103.3	101.3	95.0	94.0	95.8	94.0	96.8	93.7	97.3	95.5	95.2	95.7	93.6	97.7	145.1
630	96.6	98.6	103.1	106.9	103.7	100.4	98.0	100.1	94.6	96.6	98.1	96.3	97.4	94.7	96.6	91.8	100.2	147.6
800	99.8	102.0	107.1	107.1	110.6	108.3	104.4	102.9	97.8	98.4	100.4	98.7	98.9	99.1	97.4	92.5	104.4	151.8
1000	100.8	103.8	106.3	107.3	113.1	108.9	102.4	98.6	96.9	98.8	96.9	100.7	100.1	97.9	97.4	94.2	105.0	152.4
1250	100.0	102.0	104.0	106.0	114.0	109.9	104.7	100.9	99.9	98.2	98.4	101.1	99.2	98.0	95.4	93.6	105.8	153.2
1600	105.6	107.0	108.3	109.5	111.8	107.8	102.8	100.8	99.5	100.1	103.3	102.1	103.0	99.3	97.1	96.5	105.6	153.0
2000	110.5	112.3	113.1	113.6	115.5	112.1	106.1	104.8	103.0	103.1	108.0	106.1	107.1	103.1	101.1	100.9	109.8	157.2
2500	101.0	102.3	103.5	104.5	106.5	103.3	98.8	97.0	98.2	98.7	99.7	99.9	100.0	96.0	94.0	91.2	101.5	148.9
3150	100.6	102.6	103.9	103.6	105.2	102.1	97.9	96.9	98.6	100.4	101.6	102.2	101.7	97.9	94.1	92.0	101.8	149.2
4000	104.2	104.0	105.3	105.2	105.7	103.7	98.2	96.8	98.7	101.3	102.7	103.3	103.9	100.3	95.5	92.8	103.2	150.6
5000	100.0	101.5	101.7	103.3	102.3	101.0	95.8	94.8	97.8	99.0	100.5	100.8	102.5	97.5	95.5	91.0	101.1	148.5
6300	98.6	98.8	99.9	100.5	100.6	98.5	93.5	93.5	95.1	96.4	98.2	98.7	100.2	95.9	93.7	88.7	99.3	146.7
8000	96.7	98.3	99.8	99.7	100.2	98.2	92.7	91.3	94.8	97.4	98.5	99.4	100.2	95.5	92.8	89.0	98.8	147.2
10000	95.0	96.5	96.9	98.0	98.5	96.6	90.3	88.6	92.6	94.4	96.3	96.2	98.3	93.3	90.5	85.9	98.6	146.0
12500	92.4	93.7	93.9	94.8	95.8	93.7	86.6	85.7	88.7	91.2	93.0	93.6	95.2	90.2	87.9	83.3	96.9	144.3
16000	89.5	90.3	91.0	91.7	92.3	90.3	81.4	80.3	85.0	87.2	88.4	89.1	90.2	87.0	84.8	78.8	95.0	142.4
20000	85.3	85.5	87.5	88.7	89.9	86.0	78.0	74.7	79.0	82.0	83.6	85.1	86.1	81.5	79.9	73.3	93.9	141.3
OVERALL	114.4	115.9	117.3	118.3	121.1	117.6	112.5	110.9	110.0	111.0	113.1	113.0	113.6	110.9	110.1	108.8	115.5	162.9
SIDELINE PERCEIVED NOISE LEVELS																		
61 METERS	102.3	111.9	117.1	120.4	123.9	121.9	117.8	116.9	116.6	117.5	119.5	118.3	117.8	113.0	108.9	103.5		

(d) Percent of design speed, 90; fan physical speed, 4720 rpm; fundamental blade passage frequency, 2045 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	86.9	83.4	84.7	84.9	85.7	86.7	86.4	86.9	88.7	88.7	89.9	92.2	93.4	95.2	98.4	102.3	92.3	139.7
63	82.9	84.9	84.9	84.4	84.9	85.1	85.6	85.9	86.9	87.4	89.4	90.9	93.9	96.4	99.1	101.5	92.1	139.5
80	91.7	92.9	95.4	92.2	87.2	85.2	88.2	89.2	87.7	91.2	93.4	95.2	97.9	99.9	103.2	105.3	96.1	143.5
100	86.7	84.9	85.7	85.9	85.4	86.2	87.7	89.4	91.9	93.7	95.4	98.4	99.9	102.9	105.4	105.8	97.7	145.1
125	91.2	89.4	89.9	89.4	90.7	91.2	91.4	92.9	94.9	95.9	97.4	99.7	103.2	104.9	104.3	98.2	98.2	145.6
160	91.7	93.5	94.5	92.7	94.0	94.0	96.0	95.0	96.2	96.5	96.5	99.7	100.0	101.2	102.2	100.3	97.5	144.9
200	90.9	92.7	91.9	93.7	92.9	92.4	92.2	91.7	92.7	94.7	96.2	99.4	100.9	101.7	99.3	95.9	95.9	143.3
250	96.9	99.9	97.4	102.4	100.4	97.4	96.9	94.7	93.9	95.4	96.9	98.5	100.4	102.2	101.7	99.6	98.8	146.2
315	102.0	96.0	103.2	103.0	99.0	101.2	97.5	98.7	98.5	97.2	99.7	100.5	103.0	102.5	102.0	98.3	100.5	147.9
400	96.1	100.6	100.4	105.4	106.9	102.4	95.6	99.1	97.9	98.1	97.1	98.4	99.6	100.4	99.9	96.3	101.2	148.6
500	103.1	108.9	114.9	114.9	112.4	108.4	107.4	105.1	104.6	105.6	102.9	102.1	100.9	100.6	98.8	108.7	108.7	156.1
630	99.1	103.1	109.9	107.9	109.4	108.6	105.4	101.6	100.9	99.6	101.6	100.6	99.9	100.6	100.4	96.8	104.9	152.3
800	105.9	105.1	109.9	110.1	111.9	109.6	108.6	99.9	99.9	101.6	99.4	99.4	100.9	101.9	101.1	101.0	106.4	153.8
1000	103.2	102.7	105.5	110.2	112.2	106.5	102.5	99.2	98.7	99.0	99.2	101.5	100.0	100.0	99.5	96.1	104.9	152.3
1250	104.1	105.9	106.1	110.6	110.1	106.6	103.1	101.1	99.6	100.1	99.1	99.9	99.9	99.9	97.4	96.8	104.7	152.1
1600	102.5	103.0	104.5	106.0	108.3	105.5	100.3	99.3	98.3	99.1	100.1	100.1	100.3	97.8	97.6	94.2	102.7	150.1
2000	106.5	106.5	108.5	111.2	109.7	109.0	103.2	102.5	107.5	104.7	108.2	106.5	106.7	101.7	102.2	99.1	107.3	154.7
2500	103.1	104.3	105.1	106.1	106.3	104.1	99.6	97.8	99.1	100.1	100.3	100.6	100.6	97.6	96.8	94.0	102.4	149.8
3150	101.1	102.8	103.6	104.3	105.1	103.1	97.8	97.3	99.1	99.6	101.3	101.1	100.6	96.3	95.1	93.0	101.7	149.1
4000	101.2	102.2	103.2	103.7	104.2	102.4	98.2	98.9	100.9	103.2	104.4	105.2	104.5	98.5	97.0	95.1	103.3	150.7
5000	99.9	100.7	100.9	102.9	102.9	100.9	96.4	95.4	98.2	98.9	99.9	101.0	100.9	97.2	95.2	92.1	100.9	148.3
6300	98.2	97.9	98.6	99.9	100.8	98.4	94.2	94.1	97.3	98.3	100.9	100.4	102.6	97.3	94.8	90.6	100.4	147.8
8000	96.2	96.9	98.5	99.2	100.2	97.9	93.4	92.9	96.7	99.0	100.5	101.1	100.9	95.7	93.7	90.7	100.5	147.9
10000	94.0	95.0	96.3	97.0	98.3	97.0	91.3	90.8	94.8	96.0	98.5	98.1	99.8	94.0	92.3	87.6	99.5	146.9
12500	90.9	92.0	93.0	94.9	96.1	94.4	87.4	88.0	90.9	93.9	95.7	96.4	91.4	89.4	85.5	98.1	98.1	145.5
16000	88.1	88.4	90.1	92.3	93.8	91.3	82.4	83.4	88.0	89.9	91.4	91.6	92.5	88.3	86.8	81.7	96.6	144.0
20000	83.6	83.4	86.4	89.4	91.6	87.6	78.6	78.2	82.2	85.1	87.1	88.0	88.4	83.2	82.1	76.4	95.6	143.0
OVERALL	114.5	115.8	119.2	120.3	120.3	117.8	114.7	112.1	113.3	113.2	114.6	114.6	115.0	113.9	114.3	113.5	116.6	164.0

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE	61 METERS	305 METERS
	101.4	76.5
	110.1	89.4
	116.2	98.2
	120.6	102.3
	121.9	104.2
	121.5	104.0
	118.0	100.8
	117.2	101.1
	120.0	102.8
	119.5	101.7
	120.7	103.2
	119.9	101.7
	118.7	100.5
	114.0	95.8
	111.4	92.6
	105.1	85.1

TABLE VII. - NOISE OF FAN C CONFIGURATION 304 (HARD INLET, FORE-STATOR-TREATED 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/sq m; PWL re 0.1 picowatt.]

(a) Percent of design speed, 60; fan physical speed, 3090 rpm; fundamental blade passage frequency, 1339 hertz.

FREQUENCY	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS											AVERAGE SPL	POWER LEVEL (PWL)				
	ANGLE, DEG																
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	
50	76.5	79.7	81.5	80.3	83.3	78.2	84.0	79.8	79.2	79.2	76.8	77.4	78.7	79.8	81.7	83.7	80.5
63	73.0	74.1	73.1	73.0	75.0	74.3	74.0	73.6	74.3	74.6	75.1	76.6	79.3	80.6	81.5	82.5	76.7
80	74.8	74.5	73.0	71.8	73.8	75.6	74.8	74.3	75.3	76.3	77.6	78.9	81.3	83.3	84.6	85.8	78.8
100	83.2	81.3	81.7	76.3	80.2	79.5	77.8	78.8	82.0	80.5	81.7	82.3	83.8	86.5	87.0	87.9	82.4
125	85.1	80.6	80.1	78.8	80.1	79.5	80.0	80.3	81.6	81.8	82.3	83.4	84.3	85.5	86.5	86.3	82.4
160	81.3	80.4	80.9	83.1	83.3	80.6	82.3	83.1	82.1	83.3	83.6	83.5	83.1	85.4	85.3	84.0	83.1
200	82.0	89.3	82.8	79.2	79.2	79.2	77.8	77.7	78.5	79.5	79.5	79.9	82.2	83.5	83.5	82.2	81.2
250	84.2	83.9	82.7	81.4	81.4	80.2	78.5	78.7	80.7	80.9	82.0	83.5	84.4	85.5	84.5	82.1	82.2
315	84.0	82.6	83.0	81.1	82.0	79.8	79.6	79.5	80.6	80.8	81.6	82.6	83.3	84.1	83.0	80.7	81.7
400	85.3	85.1	85.4	83.8	83.8	79.8	79.4	80.3	82.4	82.4	83.3	84.0	85.1	84.6	83.1	80.6	83.1
500	86.4	86.1	86.6	86.4	84.7	80.7	80.6	81.1	81.7	83.6	84.2	85.2	85.7	85.1	83.2	80.5	84.1
630	87.7	87.2	87.7	87.2	85.0	82.0	81.2	81.8	83.0	84.8	86.3	86.6	88.0	86.8	83.8	81.1	85.4
800	89.6	89.5	88.8	88.0	87.0	84.3	84.1	84.3	85.5	86.3	87.8	88.9	90.6	88.5	84.8	82.7	87.3
1000	91.2	90.6	91.7	89.4	88.6	85.6	85.4	85.7	87.2	88.4	89.7	90.3	91.4	90.2	86.6	83.4	89.0
1250	99.1	99.6	101.8	101.8	101.1	98.5	93.1	93.8	92.1	92.5	95.0	94.6	96.6	95.3	91.6	88.7	97.3
1600	93.0	93.2	94.3	93.8	92.8	90.0	86.5	87.8	88.7	90.0	91.7	92.1	93.7	91.5	87.3	84.6	91.4
2000	90.7	91.4	91.5	90.5	88.7	86.0	84.7	86.9	89.0	90.5	92.2	92.6	94.2	91.2	87.7	83.8	90.6
2500	95.1	95.6	97.1	96.8	96.1	92.1	87.6	87.8	89.6	92.1	92.4	92.9	94.6	94.3	90.3	84.7	93.6
3150	91.2	92.5	93.5	92.5	90.9	87.0	83.5	85.0	87.9	90.2	91.5	92.8	94.2	91.4	88.2	82.6	91.2
4000	93.5	93.0	96.5	97.0	95.0	92.0	85.4	85.9	89.2	90.9	93.9	93.8	95.0	92.5	88.7	84.1	93.7
5000	92.5	94.4	93.5	94.7	91.8	89.4	83.2	83.3	87.2	88.2	89.7	90.3	92.0	90.3	87.4	81.3	91.3
6300	92.1	92.2	92.9	92.7	90.9	88.1	80.8	80.6	84.1	85.5	88.0	88.1	89.5	87.5	84.1	78.4	89.9
8000	91.0	92.4	92.5	91.8	90.5	87.6	79.5	78.8	82.3	84.5	86.7	86.3	88.3	85.3	82.5	77.5	89.7
10000	89.6	91.3	90.8	93.4	89.5	87.0	78.1	76.8	79.9	81.4	84.6	83.8	86.3	83.1	80.9	74.2	89.1
12500	88.0	89.7	88.5	88.5	87.1	84.3	74.5	74.4	77.0	78.5	81.5	80.8	83.2	79.5	78.1	72.1	88.1
16000	86.6	86.8	86.1	87.1	84.1	81.4	69.7	70.1	74.6	75.3	77.8	77.4	79.9	77.5	76.1	69.0	87.5
20000	83.1	84.3	84.2	84.2	81.7	77.0	67.3	67.1	70.4	72.4	75.1	75.1	77.5	73.9	72.6	65.5	87.5
OVERALL	104.7	105.5	106.5	106.3	105.2	102.3	98.0	98.5	99.5	100.8	102.6	102.9	104.4	102.9	100.1	97.5	103.6

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE	61 METERS	113 METERS
	90.8	99.9
	82.0	92.2
	105.0	107.5
	108.1	106.2
	102.9	103.7
	105.8	107.3
	108.8	108.2
	108.3	105.2
	99.4	91.1
	101.6	99.6
	96.6	97.5
	99.5	101.1
	102.2	101.6
	101.5	98.6
	101.5	92.4
	98.6	83.7

(b) Percent of design speed, 70; fan physical speed, 3605 rpm; fundamental blade passage frequency, 1562 hertz.

FREQUENCY	ANGL ^E , 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	79.6	75.3	78.3	78.3	77.8	78.5	79.0	80.0	80.3	81.0	81.8	83.2	84.3	86.0	88.0	89.2	82.5	129.9
63	86.0	79.5	83.7	88.0	81.8	83.3	83.8	84.7	81.2	84.2	85.0	85.1	87.7	87.3	89.2	90.4	85.5	132.9
80	78.1	77.8	76.3	75.3	75.8	77.3	76.5	77.3	79.5	81.3	82.5	85.1	87.1	89.1	91.3	92.4	84.4	131.8
100	79.5	78.7	79.2	77.2	78.0	79.3	79.8	81.7	83.2	84.7	86.3	87.8	90.2	91.8	93.0	93.2	86.8	134.2
125	84.4	84.1	86.1	83.4	83.1	84.6	84.8	85.4	86.1	87.3	87.9	89.4	90.3	91.8	92.8	92.3	88.0	135.4
160	83.1	84.0	84.6	83.0	84.5	84.5	85.0	86.0	86.6	86.5	86.8	88.0	89.0	90.0	89.8	88.5	86.8	134.2
200	85.6	85.1	84.8	82.5	84.5	83.3	82.8	83.6	83.8	84.8	86.5	88.0	89.5	89.5	89.5	87.2	85.6	133.0
250	89.1	88.6	88.3	85.8	86.6	85.1	83.1	83.8	86.8	87.0	87.1	88.7	90.5	91.0	90.1	87.0	87.6	135.0
315	87.1	87.4	86.9	85.3	85.1	84.6	84.6	84.9	86.1	86.8	87.1	88.2	89.4	89.8	88.4	85.5	86.9	134.3
400	89.4	91.2	90.7	90.4	86.9	86.2	86.9	86.9	87.7	89.2	88.5	89.1	91.4	85.9	88.2	87.7	88.9	136.3
500	91.6	91.9	93.1	89.4	88.4	86.6	85.8	87.3	87.9	87.8	88.6	89.8	91.1	90.1	87.8	85.3	89.1	136.5
630	91.4	93.4	93.6	92.9	91.9	88.6	87.3	85.9	88.6	89.3	91.6	91.2	93.3	91.9	88.1	86.3	90.8	138.2
800	92.8	93.3	92.5	92.0	92.3	90.1	88.5	88.0	89.0	90.6	92.0	92.7	94.6	92.1	88.3	86.7	91.4	138.8
1000	94.6	95.5	95.7	96.7	95.0	92.5	91.6	91.8	91.5	93.1	94.1	95.1	96.8	93.8	90.5	87.9	94.1	141.5
1250	95.5	97.1	97.5	97.6	96.8	94.1	92.5	91.6	92.0	93.1	94.1	95.6	96.1	94.0	90.0	88.2	94.8	142.2
1600	100.4	109.5	109.2	112.9	111.0	107.9	104.9	104.0	100.4	99.9	100.0	103.1	102.2	100.2	98.9	96.8	106.5	153.9
2000	95.7	97.0	96.7	97.0	96.5	94.4	92.0	91.9	93.5	95.0	96.2	96.8	97.9	93.5	90.9	88.4	95.5	142.9
2500	95.0	96.8	96.3	96.1	95.8	93.1	90.6	90.6	93.5	94.8	95.6	96.7	97.6	93.8	90.3	87.0	95.1	142.5
3150	101.1	104.1	104.5	103.8	104.8	100.8	95.1	93.1	96.1	96.6	98.0	100.1	101.8	100.3	96.0	91.4	101.0	148.4
4000	96.6	98.4	98.4	98.6	97.6	95.9	90.8	90.3	92.9	94.8	96.6	97.1	98.6	94.2	90.1	87.2	96.6	144.0
5000	99.8	101.2	100.5	101.8	100.5	98.7	92.3	90.0	93.3	95.0	96.6	97.1	98.5	95.5	92.2	87.9	98.5	145.9
6300	96.8	97.3	97.9	98.8	97.1	95.3	88.1	86.8	90.1	90.9	93.4	93.1	95.1	91.2	88.1	83.6	95.5	142.9
8000	94.5	96.8	97.0	96.6	96.3	94.3	87.0	84.8	88.5	90.0	92.3	92.7	93.5	89.2	86.3	82.5	95.0	142.4
10000	92.7	94.8	94.8	94.6	94.3	92.8	85.0	82.5	85.8	87.1	90.0	89.7	91.8	87.3	84.3	79.0	93.9	141.3
12500	90.7	92.7	91.4	91.7	91.6	89.7	80.9	79.6	82.4	84.6	86.9	87.2	88.2	83.4	81.8	76.8	92.3	139.7
16000	88.7	89.7	88.7	90.2	88.2	86.0	76.2	75.2	79.7	80.3	82.5	82.9	84.5	81.6	79.7	73.5	91.2	138.6
20000	85.2	86.4	86.5	87.3	85.9	81.5	73.6	72.6	75.6	77.6	79.9	81.2	82.2	78.1	76.4	70.7	91.1	138.5
OVERALL	110.2	112.5	112.4	114.5	113.2	110.3	106.8	106.0	105.3	106.1	107.2	108.6	109.5	107.3	105.2	103.4	110.1	157.5

SIDELINE PERCEIVED NOISE LEVELS

61 METERS	97.4	107.7	111.6	116.1	116.6	115.1	112.6	112.3	111.9	112.6	113.4	114.1	114.3	110.5	104.7	97.9
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TABLE VII. - Concluded.

(c) Percent of design speed, 80; fan physical speed, 4128 rpm; fundamental blade passage frequency, 1788 hertz.

FR. QUENCY	ANGL. F., 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	83.1	87.1	81.4	81.3	82.3	82.9	82.4	83.8	84.6	85.1	85.3	86.9	88.1	90.9	92.9	95.5	87.2	134.6
63	87.1	87.6	90.4	86.6	81.9	83.3	84.3	83.8	86.1	85.6	87.3	88.2	89.1	91.1	94.1	95.1	88.3	135.7
80	84.7	86.7	85.5	82.7	80.8	81.3	82.3	82.7	84.7	85.3	87.5	89.9	92.3	94.3	97.3	98.5	90.0	137.4
100	84.6	86.3	82.6	82.4	82.6	83.3	84.3	85.8	87.8	89.3	91.1	92.7	94.8	97.4	98.9	99.8	92.2	139.6
125	88.6	89.0	88.3	87.0	87.6	88.6	89.5	89.3	90.3	91.5	92.6	94.1	95.6	97.6	99.1	98.2	93.1	140.5
160	88.6	87.9	88.6	87.6	88.6	88.3	89.4	90.1	90.6	91.3	91.9	92.7	93.8	95.4	95.9	94.5	91.7	139.1
200	89.6	89.6	89.3	87.1	87.0	86.6	87.6	88.0	87.8	88.0	89.5	90.7	93.5	94.6	95.6	93.2	90.4	137.8
250	90.1	92.3	90.8	92.8	93.8	87.5	90.8	89.5	92.1	92.0	94.6	95.9	96.0	96.6	96.5	93.7	93.5	140.9
315	90.1	90.8	93.8	92.5	91.5	88.0	90.0	90.0	91.0	91.1	92.6	94.4	94.8	95.1	94.8	91.9	92.4	139.8
400	92.5	91.0	94.4	92.2	93.5	90.0	90.0	90.4	91.9	91.9	92.4	94.0	94.7	94.7	94.2	90.6	92.7	140.1
500	101.6	101.2	107.1	105.9	105.7	99.9	96.1	99.1	96.9	98.1	96.7	97.7	96.1	95.7	96.9	92.1	100.9	148.3
630	98.6	101.1	105.1	108.4	107.8	102.8	100.4	98.6	98.6	97.1	99.3	98.0	97.3	97.1	96.1	94.3	102.2	149.6
800	101.5	101.5	107.0	106.3	110.0	107.0	103.8	101.8	99.5	97.3	98.2	98.3	99.5	98.3	96.3	93.4	103.7	151.1
1000	102.0	102.0	105.2	107.2	109.5	106.2	103.3	99.5	98.7	98.8	99.5	99.3	101.3	98.3	96.5	95.1	103.4	150.8
1250	102.1	104.7	104.4	109.1	108.7	107.1	103.7	100.7	98.2	98.2	99.1	99.8	100.4	96.7	96.7	93.3	103.8	151.2
1600	107.2	108.3	109.8	112.2	115.2	111.0	106.8	102.0	102.3	100.7	103.5	102.9	104.3	100.7	98.3	97.4	108.2	155.6
2000	109.7	110.2	111.5	113.9	116.9	112.9	108.5	103.4	104.0	101.9	105.0	104.6	106.0	102.2	100.0	99.3	110.0	157.4
2500	101.9	102.9	104.4	105.1	105.7	104.1	99.6	97.1	97.9	98.6	99.7	100.0	100.4	96.6	94.2	91.8	101.7	149.1
3150	102.3	102.8	104.4	105.1	105.9	103.9	98.4	96.9	98.1	99.8	101.6	102.4	102.3	97.9	94.6	92.2	102.4	149.8
4000	104.1	103.6	104.9	105.9	106.7	105.2	98.9	96.9	98.1	99.6	101.6	102.0	103.1	99.1	95.2	92.3	103.2	150.6
5000	100.9	101.8	101.9	103.6	103.1	102.3	96.8	94.3	96.6	97.6	98.8	98.9	100.1	95.6	93.8	89.7	100.7	148.1
6300	99.4	98.9	100.3	101.1	100.8	99.6	93.2	91.1	93.4	94.1	96.7	96.1	97.4	93.2	91.2	87.1	98.6	146.0
8000	97.2	98.4	99.9	99.0	100.5	98.7	92.5	89.7	92.3	93.9	96.4	96.2	96.9	92.0	89.8	86.4	98.5	145.9
10000	94.9	96.1	96.6	97.1	97.9	97.3	89.7	87.1	89.7	90.7	93.7	93.1	94.9	89.6	87.6	83.0	97.1	144.5
12500	92.4	93.7	93.5	94.5	96.0	94.3	85.9	84.1	85.9	88.1	90.4	90.1	91.8	86.5	85.2	80.0	95.7	143.1
16000	90.4	90.4	91.1	93.1	92.7	91.0	81.4	79.6	83.2	84.0	86.4	86.4	88.0	83.7	83.1	77.0	94.6	142.0
20000	87.1	87.3	88.7	90.3	90.9	88.1	79.4	76.3	79.2	80.9	83.6	83.9	85.1	80.6	79.8	74.0	94.7	142.1
OVERALL	15.0	115.6	117.6	119.3	121.4	117.9	113.8	110.6	110.6	110.3	112.1	112.2	113.2	110.7	109.9	108.6	115.7	163.1
SIDELINE PERCEIVED NOISE LEVELS																		
DISTANCE																		
61 METERS	102.5	111.2	116.8	121.1	124.8	122.7	119.3	116.4	117.1	116.5	118.1	117.5	117.2	112.4	108.3	102.7		

(d) Percent of design speed, 90; fan physical speed, 4639 rpm; fundamental blade passage frequency, 2010 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	86.8	83.1	85.3	85.1	85.9	86.4	86.9	87.3	88.1	89.1	89.9	90.5	92.6	95.6	99.1	100.8	91.9	139.3	
63	83.8	86.3	84.9	83.9	85.1	85.9	86.3	86.9	87.1	88.9	90.8	93.4	96.3	99.6	101.0	92.0	139.4	142.8	
80	91.6	90.5	89.6	89.0	90.1	88.6	85.6	89.0	88.6	89.5	92.5	93.4	97.0	100.0	102.8	104.7	95.4	145.2	
100	88.1	86.1	86.5	85.8	86.5	88.3	85.3	90.5	91.5	93.5	95.8	97.0	99.8	102.6	105.8	106.3	97.8	145.6	
125	91.7	89.5	90.5	89.7	91.0	92.7	92.7	94.0	95.3	95.8	97.5	98.6	100.5	103.0	105.3	104.0	98.2	145.1	
160	94.4	92.6	93.0	92.0	94.3	93.8	96.1	96.0	96.6	97.5	97.8	98.1	99.5	101.6	102.8	100.9	97.7	143.7	
200	93.7	93.5	93.3	95.7	95.5	95.0	94.5	92.5	92.5	93.0	94.2	95.9	98.7	100.8	101.8	99.1	96.3	147.3	
250	100.2	98.0	99.3	103.2	103.0	101.3	100.3	95.7	94.3	95.5	97.2	98.4	100.5	102.3	102.3	98.9	99.9	148.2	
315	99.4	99.3	104.0	105.0	98.6	95.0	99.0	99.8	101.5	100.1	99.1	100.7	102.3	101.8	101.3	97.2	100.8	149.0	
400	96.6	101.1	102.4	106.1	107.4	103.2	99.7	97.6	96.6	98.6	97.7	98.8	99.6	100.7	99.6	96.3	101.6	156.8	
500	103.8	112.2	111.7	114.2	113.2	110.4	109.6	108.6	108.6	108.1	106.1	104.8	102.7	102.6	102.4	98.8	109.4	151.6	
630	98.1	107.2	107.6	108.4	108.4	106.6	104.6	102.1	101.4	100.1	99.7	100.3	99.7	100.1	99.2	97.6	104.2	149.0	
800	107.4	106.8	111.3	111.2	112.2	109.0	107.5	103.5	102.3	102.3	98.3	100.6	100.3	102.5	101.7	97.0	106.8	153.5	
1000	103.7	104.0	108.4	111.9	112.9	108.4	104.7	100.4	99.5	100.2	99.5	100.3	99.9	100.2	98.5	95.6	100.1	151.7	
1250	104.6	106.3	107.1	109.4	109.6	105.4	102.9	102.1	99.5	100.0	98.8	100.5	100.0	98.9	98.1	95.0	104.3	149.9	
1600	102.7	104.2	105.7	106.4	108.0	103.9	101.0	98.2	98.5	98.7	98.9	100.1	99.2	97.9	97.4	94.4	102.5	154.9	
2000	106.7	108.5	108.9	112.7	110.2	108.0	105.7	103.0	106.5	104.7	105.9	106.6	106.9	102.4	101.2	99.6	107.5	150.3	
2500	103.7	105.6	105.2	107.7	107.1	104.2	100.2	98.4	99.2	99.4	100.2	100.2	99.9	98.1	96.6	93.6	102.9	149.5	
3150	101.8	103.5	104.4	105.0	106.0	102.7	98.7	97.9	99.0	99.9	100.9	101.5	100.0	97.4	95.5	93.1	102.1	150.8	
4000	101.4	103.1	104.1	105.3	105.4	102.9	98.6	98.8	100.8	101.9	103.8	104.6	104.0	99.1	97.5	94.7	103.4	148.4	
5000	100.4	101.9	101.5	104.2	103.5	101.5	97.0	95.7	98.2	97.7	99.2	99.7	99.5	96.7	96.1	91.3	101.0	147.3	
6300	98.2	98.8	99.7	101.8	101.7	98.9	94.6	93.6	96.5	96.7	99.2	98.9	100.2	95.6	94.6	89.0	99.9	147.0	
8000	96.2	98.0	99.0	100.0	101.7	98.4	93.5	91.9	95.2	96.0	98.4	98.2	98.5	93.4	92.7	88.7	99.6	145.7	
10000	93.7	95.5	96.3	98.2	99.4	97.0	91.3	89.5	92.7	92.8	96.0	95.2	96.3	91.7	90.2	85.1	98.3	144.7	
12500	90.7	93.2	93.3	96.0	97.5	95.0	88.1	87.7	89.5	91.0	93.2	92.6	93.6	88.5	87.8	83.2	97.3	144.0	
16000	88.3	90.2	90.7	94.8	95.3	92.2	84.0	83.4	87.6	87.4	89.2	89.6	90.1	86.4	86.1	80.3	96.6	144.7	
20000	85.5	86.8	88.9	93.1	93.9	89.9	82.6	80.3	83.8	84.8	86.6	87.5	88.1	83.5	83.1	77.4	97.3	164.2	
OVERALL	115.0	117.7	118.8	120.9	120.7	117.6	115.5	113.5	114.0	113.8	114.3	114.4	113.9	114.5	113.2	116.8			

SIDELINE PERCEIVED NOISE LEVELS

SIDELINE PERCEIVED NOISE LEVELS

61 METERS	101.8	111.7	116.6	121.7	122.5	121.1	119.3	117.8	119.8	119.1	119.6	119.4	118.3	114.2	111.1	104.9
305 METERS	77.5	91.6	97.3	103.4	104.7	103.6	102.3	100.8	102.7	101.9	101.9	101.6	100.3	96.1	92.4	84.9

TABLE VIII. - NOISE OF FAN C CONFIGURATION 305 (HARD INLET, FULLY TREATED 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/sq m; PWL re 0.1 picowatt.]

(a) Percent of design speed, 60; fan physical speed, 3117 rpm; fundamental blade passage frequency, 1350 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
50	77.7	79.2	80.8	82.8	83.2	80.5	86.8	80.8	83.0	81.3	81.7	87.1	83.7	80.7	82.5	84.2	83.3	130.7
63	72.2	74.3	73.7	75.2	76.3	78.5	81.7	78.2	79.3	78.7	81.3	85.2	84.8	81.0	81.8	83.7	80.9	128.3
80	73.5	74.5	73.1	74.3	75.1	77.0	81.1	78.0	77.8	79.6	81.6	85.7	84.5	83.6	85.0	85.7	81.4	128.8
100	80.1	79.8	79.0	80.8	81.0	78.3	81.5	78.5	80.3	81.1	83.0	86.6	86.0	86.1	86.1	87.4	83.1	130.5
125	79.3	80.0	79.2	79.0	78.7	79.5	80.8	80.5	80.3	81.8	83.8	87.1	86.0	85.2	86.2	86.2	83.1	130.5
160	82.0	82.0	82.4	84.7	84.2	82.0	82.9	83.0	82.7	84.4	84.7	85.5	85.5	85.0	84.7	83.8	84.0	131.4
200	81.9	88.6	82.4	79.9	79.4	79.7	78.6	78.6	78.1	79.1	80.7	82.8	82.9	82.7	82.9	82.6	81.4	128.8
250	83.7	83.9	82.7	80.7	81.0	78.5	78.4	79.2	79.4	81.0	82.0	83.9	84.7	84.4	83.7	81.9	81.9	129.3
315	83.4	82.9	82.6	81.4	80.6	79.7	79.9	80.1	79.9	80.7	81.6	83.3	83.4	83.4	82.7	80.6	81.6	129.0
400	85.0	85.0	84.5	82.8	82.1	79.8	79.3	79.6	80.8	81.8	83.0	84.0	84.8	84.0	83.0	80.3	82.6	130.0
500	86.2	86.3	85.5	85.0	83.0	80.8	80.0	80.7	80.3	82.0	83.2	84.4	84.8	84.5	82.3	80.0	83.2	130.6
630	87.3	87.1	86.1	85.8	83.8	81.0	79.8	80.8	81.3	82.6	83.8	84.9	86.1	85.5	82.6	79.9	83.9	131.3
800	89.3	88.6	87.6	86.8	85.3	83.0	81.8	82.3	82.1	83.3	85.0	86.2	88.0	87.0	83.5	80.9	85.3	132.7
1000	90.8	90.4	89.5	88.3	87.3	83.8	82.9	83.1	83.4	84.4	85.6	87.2	88.3	87.4	83.9	81.5	86.5	133.9
1250	100.0	98.7	100.3	99.5	101.0	94.7	93.0	89.7	87.7	88.7	89.8	91.3	92.5	91.7	87.7	85.2	95.3	142.7
1600	93.7	93.4	93.9	93.0	93.2	88.0	85.7	83.7	83.2	84.5	85.9	87.6	89.5	87.4	83.5	80.8	89.2	136.6
2000	90.4	91.1	90.2	89.2	87.2	83.7	80.4	81.2	81.9	83.6	86.1	87.2	89.4	86.2	83.1	79.5	86.6	134.0
2500	94.5	96.2	96.0	95.0	93.5	88.8	84.5	83.7	84.3	86.2	87.5	88.8	91.2	89.9	87.2	81.8	90.9	138.3
3150	91.1	92.6	92.4	91.3	89.4	85.3	80.9	82.6	85.4	87.6	89.5	90.8	89.3	85.1	80.0	88.7	88.7	136.1
4000	92.4	94.4	95.2	95.2	92.7	89.0	83.7	82.5	84.7	86.7	90.4	91.3	92.0	90.2	86.0	81.6	91.3	138.7
5000	92.1	94.2	92.2	93.5	90.7	87.0	81.0	80.2	83.4	84.0	86.4	87.5	89.9	88.5	85.2	79.7	89.5	136.9
6300	91.4	92.1	91.8	91.4	89.8	85.7	78.8	77.7	81.2	81.7	84.8	85.2	87.2	85.7	82.1	76.8	88.2	135.6
8000	90.1	92.2	91.9	90.8	89.6	85.5	77.9	75.9	78.9	80.9	83.3	84.1	85.9	84.1	80.6	76.5	88.3	135.7
10000	89.3	91.1	90.3	88.9	88.4	85.1	76.3	74.6	77.4	78.9	81.8	82.2	84.8	82.3	79.6	73.8	87.9	135.3
12500	88.0	89.8	88.5	87.6	86.4	82.9	73.7	73.1	75.3	77.6	80.1	80.9	82.6	80.0	77.8	72.5	87.6	135.0
16000	85.9	86.5	85.7	85.6	82.4	79.1	68.6	68.6	73.2	74.4	75.9	77.1	78.5	77.9	75.9	69.2	86.4	133.8
20000	81.6	82.3	82.1	81.3	78.8	74.0	64.8	64.3	68.0	69.3	72.5	73.6	74.6	73.0	71.1	64.1	85.0	132.4
OVERALL	104.7	105.2	105.3	104.7	104.3	99.6	97.4	95.7	96.0	97.3	99.1	100.8	101.8	100.5	98.1	96.3	101.8	149.2
SIDELINE PERCEIVED NOISE LEVELS																		
61 METERS	90.4	100.0	103.9	106.1	106.5	103.9	101.4	100.6	102.0	103.4	105.6	106.0	105.8	102.4	96.9	88.9		
113 METERS	82.2	92.3	96.9	99.1	100.1	97.2	95.2	94.4	95.5	97.0	99.0	99.4	99.0	95.5	89.9	81.5		

(b) Percent of design speed, 70; fan physical speed, 3630 rpm; fundamental blade passage frequency, 1573 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	78.6	76.7	79.7	80.7	79.9	81.2	79.6	81.1	82.7	80.7	84.2	85.5	86.2	86.6	87.6	88.8	83.6	131.0
63	83.6	79.0	85.6	87.6	81.3	86.5	85.0	86.1	84.6	86.5	88.3	86.7	90.0	88.1	89.0	90.3	86.9	134.3
80	76.6	76.6	77.5	78.3	78.5	78.8	76.8	79.8	81.0	84.8	87.1	89.0	89.0	89.0	91.3	92.3	85.1	132.5
100	79.3	78.3	79.4	80.9	80.4	80.4	80.1	81.6	83.3	84.9	86.6	88.2	89.6	91.4	93.4	93.2	86.9	134.3
125	86.2	85.5	87.2	87.2	86.3	85.0	86.0	85.7	86.2	88.0	89.0	89.8	91.0	91.5	93.5	92.6	88.7	136.1
160	83.3	83.8	85.3	84.4	84.6	84.1	84.4	84.9	85.9	86.1	86.6	88.2	88.9	89.1	89.6	89.6	86.6	134.0
200	85.8	84.6	86.3	85.1	85.1	83.4	83.9	85.4	82.4	82.6	85.9	87.0	88.8	89.3	89.6	88.7	86.1	133.5
250	89.5	87.2	88.3	84.8	85.8	84.7	82.2	83.5	84.8	86.7	87.5	89.1	89.3	90.2	89.5	87.9	87.1	134.5
315	87.1	87.5	86.5	85.5	84.8	83.6	83.8	85.0	84.6	85.3	87.0	87.4	88.1	89.1	88.5	86.4	86.3	133.7
400	90.1	88.2	90.6	91.6	86.6	85.6	83.7	86.6	85.6	87.1	87.1	89.2	90.7	88.9	88.2	87.1	88.2	135.6
500	92.4	90.1	89.6	90.1	87.6	84.7	85.6	85.6	85.7	86.7	87.4	89.0	89.7	89.6	87.7	85.4	87.9	135.3
630	90.7	93.4	94.1	91.2	92.1	87.9	86.7	85.4	99.1	88.4	88.9	90.0	90.1	91.1	88.2	85.9	89.9	137.3
800	92.1	91.9	91.4	90.8	90.9	89.1	86.3	86.1	86.8	88.4	89.3	90.2	91.8	90.3	87.6	85.6	89.5	136.9
1000	94.3	94.7	94.1	95.6	93.7	90.5	90.5	90.3	88.5	90.3	90.0	91.9	94.0	91.5	88.5	86.7	92.0	139.4
1250	94.9	95.6	96.8	95.4	95.4	92.1	90.4	88.4	88.8	88.9	90.1	92.0	92.4	90.9	87.9	85.8	92.4	139.8
1600	106.5	106.9	110.4	110.0	108.9	105.0	102.4	99.2	98.0	96.9	96.0	100.0	98.5	97.4	95.0	94.8	104.3	151.7
2000	95.1	95.7	96.4	95.9	95.4	92.2	88.9	87.2	88.4	89.4	91.1	92.2	93.4	99.7	87.2	84.8	92.5	139.9
2500	94.4	95.6	95.6	94.9	93.3	91.3	86.9	86.1	87.8	89.6	91.4	91.9	93.1	90.0	87.3	84.0	91.9	139.3
3150	101.8	102.0	103.2	102.2	101.7	98.2	93.0	91.2	91.3	92.7	94.3	96.8	97.7	98.5	93.2	88.9	98.5	145.9
4000	95.8	97.0	97.7	96.8	95.8	93.2	87.7	86.7	88.5	90.4	92.7	94.0	95.7	91.5	88.5	84.8	94.1	141.5
5000	98.2	99.8	99.2	100.2	98.3	96.2	89.5	88.0	89.1	90.8	93.0	93.8	96.3	92.5	90.1	85.9	96.2	143.6
6300	95.5	95.7	97.1	97.0	95.5	93.3	86.2	83.8	86.3	87.5	90.2	90.3	92.3	88.7	86.5	81.5	93.5	140.9
8000	93.6	95.3	96.4	95.4	94.4	91.9	84.8	81.8	84.9	86.4	89.1	90.0	91.3	87.3	84.4	81.1	93.1	140.5
10000	92.1	93.9	94.8	92.9	92.9	90.8	82.6	79.9	82.9	84.8	87.6	87.3	90.1	85.9	83.3	78.2	92.4	139.8
12500	90.3	91.9	91.8	90.9	90.8	87.3	79.3	78.4	80.9	82.6	85.7	85.9	88.0	83.4	81.6	76.8	91.3	138.7
16000	87.8	88.3	88.5	88.5	86.1	83.5	73.9	74.0	78.5	79.3	81.4	81.7	83.4	81.5	79.7	73.4	89.8	137.2
20000	83.6	84.0	85.0	84.5	82.3	77.9	70.3	69.3	73.5	74.6	77.5	77.9	79.3	76.8	75.1	68.6	88.4	135.8
OVERALL	109.9	110.5	112.6	112.2	111.1	107.8	104.6	102.5	102.4	102.9	104.0	105.8	106.7	105.4	103.7	102.6	108.0	155.4
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	97.3	105.7	111.9	114.1	114.7	112.8	110.4	108.8	108.9	109.2	110.2	111.2	111.1	108.6	102.6	96.3		

TABLE VIII. - Concluded.

