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Randall L. Peterson
Marianne Mosher, Ames Research Center, Moffett Field, California

National Aeronautics and Space Administration

Ames Research Center
Moffett Field, California 94035

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SYMBOLS

A	coefficient in background noise curve fit
B	coefficient in background noise curve fit
$C_{LR/\sigma,R}$	isolated rotor lift coefficient, CLR/S,R, $L/\rho(\Omega R)^2S$
$C_{P/\sigma}$	rotor power coefficient, CP/S, $P/\rho(\Omega R)^3S$
c	speed of sound, m/sec
$\bar{c}$	blade chord at 75% radius, m
dB	sound pressure level, 20 $\log(P_{rms}/P_{ref})$
dBB	background sound pressure level, 20 $\log(P_{rms}/P_{ref})$
dBAC	A-weighted dB corrected for background noise
dBAU	A-weighted dB not corrected for background noise
dBC	sound pressure level corrected for background noise
dBU	sound pressure level not corrected for background noise
J THRUST	total thrust of J60 auxiliary propulsion engine, N
L	isolated rotor lift, N
M	wind tunnel Mach number, V/c
M_{at}	advancing tip Mach number, MAT, $(1 + \mu)M_{tip}$
M_{tip}	rotor rotational Mach number, MTIP, $\Omega R/c$
N	total number of blades
P	rotor power, W
PMAX	maximum pressure in time history sample, N/m^2
PMIN	minimum pressure in time history sample, N/m^2
PNdBC	perceived noise level corrected for background noise
PNdBU	perceived noise level not corrected for background noise
P_{ref}	reference pressure (0.00002 N/m^2)
P_{rms}	root-mean-square sound pressure, N/m^2
R	rotor radius, m

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RPM	rotor rotational speed, rev/min
r	distance to microphone from midway between rotor hubs, m
S	reference area, $S = N\bar{c}R$, m^2
V	wind tunnel speed, knots or m/sec
x	distance upstream from rotor center, m
y	distance left from rotor center looking upstream, m
z	distance up from midway between hubs, m
%RPM J1	auxiliary engine rotational speed expressed as percent of nominal value, RPM J1/16,000
%RPM J2	auxiliary engine rotational speed expressed as percent of nominal value, RPM J2/16,000
α	angle of attack of rotor shaft, ALPHA, deg
$\Delta\theta$	upper rotor blade collective pitch minus lower rotor blade collective pitch, deg
μ	rotor advance ratio, MU, $V/\Omega R$
ρ	air density, kg/m^3
σ	solidity, $S/\pi R^2$
θ	rotor blade collective pitch, deg
ϕ	angle below rotor plane, $\tan^{-1}(-z/r)$, deg
ψ	azimuth angle from downstream, $\tan^{-1}(-y/-x)$, deg
Ω	rotor rotational speed, rad/sec

SUMMARY

Acoustic data were obtained during a full-scale test of the XH-59A Advancing Blade Concept Technology Demonstrator in the 40- by 80-Foot Wind Tunnel. The XH-59A is a research helicopter with two coaxial rotors and hingeless blades. Performance, vibration, and noise at various forward speeds, rotor lift coefficients and rotor shaft angles of attack were investigated. The noise data were acquired over an isolated rotor lift coefficient range of 0.024 to 0.162, an advance ratio range of 0.23 to 0.45 corresponding to tunnel wind speeds of 89 to 160 knots, and angles of attack from 0° to 10°. Acoustic data are presented for seven microphone locations for all run conditions where the model noise is above the background noise. Model test configuration and performance information are also listed. Acoustic waveforms, dBA, and 1/3-octave spectra as functions of operating condition for selected data points and microphones are presented. In general, the noise level is shown to increase with rotor lift coefficient except under certain operating conditions where significant impulsive blade/vortex interactions increase noise levels. The impulsivity appears to depend upon how the lift is distributed between the two rotors.

INTRODUCTION

In the design and development of new helicopters, noise, as well as performance, handling qualities, and stability and control must be considered. This report describes the acoustic results from a recent full-scale test of an advanced technology rotorcraft. Under U.S. Army sponsorship, Sikorsky Aircraft built two XH-59A Advancing Blade Concept Technology Demonstrator helicopters that utilize two counter-rotating coaxial hingeless rotors to improve high-speed performance and increase cruise efficiency. On a conventional helicopter in forward flight, the rotor blades operate at a low lift coefficient on the advancing side because the rotor must produce no roll moment in level flight. The use of two counter-rotating rigid rotors allows each individual rotor to have a high lift coefficient on the advancing side while the aircraft has no total roll moment. The full-scale XH-59A Advancing Blade Concept (ABC) aircraft tested in the Ames 40- by 80-Foot Wind Tunnel is shown in figure 1. For additional information pertaining to the ABC concept, see references 1 through 3.

The ABC aircraft is significantly different from a conventional helicopter; therefore, one would expect the noise produced by this aircraft to differ from noise produced by a conventional helicopter. This aircraft has a slow rotational tip speed (M_{tip} = 0.52 to 0.58) which may reduce the overall noise since all sources and convective amplification increase with increasing Mach number. Also, the high speed impulsive noise may be less than that of a conventional helicopter at a given forward speed because of the slower tip speed. However, high speed noise will still become a problem because this aircraft is designed to fly at faster speeds than a conventional rotorcraft. Also, under certain flight conditions, one would expect some impulsive blade slap due to the interaction of tip vortices from the upper rotor with the lower rotor.

This report presents the noise data of a full-scale ABC aircraft as measured in the Ames 40- by 80-Foot Wind Tunnel. Noise data were measured over an advance ratio range of 0.23 to 0.45 (89 knots to 160 knots) with the rotor on and from 60 to 180 knots with the rotor off. The rotor-on testing was conducted over an angle of attack range of 0° to 10°, and the auxiliary propulsion engines were operated at flight idle for all noise data runs.

EXPERIMENT

The ABC aircraft (shown installed in the Ames 40- by 80-Foot Wind Tunnel in fig. 1) has two rotors, each containing three 5.5 m radius blades. General specifications for the ABC rotor system are listed in table 1. The midpoint between these two rotors was 1.5 m above the tunnel centerline. Viewed from above, the upper rotor of the model rotates in the counter-clockwise direction, and the lower rotor rotates in the clockwise direction. Collective, lateral cyclic, and longitudinal cyclic for each rotor were independently operated by six rotor controls, thereby allowing the rotors to independently apply trim forces and moments to the aircraft. The rotors were powered by two 552,000 W PT6T-3 turboshaft engines. Auxiliary propulsive force is provided by two nacelle-mounted J60-P3A turbojet engines which produce 13,300 N of thrust each. For a more detailed description of the aircraft, see Felker (ref. 3).

Performance, loads, and noise data for the full-scale ABC aircraft were measured in the Ames 40- by 80-Foot Wind Tunnel. Table 2 shows the flight conditions where data were taken. During testing, the rotor speed was adjusted to give the desired tip Mach number, M_{tip}, then the tunnel speed was adjusted to obtain the desired advance ratio, μ. Noise data were then acquired for a matrix of isolated rotor lift coefficients, $C_{LR/\sigma,R}$, and shaft angles, α. The rotor-on testing was conducted over an isolated rotor lift coefficient range of 0.024 to 0.162 and an angle of attack range of 0° to 10°. The auxiliary propulsion engines were operated at flight idle for all noise data runs. For this test, the background wind tunnel noise was recorded at 60, 90, 120, and 180 knots with the model installed in the wind tunnel, the rotor blades off, the rotor head rotating, and the auxiliary engines operating at flight idle. A more detailed description of the test can be found in reference 3.

DATA ACQUISITION AND REDUCTION

The acoustic data for this test were acquired using seven 1.3-cm condensor microphones equipped with nose cones to reduce wind-induced noise. Four of these microphones were located upstream of the model, and three microphones were located near the model. Three of the seven microphones were flush mounted on plates near the floor while the remaining four were mounted on stands at various heights below the midpoint between the two rotors. The microphone locations are given in table 3 and shown in figure 2; the coordinate system used is also shown. Signal conditioners were used to control the gain of the acoustic signal and to power the microphones. The acoustic signals were recorded on tape using a 14-track frequency-modulated (FM) tape recorder running at 15 ips. This gave a bandwidth of 10 kHz. All microphones were calibrated at the start and end of each day using a 124-dB, 250 Hz signal from a pistonphone. At each data point, a 50-sec sample of acoustic data was recorded for later analysis. In order to assure a maximum signal-to-noise ratio, the gain of the acoustic signal was adjusted in 10-dB intervals. A schematic of the data acquisition system is shown in figure 3.

Initially, the acoustic data were reduced and analyzed off-line on a minicomputer time series data system. Figure 4 shows a flow chart of the equipment used for data reduction. Data are digitized at a sample rate of 20 kHz while being played back through a low pass filter with a cutoff frequency of 10 kHz to prevent aliasing. From the digitized data, the minicomputer generated 1/3-octave spectra from 1-Hz spectra in the range of 10 to 200 Hz, and from 10-Hz spectra in the range of 250 Hz to 10 kHz. The minicomputer also computed dB, dBA, and PNdB from the 1/3-octave spectra and the first 10 blade passage harmonics from the 1-Hz, narrow-band spectra. The computed acoustic data were then transferred into a computer containing the data base with all of the measured test parameters. Background noise corrections, obtained with all the propulsion systems operating but rotor blades removed, were applied to the 1/3-octave spectra in the following manner. Background noise measurements were fitted to a linear regression of the form

$$dBB = A + B*\log(V)$$

and then subtracted from the measured spectra on a power basis for each 1/3-octave,

$$dBC = 10 \log[10^{dB/10} - 10^{dBB/10}]$$

Graphs and tables were then constructed from this data base. The background noise levels used for corrections on microphones 1 through 7 are tabulated in appendix A. Appendix A also contains 1/3-octave plots of the averaged background noise measurements used at 89, 106, 142, and 160 knots, and plots of dBA as a function of velocity for each microphone. The effect of these corrections is to remove the jet noise as well as the background noise from the noise data.

RESULTS AND DISCUSSION

Acoustic data for the XH-59A model are presented in appendix B. Performance and global acoustic measurements are listed for all of the microphones. The data are for rotor-on configurations at forward speeds of 89, 106, 142, and 160 knots and angles of attack from 0° to 10°.

Figures 5 through 10 show the general trends in the acoustic data with airspeed and shaft angle. Data from microphones 2, 4, and 7 are shown as a function of isolated rotor lift coefficient, $C_{LR/\sigma},R$. Figures 5, 6, and 7 display the corrected dBA as a function of isolated rotor lift coefficient for tunnel wind speeds of 89, 106, and 142 knots, respectively. Data are grouped by shaft angle of attack (2.5°, 5.0°, and 7.5°) for each curve on each figure. Figures 8, 9, and 10 show the corrected dBA as a function of isolated rotor lift coefficient for angles of attack of 2.5°, 5.0°, and 7.5°, respectively. Data are grouped by tunnel wind speed (89, 106, and 142 knots) for each curve on each plot. In general, these figures (5 to 10) show an increase in noise level with increasing rotor lift coefficient. There are some exceptions to these trends and it is believed that this is due to impulsive blade/vortex interaction noise.

Blade/vortex interactions appear to depend on the control settings. Noise levels for a number of points in figure 10 are listed in table 4 with some control settings. Data are shown for shaft angle of attack of 7.5° and wind velocities of 89 and 106 knots. For each wind velocity, the data are listed in increasing order of rotor lift coefficient. The collective pitch, θ, and the differential collective pitch, $\Delta\theta$, are included in the table. In the data at 106 knots, the noise levels appear to depend on $\Delta\theta$ as well as the rotor lift coefficient. Noise levels are higher for negative values of $\Delta\theta$ than for positive values of $\Delta\theta$ for some data with nearly identical rotor lift coefficients. Other data does not show this trend so no definitive conclusions can be made. Dependence of blade/vortex interaction upon lift distribution is a reasonable hypothesis; lift distribution effects the strength and location of the shed tip vortex and therefore would be expected to directly affect the blade/vortex interactions and impulsive noise.

Detailed acoustic data for selected data points are presented in appendix C. These data are for various wind speeds and angles of attack from microphones 2, 4, and 7. The tabulated data in appendix C shows 1/3-octave spectra, 1/3-octave spectra corrected for background noise, and the first 10 blade passage harmonic sound levels (dB).

Figures 11 through 17 show corrected 1/3-octave spectra as functions of isolated rotor lift coefficient. Each figure is for a specific tunnel wind speed, shaft angle of attack, and microphone. Data for microphones 2, 4, and 7 are shown for tunnel wind speeds of 89, 106, and 142 knots and for angles of attack of 2.5°, 5.0°, and 7.5°. Except for the frequency range 50 to 1600 Hz, the 1/3-octave spectra for all data are nearly the same. In this mid-frequency range, the sound pressure levels vary from point to point. The mid-frequency sound pressure levels follow the same trend seen in the dBA in figures 5 through 7. At 89 knots the mid-frequency noise levels increase as the rotor lift coefficient increases, and at the other wind tunnel speeds the noise levels are more sporadic. The curves also show that the energy in the high frequency range has been removed due to background noise corrections. This is because the noise of the auxiliary propulsive engines was included in the background noise measurements.

Figures 18 through 26 show typical time histories from the above 1/3-octave curves. Averaged time histories were obtained from the recorded microphone signals. A 1-per-revolution trigger signal was utilized to synchronize the microphone data, allowing constructive averaging of the coherent signal and destructive averaging of the random signal. Time histories are shown for data from microphone 4 located under the rotor. Each figure contains several time history plots for several isolated rotor lift coefficients at a fixed velocity and shaft angle. Velocities of 89, 106, and 142 knots and shaft angles of 2.5°, 5.0°, and 7.5° are used for the plots. The periodicity of the noise signals is very evident in these figures; all show a complicated time history with much high frequency harmonic noise. Some of the figures contain impulses from blade vortex interaction noise.

The time histories (figs. 18 to 20) for data taken at 89 knots show only a small amount of impulsive noise. The most impulsive data are for $\alpha = 2.5°$ and $C_{LR/\sigma,R} = 0.150$ which are also the data points with the highest noise level in figure 5b.

The time histories (figs. 21 to 23) for data taken at 106 knots show a mixture of impulsive and nonimpulsive noise. Some data are nonimpulsive and have low noise levels in figure 6b. Those points are identified with the following settings: $\alpha = 5.0°$ and $C_{LR/\sigma,R} = 0.114$; $\alpha = 7.5°$ and $C_{LR/\sigma,R} = 0.067$, 0.116, and 0.131. Some data are impulsive and have high noise levels in figure 6b. Those points can be identified with the following settings: $\alpha = 7.5°$ and $C_{LR/\sigma,R} = 0.093$ and 0.106. The other time histories shown for 106 knots have moderate impulsive character and low to moderate noise levels in figure 6b.

The time histories (figs. 24 to 26) for some of the data taken at 142 knots show very little impulsive character except for the two points (fig. 24a $\alpha = 7.5°$, $C_{LR/\sigma,R} = 0.079$; and fig. 26a $\alpha = 7.5°$, $C_{LR/\sigma,R} = 0.090$) with slight impulsivity. The corresponding data in figure 7b have moderate noise levels with the two points mentioned above having higher noise levels than average.

In general, the time histories with a distinct impulsive nature correspond to data with high overall noise levels. The presence of this impulsive noise is not a simple function of the basic parameters of forward speed, isolated rotor lift coefficient, and angle of attack.

CONCLUDING REMARKS

Acoustic measurements of the XH-59A ABC Technology Demonstrator helicopter were obtained from a full-scale test in the NASA Ames 40- by 80-Foot Wind Tunnel. General noise measurements at all microphone locations and specific detailed noise measurements for three representative microphones are presented. From analysis of these test results, the following conclusions may be drawn:

1. Under certain operating conditions the rotor experienced significant blade/vortex interactions. How the lift was distributed between the upper and lower rotor may have a large influence on the impulsivity of the noise. Unfortunately, accurate measurements of all the control settings are not available; therefore, the effect of the controls on the noise cannot be quantified.

2. When impulses are not present, the noise level increases as the lift coefficient increases and as the angle of attack approaches 0° as in a typical rotor.

APPENDIX A

The following tables and dB and dBA plots (figs. A1-A14) present the XH-59A ABC background noise data. The background noise data are presented in terms of 1/3-octave center frequencies, 1/3-octave spectra, and as a function of tunnel velocity (knots) for microphones 1 through 7.

Background noise data in terms of 1/3-octave center frequencies are presented first in tabular form for each microphone. One-third-octave spectra are presented next for tunnel wind speeds of 89, 106, 142, and 160 knots for each microphone. Lastly, the background noise at each microphone is presented as a function of tunnel velocity (knots).

SYMBOLS

A coefficient in background noise curve fit

B coefficient in background noise curve fit

DB background sound pressure level

MIC microphone number

PT point number

RUN run number

V wind tunnel speed, knots

# BACKGROUND NOISE CURVE FIT
DB = A + B * LOG(V)

1/3 OCTAVE	MICROPHONE 1		MICROPHONE 2	
CENTER FREQUENCY	A	B	A	B
10.0	16.74	32.34	39.98	19.34
12.5	27.28	26.22	40.98	18.35
16.0	58.27	13.54	47.45	17.93
20.0	46.27	21.93	35.32	25.68
25.0	17.94	33.74	-5.07	45.03
31.5	35.66	26.29	16.98	35.00
40.0	31.71	30.46	31.48	30.93
50.0	-13.01	54.52	-3.53	48.14
63.0	38.19	28.96	32.37	30.95
80.0	-6.15	51.57	22.68	37.04
100.0	20.37	38.85	29.44	34.46
125.0	42.34	28.04	54.97	21.90
160.0	38.35	30.09	45.81	26.05
200.0	26.07	35.99	22.48	37.65
250.0	22.61	36.67	18.00	38.94
315.0	37.19	29.24	36.37	29.41
400.0	54.74	20.75	53.39	21.30
500.0	56.38	19.83	54.10	20.79
630.0	46.41	24.32	44.04	25.31
800.0	59.51	18.66	55.22	20.28
1000.0	67.62	15.48	64.45	16.19
1250.0	40.30	29.07	59.25	19.15
1600.0	66.15	16.36	71.80	13.31
2000.0	48.39	22.59	50.19	21.40
2500.0	68.55	13.96	71.54	12.05
3150.0	74.70	12.13	82.59	8.16
4000.0	66.35	14.30	67.23	13.55
5000.0	112.09	-5.91	97.33	-0.33
6300.0	73.74	12.19	96.00	1.93
8000.0	103.33	-1.65	100.23	-1.45

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BACKGROUND NOISE CURVE FIT
DB = A + B * LOG(V)

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 3 A	MICROPHONE 3 B	MICROPHONE 4 A	MICROPHONE 4 B
10.0	23.48	30.15	21.66	30.59
12.5	27.06	26.65	23.53	28.19
16.0	49.85	17.66	47.40	19.50
20.0	47.60	22.37	37.80	26.83
25.0	-0.49	43.22	-20.95	54.16
31.5	26.30	30.93	1.30	43.54
40.0	42.71	25.93	32.10	30.27
50.0	-2.98	48.71	0.53	46.65
63.0	34.13	30.52	32.98	31.20
80.0	22.39	37.27	24.69	37.55
100.0	37.08	31.51	27.72	35.58
125.0	51.13	23.98	40.55	29.63
160.0	43.16	27.87	36.53	31.15
200.0	23.49	37.49	24.93	36.62
250.0	24.04	36.06	24.24	36.12
315.0	27.94	28.83	39.55	28.45
400.0	56.23	19.84	58.74	19.17
500.0	54.88	20.37	60.64	18.29
630.0	47.55	23.62	46.75	23.55
800.0	59.15	18.50	[illegible]	19.31
1000.0	68.50	14.41	[illegible]	16.08
1250.0	52.23	22.37	23.26	36.92
1600.0	73.53	12.61	75.58	12.37
2000.0	58.24	17.69	49.64	22.30
2500.0	74.31	11.24	58.52	18.37
3150.0	91.17	4.78	86.07	6.95
4000.0	74.82	10.56	73.05	11.47
5000.0	100.76	-1.28	74.34	10.52
6300.0	104.92	-1.60	87.04	6.58
8000.0	105.99	-2.57	92.89	2.43

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# BACKGROUND NOISE CURVE FIT
DB = A + B * LOG(V)

4

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 5 A	MICROPHONE 5 B	MICROPHONE 6 A	MICROPHONE 6 B
10.0	21.90	31.60	29.58	31.53
12.5	25.42	28.62	29.99	30.59
16.0	28.07	30.56	21.49	37.31
20.0	35.90	28.58	24.58	37.35
25.0	13.76	38.83	0.54	49.19
31.5	32.13	30.93	24.14	38.90
40.0	29.13	34.05	15.72	44.04
50.0	0.80	48.41	14.78	44.49
63.0	39.68	29.40	13.99	45.00
80.0	30.66	35.12	18.99	43.36
100.0	46.97	27.51	24.45	40.68
125.0	46.91	27.92	28.55	38.73
160.0	44.90	29.38	23.09	41.29
200.0	28.74	37.27	20.33	42.74
250.0	32.66	35.00	21.71	41.55
315.0	40.75	31.47	28.72	38.56
400.0	47.01	28.43	39.13	33.31
500.0	45.85	29.07	37.31	34.02
630.0	37.39	33.12	30.60	37.15
800.0	38.18	32.78	36.16	34.36
1000.0	40.75	31.61	40.48	32.35
1250.0	43.21	30.36	40.85	32.05
1600.0	50.50	26.85	46.27	29.49
2000.0	25.83	37.12	18.17	41.53
2500.0	48.76	26.04	44.93	28.88
3150.0	67.33	17.74	50.46	25.63
4000.0	62.86	17.66	50.08	24.43
5000.0	95.88	0.95	88.90	6.70
6300.0	98.47	1.80	62.68	18.36
8000.0	102.22	-0.53	46.13	7.27

BACKGROUND NOISE CURVE FIT
DB = A + B * LOG(V)

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 7 A	B
10.0	10.17	39.15
12.5	3.65	41.44
16.0	27.26	3[illegible].[illegible]5
20.0	23.97	36.16
25.0	6.95	44.40
31.5	11.56	43.21
40.0	25.68	37.91
50.0	17.90	41.92
63.0	20.12	41.27
80.0	14.13	44.55
100.0	15.93	43.89
125.0	21.14	41.31
160.0	21.82	40.94
200.0	18.73	42.73
250.0	21.49	41.00
315.0	36.20	34.43
400.0	38.42	33.13
500.0	43.14	30.93
630.0	31.62	36.32
800.0	32.00	35.99
1000.0	40.07	32.31
1250.0	30.62	36.30
1600.0	33.39	34.90
2000.0	11.53	44.08
2500.0	20.60	39.17
3150.0	39.11	30.10
4000.0	37.42	29.89
5000.0	49.73	23.67
6300.0	57.19	20.00
8000.0	57.75	19.10

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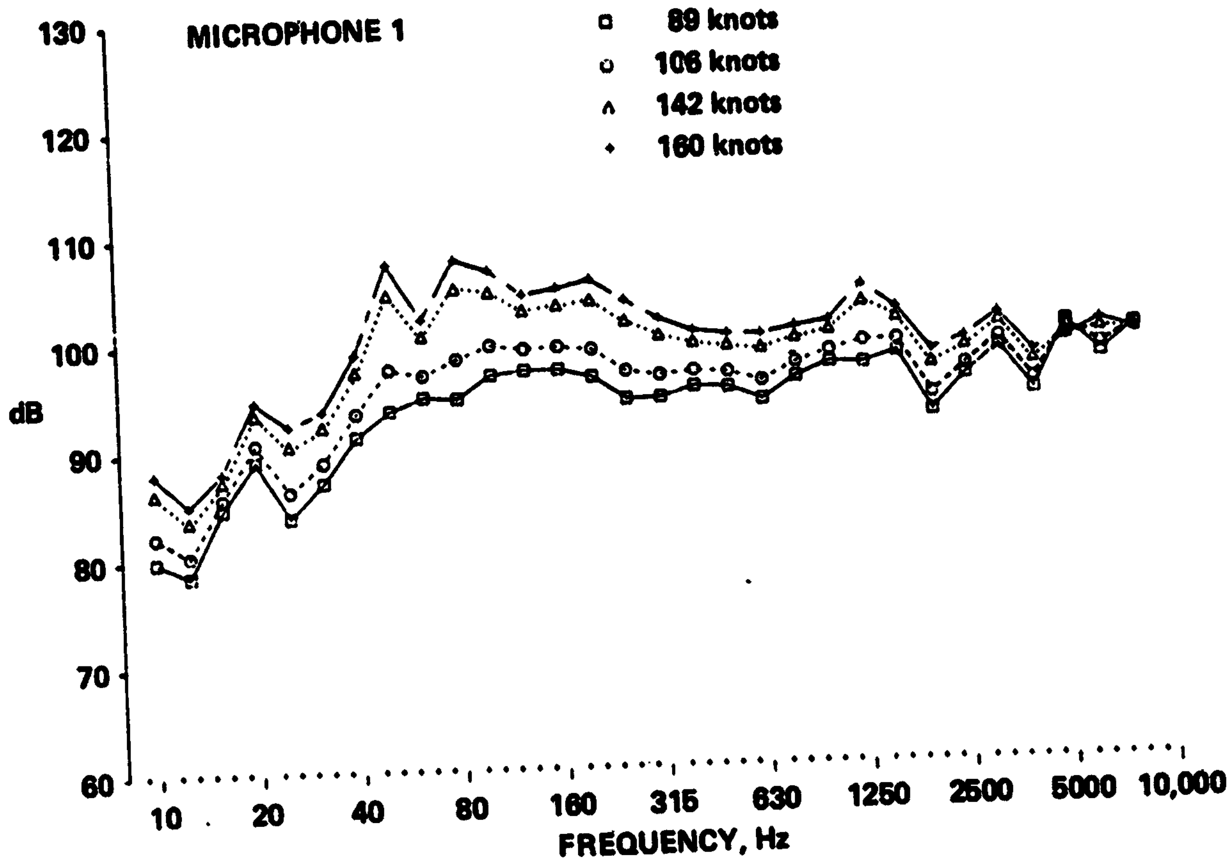

Figure A1.- Background 1/3-octave spectrum for microphone 1.

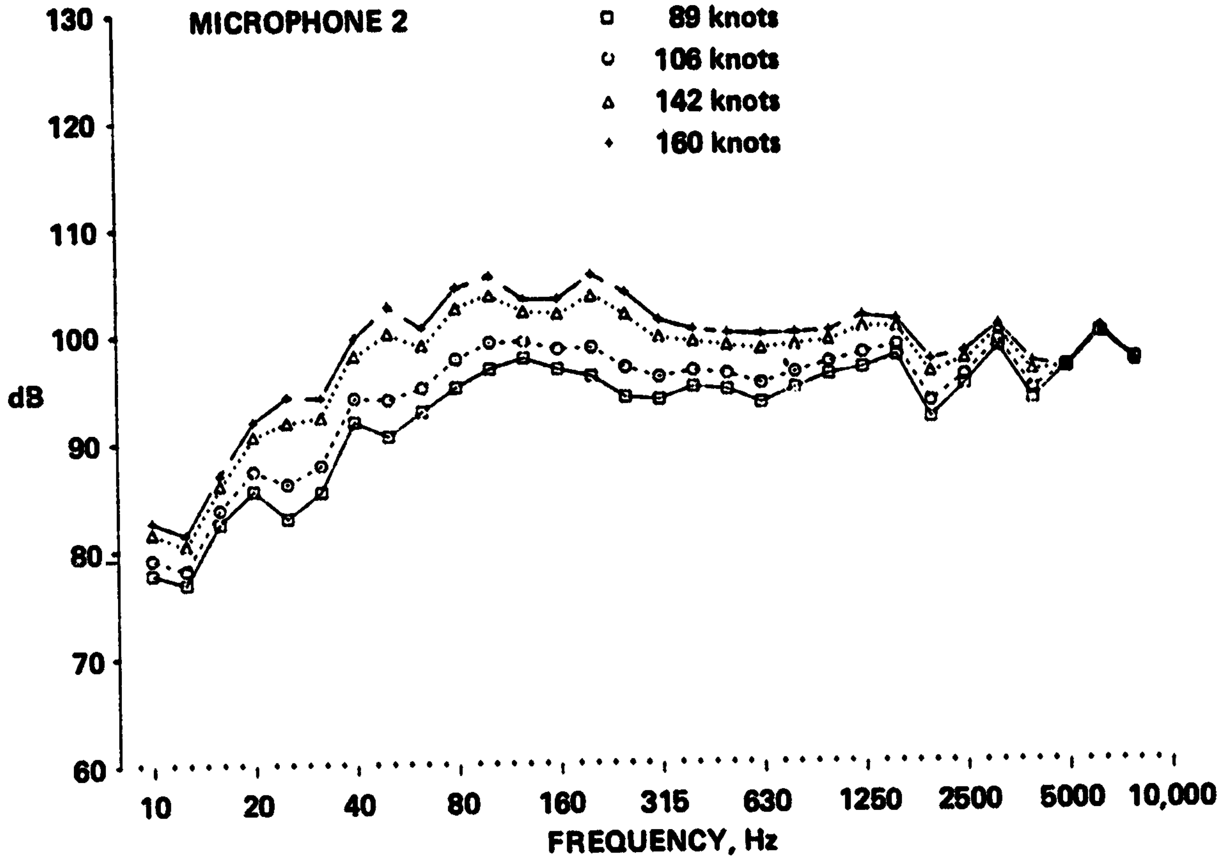

Figure A2.- Background 1/3-octave spectrum for microphone 2.

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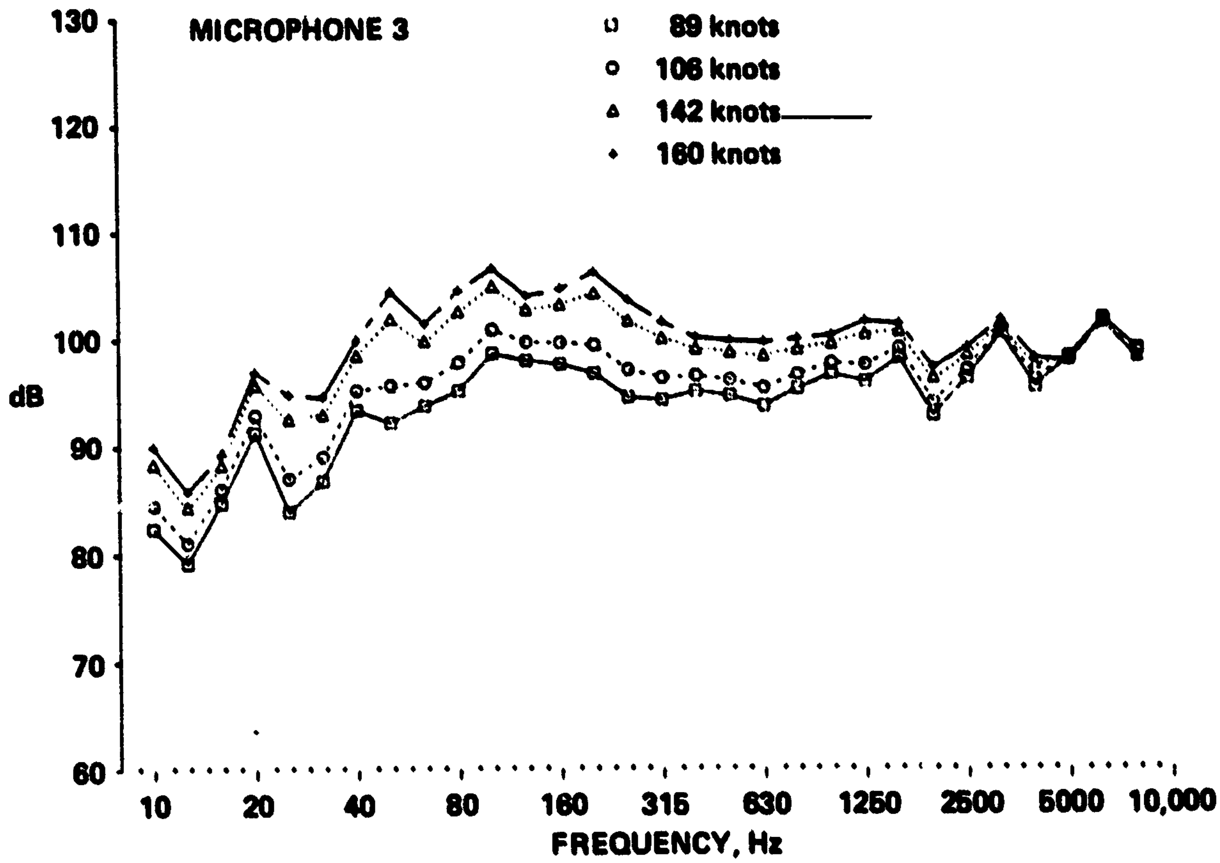

Figure A3.- Background 1/3-octave spectrum for microphone 3.

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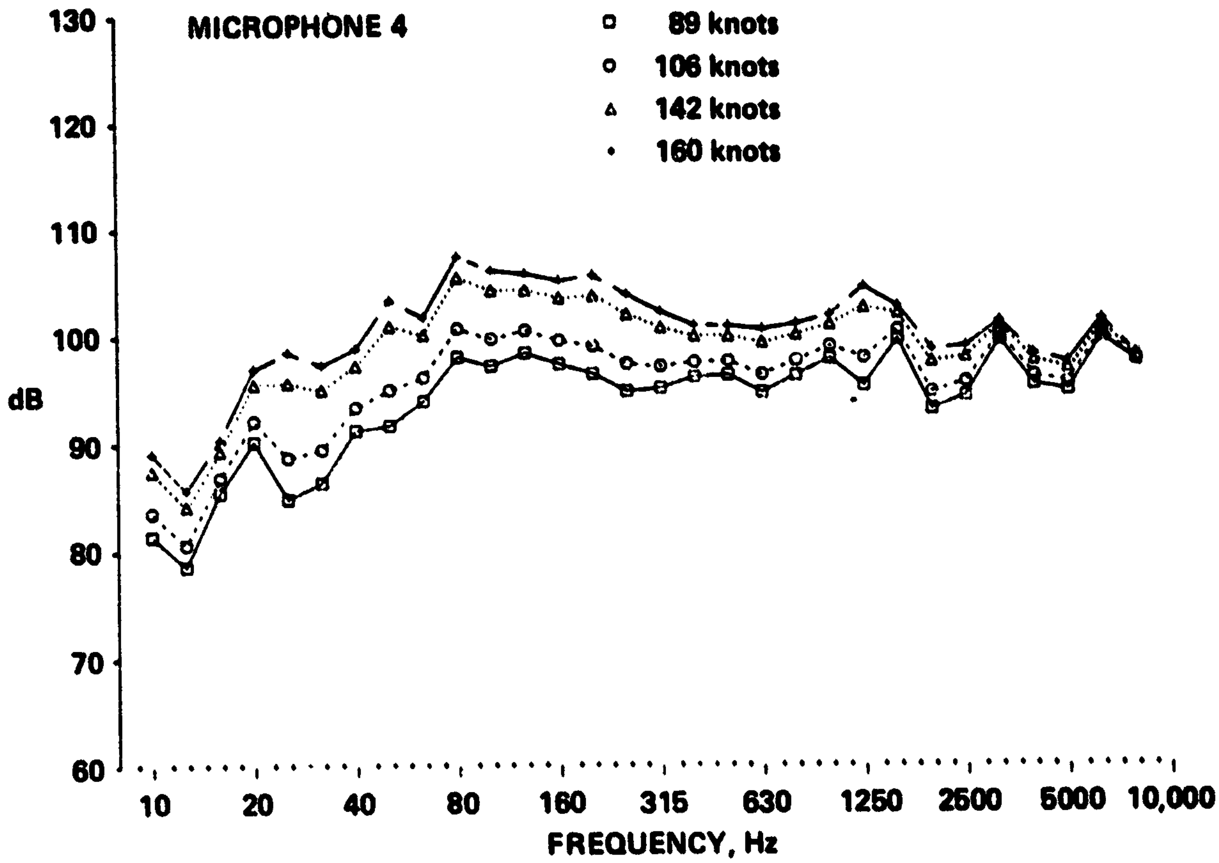

Figure A4.- Background 1/3-octave spectrum for microphone 4.