(c) Percent of design speed, 80; fan physical speed, 4152 rpm; fundamental blade passage frequency, 1799 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
50	82.2	79.2	80.3	80.5	81.2	82.0	82.2	82.8	83.2	84.5	85.3	86.9	88.3	89.3	92.5	94.9	86.5	133.9
63	84.2	83.7	89.4	83.9	81.9	82.9	81.9	83.6	84.4	85.9	86.4	87.3	89.6	91.1	92.6	95.3	87.6	135.0
80	83.2	82.4	86.0	81.7	81.2	81.4	80.9	82.0	83.5	85.7	87.2	89.5	91.9	94.0	96.4	97.9	89.4	136.8
100	82.7	81.0	81.4	81.4	81.4	82.2	83.9	84.7	86.0	89.0	90.4	92.3	94.0	96.2	98.7	99.3	91.5	138.9
125	87.9	87.6	87.3	87.8	88.6	88.3	87.4	88.8	89.8	91.6	92.4	93.5	94.9	96.6	98.4	97.5	92.5	139.9
160	86.9	88.6	88.4	87.9	88.9	88.6	88.4	89.4	90.3	90.6	91.8	92.0	93.1	94.4	95.4	94.5	91.2	138.6
200	87.4	89.6	87.4	86.1	86.4	86.3	86.4	86.4	86.9	87.8	89.6	90.7	92.3	94.6	95.3	93.2	89.9	137.3
250	89.6	92.6	88.8	89.9	89.6	87.8	89.6	87.3	89.3	91.8	93.6	94.2	94.3	95.6	95.8	93.8	92.1	139.5
315	89.6	91.6	92.9	91.1	88.9	87.9	89.9	88.9	89.4	90.7	91.9	93.2	93.7	94.4	93.9	91.6	91.5	138.9
400	90.5	90.5	93.5	91.2	90.7	88.5	89.2	88.7	91.0	90.4	91.4	93.5	93.5	93.9	93.0	90.9	91.6	139.0
500	97.5	98.7	98.4	101.5	99.0	94.2	93.2	94.9	93.0	94.5	94.9	99.3	94.5	94.4	94.0	91.4	96.6	144.0
630	94.7	98.4	102.4	103.9	103.2	100.7	98.9	95.7	92.9	96.2	97.9	95.4	97.4	95.0	95.8	91.4	99.0	146.4
800	101.3	103.3	106.6	107.1	110.6	108.3	104.6	102.4	99.1	99.1	98.4	99.2	97.9	96.8	95.4	92.7	104.3	151.7
1000	100.9	103.1	103.4	108.3	112.4	109.1	101.3	100.4	97.4	96.8	94.9	95.9	98.8	98.4	95.1	93.5	104.7	152.1
1250	99.9	102.3	103.8	108.1	111.9	109.3	103.4	101.3	97.3	95.6	95.1	98.4	97.6	98.8	94.1	92.6	104.7	152.1
1600	106.0	106.0	110.3	109.9	112.3	109.9	105.4	101.1	97.6	97.6	99.6	99.0	100.1	95.9	95.8	93.7	106.1	153.5
2000	108.8	109.3	113.8	111.6	114.1	113.3	108.1	103.6	98.8	100.0	102.1	101.7	103.1	97.8	98.8	96.4	108.8	156.2
2500	101.3	102.2	103.0	104.3	105.7	102.5	98.3	95.5	94.3	94.7	95.7	96.1	96.5	94.0	91.3	89.1	100.2	147.6
3150	100.4	102.6	104.1	103.9	105.7	102.2	96.7	94.7	94.4	95.9	98.1	98.9	98.6	95.1	91.7	89.5	100.7	148.1
4000	102.1	102.9	104.9	104.4	105.9	102.9	97.4	94.5	94.2	95.7	99.0	98.8	100.2	96.1	92.6	90.0	101.4	148.8
5000	100.0	101.5	101.8	103.0	102.6	101.3	95.1	91.6	93.5	93.8	95.3	96.1	98.5	93.8	91.3	87.8	99.4	146.8
6300	97.7	98.6	99.7	100.4	100.6	98.7	91.6	88.9	90.6	91.3	93.7	93.8	95.4	91.1	88.9	84.7	97.4	144.8
8000	96.3	97.8	99.3	98.8	100.0	97.7	90.7	86.8	89.5	91.0	93.0	93.9	94.7	90.0	87.3	84.4	97.2	144.6
10000	94.7	96.2	96.7	96.7	98.2	96.3	88.5	85.0	87.3	88.8	91.2	91.4	93.2	88.7	85.8	81.4	96.3	143.7
12500	92.1	94.5	93.8	94.3	95.4	93.7	84.8	82.5	84.6	86.4	88.7	88.9	90.7	85.8	83.8	80.0	95.1	142.5
16000	89.4	90.5	90.8	91.8	92.1	89.9	80.2	78.2	82.1	84.6	85.5	86.8	84.0	81.8	76.1	74.1	93.7	141.1
20000	85.1	86.4	87.4	88.8	90.1	85.7	76.6	73.7	77.0	78.4	81.1	81.9	82.9	79.4	77.7	71.3	93.1	140.5
OVERALL	113.6	114.7	117.7	117.8	120.3	118.1	113.0	110.1	107.6	108.1	109.4	110.3	110.7	109.0	108.6	107.5	114.7	162.1

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE

61 METERS 101.3 110.3 117.5 119.3 123.0 122.6 118.5 115.7 113.7 114.1 115.3 115.0 114.6 109.8 106.8 100.7

(d) Percent of design speed, 90; fan physical speed, 4671 rpm; fundamental blade passage frequency, 2024 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	85.6	85.6	85.6	84.9	85.3	86.9	87.4	88.1	88.3	88.9	90.4	91.8	92.8	95.9	98.4	100.5	91.9	139.3
63	82.6	86.6	85.1	84.7	84.9	85.2	85.9	86.4	86.9	88.1	89.2	91.0	93.4	96.2	99.1	101.3	92.0	139.4
80	91.1	87.7	87.9	90.9	90.2	89.7	86.4	91.1	89.1	89.9	92.7	94.8	97.6	100.6	102.9	104.8	95.8	143.2
100	87.0	84.9	86.7	86.5	86.4	87.0	88.0	89.9	91.2	93.9	95.4	97.3	100.0	103.0	105.0	105.4	97.5	144.9
125	91.6	89.6	90.2	90.2	90.6	91.2	91.9	92.9	94.6	95.9	97.2	99.0	100.4	102.7	105.2	103.8	98.0	145.4
160	94.1	91.9	93.7	93.7	94.2	92.9	94.6	95.9	95.4	96.6	97.6	98.5	98.9	101.1	101.7	100.9	97.2	144.6
200	91.1	93.6	92.1	94.8	93.5	92.8	92.3	92.0	91.6	93.0	94.1	95.9	98.8	101.0	101.3	98.9	95.8	145.2
250	96.1	99.1	96.8	102.1	99.9	97.6	95.9	95.1	93.3	95.2	96.6	98.5	99.9	102.2	101.6	99.1	98.5	145.9
315	100.1	98.8	104.8	105.3	100.5	99.3	95.3	98.6	98.0	97.3	97.8	100.9	103.8	102.0	100.8	98.2	100.7	148.1
400	93.1	99.4	101.2	105.4	106.1	102.2	98.7	98.9	96.4	98.6	96.4	98.0	99.1	100.6	98.7	95.8	100.8	148.2
500	99.5	110.9	114.9	114.5	111.9	109.4	108.7	106.4	104.2	104.9	106.7	102.6	102.9	101.5	100.5	98.9	108.8	156.2
630	94.1	104.7	109.1	107.1	107.4	107.1	104.7	100.6	98.4	98.9	100.9	100.1	99.7	100.6	99.2	97.1	103.8	151.2
800	103.6	105.4	107.6	110.8	112.8	109.3	107.1	101.8	103.4	102.3	99.3	100.2	100.4	100.1	98.8	98.0	106.4	153.8
1000	101.1	101.8	107.3	110.9	110.9	106.4	103.1	98.6	98.3	98.6	97.9	100.0	99.8	98.9	97.6	95.3	104.6	152.0
1250	104.0	104.2	106.0	109.4	109.5	105.2	102.5	101.0	98.7	97.5	98.0	98.8	99.5	99.5	96.7	94.6	103.8	151.2
1600	102.2	102.8	103.5	105.8	108.2	105.7	95.8	96.7	96.5	96.3	97.3	97.9	98.0	96.5	95.5	92.4	102.0	149.4
2000	106.7	109.0	109.0	110.9	111.4	106.9	101.7	99.7	101.4	101.2	103.5	101.8	102.9	99.0	97.7	95.4	105.9	153.3
2500	103.7	104.7	104.7	106.4	106.9	103.2	98.7	96.7	96.1	96.7	97.1	97.3	97.7	96.1	94.4	91.8	101.7	149.1
3150	100.3	103.1	104.0	104.5	105.0	101.6	97.1	95.3	95.1	96.8	98.3	98.4	97.7	95.1	93.1	91.4	100.6	148.0
4000	101.4	102.3	103.4	103.9	104.6	101.3	96.8	95.3	96.4	99.1	100.4	101.6	101.3	96.4	93.9	91.5	101.3	148.7
5000	99.6	101.1	100.9	103.3	102.8	100.3	94.9	92.8	94.3	95.3	96.4	96.7	97.6	94.4	93.1	89.7	99.4	146.8
6300	97.9	98.1	99.5	100.8	100.5	97.9	92.4	91.1	92.8	94.3	96.5	96.2	98.2	93.0	91.6	87.1	98.2	145.6
8000	96.2	97.4	98.9	99.6	100.4	97.3	91.6	89.1	92.2	93.6	96.1	95.9	96.7	91.6	89.9	86.9	98.1	145.5
10000	93.5	95.3	96.5	97.0	98.5	96.4	89.7	87.5	89.8	91.3	94.0	93.4	94.8	90.0	88.5	84.1	97.1	144.5
12500	90.9	93.1	93.7	95.1	96.6	94.1	86.7	85.4	87.1	89.3	91.6	91.6	92.6	87.6	86.5	82.1	98.3	143.7
16000	88.1	89.6	90.1	93.0	93.8	90.8	81.8	81.3	85.3	86.6	87.9	88.5	89.1	85.6	84.6	79.0	95.2	142.6
20000	83.8	85.2	86.5	89.9	92.0	87.4	78.9	76.7	80.2	81.8	84.4	85.2	85.5	81.7	80.5	74.6	94.8	142.2
OVERALL	113.6	116.6	119.1	120.3	120.2	117.0	114.2	111.8	111.2	111.6	112.7	112.5	113.4	113.3	113.4	112.8	115.9	163.3
SIDELINE PERCEIVED NOISE LEVELS																		
DISTANCE																		
61 METERS	101.0	111.3	116.3	120.6	122.6	120.3	116.9	115.5	116.2	116.7	117.6	117.2	116.3	112.4	108.9	103.0		
305 METERS	74.9	90.4	98.1	102.3	104.8	102.8	100.4	99.0	99.2	99.4	100.2	98.9	98.2	94.4	90.4	84.0		

TABLE IX. - NOISE OF FAN C CONFIGURATION 306 (HARD INLET, FULLY TREATED FAN FRAME, HARD EXHAUST, NOMINAL NOZZLE, RAKES) TEST PURPOSE - FAR-FIELD NOISE.

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

(a) Percent of design speed, 60; fan physical speed, 3135 rpm; fundamental blade passage frequency, 1358 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	78.4	80.9	78.0	83.4	80.0	77.9	85.0	77.2	80.5	79.4	77.7	78.8	78.9	79.7	81.7	83.3	80.6	128.0
63	71.3	74.6	73.4	74.6	74.3	74.9	76.3	73.4	74.8	74.1	75.4	77.7	78.6	79.8	81.3	82.8	76.8	124.2
80	73.3	74.8	73.6	73.4	72.8	74.9	74.3	73.8	74.9	75.6	77.4	80.0	81.4	82.8	94.4	85.2	78.6	126.0
100	81.6	77.2	76.9	79.9	81.1	80.1	76.7	77.6	78.6	78.7	81.9	82.6	84.4	84.9	86.4	87.1	81.7	129.1
125	78.4	79.0	79.0	78.9	79.2	79.5	78.7	79.0	80.7	80.9	82.0	83.5	84.0	84.4	86.9	85.8	81.9	129.3
160	82.2	81.2	81.4	85.7	85.2	84.2	81.2	81.1	83.6	82.9	82.2	84.2	83.6	83.7	84.6	83.1	83.4	130.8
200	80.6	90.7	81.2	81.7	78.1	81.7	80.1	80.2	78.1	78.6	79.4	79.7	81.1	82.1	83.4	81.8	81.6	129.0
250	83.1	83.9	81.3	79.8	79.3	79.9	78.1	78.6	79.4	80.9	81.8	82.5	83.4	83.6	83.6	81.5	81.3	128.7
315	82.1	81.9	81.6	80.6	80.4	79.4	80.4	79.6	80.4	80.4	81.1	81.7	82.6	82.4	82.4	80.5	81.0	128.4
400	84.6	84.3	84.0	82.1	82.5	80.0	80.1	79.8	80.8	81.8	82.6	83.1	84.1	83.5	82.3	80.2	82.3	129.7
500	85.2	84.8	84.5	84.0	83.0	82.8	81.5	81.3	81.7	82.7	83.3	83.8	83.7	83.7	82.5	80.4	83.1	130.5
630	85.9	86.3	85.9	85.8	83.8	81.8	81.4	81.8	82.4	83.4	84.4	84.5	85.3	84.4	82.4	80.5	83.9	131.3
800	88.7	87.9	87.1	86.9	85.4	83.9	83.2	83.1	83.9	84.1	85.2	85.8	87.1	85.9	83.4	80.8	85.3	132.7
1000	89.9	89.7	89.1	88.1	87.1	84.7	83.9	83.1	84.4	84.8	85.6	86.4	87.6	87.1	84.1	81.3	86.3	133.7
1250	99.2	97.4	99.9	99.7	99.2	96.9	90.1	88.1	87.7	87.5	89.1	89.3	91.6	89.0	86.4	84.8	94.6	142.0
1600	93.7	92.7	94.2	93.7	92.5	90.9	85.2	83.7	83.7	84.4	85.7	86.5	88.9	86.4	83.9	81.3	89.3	136.7
2000	89.8	91.0	90.0	88.8	86.6	84.0	81.5	81.3	82.5	83.3	85.5	86.2	88.5	85.6	82.8	79.5	86.2	133.6
2500	93.7	95.2	95.1	94.7	92.9	89.2	85.2	83.2	84.2	85.2	87.2	87.9	90.6	88.2	85.9	81.3	90.3	137.7
3150	90.7	92.1	92.4	91.1	89.4	85.6	81.7	81.1	82.4	84.6	87.4	88.7	90.4	88.4	85.4	80.6	88.4	135.8
4000	91.8	94.0	95.5	95.3	92.5	89.3	83.6	82.3	84.8	86.0	89.1	90.1	91.5	89.3	86.8	82.2	91.0	138.4
5000	90.8	92.7	92.6	92.8	90.3	87.2	81.6	80.5	83.0	83.6	85.3	86.6	89.5	88.0	85.3	80.7	89.0	136.4
6300	90.1	91.5	92.3	91.3	88.6	86.6	79.6	78.2	81.0	81.0	85.0	85.6	86.7	85.5	82.9	77.8	88.1	135.5
8000	90.0	92.0	92.2	90.4	88.7	86.4	78.9	76.6	79.6	79.4	83.9	84.4	86.3	83.8	81.4	77.8	88.3	135.7
10000	89.8	91.0	91.0	89.0	88.0	86.3	77.5	75.6	78.3	78.6	82.1	82.0	84.5	82.3	80.3	75.3	88.1	135.5
12500	87.6	89.3	88.3	86.8	85.4	84.3	76.4	74.7	76.7	77.2	80.0	80.1	83.0	80.0	78.7	74.3	87.4	134.8
16000	83.9	85.0	84.8	84.6	81.3	80.3	69.5	69.1	73.7	73.2	76.7	77.2	78.3	77.4	76.3	70.4	85.7	133.1
20000	79.4	81.0	81.0	79.9	76.4	73.6	65.1	63.8	67.3	67.7	71.2	71.5	73.3	72.0	71.0	64.1	83.6	131.0
OVERALL	104.1	104.5	105.1	104.7	103.3	101.0	96.4	95.1	96.1	96.6	98.5	99.2	100.9	99.4	98.0	96.1	101.3	148.7
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	89.7	99.2	103.6	106.0	105.9	104.6	101.2	100.3	102.1	102.8	104.7	104.7	105.0	101.5	96.7	88.9		
113 METERS	81.5	91.5	96.4	99.0	99.3	98.2	94.9	94.1	95.6	96.3	98.1	98.1	98.2	94.5	89.5	81.4		

(b) Percent of design speed, 70; fan physical speed, 3658 rpm; fundamental blade passage frequency, 1585 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	77.7	77.9	78.4	78.7	77.7	78.9	79.4	79.4	80.7	80.9	82.4	82.5	83.4	85.5	87.0	89.1	82.2	129.6
63	79.5	84.3	87.3	85.0	80.2	87.5	87.2	86.5	84.3	86.3	89.5	83.9	89.8	88.5	89.3	89.9	87.1	134.5
80	76.9	78.0	76.5	76.2	77.0	78.0	78.7	77.5	79.2	80.7	82.4	84.1	87.2	89.0	91.2	92.2	84.3	131.7
100	79.5	81.2	79.5	78.8	79.3	81.7	81.5	81.5	82.7	84.3	86.0	87.4	89.3	91.5	92.5	93.5	86.6	134.0
125	88.7	88.9	88.4	88.4	89.4	89.4	88.4	86.1	86.4	85.2	87.9	89.7	91.6	92.2	93.6	93.1	89.4	136.8
160	82.0	84.4	84.7	83.4	83.7	84.7	84.7	84.4	85.7	86.2	87.5	88.0	88.5	89.0	90.0	89.8	86.6	134.0
200	83.9	84.0	86.5	84.7	84.4	83.4	85.5	84.4	83.7	83.4	88.5	87.0	89.0	89.4	89.7	89.3	86.5	133.9
250	86.2	85.7	85.9	83.9	85.6	84.9	84.1	83.6	85.4	86.4	89.2	89.5	89.6	89.9	89.7	88.0	87.2	134.6
315	87.1	85.4	85.6	87.2	88.6	84.7	85.9	86.6	86.4	86.4	86.9	87.3	89.1	89.1	88.9	86.3	87.1	134.5
400	87.6	90.6	91.3	91.0	86.6	87.3	85.6	86.8	87.0	88.6	87.1	88.9	92.3	89.0	88.3	88.0	88.8	136.2
500	89.7	88.8	89.5	90.2	86.2	85.8	86.3	85.8	87.0	87.0	87.2	88.4	89.7	89.8	88.8	85.7	87.9	135.3
630	90.7	92.8	92.7	89.8	92.3	91.3	87.7	86.5	89.7	88.2	88.7	89.9	91.3	90.8	88.0	86.0	90.1	137.5
800	91.8	91.3	90.9	89.4	89.6	90.3	88.1	87.8	88.1	88.8	89.9	90.4	91.8	90.3	88.4	85.6	89.7	137.1
1000	94.3	94.4	95.0	93.0	95.0	92.4	90.6	90.3	89.3	91.6	91.6	91.4	93.9	92.8	90.8	86.0	92.4	139.8
1250	93.9	95.0	96.0	96.2	94.9	91.5	90.9	88.7	89.5	88.9	90.0	90.5	92.4	91.0	88.0	85.8	92.2	139.6
1600	102.7	106.2	109.9	113.2	108.4	104.7	102.1	98.9	95.1	95.2	98.4	97.2	97.9	95.2	97.1	95.5	104.9	152.3
2000	94.2	95.2	96.0	97.5	95.5	92.8	89.3	87.7	87.8	88.3	90.2	90.9	92.8	89.5	87.7	84.7	92.5	139.9
2500	94.3	94.9	95.3	96.3	93.8	91.6	87.6	86.4	87.8	88.8	90.8	91.5	93.3	89.6	87.3	84.3	92.0	139.4
3150	101.4	102.6	103.2	101.7	102.1	99.6	92.6	90.2	91.6	91.6	94.9	96.7	98.4	99.6	94.7	89.5	98.8	146.2
4000	95.2	97.4	96.9	97.1	96.1	93.9	87.9	86.4	88.4	89.4	91.9	92.7	94.9	91.6	89.4	86.0	93.9	141.3
5000	97.3	99.6	99.3	100.5	98.6	96.6	90.6	87.8	90.3	90.1	92.1	92.4	95.1	92.8	90.8	86.9	96.2	143.6
6300	94.0	96.0	96.5	97.1	95.0	94.0	86.8	83.8	86.6	86.8	90.2	90.4	91.6	89.1	87.1	82.6	93.4	140.8
8000	93.4	95.8	96.1	94.9	94.9	92.9	85.4	82.4	85.4	85.1	89.1	89.6	91.3	87.4	85.6	82.4	93.2	140.6
10000	92.6	94.1	93.5	93.2	92.9	91.7	83.6	81.1	83.4	84.1	87.4	87.2	89.6	86.2	84.6	79.6	92.4	139.8
12500	90.0	92.1	90.9	90.4	89.7	88.7	80.5	78.9	81.1	81.8	84.8	84.7	87.2	83.6	82.6	78.1	91.1	138.5
16000	86.3	87.7	87.2	87.6	85.3	84.1	75.3	74.5	78.8	78.3	81.4	82.2	82.8	81.3	80.4	74.7	89.3	136.7
20000	81.1	83.3	83.0	82.8	80.2	77.3	70.1	69.1	72.9	72.9	76.1	76.1	78.1	76.1	75.2	68.9	86.9	134.3
OVERALL	108.2	110.3	112.2	114.4	110.9	108.1	104.7	102.4	101.9	102.3	104.5	104.8	106.5	105.5	104.4	102.9	108.3	155.7

SIDELINE PERCEIVED NOISE LEVELS

61 METERS	95.1	105.4	111.5	115.9	114.6	113.1	110.6	108.7	108.3	108.4	110.6	110.7	111.2	109.1	103.6	96.9
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TABLE IX. - Concluded.

(c) Percent of design speed, 80; fan physical speed, 4180 rpm; fundamental blade passage frequency, 1811 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	82.8	80.3	80.7	80.8	81.2	82.5	83.7	83.7	83.7	84.5	85.3	86.8	88.3	89.8	93.3	94.7	86.8	134.2	
63	87.1	83.7	85.4	80.2	81.6	81.9	83.2	84.2	84.7	86.9	85.1	87.7	89.2	90.7	94.4	96.3	87.9	135.3	
80	85.9	82.9	83.7	79.5	81.2	81.4	82.4	83.5	84.7	87.2	87.4	89.6	91.9	94.4	96.9	98.8	89.9	137.3	
100	83.5	82.2	81.0	80.8	81.3	83.2	83.8	85.0	88.0	89.0	90.5	92.1	95.0	96.8	99.7	99.1	92.0	139.4	
125	87.2	86.7	85.9	85.4	87.9	88.2	87.9	88.0	90.4	91.7	93.2	93.8	95.4	96.7	98.7	97.9	92.7	143.1	
160	87.4	87.5	87.9	87.5	89.2	89.2	89.2	89.5	90.2	90.9	91.7	92.4	93.5	95.2	96.4	95.2	91.6	139.0	
200	88.3	88.8	87.1	86.3	86.4	86.8	87.6	86.9	87.6	87.8	89.3	91.0	93.4	94.8	95.8	93.8	90.3	137.7	
250	89.9	89.2	88.9	91.0	90.5	87.0	90.5	89.5	90.2	91.2	93.7	95.3	95.2	96.0	96.4	93.9	92.6	140.0	
315	89.7	90.7	92.4	91.7	90.2	88.0	91.0	90.2	90.4	90.9	92.7	94.3	94.2	94.9	95.4	92.6	92.2	139.6	
400	90.0	90.3	92.8	94.5	92.0	92.0	90.7	89.3	92.5	91.7	91.5	93.8	93.3	94.7	94.5	92.2	92.6	140.0	
500	101.0	102.0	105.8	106.0	104.2	99.3	101.5	99.7	96.3	97.5	94.7	97.6	96.2	96.8	95.7	96.5	100.7	148.1	
630	97.8	103.3	107.5	109.8	104.3	102.2	102.1	101.6	96.5	96.0	100.3	95.9	97.8	96.0	98.0	93.2	102.5	149.9	
800	99.9	103.7	109.0	108.2	111.7	109.4	106.0	104.4	101.5	99.5	102.0	97.8	98.0	97.7	97.7	92.4	105.6	153.0	
1000	102.9	104.4	104.7	107.5	111.9	108.5	103.5	97.0	97.0	97.2	95.7	99.8	98.2	96.0	96.5	94.1	104.4	151.8	
1250	101.9	102.4	105.0	108.7	113.0	111.2	105.2	100.5	96.5	97.9	95.9	100.8	97.7	96.9	95.0	93.4	105.9	153.3	
1600	106.4	106.2	107.1	108.1	108.2	107.7	102.6	98.6	96.7	96.2	96.6	98.4	95.4	94.4	94.4	93.6	103.5	150.9	
2000	111.1	110.9	111.7	112.1	111.9	111.1	106.9	101.6	100.7	99.6	99.4	99.8	102.4	98.4	97.1	98.1	107.5	154.9	
2500	101.9	102.9	104.4	106.1	106.9	104.2	99.1	95.7	94.9	93.9	94.7	95.4	96.6	93.1	93.4	90.0	101.3	148.7	
3150	101.2	102.1	103.4	104.2	104.1	102.9	97.4	94.2	93.9	94.8	97.4	98.0	98.4	94.8	93.6	90.5	100.3	147.7	
4000	103.2	103.9	104.9	105.7	105.4	103.5	98.4	94.4	94.6	95.7	98.4	98.0	100.4	96.2	95.7	91.6	101.7	149.1	
5000	99.4	100.7	100.7	103.1	102.1	100.9	95.9	91.7	93.1	93.2	94.1	94.7	96.6	93.4	92.7	88.8	98.9	146.3	
6300	97.1	98.2	99.3	100.5	99.5	98.5	92.9	89.2	90.5	90.7	93.8	94.8	94.3	91.2	90.5	86.1	97.1	144.5	
8000	96.9	97.7	99.1	98.2	99.1	97.2	91.9	87.2	89.6	89.9	93.4	93.7	94.3	90.2	89.2	86.1	96.9	144.3	
10000	94.7	95.7	96.5	96.4	96.7	95.7	89.4	85.7	87.6	88.4	91.0	90.7	92.4	88.7	87.4	83.1	95.8	143.2	
12500	92.3	93.6	93.9	93.7	94.1	92.8	86.1	83.6	85.0	85.6	88.3	87.9	90.3	86.2	85.2	81.5	94.5	141.9	
16000	87.7	88.2	90.1	91.2	90.1	89.1	81.2	78.9	82.3	81.9	84.9	85.1	85.9	83.8	83.2	77.4	92.8	143.2	
20000	93.1	84.3	85.4	86.9	86.1	84.4	77.1	73.1	76.5	76.1	79.3	80.0	81.3	78.3	77.8	71.8	90.9	138.3	
OVERALL	115.0	115.6	117.5	118.5	119.7	117.8	113.6	110.3	108.5	108.3	109.4	109.8	110.5	109.0	109.5	108.3	114.6	162.0	
SIDELINE PERCEIVED NOISE LEVELS																			
DISTANCE																			
61 METERS	102.9	111.3	116.6	119.9	121.8	121.7	118.5	115.0	114.4	113.9	114.7	114.3	114.3	114.3	109.9	107.1	102.0		

(d) Percent of design speed, 90; fan physical speed, 4700 rpm; fundamental blade passage frequency, 2036 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	85.6	85.4	85.3	87.1	86.8	87.3	88.4	88.1	89.9	91.3	93.1	95.8	99.4	100.5	92.0	139.4	
63	83.0	85.5	85.5	84.3	85.3	85.8	86.0	86.0	87.0	87.5	89.6	91.4	94.3	96.5	99.6	101.3	92.3	139.7	
80	87.8	91.8	94.1	93.3	88.9	86.9	88.4	90.8	88.3	91.6	94.8	95.8	98.8	100.8	103.4	105.3	96.5	143.9	
100	87.0	85.7	86.7	86.3	86.0	88.0	88.2	90.3	92.8	95.0	96.3	97.7	100.7	103.7	105.3	105.7	98.0	145.4	
125	92.3	89.8	90.4	89.9	91.4	92.1	92.3	92.9	94.9	96.1	97.3	98.9	101.3	102.8	105.3	104.0	98.2	145.6	
160	94.3	91.9	93.8	92.8	95.6	94.8	96.3	96.8	97.8	97.1	96.8	97.9	99.4	100.6	101.6	100.3	97.5	144.9	
200	91.3	92.3	92.8	95.3	94.6	93.8	93.6	92.4	91.9	93.1	93.9	96.2	99.3	100.9	102.6	99.5	96.3	143.7	
250	97.0	99.3	100.5	103.5	103.5	101.8	100.2	96.7	94.2	96.0	98.2	98.4	101.3	102.7	102.7	99.4	100.5	147.9	
315	101.2	97.8	104.5	105.0	100.3	100.0	97.5	98.3	98.8	98.0	98.5	100.4	103.0	101.7	101.5	98.7	100.7	148.1	
400	95.4	100.5	100.9	106.2	107.5	102.7	101.9	99.7	98.9	98.2	97.4	97.8	99.9	100.4	100.0	96.1	101.8	149.2	
500	102.6	109.6	115.1	115.9	113.9	110.6	107.2	106.6	105.1	104.9	106.1	103.8	102.1	101.7	101.4	98.8	109.5	156.9	
630	97.6	106.4	109.1	109.6	107.4	107.8	105.1	102.3	100.8	99.3	102.1	101.2	99.8	100.6	99.3	96.5	104.7	152.1	
800	107.5	106.1	109.0	112.0	112.6	110.6	108.8	102.6	104.0	102.3	98.0	99.9	101.6	101.0	101.3	98.2	107.2	154.6	
1000	102.5	104.3	104.5	110.3	112.2	106.8	101.7	99.0	98.8	99.0	98.7	100.3	99.2	99.0	98.2	95.9	104.8	152.2	
1250	104.6	103.4	105.4	110.2	110.2	105.4	103.2	101.4	100.9	98.9	98.2	99.0	99.4	98.4	97.9	95.9	104.3	151.7	
1600	101.8	102.5	104.3	105.1	108.0	104.5	99.6	97.0	96.5	97.1	96.8	97.4	98.1	97.3	96.5	92.7	101.7	149.1	
2000	105.0	107.0	108.1	109.5	108.8	107.3	102.3	99.3	99.5	101.5	103.1	101.4	102.5	99.0	98.3	95.9	104.8	152.2	
2500	102.5	104.6	106.1	105.8	106.6	102.5	98.5	95.6	96.3	96.1	96.8	96.7	97.8	95.8	95.1	92.7	101.5	148.9	
3150	100.6	102.6	103.1	103.6	104.6	102.1	97.4	94.4	94.9	95.4	97.1	97.5	97.1	94.7	94.2	91.3	100.1	147.5	
4000	100.3	102.0	103.0	103.8	104.1	102.1	97.1	94.8	95.8	97.1	100.0	100.2	100.0	97.0	96.5	93.2	100.9	148.3	
5000	98.5	100.1	100.6	103.0	102.6	100.0	95.5	92.5	94.3	94.1	95.1	95.3	96.8	94.5	94.0	89.9	99.0	146.4	
6300	96.3	97.7	98.8	100.1	100.0	98.3	92.9	90.4	93.3	93.5	96.7	96.3	96.9	93.0	93.2	88.5	97.9	145.3	
8000	94.8	97.5	98.1	98.3	99.8	96.8	92.0	89.5	92.0	92.3	96.0	95.6	96.1	92.1	91.3	88.1	97.6	145.0	
10000	93.3	95.0	96.0	96.4	98.2	96.4	90.7	88.0	90.5	91.0	93.8	92.9	94.2	90.4	89.9	85.5	96.9	144.3	
12500	90.5	92.7	93.0	94.6	95.9	94.1	87.5	86.3	88.3	88.2	90.9	90.8	92.8	88.1	87.4	83.7	96.0	143.4	
16000	86.1	87.8	89.5	92.1	92.6	90.9	82.3	81.8	85.5	85.4	88.2	88.2	88.6	86.6	85.7	80.3	94.7	142.1	
20000	81.6	83.5	85.3	88.5	89.9	86.3	78.3	76.7	80.4	80.0	83.2	83.1	84.3	81.6	81.1	74.7	93.3	140.7	
OVERALL	114.2	116.2	119.1	120.9	120.6	117.7	114.6	112.1	111.9	111.7	112.5	112.4	113.4	113.4	114.2	113.0	116.2	163.6	
SIDE LINE PERCEIVED NOISE LEVELS																			
61 METERS	100.6	110.4	116.0	120.1	121.7	120.7	117.5	115.5	115.9	116.5	117.3	116.5	115.9	112.4	109.8	103.5			
305 METERS	77.0	89.9	98.3	102.7	104.1	103.3	100.7	99.1	98.9	99.4	100.0	98.6	98.1	94.5	91.2	84.3			

TABLE X. - NOISE OF FAN C CONFIGURATION 308 (SUPPRESSED INLET, FULLY TREATED FAN FRAME, SUPPRESSED EXHAUST,

NOMINAL NOZZLE, MUFFLED CASING, RAKES) TEST PURPOSE - FAR-FIELD NOISE

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

(a) Percent of design speed, 60; fan physical speed, 3099 rpm; fundamental blade passage frequency, 1342 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	77.2	80.5	78.8	84.0	81.0	81.3	84.7	77.7	82.2	77.8	81.7	83.4	84.7	80.5	81.8	85.0	82.1	129.5	
63	70.1	72.6	70.8	74.3	75.3	73.6	73.6	72.1	73.6	72.6	75.3	78.0	81.1	79.4	80.9	82.0	76.6	124.0	
80	72.0	72.0	70.1	72.8	74.5	73.0	71.5	71.0	72.5	73.1	76.1	79.7	82.5	81.3	83.1	84.2	77.7	125.1	
100	83.1	78.8	81.3	75.8	77.4	81.3	76.9	74.9	77.4	78.3	79.4	82.9	84.4	84.1	85.3	86.3	81.1	128.5	
125	76.6	75.9	76.4	75.9	76.3	76.9	77.1	76.9	78.8	79.4	80.9	82.5	83.9	83.6	84.9	84.3	80.5	127.9	
160	79.4	78.6	78.6	77.4	77.1	77.6	79.6	80.9	79.8	80.8	82.3	84.5	83.9	82.9	83.3	83.2	81.3	128.7	
200	80.8	82.1	78.8	76.9	75.4	77.8	75.4	74.9	76.1	75.9	76.8	78.7	80.6	80.9	81.8	81.0	78.3	125.7	
250	79.8	80.0	78.3	76.5	76.7	76.8	76.7	77.0	78.7	80.3	81.5	83.0	82.7	82.7	81.0	81.0	80.4	127.8	
315	80.5	79.2	78.3	77.0	77.0	77.3	77.8	78.0	79.0	80.2	81.0	82.4	83.0	82.8	81.7	79.9	80.1	127.5	
400	81.9	80.8	79.4	77.6	77.3	76.3	76.8	77.6	79.1	80.9	82.4	83.7	84.4	84.3	82.8	80.8	81.1	128.5	
500	82.9	80.6	79.1	77.9	77.1	76.6	77.6	78.1	79.7	80.7	82.1	83.3	84.2	84.1	82.4	80.1	81.0	128.4	
630	83.6	81.1	79.8	78.4	77.3	76.9	77.4	78.1	79.8	81.3	81.9	83.0	84.1	83.4	81.1	79.2	80.9	128.3	
800	85.4	81.9	80.3	78.8	77.8	77.8	78.3	79.1	80.3	81.1	81.9	82.7	83.9	83.6	80.8	78.8	81.1	128.5	
1000	86.2	82.7	80.7	79.0	78.5	78.2	78.7	78.8	80.2	81.0	81.3	82.1	82.8	82.3	79.8	77.9	80.8	128.2	
1250	88.4	84.9	83.0	80.9	79.7	79.9	79.0	79.4	80.0	81.4	81.9	82.3	83.7	83.9	80.4	78.6	81.9	129.3	
1600	85.3	81.8	80.5	78.6	77.5	76.8	76.3	76.6	78.1	79.0	79.8	80.4	81.3	80.8	77.8	75.7	79.4	126.8	
2000	84.2	81.2	79.1	77.2	76.2	75.6	75.1	75.2	77.6	78.1	79.2	79.5	81.6	80.4	76.6	74.1	78.7	126.1	
2500	84.6	83.4	81.4	78.4	76.8	74.6	73.8	74.1	76.8	77.4	78.8	79.2	80.4	80.3	76.8	73.7	78.8	126.2	
3150	84.4	82.9	80.3	77.1	74.9	73.3	72.6	72.6	74.8	76.3	77.8	78.9	80.6	79.4	76.1	73.5	78.2	125.6	
4000	87.9	87.4	86.6	84.8	80.9	77.4	74.9	74.2	76.6	78.6	80.4	81.8	84.7	83.2	80.9	76.3	82.6	130.0	
5000	88.1	87.9	86.6	86.4	81.9	77.8	74.1	73.4	76.1	76.4	78.9	80.9	83.1	82.4	78.9	74.7	82.7	130.1	
6300	88.6	89.5	88.8	87.1	84.0	79.3	75.3	72.6	75.6	75.6	77.6	79.9	81.6	80.1	76.9	73.6	83.8	131.2	
8000	89.8	90.3	89.2	86.8	84.7	80.4	76.2	73.3	75.7	77.5	79.8	80.2	83.2	80.8	78.3	75.5	85.2	132.6	
10000	90.6	90.6	90.2	88.8	87.2	82.8	77.1	73.8	76.4	77.3	80.1	80.3	83.1	80.3	78.0	73.9	87.2	134.6	
12500	89.0	89.5	88.3	87.3	86.5	82.3	76.1	73.3	74.8	78.3	81.2	81.1	83.7	80.7	78.8	75.3	87.7	135.1	
16000	85.4	85.5	85.2	84.6	82.6	77.4	70.6	68.6	72.4	74.7	77.5	78.9	80.2	78.6	77.1	71.5	86.2	133.6	
20000	81.3	81.3	80.6	79.5	76.5	71.3	65.5	63.4	68.0	70.1	72.0	73.7	75.0	73.4	72.2	65.6	83.9	131.3	
OVERALL	99.7	99.1	98.0	96.7	94.8	92.6	91.5	90.5	92.2	93.0	94.5	95.8	97.3	96.3	95.3	94.5	96.7	144.1	
SIDELINE PERCEIVED NOISE LEVELS																			
61 METERS	83.5	91.8	95.3	96.4	95.8	94.9	94.1	94.1	96.3	97.4	98.5	99.0	99.7	96.8	91.9	84.8			
113 METERS	74.4	83.2	87.5	89.0	88.8	88.1	87.6	87.6	89.9	90.9	91.9	92.3	92.9	89.8	84.6	77.2			

(b) Percent of design speed, 70; fan physical speed, 3615 rpm; fundamental blade passage frequency, 1566 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	77.3	77.6	78.6	77.5	77.1	78.8	78.8	79.1	79.6	79.8	81.8	82.1	83.6	84.6	86.1	87.5	81.5	128.9
63	81.9	87.1	86.3	81.9	82.3	85.1	83.3	85.1	82.1	85.9	89.9	84.0	89.4	89.1	87.9	88.8	86.4	133.8
80	76.0	76.6	75.5	74.3	75.1	75.8	75.5	76.1	78.3	79.1	81.6	83.6	86.6	87.5	89.8	91.5	83.2	130.6
100	77.5	75.8	76.3	75.6	76.3	77.8	78.1	80.0	81.5	83.1	85.1	86.6	88.6	90.3	92.0	92.5	85.5	132.9
125	83.0	80.5	82.5	81.0	81.0	81.3	81.8	83.0	85.5	87.1	86.8	87.5	89.0	90.1	91.1	90.8	86.4	133.8
160	79.8	80.3	80.8	81.3	81.3	82.0	83.0	83.3	85.0	85.3	85.8	86.4	87.0	88.1	88.3	87.7	85.0	132.4
200	81.8	81.0	80.7	82.5	81.5	80.3	82.0	81.8	81.7	82.2	83.2	85.1	87.2	87.3	88.5	87.6	84.0	131.4
250	84.4	84.4	84.0	84.7	82.0	83.9	82.5	85.4	87.0	87.7	87.6	89.0	88.9	88.5	87.4	86.2	86.2	133.6
315	82.8	81.8	81.7	80.8	81.5	81.7	82.0	83.2	84.2	85.3	86.0	86.9	88.2	87.8	87.0	85.4	84.9	132.3
400	84.6	83.2	82.2	83.1	83.6	81.1	81.4	82.4	84.4	85.9	86.7	87.7	89.4	88.7	87.6	85.5	85.7	133.1
500	85.6	83.7	83.4	82.4	82.1	81.4	82.2	82.9	83.9	85.4	86.7	87.5	89.1	88.6	86.9	84.3	85.5	132.9
630	86.6	83.9	82.8	84.6	81.4	82.6	81.9	83.1	84.8	85.4	86.6	87.5	88.3	87.8	86.4	84.1	85.4	132.8
800	88.5	85.3	83.8	82.6	82.1	82.6	83.1	84.0	85.0	86.0	87.1	87.7	89.0	88.1	85.8	83.3	85.8	133.2
1000	90.1	86.9	84.7	82.9	82.6	82.7	83.1	84.1	85.6	86.1	86.7	87.0	88.2	87.4	85.2	83.1	85.7	133.1
1250	89.8	86.8	85.2	83.7	83.0	82.7	82.8	83.8	85.3	85.8	86.0	86.7	87.8	86.5	84.3	82.2	85.5	132.9
1600	93.8	93.0	89.5	89.8	87.5	84.3	82.6	83.6	84.5	86.3	86.3	89.2	89.3	87.0	84.3	82.3	87.6	135.0
2000	88.6	86.1	83.8	82.5	81.3	80.8	80.3	81.3	83.5	83.5	84.5	85.1	87.1	84.8	82.5	79.9	84.0	131.4
2500	87.6	84.9	82.8	80.9	79.4	79.4	78.6	79.9	82.4	82.8	83.4	83.9	85.1	83.6	81.3	78.3	82.8	130.2
3150	91.9	91.1	90.6	86.3	83.1	81.6	79.9	79.9	81.8	82.8	84.1	85.7	87.3	86.3	82.3	79.3	85.8	133.2
4000	90.9	89.8	88.3	85.5	82.1	80.3	78.4	78.9	81.4	82.6	84.5	85.4	87.5	84.9	82.8	79.7	85.2	132.6
5000	93.3	94.2	92.3	91.0	87.0	84.0	80.0	79.6	82.6	83.3	86.1	87.4	89.3	87.3	85.5	81.2	88.5	135.9
6300	91.8	92.8	92.6	91.3	87.3	83.5	79.5	77.3	80.6	80.5	82.4	84.0	85.1	83.0	80.5	76.9	87.6	135.0
8000	92.3	93.3	92.3	90.0	87.5	84.3	79.8	77.6	80.5	82.1	84.3	84.3	86.8	83.8	81.1	78.6	88.5	135.9
10000	92.7	93.4	93.1	91.3	89.7	87.0	80.7	78.3	81.1	81.3	84.0	84.0	86.5	83.4	81.0	77.3	90.2	137.6
12500	91.7	92.2	91.5	90.8	89.5	87.2	80.3	78.2	79.5	82.4	85.4	84.6	86.7	83.5	81.5	78.0	91.1	138.5
16000	87.6	88.1	88.0	87.8	85.2	82.2	75.5	74.6	78.0	80.2	82.1	83.1	83.5	82.0	80.2	75.3	89.6	137.0
20000	82.6	83.4	83.0	82.3	79.2	75.8	69.7	68.5	73.3	75.3	76.9	77.9	79.3	77.3	75.6	69.8	87.1	134.5
OVERALL	103.2	103.0	101.9	100.5	98.6	96.9	95.4	95.8	97.3	98.5	99.8	100.3	101.9	101.3	100.7	100.1	101.0	148.4

SIDELINE PERCEIVED NOISE LEVELS

61 METERS	88.3	96.2	99.7	100.9	100.3	99.8	99.1	99.8	101.8	102.6	103.6	103.7	104.1	101.2	96.5	89.9
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TABLE X. - Concluded.

(c) Percent of design speed, 80; fan physical speed, 4132 rpm; fundamental blade passage frequency, 1790 hertz.

FREQUENCY	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	AVERAGE SPL	POWER LEVEL (PWL)
	ANGLE, DEG																		
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160			
50	81.7	78.9	80.9	80.6	80.4	81.1	81.6	81.9	83.1	83.7	84.4	86.0	87.6	89.4	91.4	93.6	85.7	133.1	
63	88.7	85.5	88.9	84.7	81.5	82.2	84.5	84.5	86.7	85.0	88.1	88.7	90.2	92.7	94.8	97.3	87.5	134.9	
80	85.1	82.6	84.6	80.7	79.9	81.6	80.2	82.1	83.1	85.6	86.9	88.8	91.1	93.6	95.6	97.3	88.8	136.2	
100	82.3	79.6	79.9	79.6	80.3	81.8	82.6	83.9	86.4	87.6	89.9	91.5	93.6	95.4	97.4	98.1	90.6	138.0	
125	84.9	86.9	86.3	86.8	86.4	85.9	86.6	87.4	89.3	90.4	91.6	93.0	94.1	95.8	97.6	96.5	91.6	139.0	
160	84.1	85.5	86.0	86.6	87.0	87.1	88.1	88.0	89.1	90.0	90.6	91.7	92.3	94.0	94.6	94.0	90.3	137.7	
200	86.1	83.9	85.2	84.6	84.7	85.4	85.2	85.2	86.2	87.1	88.2	89.8	91.7	93.4	94.6	93.0	88.9	136.3	
250	88.1	85.4	85.9	86.4	85.9	85.1	85.6	85.9	88.3	89.8	91.8	92.9	93.8	95.4	94.8	92.7	90.6	138.0	
315	86.4	86.3	87.3	87.9	88.1	88.3	87.9	87.8	88.8	89.4	90.6	91.5	92.6	93.8	93.3	91.0	90.1	137.5	
400	85.8	85.6	86.3	85.1	87.0	86.5	85.6	86.5	89.3	89.6	91.3	92.4	93.5	93.8	92.8	90.0	90.1	137.5	
500	88.7	90.3	89.8	89.5	93.0	90.0	88.2	87.7	89.7	91.7	91.5	92.1	94.3	93.5	91.8	90.0	91.3	138.7	
630	88.6	87.7	89.6	89.7	88.4	89.1	87.4	87.4	89.2	90.4	91.1	91.5	93.1	92.1	91.2	89.1	90.2	137.6	
800	91.4	89.2	88.7	87.7	87.6	87.4	87.4	88.7	89.7	90.7	91.2	92.0	93.4	92.9	91.4	88.8	90.4	137.8	
1000	93.1	90.1	88.8	87.4	87.3	87.3	87.9	88.4	90.1	90.6	91.3	92.2	93.1	92.1	90.3	87.8	90.3	137.7	
1250	93.1	90.9	89.2	87.4	87.2	87.1	87.4	88.2	89.9	90.1	90.7	91.3	92.6	91.2	89.3	87.3	90.0	137.4	
1600	94.9	92.8	91.6	89.4	87.9	86.9	86.9	87.8	88.7	89.2	90.3	91.8	93.1	90.9	89.4	86.5	90.2	137.6	
2000	95.7	93.5	92.9	90.2	89.0	86.9	86.7	87.7	88.7	89.2	90.4	92.1	94.0	90.7	89.2	85.8	90.7	138.1	
2500	91.6	89.9	87.8	86.4	84.9	84.6	83.8	85.3	87.3	87.8	88.8	89.2	89.9	88.4	87.1	84.2	87.9	135.3	
3150	93.5	91.2	89.5	87.7	86.3	85.0	84.0	84.0	86.5	87.7	89.0	89.6	90.5	88.7	86.2	84.2	88.5	135.9	
4000	93.8	92.9	92.4	92.0	89.7	88.5	84.3	84.3	86.3	87.5	89.3	90.5	92.2	89.7	87.2	84.8	90.2	137.6	
5000	93.7	92.8	91.9	94.3	90.6	88.9	83.7	83.7	86.7	86.9	88.6	89.9	90.9	88.9	87.1	83.5	90.5	137.9	
6300	93.2	93.4	93.1	94.4	92.1	89.9	84.1	82.0	85.0	85.1	86.9	87.7	88.4	86.0	84.7	80.7	90.6	138.0	
8000	93.7	94.3	93.6	92.7	91.8	89.1	83.9	82.1	84.6	86.2	88.4	87.9	89.6	86.6	84.7	81.7	91.3	138.7	
10000	93.3	93.9	93.9	92.6	92.4	89.6	83.9	82.1	84.8	85.0	87.5	89.4	86.3	84.3	80.2	92.2	92.2	139.6	
12500	92.6	93.6	93.1	92.3	92.1	89.8	82.7	82.1	83.1	85.5	88.0	87.0	89.1	85.1	83.6	80.0	93.2	140.6	
16000	88.5	89.3	89.2	89.1	87.7	86.8	78.7	78.2	81.8	83.8	85.6	86.3	86.3	84.8	83.0	77.5	91.9	139.3	
20000	83.3	84.4	84.4	83.7	81.0	77.9	73.7	73.2	77.4	79.3	80.7	81.4	82.4	79.9	78.6	72.9	89.5	136.9	
OVERALL	105.5	104.6	104.2	103.6	102.8	101.4	99.7	100.0	101.7	102.7	103.8	104.8	106.2	106.1	106.2	105.6	104.7	152.1	

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE	61 METERS
	91.5 98.2 102.3 104.7 105.0 105.2 103.5 104.4 106.4 107.2 108.0 108.2 108.4 105.2 101.4 95.2

(d) Percent of design speed, 90; fan physical speed, 4657 rpm; fundamental blade passage frequency, 2018 hertz.

FREQUENCY	ANGLE, DEG																	AVERAGE SPL	POWER LEVEL (PWL)
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																		
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160			
50	85.1	81.6	83.9	83.7	84.1	85.2	86.2	85.9	86.6	87.6	88.9	90.0	92.2	94.4	96.7	99.4	90.5	137.9	
63	82.5	85.4	84.4	83.7	84.2	84.9	85.5	85.9	86.5	88.4	90.3	93.2	95.4	98.2	100.1	91.1	138.5		
80	90.7	94.2	95.8	93.8	89.5	86.0	86.2	91.3	88.7	89.7	92.9	93.1	96.5	98.9	101.2	103.7	95.0	142.4	
100	86.2	84.2	84.2	84.6	84.6	85.9	86.7	88.4	90.9	92.9	94.6	96.7	99.1	101.2	103.6	104.1	96.2	143.6	
125	87.9	86.2	86.5	87.4	88.7	89.2	91.0	91.7	93.4	94.7	96.2	97.6	99.4	101.2	103.4	102.1	96.5	143.9	
160	87.7	90.2	90.2	91.0	91.5	91.4	92.5	93.0	94.2	94.7	95.7	96.5	97.5	99.2	100.7	99.2	95.4	142.8	
200	87.7	88.0	89.0	91.2	91.7	91.4	91.0	90.7	90.9	91.7	93.2	94.8	97.5	99.4	100.2	98.4	94.4	141.8	
250	92.9	90.4	92.1	97.4	97.4	97.4	96.6	94.1	93.4	94.8	95.8	97.5	98.9	100.8	100.3	98.5	96.8	144.2	
315	87.5	92.1	99.6	99.5	95.0	92.4	93.1	93.8	94.8	94.8	95.8	97.5	98.6	99.3	99.1	96.5	96.4	143.8	
400	88.2	90.0	91.2	95.2	96.9	94.2	92.5	91.9	93.0	94.0	95.5	96.8	98.0	99.2	98.2	95.4	95.5	142.9	
500	93.3	95.3	98.7	103.8	102.5	98.7	96.0	94.5	93.8	95.5	95.5	97.4	98.3	98.0	97.3	94.4	98.3	145.7	
630	90.5	91.5	95.5	94.0	96.3	93.0	92.7	93.0	93.2	94.2	95.5	96.9	97.5	97.8	96.7	94.1	95.2	142.6	
800	94.3	92.7	93.5	93.7	93.3	92.2	92.8	92.3	93.7	95.0	95.7	96.6	97.7	98.0	96.5	93.7	95.0	142.4	
1000	95.4	92.9	92.9	95.1	93.6	92.6	92.4	92.6	93.9	94.4	95.6	96.8	97.4	97.4	95.4	93.0	94.9	142.3	
1250	95.5	93.4	91.9	93.5	92.4	93.2	92.0	92.5	93.9	94.5	95.2	96.5	97.0	96.5	94.7	92.3	94.6	142.0	
1600	96.2	93.4	92.0	92.2	91.9	90.9	90.7	91.4	93.0	93.0	94.2	95.5	96.2	95.5	93.7	90.9	93.6	141.0	
2000	97.1	95.9	93.6	93.7	91.7	91.7	90.9	91.4	93.4	93.7	95.1	96.3	98.2	95.6	94.2	91.0	94.6	142.0	
2500	95.7	93.9	92.6	92.6	90.9	90.4	89.3	89.9	91.7	92.2	93.2	93.7	94.2	93.7	92.4	89.5	92.7	140.1	
3150	94.7	94.0	93.0	93.0	91.4	90.2	89.4	89.5	91.0	92.0	93.0	93.3	93.7	92.8	91.3	88.8	92.6	140.0	
4000	95.7	95.9	95.7	97.2	94.0	93.2	90.2	89.7	91.4	92.5	94.7	95.0	96.0	93.2	92.0	89.1	94.6	142.0	
5000	94.7	95.8	95.7	98.2	94.8	93.2	89.3	88.8	91.2	90.8	92.3	93.4	93.8	92.7	91.3	87.4	94.3	141.7	
6300	94.0	95.7	95.2	97.3	95.0	93.0	88.5	86.5	89.5	89.2	90.7	91.3	91.5	90.0	89.2	84.8	93.7	141.1	
8000	94.4	96.4	95.4	94.8	93.3	92.0	88.0	86.4	89.7	90.4	92.1	90.9	92.4	89.7	88.6	85.2	93.9	141.3	
10000	93.8	95.1	94.3	93.5	92.3	91.3	87.0	85.7	88.6	88.6	90.8	90.3	92.0	89.1	87.3	83.3	93.9	141.3	
12500	92.2	94.1	92.9	92.6	91.6	90.4	85.5	85.1	86.4	88.8	90.9	89.8	91.1	87.4	86.1	82.7	94.4	141.8	
16000	89.0	90.8	90.3	90.7	89.1	87.1	82.0	82.0	85.4	86.7	88.0	89.0	88.5	86.6	85.6	80.5	94.0	141.4	
20000	83.6	85.1	84.6	84.5	81.8	79.6	77.1	77.1	81.4	83.1	84.3	84.4	85.1	82.9	81.8	75.7	91.8	139.2	
OVERALL	107.2	107.3	108.0	109.6	108.3	106.5	105.2	105.0	106.0	106.9	108.2	109.3	110.6	111.3	111.8	111.2	109.1	156.5	
DISTANCE																			
SIDELINE PERCEIVED NOISE LEVELS																			
61 METERS	93.4	101.4	106.0	110.1	110.0	110.1	109.0	109.3	110.9	111.6	112.7	112.6	112.5	109.9	106.6	100.3			
305 METERS	68.0	79.2	85.4	91.3	92.2	91.5	91.1	91.8	93.5	93.9	94.7	94.8	94.7	91.9	88.4	82.0			

TABLE XI. - NOISE OF FAN C CONFIGURATION 309 (SUPPRESSED INLET, FULLY TREATED FAN FRAME, SUPPRESSED EXHAUST, NOMINAL NOZZLE, RAKES) TEST PURPOSE - FAR-FIELD NOISE

[Data adjusted to standard day of 15° C and 70 percent relative humidity; SPL re 0.0002 N/sq m; PWL re 0.1 picowatt.]

(a) Percent of design speed, 60; fan physical speed, 3099 rpm; fundamental blade passage frequency, 1342 hertz.

FREQUENCY	ANGLE, DEG																AVERAGE SPL	POWER LEVEL (PWL)
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
50	74.3	80.1	78.5	81.5	80.0	79.0	83.5	75.1	80.6	75.1	80.5	81.2	81.6	80.3	81.8	84.0	80.5	127.9
63	70.3	72.3	70.4	71.9	71.4	71.8	73.4	70.4	72.6	72.1	74.8	77.8	79.1	79.4	80.3	82.0	75.7	123.1
80	72.3	71.4	70.1	69.8	69.8	71.3	70.9	70.3	72.1	73.8	76.4	79.2	81.6	81.9	83.1	83.6	77.3	124.7
100	81.5	78.0	79.8	73.8	79.0	80.7	78.0	76.8	77.0	78.2	79.7	83.1	84.0	84.3	85.3	85.7	81.0	128.4
125	77.2	77.2	76.8	76.2	75.8	76.3	76.7	77.7	80.2	80.8	82.6	83.7	84.3	84.7	84.9	80.6	80.6	128.0
160	81.3	82.8	81.4	78.4	76.8	77.1	79.6	81.3	79.9	80.6	81.1	84.5	83.3	83.4	82.8	81.4	81.4	128.8
200	82.3	82.6	79.1	77.3	75.5	78.1	75.3	75.3	76.0	76.5	77.3	79.0	81.3	81.5	81.1	80.7	78.6	126.0
250	80.1	80.5	78.3	77.3	76.1	76.6	77.3	78.0	79.8	80.5	82.0	82.7	83.6	83.5	82.3	80.7	80.5	127.9
315	80.0	80.2	78.7	78.4	77.9	78.5	78.7	78.7	80.2	80.7	81.5	81.9	82.7	82.7	81.4	79.6	80.4	127.8
400	81.9	81.1	80.3	79.1	77.6	78.1	77.9	78.4	80.4	80.8	82.9	83.0	84.3	84.1	82.3	80.7	81.3	128.7
500	82.8	81.5	79.8	79.0	79.3	78.5	79.5	80.3	81.0	82.0	82.3	83.4	84.0	84.0	82.1	80.7	81.6	129.0
630	83.6	81.3	80.1	78.9	78.6	79.1	79.8	80.1	80.8	82.1	82.4	83.4	84.4	83.3	81.6	79.3	81.6	129.0
800	85.6	83.0	81.0	79.6	79.8	80.3	81.3	81.1	81.5	82.0	82.3	82.6	84.3	84.0	81.3	78.7	82.0	129.4
1000	86.3	83.1	81.2	79.9	79.4	79.9	81.3	81.1	81.3	81.8	81.3	82.0	83.4	82.6	79.9	78.2	81.6	129.0
1250	89.6	85.4	85.1	82.6	83.2	83.1	81.7	81.7	81.4	83.1	83.6	83.2	83.9	84.1	81.2	79.6	83.4	130.8
1600	85.8	82.4	81.1	79.1	79.3	78.6	78.3	78.3	78.9	79.6	80.4	80.7	81.6	80.6	77.8	75.5	80.1	127.5
2000	84.6	81.4	79.3	78.3	77.4	76.9	76.3	76.6	78.3	78.3	79.3	79.5	81.3	80.4	77.1	74.5	79.1	126.5
2500	84.5	83.3	81.2	78.3	77.0	76.8	75.2	75.3	77.3	77.8	79.0	79.4	80.7	80.3	77.0	74.2	79.1	126.5
3150	83.9	82.4	80.7	77.1	75.7	74.9	73.6	73.9	75.6	76.7	78.1	79.0	80.6	79.4	76.4	73.3	78.4	125.8
4000	87.7	87.2	87.4	84.7	80.7	78.2	76.2	75.2	77.2	79.2	81.0	82.0	84.5	83.3	81.2	76.6	82.8	130.2
5000	87.7	88.2	86.5	86.5	81.7	78.7	75.4	74.5	77.0	77.0	78.8	81.0	83.5	82.7	79.2	75.3	82.9	130.3
6300	88.3	89.5	89.3	87.6	84.0	80.5	75.8	73.6	76.1	76.1	78.1	79.7	81.6	80.3	77.3	73.7	84.1	131.5
8000	89.5	90.7	89.3	86.8	84.5	81.4	77.4	74.3	76.7	78.0	79.9	80.2	83.3	81.3	78.5	75.3	85.4	132.8
10000	90.4	91.1	90.4	88.7	87.0	84.0	78.2	74.8	77.2	77.5	80.3	80.2	83.3	80.2	78.2	74.5	87.4	134.8
12500	88.8	89.4	88.4	87.5	86.6	83.4	77.6	76.0	76.8	79.0	81.7	80.9	84.0	80.7	79.1	75.3	88.0	135.4
16000	85.2	86.1	85.4	85.1	83.0	78.8	72.6	71.3	76.4	75.9	77.6	79.2	80.3	78.9	77.8	72.0	86.7	134.1
20000	81.6	81.7	81.0	80.1	76.9	72.8	67.9	65.9	69.7	70.9	72.4	73.6	75.3	73.6	72.6	65.9	84.4	131.8
OVERALL	99.7	99.4	98.4	96.9	95.1	93.6	92.5	91.8	92.9	93.6	94.7	95.7	97.1	96.5	95.3	94.3	97.1	144.4

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE	61 METERS	113 METERS
	83.5 91.9 95.8 96.6 96.1 96.0 95.4 95.3 97.0 97.9 98.9 99.0 99.6 96.9 92.1 84.9	75.0 83.4 88.1 89.2 89.1 89.3 88.9 88.9 90.5 91.5 92.3 92.4 92.8 89.9 84.8 77.2

(b) Percent of design speed, 70; fan physical speed, 3615 rpm; fundamental blade passage frequency, 1566 hertz.

FREQUENCY	ANGLE, DEG																	AVERAGE SPL	POWER LEVEL (PWL)
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																		
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160			
50	77.7	77.0	77.2	76.8	77.3	78.3	78.0	78.7	79.0	80.3	81.5	82.3	84.2	84.0	85.8	88.7	81.5	128.9	
63	80.6	87.1	86.0	83.5	82.1	87.5	84.6	84.0	83.0	86.5	89.8	84.9	90.5	89.3	88.3	89.8	86.9	134.3	
80	75.9	75.8	74.3	74.1	74.9	75.9	74.6	75.6	78.1	79.8	81.6	83.4	86.3	87.1	89.9	91.7	83.1	130.5	
100	77.1	76.4	76.1	76.8	76.9	77.6	77.9	79.9	81.9	83.4	84.6	86.9	88.4	89.8	92.3	92.6	85.5	132.9	
125	83.3	81.8	83.0	82.8	82.5	82.2	81.7	82.8	85.5	87.2	87.3	88.1	89.3	90.5	92.0	91.4	86.9	134.3	
160	81.6	82.6	82.0	83.0	83.1	82.8	83.1	83.8	85.8	85.3	85.3	87.2	87.1	88.3	89.1	87.8	85.4	132.8	
200	82.9	83.8	81.4	84.3	83.4	81.8	81.1	82.4	82.1	82.9	83.3	85.0	87.1	87.9	88.3	87.3	84.4	131.8	
250	84.9	86.4	82.9	82.2	83.5	84.7	84.5	83.4	86.2	88.5	87.7	88.4	88.0	89.0	88.9	87.1	86.6	134.0	
315	83.3	82.8	82.0	82.0	82.0	83.2	83.0	84.2	85.2	86.3	86.5	86.9	87.8	88.0	87.5	85.4	85.4	132.8	
400	85.4	84.6	83.9	82.7	83.6	83.2	83.1	84.1	88.1	86.9	87.1	87.7	88.7	89.1	87.4	85.3	86.4	133.8	
500	85.8	87.4	84.4	83.6	84.1	86.1	83.3	83.9	85.4	87.3	87.8	88.9	88.6	89.4	87.1	85.5	86.7	134.1	
630	88.2	87.0	88.2	91.2	86.3	84.7	86.5	86.2	85.8	87.5	87.7	87.8	89.0	88.5	87.5	85.5	87.6	135.0	
800	88.7	86.7	85.2	84.7	85.5	86.0	85.7	86.0	86.5	86.7	87.3	88.3	89.3	88.2	86.7	84.7	86.9	134.3	
1000	90.2	88.0	86.5	86.7	86.4	87.0	87.5	86.9	86.0	88.0	86.9	88.1	89.2	88.7	86.4	84.8	87.5	134.9	
1250	90.8	88.1	86.3	85.6	87.1	85.1	86.9	85.4	86.1	86.4	86.4	87.4	88.4	86.6	85.1	83.0	86.8	134.2	
1600	95.2	97.8	90.2	96.5	101.0	94.7	87.7	92.0	88.5	91.0	88.3	93.8	92.5	90.3	89.8	86.2	94.1	141.5	
2000	88.9	86.6	84.4	83.6	84.8	83.1	81.8	82.3	83.6	84.1	85.0	85.4	87.3	84.6	82.9	80.2	84.7	132.1	
2500	87.8	85.3	83.1	82.1	81.5	81.0	80.1	81.0	82.5	83.0	83.3	84.2	85.0	83.5	81.5	78.9	83.2	130.6	
3150	92.9	91.3	89.3	86.8	83.8	83.9	81.1	81.4	82.3	83.6	84.6	86.2	86.9	86.3	82.8	79.7	86.1	133.5	
4000	91.0	90.2	88.2	85.9	82.7	81.9	79.9	79.5	81.9	83.0	85.0	85.8	87.2	84.9	82.9	79.6	85.5	132.9	
5000	93.3	93.6	92.5	90.3	86.8	84.8	80.3	80.6	83.1	83.3	85.9	87.4	88.6	87.3	84.8	81.5	88.3	135.7	
6300	92.0	93.1	92.4	91.1	87.7	84.4	80.1	78.0	81.0	80.9	82.4	84.3	84.9	83.3	80.5	77.8	87.7	135.1	
8000	92.5	93.5	92.2	90.2	87.7	85.2	81.0	78.2	81.0	82.4	84.5	84.3	86.7	83.9	81.5	79.2	88.7	136.1	
10000	93.0	93.8	93.1	91.7	89.7	87.7	81.5	78.1	81.9	82.2	84.0	84.4	86.5	83.5	81.0	77.5	90.5	137.9	
12500	91.6	92.3	91.4	91.0	89.6	87.5	81.5	79.3	81.0	82.8	85.3	84.9	87.2	83.3	81.7	78.3	91.3	138.7	
16000	87.6	88.4	88.0	87.7	85.8	82.9	77.1	75.8	79.6	80.7	82.4	83.2	83.8	82.1	80.7	75.5	89.9	137.3	
20000	83.0	84.0	83.1	82.4	79.6	76.6	72.2	70.8	74.7	76.0	77.3	78.3	79.3	77.2	76.0	70.1	87.5	134.9	
OVERALL	103.7	104.1	102.1	102.3	103.2	98.9	97.4	98.0	98.4	99.7	100.1	101.3	102.2	101.6	101.3	100.6	102.0	149.4	

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE	61 METERS
61 METERS	89.2 98.2 99.7 103.2 106.5 104.2 101.2 103.3 103.0 104.4 103.9 105.3 104.4 101.4 97.8 91.4

TABLE XI. - Concluded.

(c) Percent of design speed, 80; fan physical speed, 4132 rpm; fundamental blade passage frequency, 1790 hertz.

FREQUENCY	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																AVERAGE SPL	POWER LEVEL (PWL)	
	ANGL.F, DEG																		
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160			
50	81.4	78.4	80.9	80.4	81.3	81.4	81.9	82.1	82.3	83.4	85.4	86.2	87.8	89.3	92.1	93.6	85.9	133.3	
63	87.7	83.8	88.3	83.7	81.8	82.0	81.7	84.3	85.3	86.5	85.2	88.6	89.8	90.0	93.0	94.2	87.5	134.9	
80	84.5	81.7	84.4	80.5	79.7	80.2	79.5	82.2	83.7	85.5	86.7	89.1	92.0	93.2	95.9	97.2	88.9	136.3	
100	80.8	80.5	80.8	80.5	80.3	81.5	82.2	84.0	85.8	87.7	89.8	91.8	94.0	95.8	98.0	98.9	91.0	138.4	
125	87.5	88.0	88.4	86.5	85.2	85.9	86.4	87.5	89.0	89.9	92.0	92.5	94.9	95.9	97.7	96.6	91.7	139.1	
160	87.1	87.6	88.2	87.1	86.9	86.7	87.6	88.1	90.1	90.2	90.6	91.8	93.1	93.7	94.2	94.1	90.5	137.9	
200	86.6	85.6	85.9	86.1	85.1	84.8	85.6	85.8	86.1	86.9	88.6	90.2	92.8	93.9	94.8	93.1	89.3	136.7	
250	86.3	86.9	86.1	87.9	87.6	87.1	87.9	86.9	88.3	90.1	91.6	92.9	93.9	94.6	95.1	93.0	90.8	138.2	
315	85.9	87.0	86.5	87.9	88.7	88.9	88.0	88.7	89.5	90.7	91.6	93.0	93.9	93.4	91.3	90.3	90.3	137.7	
400	87.3	86.7	86.5	86.3	86.0	87.7	87.8	87.7	92.0	90.8	91.7	93.4	94.3	94.0	92.8	90.4	91.0	138.4	
500	90.2	94.7	90.2	95.2	93.2	95.8	93.5	90.2	92.3	92.2	93.0	95.6	99.7	96.7	97.3	94.6	94.9	142.3	
630	90.6	92.6	89.0	96.3	91.8	90.3	91.1	89.0	90.3	92.3	91.8	92.9	93.1	92.5	91.8	91.2	92.1	139.5	
800	93.2	91.0	89.2	92.7	89.5	88.9	90.4	90.7	90.2	92.0	91.9	93.1	93.9	93.4	92.0	90.6	91.7	139.1	
1000	94.4	92.2	91.5	90.7	91.1	91.9	91.1	91.6	92.1	92.6	92.2	93.2	93.7	92.9	92.7	91.1	92.3	139.7	
1250	94.7	92.5	93.7	90.5	90.2	91.2	91.2	90.3	91.2	91.7	92.2	92.6	93.5	92.5	92.0	89.7	92.0	139.4	
1600	95.9	93.9	93.9	91.4	94.4	92.4	90.9	91.6	90.2	92.2	91.2	92.2	96.7	91.7	90.1	87.5	92.8	140.2	
2000	96.8	94.8	95.8	92.2	96.8	94.2	92.2	92.8	90.8	93.2	91.2	92.3	98.7	92.2	90.5	87.7	94.2	141.6	
2500	91.5	90.4	88.5	87.9	86.5	87.7	85.2	85.7	87.9	88.2	88.7	89.5	90.0	88.7	87.2	85.0	88.5	135.9	
3150	93.2	91.5	90.0	88.2	87.0	86.2	86.0	85.2	87.0	88.0	89.4	90.0	90.9	88.9	86.9	84.8	89.0	136.4	
4000	93.7	92.9	92.1	92.2	90.1	89.4	86.4	84.7	86.7	87.9	90.0	90.8	89.9	89.9	87.6	85.3	90.5	137.9	
5000	93.5	93.2	91.7	94.4	90.5	90.0	84.5	84.0	87.0	87.2	88.7	90.3	90.8	88.7	87.7	84.1	90.7	138.1	
6300	93.2	93.9	93.2	94.7	92.5	90.4	84.5	82.5	85.3	85.2	87.2	88.2	88.2	86.0	84.8	81.0	90.9	138.3	
8000	93.9	94.9	93.8	92.5	91.9	89.8	84.8	83.1	85.1	86.8	88.6	88.1	89.8	86.6	84.9	83.4	91.6	139.0	
10000	93.4	94.4	93.5	92.3	92.3	90.0	84.5	83.0	85.2	85.7	87.7	87.7	89.5	86.4	84.5	81.2	92.3	139.7	
12500	92.7	93.9	92.7	92.4	92.0	90.2	84.2	82.7	83.6	86.1	88.4	87.3	89.2	85.2	84.2	80.7	93.4	140.8	
16000	87.8	89.5	89.0	89.4	88.2	85.5	79.8	79.3	83.0	84.0	85.8	86.8	86.5	84.3	83.3	78.0	92.2	139.6	
20000	83.6	84.9	84.1	84.3	81.4	78.8	74.9	74.6	78.7	79.7	80.8	81.9	82.6	79.7	79.1	73.2	89.9	137.3	
OVERALL	106.0	105.7	105.0	105.2	104.5	103.8	102.2	101.8	102.8	103.7	104.3	105.5	107.7	106.5	107.0	106.2	105.7	153.1	
SIDELINE PERCEIVED NOISE LEVELS																			
DISTANCE																			
61 METERS	92.3	99.4	103.5	105.8	107.8	107.8	106.7	107.1	107.4	108.7	108.5	108.7	110.6	105.7	102.4	96.5			

(d) Percent of design speed, 90; fan physical speed, 4648 rpm; fundamental blade passage frequency, 2014 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	85.6	82.0	85.0	84.5	84.6	85.6	86.1	87.3	87.1	88.6	90.1	92.4	93.6	97.4	99.0	90.5	137.9	
63	82.5	85.5	84.5	84.0	84.1	84.5	84.8	85.8	86.1	88.4	90.6	93.1	95.4	98.6	100.5	91.3	138.7	
80	91.8	91.3	93.7	93.2	91.2	88.7	87.2	93.0	89.0	88.9	92.7	93.9	96.2	98.9	101.9	95.1	142.5	
100	86.2	84.8	85.0	85.0	85.2	86.5	87.7	88.8	91.5	92.9	94.7	96.4	99.2	101.4	104.2	96.6	144.0	
125	91.3	88.5	89.1	89.1	89.6	90.3	91.0	92.1	93.8	94.9	95.9	98.1	99.9	101.1	103.4	96.7	144.1	
160	91.4	91.9	92.9	92.4	92.1	92.3	92.6	93.6	93.9	94.6	95.6	96.9	98.8	99.3	99.8	95.7	143.1	
200	90.2	90.2	90.4	91.5	92.0	91.9	90.7	90.5	91.2	91.4	93.7	95.4	98.2	99.7	100.7	94.8	142.2	
250	92.8	92.1	92.8	96.8	97.3	98.0	95.1	93.8	95.0	94.6	96.1	98.1	99.1	100.9	100.6	98.5	144.5	
315	89.9	93.9	96.2	98.9	96.2	92.0	94.5	92.7	93.7	94.4	95.2	98.2	99.7	99.2	97.1	96.3	143.7	
400	89.6	91.4	91.6	95.9	96.9	94.6	92.4	92.1	92.8	95.1	95.3	97.3	98.3	98.8	98.1	95.7	143.1	
500	94.8	97.6	97.6	104.1	102.1	100.8	97.3	92.6	94.3	96.6	97.6	98.1	99.8	98.8	99.3	99.0	146.4	
630	92.9	91.4	97.4	95.1	97.4	95.7	93.6	93.4	93.7	95.6	96.8	97.1	98.6	97.8	96.6	96.1	143.5	
800	95.0	94.8	97.0	94.5	94.0	95.6	94.0	93.3	95.0	95.4	95.9	96.9	98.6	98.1	96.9	94.2	143.3	
1000	96.6	95.0	96.0	97.0	95.0	93.8	94.1	93.5	94.5	95.1	96.1	97.4	97.6	96.1	94.5	95.8	143.2	
1250	96.1	96.3	93.6	95.6	96.9	96.6	93.9	93.4	94.8	95.1	95.8	96.9	97.8	97.6	95.8	96.0	143.4	
1600	96.4	93.6	92.9	93.8	93.3	92.4	91.8	91.6	93.1	93.3	94.3	95.4	96.3	95.6	93.6	94.0	141.4	
2000	97.3	95.6	95.5	95.5	93.0	95.1	92.5	92.3	93.6	94.6	95.9	96.4	97.4	95.6	93.9	91.5	142.6	
2500	95.6	94.1	93.4	93.6	91.6	90.8	89.4	90.1	92.1	92.8	94.1	94.3	93.6	92.1	89.5	92.9	140.3	
3150	94.9	94.7	94.2	93.8	92.1	90.9	89.6	89.7	91.1	92.1	92.8	93.1	93.6	92.3	91.1	89.0	140.2	
4000	95.5	96.0	96.2	98.2	94.5	93.7	90.8	90.3	91.3	92.7	94.2	94.7	96.2	93.2	91.4	89.1	142.2	
5000	94.9	95.7	95.4	99.5	94.9	94.2	89.8	89.0	91.3	90.7	92.4	93.2	93.7	92.2	90.9	87.6	142.0	
6300	94.1	95.8	95.6	97.3	94.8	93.4	88.8	86.8	89.4	89.0	90.8	91.3	92.0	90.0	89.0	93.8	141.2	
8000	94.4	95.8	95.7	95.1	93.8	92.1	88.7	86.8	89.2	90.6	92.1	91.2	92.6	89.6	88.4	94.1	141.5	
10000	94.0	94.6	95.0	94.0	93.1	92.0	87.5	86.5	89.0	88.7	91.0	90.6	92.5	89.0	87.7	94.3	141.7	
12500	92.4	93.8	93.3	93.0	91.6	90.4	86.1	85.8	87.1	89.2	91.0	90.3	91.5	88.0	86.5	94.7	142.1	
16000	89.3	90.8	90.6	91.3	89.3	87.9	83.1	82.8	86.7	87.7	88.6	89.6	89.1	87.2	85.7	94.6	142.0	
20000	84.3	84.9	84.9	85.4	82.2	80.7	78.4	78.0	82.7	84.2	84.7	85.2	85.7	83.2	82.2	92.5	139.9	
OVERALL	107.8	107.9	108.4	110.2	108.8	108.0	105.9	105.3	106.5	107.3	108.5	109.7	111.0	111.4	112.1	109.5	156.9	

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE	61 METERS	305 METERS
	94.0	69.3
	101.9	80.2
	106.7	86.0
	110.9	91.9
	110.6	92.6
	111.1	93.2
	111.8	92.1
	112.7	92.3
	112.7	93.8
	112.7	94.4
	112.7	95.1
	112.7	95.1
	112.7	94.7
	109.9	92.0
	106.6	88.7
	100.8	82.6

TABLE XII. - NOISE OF FAN C CONFIGURATION 310 (TREATED WALL INLET, FULLY TREATED FAN FRAME, SUPPRESSED 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/sq m; PWL re 0.1 picowatt.]