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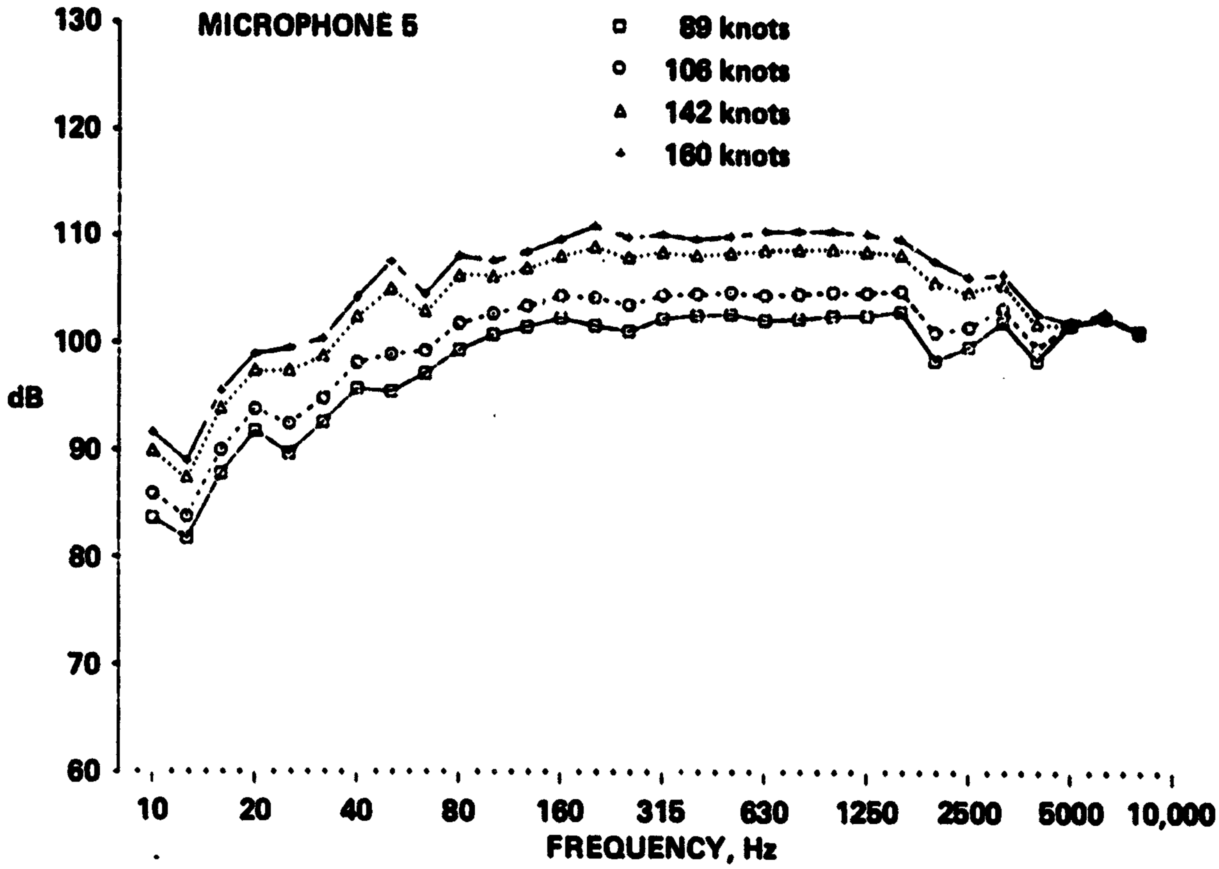

Figure A5.- Background 1/3-octave spectrum for microphone 5.

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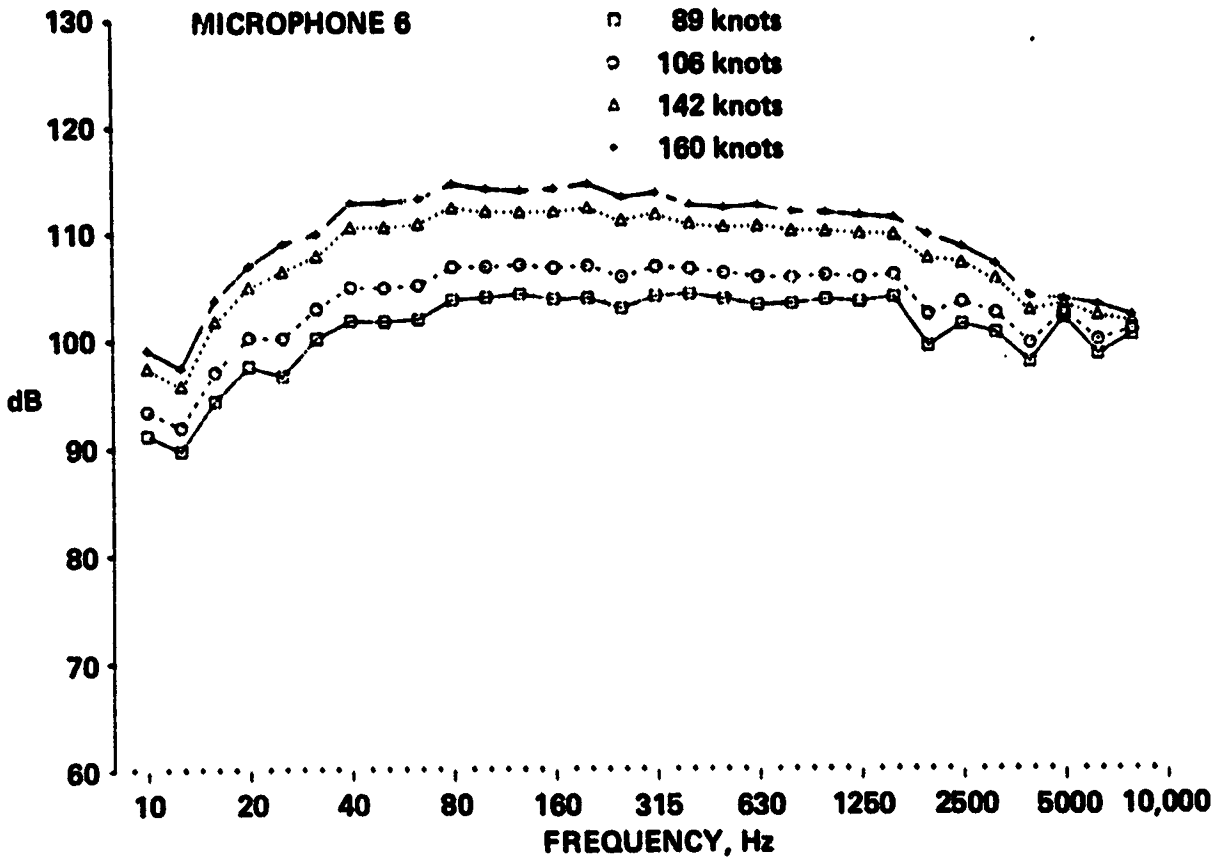

Figure A6.- Background 1/3-octave spectrum for microphone 6.

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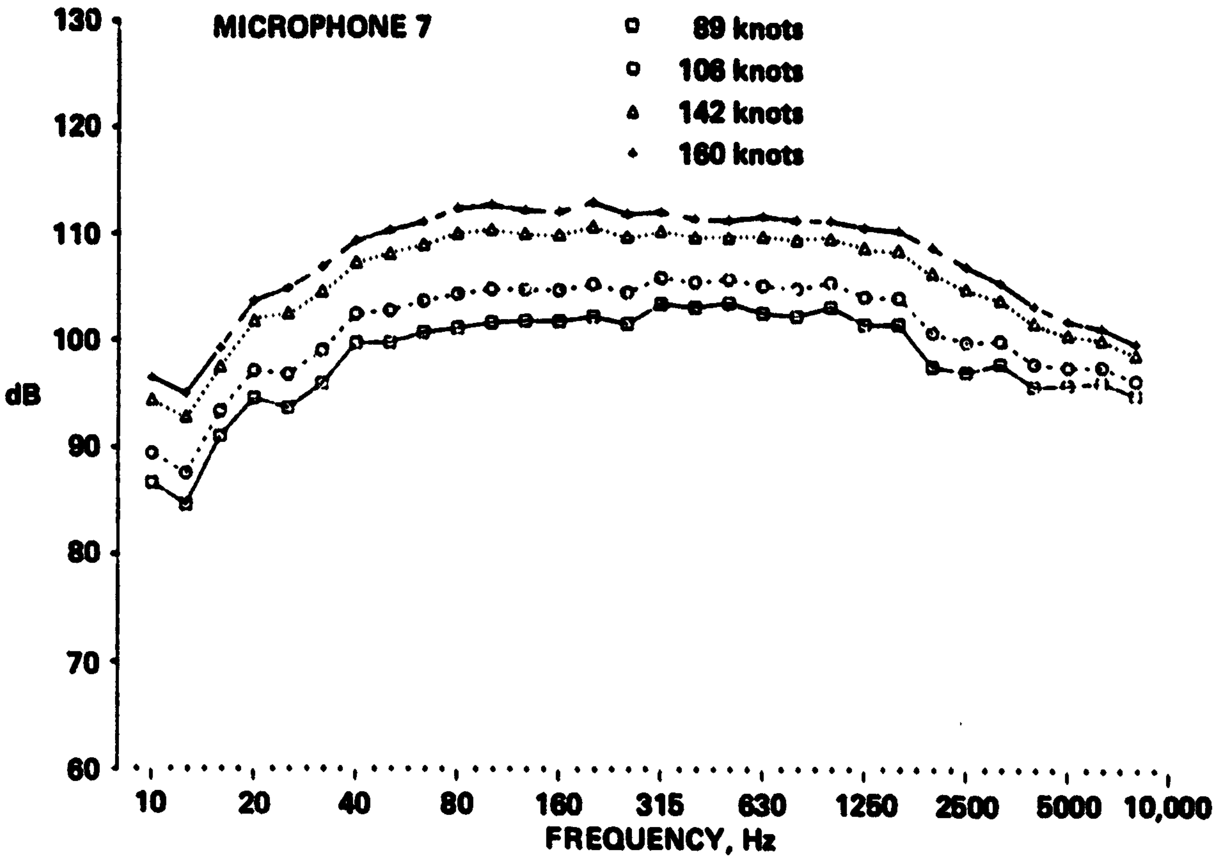

Figure A7.- Background 1/3-octave spectrum for microphone 7.

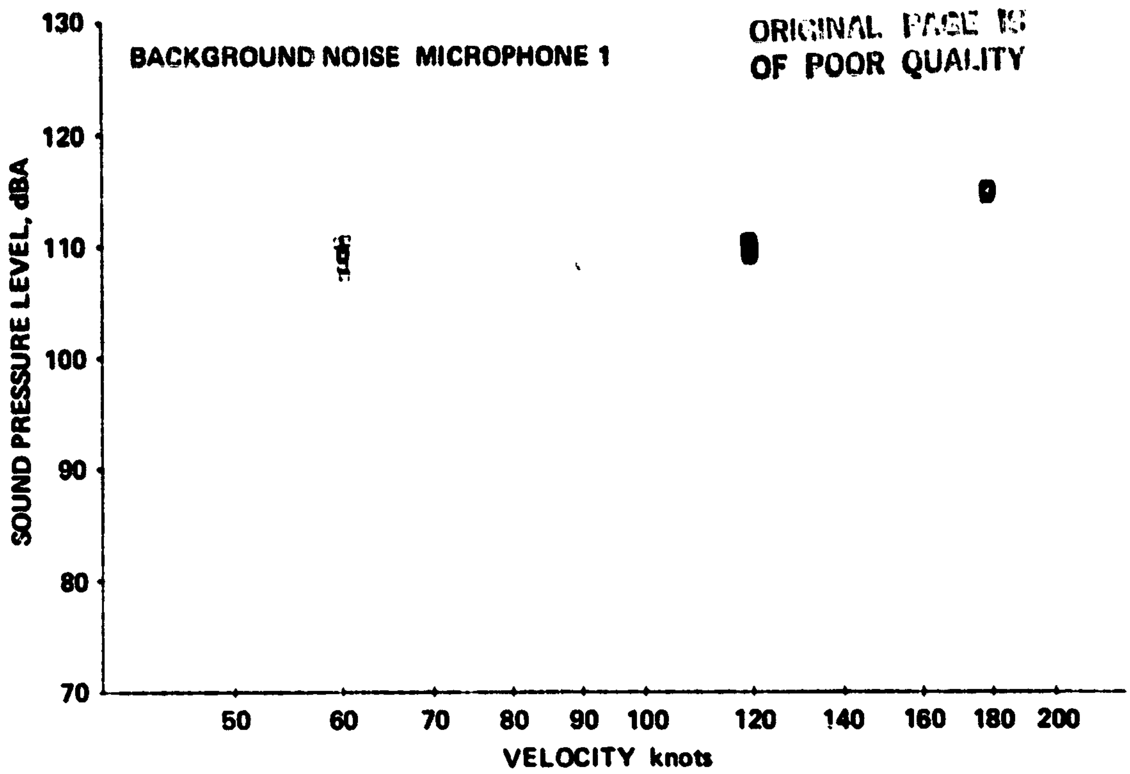

Figure A8.- A-weighted background sound pressure level for microphone 1.

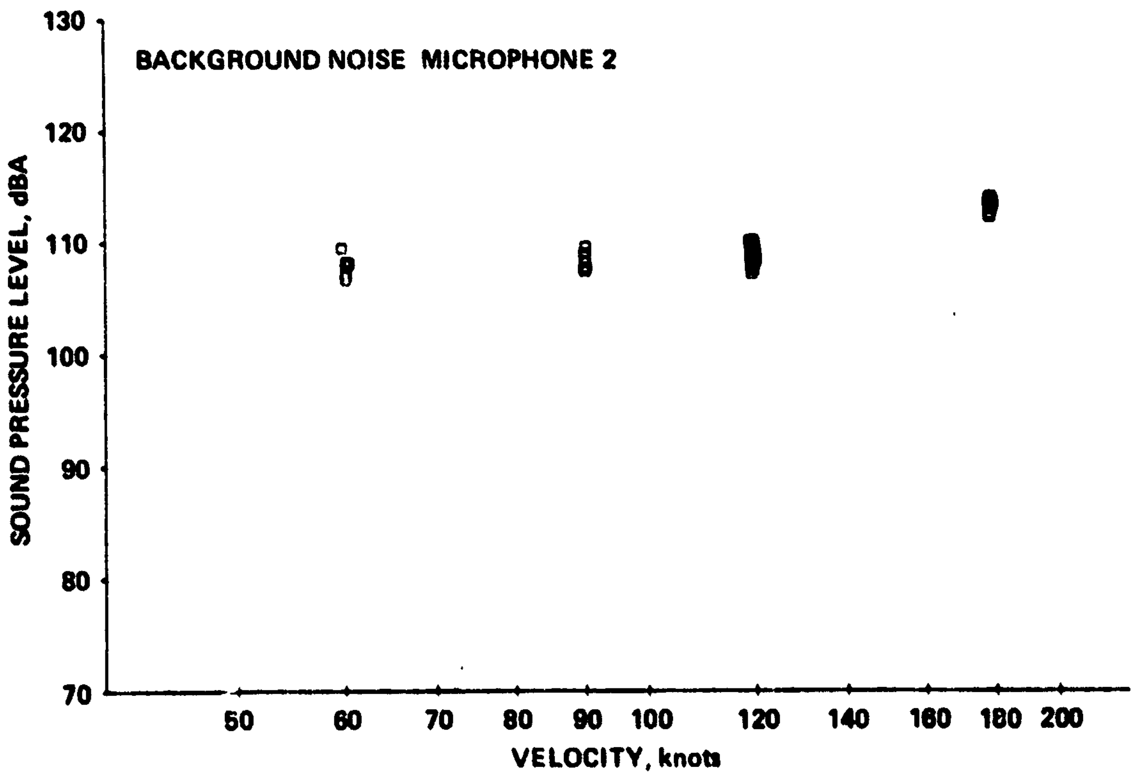

Figure A9.- A-weighted background sound pressure level for microphone 2.

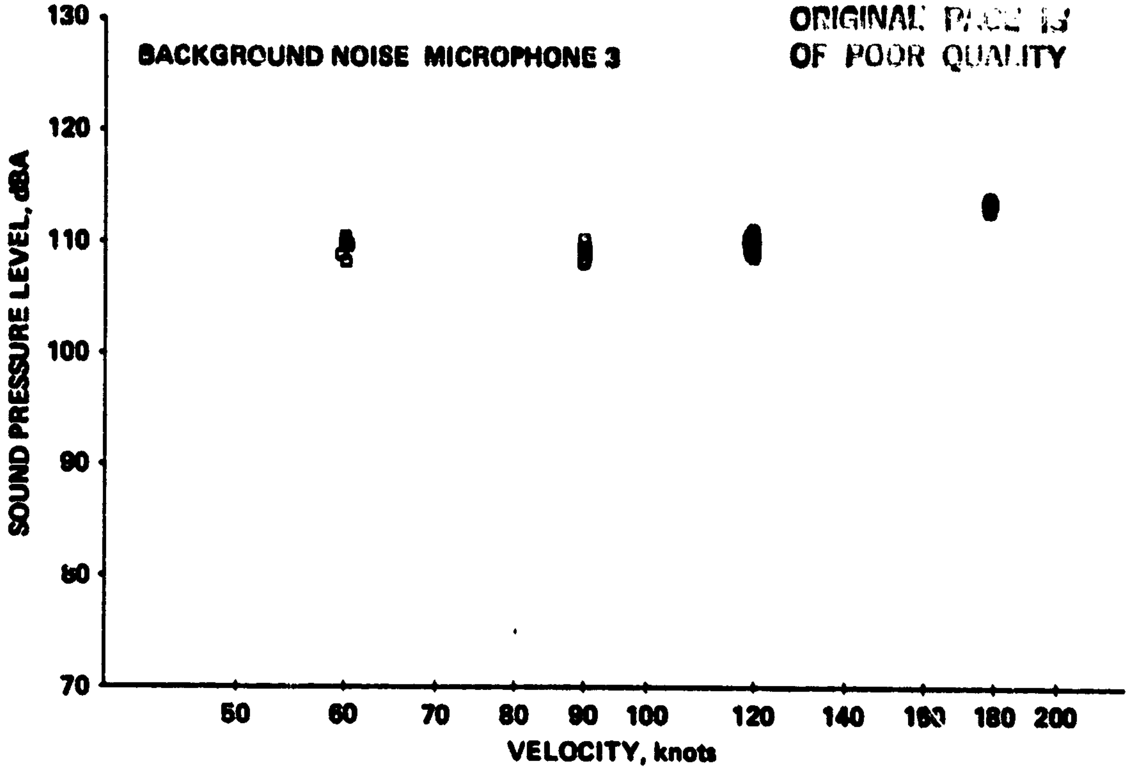

Figure A10.- A-weighted background sound pressure level for microphone 3.

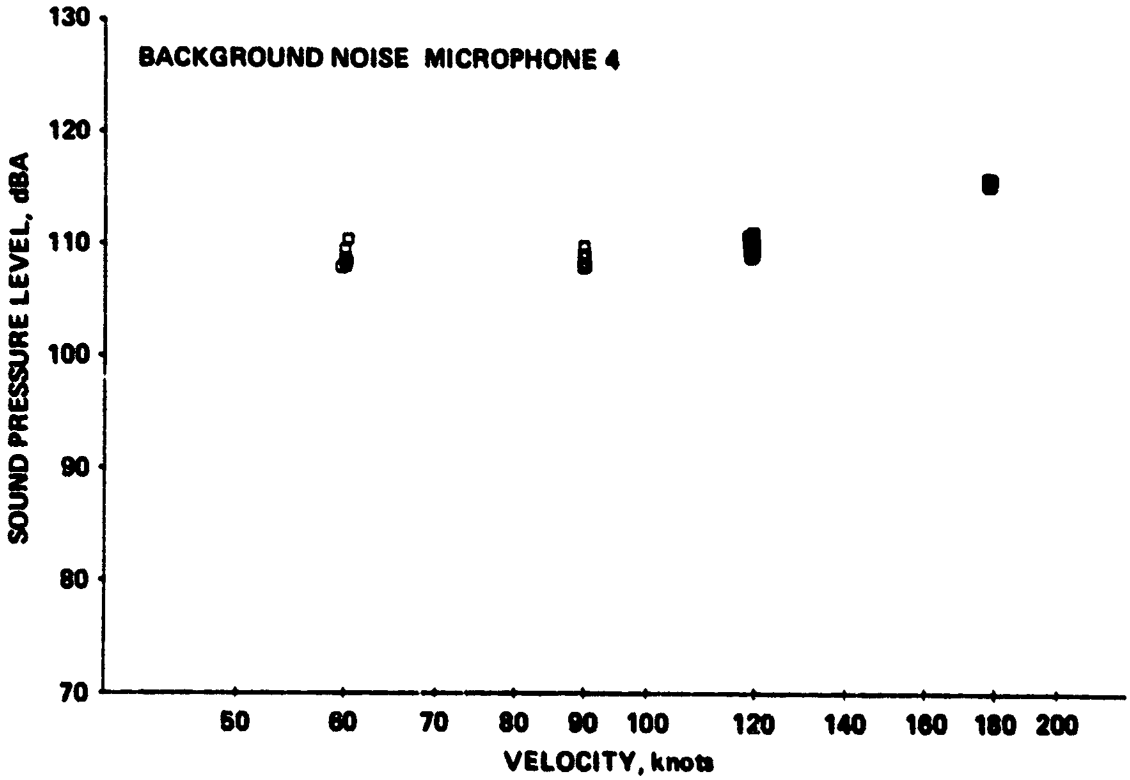

Figure A11.- A-weighted background sound pressure level for microphone 4.

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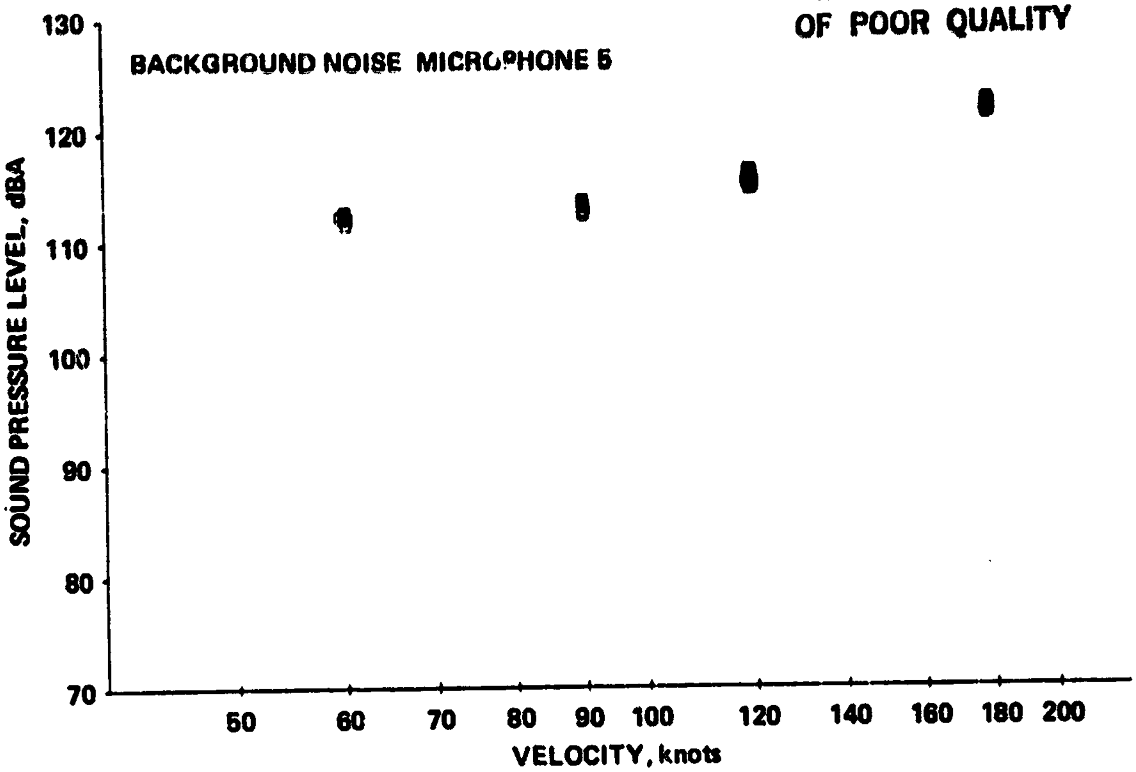

Figure A12.- A-weighted background sound pressure level for microphone 5.

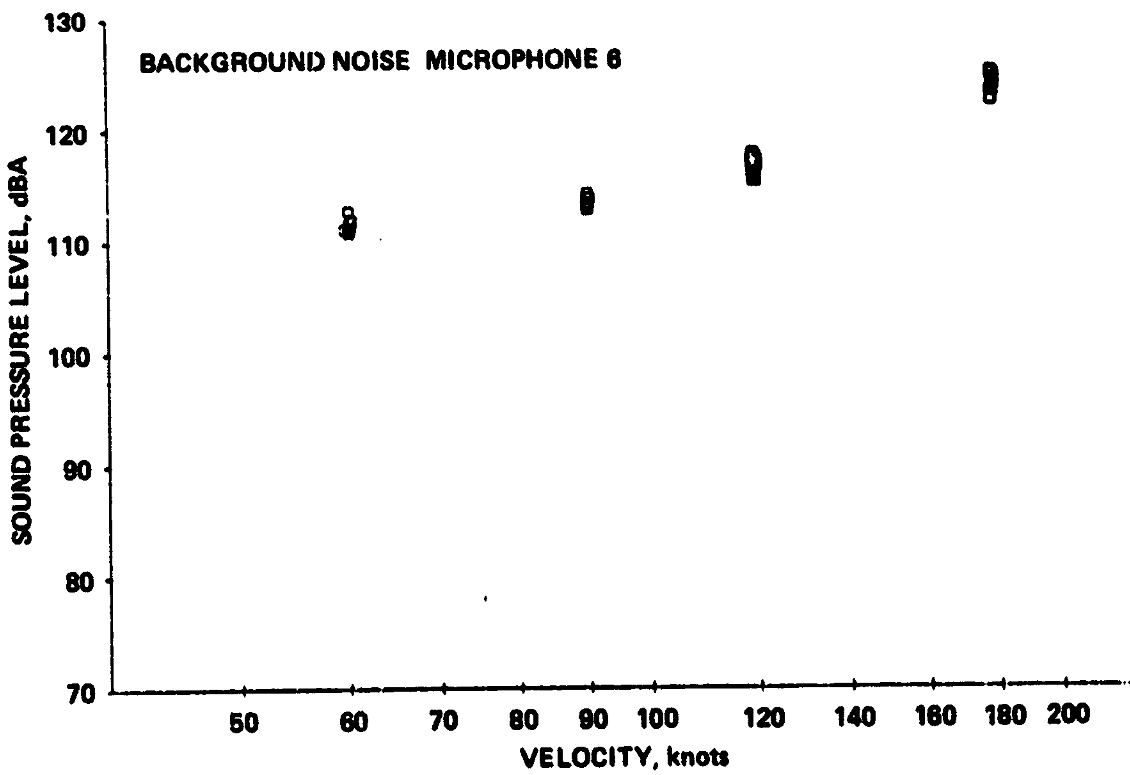

Figure A13.- A-weighted background sound pressure level for microphone 6.

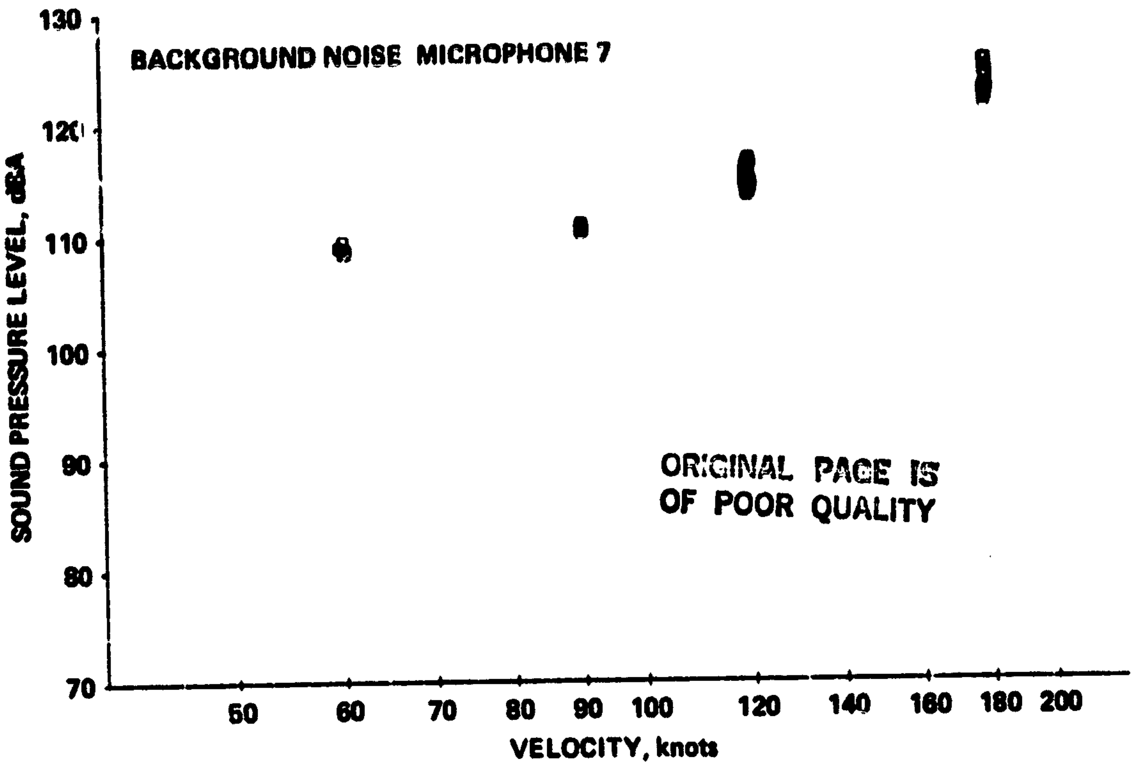

Figure A14.- A-weighted background sound pressure level for microphone 7.

APPENDIX B

The following tables present acoustic and performance data for the XH-59A ABC model. Acoustic data are presented for microphones 1 through 7. The run/point number sequence used is based on tunnel velocity (knots), shaft angle of attack (ALPHA), and isolated rotor lift coefficient (CLR/S,R). The run/point numbers are ordered in terms of increasing isolated rotor lift coefficient at each tunnel velocity and shaft angle of attack.

SYMBOLS

ALPHA	model pitch, positive up, deg
CLR/S,R	isolated rotor lift coefficient
CP/S	rotor power coefficient
DBAC	dBA corrected for background noise
DBAU	dBA not corrected for background noise
DBC	dB corrected for background noise
DBU	dB not corrected for background noise
J THRUST	total auxiliary engine thrust, N
MAT	advancing tip Mach number
MTIP	rotor tip Mach number
MTUN	tunnel Mach number
MU	advance ratio
PMAX	maximum pressure in time history sample, N/m^2
PMIN	minimum pressure in time history sample, N/m^2
PNDBC	PNdB corrected for background noise
PNDBU	PNdB not corrected for background noise
PT	point number
RPM	rotor rotational speed, rev/min
RUN	run number
VELOCITY	tunnel velocity, knots
VTIP	rotor tip velocity, m/sec

%RPM J1 auxiliary engine rotational speed expressed as percent of nominal value, RPM J1/16,000

%RPM J2 auxiliary engine rotational speed expressed as percent of nominal value, RPM J2/16,000

Acoustic data are presented in the following order:

RUN/PT	VELOCITY	ALPHA	CLR/S,R
21/16	90.2	10.0	0.068
21/17	91.1	10.0	.080
29/7	88.7	10.0	.108
21/11	89.8	7.5	.074
21/12	90.0	7.5	.074
21/13	90.0	7.5	.090
29/6	88.4	7.5	.099
21/14	90.1	7.5	.119
29/10	87.9	7.5	.124
21/15	90.0	7.5	.141
29/11	88.4	7.5	.162
21/7	89.4	5.0	.072
21/18	90.1	5.0	.074
21/8	90.0	5.0	.093
29/5	88.6	5.0	.093
30/7	88.2	5.0	.104
29/9	88.1	5.0	.116
21/9	89.8	5.0	.121
30/6	88.0	5.0	.128
29/8	88.2	5.0	.133
21/10	89.9	5.0	.134
28/6	88.3	2.5	.082
28/7	88.6	2.5	.109
28/8	88.8	2.5	.150
21/6	89.3	0.0	.026
25/6	106.2	7.5	.067
23/12	106.8	7.5	.093
25/7	104.7	7.5	.106
25/5	105.3	7.5	.107
25/8	104.8	7.5	.116
23/14	107.0	7.5	.117
23/13	107.0	7.5	.131
25/9	104.3	7.5	.138
21/19	108.5	5.0	.069
23/9	105.6	5.0	.114
23/10	106.1	5.0	.135
23/11	106.4	5.0	.145
23/15	107.8	2.5	.085
23/7	105.0	0.0	.025
23/8	105.8	0.0	.083
24/9	142.4	7.5	.090
24/6	140.9	5.0	.079
24/7	140.9	5.0	.113
24/8	141.2	5.0	.125
23/16	143.0	2.5	.079

RUN/PT	VELOCITY	ALPHA	CLR/S,R
23/18	143.2	2.5	0.093
23/17	143.0	2.5	.110
30/8	141.9	2.5	.110
30/9	142.1	2.5	.113
24/12	160.6	2.5	.085
24/11	160.6	2.5	.085

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XH-59A ACOUSTIC DATA

	VELOCITY / MTUN	CLR/S.F / CP/S	ALPHA / MU	RPM / MAT	VTIP / MTIP	J THRUST	%RPM J1 / %RPM J2	
	DBAC	DBAC	DBU	DBC	PNDBU	PNDBC	PMIN	PMAX
RUN 21	90.2	0.068552	10.0	333.1	191.4	904.3	49.2	
PT 16	0.1310	0.000251	0.2424	0.6715	0.5405		42.0	
MIC 1	110.4	109.3	118.2	117.7	124.0	118.6	-59.4	43.8
MIC 2	110.1	107.7	117.8	117.2	124.6	118.7	-37.7	42.9
MIC 3	110.9	106.2	119.0	118.5	125.8	119.0	-53.2	43.7
MIC 4	110.7	108.4	118.9	118.3	125.0	119.2	-40.1	52.3
MIC 5	114.5	111.0	121.7	120.8	127.9	121.0	-64.0	84.5
MIC 6	114.8	111.1	121.6	120.2	127.7	120.3	-75.5	66.1
MIC 7	116.0	114.2	122.4	121.6	128.4	122.8	-111.5	72.2
RUN 21	91.1	0.080180	10.0	360.2	206.9	945.3	49.2	
PT 17	0.1323	0.000208	0.2264	0.7169	0.5845		42.9	
MIC 1	113.4	112.3	121.1	120.8	126.7	122.6	-70.7	85.4
MIC 2	112.4	111.1	121.1	120.8	126.6	122.7	-58.7	66.0
MIC 3	112.6	111.1	120.2	119.8	126.3	121.7	-65.9	54.6
MIC 4	113.4	112.2	122.9	122.7	128.0	124.2	-77.9	88.8
MIC 5	116.2	114.1	122.6	121.8	129.5	124.1	-69.4	81.6
MIC 6	116.8	114.6	124.9	124.2	130.0	125.2	-95.5	70.6
MIC 7	117.5	116.3	123.0	122.3	129.5	125.9	-71.5	89.0
RUN 29	88.7	0.108137	10.0	319.2	183.4	875.4	43.7	
PT 7	0.1311	0.004458	0.2489	0.6575	0.5264		43.7	
MIC 1	111.4	109.3	118.3	117.8	126.1	120.6	-454.1	58.9
MIC 2	110.7	108.5	119.8	119.5	125.0	119.8	-481.4	50.8
MIC 3	112.1	109.2	119.4	118.8	127.5	122.3	-469.0	51.5
MIC 4	111.7	109.8	120.5	120.1	126.3	120.9	-50.0	62.0
MIC 5	115.3	112.5	122.9	122.3	128.8	123.2	-79.9	88.3
MIC 6	114.8	110.9	122.1	120.9	128.3	121.5	-86.5	75.9
MIC 7	116.0	114.2	124.4	124.0	129.1	126.0	-494.1	97.7