(a) Percent of design speed, 60; fan physical speed, 3072 rpm; fundamental blade passage frequency, 1331 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	91.1	80.4	82.9	77.6	80.9	76.9	82.4	75.6	78.6	76.7	77.7	78.0	78.1	79.6	82.2	82.4	80.3	
63	104.2	73.6	71.9	71.1	71.7	72.1	72.2	71.2	72.1	73.1	74.7	76.2	78.2	79.6	81.9	82.3	86.5	
80	80.9	72.9	72.0	71.7	72.0	71.4	71.2	72.0	73.0	75.5	77.5	78.6	80.9	82.5	84.4	85.1	125.5	
100	86.2	85.2	85.7	79.3	82.0	81.7	79.2	80.2	80.0	79.0	80.7	84.3	84.2	85.2	86.0	86.9	82.8	
125	79.4	77.5	77.5	77.2	77.5	77.5	77.7	79.4	80.0	80.9	80.9	82.7	84.7	84.9	84.4	80.7	128.1	
160	81.3	80.3	80.2	78.8	77.8	78.3	78.8	80.3	80.2	80.3	80.7	83.6	81.5	82.8	83.8	82.9	128.3	
200	83.9	84.7	79.5	77.4	77.5	79.2	75.0	74.7	76.0	77.4	78.0	79.6	81.5	82.5	82.4	80.7	79.4	
250	81.7	80.7	78.1	77.2	77.2	76.9	77.9	77.6	79.4	80.4	80.7	82.2	82.6	83.1	82.4	80.8	126.8	
315	81.7	79.6	78.2	78.1	77.2	78.4	77.9	77.4	78.6	79.7	80.2	81.1	82.2	82.9	81.7	79.4	127.2	
400	83.4	80.4	79.6	78.9	77.8	77.8	76.9	77.3	79.1	80.8	81.8	82.7	83.6	83.4	81.6	79.5	80.7	
500	84.5	81.7	80.4	78.9	78.7	77.7	77.0	77.0	78.2	80.4	80.9	82.3	83.2	83.9	81.9	78.9	128.0	
630	85.9	82.0	80.7	79.7	79.0	77.7	77.0	77.4	78.2	79.5	80.7	82.1	83.2	83.0	80.9	77.9	127.9	
800	88.5	84.2	82.3	81.0	79.5	78.2	78.2	77.8	78.8	79.5	80.5	81.6	83.0	83.2	80.5	78.2	128.4	
1000	90.1	85.6	83.5	81.5	80.0	78.8	78.9	78.5	78.9	79.7	80.1	81.2	82.6	81.7	79.9	77.4	128.7	
1250	97.0	94.0	87.9	88.0	85.7	82.2	81.7	82.2	81.2	82.0	83.9	82.8	84.0	82.9	81.5	79.1	133.4	
1600	91.4	86.5	82.4	81.0	79.5	77.7	77.1	76.9	77.4	78.1	78.9	79.8	81.2	80.2	77.9	75.4	128.1	
2000	90.0	85.9	82.0	79.9	78.2	77.4	76.0	75.9	76.9	77.0	77.5	78.5	80.9	79.9	77.2	74.4	127.3	
2500	94.8	93.1	89.8	86.6	82.5	80.5	78.1	76.8	77.8	78.0	78.5	79.1	81.0	81.0	78.3	76.7	131.8	
3150	91.3	89.5	87.5	84.4	80.7	78.0	75.8	74.7	75.5	76.5	77.5	79.1	80.5	79.5	77.2	74.7	129.5	
4000	94.3	93.3	93.3	92.3	87.7	84.2	80.5	77.2	78.3	79.8	81.5	82.6	85.0	83.5	81.5	77.7	134.8	
5000	93.7	92.9	91.9	92.9	89.4	84.9	80.6	77.1	77.9	78.1	79.9	81.5	83.6	83.2	79.9	76.2	134.9	
6300	93.1	92.9	93.1	92.2	89.2	84.9	80.1	75.2	76.4	76.6	78.7	80.1	81.7	80.9	77.9	74.0	135.1	
8000	93.0	92.8	91.7	89.6	87.0	83.5	78.7	75.2	76.5	78.2	79.7	80.4	83.0	80.7	78.2	74.4	134.7	
10000	93.2	92.3	92.0	90.6	88.4	85.3	79.5	75.4	77.1	77.4	79.9	79.7	82.7	80.3	77.6	72.6	136.1	
12500	91.2	90.4	89.5	88.9	87.4	84.0	77.3	75.4	76.1	78.6	80.9	80.2	82.7	79.4	78.1	72.7	136.0	
16000	88.5	87.2	86.9	86.7	84.9	79.9	73.0	71.1	74.5	76.2	78.5	78.5	79.3	77.2	76.2	69.4	135.2	
20000	86.1	84.8	84.2	84.3	80.8	75.4	69.6	66.4	70.5	73.7	73.0	74.0	75.8	73.3	71.8	64.6	134.8	
OVERALL	107.5	103.0	101.6	100.6	98.0	95.0	92.5	91.3	92.2	93.0	94.2	95.3	96.5	96.4	95.5	94.3	98.9	

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE	61 METERS	113 METERS
61 METERS	91.0	97.0
113 METERS	81.8	89.1

(b) Percent of design speed, 70; fan physical speed, 3583 rpm; fundamental blade passage frequency, 1552 hertz.

FREQUENCY	ANGLE, DEG																	AVERAGE SPL	POWER LEVEL (PWL)
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																		
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160			
50	91.4	76.6	76.9	78.2	77.4	78.1	77.6	78.6	79.2	79.7	80.6	81.7	83.6	84.7	86.2	87.9	81.9	129.3	
63	104.6	82.4	78.1	86.7	80.6	80.9	79.2	79.7	78.7	81.4	81.9	83.8	85.6	85.7	88.1	89.6	88.2	135.6	
80	82.1	76.4	74.1	74.1	75.1	75.8	75.8	77.3	78.8	80.9	82.3	84.0	86.4	88.6	90.9	92.5	84.0	131.4	
100	80.2	77.4	77.4	77.9	77.2	78.5	79.4	81.2	82.7	84.2	85.7	87.3	88.9	91.0	92.4	92.7	86.1	133.5	
125	84.9	81.1	82.6	84.3	83.3	83.3	83.1	84.1	85.4	86.1	87.1	88.5	89.3	90.4	92.3	91.0	87.0	134.4	
160	84.1	82.7	83.1	82.1	82.7	83.2	83.1	84.1	84.9	85.1	85.6	86.3	87.1	87.9	88.4	87.3	85.2	132.6	
200	85.2	82.7	81.9	81.7	80.9	80.9	80.7	81.7	82.1	82.4	84.1	85.5	87.2	88.2	88.9	87.0	84.3	131.7	
250	86.8	87.1	86.0	86.1	83.0	85.8	83.3	82.8	86.6	88.6	88.1	88.6	88.8	89.3	89.3	88.2	87.1	134.5	
315	84.8	82.1	81.6	82.1	81.8	81.9	83.1	83.4	84.8	84.3	85.1	86.5	87.9	87.9	87.8	85.0	84.9	132.3	
400	86.0	83.4	83.7	82.2	85.0	81.7	83.4	83.4	86.4	85.9	87.4	87.8	88.0	88.2	87.0	85.4	85.9	133.3	
500	87.2	85.7	85.1	84.1	84.2	85.1	82.6	83.7	86.7	87.6	86.9	88.3	88.6	88.2	86.6	84.3	86.4	133.8	
630	88.7	89.2	92.7	89.4	87.4	83.5	86.5	86.9	84.7	88.9	88.9	87.8	88.9	88.9	86.4	85.1	88.1	135.5	
800	92.1	87.9	86.1	85.1	85.4	84.6	83.6	84.3	84.1	85.3	86.1	87.0	88.1	88.1	85.8	83.6	86.1	133.5	
1000	93.8	90.5	90.1	86.8	84.8	87.8	87.6	84.8	85.1	87.0	85.5	87.1	88.5	88.1	86.0	83.9	87.4	134.8	
1250	94.4	90.7	88.0	87.4	85.5	87.0	84.9	84.4	84.7	85.2	85.2	86.5	87.4	86.4	84.5	81.9	86.7	134.1	
1600	103.1	100.3	97.1	100.1	94.4	100.8	87.6	93.4	92.8	90.8	88.1	93.0	90.8	89.9	89.4	85.7	95.6	143.0	
2000	93.6	90.1	87.8	86.8	84.3	84.4	81.4	82.4	83.1	82.9	83.8	84.7	86.6	84.8	82.6	80.0	85.4	132.8	
2500	94.2	92.2	89.7	86.3	84.0	82.5	81.0	81.0	82.5	82.3	83.0	83.2	85.1	83.8	81.8	79.4	85.4	132.8	
3150	99.6	97.9	96.6	94.6	90.4	86.7	84.9	83.2	84.6	84.2	84.9	86.7	88.1	86.4	85.1	82.6	90.8	138.2	
4000	97.7	96.5	94.7	94.3	90.2	86.8	83.2	81.5	82.0	83.3	85.2	85.8	88.0	85.3	83.5	80.4	89.9	137.3	
5000	100.1	99.1	96.8	98.9	95.4	91.4	86.1	82.9	84.1	83.7	86.4	87.0	90.1	87.7	85.9	82.3	93.4	140.8	
6300	97.0	96.6	97.4	96.7	94.5	90.4	85.4	81.1	82.1	81.8	83.6	84.6	85.7	83.8	81.7	78.8	92.2	139.6	
8000	95.8	96.3	95.5	93.8	91.8	89.3	83.3	79.9	81.2	82.4	84.9	84.4	86.9	83.6	81.2	78.3	91.3	138.7	
10000	95.5	95.0	95.0	94.2	92.2	90.6	84.1	80.5	81.9	81.5	84.3	83.9	86.1	82.5	80.7	76.3	92.2	139.6	
12500	93.5	93.2	92.4	92.0	91.1	89.0	82.0	79.6	80.2	82.5	85.1	83.9	86.3	81.2	80.6	76.1	92.0	139.4	
16000	89.9	89.7	89.6	89.6	87.7	84.3	77.5	76.1	79.8	80.4	83.3	83.3	83.3	80.0	79.3	73.5	91.0	138.4	
20000	87.4	87.0	86.5	86.8	83.3	79.4	74.3	71.8	76.3	76.8	77.7	78.7	80.0	77.0	75.6	68.6	90.2	137.6	
OVERALL	110.3	107.3	106.0	106.2	103.0	103.5	97.8	98.3	98.9	99.3	98.7	100.9	101.9	101.5	101.4	100.5	103.7	151.1	

SIDELINE PERCEIVED NOISE LEVELS

61 METERS	95.6	101.6	104.8	107.3	106.3	108.2	102.6	104.2	104.7	104.1	103.8	104.8	104.4	101.4	97.8	91.4
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TABLE XII. - Concluded.

(c) Percent of design speed, 80; fan physical speed, 4095 rpm; fundamental blade passage frequency, 1774 hertz.

FREQUENCY	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																	AVERAGE SPL	POWER LEVEL (PWL)
	ANGLE, DEG																		
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160			
50	91.5	81.3	81.5	81.3	81.7	81.8	82.0	82.8	83.7	84.3	85.0	86.8	87.7	90.2	92.7	94.6	86.7	134.1	
63	104.4	84.4	84.6	85.2	82.6	82.7	82.7	81.9	84.9	84.4	86.6	88.2	89.7	90.7	93.6	95.3	90.1	137.5	
80	88.2	83.0	83.5	80.9	80.2	80.5	80.5	81.2	83.5	85.2	87.5	89.6	92.4	94.4	97.2	98.4	89.8	137.2	
100	85.6	83.1	81.6	81.8	81.8	83.8	83.6	85.3	87.3	89.1	90.9	92.7	94.6	96.8	98.9	99.5	91.9	139.3	
125	90.6	87.4	86.2	85.7	87.2	87.4	88.2	88.7	89.9	91.1	92.4	93.8	95.6	96.6	98.6	97.0	92.5	139.9	
160	90.6	88.6	87.6	87.4	88.1	87.9	88.4	89.8	89.8	90.4	91.1	92.4	93.4	94.8	95.9	93.8	91.2	138.6	
200	91.4	87.7	86.2	86.4	85.7	85.9	85.6	85.7	86.9	87.6	88.9	90.8	93.4	94.6	95.4	92.8	89.9	137.3	
250	92.1	89.3	87.1	87.3	87.4	88.6	88.3	87.9	88.6	90.8	91.9	93.0	94.3	95.4	95.6	93.0	91.2	138.6	
315	89.6	90.3	89.3	87.9	88.1	89.4	88.1	88.1	89.1	89.9	90.8	92.4	93.8	94.4	93.9	91.0	90.8	138.2	
400	90.1	87.9	89.1	87.6	87.9	88.9	88.9	90.1	88.9	91.1	90.9	92.5	93.9	94.3	93.1	89.7	90.9	138.3	
500	95.5	94.5	95.9	97.7	96.7	98.9	93.2	94.5	95.0	90.5	93.0	95.8	99.9	96.2	96.2	93.4	96.1	143.5	
630	96.0	94.4	92.4	98.5	93.9	91.2	90.7	88.7	90.7	91.7	91.9	92.6	94.4	93.2	93.0	90.8	93.1	140.5	
800	98.9	95.2	92.4	94.4	91.2	91.4	90.9	88.7	89.0	90.4	91.4	92.5	93.7	93.5	92.0	89.8	92.2	139.6	
1000	99.7	95.7	96.2	93.9	93.1	94.2	91.7	91.6	90.1	92.1	91.9	93.8	93.7	93.2	93.1	91.3	93.4	140.8	
1250	99.0	96.6	95.5	96.3	94.1	92.1	90.8	89.8	90.0	90.5	90.8	92.4	93.5	92.3	91.3	89.0	93.0	140.4	
1600	102.2	101.6	100.7	99.2	99.2	96.9	93.9	91.4	91.2	91.4	92.2	93.0	97.1	92.9	92.7	88.5	96.3	143.7	
2000	103.8	102.6	101.1	99.6	99.6	97.3	94.1	91.4	91.3	91.6	92.3	92.9	97.1	92.9	92.8	88.2	96.8	144.2	
2500	99.3	97.8	96.0	95.0	94.3	92.0	87.8	86.8	87.5	88.0	88.8	90.1	90.5	89.2	87.7	85.2	92.1	139.5	
3150	100.7	99.2	97.7	96.7	96.4	92.5	88.9	87.0	87.3	87.8	89.5	90.8	91.3	89.5	87.8	85.8	93.5	140.9	
4000	101.6	100.7	99.2	99.4	99.1	96.1	91.1	87.6	87.6	88.4	90.2	91.7	92.7	89.9	88.4	85.8	95.6	143.0	
5000	100.1	99.6	97.7	100.6	99.7	97.1	91.1	88.1	88.1	88.2	89.6	91.2	91.4	90.1	88.1	84.3	95.9	143.3	
6300	98.8	98.7	98.0	99.9	99.0	96.9	90.5	86.5	86.8	86.2	87.7	88.5	88.7	87.6	86.0	82.3	95.6	143.0	
8000	98.4	99.0	97.9	97.3	97.2	95.7	89.3	85.9	85.9	86.9	88.8	88.6	90.1	86.7	85.7	83.0	95.2	142.6	
10000	97.0	97.0	96.0	96.0	95.7	94.5	87.8	84.3	84.7	84.7	87.5	87.7	89.2	85.7	83.8	79.5	94.7	142.1	
12500	94.6	94.9	93.4	93.6	93.4	92.6	85.5	83.1	83.3	85.2	87.7	87.1	88.8	83.3	82.6	78.6	94.2	141.6	
16000	90.7	92.3	90.4	90.9	90.7	88.5	80.3	79.4	82.8	83.0	86.3	86.3	86.4	82.6	81.6	76.2	93.4	140.8	
20000	87.4	90.2	87.4	88.5	86.5	83.7	77.4	75.7	79.4	81.0	81.5	82.3	83.4	79.4	78.2	73.1	92.8	140.2	
OVERALL	112.5	110.7	109.5	109.8	109.0	107.5	103.7	102.6	103.0	103.4	104.5	105.8	107.9	107.1	107.7	106.6	107.8	155.2	
SIDELINE PERCEIVED NOISE LEVELS																			
DISTANCE																			
61 METERS	98.9	105.5	108.4	111.3	112.6	111.8	108.8	107.4	107.8	108.1	108.7	109.3	110.2	106.3	103.5	96.6			

(d) Percent of design speed, 90; fan physical speed, 4607 rpm; fundamental blade passage frequency, 1996 hertz.

FREQUENCY	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																AVERAGE SPL	POWER LEVEL (PWL)
	ANGLE, DEG																	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
50	92.0	83.3	84.7	85.0	85.3	85.7	86.3	86.5	87.3	88.0	89.3	90.6	92.7	94.5	97.5	100.4	91.2	138.6
63	104.3	85.6	84.6	84.5	84.3	85.0	84.8	84.8	86.1	86.6	89.0	91.1	93.6	96.1	98.6	101.2	92.8	140.2
80	92.0	88.7	89.5	87.3	87.3	89.3	84.5	87.3	89.5	90.7	92.2	93.9	97.2	99.3	102.3	104.4	99.1	142.5
100	88.3	86.2	86.3	85.5	85.8	87.3	88.3	89.8	91.8	93.3	95.8	97.3	99.5	102.3	104.8	104.6	97.1	144.5
125	93.8	90.2	89.8	90.2	91.2	91.7	92.2	92.5	94.2	96.0	97.0	98.3	100.0	102.0	104.5	102.9	97.5	144.9
160	95.0	91.7	93.0	91.7	93.7	92.5	93.7	94.0	94.7	95.0	96.2	97.1	98.7	100.5	101.0	99.6	96.3	143.7
200	94.1	91.6	92.4	94.7	93.9	93.9	93.6	91.6	91.9	92.9	94.1	95.8	98.2	100.6	101.1	98.6	95.7	143.1
250	98.3	94.3	96.5	101.5	99.7	99.5	99.0	95.3	95.7	96.5	96.3	98.3	99.5	101.2	101.2	98.7	98.6	146.0
315	92.5	96.9	102.9	103.9	100.2	94.4	93.2	93.0	93.4	95.5	95.9	98.5	99.0	100.0	99.7	96.9	98.3	145.7
400	93.5	93.0	93.5	96.8	98.1	95.1	93.6	92.6	93.3	94.8	95.5	97.6	98.8	99.6	98.5	95.4	98.3	143.7
500	99.6	99.8	100.0	104.6	103.0	100.3	97.8	95.0	95.0	97.6	99.5	97.9	100.8	99.1	100.0	95.9	99.8	147.2
630	94.7	93.4	98.0	96.7	97.9	94.7	93.9	94.2	92.4	95.5	97.2	97.8	98.5	98.4	97.0	93.7	96.4	143.8
800	101.7	98.7	98.0	97.8	96.5	96.5	96.1	92.6	94.5	95.0	96.5	96.9	98.5	98.8	96.5	93.5	96.8	144.2
1000	101.4	98.8	95.9	99.8	96.8	95.3	94.6	93.1	93.6	94.8	95.6	97.2	98.1	97.9	95.8	93.6	96.5	143.9
1250	101.2	100.7	99.9	100.5	101.7	97.5	94.7	93.5	94.0	94.5	95.7	97.3	97.7	97.4	95.4	92.4	97.7	145.1
1600	100.9	98.1	99.1	96.8	96.8	93.9	92.4	92.4	92.4	93.4	94.3	95.5	96.4	95.6	93.6	90.5	95.4	142.8
2000	105.8	104.1	102.9	101.4	100.8	98.1	94.3	93.3	94.1	94.4	95.9	97.0	97.8	96.4	94.6	91.3	98.6	146.0
2500	102.3	101.0	101.6	101.1	98.3	95.8	92.0	91.8	92.1	92.6	93.5	93.9	94.6	94.1	92.3	89.5	96.6	144.0
3150	101.5	100.3	100.8	100.3	98.8	95.2	92.7	91.3	91.5	92.5	93.3	93.9	94.3	93.5	91.8	88.9	96.4	143.8
4000	102.7	101.9	102.6	103.7	101.2	98.7	93.9	92.6	91.7	93.2	95.1	95.8	96.6	93.4	92.2	89.3	98.7	146.1
5000	100.9	100.5	100.5	103.4	100.9	97.7	93.2	91.4	92.0	92.0	93.4	94.2	94.4	92.7	92.0	88.0	98.0	145.4
6300	99.5	99.5	99.6	101.4	99.1	95.5	92.1	89.1	90.2	90.1	91.5	92.0	92.0	90.6	89.6	85.6	96.7	144.1
8000	98.4	99.4	99.1	98.5	97.5	95.2	90.6	88.1	88.9	90.4	92.2	91.2	93.0	89.2	88.9	85.8	96.3	143.7
10000	97.3	96.9	97.3	96.6	95.1	93.5	89.3	86.6	88.0	88.3	90.8	90.0	91.8	87.8	87.6	83.9	99.5	142.9
12500	94.6	94.3	94.1	93.9	93.2	92.0	86.6	85.9	86.1	88.1	90.8	89.4	91.1	85.6	85.6	81.5	95.0	142.4
16000	90.7	90.2	91.2	92.1	91.2	87.9	82.7	82.7	85.8	86.9	89.6	89.3	88.9	84.8	84.8	79.1	94.8	142.2
20000	87.9	87.5	88.0	89.6	86.8	83.5	79.9	79.0	83.2	84.0	84.8	86.1	87.0	82.6	82.0	76.1	94.3	141.7
OVERALL	113.8	112.1	112.5	113.6	112.1	109.6	107.4	106.0	106.5	107.7	109.0	110.0	111.3	112.0	112.7	111.8	111.0	158.4

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE

61 METERS	100.8	107.2	111.8	115.4	115.5	114.3	111.9	111.0	111.2	112.3	113.3	113.3	113.1	110.5	107.2	100.7
305 METERS	74.7	85.3	91.3	95.0	96.3	95.4	93.8	93.2	94.0	94.7	95.4	95.5	95.1	92.6	89.2	82.4

(b) Percent of design speed, 70; fan physical speed, 3562 rpm; fundamental blade passage frequency, 1543 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	79.1	80.1	80.6	81.6	82.1	83.6	81.6	83.6	81.6	84.0	85.4	86.5	86.3	87.5	88.5	84.0	131.4
63	86.8	84.1	83.1	87.3	82.8	84.6	83.8	83.1	82.6	81.4	83.6	84.3	87.3	86.6	87.8	89.1	84.9	132.3
80	78.6	79.0	78.3	77.6	80.3	80.3	82.6	80.5	81.8	80.8	83.8	85.7	88.6	89.0	90.6	91.9	85.0	132.4
100	80.3	79.8	79.6	79.6	81.1	81.3	82.8	82.1	83.5	84.0	86.6	88.4	90.5	91.3	92.6	93.0	86.9	134.3
125	86.3	83.7	83.2	86.3	83.8	84.0	84.5	84.0	86.3	86.5	87.7	89.1	90.8	91.5	92.5	91.7	87.8	132.2
160	83.3	84.0	84.5	83.3	84.0	83.7	84.7	84.0	85.7	85.5	86.3	87.9	88.2	89.0	89.5	88.9	86.2	133.6
200	84.3	84.6	83.8	82.3	82.0	82.1	82.3	81.8	82.5	82.5	84.1	85.9	87.6	88.5	89.1	88.2	84.8	132.2
250	87.8	88.8	88.0	85.8	85.6	86.3	82.3	83.0	87.3	86.1	87.1	88.5	89.6	89.8	89.5	87.3	87.2	134.6
315	85.3	85.7	85.8	84.3	83.8	83.3	83.7	83.5	85.7	85.0	86.2	87.6	88.2	88.8	88.0	85.9	85.9	133.3
400	88.2	88.0	87.2	85.9	85.7	84.4	83.7	82.7	86.2	88.2	87.2	88.6	89.2	88.9	88.4	87.4	87.1	134.5
500	88.3	89.1	90.8	90.4	90.4	86.9	85.8	86.3	85.8	86.9	88.1	90.0	89.6	88.3	87.6	84.5	88.4	135.8
630	91.3	92.0	95.6	93.3	94.3	90.5	87.6	84.1	89.5	87.0	89.1	90.6	90.6	90.1	88.3	85.0	90.7	138.1
800	92.0	91.5	91.1	91.5	90.8	89.0	86.5	84.5	85.3	85.8	86.3	88.2	88.3	88.8	86.8	84.3	88.4	135.8
1000	94.2	94.8	94.8	94.5	94.6	92.1	89.1	87.1	86.6	87.4	86.2	88.5	88.6	88.6	86.9	84.6	90.8	138.2
1250	94.9	96.6	97.3	97.4	96.8	93.1	90.3	87.9	87.6	86.8	86.6	87.5	88.4	88.6	86.8	84.5	92.4	139.8
1600	105.2	108.2	109.5	111.0	110.5	106.5	103.5	98.5	99.8	97.0	95.8	96.0	96.5	97.5	97.5	94.7	105.0	152.4
2000	94.9	96.2	96.4	96.5	96.0	93.5	88.9	85.0	85.4	84.4	85.0	85.6	87.2	86.5	84.5	82.3	91.6	139.0
2500	95.1	96.3	96.9	97.1	94.8	92.9	87.4	84.1	84.4	83.4	84.2	84.9	85.4	84.7	83.2	81.5	91.4	138.8
3150	102.6	102.6	104.3	103.4	102.3	99.9	93.3	89.4	87.6	87.1	87.3	88.1	88.9	88.1	86.4	85.2	98.2	145.6
4000	96.8	97.8	98.8	98.6	97.1	94.9	88.4	83.8	83.4	84.0	85.5	86.4	88.1	85.6	84.1	81.2	93.5	140.9
5000	98.3	99.4	100.4	101.6	99.9	96.9	89.9	84.8	84.6	84.1	86.6	87.4	89.1	87.8	85.6	81.6	96.0	143.4
6300	95.4	96.7	97.3	98.3	96.3	93.9	86.3	80.8	81.8	81.0	83.3	84.0	84.8	83.9	81.3	78.3	93.1	140.5
8000	94.9	96.7	97.1	96.4	94.9	93.7	84.6	79.7	80.5	81.5	83.8	84.2	86.0	83.1	81.2	78.1	93.0	140.4
10000	93.8	94.9	95.4	94.8	93.3	92.3	83.5	78.8	80.7	80.2	83.4	82.9	85.2	82.3	80.1	75.8	92.5	139.9
12500	91.2	93.4	93.4	92.4	91.8	90.4	81.2	78.6	79.6	81.5	83.9	84.0	86.0	80.9	80.7	76.0	92.3	139.7
16000	89.6	90.9	90.9	91.2	90.4	87.2	77.9	76.4	80.2	80.7	84.0	83.9	84.1	80.5	80.4	74.7	92.5	139.9
20000	88.0	89.3	89.5	89.3	87.2	83.8	76.0	73.3	77.8	78.6	80.5	80.4	81.9	79.3	77.9	71.6	92.9	140.3
OVERALL	109.7	111.4	112.5	113.3	112.5	109.2	105.3	101.3	102.4	101.0	101.3	102.3	103.3	103.3	103.1	101.7	108.3	155.7

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE

61 METERS	96.6	106.5	111.7	115.0	116.0	114.1	111.1	107.5	108.7	107.0	106.6	106.6	106.2	104.6	101.5	95.3
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TABLE XIII. - Concluded.

(c) Percent of design speed, 80; fan physical speed, 4087 rpm; fundamental blade passage frequency, 1782 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	84.1	80.5	84.0	82.3	82.8	83.3	85.8	84.3	86.0	85.0	87.0	87.4	88.5	91.0	93.0	95.0	87.5	134.9
63	90.3	86.9	90.6	85.9	85.3	82.6	86.1	83.9	86.9	84.4	87.3	88.5	89.6	91.8	93.4	95.7	88.6	136.0
80	85.0	83.3	84.5	81.6	81.8	81.3	84.6	83.0	85.1	85.5	88.5	90.4	92.6	94.6	96.8	98.2	90.0	137.4
100	83.8	82.3	83.5	82.5	82.1	83.6	86.1	86.0	87.8	89.0	91.5	92.5	95.0	97.0	99.1	99.3	92.1	139.5
125	88.4	87.9	89.2	88.2	87.2	87.5	88.0	88.9	90.5	90.9	93.0	94.4	95.2	97.2	99.0	97.7	92.9	140.3
160	87.2	87.5	88.7	88.0	87.8	88.5	89.0	89.5	90.5	90.5	91.7	92.8	93.2	95.2	95.5	94.9	91.4	138.8
200	86.7	88.3	87.3	87.0	86.0	86.5	87.2	87.0	87.7	87.5	89.8	91.4	93.0	94.8	95.7	94.2	90.3	137.7
250	89.0	90.3	88.5	91.0	89.3	87.5	87.8	87.2	89.5	90.0	91.8	93.8	94.3	95.3	95.8	93.7	91.6	139.0
315	88.3	90.6	90.5	90.3	88.1	87.8	87.6	89.6	89.6	90.0	91.5	92.6	93.6	94.8	94.1	91.7	93.1	138.5
400	91.9	91.6	95.3	92.4	95.3	92.6	92.6	91.4	93.8	93.4	92.8	93.7	95.3	95.8	95.1	92.5	93.8	141.2
500	99.6	100.1	106.3	106.6	108.3	104.1	100.3	97.8	99.5	96.6	99.5	100.3	97.3	101.1	97.7	102.4	102.4	149.8
630	101.0	100.6	109.0	111.0	109.6	104.5	101.3	98.8	95.3	97.8	99.0	100.4	97.0	96.3	93.6	94.7	104.0	151.4
800	99.2	103.8	107.7	107.0	109.7	109.2	104.3	103.7	101.0	99.0	97.2	97.1	97.8	97.8	98.3	93.2	104.4	151.8
1000	102.6	104.8	105.8	107.9	113.8	110.8	105.4	99.8	98.4	97.4	97.6	99.4	97.6	98.8	95.8	95.7	106.0	153.4
1250	100.4	102.9	104.7	109.0	111.2	108.0	104.4	100.0	96.7	96.5	94.7	96.5	96.2	95.5	94.5	93.6	104.3	151.7
1600	108.0	110.0	112.0	112.0	112.7	109.0	106.7	102.9	98.7	97.5	97.9	98.1	98.5	96.7	95.4	96.1	107.0	154.4
2000	107.4	109.4	111.2	111.2	112.2	108.7	106.2	101.6	98.2	96.4	97.4	97.4	97.9	95.7	94.4	95.5	106.5	153.9
2500	101.9	103.4	104.7	106.2	106.9	104.4	98.9	94.7	93.4	91.4	91.7	91.7	91.9	91.9	90.2	88.6	101.1	148.5
3150	101.4	103.8	104.8	105.6	105.6	103.1	97.6	93.6	91.8	90.4	90.9	92.2	92.1	90.9	89.6	88.0	100.5	147.9
4000	102.1	104.0	104.8	106.0	106.0	103.8	97.5	92.8	90.8	90.3	91.0	92.1	92.6	90.8	89.5	87.9	101.0	148.4
5000	99.3	101.6	102.1	104.6	103.6	101.5	95.3	89.8	89.3	88.1	89.8	91.0	91.0	90.1	88.0	87.9	99.2	146.6
6300	97.7	99.5	100.0	101.6	100.9	98.8	92.3	86.8	86.8	85.5	87.5	88.0	88.3	87.4	85.6	81.9	97.0	144.4
8000	97.2	99.7	100.2	99.8	99.5	98.7	90.9	85.2	83.0	86.0	87.8	88.6	86.2	84.7	82.3	79.2	96.9	144.3
10000	95.4	97.6	97.6	97.7	97.9	96.9	89.3	83.8	84.3	83.6	86.8	86.7	87.8	85.4	83.1	79.2	96.0	143.4
12500	93.1	95.4	95.3	95.3	96.1	94.8	87.1	82.1	82.7	84.9	86.6	86.6	87.7	83.3	83.0	78.9	95.5	142.9
16000	90.7	92.7	93.1	93.9	94.2	91.9	83.4	79.9	83.4	83.7	87.0	87.1	86.7	83.4	82.9	77.0	95.6	143.0
20000	88.4	90.6	91.1	91.7	91.3	88.3	81.6	77.1	80.6	82.1	83.4	83.5	84.6	81.8	80.0	74.8	95.7	143.1
OVERALL	114.1	116.1	118.4	119.3	120.7	117.7	113.7	110.2	108.2	107.3	108.0	108.4	108.9	108.7	108.9	108.2	115.0	162.4
SIDELINE PERCEIVED NOISE LEVELS																		
DISTANCE																		
61 METERS	101.1	111.0	117.0	120.1	122.6	120.9	118.2	114.8	112.9	111.6	112.1	111.7	111.0	108.3	104.9	100.7		

(d) Percent of design speed, 90; fan physical speed, 4575 rpm; fundamental blade passage frequency, 1982 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	86.1	83.3	85.6	85.6	86.8	87.1	89.0	87.1	88.8	89.1	90.5	91.7	93.5	95.0	97.5	100.2	91.7	139.1	
63	83.8	85.7	86.3	85.3	86.2	85.7	88.0	85.8	88.3	88.0	89.2	91.8	94.5	96.0	98.8	101.2	92.2	139.6	
80	90.1	90.4	91.9	89.9	88.8	87.1	87.9	87.6	89.6	89.5	92.3	94.9	97.2	99.5	102.1	104.3	95.2	142.6	
100	87.3	85.5	86.3	86.7	85.7	87.5	89.7	89.0	92.0	93.5	95.5	97.6	99.5	102.7	104.5	105.1	97.2	144.6	
125	91.7	89.5	89.7	90.5	90.7	91.5	92.5	92.0	94.7	95.0	97.2	98.6	100.2	102.3	104.2	103.0	97.5	144.9	
160	93.5	92.0	92.6	91.8	94.3	92.8	94.1	94.0	95.0	95.6	96.0	98.2	98.5	100.6	101.0	100.0	96.5	143.9	
200	92.5	93.8	92.8	98.7	96.7	95.0	93.5	92.0	92.0	92.2	94.2	96.1	98.5	100.5	101.2	99.2	96.3	143.7	
250	96.2	97.8	97.5	104.3	102.0	100.0	97.2	95.0	93.5	95.2	96.3	98.1	99.7	102.3	101.7	99.6	99.3	146.7	
315	99.8	99.5	105.7	103.3	100.2	98.7	97.5	98.5	98.8	97.2	97.3	98.4	100.2	100.5	100.5	97.4	99.9	147.3	
400	99.1	102.8	101.1	107.8	107.3	103.5	101.0	99.1	98.8	98.3	98.0	98.1	99.2	100.5	99.3	96.5	102.1	149.5	
500	104.3	109.8	113.3	113.6	111.9	108.9	109.9	107.8	106.4	106.3	106.8	101.7	102.4	103.4	102.1	101.5	108.7	156.1	
630	98.5	104.7	106.5	110.0	108.8	107.5	104.0	100.2	98.7	97.7	100.7	99.4	99.0	101.0	98.0	96.9	104.2	151.6	
800	106.1	107.2	110.1	111.2	113.9	110.6	109.2	103.7	104.6	101.2	99.9	100.1	99.6	102.6	99.9	96.6	107.6	155.0	
1000	103.8	103.1	105.9	111.8	110.7	105.6	101.6	101.2	99.7	100.1	98.4	98.8	99.1	99.2	98.6	94.8	104.7	152.1	
1250	104.5	105.6	106.6	108.9	109.9	105.5	103.5	100.8	99.8	97.9	97.3	97.9	99.1	98.6	97.3	94.7	104.0	151.4	
1600	102.6	104.4	104.9	106.6	107.4	105.1	100.1	96.9	96.2	95.1	95.9	96.8	97.5	96.7	95.6	92.5	101.9	149.3	
2000	107.1	109.1	109.8	111.6	109.9	107.8	102.4	98.3	98.4	96.8	97.4	98.2	99.3	97.6	96.4	94.2	105.4	152.8	
2500	103.6	105.7	106.3	107.7	106.9	104.1	99.9	95.8	94.9	93.8	94.4	95.4	95.4	95.4	93.8	91.5	102.1	149.5	
3150	102.1	104.1	104.9	105.4	104.6	102.2	98.1	94.1	93.2	92.7	93.9	94.2	94.3	93.7	92.4	90.3	100.4	147.8	
4000	102.0	103.5	104.3	105.3	104.7	102.3	98.0	93.0	92.8	93.5	95.0	95.7	96.3	93.7	92.5	89.8	100.6	148.0	
5000	99.5	101.5	102.1	104.3	103.8	100.8	95.6	91.1	91.8	90.8	93.0	93.5	93.9	93.0	91.5	87.8	99.4	146.8	
6300	98.0	99.5	100.3	101.6	101.4	98.1	93.1	88.1	89.1	88.8	90.8	90.8	90.7	90.6	89.2	85.1	97.4	144.8	
8000	97.3	99.4	100.1	100.1	99.9	98.4	92.3	87.1	88.1	89.1	89.1	91.0	90.7	89.3	88.3	84.9	97.4	144.8	
10000	95.4	97.2	97.7	98.2	98.6	97.1	91.2	85.7	87.1	87.1	89.6	88.8	90.4	87.7	86.7	84.0	96.7	144.1	
12500	92.4	94.4	95.4	96.1	96.8	95.6	88.7	84.8	85.6	87.4	89.6	89.0	89.9	84.9	85.3	81.8	96.4	143.8	
16000	89.8	92.2	92.5	94.7	95.3	92.6	85.5	82.7	86.3	86.8	90.3	89.8	89.2	84.8	85.1	80.1	96.8	144.2	
20000	87.4	89.7	91.3	92.6	92.7	89.5	84.6	80.4	84.9	85.4	87.5	87.1	87.5	84.5	83.2	78.0	97.3	144.7	
OVERALL	114.9	117.1	119.0	120.8	120.4	117.5	115.3	111.8	111.0	111.0	111.5	111.0	111.9	113.1	113.2	112.5	116.0	163.4	

SIDELINE PERCEIVED NOISE LEVELS

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE	61 METERS	305 METERS
	101.9 111.8 117.0 121.3 122.1 120.9 117.8 115.4 115.0 114.4 114.7 113.8 113.5 111.6 108.3 102.6	77.2 90.6 97.7 103.0 104.4 103.4 101.4 99.3 98.8 98.1 98.3 96.5 96.0 94.2 90.5 84.5

TABLE XIV. - NOISE OF FAN C CONFIGURATION 312 (HARD INLET, FULLY TREATED FAN FRAME, SUPPRESSED EXHAUST, LARGE NOZZLE) TEST PURPOSE - FAR-FIELD NOISE

[Data adjusted to standard day of 15° C and 70 percent relative humidity; SPL re 0.0002 N/sq m; PWL re 0.1 picowatt.]

(a) Percent of design speed, 60; fan physical speed, 3032 rpm; fundamental blade passage frequency, 1313 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	77.1	79.4	77.1	81.9	79.9	77.4	83.4	76.4	81.1	76.6	77.9	76.4	78.1	78.9	80.1	81.5	79.5	126.9
63	69.1	71.9	69.6	72.1	71.4	71.6	73.1	74.9	74.4	73.1	74.9	74.9	78.1	78.6	81.1	81.7	75.6	123.0
80	71.9	71.6	69.9	71.4	70.6	70.9	72.1	74.9	73.9	73.4	76.4	76.9	80.1	81.6	82.6	84.5	77.1	124.5
100	85.4	85.9	84.9	83.4	82.7	78.2	78.2	76.2	77.2	77.2	79.7	81.4	84.2	85.2	84.4	85.8	82.0	129.4
125	76.9	78.1	76.4	75.9	76.4	75.6	76.6	77.4	77.9	78.9	80.6	80.9	81.9	82.6	83.9	83.7	79.6	127.0
160	83.9	83.7	79.4	78.7	80.7	81.4	81.4	82.9	78.7	80.4	81.4	81.9	80.9	83.4	84.2	82.8	81.6	129.0
200	84.2	87.2	81.2	76.7	79.9	75.9	74.7	75.7	75.7	76.7	78.2	77.7	79.7	80.7	81.2	80.5	79.2	126.6
250	80.2	80.7	78.2	77.9	77.2	76.4	76.4	77.4	77.4	79.2	79.7	80.5	81.2	81.9	80.9	80.1	79.1	126.5
315	83.7	81.4	79.4	79.2	78.4	77.9	77.2	76.9	77.9	78.4	79.4	80.2	81.4	81.2	80.2	78.8	79.2	126.6
400	81.4	82.4	80.9	79.6	81.1	77.4	76.1	77.6	77.6	79.6	81.4	80.9	82.6	81.9	80.4	78.7	80.1	127.5
500	83.3	83.1	81.3	81.1	80.8	78.8	78.1	77.3	77.6	78.6	80.3	80.6	81.8	81.8	80.1	78.7	80.2	127.6
630	84.6	84.4	82.6	81.6	80.1	78.1	77.1	76.4	77.6	78.3	79.6	79.9	81.6	81.1	79.1	77.5	80.0	127.4
800	87.5	87.2	87.0	85.2	84.7	81.7	79.7	79.2	78.5	79.2	79.7	80.2	81.2	81.5	79.7	78.4	82.3	129.7
1000	89.5	89.0	87.7	86.7	85.7	83.0	81.2	80.0	79.5	80.5	80.5	80.2	81.2	81.5	79.5	78.1	83.4	130.8
1250	99.8	99.8	101.0	97.8	100.3	95.5	91.3	87.8	87.8	85.0	86.5	85.3	88.5	87.8	86.8	84.7	94.6	142.0
1600	90.6	91.1	91.1	89.4	89.1	84.9	81.4	78.9	78.9	77.9	79.2	79.2	81.4	80.7	78.4	77.1	85.1	132.5
2000	88.5	90.0	88.8	87.8	85.5	82.0	78.0	76.8	77.0	77.0	78.0	78.0	80.5	79.8	77.0	75.2	83.1	130.5
2500	93.7	96.4	96.2	95.9	94.7	90.4	85.2	81.1	80.4	79.6	80.1	79.9	81.4	82.2	79.1	78.1	90.2	137.6
3150	89.1	90.6	90.4	89.6	87.4	83.4	78.3	75.3	75.4	75.6	77.1	77.9	79.6	79.6	76.6	74.1	84.4	131.8
4000	92.2	94.2	94.7	94.9	92.4	88.9	82.4	77.9	77.4	78.4	80.7	81.0	83.7	83.4	80.4	76.6	89.1	136.5
5000	90.2	92.2	92.2	93.5	91.0	87.2	79.7	75.7	76.0	76.0	78.7	80.1	82.2	80.7	78.0	73.9	87.6	135.0
6300	89.6	91.3	90.5	91.1	88.8	86.1	78.0	73.0	74.3	74.3	76.8	77.9	80.3	79.3	75.5	72.1	86.3	133.7
8000	89.8	92.3	91.0	90.4	88.5	87.0	77.5	72.8	74.6	76.3	78.8	79.2	81.8	80.8	77.1	72.9	87.3	134.7
10000	88.9	91.1	90.1	89.3	87.6	86.4	77.1	73.8	76.3	76.3	79.0	78.4	81.5	79.9	77.3	71.4	87.4	134.8
12500	87.9	89.9	88.9	87.6	87.1	85.9	76.3	74.1	74.9	77.6	80.1	79.8	82.9	80.1	78.8	73.0	88.1	135.5
16000	85.4	88.1	86.9	87.5	85.9	83.8	72.8	72.1	75.8	76.4	80.1	80.0	80.3	78.6	77.9	71.6	88.7	136.1
20000	84.0	85.9	86.0	86.0	83.0	80.2	70.7	68.7	73.3	74.2	76.2	76.5	78.2	76.0	74.2	68.8	89.2	136.6
OVERALL	103.9	105.0	105.0	103.8	103.7	99.9	95.4	92.9	93.0	92.7	94.2	94.3	96.3	96.1	95.1	94.2	100.6	148.0
SIDELINE PERCEIVED NOISE LEVELS																		
61 METERS	89.5	99.5	103.3	105.5	106.2	103.8	99.9	97.4	97.4	97.1	98.3	97.7	98.7	96.6	91.7	85.6		
113 METERS	81.3	91.8	96.2	98.7	99.6	97.3	93.6	91.2	91.3	90.9	91.7	91.1	91.9	89.6	84.8	78.7		

(b) Percent of design speed, 70; fan physical speed, 3537 rpm; fundamental blade passage frequency, 1532 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	78.3	74.8	78.5	79.5	77.8	78.0	78.8	79.5	81.3	80.8	81.8	81.3	82.0	84.3	86.5	87.4	81.5	128.9	
63	84.0	78.5	84.2	87.2	80.5	81.7	84.0	84.2	81.5	82.0	83.5	82.0	84.0	84.7	87.7	88.6	84.0	131.4	
80	74.5	76.0	75.0	74.0	75.0	75.8	75.5	76.5	79.0	79.0	82.3	83.3	85.5	87.5	89.8	91.2	83.0	130.4	
100	77.3	76.8	77.3	78.3	77.0	78.5	78.5	79.3	81.8	83.0	84.8	86.3	88.3	89.8	91.0	91.9	85.1	132.5	
125	82.0	80.8	82.8	86.5	82.8	82.5	82.0	82.3	84.8	85.5	86.3	88.0	89.0	89.5	90.8	90.2	86.3	133.7	
160	80.8	82.5	81.8	81.8	82.0	81.8	82.3	83.3	83.5	84.3	84.8	85.3	86.0	86.8	87.5	87.7	84.3	131.7	
200	82.0	83.3	81.0	81.5	80.8	80.3	80.0	80.5	81.8	82.8	83.5	85.5	87.3	87.8	86.9	83.2	130.6		
250	85.0	87.8	85.5	86.0	82.3	84.3	81.3	81.5	83.5	84.8	85.0	86.3	87.0	87.5	87.8	86.4	85.2	132.6	
315	83.5	85.3	83.3	83.5	81.3	80.8	81.8	82.8	83.5	84.5	84.8	85.3	86.0	87.0	86.0	84.7	84.2	131.6	
400	86.5	87.0	86.0	87.3	84.8	83.5	83.3	84.5	84.0	86.5	86.5	86.3	87.5	87.3	86.8	84.6	85.9	133.3	
500	89.0	89.8	91.0	91.5	91.0	85.3	86.5	85.0	88.3	89.3	89.3	88.0	89.5	89.3	86.3	83.9	88.8	136.2	
630	92.0	93.5	92.5	91.3	94.0	90.8	88.0	85.0	89.7	86.7	88.7	86.8	90.5	88.0	86.5	84.1	89.9	137.3	
800	91.8	92.1	92.3	92.8	91.3	89.1	87.3	85.1	84.3	85.6	85.3	87.9	86.6	88.1	85.1	83.2	88.6	136.0	
1000	94.4	97.5	96.6	94.4	93.8	94.9	91.1	87.9	86.1	86.1	85.9	87.4	87.1	89.1	87.6	84.3	91.6	139.0	
1250	94.1	97.1	96.1	96.6	95.6	93.4	89.4	89.1	86.4	87.6	86.4	86.1	87.4	86.1	85.9	84.0	91.8	139.2	
1600	104.0	109.5	109.3	109.8	107.8	105.8	99.3	102.5	96.5	100.0	94.8	93.1	94.3	93.5	97.8	94.2	104.0	151.4	
2000	94.3	96.3	96.1	95.3	96.3	95.1	88.8	86.1	84.8	84.6	84.8	84.4	86.8	84.6	83.6	81.2	91.6	139.0	
2500	95.1	96.6	97.3	97.6	96.1	94.1	88.3	85.1	83.8	83.6	84.1	83.9	85.6	83.8	82.1	81.0	92.0	139.4	
3150	101.8	103.0	103.8	103.3	101.3	99.5	93.0	88.5	86.3	86.0	87.0	88.1	89.0	88.5	86.3	84.5	97.8	145.2	
4000	95.7	98.3	97.7	98.3	97.3	95.3	88.8	84.5	82.8	83.8	84.8	85.3	87.8	85.3	83.5	80.5	93.3	140.7	
5000	96.9	99.6	98.9	100.4	98.9	96.1	89.1	84.9	83.6	83.6	85.6	86.5	88.1	86.1	84.6	81.1	95.0	142.4	
6300	94.2	96.5	96.5	97.0	96.0	93.4	86.3	80.2	80.2	79.9	82.2	82.6	84.2	82.4	79.5	77.0	92.4	139.8	
8000	94.3	96.3	96.0	96.0	94.8	93.5	85.0	79.5	79.4	81.2	83.5	83.8	86.0	84.0	80.5	77.4	92.6	140.0	
10000	92.5	94.5	94.2	94.2	92.7	91.7	83.0	78.7	79.4	79.6	82.6	82.2	84.9	82.5	79.4	75.3	91.8	139.2	
12500	90.3	92.8	92.5	92.5	91.0	90.3	82.0	78.5	79.0	81.7	83.7	83.7	86.5	82.6	80.5	76.1	92.0	139.4	
16000	88.5	91.0	90.0	91.3	89.8	87.5	78.2	77.3	80.5	81.2	84.4	84.4	84.5	81.7	80.9	75.5	92.4	139.8	
20000	86.4	88.5	88.4	89.1	86.9	83.9	76.4	74.4	78.4	79.6	80.9	81.5	82.9	79.6	78.2	72.5	92.7	140.1	
OVERALL	138.8	112.2	112.1	112.4	110.7	108.8	103.0	103.8	100.4	102.3	100.6	100.5	101.9	101.5	102.3	100.8	107.6	155.0	
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																		
61 METERS	95.5	107.3	111.2	114.1	114.3	113.6	108.8	109.7	106.5	108.3	105.8	104.5	104.7	102.3	101.1	94.5			

TABLE XIV. - Concluded.

(c) Percent of design speed, 80; fan physical speed, 4042 rpm; fundamental blade passage frequency, 1751 hertz.

FREQUENCY	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																AVERAGE SPL	POWER LEVEL (PWL)
	ANGLE, DEG																	
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160		
50	80.9	78.6	81.4	80.4	80.6	81.1	81.6	82.4	83.1	83.6	84.4	85.9	87.1	89.1	91.4	93.5	85.6	133.0
63	89.7	88.7	87.2	85.2	83.2	81.7	83.2	86.7	86.0	84.7	86.4	87.5	88.5	91.2	93.0	94.3	87.6	135.0
80	82.2	81.7	80.7	79.9	79.2	78.9	79.4	81.4	82.9	83.9	86.4	87.9	90.9	93.2	95.2	97.1	88.3	135.7
100	81.4	79.9	80.9	80.1	80.4	80.9	82.1	84.1	85.9	87.6	90.1	91.1	92.9	95.1	97.1	97.8	90.3	137.7
125	86.2	84.5	87.7	87.5	86.7	86.0	86.5	87.5	89.0	90.5	91.7	93.0	94.0	95.2	96.5	96.3	91.3	138.7
160	85.0	85.0	86.5	86.2	86.0	86.0	86.7	88.2	88.5	89.0	90.0	91.0	91.5	93.5	93.5	93.4	89.6	137.0
200	85.4	86.7	85.7	84.7	84.2	84.7	84.7	84.9	85.4	86.4	87.9	89.9	91.9	93.2	93.7	92.6	88.6	136.0
250	87.6	87.1	89.4	89.6	90.4	87.4	86.4	87.4	87.4	88.1	89.9	91.4	92.4	93.6	94.1	91.8	90.1	137.5
315	88.0	86.5	90.0	89.5	88.5	86.3	86.0	87.5	88.3	89.0	90.8	90.0	91.5	92.8	92.5	90.1	89.5	136.9
400	88.3	90.1	95.6	100.1	98.8	98.1	93.8	91.6	93.8	93.3	95.3	91.3	94.3	92.6	94.6	91.7	95.4	142.8
500	98.7	104.2	108.2	111.4	109.7	108.9	104.2	99.9	103.2	92.9	104.9	96.4	101.2	94.2	102.2	97.8	105.4	152.8
630	100.2	102.6	112.4	113.1	109.7	107.9	101.7	97.2	95.1	102.4	96.6	94.7	96.6	96.2	97.6	97.0	105.7	153.1
800	99.2	102.0	106.7	106.5	111.0	109.2	106.7	105.0	101.0	100.2	98.0	94.8	98.5	99.0	94.7	92.4	105.0	152.4
1000	105.3	105.3	107.8	109.1	113.8	111.3	104.8	101.6	99.6	99.8	94.8	97.1	98.3	97.5	94.8	96.2	106.4	153.8
1250	100.6	103.1	104.3	109.1	111.8	108.1	104.3	102.8	98.8	98.1	94.6	96.1	96.6	94.8	94.3	93.5	104.7	152.1
1600	107.4	108.7	109.2	110.4	111.4	109.4	104.4	101.2	96.9	97.4	98.7	95.2	98.4	95.9	94.9	94.6	105.7	153.1
2000	106.1	106.8	107.6	109.8	109.8	107.6	102.6	99.6	95.8	95.5	97.0	93.8	96.5	94.6	93.3	93.0	104.3	151.7
2500	101.7	102.9	103.2	106.2	106.2	103.9	98.7	95.2	93.2	91.2	91.2	91.0	91.7	90.4	89.2	87.8	100.6	148.0
3150	101.4	102.4	103.9	104.9	105.1	102.6	97.6	93.4	90.4	90.6	89.9	90.7	92.4	90.1	88.6	87.1	99.9	147.3
4000	101.2	102.7	103.7	104.9	104.9	102.9	96.9	91.9	89.7	89.4	90.4	90.2	92.7	89.4	88.2	86.1	100.0	147.4
5000	98.8	100.3	102.0	104.0	103.5	100.8	94.3	89.8	89.0	87.0	89.0	89.4	91.0	87.0	86.8	83.8	98.7	146.1
6300	97.4	98.9	99.4	100.9	100.7	97.9	92.0	86.7	85.7	85.1	86.9	86.7	87.4	85.1	83.7	81.0	96.4	143.8
8000	97.1	98.4	99.4	99.6	99.6	98.1	90.6	85.4	84.6	85.4	87.6	86.9	88.8	86.6	83.6	80.5	96.5	143.9
10000	95.2	96.4	97.2	97.7	97.2	96.4	88.9	83.4	83.7	83.5	86.2	85.4	88.0	84.7	82.5	78.3	95.5	142.9
12500	92.6	94.4	95.1	95.1	96.2	94.4	87.4	82.7	82.8	84.9	87.6	86.6	88.6	84.4	82.8	78.6	95.4	142.8
16000	90.1	92.1	92.6	94.1	94.6	91.9	84.6	80.9	84.6	84.9	88.1	87.6	88.1	84.1	83.3	77.8	95.9	143.3
20000	87.7	89.7	91.0	91.7	91.5	88.3	82.0	79.0	82.5	83.8	85.3	85.3	86.0	83.0	81.0	76.0	96.1	143.5
OVERALL	113.8	115.2	118.0	119.7	120.4	118.3	113.4	110.7	108.8	108.3	108.9	106.3	108.6	107.5	108.3	107.4	115.0	162.4

DISTANCE SIDELINE PERCEIVED NOISE LEVELS

61 METERS 100.2 109.5 115.1 119.5 121.6 120.6 116.5 114.0 111.8 111.3 111.9 109.2 110.3 107.0 104.7 99.2

(d) Percent of design speed, 90; fan physical speed, 4547 rpm; fundamental blade passage frequency, 1970 hertz.

FREQUENCY	ANGLE, DEG																	AVERAGE SPL	POWER LEVEL (PWL)
	1/3-OCTAVE BAND SOUND PRESSURE LEVEL (SPL) ON 30.5-METER RADIUS																		
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160			
50	85.5	82.0	84.5	84.2	84.5	84.7	85.5	86.0	86.0	87.5	88.0	90.0	91.7	93.7	96.7	99.1	90.2	137.6	
63	84.5	85.5	84.2	83.5	84.0	84.0	83.7	85.0	85.5	86.5	88.2	89.7	92.5	95.2	97.7	99.6	90.7	138.1	
80	85.2	90.0	90.0	89.2	87.5	85.2	83.7	89.2	88.7	89.0	92.0	93.2	96.2	98.2	101.2	103.4	94.2	141.6	
100	85.4	84.4	84.4	83.9	84.4	86.2	87.2	88.2	90.2	92.4	94.4	95.7	98.7	100.9	102.4	103.6	95.6	143.0	
125	89.7	87.5	88.2	88.0	89.0	89.7	90.7	91.0	93.0	94.5	95.5	96.7	99.0	100.4	101.9	101.6	95.8	143.2	
160	92.5	91.0	91.2	89.5	93.5	92.0	92.5	93.0	94.7	94.5	94.5	96.0	97.2	99.2	99.7	97.6	95.1	142.5	
200	90.5	92.5	92.0	97.0	95.2	95.0	93.2	91.2	90.2	90.7	92.7	94.0	97.0	98.7	99.5	96.8	94.8	142.2	
250	94.3	95.8	97.5	101.8	99.3	98.8	96.8	94.5	92.8	93.8	95.3	96.3	98.3	100.0	98.5	96.9	97.5	144.9	
315	101.8	100.5	108.3	106.0	101.3	98.5	99.0	100.0	99.0	97.3	98.3	99.3	100.5	98.3	98.3	96.7	101.1	148.5	
400	95.9	103.4	100.7	109.4	110.7	104.4	104.2	100.9	100.4	100.2	96.7	95.9	99.2	98.7	97.4	97.0	103.8	151.2	
500	100.4	108.4	112.4	113.2	112.4	108.4	110.7	108.9	107.4	108.4	100.9	105.7	101.2	104.4	98.9	100.8	108.8	156.2	
630	98.8	103.5	106.5	110.3	111.0	108.5	106.0	101.3	98.3	99.3	97.8	100.0	97.5	99.8	100.0	96.4	105.1	152.5	
800	104.3	106.3	109.3	111.3	114.3	109.0	108.5	102.5	104.0	102.8	99.0	100.1	100.5	100.3	99.0	96.4	107.3	154.7	
1000	103.3	102.1	104.3	111.3	111.3	105.1	98.3	101.3	99.1	97.6	97.1	97.1	97.3	97.3	97.3	94.2	104.3	151.7	
1250	101.8	105.8	105.8	108.3	108.0	103.1	103.1	101.3	99.8	96.1	95.6	96.8	98.6	98.1	94.6	93.4	102.9	150.3	
1600	102.5	102.5	103.7	105.5	106.5	102.5	98.5	96.2	94.5	94.0	94.7	94.8	95.2	94.5	93.7	90.9	100.5	147.9	
2000	105.1	106.6	107.1	110.6	107.4	105.9	100.6	97.9	96.4	97.4	96.1	96.2	97.9	95.4	94.1	92.1	103.6	151.0	
2500	101.7	104.2	104.7	106.5	106.7	102.0	98.0	95.2	94.2	92.7	93.2	93.5	94.0	92.7	92.0	89.9	100.9	148.3	
3150	99.7	102.4	103.7	104.4	104.4	101.5	97.4	93.9	91.7	91.2	92.2	92.5	92.7	92.0	90.2	88.4	99.5	146.9	
4000	100.0	102.7	103.2	104.2	104.2	101.2	96.5	93.2	91.5	92.0	93.5	94.5	95.0	92.7	90.5	88.2	99.6	147.0	
5000	97.6	99.9	101.4	103.9	102.6	98.9	94.4	90.4	90.1	89.9	92.1	92.5	92.9	89.6	89.4	86.1	98.3	145.7	
6300	97.2	98.2	98.9	101.2	101.0	97.2	91.7	87.7	87.9	87.7	89.9	89.6	89.9	87.9	86.7	83.2	96.6	144.0	
8000	96.7	97.9	98.7	99.4	99.4	96.8	91.2	86.9	87.2	88.2	90.1	89.6	91.1	88.8	86.7	84.0	96.4	143.8	
10000	95.2	96.2	96.4	97.4	98.0	96.0	89.2	86.0	86.5	86.0	88.7	87.9	90.0	86.7	84.5	81.3	95.8	143.2	
12500	94.0	93.4	94.4	95.2	97.0	93.7	87.9	85.5	85.9	87.4	89.4	88.9	90.4	85.5	84.4	80.9	95.9	143.3	
16000	92.6	90.7	91.2	93.9	95.7	90.9	84.9	83.9	87.4	87.6	90.6	90.1	89.9	85.6	85.1	80.3	96.7	144.1	
20000	91.3	88.3	89.5	92.0	92.9	87.6	83.6	82.0	85.8	86.8	87.9	87.8	88.8	85.1	83.3	78.6	97.3	144.7	
OVERALL	113.4	115.9	118.1	120.5	120.7	116.5	115.4	112.8	111.8	111.8	109.2	110.9	111.0	111.8	111.5	111.3	115.6	163.0	
DISTANCE																			
SIDELINE PERCEIVED NOISE LEVELS																			
61 METERS	100.2	110.2	115.4	120.6	121.5	119.5	117.6	115.8	114.8	114.9	112.6	113.1	112.3	110.2	106.4	101.4			
305 METERS	75.2	89.2	96.8	102.3	103.9	102.0	101.3	99.7	98.7	98.8	95.5	96.6	94.8	93.4	88.5	83.4			

TABLE XV. -- NOISE OF FAN C CONFIGURATION 313 (HARD INLET, FULLY TREATED FAN FRAME, SUPPRESSED 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/sq m; PWL re 0.1 picowatt.]

(a) Percent of design speed, 60; fan physical speed, 3044 rpm; fundamental blade passage frequency, 1319 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	82.0	83.0	81.7	84.3	84.0	84.8	84.2	80.8	84.2	80.5	79.5	79.2	80.3	82.0	82.3	84.2	82.6	130.0
63	80.1	78.3	76.3	76.4	76.1	80.8	79.1	79.3	82.4	77.6	77.3	78.4	80.3	81.9	83.1	84.2	79.9	127.3
80	80.3	79.0	76.0	76.1	74.3	79.8	79.6	79.0	82.6	79.0	78.5	80.2	82.0	84.3	85.3	87.2	81.0	128.4
100	87.5	87.0	86.5	85.5	83.0	82.0	81.7	81.2	83.2	81.2	81.8	84.4	86.0	87.7	87.2	87.9	84.5	131.9
125	84.7	84.8	84.5	83.5	81.5	82.3	82.0	81.5	83.3	83.5	84.9	85.3	86.8	87.0	87.6	87.6	84.1	131.5
160	86.7	86.2	85.7	86.2	83.5	82.5	84.5	84.2	83.4	83.7	84.2	84.6	86.7	86.9	86.2	85.7	84.9	132.3
200	86.8	88.5	85.5	81.6	80.1	81.1	79.5	79.6	79.8	79.0	80.1	81.2	82.6	84.3	84.1	83.7	82.2	129.6
250	87.0	87.3	86.0	84.7	82.7	82.7	81.0	81.5	82.8	82.7	83.5	84.8	86.3	85.0	83.2	84.1	84.1	131.5
315	86.8	86.8	85.8	85.2	82.8	82.3	82.0	82.5	82.5	82.5	83.3	84.4	85.5	85.5	84.0	82.9	83.9	131.3
400	87.4	87.7	87.1	85.9	83.9	82.1	80.7	81.1	82.4	83.1	84.6	85.1	86.6	86.2	84.2	82.6	84.5	131.9
500	88.2	88.1	87.7	87.4	85.4	82.9	81.2	81.2	81.4	82.7	83.6	84.7	85.9	85.7	83.4	82.0	84.6	132.0
630	89.0	88.7	88.7	88.2	85.5	82.5	80.7	81.0	81.0	81.8	83.0	84.2	85.0	85.0	82.5	80.9	84.5	131.9
800	91.0	90.5	89.7	89.3	86.8	83.8	82.0	81.2	81.2	81.7	82.2	83.3	85.0	84.8	82.0	81.0	85.2	132.6
1000	92.6	92.6	92.8	91.1	89.1	85.6	83.0	81.5	81.3	81.5	81.8	82.6	83.8	83.6	81.8	80.3	86.7	134.1
1250	101.3	100.6	104.5	102.0	104.3	100.0	93.3	92.5	89.8	88.3	87.8	88.1	89.3	88.8	87.8	87.4	98.0	145.4
1600	93.9	95.1	95.7	94.1	93.6	89.4	84.6	82.7	81.6	81.1	81.2	82.2	83.9	82.9	81.1	80.0	89.2	136.6
2000	92.0	93.5	93.1	91.8	89.1	85.0	81.3	79.3	79.4	79.1	80.4	80.7	82.6	81.4	79.6	77.9	86.6	134.0
2500	95.7	97.2	97.6	97.7	95.9	91.1	85.9	83.4	82.7	82.1	82.2	82.0	83.6	82.9	81.6	81.0	91.6	139.0
3150	92.7	94.1	94.7	93.1	90.2	86.1	81.1	78.2	78.2	78.4	78.9	80.9	82.1	81.4	78.9	77.8	87.8	135.2
4000	94.6	95.8	97.0	97.0	94.5	90.5	83.8	80.6	80.1	81.1	82.0	83.4	85.3	84.1	81.6	80.1	91.1	138.5
5000	93.3	94.5	95.0	95.5	93.3	89.0	81.8	78.3	79.2	79.0	80.8	82.1	84.0	82.7	80.7	77.4	89.9	137.3
6300	92.8	93.8	93.5	93.6	91.5	88.0	80.0	76.1	77.5	77.5	79.5	80.1	82.0	81.3	78.6	75.6	88.9	136.3
8000	93.1	94.4	93.8	93.0	91.3	88.4	79.9	75.8	77.6	78.6	80.4	81.1	83.6	82.3	78.6	76.1	89.7	137.1
10000	92.5	93.7	93.0	91.8	90.5	87.8	79.0	75.3	77.7	77.8	79.9	80.3	82.9	80.8	78.2	73.7	89.8	137.2
12500	90.9	91.7	91.6	90.2	89.2	86.7	77.7	75.6	76.6	79.3	80.6	81.2	83.8	80.6	77.8	74.3	90.0	137.4
16000	89.0	90.0	89.3	89.6	87.8	83.8	73.6	72.3	75.8	76.8	79.5	79.9	80.6	78.5	77.0	71.6	90.2	137.6
20000	87.0	87.7	88.1	87.4	84.8	79.7	70.9	67.9	72.1	73.1	74.9	75.8	77.4	75.1	73.9	67.5	90.4	137.8
OVERALL	106.5	107.0	108.3	107.0	106.9	103.1	97.8	96.6	96.4	95.7	96.4	97.3	98.8	98.7	97.5	97.1	103.3	150.7
SIDELINE PERCEIVED NOISE LEVELS																		
61 METERS	92.2	101.6	106.2	108.4	108.9	106.4	102.0	101.0	100.5	100.0	100.3	100.5	101.0	98.5	93.9	88.8		
113 METERS	84.0	93.9	99.4	101.6	102.5	100.2	95.8	94.9	94.3	93.8	93.8	93.9	94.2	91.6	87.0	81.7		

(b) Percent of design speed, 70; fan physical speed, 3551 rpm; fundamental blade passage frequency, 1538 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	80.7	80.2	81.2	80.1	82.4	81.1	80.4	81.6	83.6	82.7	83.3	85.6	86.1	88.1	90.3	83.7	131.1	
63	88.0	82.7	84.7	88.0	81.8	84.8	82.3	83.5	81.5	83.5	82.8	83.6	85.7	87.3	89.2	90.4	85.1	132.5	
80	82.0	80.5	78.2	77.0	76.9	78.9	78.7	78.5	81.2	82.5	83.9	85.3	88.0	89.9	91.9	93.3	85.3	132.7	
100	83.4	82.4	81.9	81.2	80.4	81.7	82.2	82.4	84.2	85.9	87.5	89.0	90.9	92.4	94.0	94.6	87.9	135.3	
125	87.3	86.8	86.8	89.3	86.8	87.8	86.8	85.5	87.7	88.8	89.7	91.1	92.7	92.7	93.7	93.0	89.7	137.1	
160	85.4	86.4	86.2	85.0	84.7	85.0	85.4	85.2	86.4	86.7	87.5	88.6	89.4	90.2	90.7	90.9	87.4	134.8	
200	85.8	86.5	86.3	83.5	83.3	83.5	82.8	82.3	83.5	84.0	85.5	86.8	89.0	90.0	90.2	89.4	86.1	133.5	
250	89.3	90.0	92.3	87.7	87.7	88.0	85.8	85.2	88.5	88.7	89.5	90.2	91.8	91.8	91.8	89.9	89.4	136.8	
315	87.6	88.4	87.7	87.1	85.7	84.9	85.4	85.6	85.9	87.4	87.6	88.5	89.7	90.2	89.7	87.4	87.5	134.9	
400	90.1	89.9	89.1	87.8	87.4	85.4	85.1	84.8	86.1	88.3	88.8	89.8	90.9	90.6	89.8	88.1	88.4	135.8	
500	90.2	91.2	91.9	90.7	89.1	87.1	84.7	85.9	86.4	86.9	89.2	89.7	90.4	90.7	88.6	86.5	88.9	136.3	
630	92.4	93.9	94.7	93.5	92.5	88.9	87.4	85.4	88.4	87.4	89.2	89.9	90.9	89.0	86.7	86.7	90.4	137.8	
800	94.1	93.1	93.1	92.5	91.1	89.0	86.3	85.8	86.1	86.8	87.3	88.7	90.0	89.5	87.6	86.0	89.4	136.8	
1000	95.0	95.1	94.9	95.2	95.1	90.6	88.4	87.8	86.0	86.8	87.5	88.4	89.8	88.5	87.2	85.7	91.0	138.4	
1250	96.2	97.9	98.5	98.7	97.4	93.7	91.2	88.7	87.0	87.7	87.2	87.6	89.5	88.7	87.5	86.3	93.3	140.7	
1600	102.4	103.3	103.8	104.1	102.3	100.1	93.7	90.2	87.6	88.1	88.4	88.9	89.8	88.9	88.2	86.7	98.4	145.8	
2000	95.1	97.0	96.8	97.1	95.3	92.5	88.5	85.3	85.1	85.6	85.8	86.1	88.1	86.6	85.8	83.7	91.7	139.1	
2500	95.5	96.7	97.2	97.4	95.2	92.5	87.4	84.5	84.2	84.2	85.4	85.5	86.9	85.5	84.5	82.3	91.7	139.1	
3150	102.4	103.3	103.8	104.1	102.3	100.1	93.7	90.2	87.6	88.1	88.4	88.9	89.8	88.9	88.2	86.7	98.4	145.8	
4000	97.5	99.2	99.0	99.3	97.2	95.0	88.3	84.8	84.0	85.2	86.3	87.3	88.8	87.0	85.2	83.1	94.0	141.4	
5000	99.0	101.1	100.8	102.7	100.3	97.7	90.5	86.0	85.5	86.3	87.3	88.3	90.1	88.0	86.5	83.6	96.8	144.2	
6300	96.5	97.8	98.0	99.3	97.0	94.8	87.1	82.1	82.5	82.8	84.2	84.8	86.0	84.5	83.0	80.3	94.0	141.4	
8000	95.7	97.7	97.7	97.9	95.5	94.0	85.7	80.5	81.5	83.0	85.0	85.0	87.3	85.1	82.4	79.6	93.9	141.3	
10000	94.5	96.2	96.0	96.2	93.8	92.3	84.0	79.4	81.4	81.8	84.4	83.9	86.1	83.4	81.2	76.9	93.3	140.7	
12500	92.6	93.8	93.8	93.6	91.8	90.5	82.1	79.0	80.7	83.1	84.5	84.6	87.2	82.8	80.5	76.9	92.9	140.3	
16000	90.2	91.4	91.1	92.3	90.2	86.9	77.9	76.4	80.3	82.1	84.1	84.0	84.6	81.3	80.2	75.0	92.8	140.2	
20000	87.6	89.1	89.2	90.1	87.0	82.9	75.0	72.3	76.6	79.1	79.9	80.2	81.8	78.5	77.3	71.5	92.8	140.2	
OVERALL	110.7	112.0	113.0	114.5	113.1	109.4	105.7	101.5	101.6	102.6	102.0	102.6	103.9	104.0	104.1	103.5	109.0	156.4	

SIDELINE PERCEIVED NOISE LEVELS

61 METERS	98.0	107.1	112.3	116.2	116.5	114.3	111.4	107.7	107.8	108.7	107.1	106.5	106.5	105.0	102.5	97.3
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TABLE XV. - Concluded.