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XH-59A ACOUSTIC DATA

	VELOCITY / MTUN / DBAU	CLR/S.F / CP/S / DBAC	ALPHA / MU / DBD	RPM / MAT / DBC	VTIP / MTIP / PNDBD	J THRUST / PNDBC	%RPM J1 / %RPM J2 / PMIN	PMAX
RUN 21	89.8	0.073627	7.5	323.7	186.0	977.3	48.7	
PT 11	0.1306	0.000894	0.2485	0.6564	0.5257		42.9	
MIC 1	111.7	110.1	120.0	119.6	125.6	121.2	-58.2	47.9
MIC 2	109.9	107.4	117.7	117.2	123.9	118.4	-47.9	34.6
MIC 3	111.1	106.8	118.0	117.3	126.1	119.3	-55.5	47.0
MIC 4	111.2	109.3	119.4	118.9	125.1	120.3	-67.0	71.9
MIC 5	114.9	112.1	121.5	120.5	128.1	121.6	-69.4	78.9
MIC 6	114.8	111.0	121.9	120.5	128.2	121.5	-65.0	68.8
MIC 7	115.3	113.2	122.5	121.8	128.1	123.3	-87.4	88.3
RUN 21	90.0	0.073642	7.5	323.8	186.0	967.0	48.7	
PT 12	0.1309	0.000871	0.2490	0.6568	0.5259		42.8	
MIC 1	111.6	109.9	120.2	119.8	125.8	121.4	-46.2	64.8
MIC 2	110.1	107.8	118.2	117.7	123.9	119.0	-46.0	37.7
MIC 3	111.0	108.5	116.0	117.3	125.9	119.6	-56.0	44.9
MIC 4	111.1	109.0	119.6	119.1	125.2	120.1	-75.3	73.4
MIC 5	114.7	111.3	121.4	120.4	128.1	121.5	-60.6	72.8
MIC 6	114.6	110.5	122.3	121.0	128.1	120.6	-73.5	74.6
MIC 7	115.4	113.2	122.4	121.6	128.4	123.4	-55.6	74.2
RUN 21	90.0	0.089785	7.5	323.8	186.0	977.0	48.8	
PT 13	0.1309	0.001022	0.2489	0.6568	0.5259		42.9	
MIC 1	112.1	110.5	120.8	120.4	126.1	121.9	-60.8	61.5
MIC 2	111.1	109.4	119.9	119.5	125.3	121.3	-55.4	44.8
MIC 3	110.5	109.1	118.5	117.9	124.7	118.9	-59.7	42.8
MIC 4	112.1	110.4	120.7	120.4	126.4	122.1	-82.7	71.4
MIC 5	114.7	111.4	121.9	121.1	128.5	121.2	-78.0	73.5
MIC 6	115.6	112.6	122.9	121.8	128.9	122.9	-87.0	92.2
MIC 7	115.1	112.9	122.9	122.1	128.2	123.8	-89.0	79.2

XH-59A ACOUSTIC DATA

	VELOCITY MTUN DCAU	CLR/S.P CP/S DLAC	ALPHA MU DPU	RPM MAT DBC	VTIP MTIP PNDBU	J THRUST PNDBC	ZRPM J1 ZRPM J2 PMIN	PMAX
RUN 29 PT 6	88.4 0.1307	0.099471 0.004665	7.5 0.2490	318.0 0.6557	132.7 0.5249	885.4	43.9 43.6	
MIC 1	110.6	108.1	117.3	116.5	125.0	118.7	-450.9	37.0
MIC 2	110.4	106.2	119.7	119.3	124.5	119.7	-464.1	51.1
MIC 3	110.8	107.3	118.1	117.4	125.7	118.8	-455.0	43.3
MIC 4	111.2	109.0	118.9	118.4	126.2	121.0	-59.2	40.8
MIC 5	115.3	112.1	122.3	122.1	129.7	123.6	-79.6	73.7
MIC 6	114.8	111.0	121.4	119.9	128.1	121.8	-67.2	86.5
MIC 7	115.7	113.8	125.2	124.8	128.9	125.2	-88.3	102.6
RUN 21 PT 14	90.1 0.1303	0.118578 0.002092	7.5 0.2499	322.7 0.6545	185.4 0.5236	967.1	48.7 42.8	
MIC 1	111.5	109.6	120.8	120.5	125.6	120.6	-59.7	67.2
MIC 2	111.5	109.9	120.1	119.6	125.4	120.9	-56.6	58.0
MIC 3	111.5	109.5	120.2	119.8	125.7	120.2	-66.4	51.4
MIC 4	112.8	111.5	122.1	122.9	127.5	123.6	-70.0	93.9
MIC 5	115.4	112.8	123.4	122.8	129.2	123.5	-77.8	87.3
MIC 6	115.9	113.1	124.0	123.2	129.6	122.6	-82.8	80.8
MIC 7	116.4	114.9	125.4	125.0	129.9	125.9	-104.0	109.5
RUN 29 PT 10	87.9 0.1305	0.123751 0.004230	7.5 0.2480	317.4 0.6569	182.4 0.5264	1115.3	50.1 43.0	
MIC 1	111.8	110.1	119.3	118.9	125.8	121.5	-458.5	60.2
MIC 2	111.5	109.8	121.4	121.1	126.2	121.6	-63.8	48.7
MIC 3	112.0	109.5	119.6	119.1	127.2	122.1	-65.7	63.3
MIC 4	112.3	110.9	121.2	120.9	126.1	122.2	-67.0	64.3
MIC 5	115.9	113.5	123.6	123.0	130.1	124.7	-92.9	88.0
MIC 6	115.5	112.6	122.6	121.5	129.4	124.1	-70.6	55.4
MIC 7	116.6	115.1	126.5	126.2	129.8	127.0	-143.0	122.1

XH-59A ACOUSTIC DATA

	VELOCITY MTUN	CLP/S.R CP/S	ALPHA MU	FPM MAT	VTIP MTIP	J THRUST	%RPM J1 %RPM J2	
	DBAU	DBAC	DBU	DBC	PNDBU	PNDBC	PMIN	PMAX
RUN 21 PT 15	90.0 0.1208	0.140575 0.003825	7.5 0.2490	323.7 0.6561	196.0 0.5253	972.1	48.7 42.8	
MIC 1	112.5	111.2	121.4	121.1	126.7	122.8	-82.8	62.7
MIC 2	111.9	110.5	121.9	121.7	126.2	122.0	-70.8	64.4
MIC 3	113.6	112.4	122.6	122.4	128.0	124.6	-87.[illegible]	73.6
MIC 4	112.7	112.0	124.0	123.8	127.9	124.1	-67.1	106.9
MIC 5	115.3	113.4	124.3	123.8	129.9	124.4	-86.6	119.6
MIC 6	116.1	113.5	124.3	123.6	129.6	124.6	-128.9	101.1
MIC 7	117.8	116.7	126.8	126.5	131.4	128.6	-120.8	125.8
RUN 29 PT 11	95.4 0.1310	0.161634 0.005362	7.5 0.2507	315.7 0.6536	181.4 0.5226	1122.2	50.0 44.2	
MIC 1	115.2	114.4	123.8	123.6	129.0	126.2	-80.2	97.2
MIC 2	114.2	113.3	123.0	122.8	127.8	124.5	-66.6	68.7
MIC 3	114.7	113.4	124.2	124.0	129.4	126.3	-106.1	95.7
MIC 4	116.3	115.7	125.5	125.4	130.0	127.6	-113.4	156.1
MIC 5	119.0	117.9	126.0	125.7	132.[illegible]	129.0	-118.7	124.6
MIC 6	118.3	116.9	125.4	124.9	131.8	128.2	-118.3	170.8
MIC 7	120.3	119.8	130.5	130.4	133.8	131.9	-147.9	170.3
RUN 21 PT 7	89.4 0.1309	0.071956 0.001602	5.0 0.2504	319.8 0.6535	183.7 0.5227	1017.8	47.5 43.1	
MIC 1	110.5	108.1	118.7	118.2	124.9	119.5	-46.9	52.2
MIC 2	110.0	107.8	119.0	118.6	124.5	120.2	-47.2	42.5
MIC 3	110.2	103.0	118.3	117.7	124.5	119.1	-43.6	53.4
MIC 4	110.3	107.9	119.5	119.0	124.6	119.4	-52.3	55.2
MIC 5	114.5	111.4	121.3	120.3	128.1	121.8	-58.0	59.8
MIC 6	114.6	110.5	122.2	121.0	128.8	121.7	-67.4	56.1
MIC 7	114.6	112.1	122.7	122.0	127.8	122.4	-71.9	68.8

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XH-59A ACOUSTIC DATA

	VELOCITY MTUN DPAU	CL-/S.F CP/S DBAC	ALPHA MU DBU	RPM MAT DBC	VTIP MTIP PNDBU	J THRUST PNDBC	ZPPM J1 ZPPM J2 PMIN	PMAX
RUN 21	90.1	0.074042	5.0	323.0	185.6	959.6	48.6	
PT 15	0.1309	0.001662	0.2497	0.6550	0.5241		42.7	
MIC 1	110.6	109.4	119.6	118.1	124.3	118.8	-45.3	50.0
MIC 2	110.2	109.1	118.2	118.5	124.2	119.2	-47.6	54.2
MIC 3	110.2	107.1	117.6	116.9	125.2	117.6	-48.5	46.2
MIC 4	110.5	107.9	119.0	118.5	125.0	119.2	-44.0	62.4
MIC 5	114.4	110.7	121.1	120.1	128.2	120.8	-61.5	58.1
MIC 6	114.7	110.8	121.7	120.2	128.4	121.4	-78.4	68.6
MIC 7	115.4	113.4	122.8	122.1	128.2	123.5	-104.1	79.5
RUN 21	90.0	0.093162	5.0	320.9	184.4	1020.3	47.3	
PT 8	0.1214	0.002323	0.2511	0.6550	0.5235		42.9	
MIC 1	111.5	109.6	120.1	119.8	125.7	121.1	-57.6	56.0
MIC 2	111.0	109.4	120.5	120.2	125.4	121.0	-463.3	56.0
MIC 3	110.6	107.9	118.9	118.3	125.5	119.2	-42.6	57.5
MIC 4	111.2	109.4	122.0	121.8	125.9	121.7	-53.7	90.9
MIC 5	115.2	112.3	122.4	121.7	128.8	123.1	-67.0	83.1
MIC 6	115.6	112.8	124.1	123.3	129.1	123.3	-134.6	70.4
MIC 7	115.9	114.0	124.7	124.2	129.3	124.6	-105.3	111.9
RUN 23	88.6	0.052200	5.0	317.7	182.5	872.9	43.6	
PT 5	0.1311	0.004862	0.2497	0.6560	0.5249		43.5	
MIC 1	112.2	110.7	119.9	119.5	125.8	121.5	-468.2	64.2
MIC 2	112.4	111.3	121.1	120.8	126.0	122.1	-475.9	54.2
MIC 3	112.5	110.5	119.1	118.6	126.5	121.8	-79.1	59.2
MIC 4	112.4	110.9	119.7	119.2	126.1	122.2	-465.6	69.3
MIC 5	116.4	114.2	123.6	123.0	129.6	124.9	-110.9	103.8
MIC 6	116.2	113.6	121.9	120.5	129.2	123.9	-476.7	63.2
MIC 7	117.0	115.7	125.7	125.3	130.0	126.8	-99.5	93.1

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YH-59A ACOUSTIC DATA

	VELOCITY / ATUN	CLP/S,P / CP/S	ALPHA / MU	RPM / MAT	VTIP / MTIP	J THRUST	%RPM J1 / %RPM J2	
	DBAU	DBAC	DBU	DBC	PNDBU	PNDBC	PMIN	PMAX
RUN 30	88.2	0.103501	5.0	315.7	181.4	1246.7	50.4	
PT 7	0.1312	0.004512	0.2501	0.6557	0.5245		47.2	
MIC 1	112.8	111.4	120.2	119.9	127.1	122.2	-471.3	57.7
MIC 2	112.7	111.5	121.6	121.3	127.2	123.2	-478.0	48.4
MIC 3	112.7	110.6	119.3	118.7	127.8	123.0	-65.7	53.1
MIC 4	112.9	111.6	121.2	120.9	126.5	122.7	-470.4	43.1
MIC 5	116.3	114.1	123.1	122.5	130.1	125.1	-101.0	85.3
MIC 6	117.0	115.1	123.6	122.8	131.6	127.8	-496.1	66.1
MIC 7	118.1	117.1	126.6	126.3	130.7	128.4	-525.2	133.9
RUN 29	88.1	0.115752	5.0	316.7	182.0	1102.5	49.8	
PT 9	0.1308	0.004681	0.2490	0.6560	0.5252		43.9	
MIC 1	112.5	111.1	120.5	120.2	126.2	122.3	-51.1	61.1
MIC 2	112.5	111.2	121.9	121.7	126.7	122.7	-68.7	57.3
MIC 3	112.7	110.7	120.0	119.5	127.8	123.2	-466.6	58.9
MIC 4	113.1	111.9	122.3	122.0	127.2	123.7	-76.6	87.4
MIC 5	116.9	115.1	124.0	123.5	130.6	126.6	-494.2	85.8
MIC 6	116.2	113.9	124.4	123.7	129.9	125.5	-93.1	94.0
MIC 7	117.0	115.8	126.7	126.4	130.1	127.2	-95.2	160.0
RUN 21	89.8	0.120793	5.0	320.7	184.2	956.8	47.9	
PT 9	0.1311	0.003962	0.2507	0.6548	0.5227		42.8	
MIC 1	112.9	111.6	122.5	122.3	127.1	123.7	-56.5	80.7
MIC 2	112.9	111.8	121.9	121.7	126.8	122.9	-69.7	76.3
MIC 3	113.5	112.4	123.0	122.8	127.7	123.7	-72.2	92.1
MIC 4	113.2	112.0	124.3	124.2	127.6	123.9	-82.1	109.8
MIC 5	116.4	114.4	123.9	123.4	130.1	125.4	-83.3	55.8
MIC 6	117.2	115.3	126.2	125.9	130.5	126.1	-214.0	117.7
MIC 7	116.7	115.2	126.5	126.3	130.0	126.4	-147.8	120.8

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XH-59A ACOUSTIC DATA

	VELOCITY / MTUN / DBAU	CLR/S.R / CP/S / DBAC	ALPHA / MU / DBU	RPM / MAT / DBC	VTIP / MTIP / PNDBU	J THRUST / PNDBC	%RPM J1 / %RPM J2 / PMIN	PMAX
RUN 30	88.0	0.127927	5.0	314.0	180.4	1244.2	50.2	
PT 6	0.1311	0.004719	0.2509	0.6548	0.5227		47.3	
MIC 1	113.8	112.8	122.2	122.0	127.5	124.1	-470.7	83.6
MIC 2	113.3	112.2	122.0	121.8	127.3	124.1	-466.6	72.8
MIC 3	113.6	112.1	122.0	121.7	129.2	125.5	-80.6	63.2
MIC 4	114.1	113.2	124.0	123.9	128.4	125.1	-477.0	139.0
MIC 5	117.4	115.9	124.5	124.0	130.5	126.2	-513.3	80.2
MIC 6	117.6	116.1	124.6	124.0	131.0	127.4	-534.5	84.3
MIC 7	117.6	116.5	127.7	127.4	131.0	128.4	-577.2	129.0
RUN 29	88.2	0.133203	5.0	315.5	181.3	1109.5	49.7	
PT 8	0.1312	0.005012	0.2504	0.6549	0.5237		43.9	
MIC 1	115.5	114.8	123.1	122.9	128.7	125.9	-61.1	82.7
MIC 2	115.2	114.6	123.4	123.3	128.6	125.4	-479.9	83.5
MIC 3	114.7	113.6	122.5	122.3	128.7	125.3	-70.4	87.3
MIC 4	115.3	114.6	124.5	124.4	128.9	125.9	-82.3	138.4
MIC 5	119.2	118.2	126.2	125.9	132.4	129.2	-522.1	117.4
MIC 6	119.2	118.1	126.4	126.0	132.7	129.5	-270.9	104.0
MIC 7	118.9	118.1	127.6	127.4	131.5	128.9	-529.7	119.5
RUN 21	89.9	0.138755	5.0	322.2	165.3	954.7	48.4	
PT 10	0.1308	0.007045	0.2498	0.6546	0.5238		42.6	
MIC 1	115.8	115.2	124.3	124.2	129.4	126.5	-101.2	99.5
MIC 2	115.9	115.4	124.6	124.5	129.7	127.3	-46.7	107.8
MIC 3	115.6	114.9	123.9	123.7	129.7	126.8	-85.8	94.4
MIC 4	115.0	114.1	125.2	125.1	129.0	125.9	-84.2	99.1
MIC 5	118.4	117.2	126.0	125.6	131.7	128.6	-113.5	128.0
MIC 6	119.8	118.8	128.4	128.1	133.0	130.1	-351.2	110.2
MIC 7	118.9	118.1	127.2	127.1	132.2	129.7	-93.8	147.0

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XH-59A ACOUSTIC DATA

	VELOCITY MTUN	CLR/S.F CP/S	ALPHA MU	RPM MAT	VTIP MTIP	J THRUST	%RPM J1 %RPM J2	
	DBAU	DBAC	LBU	DBC	PNDBU	PNDBC	PMIN	PMAX
RUN 28 PT 6	88.3 0.1711	0.031592 0.002904	2.5 0.2496	316.6 0.6561	181.9 0.5251	983.8	48.8 42.9	
MIC 1	113.2	112.0	121.1	120.8	124.8	122.9	-402.3	95.0
MIC 2	112.7	111.0	120.6	120.3	126.0	122.3	-473.7	58.9
MIC 3	111.5	108.9	118.7	118.0	126.1	120.7	-478.0	54.3
MIC 4	112.0	110.5	122.4	122.2	126.6	123.0	-467.8	87.1
MIC 5	116.8	114.9	123.9	123.4	124.9	125.4	-522.1	76.8
MIC 6	117.7	116.1	124.8	124.1	131.3	126.3	-563.1	91.8
MIC 7	115.7	114.0	124.6	124.2	128.6	123.9	-523.1	110.3
RUN 28 PT 7	83.5 0.1213	0.103912 0.004381	2.5 0.2514	315.7 0.6534	181.4 0.5221	976.1	48.8 42.6	
MIC 1	115.5	114.7	123.2	123.0	128.7	125.3	-496.1	91.5
MIC 2	114.6	114.0	122.5	122.3	127.9	125.0	-488.2	103.6
MIC 3	113.9	112.5	122.0	121.7	128.4	124.9	-80.5	79.4
MIC 4	113.3	112.3	122.5	123.4	127.2	124.0	-470.1	127.6
MIC 5	118.1	116.7	125.1	124.7	131.1	127.4	-512.8	102.9
MIC 6	119.4	118.4	126.7	126.3	133.1	129.7	-613.2	116.4
MIC 7	118.2	117.2	127.5	127.3	130.8	127.9	-551.5	114.6
RUN 29 PT 3	88.8 0.1309	0.149922 0.009279	2.5 0.2505	317.3 0.6538	182.3 0.5228	1029.0	50.4 42.4	
MIC 1	118.4	118.1	127.1	127.0	132.1	130.2	-137.0	129.1
MIC 2	117.6	117.2	126.8	126.8	131.4	129.4	-507.6	105.7
MIC 3	117.4	116.8	125.4	125.3	131.2	129.4	-505.1	87.2
MIC 4	117.5	117.1	127.4	127.4	131.4	129.3	-576.2	134.6
MIC 5	120.9	119.2	127.5	127.3	133.2	130.9	-144.4	144.4
MIC 6	121.1	120.3	129.0	126.7	134.0	131.3	-146.0	175.0
MIC 7	122.2	122.9	131.1	131.0	136.5	135.1	-663.6	184.0

XH-59A ACOUSTIC DATA

	VELOCITY MTUN DBAU	CLR/S.R CP/S DBAC	ALPHA MU DBD	RPM MAT DBC	VTIP MTIP PNDBU	J THRUST PNDBC	%RPM J1 %RPM J2 PMIN	PMAX
RUN 21 PT 6	89.3 0.1309	0.025602 0.002247	0.0 0.2385	321.3 0.6570	184.6 0.5261	995.4	47.2 47.8	
MIC 1	103.3	105.3	116.5	115.6	123.1	116.7	-38.6	43.5
MIC 2	109.8	107.1	114.7	115.3	124.2	118.8	-40.7	44.7
MIC 3	109.4	106.2	114.6	115.8	123.9	116.5	-37.9	39.3
MIC 4	110.1	107.3	118.1	117.5	124.4	118.4	-36.7	40.9
MIC 5	114.0	110.4	119.8	118.4	127.0	119.9	-67.7	60.0
MIC 6	114.4	110.0	120.3	118.1	127.8	119.8	-61.5	55.9
MIC 7	114.7	112.2	121.3	120.2	127.5	122.4	-61.5	93.3
RUN 25 PT 5	106.2 0.1581	0.066537 0.000632	7.5 0.2017	315.1 0.6820	181.0 0.5239	1017.3	49.9 43.5	
MIC 1	111.5	109.2	120.2	119.6	125.3	119.8	-58.7	57.5
MIC 2	111.7	109.8	120.1	119.6	125.5	120.2	-67.5	63.6
MIC 3	111.7	109.8	119.8	119.2	125.2	119.6	-55.6	57.9
MIC 4	111.5	109.2	120.8	120.3	125.0	119.9	-64.6	59.8
MIC 5	116.4	113.2	124.9	124.3	129.6	122.8	-84.8	93.8
MIC 6	116.5	111.7	124.5	122.1	130.1	122.0	-129.1	90.7
MIC 7	117.3	114.9	124.5	123.5	129.9	124.6	-123.7	134.6
RUN 23 PT 12	106.8 0.1570	0.093217 0.001055	7.5 0.3002	318.6 0.6800	183.0 0.5230	991.4	47.7 43.4	
MIC 1	116.6	115.9	126.5	126.3	130.4	127.4	-113.0	106.1
MIC 2	118.4	116.0	126.1	125.9	131.5	129.2	-623.1	107.8
MIC 3	117.3	117.3	124.4	124.2	130.7	127.9	-90.1	107.1
MIC 4	117.2	116.6	124.8	124.6	130.0	126.9	-134.3	90.2
MIC 5	120.5	119.3	129.1	127.7	133.8	130.1	-179.4	168.2
MIC 6	120.7	119.4	129.8	129.4	134.2	130.2	-227.5	170.8
MIC 7	120.4	119.4	128.2	127.8	133.3	129.6	-112.4	236.2

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XH-59A ACOUSTIC DATA

	VELOCITY MTUN DBAU	CLP/S.F CP/S DBAC	ALPHA MU DBU	RPM MAT DBC	VTIP MTIP PNDBU	J THRUST PNDBC	%RPM J1 %RPM J2 PMIN	 PMAX
RUN 25 PT 7	104.7 0.1558	0.105815 0.002266	7.5 0.2996	313.0 0.6757	179.8 0.5195	1059.4	49.7 44.7	
MIC 1	115.8	115.0	125.3	125.1	129.6	126.5	-83.4	96.4
MIC 2	117.4	117.0	125.6	125.4	130.9	128.2	-111.6	100.0
MIC 3	117.0	116.4	124.7	124.5	130.1	126.6	-106.6	108.6
MIC 4	116.5	115.8	125.4	125.3	130.2	127.1	-116.5	111.6
MIC 5	118.9	117.3	127.5	127.2	132.2	128.2	-121.4	139.4
MIC 6	119.4	117.7	128.6	127.9	132.9	128.9	-163.5	143.0
MIC 7	119.8	118.6	128.6	128.3	132.3	128.0	-158.8	212.8
RUN 25 PT 5	105.2 0.1570	0.107211 0.001613	7.5 0.2994	315.0 0.6812	181.0 0.5242	1030.8	49.9 43.4	
MIC 1	116.2	115.5	126.4	126.3	130.3	127.1	-106.0	123.7
MIC 2	117.2	116.7	125.8	125.7	130.9	128.3	-141.5	93.8
MIC 3	115.9	115.1	124.3	124.1	129.5	126.0	-85.4	103.9
MIC 4	115.6	114.8	124.6	124.4	129.2	126.0	-115.6	79.5
MIC 5	119.4	118.0	128.0	127.7	132.6	128.2	-155.9	158.6
MIC 6	120.5	119.1	129.7	129.3	134.1	130.2	-297.4	156.8
MIC 7	119.6	118.4	129.7	128.4	132.8	128.7	-141.5	177.4
RUN 25 PT 9	104.8 0.1557	0.116004 0.001886	7.5 0.2988	314.0 0.6768	180.4 0.5211	1064.5	49.9 44.6	
MIC 1	114.7	113.6	124.7	124.5	128.6	124.9	-85.0	96.0
MIC 2	115.5	114.8	124.2	124.0	129.5	126.1	-73.0	84.4
MIC 3	114.9	113.9	123.6	123.4	128.6	124.7	-73.0	86.1
MIC 4	114.6	113.5	124.6	124.5	128.7	125.1	-86.4	92.7
MIC 5	118.4	116.5	127.5	127.2	131.6	127.0	-135.2	145.4
MIC 6	119.5	117.7	127.3	126.7	132.8	128.5	-191.5	108.0
MIC 7	119.5	118.3	128.8	128.5	132.4	128.2	-134.1	153.3

XH-59A ACOUSTIC DATA

	VELOCITY MTUN	CLR/S.F CP/S	ALPHA MU	RPM MAT	VTIP MTIP	J THRUST	%RPM J1 %RPM J2	
	DBAU	DBAC	DBU	DBC	PNDBU	PNDBC	PMIN	PMAX
RUN 23	107.0	0.117986	7.5	320.5	184.1	976.4	48.0	
PT 14	0.1567	0.004506	0.2989	0.6809	0.5242		43.7	
MIC 1	116.7	116.0	127.1	127.0	130.6	128.0	-119.9	125.5
MIC 2	118.3	117.8	127.8	127.7	132.2	129.9	-175.2	107.4
MIC 3	116.9	114.3	125.1	124.9	130.0	127.1	-93.5	115.2
MIC 4	116.3	115.6	125.9	125.7	130.0	126.9	-100.1	123.1
MIC 5	120.2	118.9	129.0	128.7	133.8	129.8	-118.1	173.2
MIC 6	121.5	120.4	131.1	130.8	135.3	131.9	-305.9	179.4
MIC 7	120.4	119.3	129.3	129.0	133.2	129.5	-127.6	187.2
RUN 23	107.0	0.131272	7.5	319.2	183.4	968.9	47.9	
PT 13	0.1572	0.007516	0.3003	0.6807	0.5235		43.3	
MIC 1	119.9	119.6	128.5	128.4	133.5	131.4	-126.1	151.1
MIC 2	119.2	118.8	127.8	127.7	132.8	130.6	-153.7	108.4
MIC 3	118.1	117.6	126.3	126.2	131.3	128.8	-97.2	112.7
MIC 4	117.9	117.4	126.9	126.8	131.8	129.3	-112.5	143.9
MIC 5	122.8	122.2	130.8	130.6	136.2	133.5	-202.8	167.9
MIC 6	124.8	124.3	133.6	133.5	136.5	136.3	-488.4	236.2
MIC 7	121.5	120.6	131.3	131.1	135.0	132.2	-173.9	215.1
RUN 25	104.3	0.137698	7.5	317.1	182.7	1062.6	50.0	
PT 9	0.1550	0.001653	0.2946	0.6813	0.5262		44.4	
MIC 1	113.7	112.4	123.7	123.5	127.5	123.2	-70.5	102.6
MIC 2	114.1	112.0	122.7	122.4	127.8	123.8	-95.1	79.8
MIC 3	114.4	113.4	124.0	123.7	128.4	124.5	-68.6	76.0
MIC 4	114.4	113.3	124.5	124.3	128.1	124.2	-73.8	142.5
MIC 5	118.0	115.9	127.1	126.7	131.7	127.1	-125.5	161.0
MIC 6	119.5	116.3	126.5	125.4	131.7	126.3	-117.2	120.3
MIC 7	119.5	118.7	129.1	128.8	133.0	128.9	-157.3	152.7

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XH-59A ACOUSTIC DATA

	VELOCITY / MTUN / DBAU	CLR/S,P / CF/S / DBAC	ALPHA / MU / DPU	RPM / MAT / DPC	VTIP / MTIP / PNDBU	J THRUST / PNDBC	%RPM J1 / %RPM J2 / PMIN	PMAX
RUN 21	108.5	0.069378	5.0	323.5	185.9	945.6	48.9	
PT 19	0.1576	0.001245	0.2002	0.6825	0.5249		42.9	
MIC 1	112.7	110.1	121.2	120.7	126.2	120.7	-70.3	67.7
MIC 2	111.3	109.1	118.9	118.2	125.0	119.8	-57.0	63.7
MIC 3	111.7	109.6	120.6	120.0	125.5	120.3	-70.8	50.9
MIC 4	111.9	109.8	120.7	120.2	125.8	120.3	-62.9	71.0
MIC 5	115.9	111.8	122.7	121.5	129.4	121.9	-58.6	88.7
MIC 6	116.6	111.9	123.9	122.2	129.6	121.6	-113.8	95.8
MIC 7	118.4	116.6	125.0	124.1	130.9	126.0	-65.1	113.9
RUN 23	105.6	0.114356	5.0	316.9	182.1	935.7	48.5	
PT 9	0.1566	0.004235	0.2985	0.6810	0.5245		43.2	
MIC 1	113.8	112.5	123.3	123.0	127.9	123.7	-79.3	79.3
MIC 2	113.1	111.8	122.4	122.1	127.2	123.3	-101.9	82.7
MIC 3	113.2	111.6	121.6	121.2	128.1	123.4	-68.7	56.6
MIC 4	113.7	112.3	122.9	122.6	127.9	123.7	-73.6	76.1
MIC 5	117.9	115.6	126.0	125.5	131.2	125.7	-118.4	158.3
MIC 6	117.9	115.2	127.0	126.3	132.0	126.6	-158.5	115.9
MIC 7	118.0	115.9	127.2	126.8	131.4	126.8	-135.5	115.0
RUN 23	106.1	0.135245	5.0	316.9	182.1	937.7	48.7	
PT 10	0.1571	0.006703	0.2998	0.6811	0.5240		43.1	
MIC 1	115.1	114.2	124.8	124.7	129.1	125.6	-93.6	97.7
MIC 2	114.6	113.7	124.3	124.1	128.5	125.4	-109.0	74.0
MIC 3	114.6	113.5	123.2	122.9	128.1	124.5	-68.4	80.6
MIC 4	115.2	114.1	123.9	123.6	129.1	125.9	-40.9	85.7
MIC 5	118.7	116.7	128.2	127.9	132.4	128.1	-119.0	200.4
MIC 6	120.1	118.4	129.2	128.8	133.6	129.5	-169.1	144.3
MIC 7	119.6	118.2	129.3	129.0	132.7	129.0	-146.5	205.0

XH-59A ACOUSTIC DATA

	VELOCITY MTUN DBAU	CL R/S.R CP/S DBAC	ALPHA MU DBU	RPM MAT DBC	VTIP MTIP PNDBU	J THRUST PNDBC	%RPM J1 %RPM J2 PMIN	PMAX
RUN 23	106.4	0.145952	5.0	317.3	182.2	986.4	47.5	
PT 11	0.1569	0.009078	0.3002	0.6797	0.5227		43.1	
MIC 1	116.4	115.6	125.5	125.3	130.0	127.1	-95.2	86.2
MIC 2	115.8	115.1	125.2	125.1	129.9	127.1	-101.0	76.5
MIC 3	115.6	114.7	124.2	124.0	129.0	125.7	-99.7	94.7
MIC 4	116.6	116.0	127.0	126.9	130.5	127.8	-114.8	139.4
MIC 5	119.5	118.1	128.7	128.4	133.2	129.2	-123.2	146.6
MIC 6	119.4	117.4	129.8	129.4	133.2	128.7	-221.5	145.6
MIC 7	120.9	120.0	130.7	130.5	134.5	131.7	-151.4	213.7
RUN 23	107.8	0.084788	2.5	322.2	185.1	938.8	47.2	
PT 15	0.1577	0.002807	0.2995	0.6842	0.5265		42.7	
MIC 1	112.0	109.8	121.3	120.9	126.2	120.6	-68.2	64.2
MIC 2	111.6	109.5	120.0	119.5	125.8	120.4	-53.1	50.2
MIC 3	111.9	109.7	118.9	118.1	125.7	120.1	-58.7	53.9
MIC 4	112.3	110.5	121.7	121.3	126.0	121.2	-66.1	66.2
MIC 5	116.4	112.0	123.5	122.6	129.7	123.7	-73.3	85.7
MIC 6	117.4	113.8	126.0	125.0	130.8	124.6	-125.1	106.5
MIC 7	117.5	115.3	126.1	125.4	130.4	125.4	-93.6	96.7
RUN 23	105.0	0.024990	0.0	314.1	180.5	988.9	47.0	
PT 7	0.1566	0.002093	0.2992	0.6798	0.5232		43.4	
MIC 1	110.7	107.6	117.5	116.4	124.4	117.6	-49.6	48.3
MIC 2	110.7	108.1	117.5	116.6	124.8	118.2	-37.9	50.3
MIC 3	110.6	107.6	117.2	116.2	124.7	117.7	-40.9	33.1
MIC 4	111.0	108.5	118.4	117.5	124.6	118.9	-40.9	44.8
MIC 5	115.4	111.0	121.2	119.6	128.5	120.2	-60.2	61.9
MIC 6	115.8	110.4	122.1	119.5	128.5	119.4	-72.3	73.3
MIC 7	118.3	116.5	124.2	123.2	130.9	126.8	-92.3	71.6

XH-59A ACOUSTIC DATA

	VELOCITY / MTUN / DBAU	CLP/S,R / CP/S / DBAC	ALPHA / MU / DBU	RPM / MAT / DBC	VTIP / MTIP / PNDBU	J THRUST / PNDBC	%RPM J1 / %RPM J2 / PMIN	PMAX
RUN 23	105.8	0.082535	0.0	314.7	180.8	988.9	47.5	
PT 8	0.1572	0.003972	0.2010	0.6795	0.5223		42.9	
MIC 1	111.5	109.1	120.7	120.3	125.6	119.1	-77.7	50.3
MIC 2	111.2	108.8	119.1	118.5	125.6	119.3	-62.3	47.5
MIC 3	111.1	108.6	119.9	119.3	125.6	119.4	-53.2	54.9
MIC 4	112.3	110.5	121.8	121.4	126.3	121.5	-85.0	92.1
MIC 5	116.2	112.6	123.0	122.0	128.8	122.0	-82.0	77.8
MIC 6	116.4	111.5	125.1	123.8	129.8	121.6	-109.0	116.3
MIC 7	118.4	116.7	126.2	125.6	131.3	126.8	-134.1	114.2
RUN 24	142.4	0.020290	7.5	316.5	183.0	774.1	51.6	
PT 9	0.2088	0.000919	0.4004	0.7302	0.5214		43.7	
MIC 1	119.8	115.3	127.8	127.6	133.2	130.9	-170.9	137.4
MIC 2	117.0	116.1	124.9	124.5	130.3	126.9	-97.8	87.6
MIC 3	117.5	116.7	126.2	125.9	130.9	127.9	-102.7	86.0
MIC 4	116.8	115.6	126.2	125.9	130.2	126.2	-88.7	126.1
MIC 5	123.5	122.1	133.2	129.7	136.5	133.4	-331.1	168.8
MIC 6	124.4	122.7	131.6	130.8	137.4	133.7	-335.7	299.9
MIC 7	121.5	119.0	127.9	126.5	133.7	128.8	-114.0	159.3
RUN 24	140.9	0.078550	5.0	313.5	180.1	779.1	50.8	
PT 6	0.2079	0.002754	0.4026	0.7244	0.5165		43.7	
MIC 1	119.0	118.3	127.7	127.5	132.2	129.3	-151.1	126.8
MIC 2	118.4	117.8	126.1	125.8	131.4	128.2	-116.0	109.9
MIC 3	117.3	116.5	125.6	125.3	130.6	127.1	-110.2	90.4
MIC 4	116.9	115.8	127.2	127.0	130.9	127.0	-110.3	93.7
MIC 5	122.7	121.1	129.6	129.1	135.4	131.7	-152.4	242.0
MIC 6	123.6	121.7	132.5	131.9	136.9	132.1	-245.8	231.9
MIC 7	121.8	119.4	129.4	128.5	134.7	130.3	-164.7	193.5

XH-59A ACOUSTIC DATA

	VELOCITY MTUN DBAU	CLR/S.F CP/S DBAC	ALPHA MU DBU	RPM MAT DBC	VTIP MTIP PNDBU	J THRUST PNDBC	%RPM J1 %RPM J2 PMIN	 PMAX
RUN 24 PT 7	140.9 0.2071	0.113114 0.003186	5.0 0.3940	320.3 0.7329	184.0 0.5258	769.3	50.9 43.6	
MIC 1	115.3	113.7	124.8	124.4	129.4	124.7	-108.7	76.9
MIC 2	114.1	112.4	124.7	124.3	128.2	124.1	-79.8	84.8
MIC 3	114.4	112.6	124.4	124.0	129.3	125.0	-120.7	86.7
MIC 4	115.0	113.2	125.1	125.7	129.2	124.7	-94.6	121.8
MIC 5	119.9	116.1	127.1	126.1	132.9	127.8	-129.6	135.3
MIC 6	120.2	114.3	128.2	126.3	133.1	125.0	-150.0	181.5
MIC 7	121.1	118.2	128.7	127.6	133.4	128.4	-146.3	146.0
RUN 24 PT 8	141.2 0.2073	0.125296 0.004110	5.0 0.3960	319.2 0.7308	183.4 0.5235	774.1	50.9 43.6	
MIC 1	116.0	114.7	126.1	125.8	130.1	126.4	-115.3	124.6
MIC 2	114.5	112.9	124.6	124.2	128.7	124.8	-86.4	89.5
MIC 3	114.7	113.1	124.1	123.7	128.8	125.0	-99.3	81.3
MIC 4	116.2	114.9	127.2	127.0	131.0	127.3	-107.3	118.4
MIC 5	120.5	117.3	128.1	127.3	133.5	128.6	-120.8	167.6
MIC 6	120.7	115.8	129.2	127.7	133.4	126.2	-142.0	165.4
MIC 7	120.9	118.0	128.7	127.6	133.6	128.4	-118.8	183.8
RUN 23 PT 16	143.0 0.2000	0.079327 0.002045	2.5 0.3993	320.6 0.7325	184.2 0.5235	599.9	47.8 43.3	
MIC 1	114.3	112.1	124.3	123.7	128.7	123.8	-89.1	80.0
MIC 2	113.0	110.4	122.1	121.5	126.9	121.8	-66.0	85.8
MIC 3	112.4	109.4	122.1	121.3	126.7	120.9	-66.9	65.4
MIC 4	114.0	111.7	123.3	122.6	127.9	122.9	-91.0	69.4
MIC 5	119.8	115.6	125.6	124.0	132.2	125.9	-100.4	89.9
MIC 6	120.1	113.2	127.1	124.2	133.4	123.8	-140.8	158.5
MIC 7	120.3	115.9	127.4	125.9	132.8	126.5	-141.4	146.0

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XH-59A ACOUSTIC DATA

	VELOCITY / MTUN / DBAU	CLR/S,R / CP/S / DBAC	ALPHA / MU / DBU	RPM / MAT / DBC	VTIP / MTIP / PNDBU	J THRUST / PNDBC	%RPM J1 / %RPM J2 / PMIN	PMAX
RUN 23	143.2	0.092938	2.5	321.2	184.5	592.7	47.8	
PT 15	0.2086	0.003489	0.3991	0.7312	0.5226		43.1	
MIC 1	114.8	112.8	123.8	123.2	128.5	123.4	-103.4	64.5
MIC 2	113.5	111.3	122.2	121.5	127.3	122.9	-71.3	91.0
MIC 3	112.6	109.7	121.3	120.4	126.8	120.8	-69.1	72.6
MIC 4	114.3	112.0	123.5	122.8	128.0	122.8	-95.0	78.0
MIC 5	119.8	115.5	125.4	123.6	132.4	125.8	-89.6	105.2
MIC 6	120.2	113.6	127.5	125.0	133.1	123.0	-173.6	143.3
MIC 7	120.4	116.5	127.9	126.4	133.0	126.6	-114.6	165.3
RUN 23	143.0	0.109872	2.5	320.8	184.2	592.7	47.6	
PT 17	0.2087	0.004461	0.3992	0.7316	0.5229		43.1	
MIC 1	115.2	113.6	124.7	124.2	129.2	124.6	-98.4	83.8
MIC 2	114.0	112.1	122.9	122.3	127.8	123.3	-62.5	63.9
MIC 3	113.8	111.7	122.3	121.6	127.7	122.5	-64.0	64.1
MIC 4	115.3	113.6	124.5	124.0	129.1	124.6	-86.6	83.8
MIC 5	120.2	116.6	126.3	125.0	132.7	127.0	-96.2	155.1
MIC 6	120.5	115.1	128.2	126.1	133.6	125.5	-195.0	171.4
MIC 7	120.8	117.3	123.5	127.3	133.4	127.9	-109.7	168.2
RUN 30	141.5	0.110322	2.5	312.8	179.7	1389.3	61.6	
PT 8	0.2107	0.004529	0.4062	0.7294	0.5187		47.3	
MIC 1	115.0	113.0	122.7	121.9	129.0	124.1	-496.3	80.8
MIC 2	114.8	112.2	124.3	123.9	129.4	125.8	-473.1	87.4
MIC 3	114.5	112.6	123.3	122.7	130.7	126.9	-491.8	61.9
MIC 4	115.7	114.0	125.9	125.5	130.2	126.6	-491.2	121.9
MIC 5	120.0	116.4	127.1	126.0	132.9	127.6	-115.7	102.8
MIC 6	120.3	114.5	127.6	125.3	133.1	124.1	-126.5	123.1
MIC 7	121.8	119.3	129.0	127.9	134.2	129.6	-157.9	183.9

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XH-59A ACOUSTIC DATA

	VELOCITY MTUN DBAU	CLR/S.R CP/S DBAC	ALPHA MU DBU	RPM MAT DBC	VTIP MTIP PNDBU	J THRUST PNDBC	%RPM J1 %RPM J2 PMIN	 PMAX
RUN 30 PT 4	142.1 0.2104	0.112681 0.003485	2.5 0.4027	316.0 0.7330	181.6 0.5226	1379.9	61.7 47.2	
MIC 1	115.4	113.7	124.7	124.3	129.3	124.9	-109.2	86.1
MIC 2	115.7	114.5	125.4	125.1	129.7	126.5	-85.6	83.4
MIC 3	114.9	113.0	124.2	123.7	130.3	126.5	-106.1	69.5
MIC 4	116.6	115.3	127.6	127.4	130.9	127.2	-130.8	109.0
MIC 5	120.3	118.0	128.8	128.1	133.7	129.2	-176.4	127.7
MIC 6	120.4	115.8	123.5	128.2	134.1	126.3	-213.6	139.7
MIC 7	122.2	120.0	130.1	129.3	135.0	131.1	-178.2	191.1
RUN 24 PT 12	160.6 0.2342	0.034655 0.003623	2.5 0.4471	321.6 0.7580	184.8 0.5238	528.1	50.7 43.4	
MIC 1	116.2	114.4	126.5	126.0	129.9	125.8	-143.6	94.5
MIC 2	114.6	112.6	123.9	123.3	128.5	123.9	-79.3	78.6
MIC 3	115.2	113.4	124.0	123.3	128.8	124.3	-101.1	115.4
MIC 4	116.3	114.4	126.2	125.7	130.0	125.6	-113.6	129.6
MIC 5	121.7	119.0	128.5	127.9	134.3	128.9	-176.9	149.0
MIC 6	123.0	118.5	130.8	129.1	135.6	129.3	-166.0	185.8
MIC 7	121.7	117.4	129.0	127.3	134.1	126.9	-154.2	147.3
RUN 24 PT 11	160.6 0.2342	0.024656 0.003551	2.5 0.4489	320.3 0.7559	194.0 0.5217	528.1	50.8 43.3	
MIC 1	116.7	115.1	126.5	126.1	130.3	126.3	-123.4	106.0
MIC 2	115.0	113.1	127.8	124.3	129.0	124.7	-107.4	72.7
MIC 3	115.7	114.1	123.9	123.2	129.0	124.5	-89.7	[illegible]
MIC 4	116.4	114.5	126.0	125.5	130.3	126.1	-112.4	100.9
MIC 5	121.5	117.6	123.2	127.1	133.9	128.5	-151.7	160.1
MIC 6	123.2	118.9	130.4	128.4	135.5	128.7	-210.4	345.3
MIC 7	122.5	118.9	129.4	127.8	134.8	129.1	-152.5	172.6

APPENDIX C

The following tables present detailed XH-59A ABC acoustic data of selected points. Data are presented for microphones 2, 4, and 7. The run/point number sequence used is based on tunnel velocity (knots), shaft angle of attack (ALPHA), and isolated rotor lift coefficient (CLR/S,R). The run/point numbers are ordered in terms of increasing isolated rotor lift coefficient at each tunnel velocity and shaft angle of attack.

SYMBOLS

ALPHA model pitch, positive up, deg

CLR/S,R isolated rotor lift coefficient

DBC dB corrected for background noise

DBU dB not corrected for background noise

MU advance ratio

PT point number

RUN run number

VELOCITY tunnel velocity, knots

Acoustic data for the selected points are presented in the following order:

RUN/PT	VELOCITY	ALPHA	CLR/S,R
28/6	88.3	2.5	0.082
28/7	88.6	2.5	.109
28/8	88.8	2.5	.150
21/7	89.4	5.0	.072
30/7	88.2	5.0	.104
30/6	88.0	5.0	.128
21/11	89.8	7.5	.074
21/14	90.1	7.5	.119
29/11	88.4	7.5	.162
23/15	107.8	2.5	.085
21/19	108.5	5.0	.069
23/9	105.6	5.0	.114
23/10	106.1	5.0	.135
23/11	106.4	5.0	.145
25/6	106.2	7.5	.067
23/12	106.8	7.5	.093
25/8	104.8	7.5	.116
23/13	107.0	7.5	.131
25/9	104.3	7.5	.134
23/16	143.0	2.5	.079
23/17	143.0	2.5	.110
30/9	142.1	2.5	.113

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RUN/PT	VELOCITY	ALPHA	CLR/S.R
24/6	140.9	5.0	0.079
24/7	140.9	5.0	.113
24/8	141.2	5.0	.125
24/9	142.4	7.5	.090

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XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S,R	MU
28	6	88.3	2.5	0.081592	0.2496

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	79.0	73.4	83.6	79.9	88.6	84.7
12.5	75.9	0.0	81.8	79.2	83.1	0.0
16.0	107.1	107.1	114.0	114.0	114.3	114.3
20.0	97.9	97.7	103.8	103.6	104.2	103.7
25.0	80.1	0.0	89.3	87.6	89.2	0.0
31.5	106.8	106.8	100.6	100.4	118.6	118.6
40.0	90.0	0.0	95.6	93.7	98.1	0.0
50.0	110.5	110.5	92.3	85.4	114.3	114.2
63.0	109.8	109.7	109.1	109.0	113.3	113.1
80.0	103.1	102.4	113.9	113.8	105.2	103.2
100.0	105.2	104.6	106.1	105.5	109.4	108.7
125.0	111.7	111.5	113.2	113.1	109.9	109.2
160.0	112.7	112.6	115.9	115.8	109.1	108.3
200.0	109.3	109.1	113.5	113.4	110.6	110.0
250.0	108.8	108.7	107.7	107.5	114.7	114.5
315.0	110.4	110.3	107.2	106.9	113.8	113.4
400.0	107.7	107.5	106.8	106.4	111.3	110.6
500.0	106.4	106.1	104.9	104.3	110.9	110.1
630.0	103.3	102.8	102.3	101.5	107.8	106.4
800.0	99.8	98.2	99.1	96.0	104.2	100.2
1000.0	99.0	96.0	100.3	96.7	104.2	98.3
1250.0	100.6	98.4	98.8	96.4	104.5	101.7
1600.0	96.6	0.0	96.8	0.0	100.8	0.0
2000.0	94.7	91.5	94.4	88.7	97.2	0.0
2500.0	96.9	92.4	95.8	90.5	96.2	0.0
3150.0	96.7	0.0	96.7	0.0	96.0	0.0
4000.0	91.8	0.0	93.2	0.0	93.5	0.0
5000.0	91.2	0.0	90.4	0.0	91.3	0.0
6300.0	90.3	0.0	92.3	0.0	88.7	0.0
8000.0	86.8	0.0	89.7	0.0	88.0	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	107.5	114.3	114.7
2	106.7	100.5	118.6
3	110.4	87.4	114.1
4	109.5	108.9	112.8
5	102.7	113.7	102.0
6	104.5	104.6	107.5
7	103.5	106.5	108.3
8	110.7	111.5	96.5
9	109.8	112.3	98.2
10	107.8	110.5	104.6

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XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
28	7	88.6	2.5	0.108912	0.2514

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	79.7	75.5	79.8	0.0	82.6	0.0
12.5	76.0	0.0	77.2	0.0	81.4	0.0
16.0	104.9	104.9	113.8	113.8	113.7	113.7
20.0	96.0	95.6	103.3	103.1	103.9	103.4
25.0	81.0	0.0	83.6	0.0	93.9	84.1
31.5	106.1	106.1	105.5	105.4	123.1	123.1
40.0	90.7	0.0	92.6	87.3	100.9	95.3
50.0	110.5	110.5	104.7	104.5	117.8	117.7
63.0	108.9	108.8	111.5	111.4	115.7	115.6
80.0	99.5	97.7	116.3	116.2	113.0	112.7
100.0	112.4	112.3	110.3	110.1	105.7	103.7
125.0	114.1	114.0	115.1	115.0	108.8	107.9
160.0	111.0	110.8	114.4	114.3	114.2	114.0
200.0	113.7	113.6	112.5	112.4	113.2	112.9
250.0	113.4	113.4	111.6	111.5	114.7	114.5
315.0	111.9	111.8	111.2	111.1	115.4	115.1
400.0	111.7	111.6	107.1	106.7	115.5	115.3
500.0	108.4	108.2	106.9	106.5	113.2	112.7
630.0	107.2	107.0	105.8	105.5	111.8	111.3
800.0	102.6	101.8	101.1	99.4	107.3	105.7
1000.0	101.3	99.8	101.1	98.3	107.3	105.3
1250.0	101.9	100.4	99.6	97.7	105.2	102.9
1600.0	98.2	86.4	98.0	0.0	102.3	95.2
2000.0	95.6	93.2	95.0	90.5	98.9	93.6
2500.0	96.7	91.8	96.6	92.7	98.8	94.3
3150.0	95.9	0.0	94.6	0.0	96.6	0.0
4000.0	92.0	0.0	93.1	0.0	93.7	0.0
5000.0	93.2	0.0	90.4	0.0	91.4	0.0
6300.0	89.0	0.0	93.2	0.0	89.3	0.0
8000.0	89.2	0.0	89.7	0.0	87.5	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	105.3	114.2	114.0
2	106.0	105.4	123.1
3	110.4	104.6	117.7
4	108.7	111.3	115.5
5	96.5	116.2	112.8
6	112.0	110.0	101.3
7	108.1	110.2	106.1
8	112.7	112.9	90.7
9	102.2	107.5	106.4
10	105.9	111.5	110.5

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XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S,R	MU
28	8	88.8	2.5	0.149922	0.2505

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2 DBU	MICROPHONE 2 DBC	MICROPHONE 4 DBU	MICROPHONE 4 DBC	MICROPHONE 7 DBU	MICROPHONE 7 DBC
10.0	83.4	82.1	83.6	79.8	88.8	85.0
12.5	76.6	0.0	75.4	0.0	84.5	68.6
16.0	104.6	104.6	114.2	114.2	113.2	113.2
20.0	96.4	96.0	105.4	105.3	105.2	104.8
25.0	86.7	84.5	93.6	93.0	97.2	94.8
31.5	106.4	106.4	99.1	98.9	117.8	117.8
40.0	94.4	91.0	95.7	93.9	100.9	95.2
50.0	110.7	110.7	109.4	109.3	122.5	122.5
63.0	116.2	116.2	115.0	115.0	122.1	122.1
80.0	115.2	115.2	120.8	120.8	118.0	117.9
100.0	113.9	113.8	115.7	115.6	114.7	114.5
125.0	119.8	119.8	118.3	118.3	113.4	113.1
160.0	117.0	117.0	118.5	118.5	118.9	118.8
200.0	118.4	118.4	118.2	118.2	120.4	120.3
250.0	118.1	118.1	114.5	114.5	117.3	117.2
315.0	115.4	115.4	115.7	115.7	124.2	124.2
400.0	112.7	112.6	112.5	112.4	121.6	121.5
500.0	110.6	110.5	110.5	110.3	117.1	116.9
630.0	109.0	108.9	110.3	110.2	113.1	112.7
800.0	105.9	105.6	106.4	106.0	111.3	110.7
1000.0	103.7	102.9	105.0	104.1	110.3	109.4
1250.0	103.4	102.4	103.7	103.0	107.5	106.3
1600.0	100.9	98.1	102.1	98.4	106.1	104.3
2000.0	98.5	97.4	100.5	99.6	104.0	102.9
2500.0	98.3	95.6	97.7	95.0	102.0	100.4
3150.0	97.3	0.0	97.1	0.0	99.8	95.6
4000.0	93.1	0.0	94.8	0.0	97.1	91.6
5000.0	93.1	0.0	91.5	0.0	94.6	0.0
6300.0	90.4	0.0	92.5	0.0	91.4	0.0
8000.0	87.7	0.0	88.5	0.0	88.0	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	105.1	114.7	113.7
2	106.4	98.9	117.7
3	110.5	109.7	122.4
4	116.0	114.8	122.0
5	115.0	120.7	117.7
6	113.6	115.1	113.0
7	115.0	117.4	107.7
8	117.8	108.9	110.7
9	112.9	112.6	11[illegible].1
10	110.8	114.6	113.9

ORIGINAL PAGE IS
OF POOR QUALITY

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S,R	MU
21	7	89.4	5.0	0.071956	0.2504

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	72.6	0.0	81.8	71.8	85.7	0.0
12.5	66.4	0.0	80.0	74.6	76.6	0.0
16.0	99.4	99.3	105.1	105.1	109.4	109.3
20.0	91.8	90.7	97.9	97.1	102.7	102.0
25.0	74.0	0.0	83.7	0.0	96.3	93.0
31.5	105.5	105.5	102.1	102.0	98.2	94.4
40.0	92.1	79.9	86.0	0.0	101.7	97.4
50.0	99.6	99.0	99.7	99.0	114.5	114.4
63.0	111.1	111.0	111.1	111.0	115.2	115.0
80.0	103.3	102.6	112.0	111.8	109.1	108.4
100.0	109.4	109.2	100.4	97.6	102.8	96.7
125.0	109.0	108.7	106.3	105.5	105.7	103.5
160.0	110.8	110.6	112.6	112.5	106.8	105.2
200.0	110.9	110.8	109.7	109.5	114.3	114.0
250.0	104.2	103.6	106.8	106.5	111.8	111.4
315.0	107.4	107.2	106.9	106.6	113.0	112.5
400.0	104.8	104.3	105.1	104.5	110.5	109.6
500.0	102.4	101.6	102.9	101.8	108.8	107.3
630.0	99.1	97.7	100.4	99.0	105.1	101.6
800.0	96.9	92.7	97.5	91.3	103.8	98.6
1000.0	97.0	90.0	98.4	88.5	103.9	96.1
1250.0	96.6	94.2	98.3	95.3	102.8	97.0
1600.0	95.6	0.0	96.5	0.0	100.5	0.0
2000.0	93.4	87.9	93.1	0.0	97.4	0.0
2500.0	96.3	90.3	94.5	79.1	95.9	0.0
3150.0	95.8	0.0	97.2	0.0	96.1	0.0
4000.0	91.2	0.0	92.3	0.0	92.5	0.0
5000.0	91.2	0.0	90.3	0.0	91.1	0.0
6300.0	93.9	0.0	94.0	0.0	88.7	0.0
8000.0	88.8	0.0	87.9	0.0	85.8	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	99.6	105.6	110.2
2	105.5	102.0	96.2
3	98.8	99.1	114.4
4	111.0	111.0	115.0
5	102.2	111.7	108.3
6	109.2	92.5	95.0
7	105.9	93.2	96.4
8	104.3	104.2	96.8
9	101.8	110.7	93.7
10	109.1	106.9	104.3

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XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
30	7	88.2	5.0	0.103501	0.2501

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	78.1	68.4	80.7	0.0	85.1	0.0
12.5	76.4	0.0	79.3	72.2	78.6	0.0
16.0	105.8	105.8	111.2	111.2	113.5	113.5
20.0	96.3	95.9	101.1	100.7	103.8	103.3
25.0	88.8	87.6	88.1	85.7	95.0	90.1
31.5	107.6	107.6	100.4	100.2	121.1	121.1
40.0	95.9	93.9	92.2	86.1	102.2	98.9
50.0	112.9	112.9	104.6	104.4	113.2	113.0
63.0	110.1	110.0	113.3	113.3	117.2	117.1
80.0	111.6	111.5	110.3	110.1	111.5	111.1
100.0	109.4	109.2	107.6	107.2	109.9	109.3
125.0	114.3	114.2	111.0	110.8	112.1	111.7
160.0	107.8	107.5	110.6	110.4	107.4	106.1
200.0	108.6	108.4	111.3	111.2	114.8	114.6
250.0	110.2	110.1	108.7	108.5	115.9	115.7
315.0	109.7	109.6	109.5	109.3	115.3	115.0
400.0	107.8	107.6	109.3	109.1	114.2	113.9
500.0	106.5	106.2	106.5	106.1	113.6	113.2
630.0	104.7	104.4	104.7	104.3	110.7	110.0
800.0	101.3	100.2	102.0	100.7	107.5	106.1
1000.0	100.5	98.6	101.3	98.7	106.7	104.4
1250.0	100.5	98.3	101.0	99.7	105.4	103.3
1600.0	98.6	91.4	98.6	0.0	103.2	98.7
2000.0	96.4	94.5	96.6	94.1	100.6	97.9
2500.0	94.7	0.0	94.9	86.3	99.2	95.5
3150.0	100.6	96.5	97.0	0.0	99.5	94.9
4000.0	92.8	0.0	94.5	0.0	95.9	84.5
5000.0	89.3	0.0	90.9	0.0	93.4	0.0
6300.0	92.6	0.0	89.8	0.0	91.1	0.0
8000.0	87.9	0.0	89.1	0.0	89.0	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	106.2	111.6	113.9
2	107.5	100.3	121.1
3	112.7	104.3	113.0
4	109.7	113.1	117.1
5	111.3	109.2	110.6
6	108.2	106.3	106.7
7	112.3	105.7	109.9
8	109.2	108.3	99.2
9	95.1	105.6	95.6
10	106.0	103.2	101.2

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
30	6	88.0	5.0	0.127927	0.2508

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	74.8	0.0	82.7	77.5	87.7	82.1
12.5	72.9	0.0	80.4	76.2	71.2	0.0
16.0	102.6	102.6	112.4	112.4	115.6	115.6
20.0	90.2	88.5	100.2	99.8	103.3	102.7
25.0	86.7	84.6	82.2	0.0	98.6	97.1
31.5	110.1	110.1	105.3	105.2	122.8	122.8
40.0	95.6	93.4	90.3	0.0	99.3	0.0
50.0	111.3	111.3	105.4	105.2	118.5	118.4
63.0	109.3	109.2	110.0	109.9	116.8	116.7
80.0	104.8	104.4	115.3	115.2	112.8	112.5
100.0	111.6	111.5	112.0	111.9	109.2	108.4
125.0	114.7	114.6	115.4	115.3	111.5	111.0
160.0	111.4	111.3	116.5	116.4	115.7	115.5
200.0	111.8	111.7	114.4	114.3	114.4	114.2
250.0	111.7	111.6	114.6	114.6	110.7	110.2
315.0	109.6	109.5	111.1	111.0	116.4	116.2
400.0	111.4	111.3	107.0	106.6	114.1	113.8
500.0	106.1	105.8	107.7	107.4	112.7	112.2
630.0	103.2	102.7	105.3	104.9	109.7	108.8
800.0	101.3	100.2	101.8	100.4	107.2	105.6
1000.0	100.0	97.8	100.6	97.4	106.3	103.7
1250.0	99.8	97.1	100.2	98.6	104.7	102.1
1600.0	98.7	91.9	97.9	0.0	103.1	98.5
2000.0	95.3	92.7	95.7	92.4	99.9	96.5
2500.0	94.1	0.0	94.5	82.1	98.5	93.7
3150.0	98.7	86.0	99.0	0.0	98.5	91.1
4000.0	93.2	0.0	93.7	0.0	95.6	76.6
5000.0	89.7	0.0	90.7	0.0	93.1	0.0
6300.0	92.2	0.0	90.6	0.0	90.9	0.0
8000.0	88.1	0.0	89.3	0.0	89.0	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	102.7	112.6	115.8
2	110.0	105.2	122.7
3	111.2	105.0	118.4
4	109.1	109.9	116.5
5	103.5	115.1	112.3
6	110.9	109.2	100.6
7	106.7	113.5	110.7
8	113.3	111.8	103.3
9	99.1	113.6	99.5
10	101.0	111.0	111.6

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XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
21	11	89.8	7.5	0.073627	0.2485

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2 DBU	MICROPHONE 2 DBC	MICROPHONE 4 DBU	MICROPHONE 4 DBC	MICROPHONE 7 DBU	MICROPHONE 7 DBC
10.0	69.8	0.0	74.4	0.0	85.8	0.0
12.5	71.2	0.0	74.9	0.0	84.1	0.0
16.0	100.3	100.2	107.8	107.8	107.4	107.3
20.0	95.7	95.3	104.2	104.0	104.4	103.9
25.0	82.0	0.0	87.8	84.7	89.1	0.0
31.5	104.6	104.5	98.0	97.7	109.6	109.4
40.0	93.1	87.0	91.1	0.0	98.3	0.0
50.0	103.3	103.1	92.3	83.7	110.5	110.1
63.0	106.2	106.0	111.4	111.3	108.0	107.1
80.0	99.5	97.6	109.4	109.1	114.2	114.0
100.0	106.3	105.8	102.1	100.4	109.1	108.2
125.0	110.8	110.6	106.3	105.5	109.4	108.6
160.0	109.3	109.1	108.8	108.5	107.6	106.3
200.0	108.9	108.7	112.0	111.9	112.8	112.4
250.0	102.6	101.9	106.9	106.6	111.8	111.4
315.0	104.4	104.0	108.4	108.2	112.3	111.7
400.0	104.9	104.4	105.3	104.7	111.9	111.3
500.0	102.7	101.9	104.1	103.3	110.6	109.6
630.0	100.3	99.3	103.4	102.8	107.9	106.4
800.0	99.3	97.4	98.8	95.1	104.4	100.2
1000.0	98.6	95.0	100.4	96.7	103.6	93.3
1250.0	99.1	95.4	100.1	98.3	103.2	98.2
1600.0	96.0	0.0	97.9	0.0	100.9	0.0
2000.0	93.2	87.1	93.0	0.0	97.9	85.5
2500.0	94.9	0.0	93.8	0.0	95.8	0.0
3150.0	96.0	0.0	95.9	0.0	95.6	0.0
4000.0	91.7	0.0	92.4	0.0	93.2	0.0
5000.0	91.4	0.0	90.0	0.0	91.3	0.0
6300.0	95.6	0.0	93.8	0.0	89.4	0.0
8000.0	87.3	0.0	86.7	0.0	85.3	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	101.3	109.4	109.0
2	104.5	97.8	109.6
3	102.9	90.8	110.2
4	106.1	111.3	107.1
5	97.8	108.6	114.0
6	105.7	98.1	107.8
7	105.0	98.1	99.5
8	109.0	105.0	107.2
9	102.5	104.8	89.3
10	107.5	103.8	104.0

ORIGINAL PAGE IS
OF POOR QUALITY

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S,R	MU
21	14	90.1	7.5	0.118578	0.2499

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2 DBU	MICROPHONE 2 DBC	MICROPHONE 4 DBU	MICROPHONE 4 DBC	MICROPHONE 7 DBU	MICROPHONE 7 DBC
10.0	80.8	77.8	80.0	0.0	77.5	0.0
12.5	76.9	74.7	73.5	0.0	88.3	85.8
16.0	105.6	105.6	113.7	113.7	113.0	113.0
20.0	100.3	100.2	108.8	108.7	108.2	108.0
25.0	61.9	0.0	85.0	67.9	95.9	91.8
31.5	109.5	109.5	105.2	105.1	115.1	115.0
40.0	90.0	0.0	92.2	85.0	97.9	0.0
50.0	105.8	105.7	102.9	102.6	116.6	116.5
63.0	110.4	110.3	110.2	110.1	117.9	117.8
80.0	99.5	97.5	114.1	114.0	109.0	108.2
100.0	112.2	112.1	109.1	108.8	110.1	109.4
125.0	110.3	110.1	108.7	108.3	106.8	105.1
160.0	108.5	108.2	117.6	117.6	112.2	111.8
200.0	109.5	109.3	113.2	113.1	115.3	115.1
250.0	107.4	107.2	109.4	109.2	110.4	109.8
315.0	109.3	109.2	111.5	111.4	116.0	115.7
400.0	108.1	107.9	107.8	107.5	113.7	113.3
500.0	105.3	104.9	105.2	104.6	110.5	109.5
630.0	102.2	101.6	102.4	101.6	108.3	106.9
800.0	98.4	95.9	99.4	96.4	105.2	102.0
1000.0	98.3	94.3	99.7	94.9	104.7	99.3
1250.0	99.6	96.5	98.9	96.3	102.8	96.7
1600.0	96.6	0.0	97.2	0.0	101.1	0.0
2000.0	94.4	90.7	93.9	85.5	98.2	88.6
2500.0	95.1	71.5	94.2	0.0	97.3	82.1
3150.0	96.9	0.0	98.1	0.0	96.4	0.0
4000.0	92.1	0.0	92.9	0.0	93.6	0.0
5000.0	91.2	0.0	90.3	0.0	91.6	0.0
6300.0	95.0	0.0	94.7	0.0	89.0	0.0
8000.0	87.9	0.0	89.1	0.0	86.2	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	106.6	114.9	114.2
2	109.5	105.1	115.0
3	105.5	101.8	116.2
4	110.2	110.0	117.8
5	95.9	114.0	106.8
6	112.1	108.6	109.1
7	107.6	106.0	102.2
8	105.8	102.3	93.5
9	98.6	116.7	100.9
10	103.7	108.6	110.6

ORIGINAL PAGE IS OF POOR QUALITY

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
29	11	88.4	7.5	0.161634	0.2507

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	80.6	77.5	78.9	0.0	89.8	87.2
12.5	78.4	73.5	80.6	76.6	92.8	92.1
16.0	98.3	98.2	110.2	110.2	116.1	116.1
20.0	91.7	90.6	98.3	97.6	106.9	106.7
25.0	88.1	86.7	93.3	92.7	92.7	0.0
31.5	110.2	110.2	104.8	104.7	125.1	125.1
40.0	94.8	91.9	90.3	0.0	103.6	101.5
50.0	110.6	110.6	107.9	107.8	121.0	121.0
63.0	112.4	112.4	108.6	108.5	121.4	121.4
80.0	102.9	102.2	119.9	119.9	116.2	116.1
100.0	113.0	112.9	111.1	110.9	104.4	104.8
125.0	116.5	116.4	117.3	117.2	114.4	114.2
160.0	112.7	112.6	115.6	115.5	115.1	114.9
200.0	110.4	110.2	115.0	114.9	118.1	118.0
250.0	112.1	112.0	111.6	111.5	119.1	119.0
315.0	112.1	112.0	115.2	115.2	120.4	120.3
400.0	110.2	110.1	112.8	112.7	116.7	116.5
500.0	108.2	108.0	111.4	111.3	114.8	114.5
630.0	105.9	105.7	108.7	108.5	112.0	111.5
800.0	102.7	102.0	103.5	102.6	108.7	107.6
1000.0	100.7	98.9	102.0	99.9	107.4	105.5
1250.0	101.3	99.5	101.7	100.6	105.9	104.1
1600.0	99.5	94.8	99.9	87.2	103.5	99.5
2000.0	96.6	94.8	97.8	96.0	101.6	99.6
2500.0	94.8	0.0	96.2	91.7	99.8	96.7
3150.0	98.0	0.0	99.8	86.3	99.0	93.1
4000.0	93.0	0.0	94.4	0.0	96.7	90.2
5000.0	89.9	0.0	91.0	0.0	94.3	0.0
6300.0	93.7	0.0	92.2	0.0	91.4	0.0
8000.0	88.8	0.0	89.3	0.0	88.8	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	98.3	110.0	116.5
2	110.1	104.4	125.1
3	110.4	107.6	120.9
4	112.1	107.8	121.3
5	101.4	119.8	116.0
6	112.6	110.4	96.4
7	108.6	115.7	100.6
8	115.3	111.6	113.5
9	110.7	112.9	108.5
10	96.0	109.7	110.9

ORIGINAL PAGE IS
OF POOR QUALITY

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
23	15	107.8	2.5	0.084788	0.2995

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2 DBU	MICROPHONE 2 DBC	MICROPHONE 4 DBU	MICROPHONE 4 DBC	MICROPHONE 7 DBU	MICROPHONE 7 DBC
10.0	75.4	0.0	82.1	0.0	91.1	85.4
12.5	82.5	80.4	79.9	0.0	92.7	91.0
16.0	96.4	96.1	95.1	94.4	109.5	109.4
20.0	93.9	92.8	91.9	0.0	105.1	104.3
25.0	83.9	0.0	86.3	0.0	102.8	101.4
31.5	101.8	101.6	107.2	107.1	115.3	115.2
40.0	91.1	0.0	93.1	0.0	102.8	84.6
50.0	104.7	104.3	100.9	99.5	117.9	117.8
63.0	111.1	111.0	111.9	111.8	116.0	115.7
80.0	102.8	101.1	115.7	115.5	119.0	118.8
100.0	112.4	112.2	104.8	103.0	108.0	104.8
125.0	110.1	109.7	114.7	114.5	109.6	107.7
160.0	111.4	111.2	109.8	109.3	109.0	106.8
200.0	110.3	110.0	110.9	110.6	112.0	110.9
250.0	107.3	106.9	109.2	108.9	114.5	114.0
315.0	108.2	107.9	109.2	108.9	115.5	115.0
400.0	106.6	106.1	106.7	106.1	113.9	113.2
500.0	105.6	105.0	107.4	106.9	112.5	111.4
630.0	102.8	101.9	104.8	104.1	110.0	108.1
800.0	100.4	98.2	101.6	99.2	107.7	104.2
1000.0	96.6	92.6	99.8	90.7	106.7	99.7
1250.0	99.4	93.3	98.9	90.0	105.6	99.4
1600.0	97.3	0.0	97.3	0.0	102.5	0.0
2000.0	92.7	0.0	93.6	0.0	99.8	0.0
2500.0	97.0	90.1	95.1	0.0	98.7	0.0
3150.0	98.4	0.0	97.1	0.0	96.5	0.0
4000.0	91.4	0.0	92.4	0.0	93.9	0.0
5000.0	92.5	0.0	90.0	0.0	91.4	0.0
6300.0	90.4	0.0	89.6	0.0	88.8	0.0
8000.0	87.7	0.0	88.5	0.0	87.2	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	98.1	95.9	110.6
2	101.8	107.1	115.2
3	104.5	100.4	117.7
4	111.0	111.5	115.2
5	101.5	115.4	118.7
6	111.9	102.7	102.0
7	102.5	103.6	107.0
8	108.4	113.7	96.6
9	102.0	102.1	103.2
10	109.8	107.6	98.6

ORIGINAL PAGE IS
OF POOR QUALITY

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
21	19	108.5	5.0	0.069378	0.3002