(c) Percent of design speed, 80; fan physical speed, 4058 rpm; fundamental blade passage frequency, 1758 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	95.1	81.9	83.6	83.6	85.9	83.2	84.4	84.4	84.9	86.7	87.1	88.3	89.4	91.9	93.6	96.1	88.2	135.6
63	90.2	90.1	89.7	86.6	85.9	82.2	83.9	83.2	86.9	87.1	88.4	89.7	90.2	93.4	94.7	95.6	89.3	136.7
80	85.1	84.9	83.9	81.9	83.9	81.4	81.6	82.6	85.3	86.4	88.8	90.7	93.1	96.3	98.1	99.6	91.0	138.4
100	86.3	85.5	85.0	84.1	85.1	85.0	85.1	86.8	88.8	90.3	92.6	93.7	95.8	97.8	100.1	100.3	93.1	140.5
125	89.8	89.3	88.9	89.4	90.4	88.8	89.8	90.1	91.4	92.6	94.3	94.9	96.6	98.1	99.9	98.7	94.0	141.4
160	89.4	90.1	89.7	89.4	89.4	89.4	89.4	90.4	91.6	91.9	93.1	93.8	94.6	96.2	96.6	96.5	92.6	140.0
200	89.6	91.4	88.9	87.4	87.1	86.6	87.1	87.4	87.9	89.1	90.8	91.8	94.8	96.3	96.8	95.1	91.4	138.8
250	92.3	91.6	91.5	91.1	91.3	89.0	89.6	90.1	91.5	93.3	94.6	95.9	96.1	97.8	97.0	95.9	93.7	141.1
315	90.8	91.0	91.1	90.3	89.8	89.0	89.3	90.3	90.8	91.6	92.5	93.7	95.0	96.0	94.8	92.8	92.2	139.6
400	92.5	91.9	92.9	90.7	93.9	90.7	90.4	90.4	91.0	92.2	93.4	94.5	96.0	95.7	94.7	92.6	93.1	140.5
500	98.5	97.5	101.2	97.7	104.2	99.2	97.3	96.7	97.3	97.5	98.3	96.3	98.2	96.3	97.8	95.7	98.8	146.2
630	100.7	100.2	105.4	105.4	105.1	101.4	96.6	96.6	94.9	97.9	99.6	98.8	96.7	95.9	95.2	93.6	100.5	147.9
800	100.0	102.0	106.2	103.2	107.7	107.2	102.7	101.5	97.5	98.2	97.7	96.1	97.9	97.7	95.0	94.6	102.5	149.9
1000	104.4	103.4	104.4	109.4	110.4	109.9	106.1	101.8	98.3	98.3	97.6	99.5	97.3	99.9	97.9	95.8	105.0	152.4
1250	100.4	101.5	102.0	105.4	109.7	106.7	102.2	98.5	97.7	95.9	95.7	95.8	95.9	96.2	93.7	91.8	102.6	150.0
1600	110.2	111.2	113.5	112.8	116.7	112.8	106.8	103.0	100.3	100.2	99.0	98.1	99.2	98.5	97.8	96.9	109.4	156.8
2000	108.9	110.0	111.7	111.1	115.0	111.4	105.2	101.4	98.9	98.2	97.7	96.5	97.7	97.1	96.7	95.5	107.9	155.3
2500	101.4	103.1	104.2	105.6	106.7	104.2	98.1	95.1	93.1	92.1	92.2	92.0	92.9	91.4	90.7	89.1	100.8	148.2
3150	103.2	104.5	106.0	106.5	106.7	105.0	99.0	94.7	93.0	92.0	92.2	92.6	92.7	91.8	90.5	89.9	101.7	149.1
4000	103.0	104.3	105.0	106.0	106.2	104.8	97.8	93.5	91.7	91.5	92.0	92.3	93.2	91.7	90.2	89.1	101.4	148.8
5000	101.1	102.4	103.6	105.3	104.9	102.6	95.9	91.8	91.1	90.1	91.6	91.9	92.4	90.1	89.6	87.1	100.3	147.7
6300	99.5	100.3	101.0	102.6	101.9	100.0	92.7	88.1	87.9	86.9	88.9	88.6	89.1	87.8	86.9	84.1	98.0	145.4
8000	99.1	100.6	101.1	100.9	101.0	100.0	92.0	86.8	86.5	87.1	88.7	88.4	90.1	88.2	86.3	84.2	98.1	145.5
10000	97.3	98.3	98.8	98.8	98.5	98.2	89.8	85.3	85.7	85.2	87.4	87.1	89.2	86.5	84.8	81.1	97.0	144.4
12500	95.0	96.1	97.0	96.3	97.2	96.3	87.8	83.8	84.2	85.9	87.7	87.3	89.2	84.6	82.8	79.8	96.7	144.1
16000	92.1	93.4	93.6	95.0	95.8	93.4	83.7	80.7	84.1	84.6	87.0	86.7	87.1	83.5	82.4	77.9	96.6	144.0
20000	89.6	91.0	92.0	93.1	92.7	90.2	81.2	77.0	81.0	81.9	83.2	84.0	84.6	81.1	80.0	74.6	96.7	144.1
OVERALL	115.5	116.4	118.3	118.5	121.2	118.4	113.1	109.9	108.0	108.2	108.5	108.5	109.1	109.6	109.5	108.8	115.2	162.6
DISTANCE	SIDELINE PERCEIVED NOISE LEVELS																	
61 METERS	102.4	111.4	117.1	119.6	124.0	122.3	117.6	114.8	113.3	112.9	112.7	111.6	111.3	109.3	106.3	101.1		

(d) Percent of design speed, 90; fan physical speed, 4566 rpm; fundamental blade passage frequency, 1978 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	89.7	85.0	86.3	87.2	87.2	88.0	88.3	88.5	89.8	90.2	91.3	92.9	93.7	96.3	99.5	101.5	92.9	140.3
63	87.9	86.8	85.8	86.3	86.1	87.1	86.9	87.1	88.1	88.4	91.3	92.7	95.1	97.8	100.4	101.7	93.2	140.6
80	89.6	90.8	91.3	90.3	90.4	88.1	87.4	90.1	91.4	92.1	93.9	95.9	98.3	101.1	103.8	105.7	96.6	144.0
100	90.9	89.1	89.3	88.6	87.8	89.4	89.9	91.3	92.6	94.9	97.1	99.2	100.9	104.1	105.9	106.2	98.6	146.0
125	94.7	93.0	92.8	92.2	92.0	93.3	93.3	94.2	96.0	97.2	98.8	100.4	101.5	104.2	105.7	104.2	99.1	146.5
160	94.8	94.8	94.6	93.0	93.6	94.1	95.0	95.8	96.8	97.5	97.8	100.0	100.3	102.1	102.6	101.8	98.1	145.5
200	94.0	94.7	93.5	93.7	92.5	92.3	92.3	92.5	92.8	94.0	95.5	97.9	100.0	101.8	102.2	100.4	96.7	144.1
250	96.7	96.3	97.0	97.5	96.2	95.0	94.0	93.8	95.3	96.5	98.3	100.1	101.7	103.2	102.5	100.6	98.5	145.9
315	101.0	100.2	107.2	105.7	102.4	98.2	98.4	98.9	98.7	98.0	98.7	100.8	102.0	101.9	101.2	98.9	101.3	148.7
400	98.9	101.4	98.6	106.7	107.6	103.1	101.1	102.7	99.6	100.4	98.2	99.2	100.6	101.4	100.6	98.3	102.4	149.8
500	103.1	107.5	112.5	111.1	108.3	105.3	107.8	106.5	104.8	105.0	104.6	100.2	103.8	102.6	101.1	100.0	106.7	154.1
630	98.8	100.8	104.6	108.9	106.6	107.4	104.1	101.6	98.9	98.8	98.9	99.0	100.8	101.6	99.8	97.3	103.5	150.9
800	103.6	106.5	110.0	110.3	111.1	109.0	108.1	102.3	102.3	100.6	98.8	100.2	101.1	102.3	101.0	99.7	106.2	153.6
1000	103.8	104.7	105.8	110.7	110.2	106.7	103.5	99.5	99.3	99.0	99.0	99.3	100.2	100.2	99.3	96.6	104.5	151.9
1250	104.6	106.3	107.1	109.0	109.3	105.6	103.1	99.6	98.0	98.1	98.3	98.6	99.5	99.6	98.5	95.9	103.9	151.3
1600	103.7	105.7	106.1	107.4	108.1	105.1	102.4	97.9	97.4	97.1	97.2	97.8	98.4	97.4	96.6	94.3	102.8	150.2
2000	109.1	110.8	111.4	113.1	111.6	108.9	103.9	99.8	99.6	98.1	98.8	99.2	100.1	98.3	98.4	96.2	106.9	154.3
2500	104.0	106.3	106.3	108.5	107.5	104.0	100.2	96.0	95.8	94.8	95.5	96.3	96.7	95.7	95.0	92.6	102.6	150.0
3150	102.6	104.1	104.9	106.6	105.4	102.9	95.4	94.8	94.4	93.9	94.6	95.1	95.6	94.8	93.6	91.7	101.2	148.6
4000	103.1	104.6	105.4	106.6	105.4	103.2	98.7	94.1	93.4	94.4	95.1	96.2	96.6	94.6	93.2	91.5	101.5	148.9
5000	100.3	102.3	103.1	105.4	103.8	101.1	96.9	92.3	93.1	92.4	94.1	94.7	94.9	92.8	92.9	89.5	100.1	147.5
6300	99.2	100.6	100.9	102.8	101.3	99.1	94.0	89.5	90.6	89.9	91.6	92.0	92.2	91.6	90.5	86.9	98.2	145.6
8000	98.0	99.8	100.5	101.2	100.3	99.1	93.2	88.5	89.3	90.0	91.4	91.0	92.8	91.5	89.3	86.9	98.1	145.5
10000	96.3	97.8	98.3	99.3	98.7	97.7	91.7	87.2	88.5	87.8	90.0	90.4	91.9	89.2	87.5	84.6	97.4	144.8
12500	94.1	95.9	96.6	97.3	97.3	96.1	85.7	85.3	86.4	88.2	89.3	89.1	91.0	87.1	85.1	83.3	97.2	144.6
16000	90.6	92.6	93.6	96.4	96.0	93.1	85.5	83.9	86.1	86.7	89.0	88.7	88.8	85.1	84.1	81.3	97.3	144.7
20000	87.6	89.8	91.4	94.7	92.8	89.6	83.9	79.6	83.3	83.6	85.1	84.9	86.4	83.9	81.7	78.8	97.3	144.7
OVERALL	115.4	117.2	119.1	120.5	119.6	117.1	114.9	112.2	111.3	111.2	111.5	111.8	113.2	114.0	114.3	113.7	116.0	163.4

SIDELINE PERCEIVED NOISE LEVELS

DISTANCE	61 METERS	305 METERS
	103.1	77.2
	112.7	91.3
	117.8	98.4
	122.0	103.5
	122.6	104.7
	121.3	103.7
	118.5	101.4
	115.6	99.1
	115.0	98.6
	114.8	98.3
	115.0	98.0
	114.7	97.5
	114.6	97.1
	112.4	94.6
	109.6	91.3
	103.9	85.0

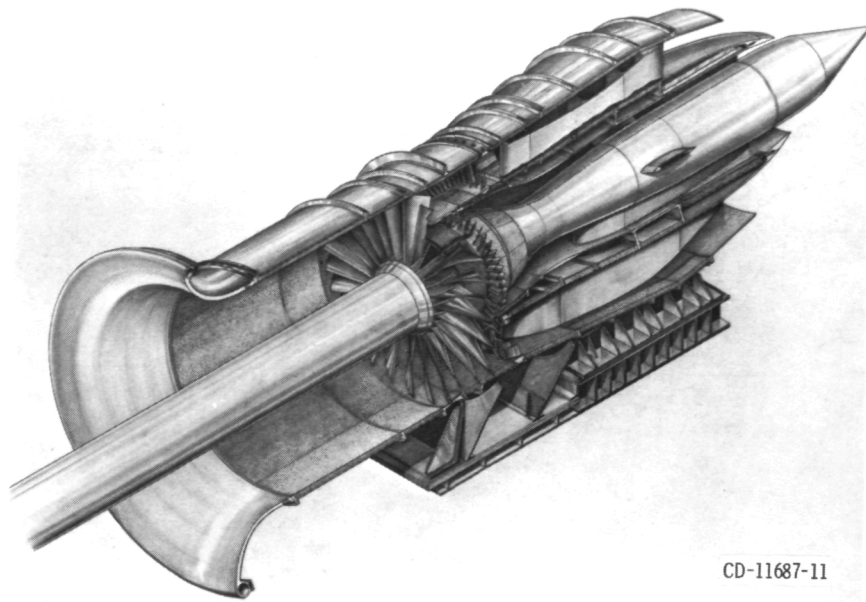


Figure 1. - Cutaway view of one configuration of fan test assembly.

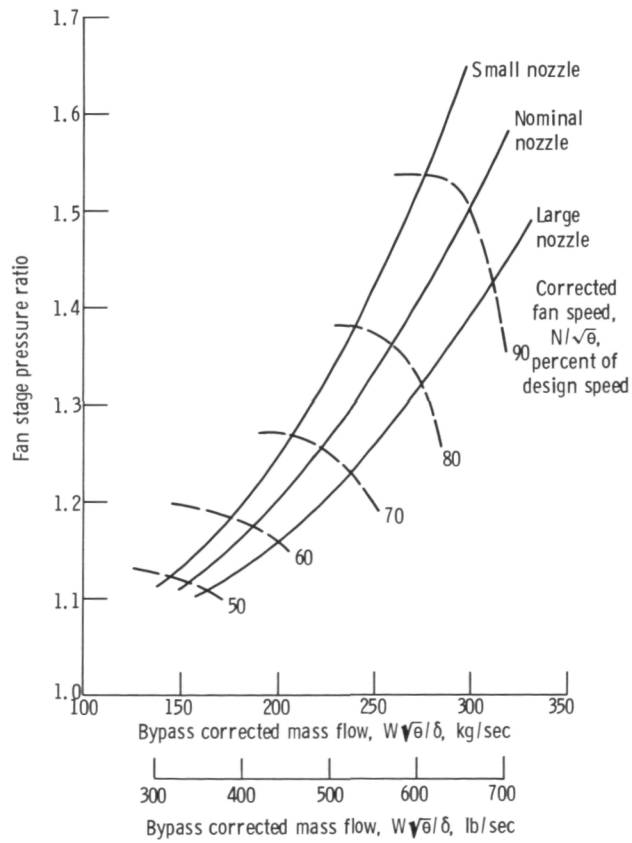
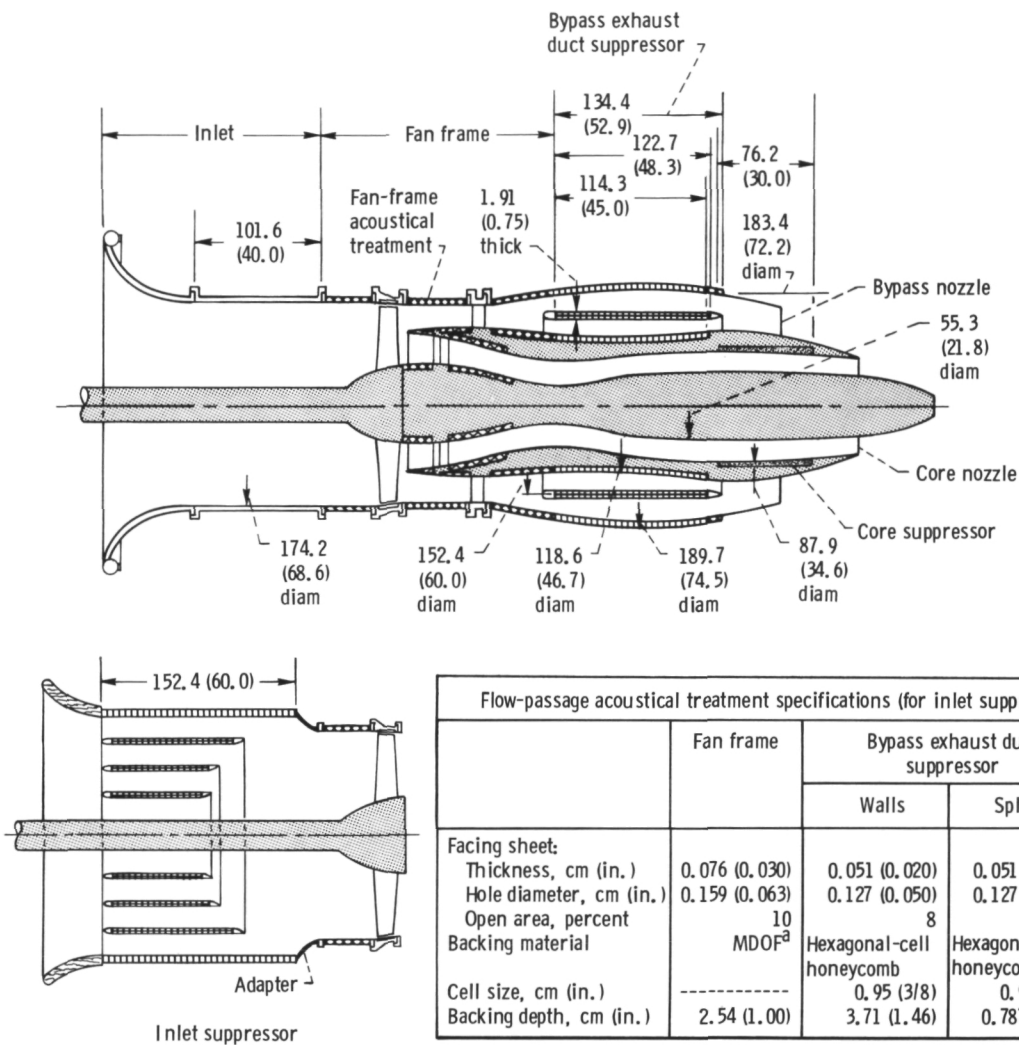


Figure 2. - Fan C performance map for acoustical tests.



^aMulti-degree of freedom (ref. 4).

Figure 3. - Cross sections of hardware for acoustical testing. All dimensions are in centimeters (in.).

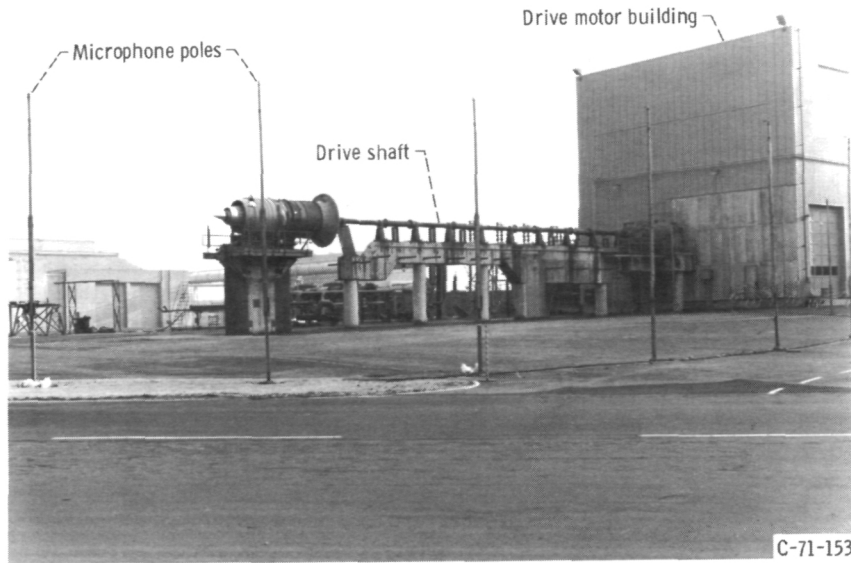


Figure 4. - Full-scale fan noise test facility.

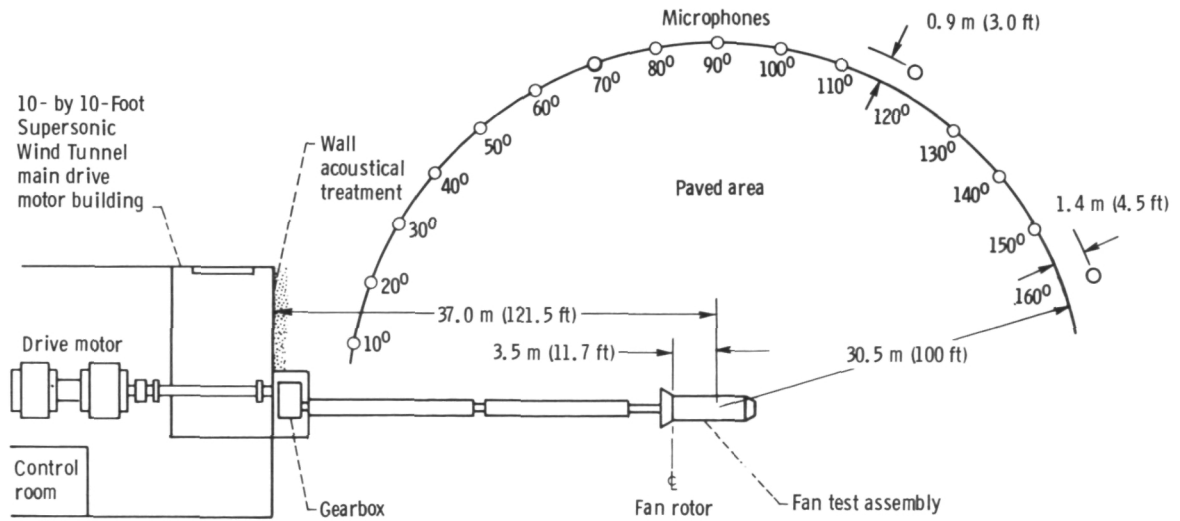


Figure 5. - Plan view of full-scale fan noise test facility.

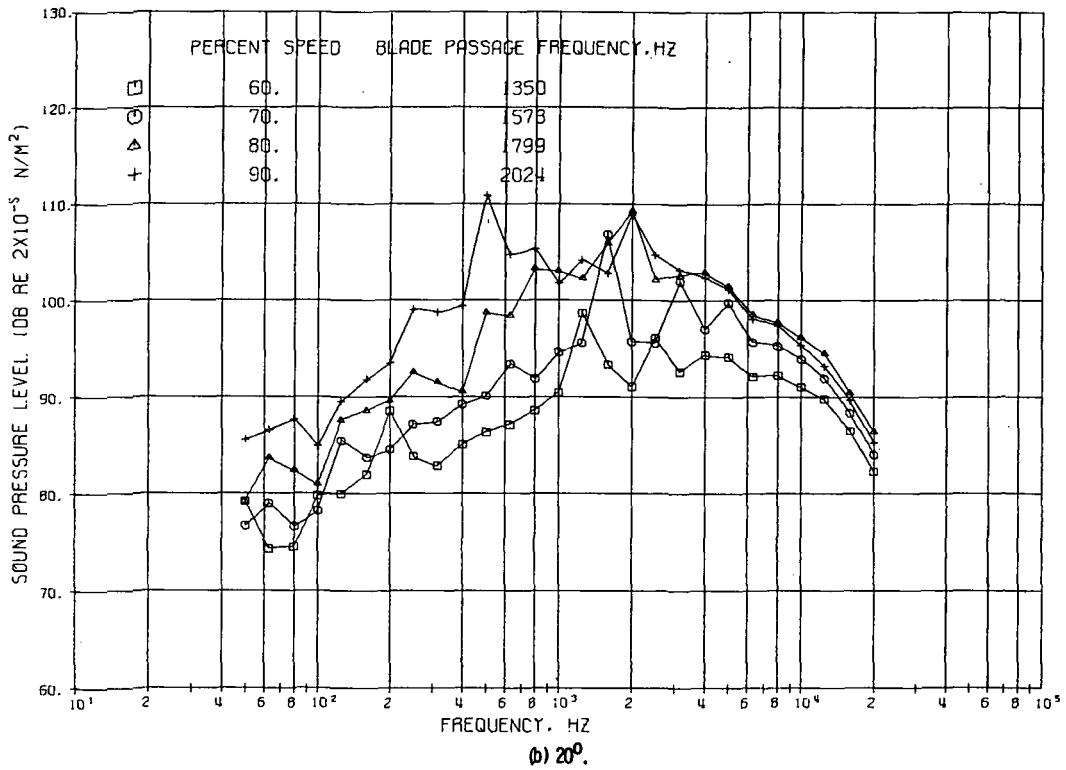
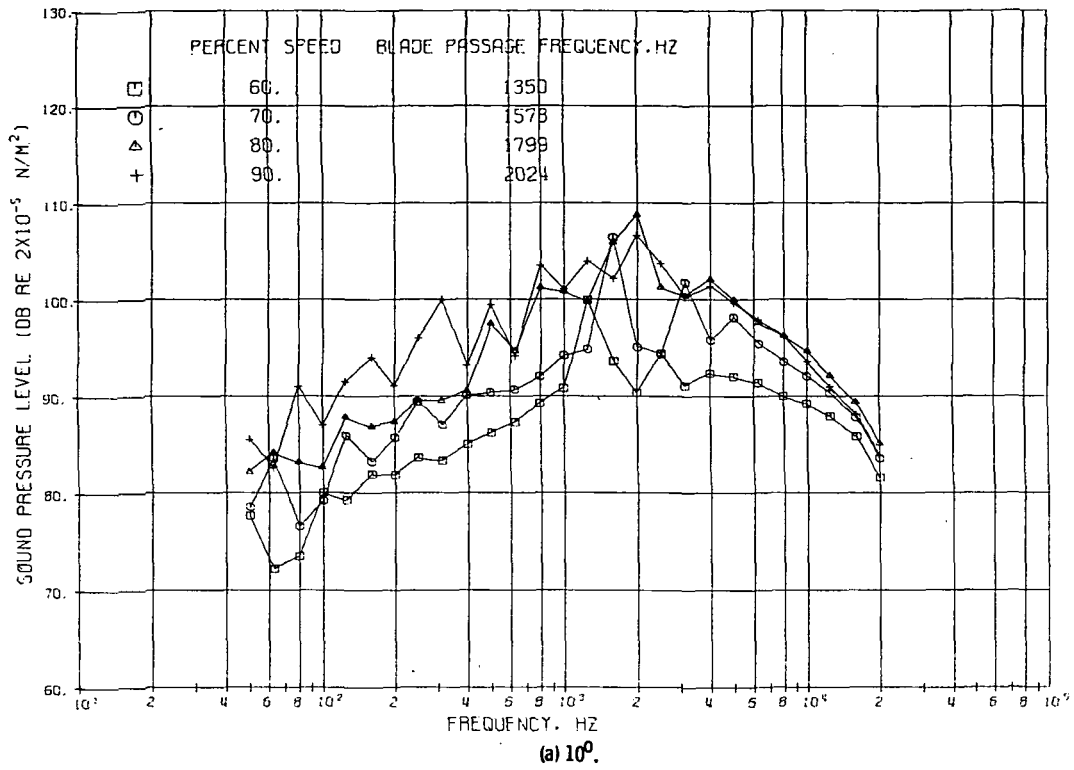


Figure 6. - Standard-day 1/3-octave band spectra on a 30.5-meter (100-ft) radius at each angle. Configuration 305: hard inlet, fully treated fan frame, hard exhaust, and nominal nozzle.

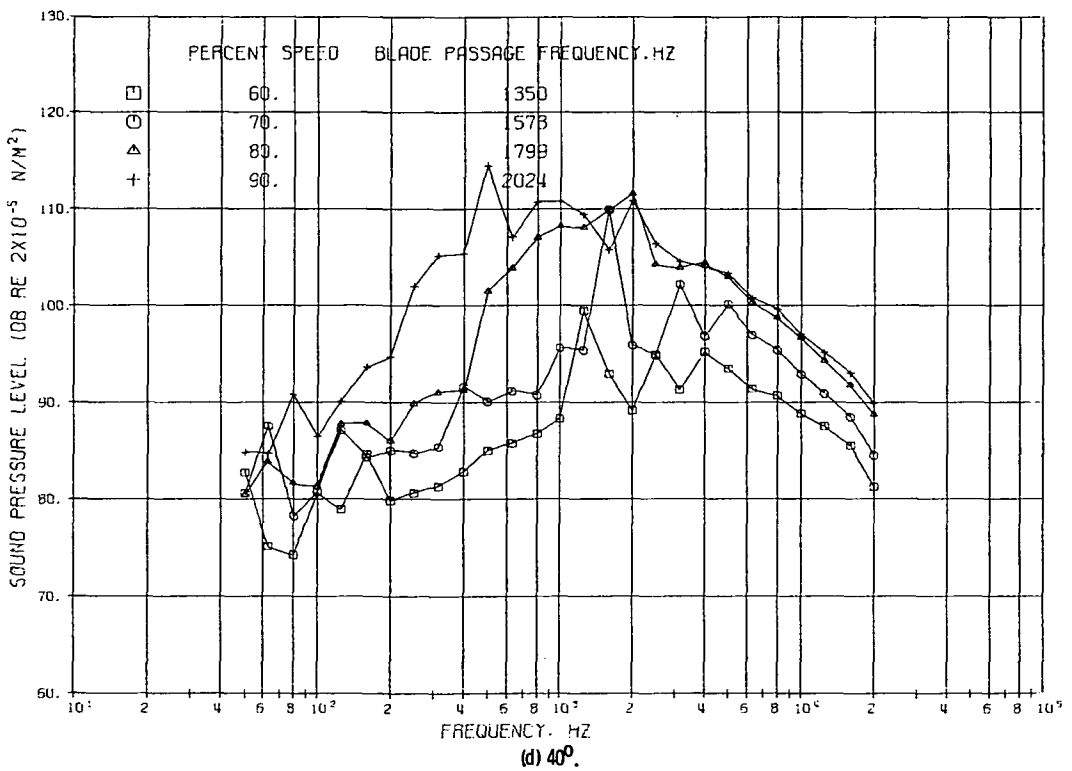
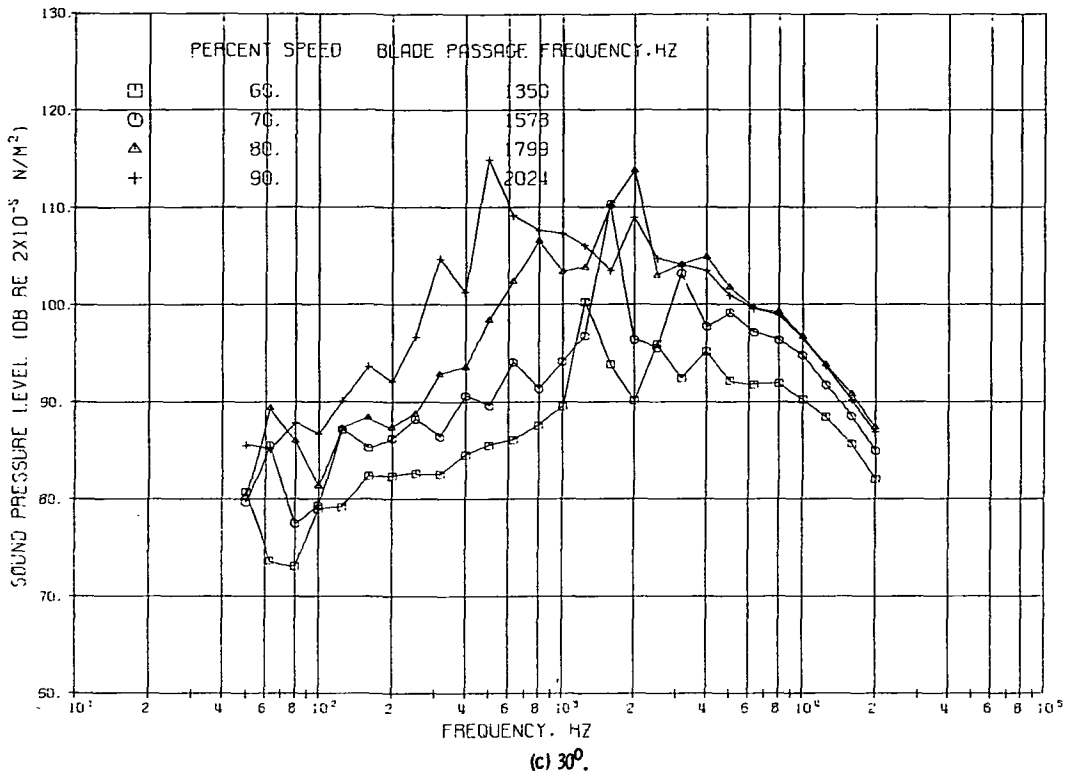


Figure 6. - Continued.

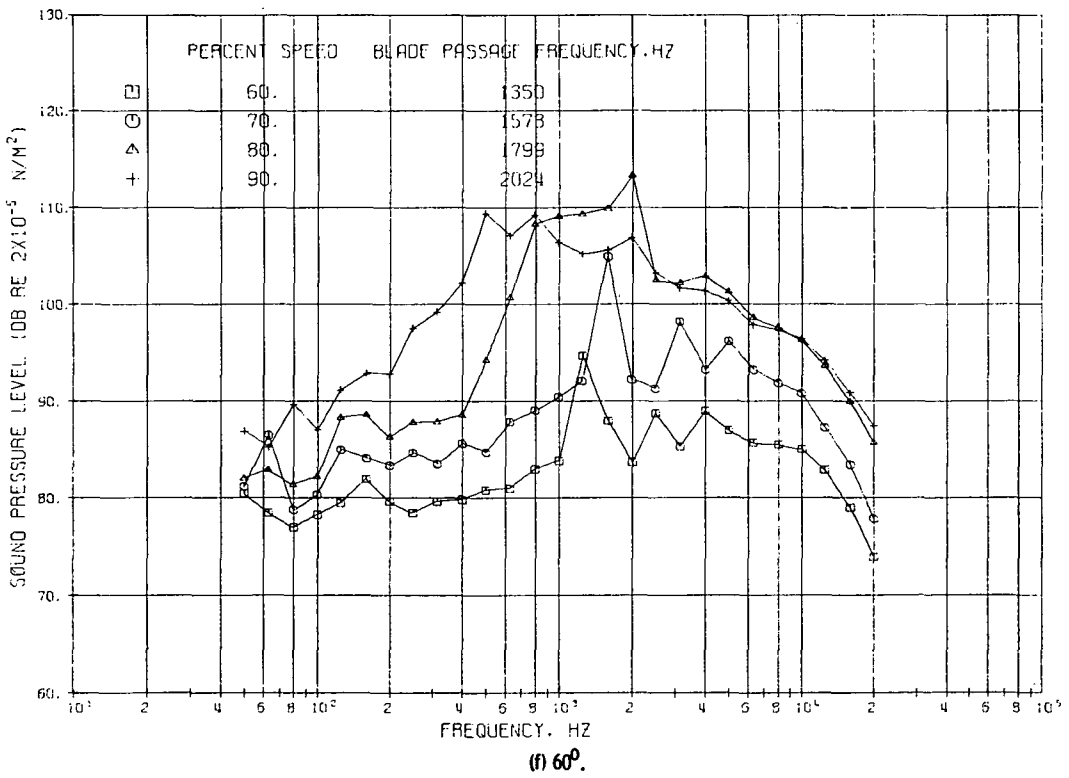
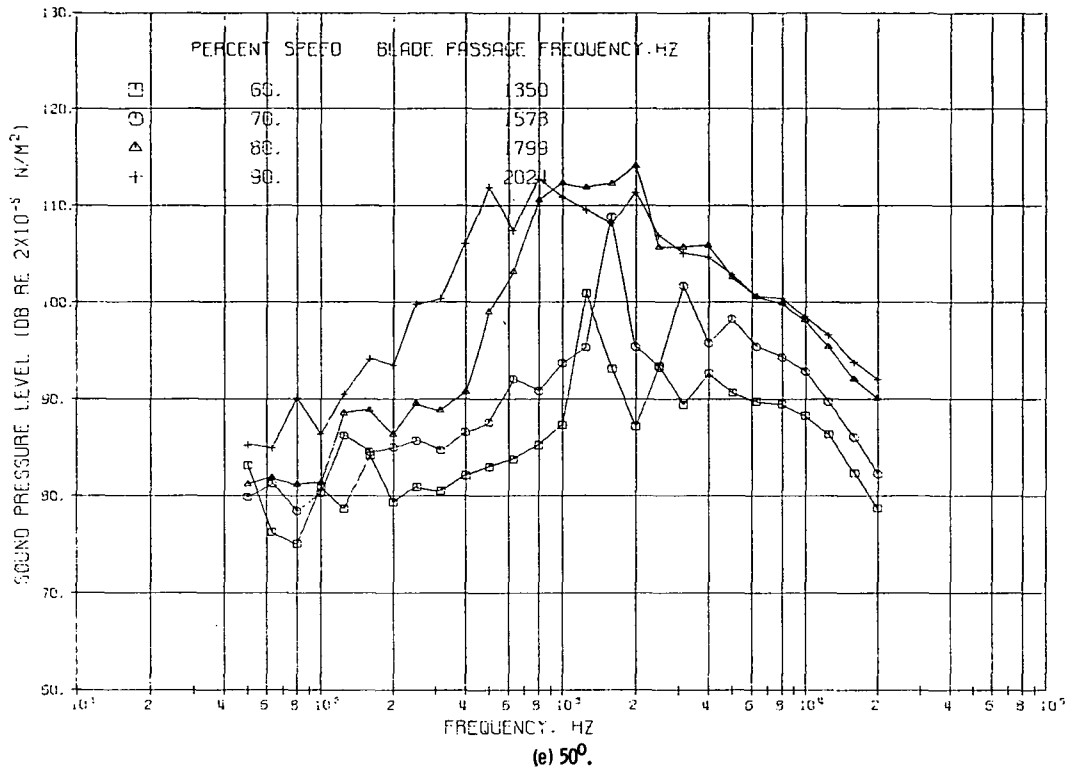
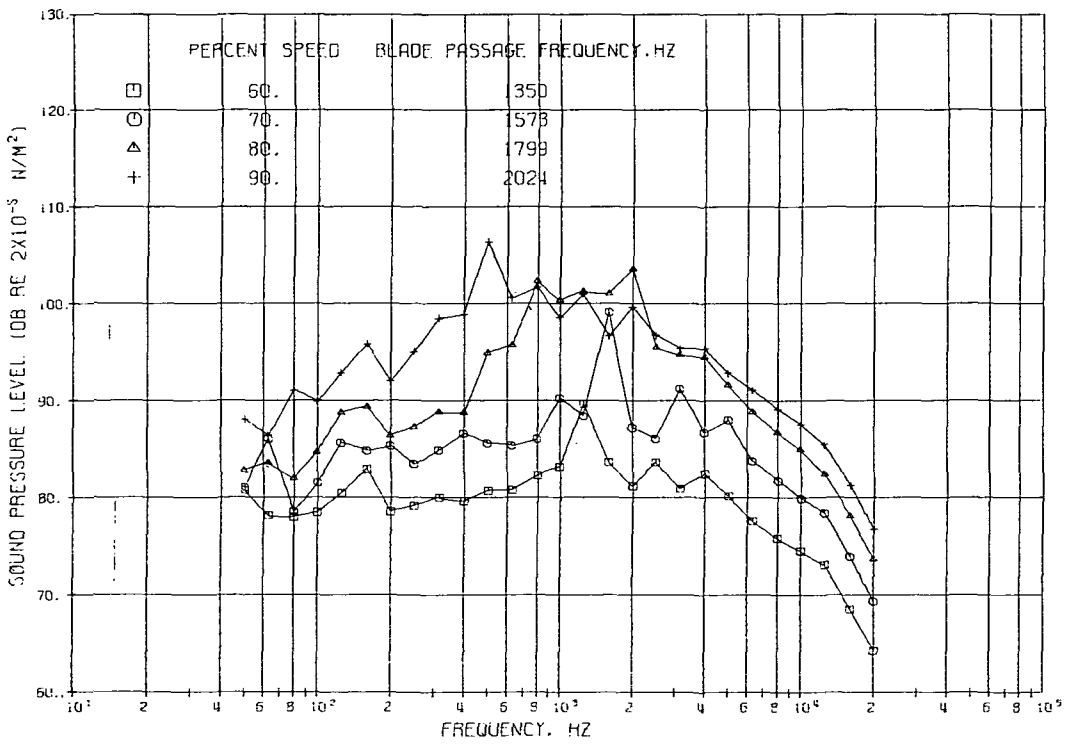
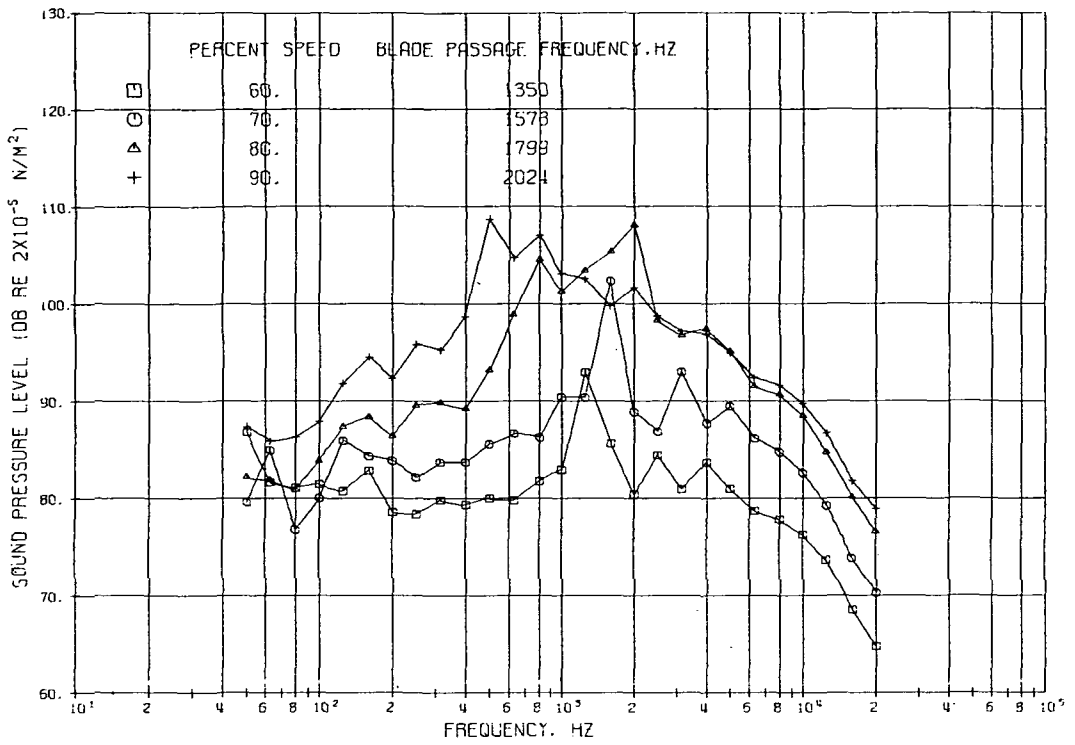


Figure 6. - Continued.