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	79.7	68.6	85.0	78.5	85.9	0.0
12.5	72.3	0.0	83.5	80.0	84.8	0.0
16.0	97.7	97.5	107.1	107.1	106.8	106.6
20.0	91.5	89.2	104.7	104.4	102.7	101.1
25.0	88.0	82.5	88.9	0.0	93.6	0.0
31.5	106.0	105.9	101.0	100.6	114.8	114.7
40.0	93.9	0.0	95.0	89.1	100.9	0.0
50.0	107.2	107.0	102.5	101.5	115.7	115.4
63.0	99.3	97.1	111.7	111.6	111.9	111.1
80.0	103.8	102.4	111.0	110.5	112.8	112.0
100.0	106.2	107.6	104.1	101.9	107.4	103.3
125.0	112.3	112.1	113.7	113.5	110.9	109.5
160.0	107.8	107.2	110.0	109.5	109.9	108.1
200.0	108.1	107.5	111.3	111.0	113.1	112.2
250.0	107.8	107.4	106.5	105.9	113.6	113.0
315.0	108.1	107.8	107.9	107.5	116.5	116.1
400.0	107.1	106.7	108.7	108.3	114.7	114.1
500.0	104.5	103.8	105.7	104.9	114.4	113.7
630.0	102.2	101.1	103.2	102.1	110.8	109.3
800.0	100.6	98.5	101.8	99.5	108.1	104.9
1000.0	98.8	93.2	99.4	83.9	107.6	102.9
1250.0	99.9	94.9	98.7	87.0	106.6	102.4
1600.0	97.3	0.0	97.4	0.0	103.9	0.0
2000.0	93.6	0.0	94.8	0.0	100.6	0.0
2500.0	97.8	93.0	94.4	0.0	99.0	0.0
3150.0	95.4	0.0	95.1	0.0	96.9	0.0
4000.0	92.3	0.0	93.5	0.0	94.4	0.0
5000.0	92.1	0.0	90.2	0.0	92.6	0.0
6300.0	94.9	0.0	95.4	0.0	89.6	0.0
8000.0	88.1	0.0	88.2	0.0	86.7	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	98.6	109.0	108.1
2	106.0	100.7	114.8
3	106.3	98.1	115.4
4	95.6	111.3	111.0
5	101.7	110.7	112.5
6	107.7	101.4	94.0
7	106.6	109.4	106.9
8	110.4	111.1	100.8
9	105.0	107.9	100.1
10	95.7	102.7	104.6

ORIGINAL PAGE IS
OF POOR QUALITY

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
23	9	105.6	5.0	0.114356	0.2985

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	77.4	0.0	78.0	0.0	95.2	93.9
12.5	72.1	0.0	79.8	0.0	93.7	92.5
16.0	101.6	101.5	96.7	96.2	111.8	111.7
20.0	93.0	91.6	91.7	0.0	103.1	101.8
25.0	86.6	77.2	88.5	0.0	99.1	95.2
31.5	109.2	109.2	105.3	105.2	114.8	114.7
40.0	94.1	72.6	92.0	0.0	105.1	101.7
50.0	109.0	108.9	102.4	101.5	120.2	120.1
63.0	107.9	107.7	108.2	107.9	119.0	118.9
80.0	107.9	107.5	112.0	111.7	116.6	116.3
100.0	114.2	114.1	102.8	99.9	108.4	105.9
125.0	116.2	116.1	119.1	119.0	117.1	116.8
160.0	113.1	112.[illegible]	109.0	108.5	112.5	111.7
200.0	111.4	111.2	114.2	114.1	114.6	114.1
250.0	107.0	106.6	109.5	109.2	116.4	116.1
315.0	111.5	111.4	113.3	113.2	115.9	115.4
400.0	109.8	109.6	108.8	108.5	113.3	112.5
500.0	106.8	106.4	105.8	105.1	111.1	109.6
630.0	103.6	102.9	103.5	102.6	110.3	108.7
800.0	100.3	98.1	102.7	101.0	107.9	104.9
1000.0	99.5	95.6	100.3	94.2	107.1	102.1
1250.0	100.8	97.5	99.6	94.5	106.2	102.0
1600.0	98.2	0.0	98.2	0.0	103.8	0.0
2000.0	93.9	83.3	94.9	79.5	101.2	91.1
2500.0	97.2	91.3	94.5	0.0	99.6	0.0
3150.0	96.3	0.0	98.6	0.0	98.3	0.0
4000.0	92.9	0.0	93.8	0.0	95.1	0.0
5000.0	92.8	0.0	90.1	0.0	92.8	0.0
6300.0	94.1	0.0	93.3	0.0	90.6	0.0
8000.0	89.1	0.0	89.2	0.0	87.7	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	102.1	97.4	112.3
2	109.1	105.1	114.8
3	108.6	100.2	120.1
4	107.2	107.7	118.9
5	107.2	111.4	115.9
6	113.8	93.2	104.4
7	114.8	112.1	108.5
8	109.7	118.0	115.9
9	106.1	103.8	105.5
10	110.5	99.0	108.4

ORIGINAL PAGE IS
OF POOR QUALITY

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
23	10	106.1	5.0	0.135245	0.2998

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2 DBU	MICROPHONE 2 DBC	MICROPHONE 4 DBU	MICROPHONE 4 DBC	MICROPHONE 7 DBU	MICROPHONE 7 DBC
10.0	80.3	73.9	83.5	0.0	94.5	92.9
12.5	76.2	0.0	82.4	77.6	94.7	93.8
16.0	99.4	99.3	102.0	101.9	115.3	115.3
20.0	90.5	87.6	97.7	96.3	105.8	105.2
25.0	89.4	86.6	94.1	92.6	99.5	96.0
31.5	110.0	110.0	102.1	101.9	120.6	120.6
40.0	95.8	90.8	95.3	90.7	104.8	101.0
50.0	111.5	111.4	100.8	99.5	121.2	121.1
63.0	109.1	108.9	100.8	99.0	122.2	122.1
80.0	105.6	104.8	115.8	115.7	117.4	117.2
100.0	116.8	116.7	105.8	104.5	107.8	104.7
125.0	118.0	117.9	117.5	117.4	116.1	115.8
160.0	116.1	116.0	114.3	114.1	115.5	115.1
200.0	113.2	113.0	116.8	116.7	115.9	115.5
250.0	109.8	109.6	110.8	110.6	116.5	116.2
315.0	113.0	112.9	112.6	112.5	117.5	117.2
400.0	109.8	109.6	111.4	111.2	116.2	115.8
500.0	107.3	106.9	108.0	107.6	113.9	113.2
630.0	107.3	107.0	106.5	106.0	113.0	112.2
800.0	102.4	101.2	104.2	103.1	109.5	107.6
1000.0	101.4	99.3	102.8	100.4	107.7	103.7
1250.0	102.1	99.9	101.2	98.3	105.9	101.1
1600.0	98.9	84.1	98.9	0.0	104.1	78.7
2000.0	95.7	91.6	96.5	91.6	101.8	94.8
2500.0	97.2	91.6	95.9	81.5	100.1	85.3
3150.0	96.4	0.0	100.5	89.4	99.4	0.0
4000.0	92.9	0.0	94.0	0.0	96.4	0.0
5000.0	91.6	0.0	90.8	0.0	93.4	0.0
6300.0	94.3	0.0	94.6	0.0	90.8	0.0
8000.0	88.5	0.0	88.4	0.0	87.0	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	99.9	103.0	115.7
2	109.9	101.8	120.6
3	111.3	100.2	120.9
4	108.2	97.1	122.0
5	104.0	115.5	116.7
6	116.6	102.5	93.4
7	117.5	108.8	100.6
8	104.5	116.5	115.4
9	112.6	100.7	108.2
10	111.7	108.9	111.4

ORIGINAL PAGE IS
OF POOR QUALITY

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S,R	MU
23	11	106.4	5.0	0.145052	0.3002

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2 DBU	MICROPHONE 2 DBC	MICROPHONE 4 DBU	MICROPHONE 4 DBC	MICROPHONE 7 DBU	MICROPHONE 7 DBC
10.0	70.9	0.0	84.0	72.9	90.3	82.5
12.5	72.1	0.0	72.4	0.0	80.7	0.0
16.0	99.8	99.7	99.5	99.3	115.4	115.4
20.0	92.7	91.2	94.6	90.9	106.3	105.7
25.0	90.6	88.6	87.7	0.0	95.3	0.0
31.5	110.9	110.9	97.6	96.9	120.6	120.6
40.0	95.9	91.1	99.7	98.5	107.0	105.1
50.0	114.2	114.2	101.4	100.2	122.3	122.3
63.0	111.4	111.3	114.4	114.3	124.9	124.9
80.0	109.7	109.4	121.2	121.2	118.2	118.0
100.0	119.4	119.4	108.9	108.3	114.1	113.5
125.0	117.2	117.1	120.5	120.5	115.1	114.7
160.0	113.0	112.8	119.8	119.8	115.9	115.5
200.0	112.8	112.6	116.5	116.4	113.5	112.6
250.0	113.0	112.9	111.4	111.2	119.0	118.8
315.0	115.1	115.0	113.5	113.4	121.1	121.0
400.0	111.3	111.2	113.0	112.9	118.3	118.1
500.0	109.3	109.1	111.2	111.0	115.3	114.8
630.0	107.8	107.5	107.6	107.3	111.4	110.2
800.0	104.8	104.1	105.4	104.6	109.6	107.8
1000.0	103.3	102.1	103.3	101.2	108.5	105.4
1250.0	103.0	101.3	102.3	100.2	107.2	104.2
1600.0	99.5	91.4	100.0	0.0	104.8	96.4
2000.0	97.1	94.6	98.3	95.7	103.0	98.9
2500.0	98.2	94.3	96.4	87.8	101.0	94.1
3150.0	95.0	0.0	97.2	0.0	99.3	0.0
4000.0	93.1	0.0	94.1	0.0	96.7	0.0
5000.0	91.5	0.0	91.3	0.0	93.9	0.0
6300.0	94.0	0.0	91.4	0.0	90.9	0.0
8000.0	87.7	0.0	88.2	0.0	87.4	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	100.4	99.9	115.8
2	110.9	97.1	120.6
3	114.1	100.4	122.3
4	110.6	114.0	124.7
5	108.3	121.1	117.8
6	119.3	106.6	113.5
7	112.8	109.1	107.6
8	114.5	119.9	113.2
9	106.1	115.8	111.8
10	107.0	116.8	110.9

ORIGINAL PAGE IS
OF POOR QUALITY

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
25	6	106.2	7.5	0.066537	0.3017

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2 DBU	MICROPHONE 2 DBC	MICROPHONE 4 DBU	MICROPHONE 4 DBC	MICROPHONE 7 DBU	MICROPHONE 7 DBC
10.0	71.7	0.0	85.4	80.7	95.5	94.2
12.5	70.3	0.0	80.5	0.0	94.1	93.0
16.0	108.0	108.0	114.9	114.9	106.2	106.0
20.0	98.3	97.9	105.7	105.5	96.1	0.0
25.0	86.9	78.8	90.7	86.2	97.9	91.0
31.5	103.8	103.7	100.5	100.1	112.6	112.4
40.0	88.2	0.0	90.9	0.0	103.8	98.0
50.0	109.7	109.6	95.9	88.5	117.1	116.9
63.0	95.0	96.7	107.0	106.6	115.7	115.4
80.0	99.9	95.8	112.9	112.6	109.0	107.2
100.0	111.4	111.1	102.7	99.6	107.3	103.6
125.0	107.9	107.2	109.4	108.8	108.5	106.1
160.0	113.7	113.6	110.3	109.9	111.4	110.3
200.0	109.0	108.6	110.6	110.3	111.0	109.6
250.0	108.8	108.5	108.6	108.3	114.0	113.5
315.0	107.7	107.4	108.0	107.6	114.9	114.3
400.0	107.4	107.0	105.1	104.3	112.4	111.4
500.0	104.9	104.3	105.3	104.5	111.1	109.6
630.0	103.1	102.3	103.2	102.2	110.6	109.1
800.0	100.2	97.9	101.9	99.8	108.0	105.1
1000.0	99.5	95.6	99.9	92.0	107.1	102.0
1250.0	100.5	96.8	99.3	93.3	106.5	102.7
1600.0	97.1	0.0	97.7	0.0	103.0	0.0
2000.0	93.5	0.0	94.9	77.5	99.6	0.0
2500.0	95.4	0.0	94.0	0.0	97.4	0.0
3150.0	97.4	0.0	96.1	0.0	98.3	0.0
4000.0	91.7	0.0	93.2	0.0	94.1	0.0
5000.0	92.5	0.0	89.8	0.0	92.1	0.0
6300.0	93.7	0.0	90.8	0.0	90.0	0.0
8000.0	87.8	0.0	86.3	0.0	67.0	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	108.4	115.3	106.3
2	103.6	100.3	112.4
3	109.5	92.7	116.9
4	97.2	105.7	115.2
5	90.6	112.4	106.3
6	110.8	99.4	101.6
7	106.3	106.8	100.4
8	98.8	103.0	103.9
9	109.7	107.1	99.4
10	109.[illegible]	94.9	105.8

ORIGINAL PAGE IS
OF POOR QUALITY

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
23	12	106.8	7.5	0.093217	0.3002

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	78.1	0.0	83.0	0.0	84.3	0.0
12.5	84.1	62.8	83.9	81.1	84.9	0.0
16.0	99.7	99.6	99.4	99.1	110.7	110.6
20.0	93.4	92.1	87.6	0.0	107.5	107.1
25.0	86.9	78.1	86.9	0.0	97.8	90.0
31.5	107.2	107.1	95.1	93.6	115.7	115.6
40.0	93.9	0.0	97.5	95.3	102.5	0.0
50.0	107.9	107.7	97.8	94.4	120.3	120.2
63.0	111.4	111.3	106.9	106.4	117.1	116.9
80.0	107.4	106.9	114.2	114.0	113.1	112.5
100.0	113.7	113.5	102.9	99.7	111.4	110.3
125.0	119.0	119.0	118.4	118.3	117.3	117.0
160.0	117.7	117.6	111.8	111.5	112.8	112.0
200.0	113.0	112.8	117.7	117.6	114.4	113.8
250.0	117.6	117.6	113.9	113.8	119.2	119.0
315.0	117.7	117.7	116.3	116.2	120.2	120.0
400.0	114.9	114.8	113.6	113.5	115.7	115.3
500.0	112.1	112.0	113.0	112.9	115.6	115.1
630.0	111.0	110.9	107.7	107.4	112.9	112.1
800.0	106.9	106.5	105.9	105.2	110.8	109.5
1000.0	104.6	103.7	103.7	101.8	109.0	106.3
1250.0	104.7	103.6	102.4	100.4	106.1	101.5
1600.0	101.4	97.9	98.9	0.0	103.4	0.0
2000.0	97.1	94.5	96.1	90.0	99.6	0.0
2500.0	97.4	91.9	94.8	0.0	98.5	0.0
3150.0	97.1	0.0	97.9	0.0	97.2	0.0
4000.0	93.4	0.0	93.3	0.0	94.1	0.0
5000.0	93.7	0.0	90.1	0.0	90.9	0.0
6300.0	94.7	0.0	90.8	0.0	89.0	0.0
8000.0	87.9	0.0	88.3	0.0	85.7	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	100.2	99.5	112.1
2	107.1	94.3	115.7
3	107.5	95.1	120.3
4	111.1	106.5	116.8
5	106.8	113.9	112.4
6	113.2	99.5	108.4
7	118.7	111.0	106.3
8	102.8	117.2	116.4
9	112.2	107.6	108.3
10	115.8	104.9	101.1

ORIGINAL PAGE IS
OF POOR QUALITY

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
25	8	104.8	7.5	0.116004	0.2988

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	75.9	0.0	85.5	81.3	93.8	91.9
12.5	79.6	74.4	77.8	0.0	90.2	87.0
16.0	101.7	101.6	109.7	109.7	110.5	110.4
20.0	92.1	90.4	100.4	99.7	95.8	0.0
25.0	83.9	0.0	84.6	0.0	96.0	0.0
31.5	109.0	109.0	99.8	99.4	117.7	117.6
40.0	89.2	0.0	96.9	94.4	101.3	0.0
50.0	111.9	111.8	99.1	97.1	122.5	122.5
63.0	105.9	105.5	113.7	113.6	122.5	122.4
80.0	111.0	110.8	119.6	119.5	114.8	114.4
100.0	116.0	115.9	111.3	111.0	108.6	106.4
125.0	108.9	108.4	115.0	114.8	112.9	112.2
160.0	117.0	116.9	113.8	113.6	113.1	112.5
200.0	112.3	112.1	113.6	113.4	116.4	116.1
250.0	117.0	117.0	113.1	113.0	115.6	115.3
315.0	113.7	113.6	113.9	113.8	117.7	117.4
400.0	111.8	111.7	110.6	110.4	115.4	114.9
500.0	108.4	108.1	107.9	107.5	115.7	115.3
630.0	106.2	105.8	104.1	103.3	112.4	111.5
800.0	103.5	102.6	103.7	102.5	109.1	107.1
1000.0	101.6	99.7	101.7	98.3	108.1	104.8
1250.0	101.7	99.3	99.7	95.1	106.4	102.7
1600.0	96.2	0.0	98.2	0.0	103.8	0.0
2000.0	94.6	88.4	95.2	85.6	100.2	0.0
2500.0	95.4	0.0	93.9	0.0	98.3	0.0
3150.0	96.4	0.0	98.7	0.0	98.1	0.0
4000.0	92.5	0.0	93.2	0.0	94.9	0.0
5000.0	89.1	0.0	89.7	0.0	91.8	0.0
6300.0	94.0	0.0	90.8	0.0	89.8	0.0
8000.0	87.9	0.0	87.7	0.0	86.7	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	102.1	110.1	110.5
2	109.0	99.6	117.5
3	111.7	96.8	122.5
4	105.3	113.5	122.4
5	110.7	119.4	114.3
6	115.8	109.3	99.8
7	106.4	111.6	110.9
8	102.9	112.6	108.0
9	112.6	108.4	109.1
10	113.7	99.2	102.4

XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
23	13	107.0	7.5	0.131272	0.3003

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	87.4	86.7	90.2	89.1	97.8	97.1
12.5	84.3	83.1	74.9	0.0	97.8	97.3
16.0	105.7	105.7	105.9	105.8	114.8	114.8
20.0	99.6	99.3	99.7	98.8	107.8	107.4
25.0	90.3	89.1	86.6	0.0	103.3	102.1
31.5	109.5	109.5	105.0	104.9	117.4	117.3
40.0	91.5	0.0	94.3	86.3	106.1	103.5
50.0	113.1	113.0	104.4	103.8	125.8	125.8
63.0	115.6	115.6	111.9	111.8	123.8	123.8
80.0	107.6	107.1	120.2	120.1	118.2	118.0
100.0	120.8	120.8	112.6	112.4	115.6	115.2
125.0	116.8	116.7	117.2	117.1	117.1	116.8
160.0	118.2	118.2	119.2	119.2	116.0	115.6
200.0	114.3	114.2	115.6	115.5	119.4	119.2
250.0	120.0	120.0	116.5	116.4	117.9	117.7
315.0	119.5	119.5	118.7	118.7	120.8	120.7
400.0	115.4	115.3	113.3	113.2	118.3	118.1
500.0	111.4	111.3	110.5	110.3	116.1	115.7
630.0	109.8	109.6	108.5	108.2	114.2	113.6
800.0	107.7	107.4	106.4	105.8	109.8	108.0
1000.0	104.9	104.1	104.4	102.8	109.3	106.9
1250.0	104.5	103.4	103.2	101.6	107.5	104.7
1600.0	101.6	98.4	100.2	0.0	105.9	101.0
2000.0	98.2	96.3	98.0	95.1	103.1	98.9
2500.0	98.5	94.9	96.5	88.2	101.3	95.1
3150.0	98.2	0.0	97.7	0.0	99.8	0.0
4000.0	92.9	0.0	94.1	0.0	96.6	0.0
5000.0	94.0	0.0	90.7	0.0	93.6	0.0
6300.0	94.6	0.0	91.2	0.0	91.1	0.0
8000.0	87.2	0.0	88.2	0.0	87.7	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	106.6	106.8	115.5
2	109.4	104.9	117.2
3	113.0	103.7	125.8
4	115.5	111.2	123.8
5	106.4	120.1	117.7
6	120.7	111.7	114.6
7	114.9	110.9	105.5
8	110.8	115.6	115.1
9	113.0	117.3	109.6
10	115.9	113.8	106.8

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XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
25	9	104.3	7.5	0.137698	0.2946

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	79.4	68.6	86.0	82.5	93.0	90.7
12.5	76.4	0.0	83.3	80.1	83.3	0.0
16.0	107.8	107.8	115.9	115.9	117.8	117.8
20.0	96.5	96.0	104.6	104.4	109.4	109.1
25.0	84.6	0.0	87.5	0.0	99.8	97.0
31.5	111.7	111.7	101.6	101.3	118.9	118.9
40.0	95.2	89.3	96.8	94.3	106.2	104.0
50.0	110.1	110.0	104.8	104.4	121.4	121.3
63.0	101.6	100.6	111.4	111.3	119.1	119.0
80.0	104.0	102.9	116.5	116.4	118.4	118.2
100.0	112.3	112.1	108.7	108.1	106.1	100.9
125.0	115.2	115.1	116.6	116.5	113.9	113.4
160.0	113.0	112.8	116.4	116.3	113.0	112.3
200.0	110.3	110.0	112.7	112.5	117.0	116.7
250.0	112.4	112.3	111.9	111.8	119.2	119.1
315.0	113.4	113.3	112.2	112.1	119.1	118.9
400.0	111.5	111.4	110.9	110.7	117.2	116.9
500.0	106.8	106.4	108.3	107.9	113.7	113.0
630.0	103.7	103.1	105.3	104.7	111.8	110.8
800.0	101.4	99.9	103.0	101.5	108.9	106.9
1000.0	100.2	97.3	100.3	94.4	107.0	102.2
1250.0	101.4	98.8	100.0	96.0	106.0	101.8
1600.0	97.7	0.0	98.1	0.0	103.7	0.0
2000.0	94.2	86.5	95.1	85.0	99.8	0.0
2500.0	95.2	0.0	94.3	0.0	98.1	0.0
3150.0	99.0	0.0	98.4	0.0	98.5	0.0
4000.0	92.7	0.0	93.2	0.0	94.5	0.0
5000.0	89.2	0.0	89.6	0.0	92.4	0.0
6300.0	93.6	0.0	90.1	0.0	90.0	0.0
8000.0	87.9	0.0	87.2	0.0	87.3	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	108.1	116.2	118.3
2	111.7	101.2	118.8
3	109.8	104.2	121.3
4	99.2	111.1	118.9
5	101.9	116.5	118.2
6	111.9	108.0	100.0
7	113.5	112.2	109.4
8	108.7	114.0	110.3
9	110.9	115.8	106.1
10	104.7	98.0	103.8

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XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
23	16	143.0	2.5	0.079327	0.3993

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	76.3	0.0	88.9	83.1	92.1	0.0
12.5	75.5	0.0	85.3	78.5	98.6	97.2
16.0	100.2	100.0	105.6	105.5	113.5	113.4
20.0	99.8	99.2	105.7	105.3	106.8	105.1
25.0	97.1	95.5	102.6	101.6	104.9	101.0
31.5	102.5	102.1	105.6	105.2	116.0	115.7
40.0	103.0	101.3	96.7	0.0	106.7	0.0
50.0	98.2	0.0	100.2	0.0	116.9	116.3
63.0	116.5	116.4	115.3	115.2	114.8	113.5
80.0	109.7	108.8	113.4	112.6	118.7	118.0
100.0	111.7	110.9	112.3	111.5	113.0	109.4
125.0	112.9	112.5	117.2	117.0	114.1	111.8
160.0	109.5	108.7	112.6	112.0	113.3	110.5
200.0	112.4	111.8	110.2	109.1	118.0	117.1
250.0	111.1	110.5	110.1	109.3	115.4	114.0
315.0	110.0	109.6	110.2	109.7	116.5	115.3
400.0	107.1	106.3	109.2	108.6	116.4	115.3
500.0	105.8	104.8	105.9	104.6	112.6	109.4
630.0	103.2	101.4	103.1	100.6	111.5	106.4
800.0	100.1	93.8	101.6	95.9	110.9	105.1
1000.0	102.1	98.8	107.0	105.7	110.0	98.4
1250.0	101.7	95.4	101.4	0.0	109.4	100.1
1600.0	99.8	0.0	100.2	0.0	107.3	0.0
2000.0	97.0	88.7	97.9	84.4	105.0	0.0
2500.0	97.0	0.0	96.9	0.0	102.6	0.0
3150.0	96.8	0.0	98.1	0.0	100.7	0.0
4000.0	93.0	0.0	94.4	0.0	96.9	0.0
5000.0	91.5	0.0	91.8	0.0	93.2	0.0
6300.0	91.5	0.0	91.3	0.0	90.5	0.0
8000.0	86.4	0.0	87.7	0.0	88.3	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	100.9	106.5	113.9
2	102.4	105.6	115.7
3	88.8	95.8	116.2
4	116.4	115.1	113.1
5	98.6	112.4	117.2
6	110.3	110.2	106.1
7	107.1	108.2	101.1
8	110.4	116.1	105.7
9	101.6	107.5	103.9
10	98.4	102.4	109.1

XH-59A ACOUSTIC DATA

ORIGINAL PAGE IS OF POOR QUALITY

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
23	17	143.0	2.5	0.109872	0.3992

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	79.3	0.0	91.8	89.7	89.5	0.0
12.5	81.5	74.5	83.9	0.0	96.6	94.1
16.0	101.4	101.3	99.5	99.0	115.6	115.5
20.0	98.7	98.0	104.4	103.8	112.6	112.2
25.0	98.2	97.0	102.5	101.5	107.5	105.8
31.5	105.8	105.6	109.7	109.5	118.5	118.3
40.0	102.7	100.8	96.1	0.0	109.5	105.3
50.0	100.3	82.3	101.0	0.0	118.5	118.1
63.0	115.5	115.4	116.0	115.9	113.5	111.6
80.0	105.3	102.0	110.4	108.6	120.1	119.6
100.0	114.3	113.9	115.0	114.6	113.3	110.0
125.0	112.9	112.5	118.6	118.4	114.9	113.1
160.0	112.6	112.2	112.4	111.8	114.2	112.1
200.0	113.3	112.8	113.0	112.4	117.3	116.2
250.0	112.7	112.3	113.4	113.1	116.9	115.9
315.0	112.1	111.8	112.0	111.7	117.6	116.7
400.0	110.2	109.8	111.2	110.9	116.6	115.6
500.0	105.7	104.7	107.3	106.4	114.1	112.1
630.0	104.1	102.7	105.2	103.8	112.4	108.8
800.0	101.0	96.8	103.2	100.1	110.9	105.1
1000.0	101.6	97.7	107.4	106.2	110.7	103.8
1250.0	101.8	95.8	102.7	0.0	109.9	103.1
1600.0	100.4	0.0	100.4	0.0	109.0	98.3
2000.0	96.9	87.9	98.2	88.5	106.1	0.0
2500.0	96.7	0.0	96.9	0.0	103.1	0.0
3150.0	98.8	0.0	98.8	0.0	101.0	0.0
4000.0	92.6	0.0	94.3	0.0	97.4	0.0
5000.0	93.5	0.0	91.9	0.0	94.2	0.0
6300.0	91.7	0.0	91.8	0.0	91.0	0.0
8000.0	86.3	0.0	88.4	0.0	88.2	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	102.3	100.7	117.1
2	105.6	109.5	118.0
3	97.0	95.1	117.8
4	115.4	115.8	111.3
5	102.4	108.4	119.4
6	113.8	114.4	107.4
7	110.7	109.1	107.9
8	107.8	117.7	104.3
9	108.4	105.6	95.5
10	99.9	106.5	102.0

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XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
30	9	142.1	2.5	0.112681	0.4027

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	84.5	81.4	88.8	82.9	93.0	0.0
12.5	76.4	0.0	85.8	80.7	90.9	0.0
16.0	117.7	117.7	122.9	122.9	115.0	114.9
20.0	107.6	107.5	114.5	114.4	109.6	108.8
25.0	95.4	92.9	106.1	105.7	107.2	105.4
31.5	108.4	108.3	100.8	99.5	121.0	120.9
40.0	104.3	103.1	102.9	101.5	109.8	106.2
50.0	114.0	113.8	112.7	112.4	110.8	107.4
63.0	114.0	113.9	117.7	117.6	124.5	124.4
80.0	110.6	109.9	119.1	118.9	117.5	116.6
100.0	113.8	113.4	110.4	109.2	115.2	113.4
125.0	116.4	116.2	113.1	112.5	114.3	112.2
160.0	115.4	115.2	113.9	113.5	114.4	112.5
200.0	113.1	112.6	116.9	116.7	117.4	116.3
250.0	114.1	113.8	112.6	112.2	116.6	115.6
315.0	114.1	113.9	111.7	111.3	120.3	119.8
400.0	111.5	111.2	112.5	112.2	117.4	116.6
500.0	106.4	107.9	109.0	108.4	116.9	116.0
630.0	107.3	106.7	108.0	107.3	113.2	110.5
800.0	103.5	101.7	104.4	102.3	112.6	109.7
1000.0	102.5	99.7	107.8	106.7	111.6	107.3
1250.0	102.1	97.0	103.9	97.6	112.1	109.4
1600.0	101.1	92.6	102.0	0.0	109.8	103.9
2000.0	96.3	94.0	100.1	96.5	106.3	0.0
2500.0	96.8	0.0	97.5	0.0	102.6	0.0
3150.0	97.7	0.0	97.2	0.0	100.7	0.0
4000.0	101.6	100.0	104.2	103.1	102.7	95.5
5000.0	91.6	0.0	93.9	0.0	96.4	0.0
6300.0	90.3	0.0	91.1	0.0	92.1	0.0
8000.0	90.3	0.0	96.0	0.0	90.0	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	118.1	123.3	115.5
2	106.4	100.4	121.0
3	113.5	112.5	109.6
4	113.4	117.6	124.2
5	108.9	118.7	116.5
6	112.1	108.7	113.4
7	106.5	105.8	106.3
8	114.7	108.7	109.8
9	109.8	109.2	102.0
10	110.9	109.0	107.4

ORIGINAL PAGE IS
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XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
24	6	140.9	5.0	0.078550	0.4026

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2 DBU	MICROPHONE 2 DBC	MICROPHONE 4 DBU	MICROPHONE 4 DBC	MICROPHONE 7 DBU	MICROPHONE 7 DBC
10.0	79.4	0.0	89.3	84.8	90.4	0.0
12.5	73.3	0.0	88.7	86.8	94.1	88.5
16.0	108.2	108.2	117.8	117.8	118.3	118.3
20.0	99.3	98.7	107.8	107.5	108.2	107.1
25.0	95.6	93.3	102.1	101.0	103.1	95.0
31.5	100.7	100.0	99.6	97.8	121.3	121.2
40.0	104.5	103.4	94.1	0.0	108.9	104.1
50.0	104.6	102.8	112.3	112.0	117.4	116.9
63.0	109.9	109.5	120.7	120.7	116.4	115.6
80.0	104.2	99.7	118.2	118.0	115.6	114.2
100.0	114.8	114.5	107.0	103.8	115.0	113.2
125.0	112.9	112.5	115.5	115.2	115.3	113.8
160.0	119.1	119.0	117.6	117.4	115.2	113.7
200.0	114.8	114.5	115.9	115.6	118.9	118.2
250.0	118.3	118.2	115.0	114.8	118.2	117.6
315.0	118.4	118.3	116.6	116.5	120.5	120.1
400.0	117.0	116.9	113.2	113.0	117.1	116.2
500.0	111.7	111.5	108.5	107.8	115.6	114.3
630.0	107.4	106.8	107.0	106.2	113.6	111.3
800.0	104.1	102.6	103.7	101.2	111.1	106.3
1000.0	103.3	101.1	107.4	106.2	111.2	106.3
1250.0	101.5	94.9	102.3	0.0	110.3	105.3
1600.0	99.8	0.0	101.1	0.0	109.3	102.1
2000.0	97.9	93.0	98.0	87.8	106.2	0.0
2500.0	96.3	0.0	96.3	0.0	102.9	0.0
3150.0	99.5	0.0	98.8	0.0	100.6	0.0
4000.0	92.6	0.0	94.5	0.0	97.6	0.0
5000.0	90.6	0.0	91.4	0.0	94.4	0.0
6300.0	94.3	0.0	91.7	0.0	91.2	0.0
8000.0	87.1	0.0	87.9	0.0	88.0	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	108.4	118.0	118.6
2	100.4	98.4	121.2
3	103.2	112.1	117.0
4	109.4	120.6	115.6
5	94.3	117.7	114.3
6	112.7	102.5	103.5
7	113.8	101.1	110.6
8	101.4	114.9	112.0
9	110.2	113.3	107.0
10	118.0	110.7	111.5

ORIGINAL PAGE IS
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XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
24	7	140.9	5.0	0.113114	0.3940

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	84.0	80.3	92.8	91.3	99.7	98.2
12.5	71.0	0.0	89.9	88.6	94.9	90.9
16.0	107.0	107.0	110.1	110.1	115.1	115.0
20.0	102.6	102.3	105.6	105.2	110.8	110.2
25.0	98.3	97.2	102.7	101.8	104.7	100.9
31.5	105.3	105.1	110.5	110.4	119.3	119.2
40.0	106.0	105.3	97.1	0.0	110.9	108.5
50.0	106.0	104.8	106.7	105.4	118.1	117.7
63.0	119.7	119.7	118.1	118.0	116.9	116.2
80.0	106.9	105.1	119.3	119.1	118.4	117.7
100.0	115.3	115.0	117.0	116.8	113.7	111.1
125.0	116.1	115.9	116.8	116.6	114.6	112.8
160.0	111.6	111.1	116.8	116.6	115.6	114.3
200.0	114.4	114.0	111.5	110.7	118.8	118.1
250.0	113.5	113.2	111.7	111.2	116.4	115.4
315.0	112.1	111.8	111.7	111.3	117.0	116.0
400.0	106.9	106.1	110.6	110.2	115.8	114.6
500.0	106.5	105.7	107.1	106.2	115.4	114.1
630.0	104.5	103.3	104.8	103.3	112.7	109.7
800.0	102.3	99.7	102.3	98.2	111.8	108.2
1000.0	103.0	100.6	106.5	105.0	111.7	107.7
1250.0	101.5	94.9	101.5	0.0	110.2	105.0
1600.0	100.2	0.0	100.4	0.0	109.3	102.1
2000.0	97.4	91.3	98.0	87.8	105.7	0.0
2500.0	95.3	0.0	96.3	0.0	102.7	0.0
3150.0	98.6	0.0	99.3	0.0	100.3	0.0
4000.0	92.9	0.0	94.5	0.0	97.4	0.0
5000.0	91.6	0.0	91.7	0.0	94.6	0.0
6300.0	92.7	0.0	91.9	0.0	91.0	0.0
8000.0	86.6	0.0	88.2	0.0	87.8	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	108.0	110.9	115.7
2	105.0	110.3	119.2
3	104.6	106.4	117.9
4	119.7	118.0	115.8
5	90.5	118.9	116.5
6	114.6	116.9	107.4
7	97.2	106.3	111.0
8	115.7	115.9	102.2
9	102.5	110.2	103.9
10	102.4	114.9	113.7

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XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S,R	MU
24	8	141.2	5.0	0.125296	0.3960

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2 DBU	MICROPHONE 2 DBC	MICROPHONE 4 DBU	MICROPHONE 4 DBC	MICROPHONE 7 DBU	MICROPHONE 7 DBC
10.0	82.8	76.7	74.6	0.0	94.0	0.0
12.5	74.8	0.0	88.3	86.2	95.0	91.1
16.0	101.6	101.5	101.0	100.7	115.2	115.1
20.0	97.6	96.6	105.3	104.8	108.8	107.9
25.0	96.8	95.2	103.3	102.5	104.3	99.8
31.5	108.7	106.6	110.2	110.1	117.9	117.7
40.0	104.2	103.0	99.3	95.2	108.4	102.3
50.0	106.1	104.9	108.6	107.8	117.4	116.9
63.0	118.5	118.5	118.3	118.2	117.2	116.5
80.0	110.4	109.7	118.4	118.2	120.8	120.4
100.0	116.8	116.6	115.0	114.6	113.0	109.7
125.0	115.2	115.0	122.3	122.2	114.0	111.8
160.0	112.3	111.9	117.3	117.1	114.7	113.0
200.0	114.5	114.1	113.4	112.9	117.8	116.9
250.0	113.5	113.2	115.1	114.9	118.5	117.9
315.0	111.4	111.1	112.5	112.2	116.5	115.3
400.0	109.2	108.7	111.8	111.5	116.9	116.0
500.0	107.1	106.4	107.5	106.7	113.8	111.7
630.0	105.3	104.3	105.8	104.7	113.2	110.6
800.0	102.6	100.2	104.1	101.9	111.0	106.0
1000.0	103.2	101.0	106.9	105.6	111.1	106.0
1250.0	101.8	96.1	102.2	0.0	110.8	106.7
1600.0	100.9	91.2	100.8	0.0	108.5	91.3
2000.0	97.7	92.4	98.3	90.1	105.1	0.0
2500.0	96.7	0.0	96.7	0.0	102.6	0.0
3150.0	99.7	0.0	97.7	0.0	99.9	0.0
4000.0	94.1	0.0	94.7	0.0	97.6	0.0
5000.0	92.6	0.0	91.9	0.0	94.2	0.0
6300.0	93.3	0.0	91.2	0.0	90.9	0.0
8000.0	86.6	0.0	87.5	0.0	87.9	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	102.3	101.6	116.0
2	108.6	110.0	117.9
3	105.0	108.2	117.0
4	118.5	118.3	116.7
5	109.8	118.0	120.5
6	116.2	114.5	109.4
7	110.3	109.5	111.4
8	113.0	121.8	105.8
9	106.3	115.7	105.3
10	108.0	109.8	105.2

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XH-59A ACOUSTIC DATA

RUN	POINT	VELOCITY	ALPHA	CLR/S.R	MU
24	9	142.4	7.5	0.090290	0.4004

1/3 OCTAVE CENTER FREQUENCY	MICROPHONE 2		MICROPHONE 4		MICROPHONE 7	
	DBU	DBC	DBU	DBC	DBU	DBC
10.0	79.6	0.0	86.6	0.0	87.6	0.0
12.5	82.0	76.6	82.7	0.0	91.2	0.0
16.0	112.6	112.6	119.2	119.2	115.0	114.9
20.0	105.2	105.0	111.2	111.1	108.4	107.3
25.0	98.4	97.3	100.1	98.1	101.3	0.0
31.5	106.8	106.6	102.7	101.9	113.4	112.8
40.0	100.4	96.6	100.6	97.9	110.6	107.8
50.0	108.5	107.8	112.1	111.7	116.4	115.7
63.0	114.9	114.8	114.7	114.5	111.3	107.4
80.0	102.9	92.8	117.2	116.9	116.3	115.1
100.0	114.4	114.0	113.5	112.9	116.3	115.0
125.0	111.2	110.6	115.9	115.6	114.9	113.2
160.0	117.7	117.6	114.6	114.2	113.6	111.1
200.0	114.6	114.2	112.2	111.5	115.3	113.4
250.0	111.3	110.8	114.8	114.6	117.8	117.1
315.0	116.1	116.0	114.7	114.5	118.4	117.7
400.0	113.3	113.1	113.9	113.7	117.5	116.7
500.0	111.8	111.6	110.2	109.8	116.2	115.1
630.0	108.3	107.8	107.2	106.4	114.2	112.2
800.0	106.8	106.0	104.5	102.5	111.6	107.4
1000.0	104.2	102.5	108.2	107.2	111.4	106.6
1250.0	103.9	101.2	103.2	93.0	110.7	106.2
1600.0	101.1	92.5	100.9	0.0	108.9	97.8
2000.0	98.2	93.7	98.2	88.8	105.3	0.0
2500.0	97.0	0.0	96.3	0.0	102.2	0.0
3150.0	98.9	0.0	100.2	0.0	100.2	0.0
4000.0	93.1	0.0	94.0	0.0	97.0	0.0
5000.0	91.4	0.0	91.8	0.0	94.0	0.0
6300.0	94.1	0.0	91.2	0.0	91.0	0.0
8000.0	85.8	0.0	86.4	0.0	87.4	0.0

BLADE PASSAGE HARMONICS	MICROPHONE 2	MICROPHONE 4	MICROPHONE 7
1	113.3	119.8	115.8
2	106.8	102.6	113.0
3	107.7	111.7	116.1
4	114.7	114.0	108.0
5	96.3	115.5	114.8
6	113.8	112.5	112.3
7	104.9	109.9	109.9
8	108.1	113.7	109.5
9	113.4	111.2	101.8
10	112.4	107.6	104.7

REFERENCES

1. Ruddell, Andrew J., "Advancing Blade Concept (ABC)™ Development, Paper No. 1012, Presented at the 32nd AHS National Forum, Washington, D.C., May 1976.

2. Ruddell, Andrew J. and Macrino, John A., "Advancing Blade Concept (ABC)™ High Speed Development," Paper No. 80-57, presented at the 36th AHS National Forum, Washington, D.C., May 1980.

3. Felker, Fort F., "Performance and Loads Data from a Wind Tunnel Test of a Full-Scale, Coaxial, Hingeless Rotor Helicopter," NASA TM 81329, October 1981.

TABLE 1.- DESCRIPTION OF ABC ROTOR

Item	Specification
Rotor radius, R	5.5 m
Number of rotors	2
Blades per rotor	3
Rotor separation	0.76 m
Blade tip chord	0.29 m
Blade taper ratio	2:1
Blade twist (nonlinear)	-10°
Solidity, σ	0.13
Reference area, S	12.0 m^2
Blade precone angle	3°
Blade prelag angle	1.4°
Shaft tilt	0°

TABLE 2.- OPERATING CONDITIONS

Parameter	Rotor-on	Rotor-off
ΩR, m/sec	180 to 206	---
M_{tip}	0.52 to 0.58	---
V, knots	89 to 160	60 to 180
μ	0.23 to 0.45	---
M_{at}	0.65 to 0.76	---
α, deg	0 to 10	-10 to 10
$C_{LR/\sigma,R}$	0.024 to 0.162	---
$C_{P/\sigma}$	0.0002 to 0.0093	---

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TABLE 3.- MICROPHONE LOCATIONS AS REFERENCED FROM MIDWAY BETWEEN HUBS

Microphone	x, m	y, m	z, m	r, m	ϕ, deg	ψ, deg
1	15.9	-5.5	-3.9	17.3	13.0	160.0
2	15.9	0.0	-3.9	16.4	13.7	180.0
3	15.9	5.5	-3.9	17.3	13.0	200.0
4	5.6	5.2	-4.8	9.0	32.3	223.0
5	17.8	-3.0	-7.3	19.4	22.0	170.3
6	5.1	-4.9	-7.3	10.2	45.9	136.3
7	-3.1	7.0	-7.3	10.6	43.5	294.0

TABLE 4.- EFFECT OF CONTROL POSITIONS ON NOISE

Run/pt	θ, deg	$\Delta\theta$, deg	$C_{LR/\sigma}$,R	Mic 2, dBA	Mic 4, dBA	Mic 7, dBA
89 knots, α = 7.5°						
21/11	7.63	0.75	0.074	107.4	109.3	113.2
21/12	7.65	.75	.074	107.8	109.0	113.2
21/13	8.98	.70	.090	109.4	110.4	112.9
21/14	11.46	.36	.119	109.9	111.5	114.9
21/15	13.54	-.01	.141	110.5	112.0	116.7
106 knots, α = 7.5°						
25/6	7.79	2.44	0.067	109.8	109.2	114.9
23/12	10.01	-.69	.093	118.0	116.6	119.4
25/7	12.23	.37	.106	117.0	115.8	118.6
25/5	11.69	-1.30	.107	116.7	114.8	118.4
25/8	12.26	.36	.116	114.8	113.5	118.3
23/14	13.23	-.27	.117	117.8	115.6	119.3
23/13	15.06	-1.52	.131	118.8	117.4	120.6
25/9	12.35	.39	.138	113.0	113.3	118.7

Figure 1.- ABC Rotor Installed in 40- by 80-Foot Wind Tunnel.

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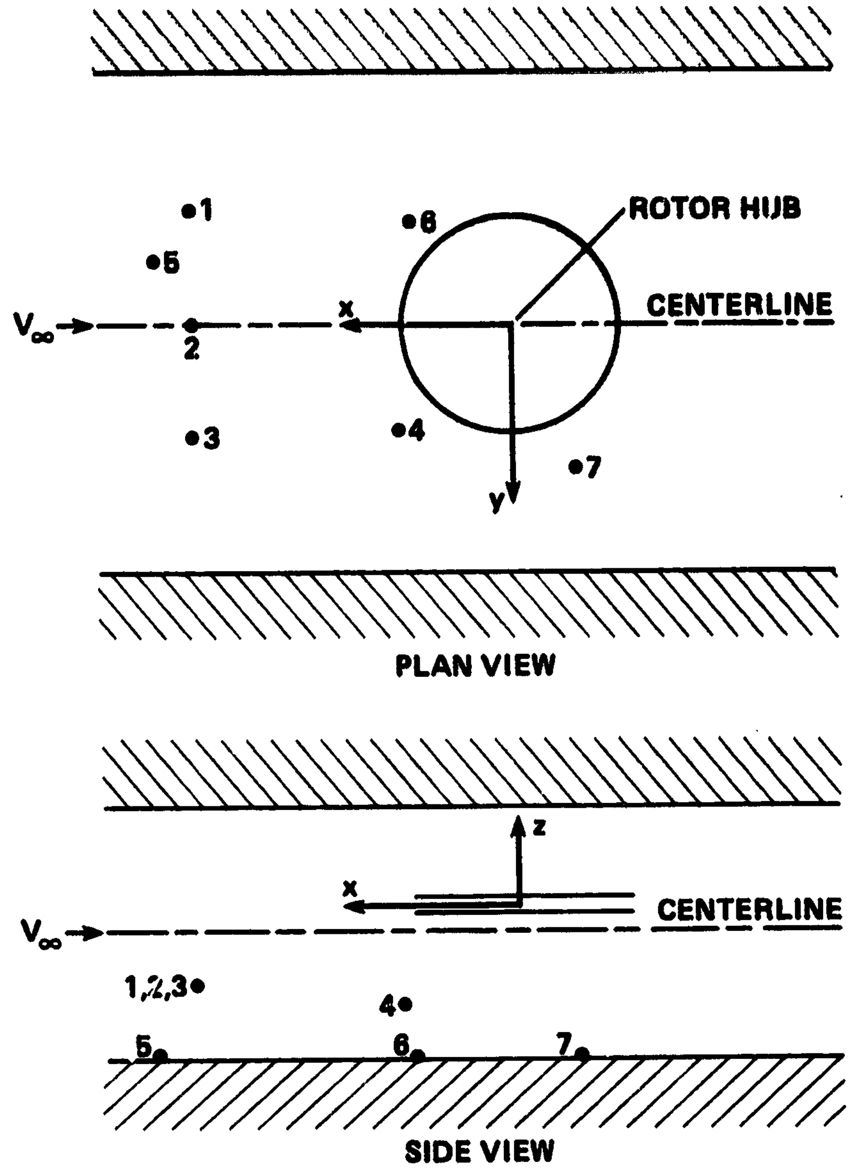

Figure 2.- Microphone locations.

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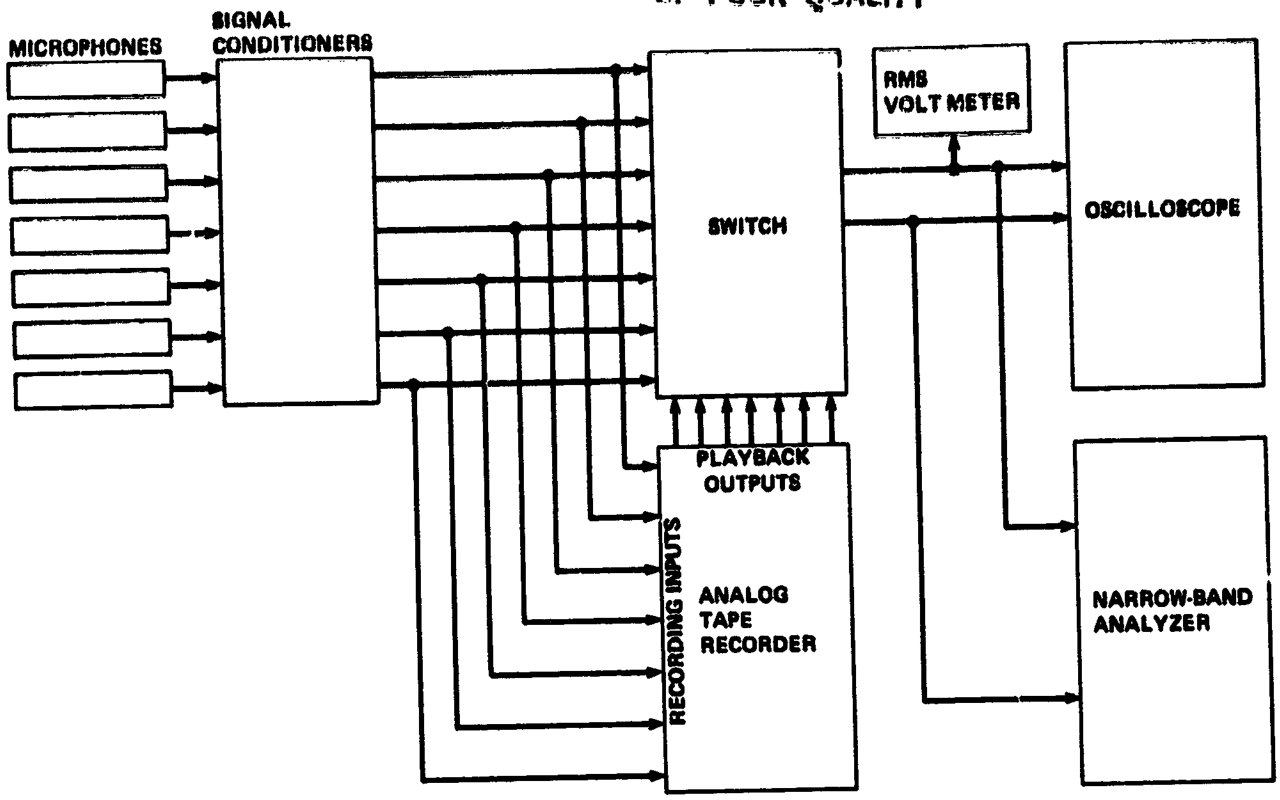

Figure 3.- Schematic of data acquisition set-up.

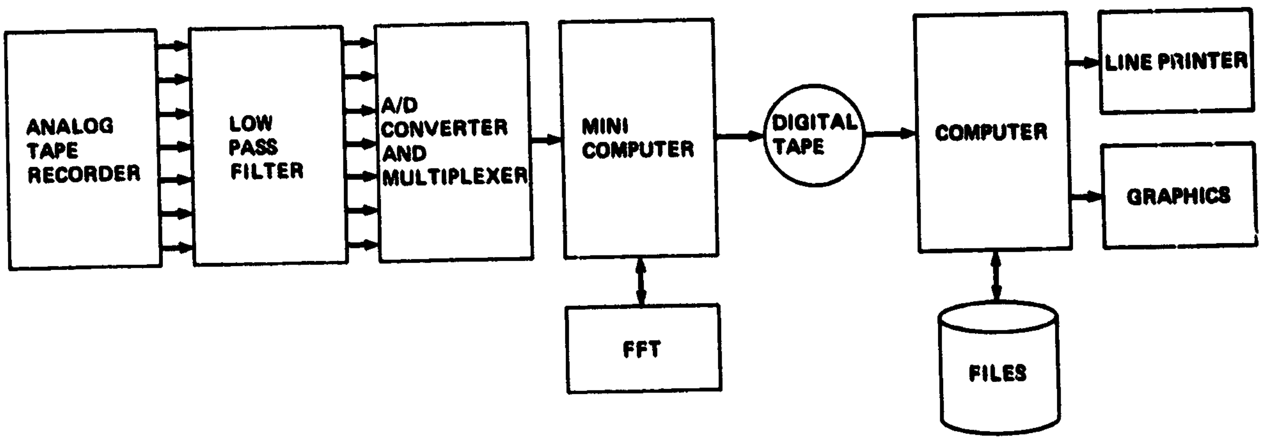

Figure 4.- Schematic of data reduction set-up.

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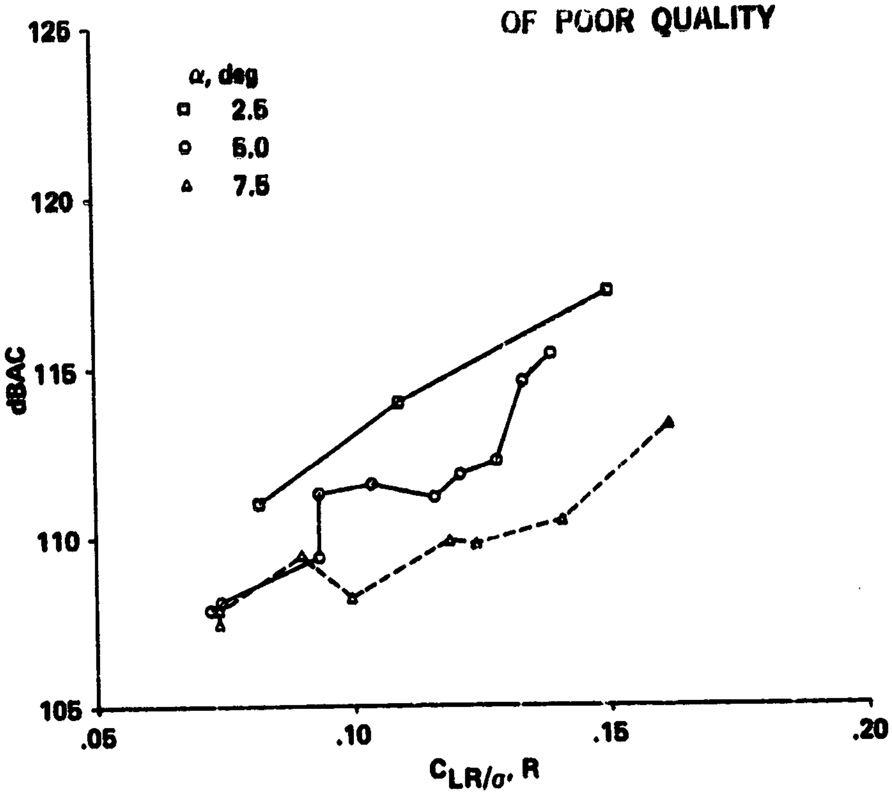
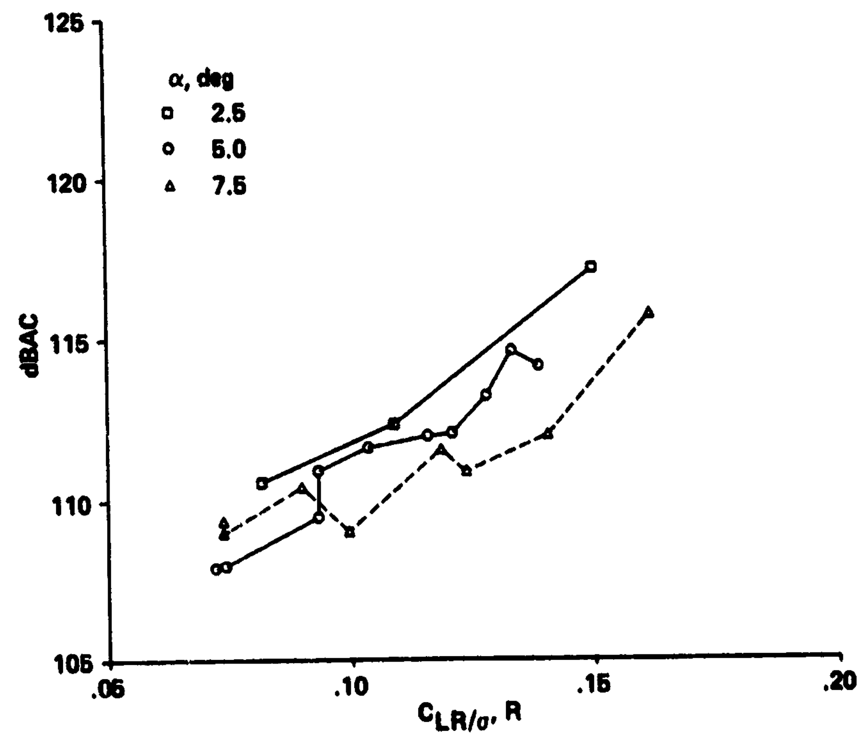


(a) In front of the rotor, microphone 2.



(b) Under the rotor, microphone 4.

Figure 5.- Corrected sound pressure level as a function of isolated rotor lift coefficient, velocity = 89 knots.

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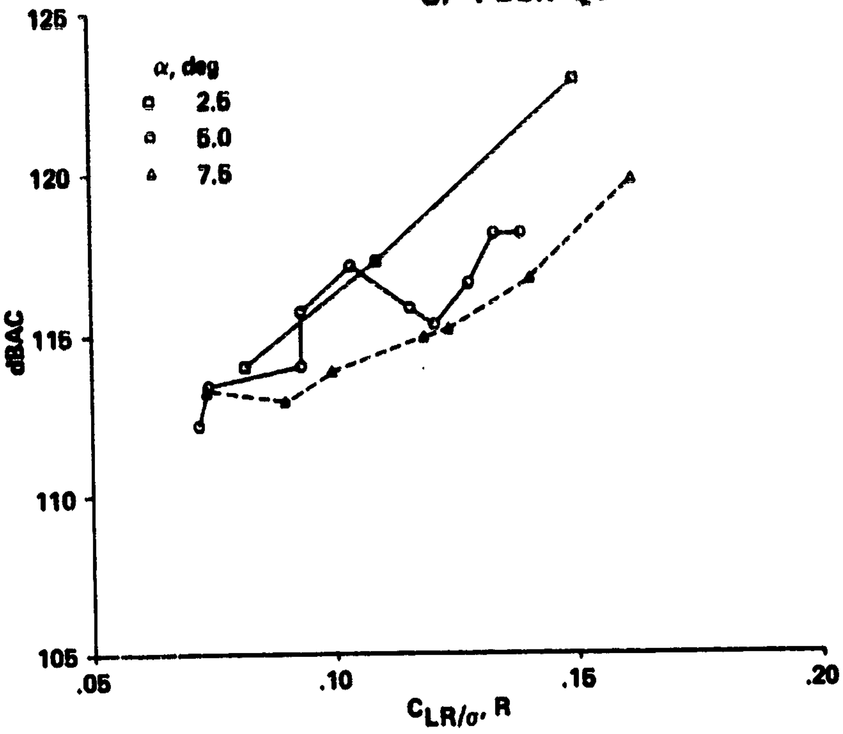
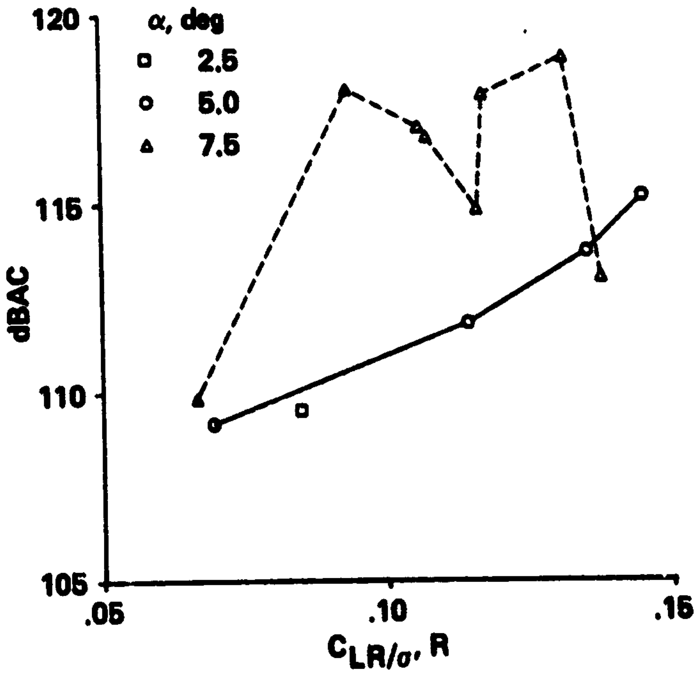


(c) Under the rotor, microphone 7.

Figure 5.- Concluded.



(a) In front of the rotor, microphone 2.

Figure 6.- Corrected sound pressure level as a function of isolated rotor lift coefficient, velocity = 106 knots.

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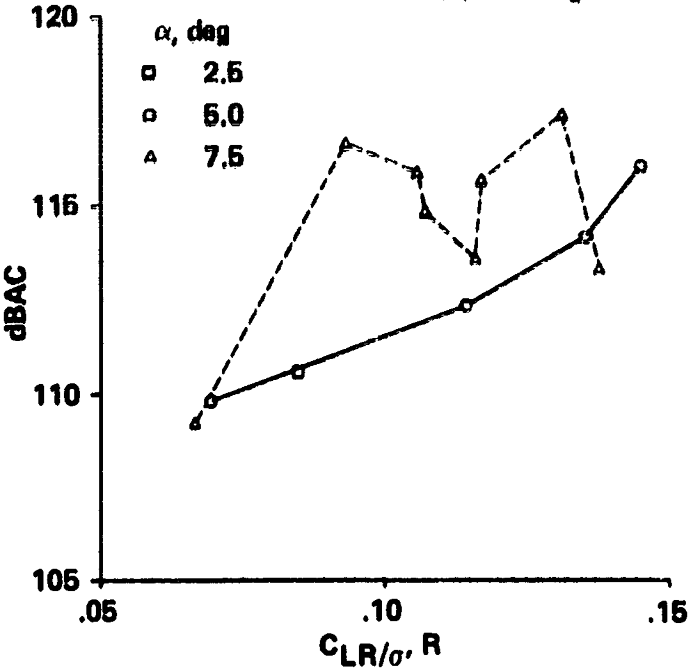
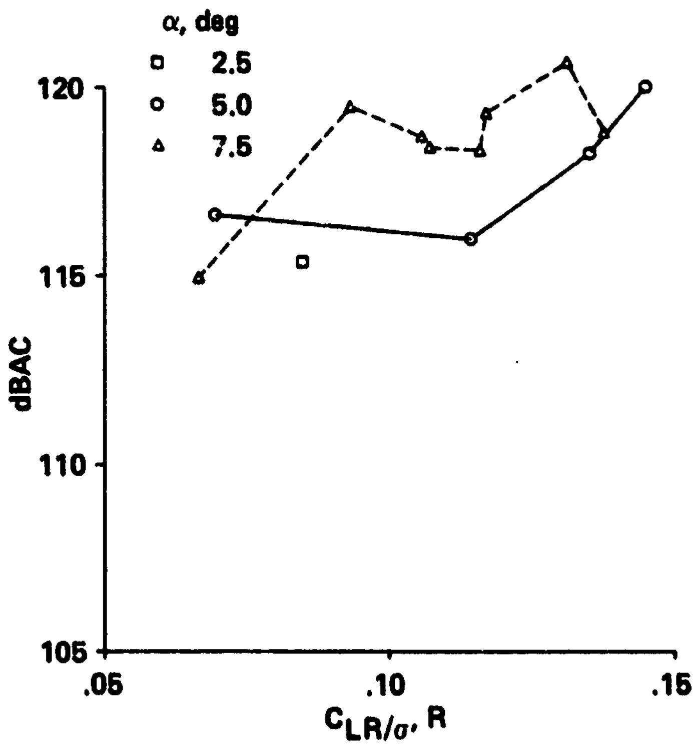
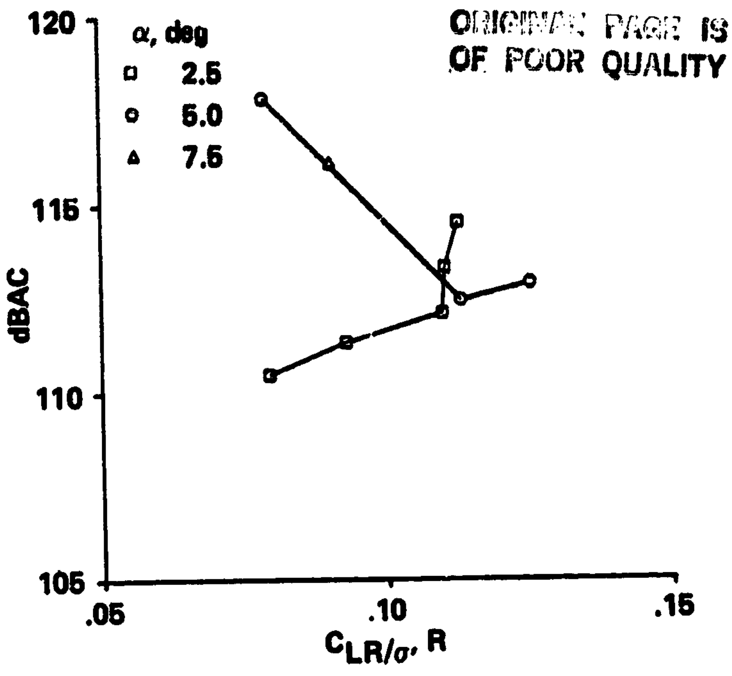


(b) Under the rotor, microphone 4.

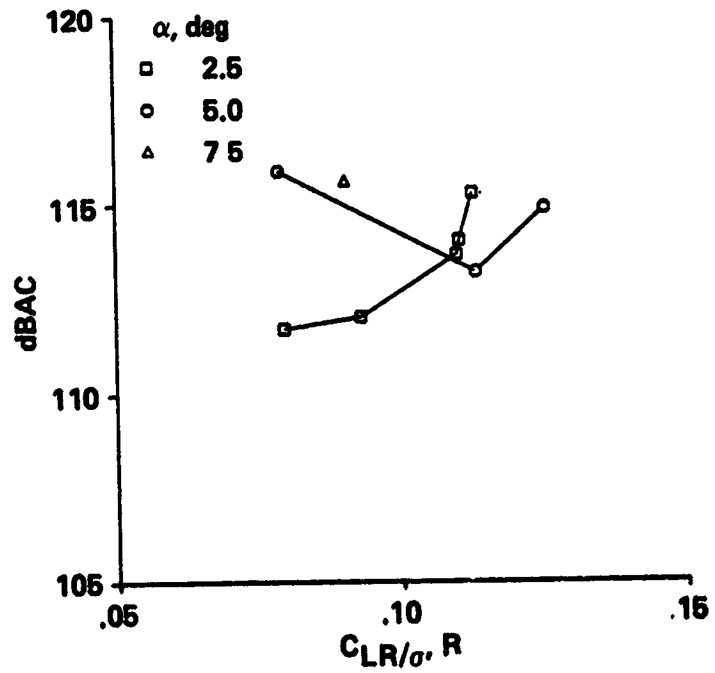


(c) Under the rotor, microphone 7.

Figure 6.- Concluded.

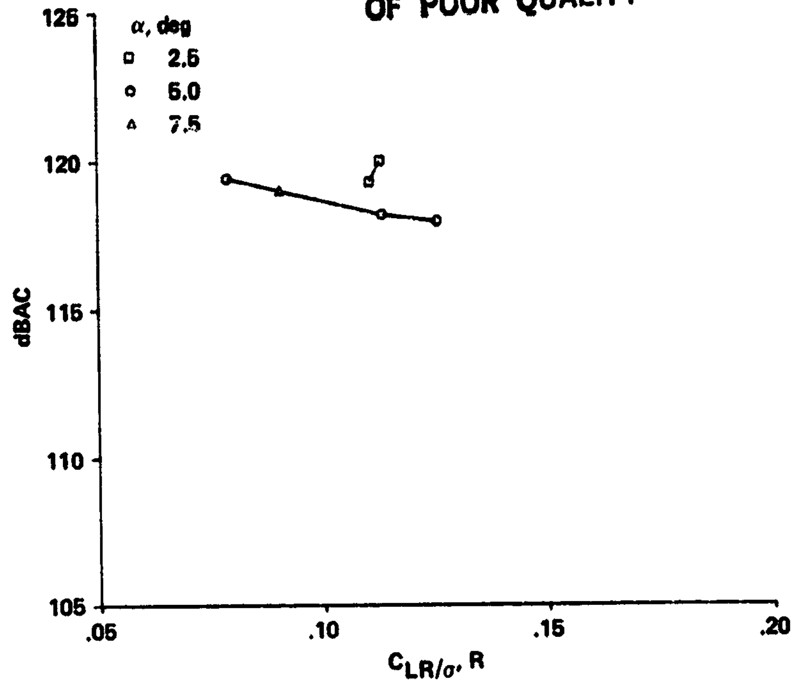


(a) In front of the rotor, microphone 2.



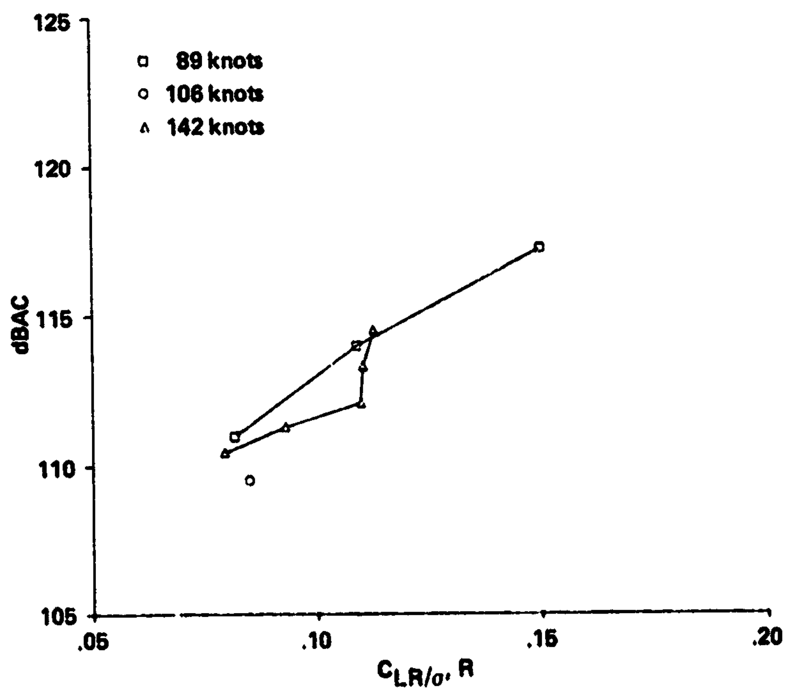
(b) Under the rotor, microphone 4.

Figure 7.- Corrected sound pressure level as a function of isolated rotor lift coefficient, velocity = 142 knots.



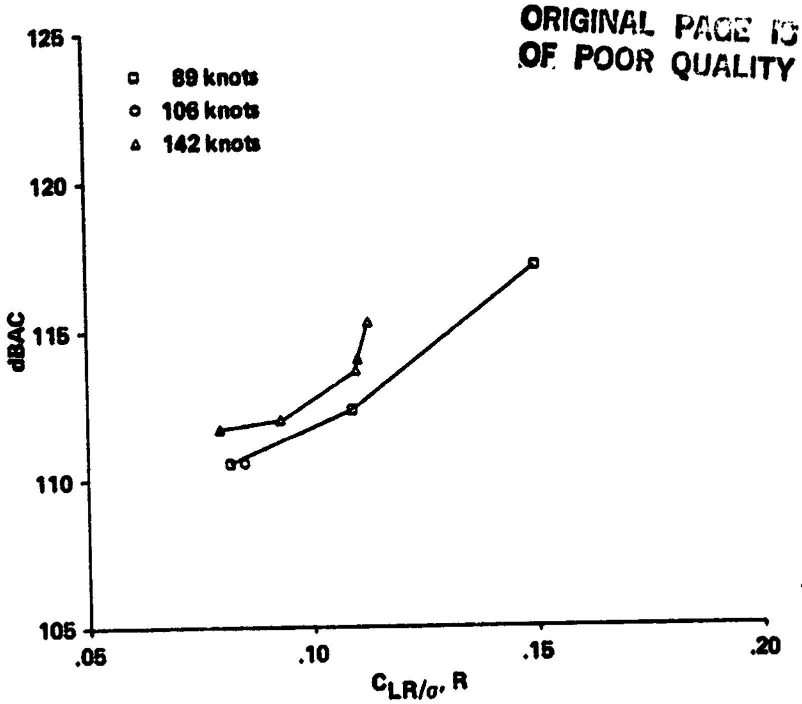
(c) Under the rotor, microphone 7.