(h) 80°.

Figure 6. - Continued.

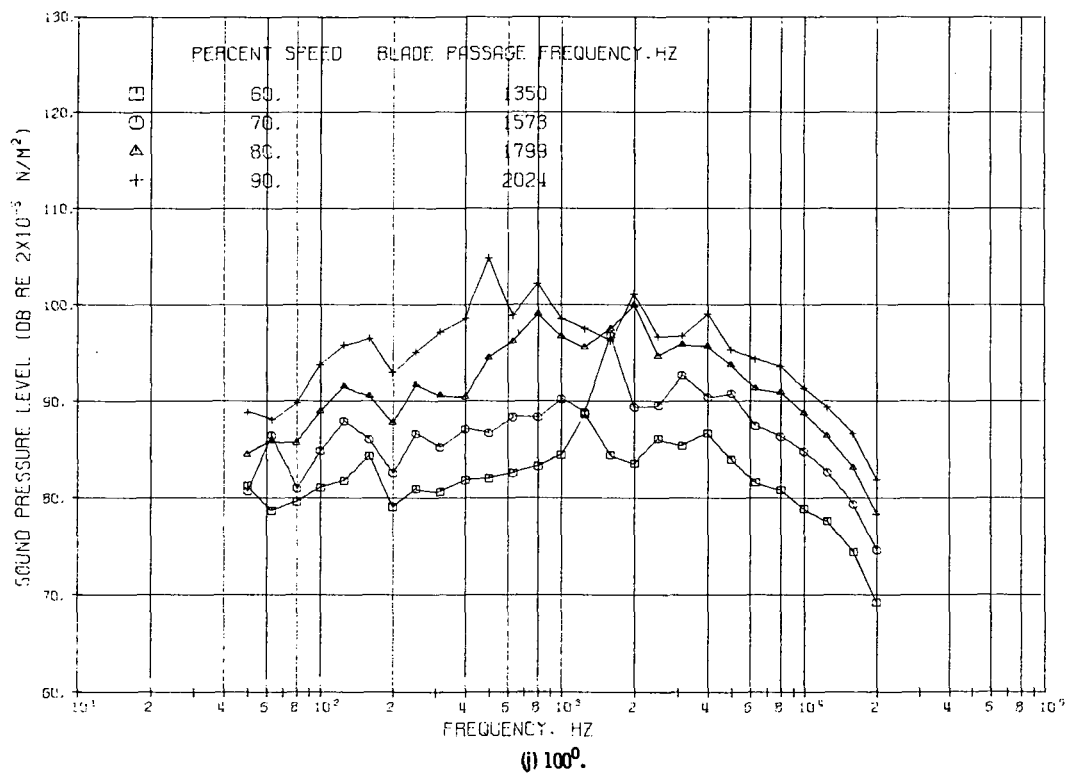
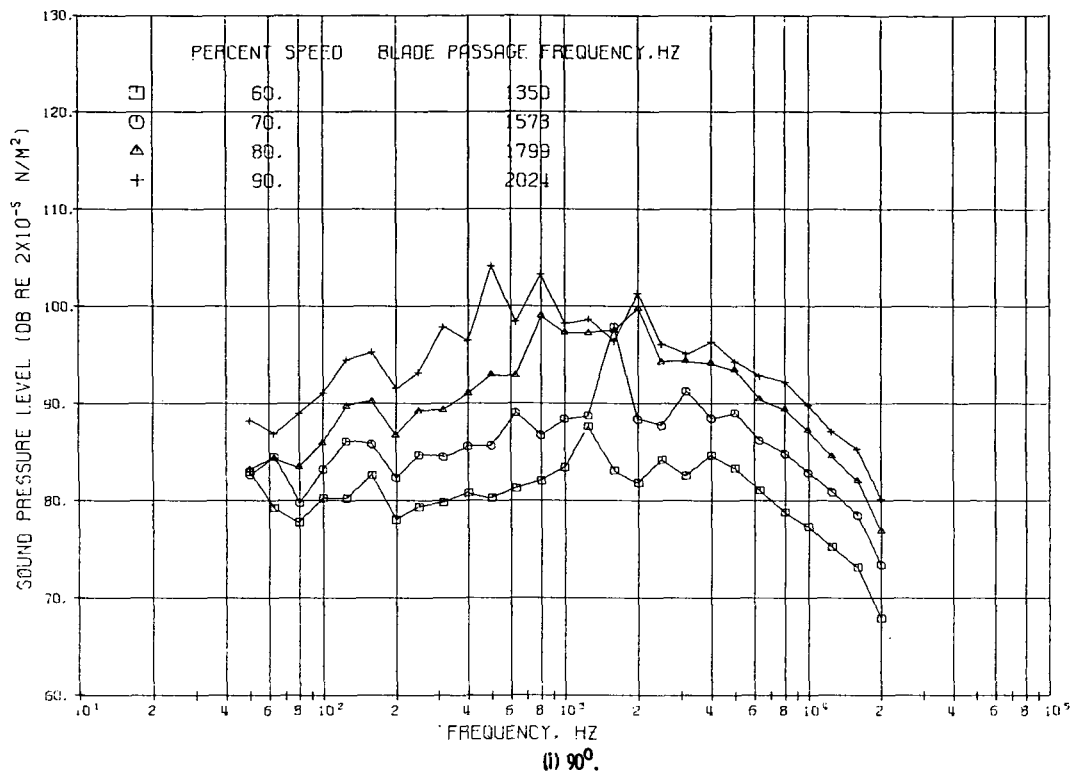


Figure 6. - Continued.

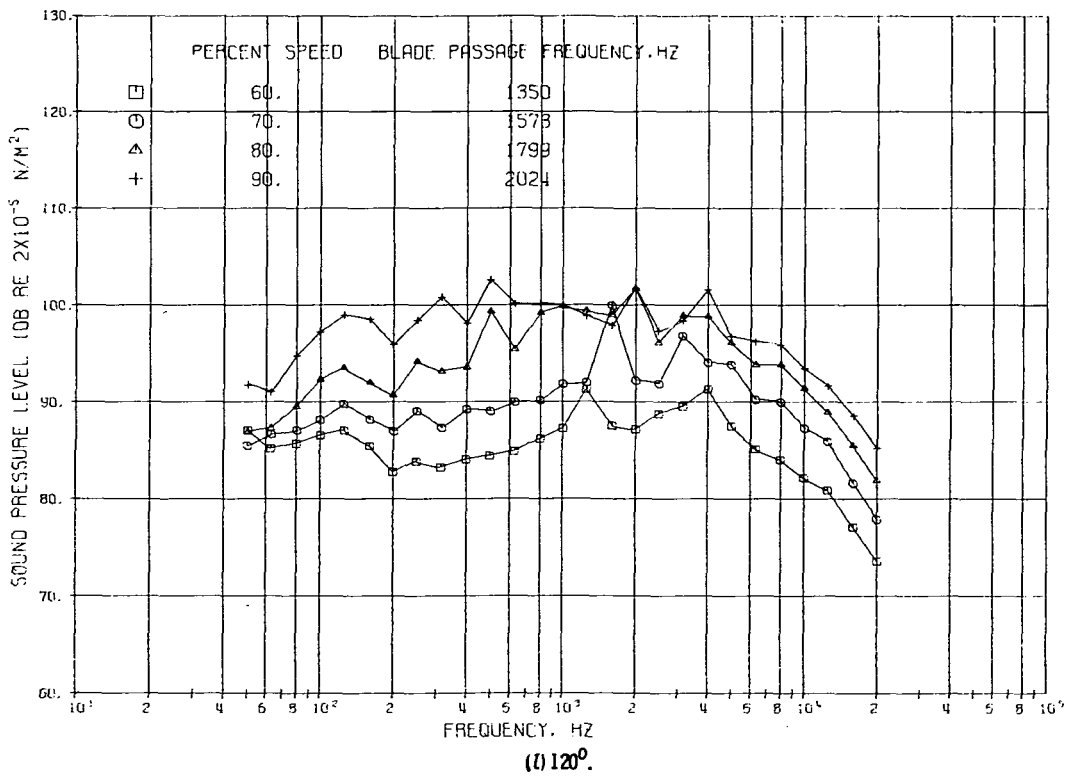
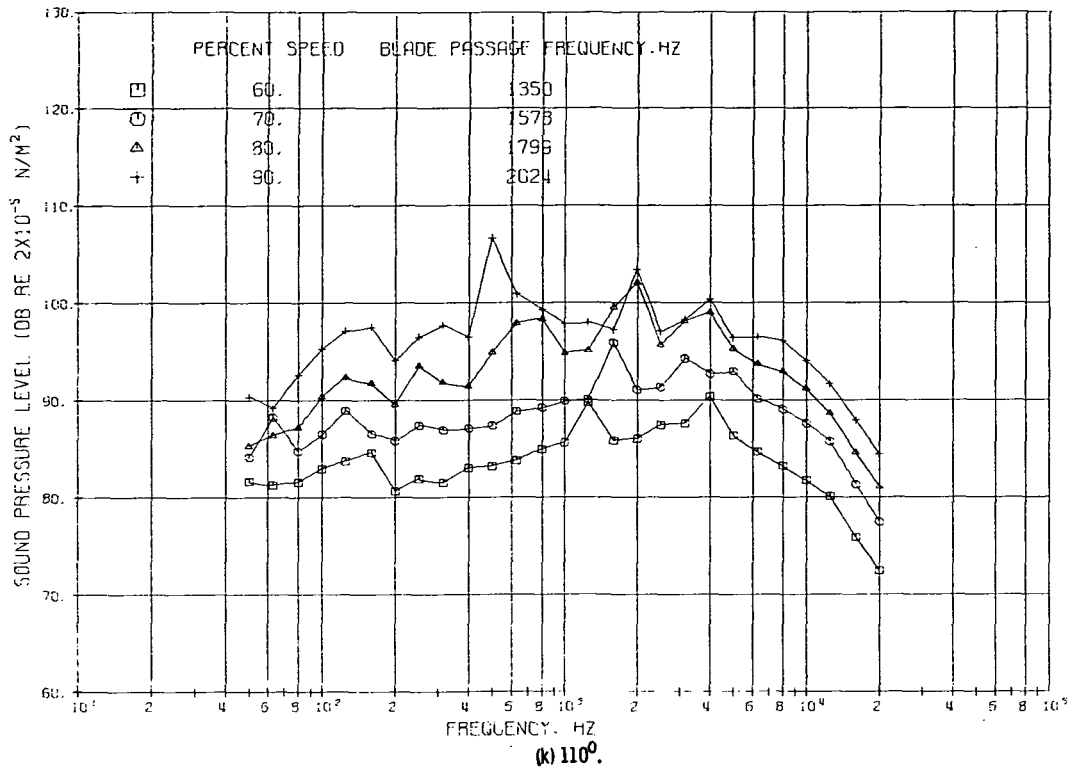


Figure 6. - Continued.

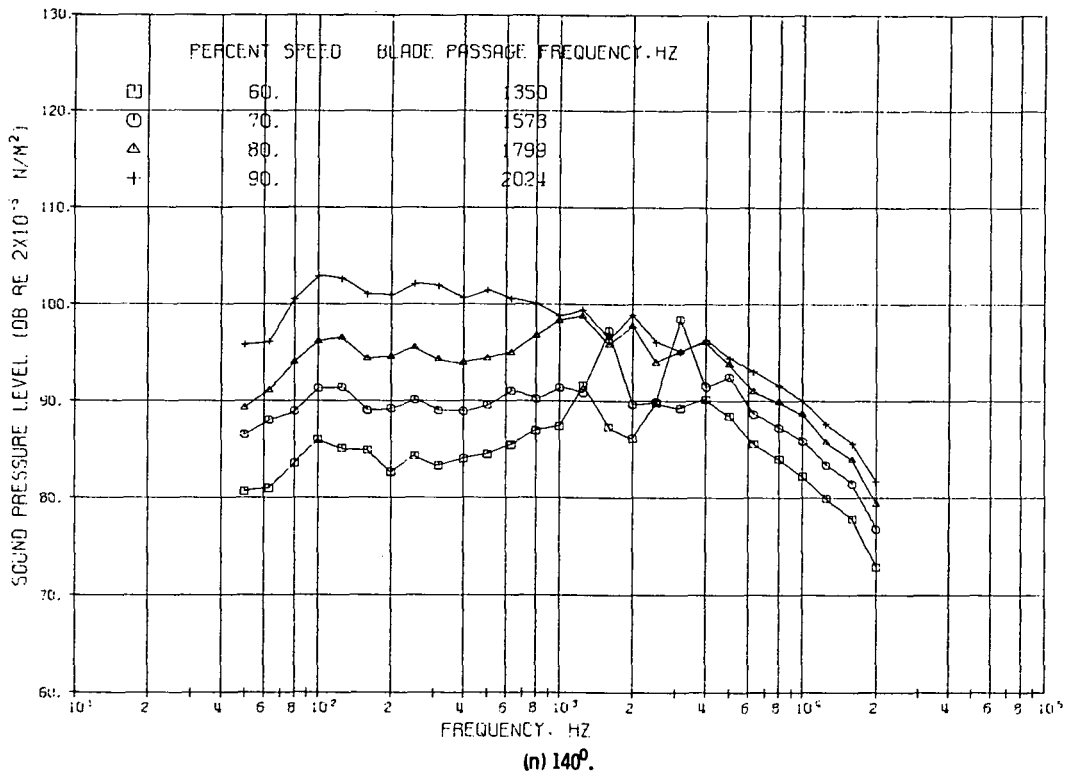
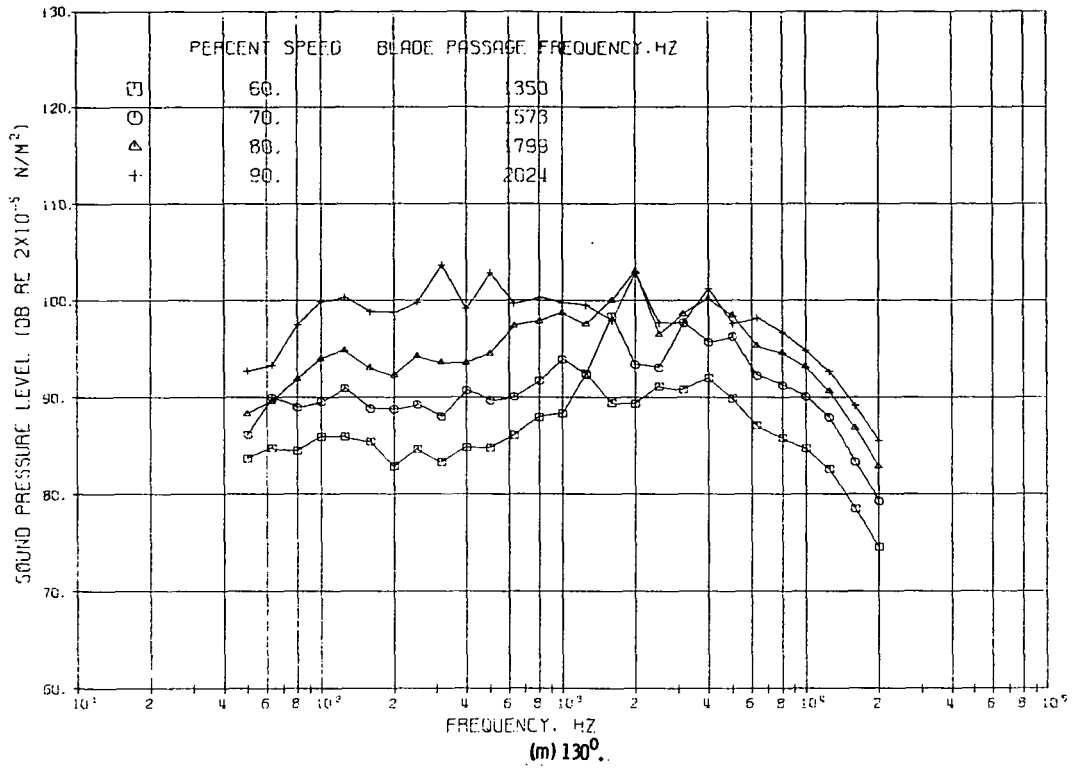


Figure 6. - Continued

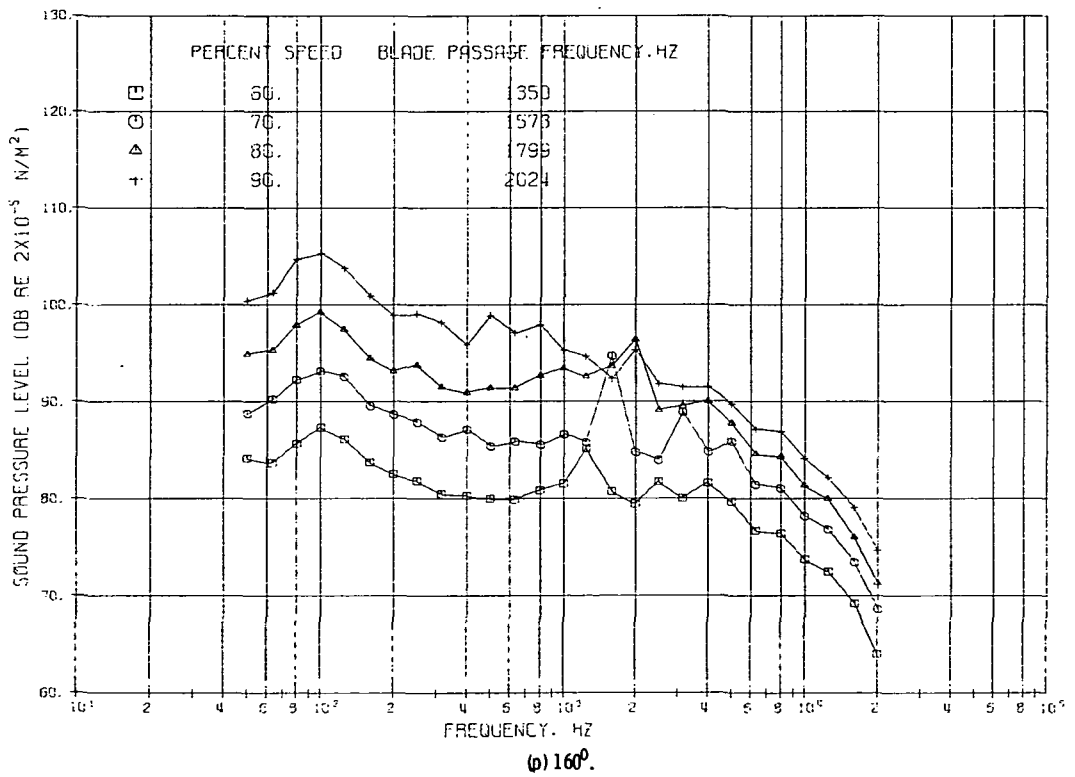
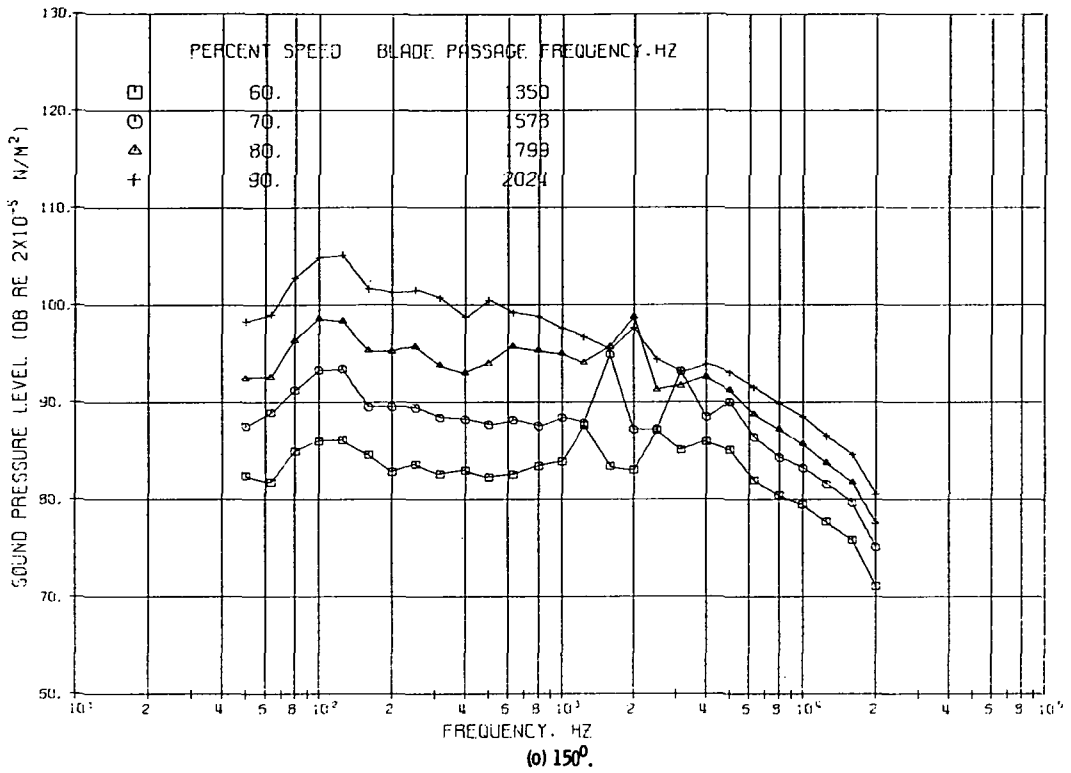


Figure 6. - Concluded.

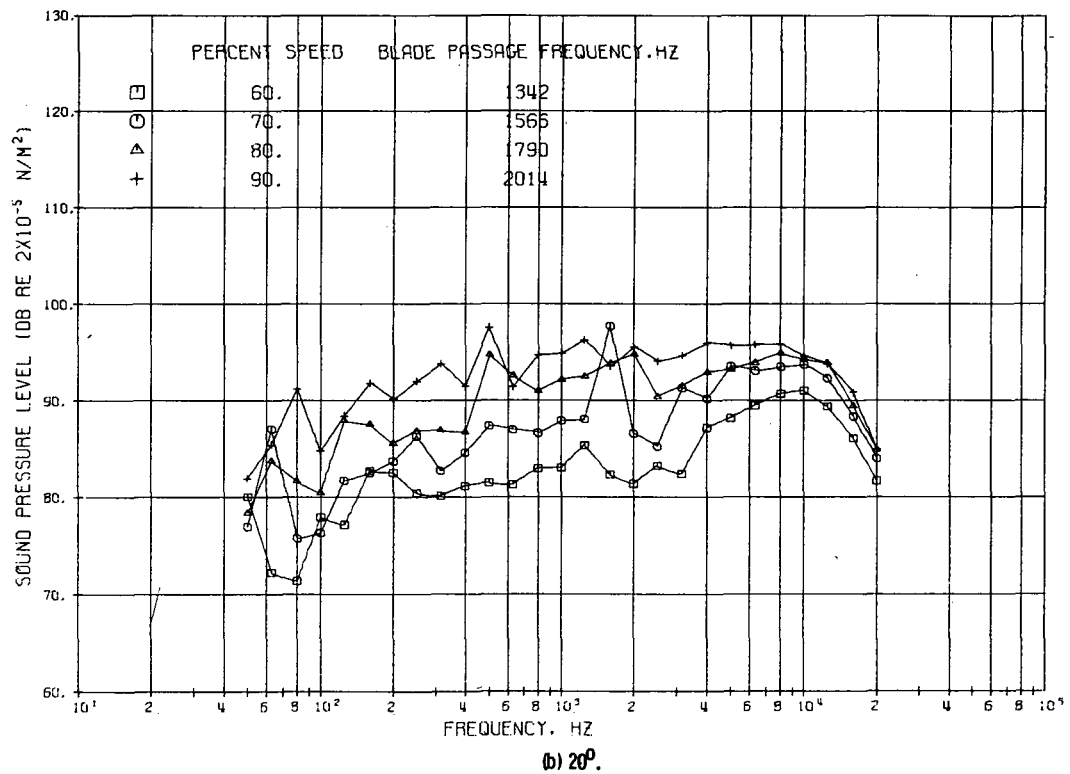
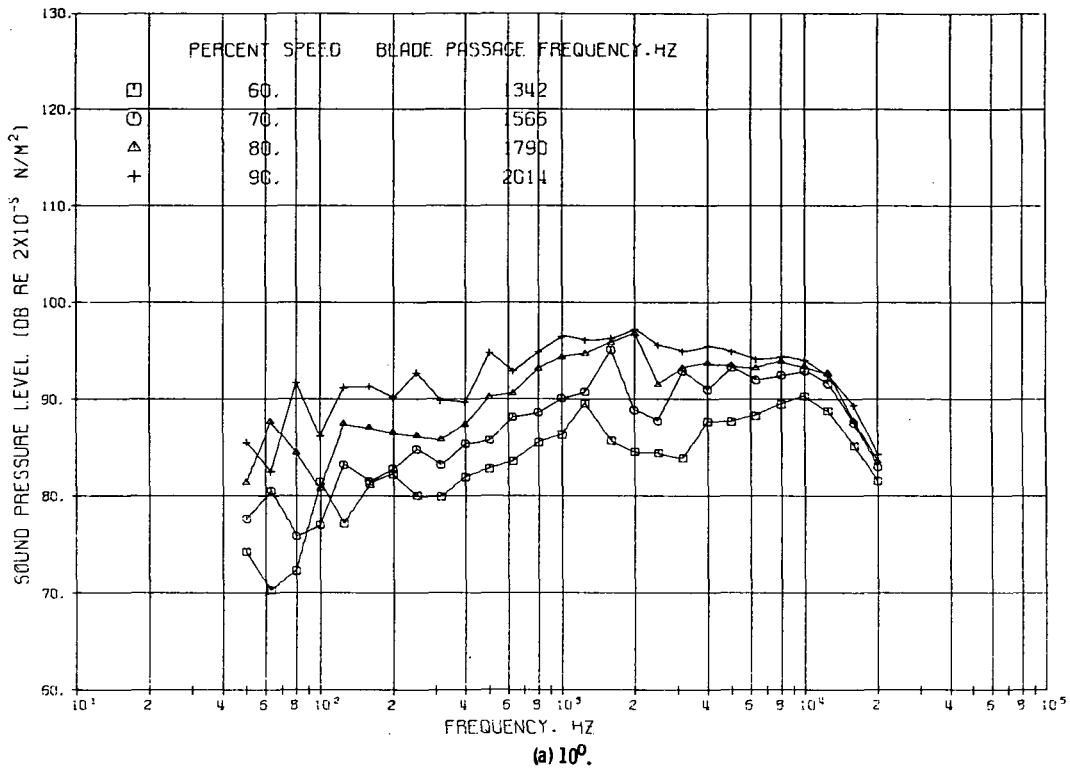


Figure 7. - Standard-day 1/3-octave band spectra on a 30.5-meter (100-ft) radius at each angle. Configuration 309: suppressed inlet, fully treated fan frame, suppressed exhaust, and nominal nozzle.

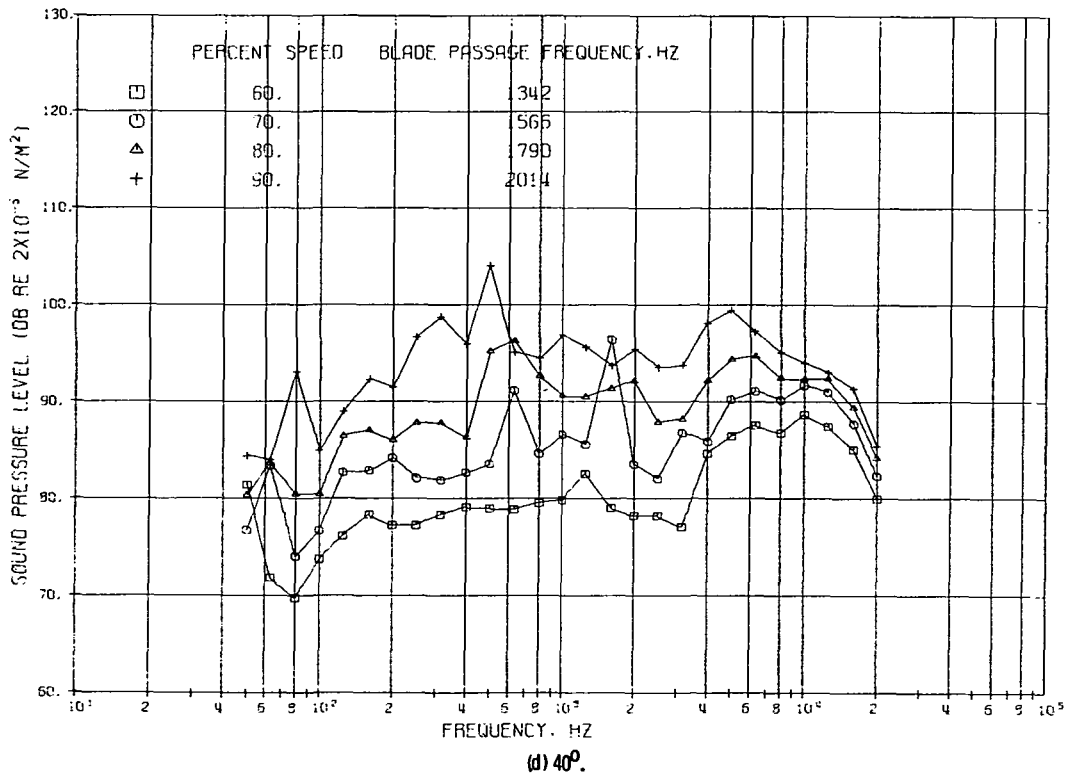
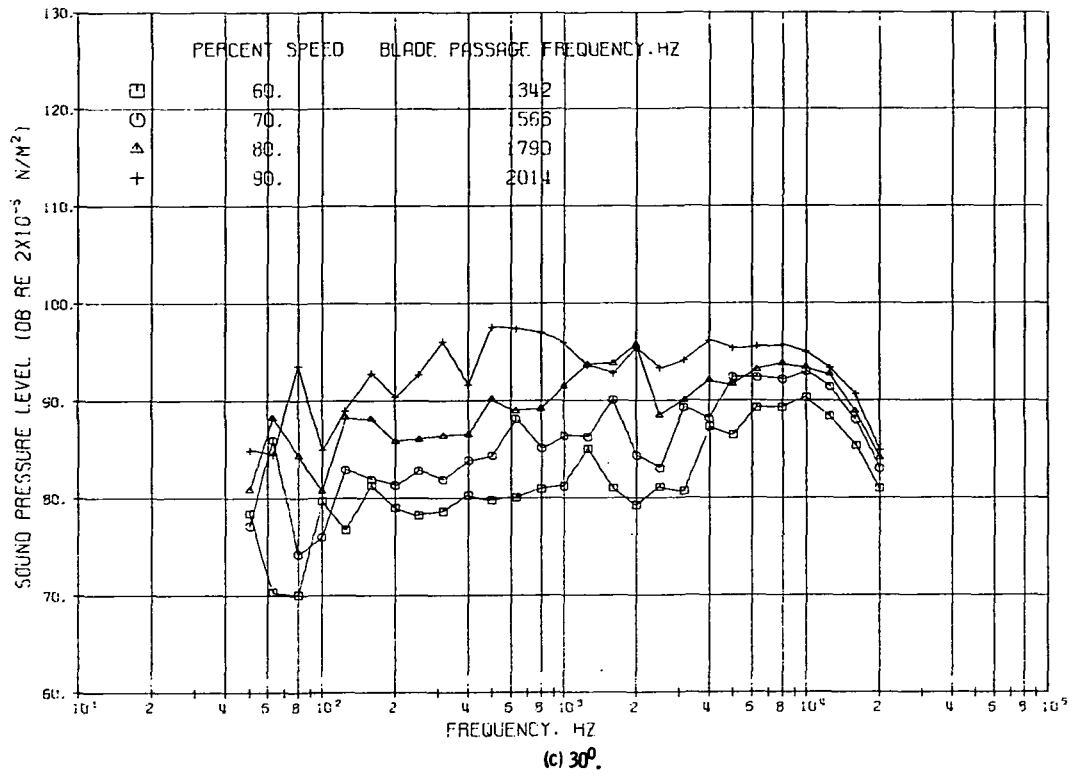


Figure 7. - Continued.