Figure 7.- Concluded.

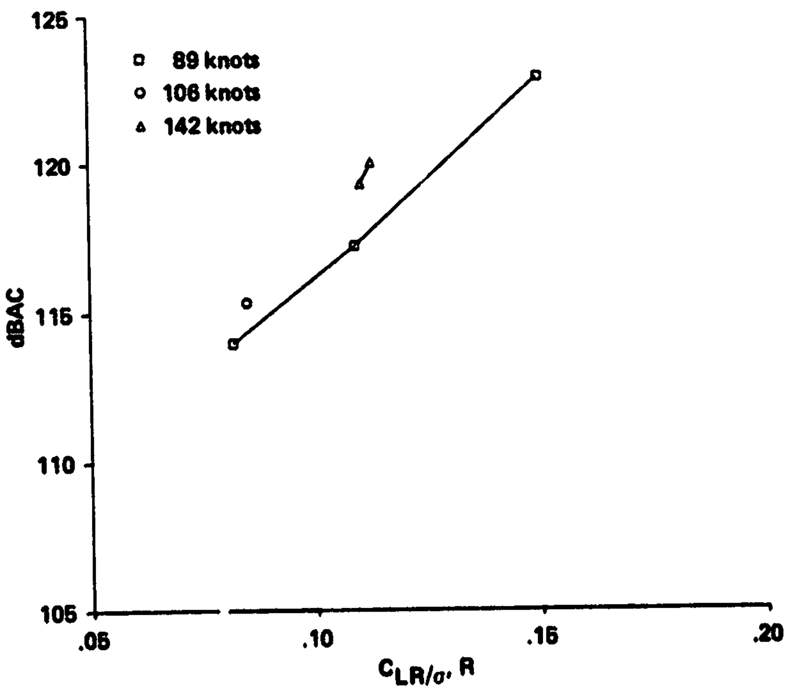


(a) In front of the rotor, microphone 2.

Figure 8.- Corrected sound pressure level as a function of isolated rotor lift coefficient, $\alpha = 2.5°$.

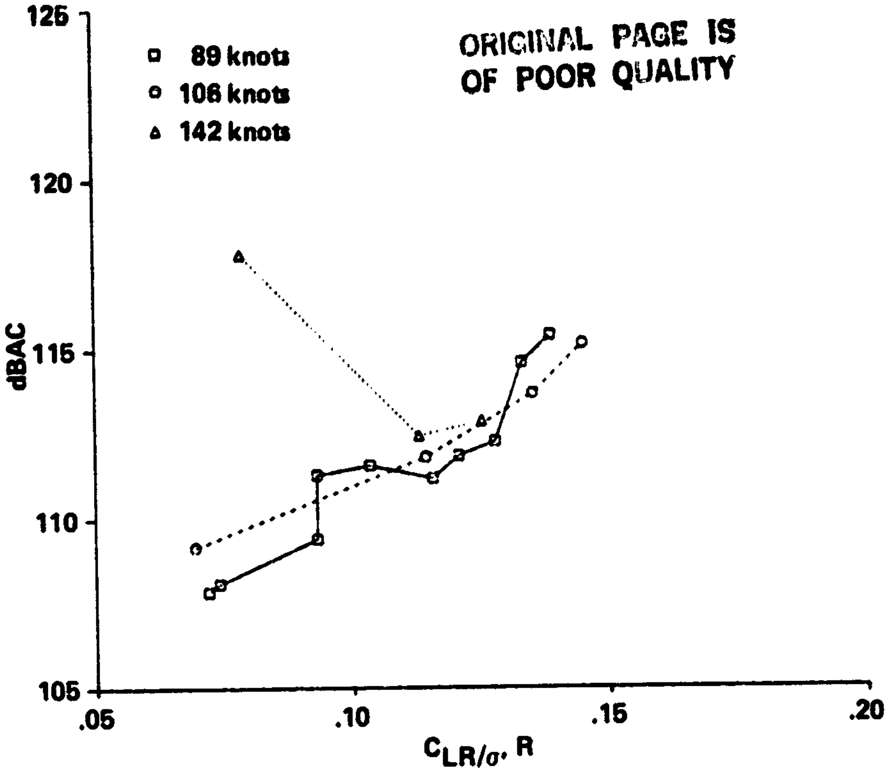


(b) Under the rotor, microphone 4.

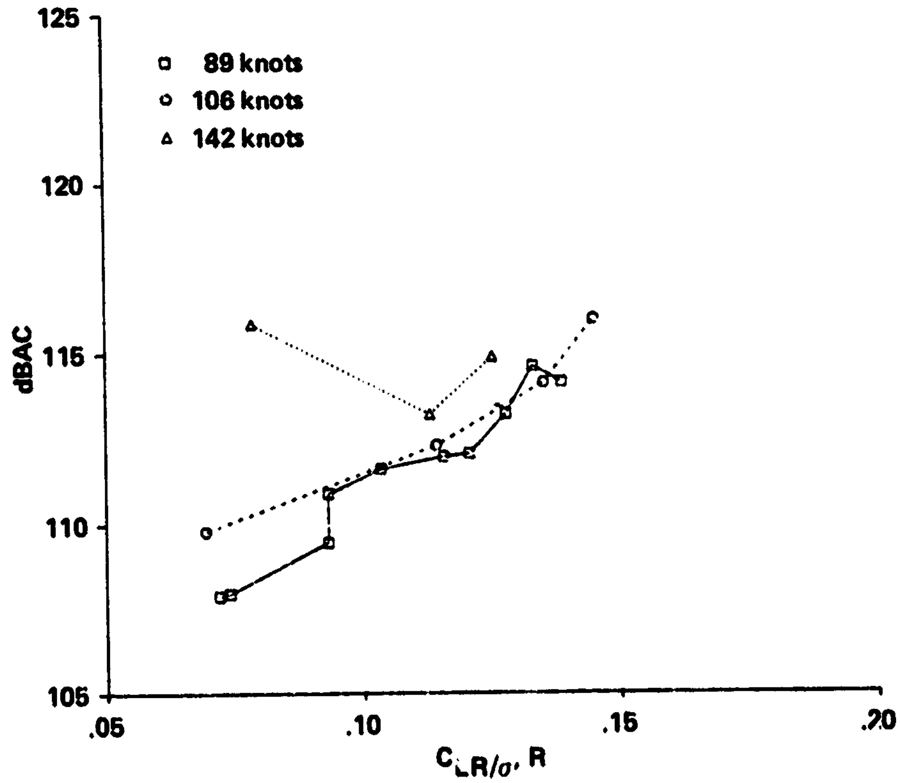


(c) Under the rotor, microphone 7.

Figure 8.- Concluded.



(a) In front of the rotor, microphone 2.



(b) Under the rotor, microphone 4.

Figure 9.- Corrected sound pressure level as a function of isolated rotor lift coefficient, $\alpha = 5.0°$.

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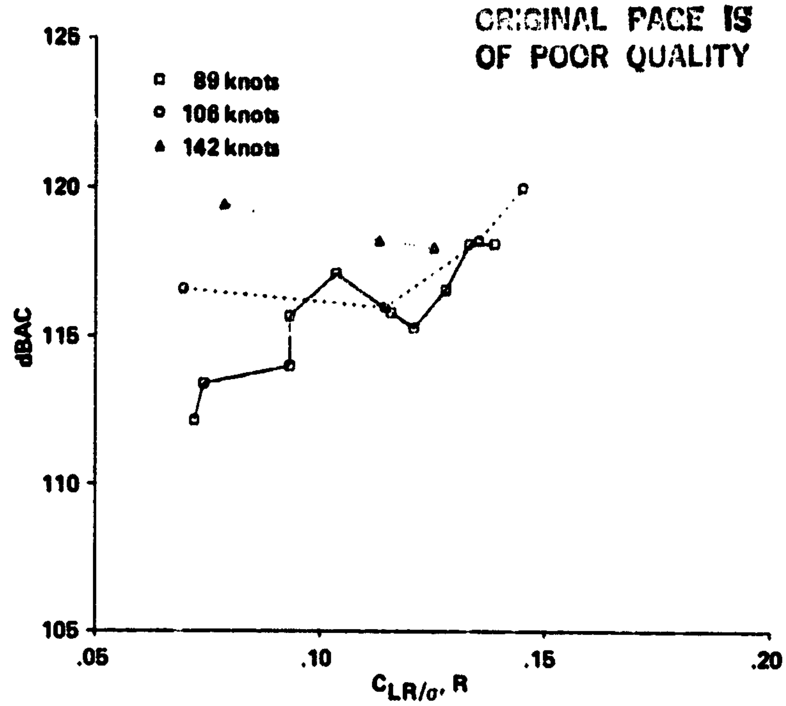
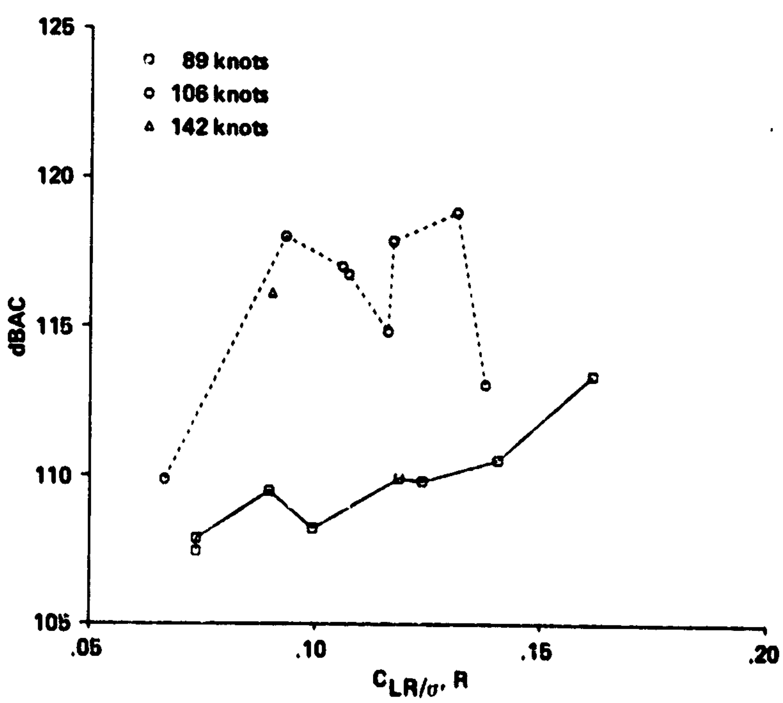


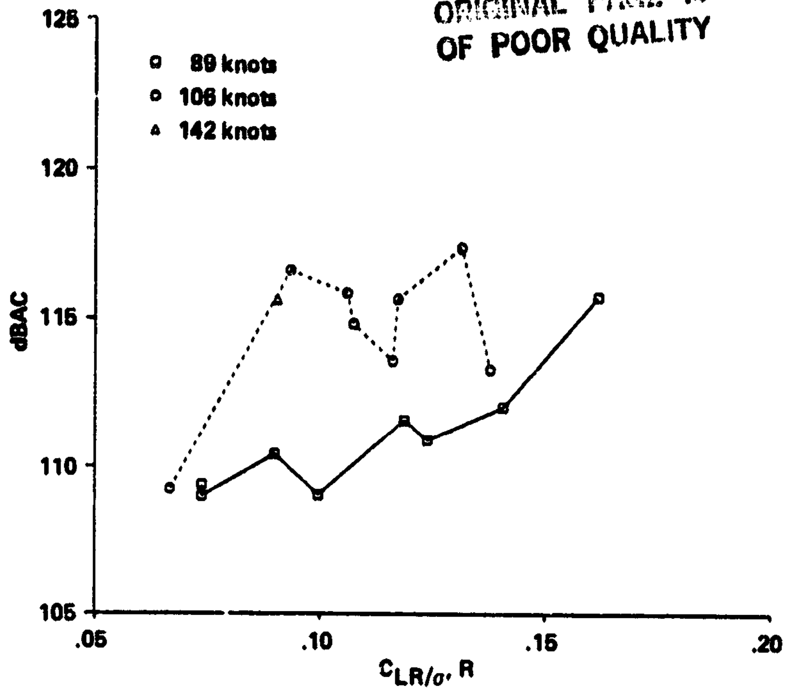
(c) Under the rotor, microphone 7.

Figure 9.- Concluded.

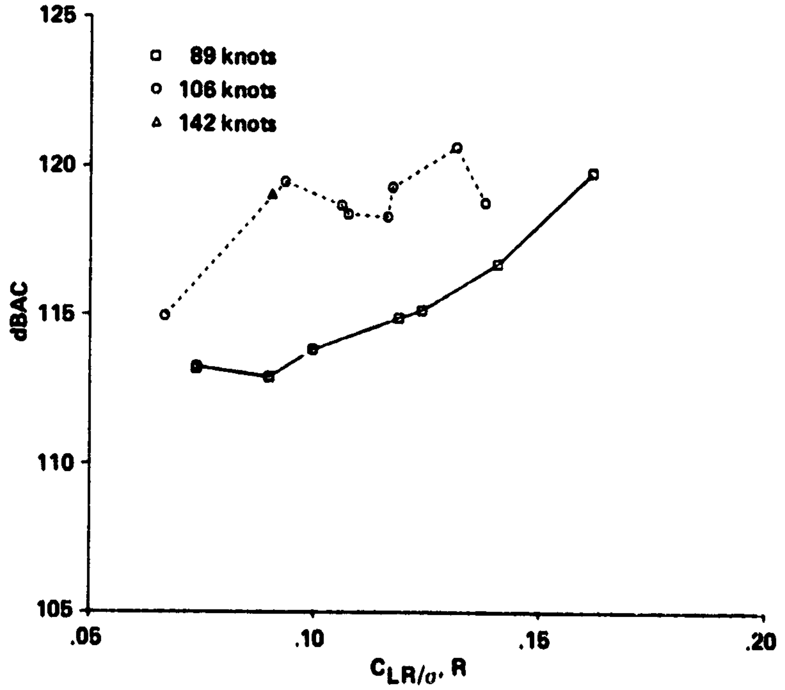


(a) In front of the rotor, microphone 2.

Figure 10.- Corrected sound pressure level as a function of isolated rotor lift coefficient, $\alpha = 7.5°$.



(b) Under the rotor, microphone 4.



(c) Under the rotor, microphone 7.

Figure 10.- Concluded.

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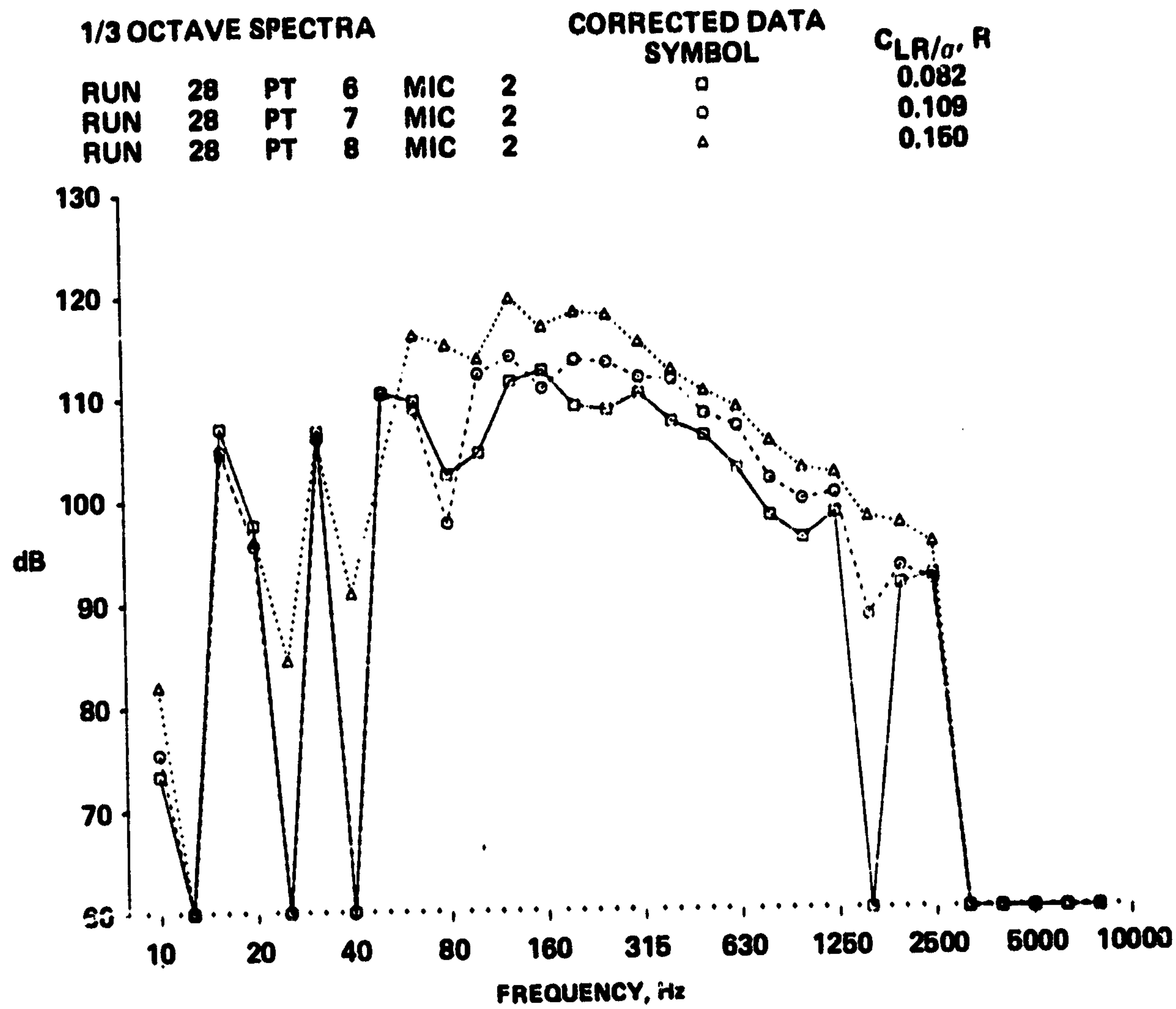

(a) In front of the rotor, microphone 2.

Figure 11.- One-third octave spectra as a function of isolated rotor lift coefficient, velocity = 89 knots, α = 2.5°.

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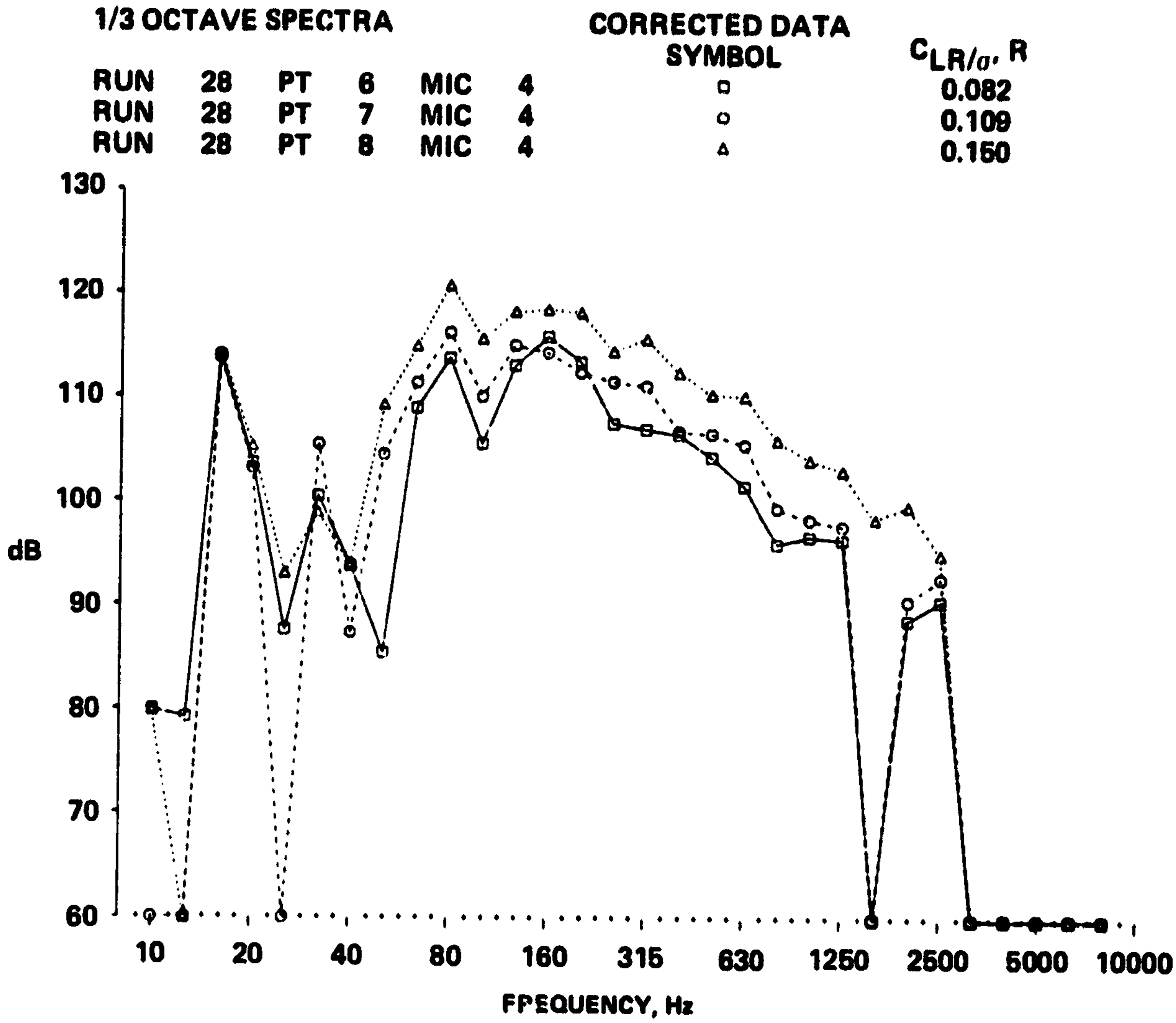
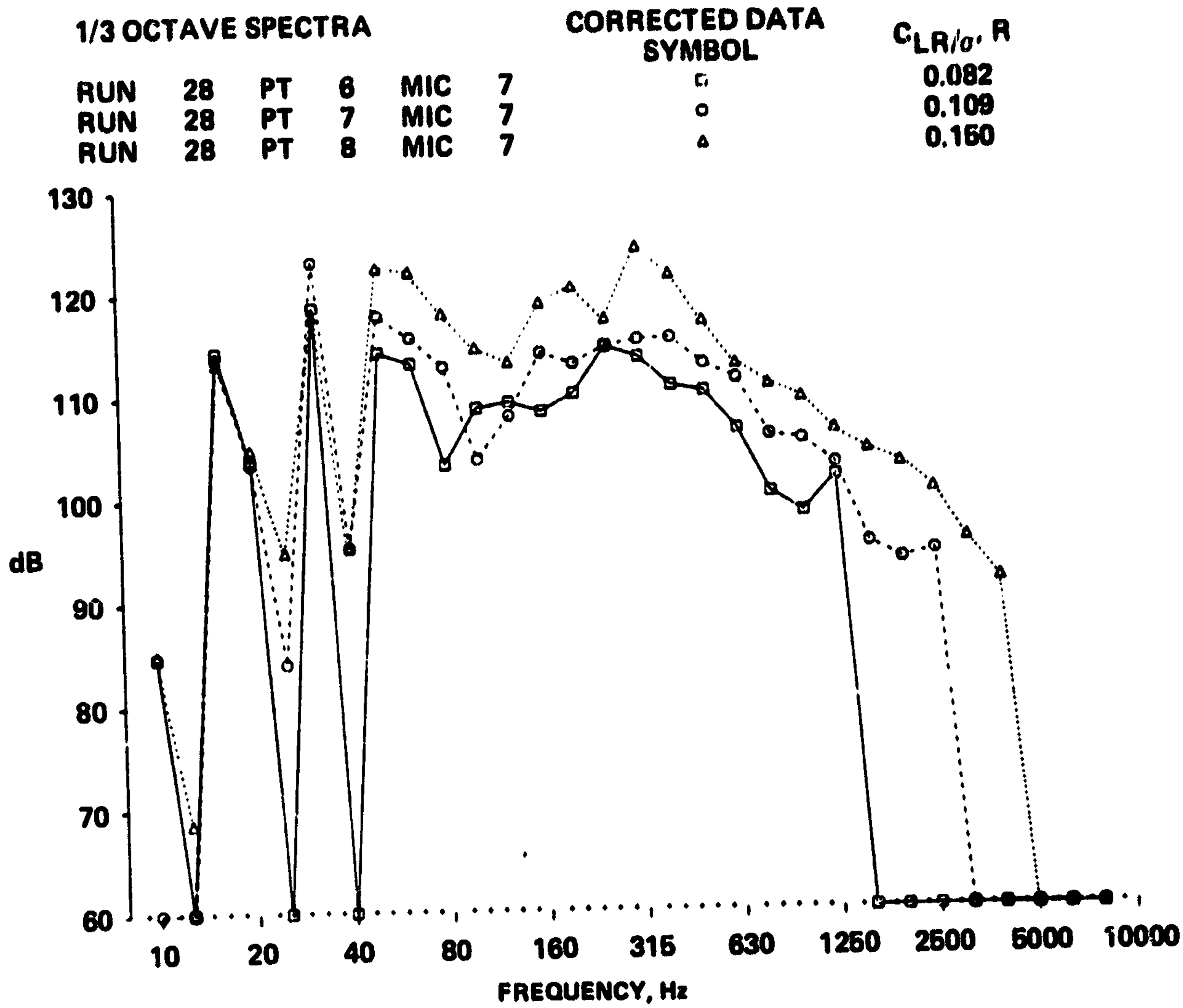


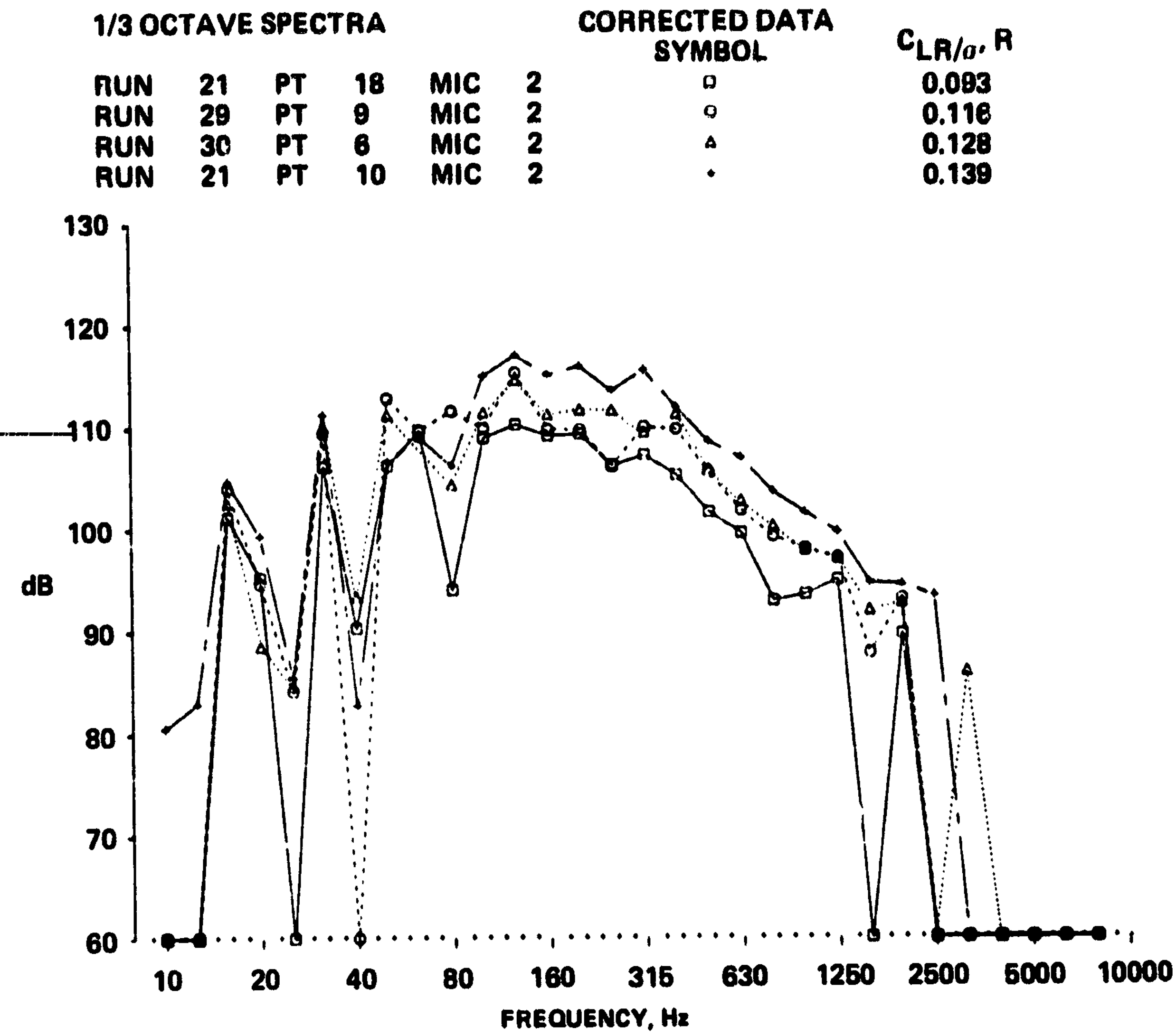
(b) Under the rotor, microphone 4.

Figure 11.- Continued.



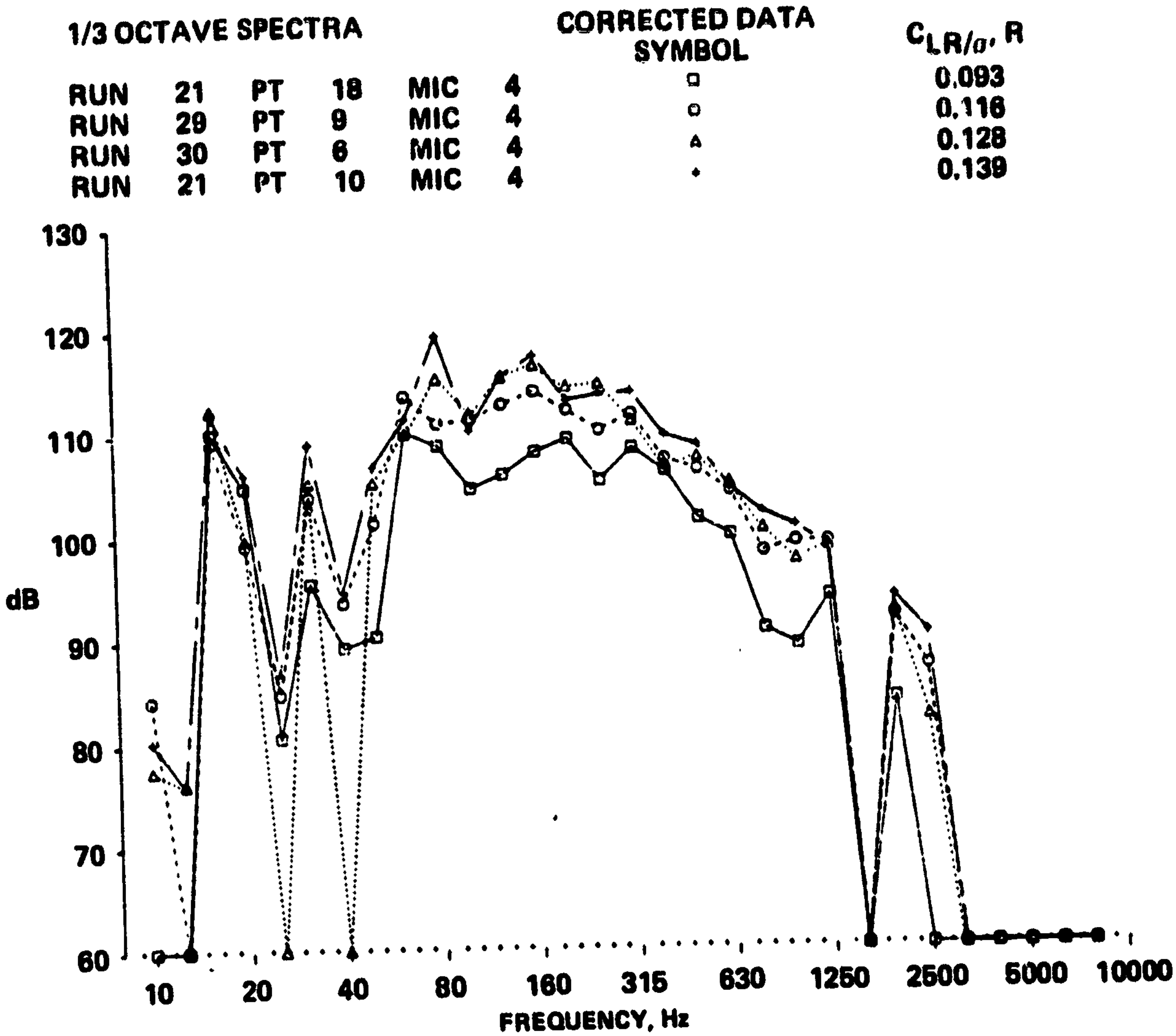
(c) Under the rotor, microphone 7.

Figure 11.- Concluded.



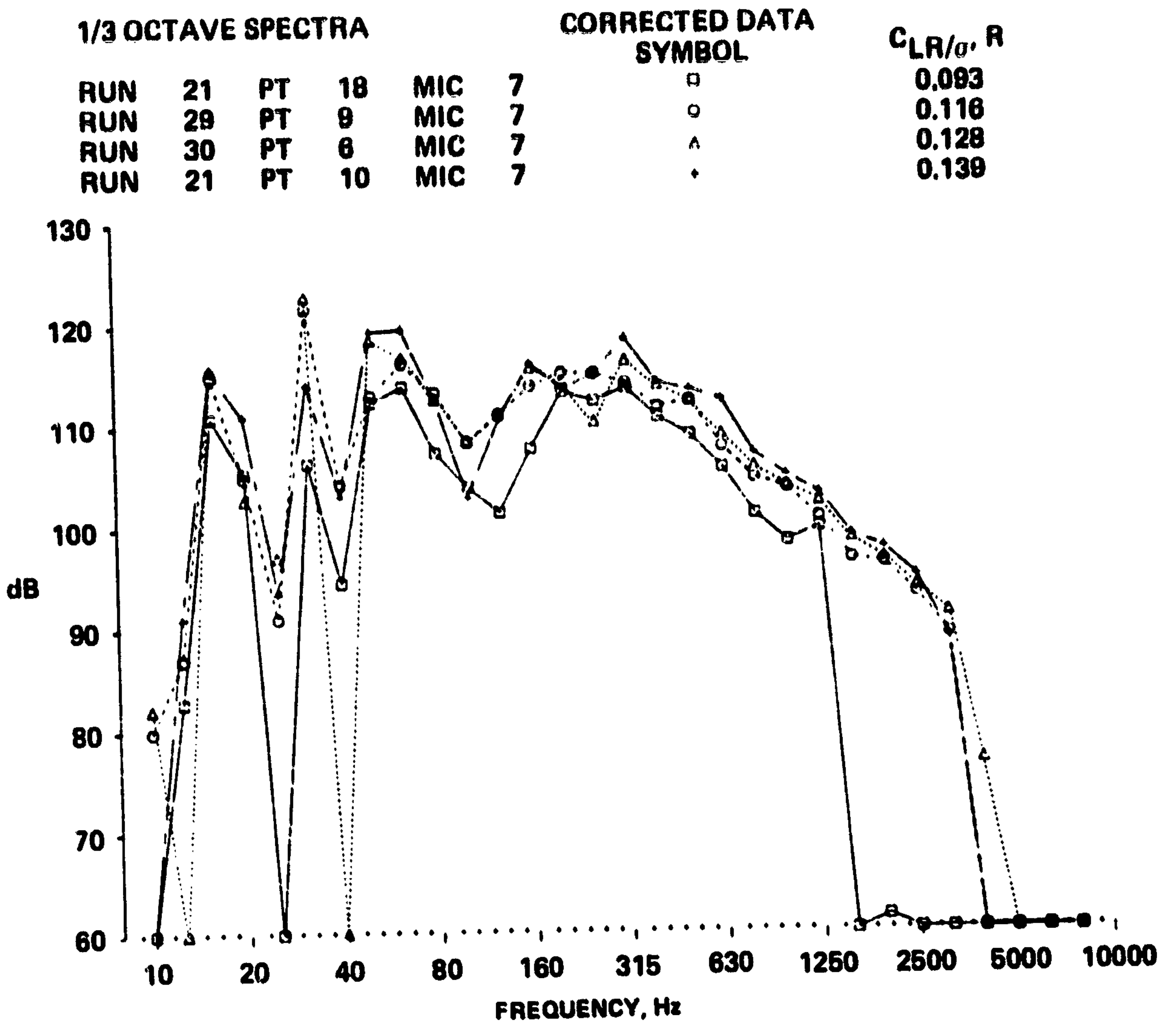
(a) In front of the rotor, microphone 2.