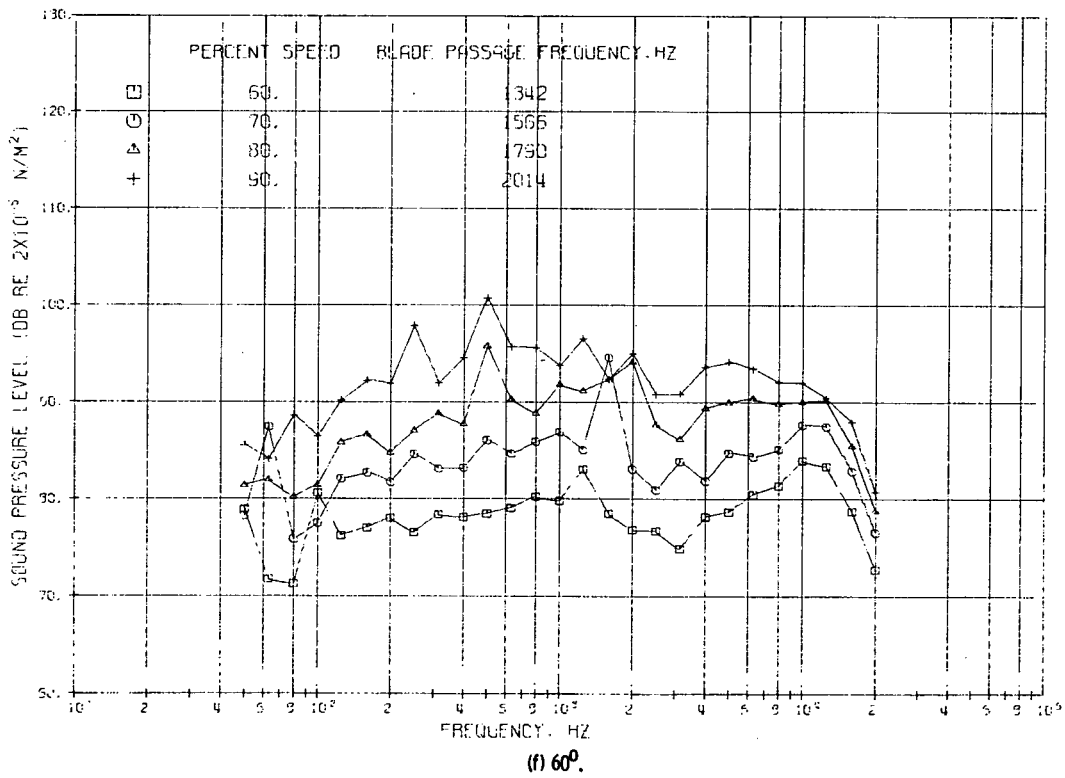
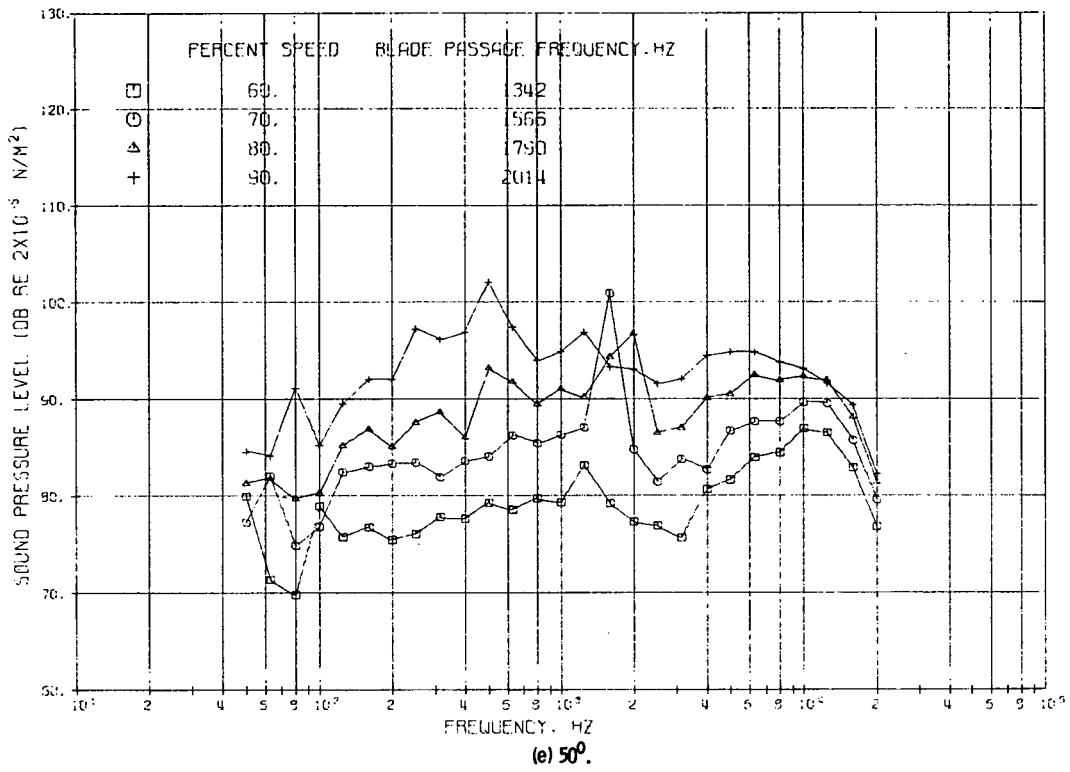


Figure 7. - Continued.

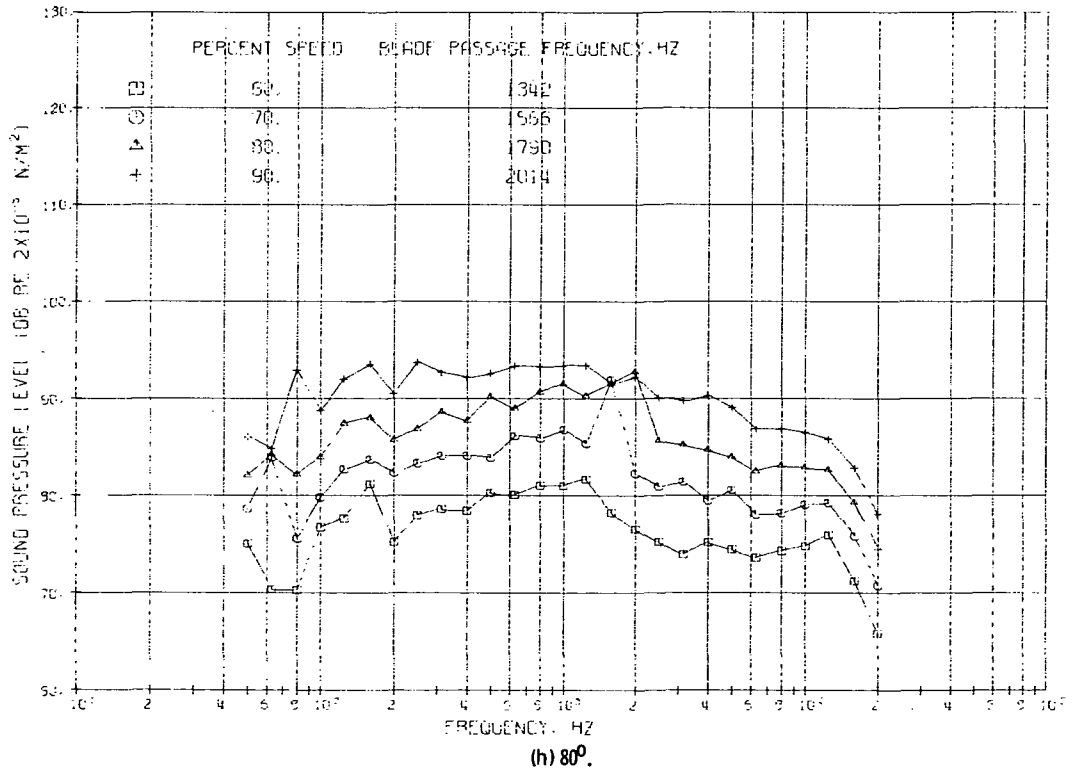
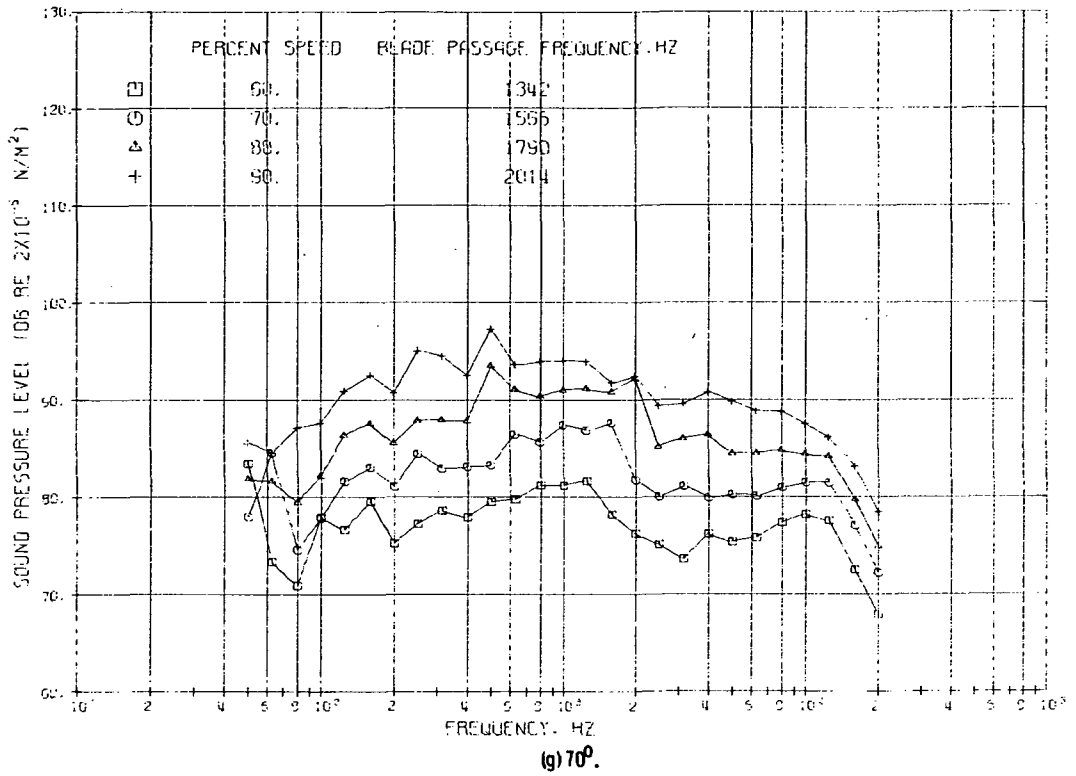


Figure 7. - Continued.

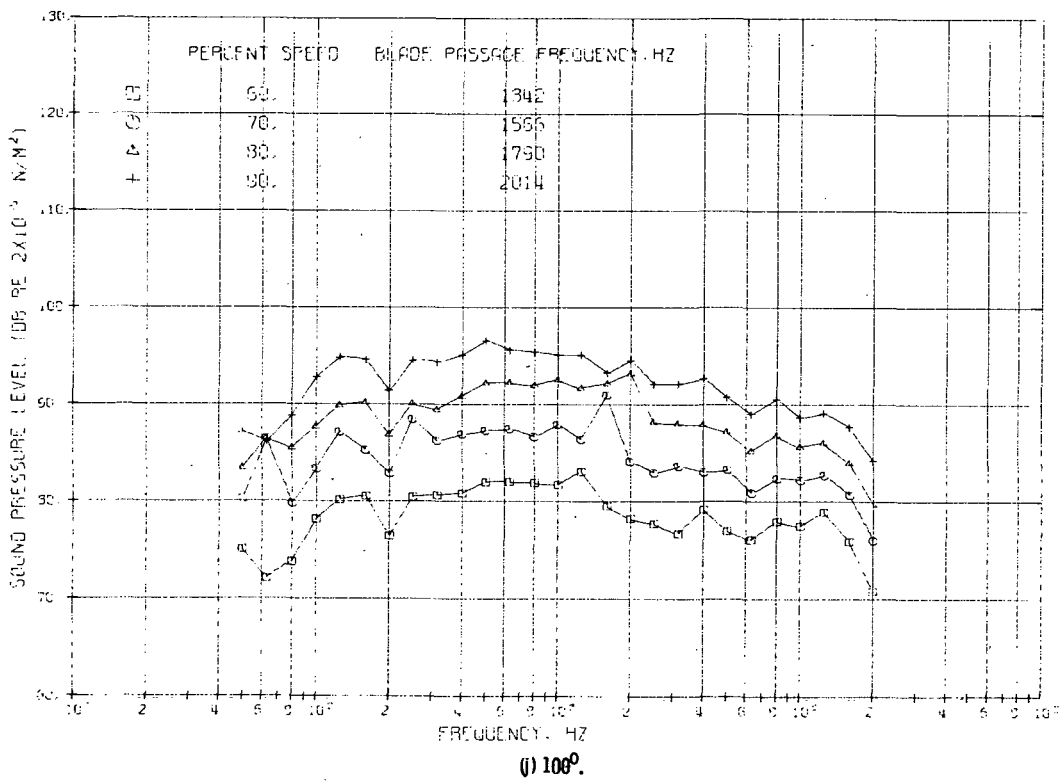
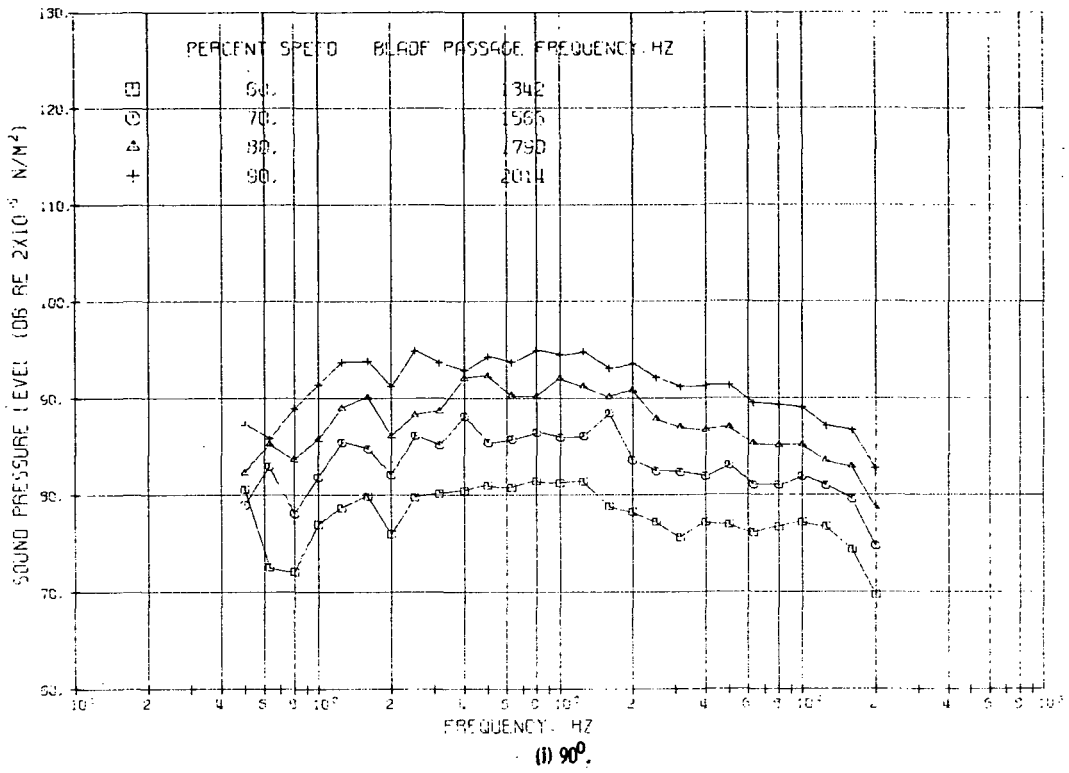


Figure 7. - Continued.

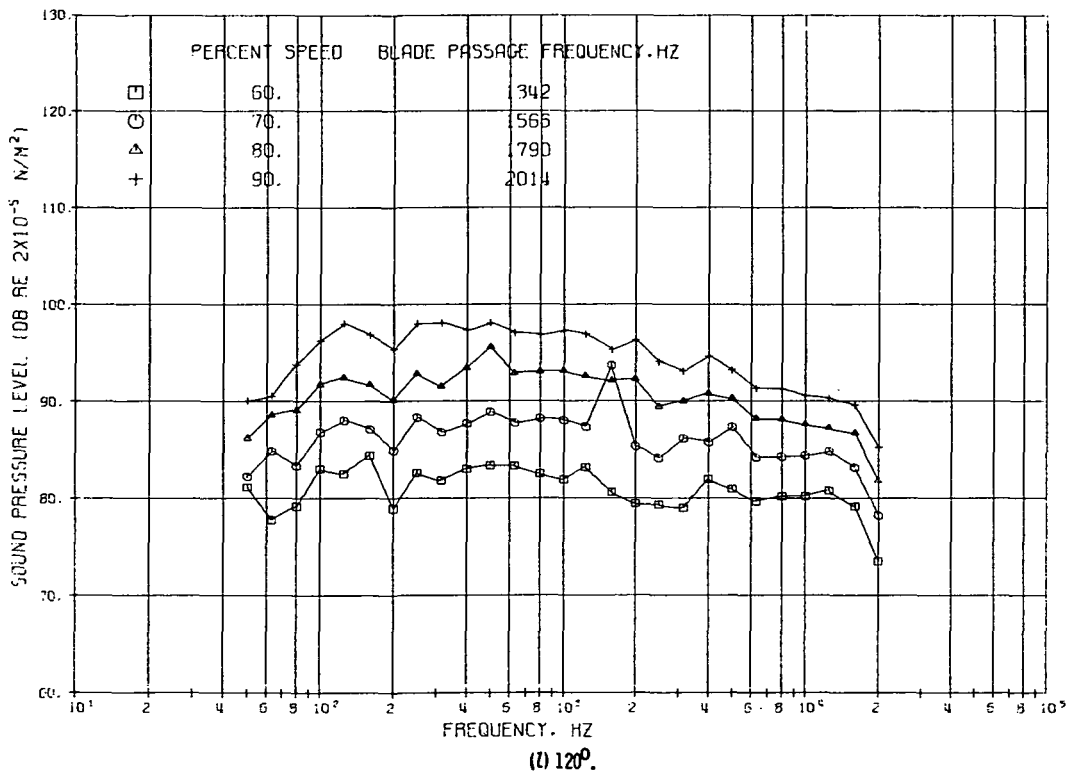
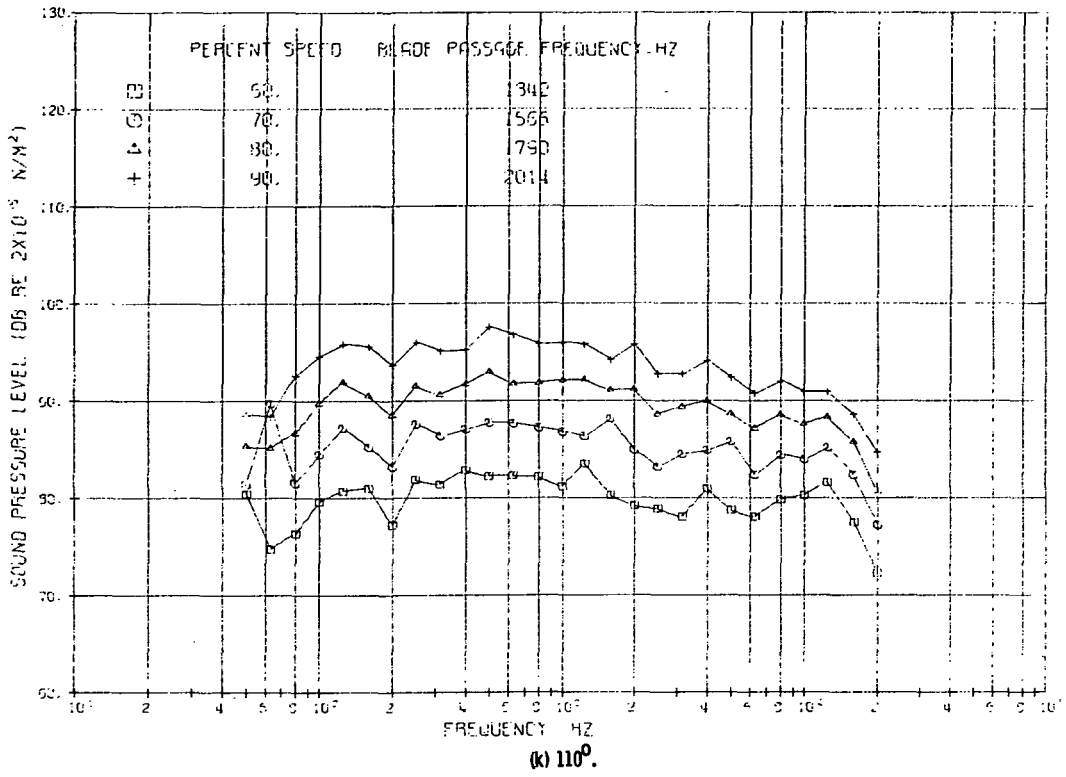


Figure 7. - Continued.

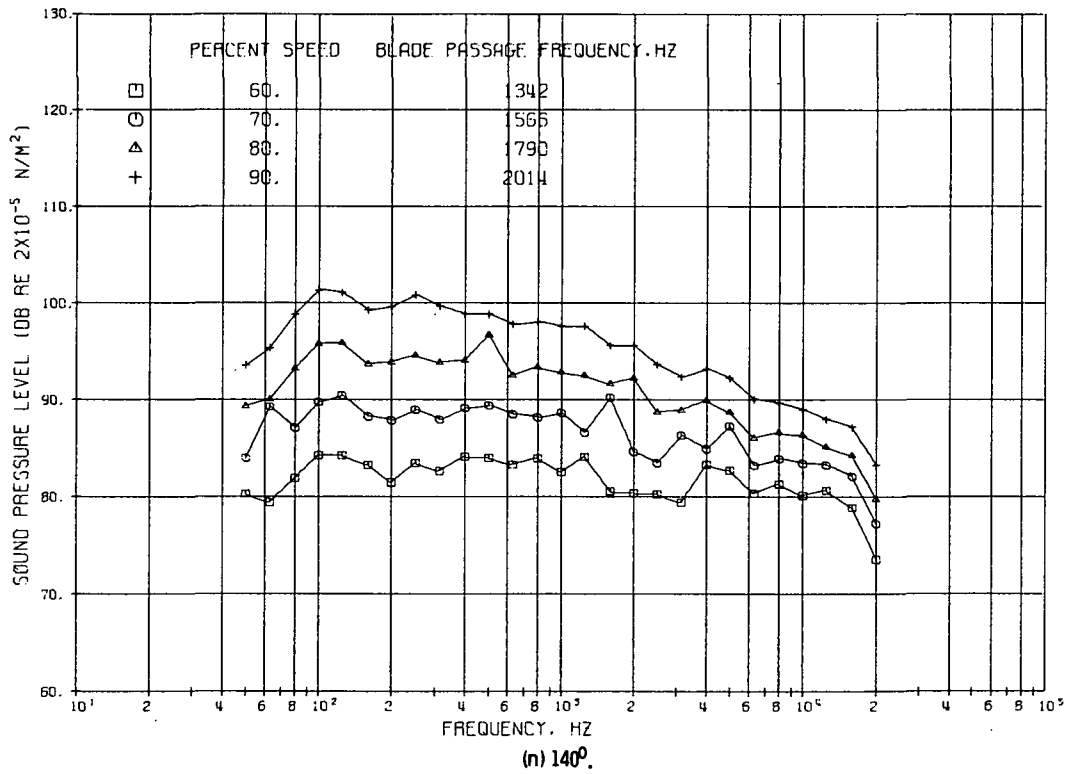
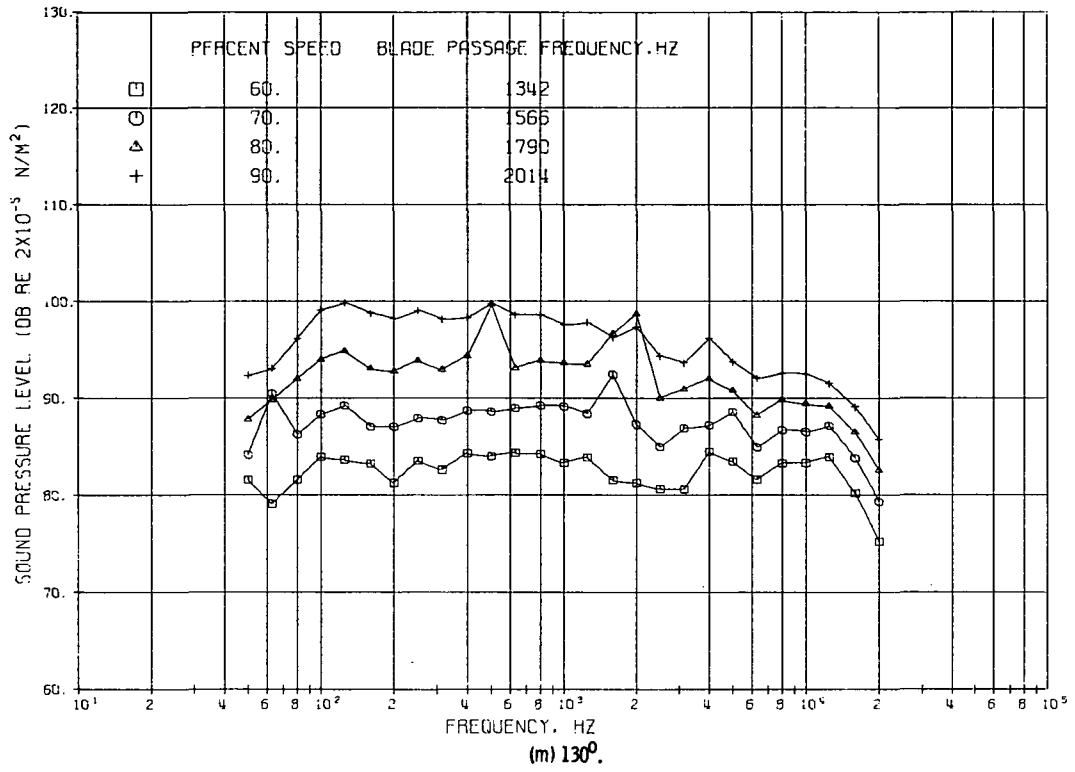


Figure 7. - Continued.

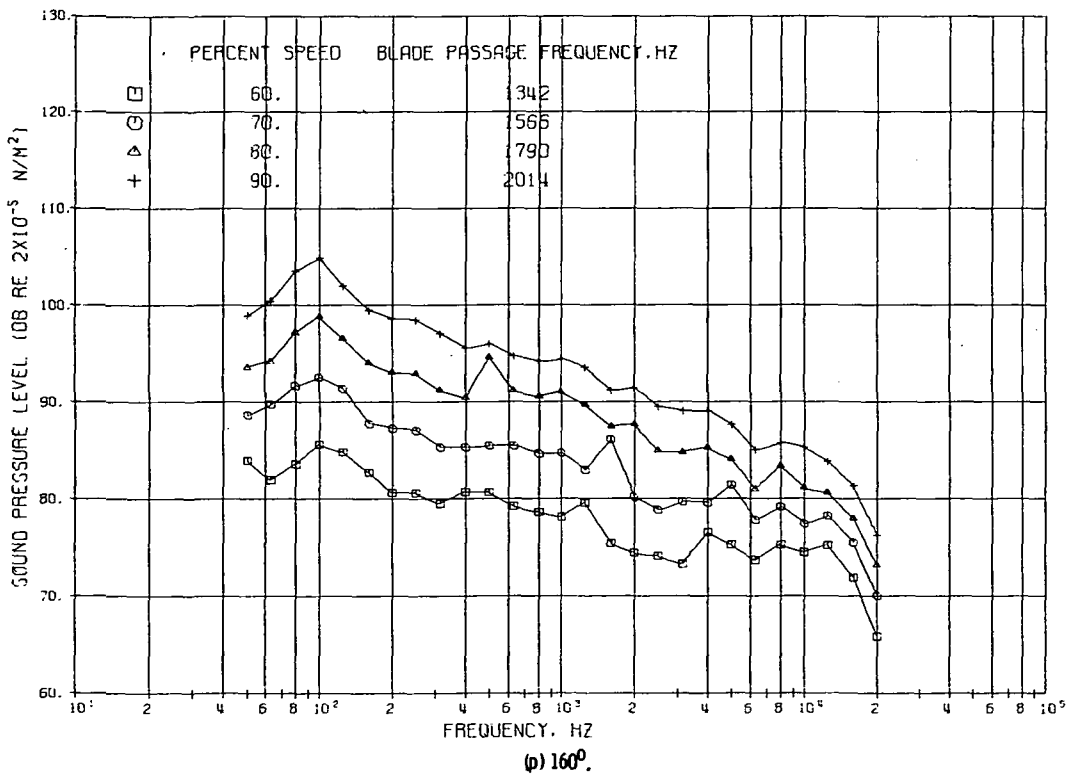
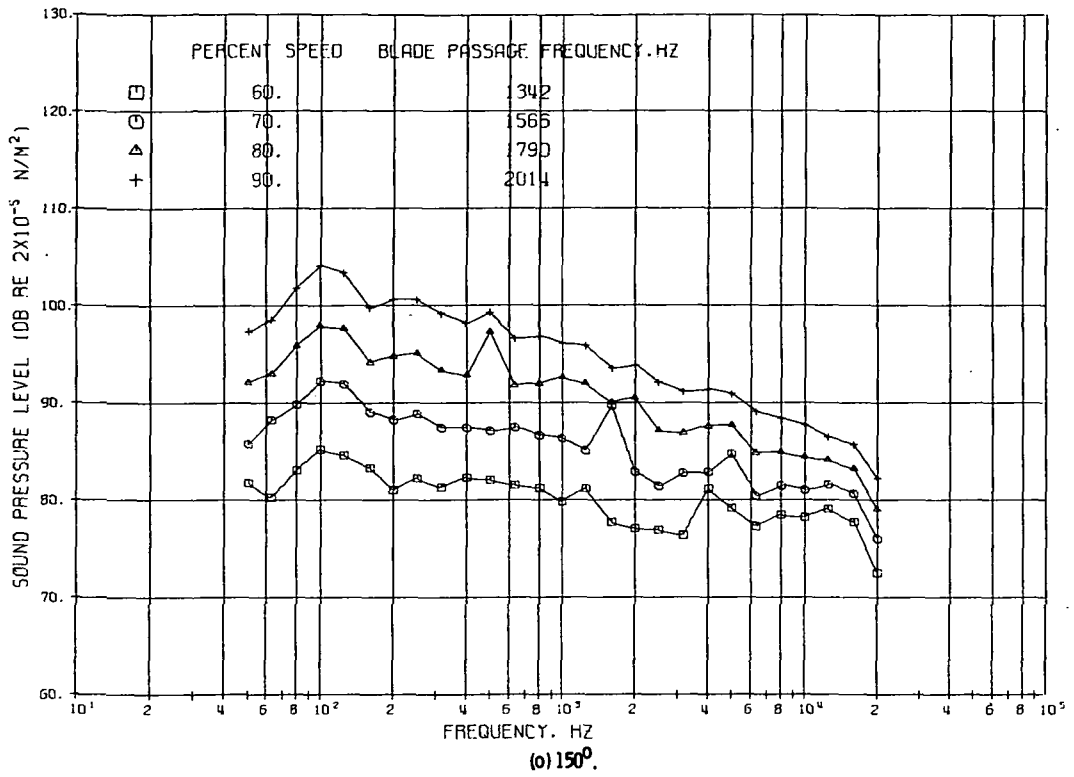


Figure 7. - Concluded.

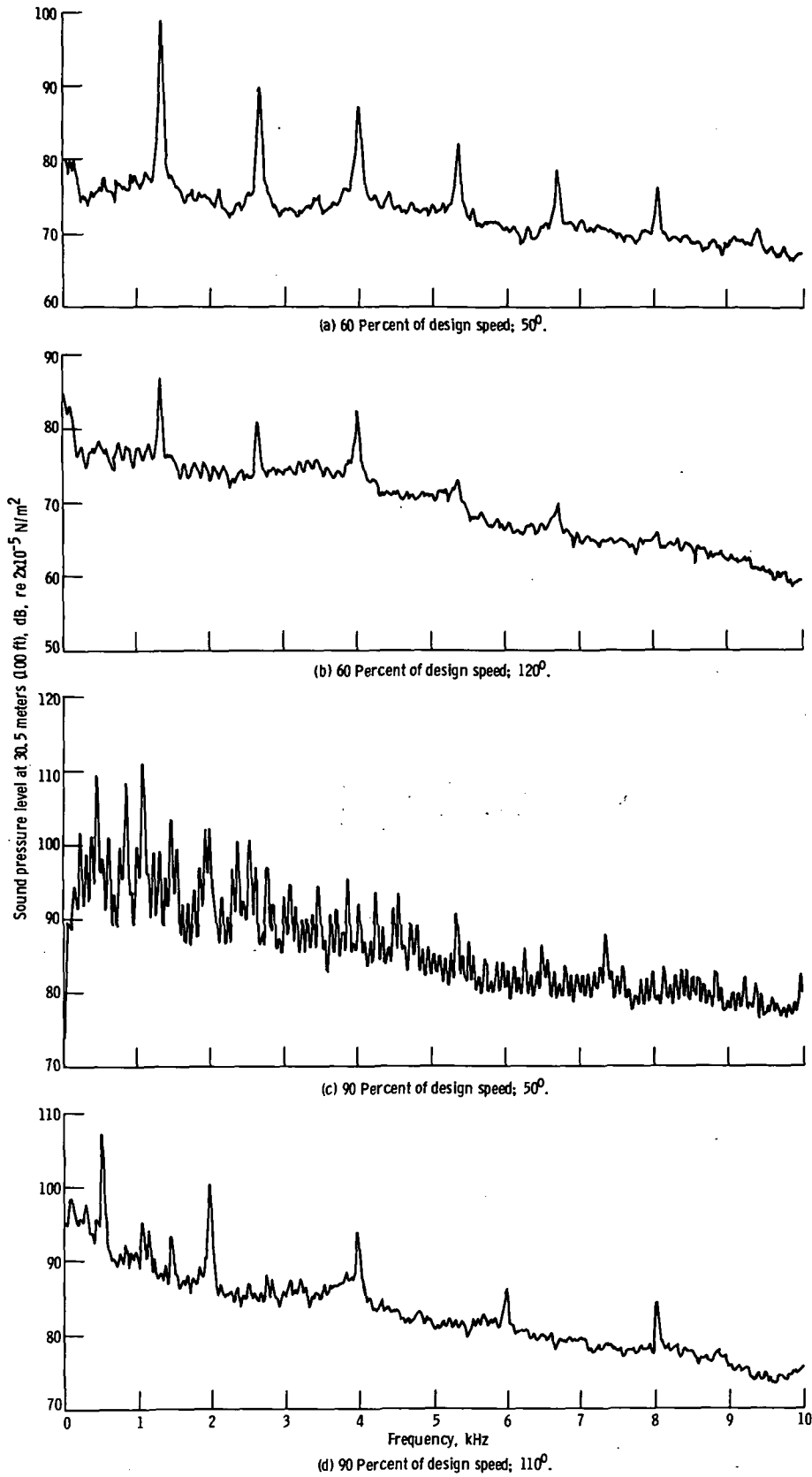


Figure 8. - Continuous 20-hertz constant bandwidth spectra at peak noise angles at 30.5-meter (100-ft) radius for configuration 305 (hard inlet, fully treated fan frame, hard exhaust, and nominal nozzle).

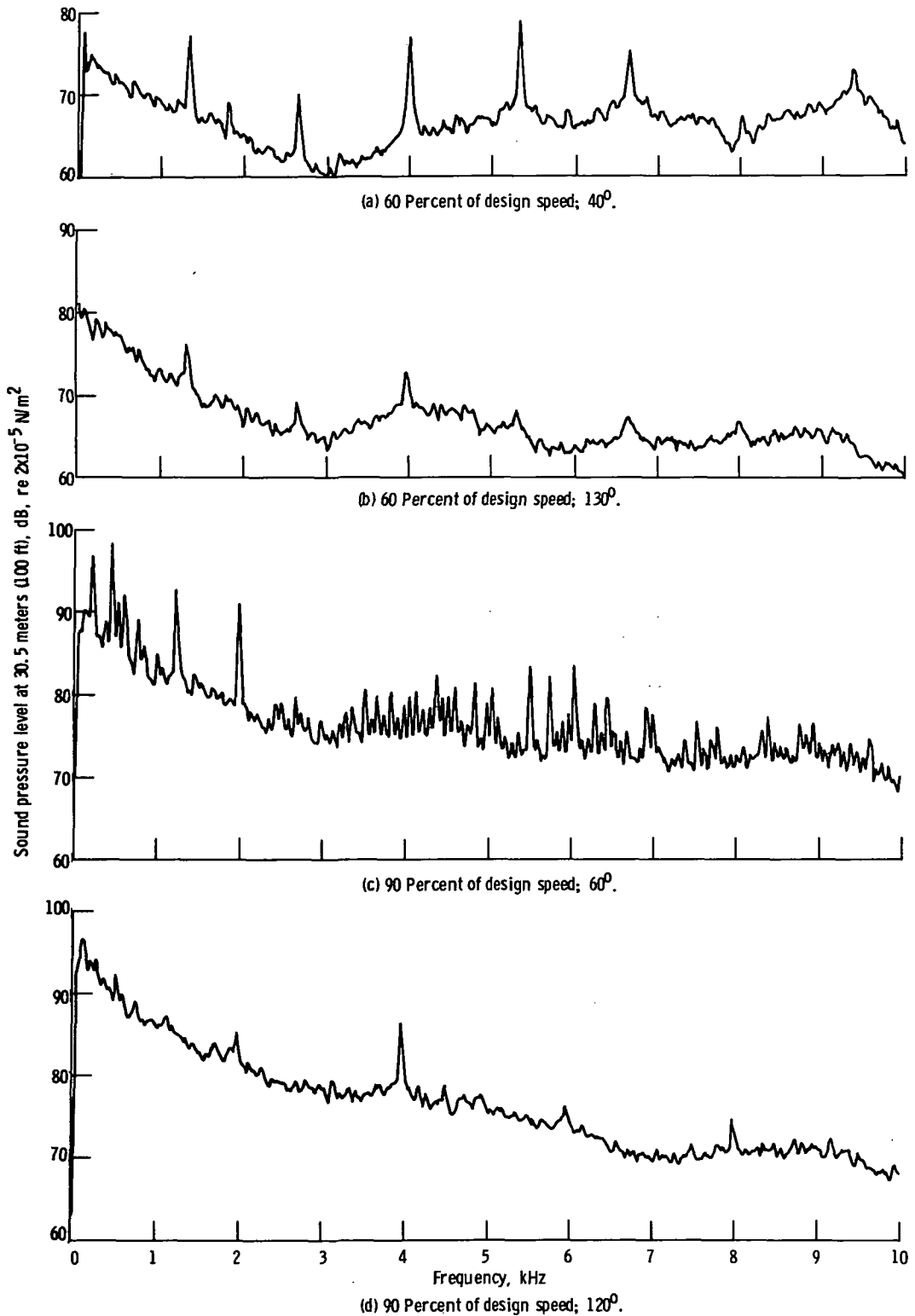


Figure 9. - Continuous 20-hertz constant bandwidth spectra at peak noise angles at 30.5-meter (100-ft) radius for configuration 309 (suppressed inlet, fully treated fan frame, suppressed exhaust, and nominal nozzle).



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