Figure 12.- One-third octave spectra as a function of isolated rotor lift coefficient, velocity = 89 knots, α = 5.0°.



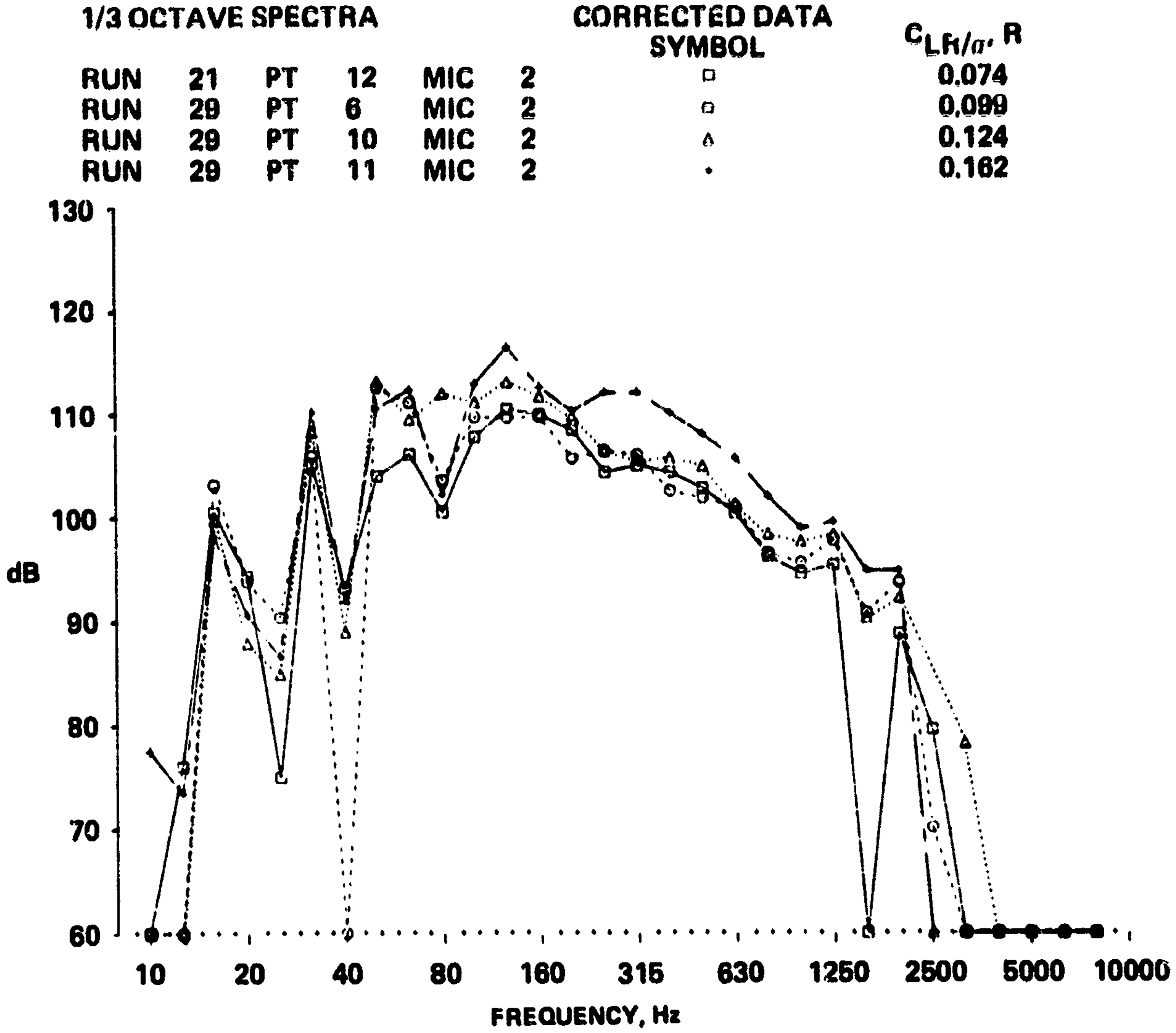
(b) Under the rotor, microphone 4.

Figure 12.- Continued.



(c) Under the rotor, microphone 7.

Figure 12.- Concluded.



(a) In front of the rotor, microphone 2.

Figure 13.- One-third octave spectra as a function of isolated rotor lift coefficient, velocity = 89 knots, α = 7.5°.

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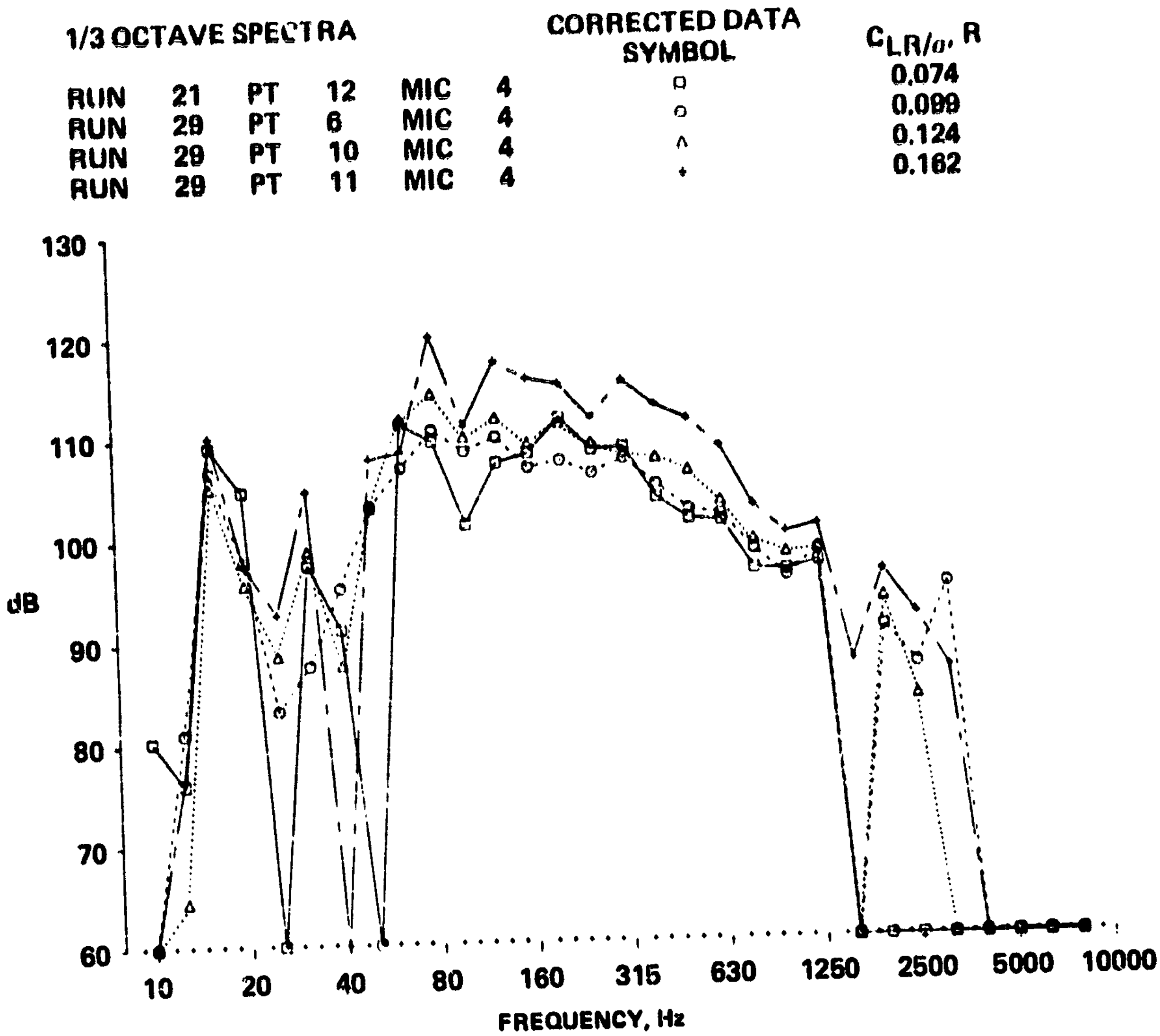
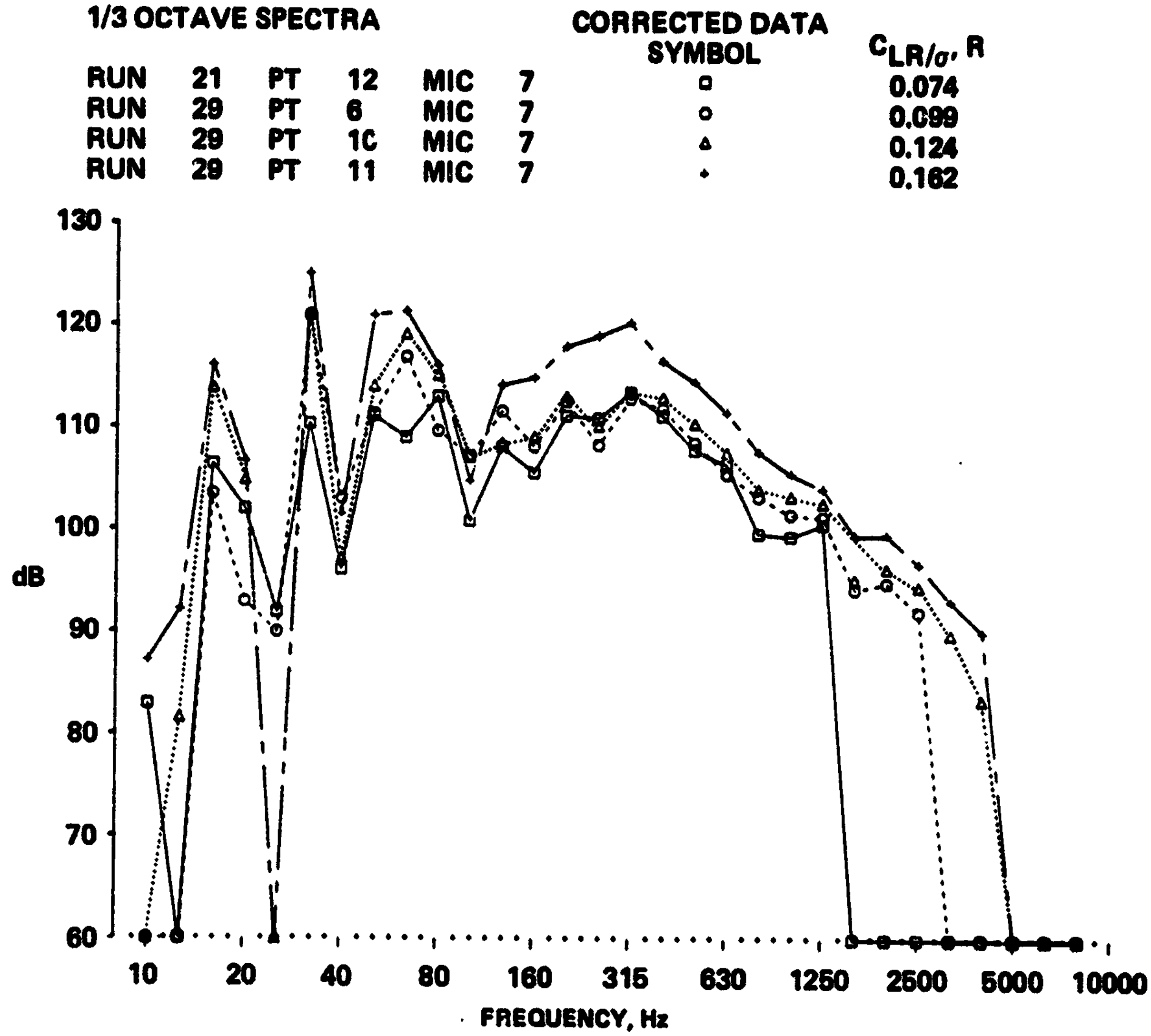


(b) Under the rotor, microphone 4.

Figure 13.- Continued.



(c) Under the rotor, microphone 7.

Figure 13.- Concluded.

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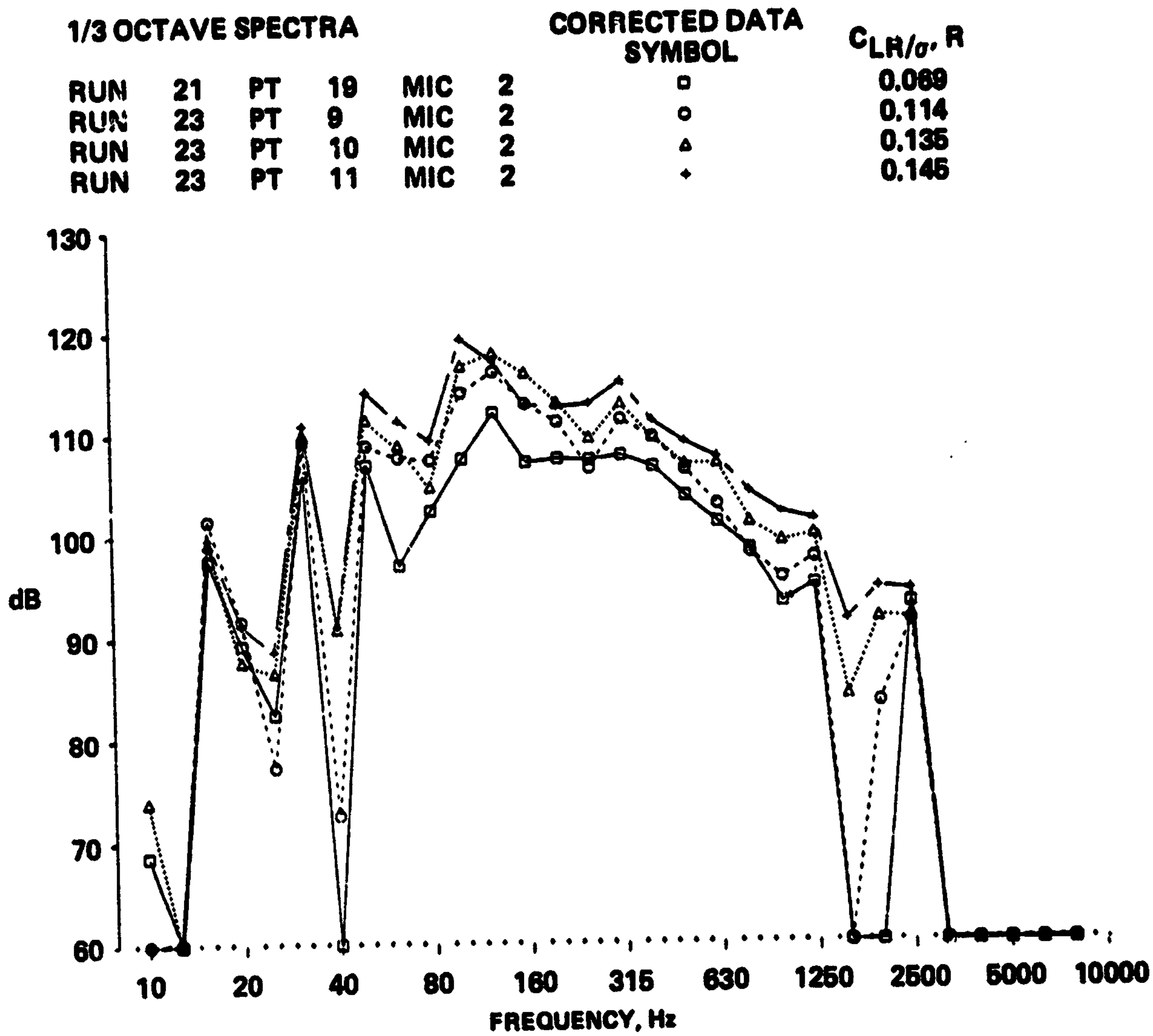

(a) In front of the rotor, microphone 2.

Figure 14.- One-third octave spectra as a function of isolated rotor lift coefficient, velocity = 106 knots, α = 5.0°.

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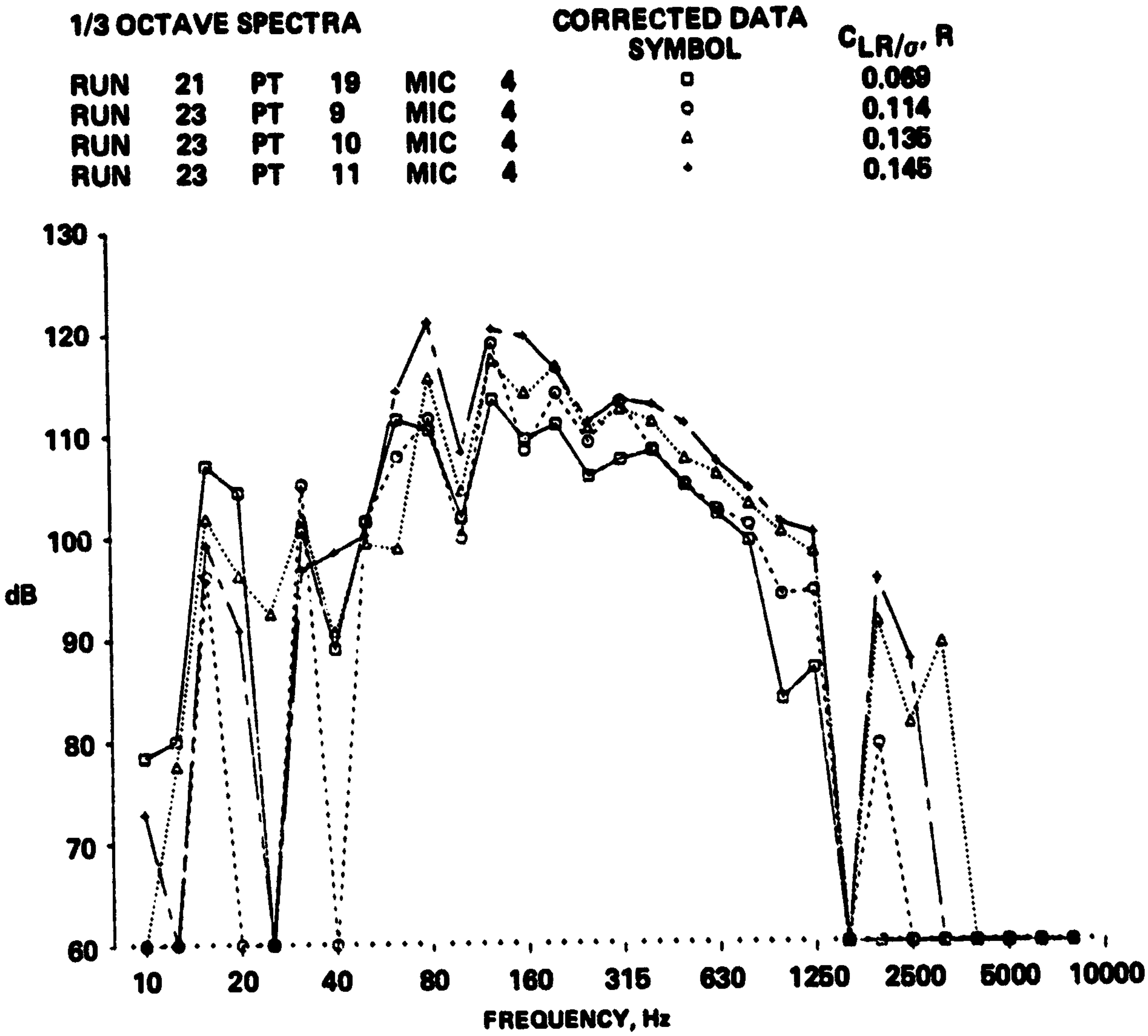

(b) Under the rotor, microphone 4.

Figure 14.- Continued.

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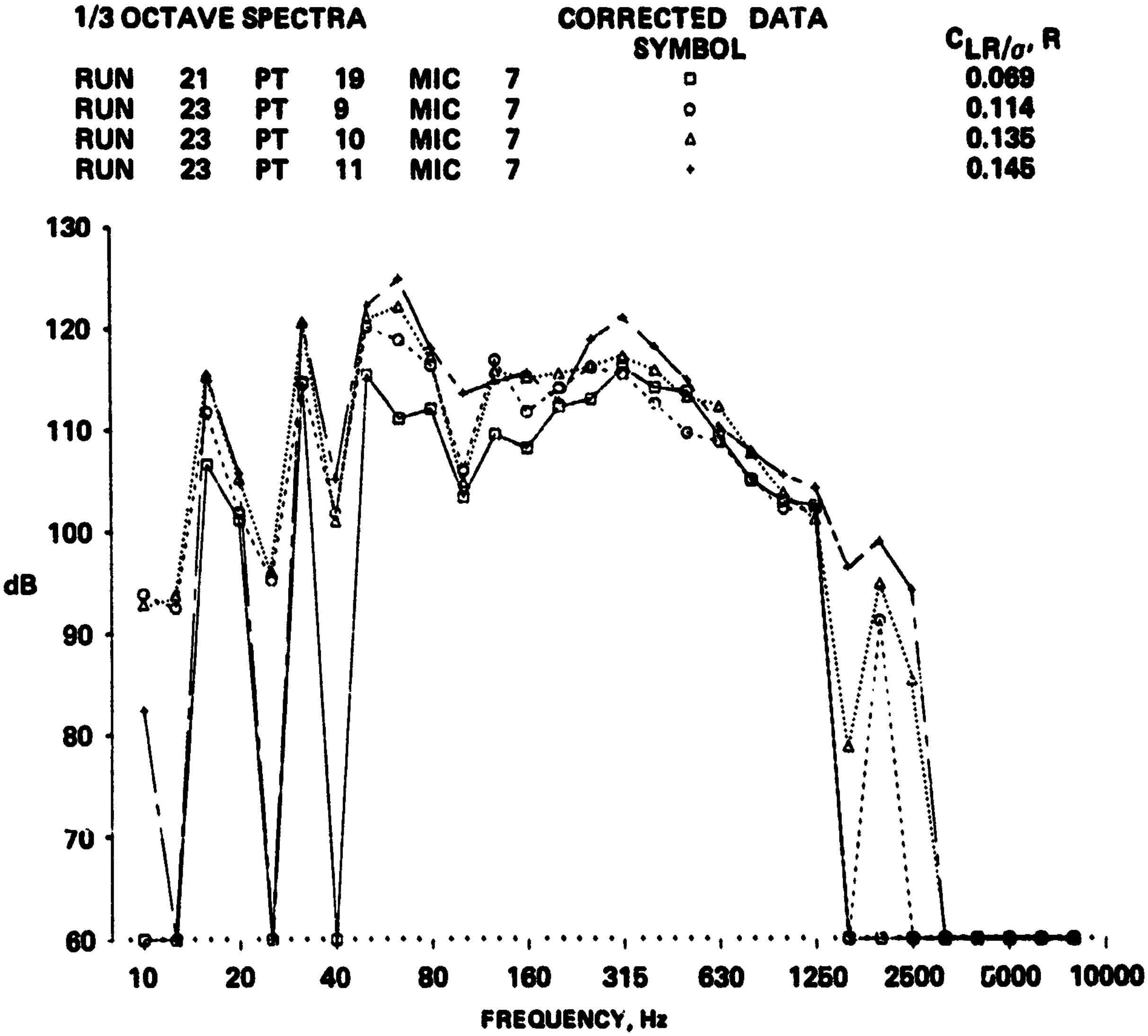

(c) Under the rotor, microphone 7.

Figure 14.- Concluded.

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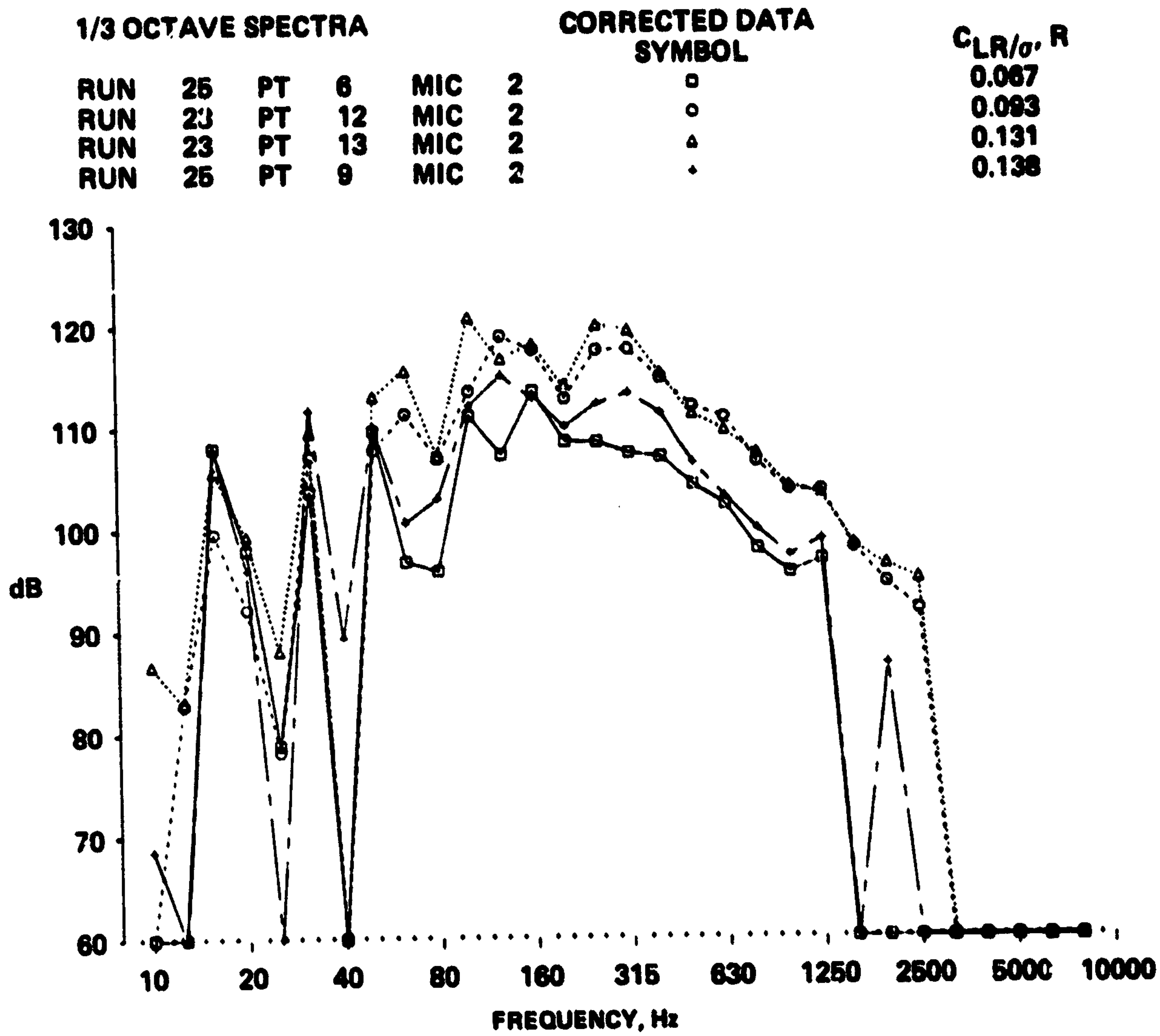

(a) In front of the rotor, microphone 2.

Figure 15.- One-third octave spectra as a function of isolated rotor lift coefficient, velocity = 106 knots, α = 7.5°.

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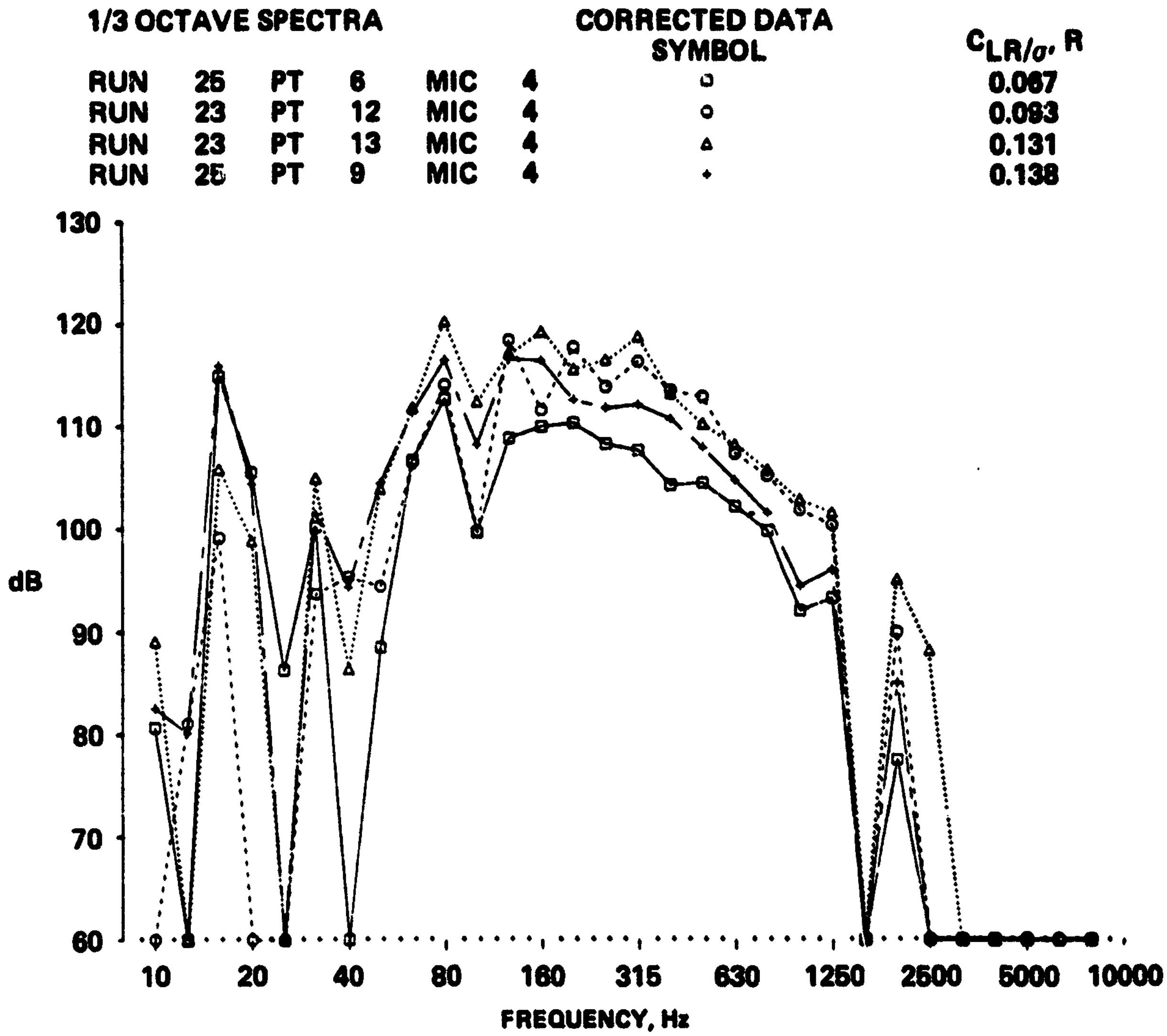

(b) Under the rotor, microphone 4.

Figure 15.- Continued.

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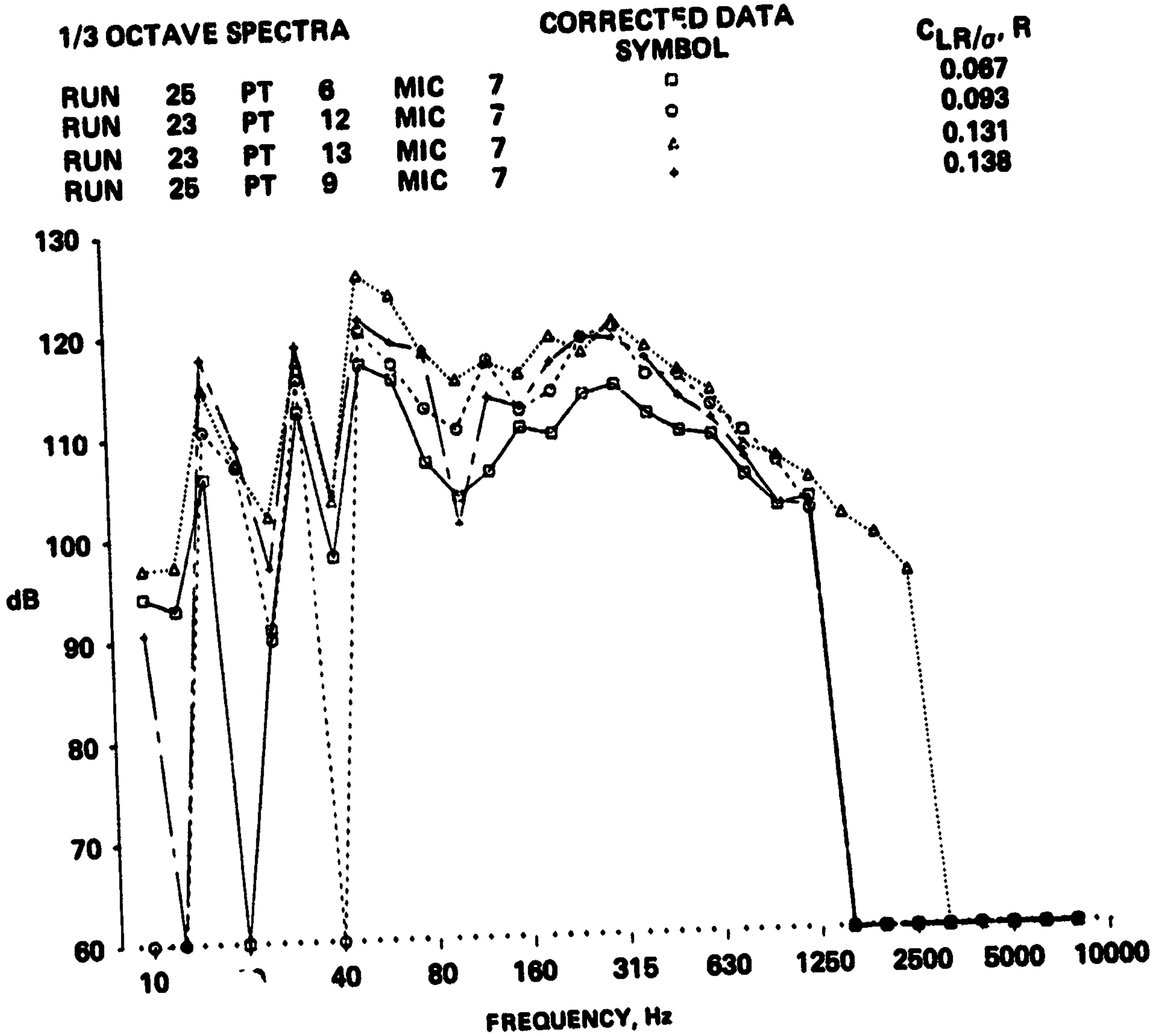
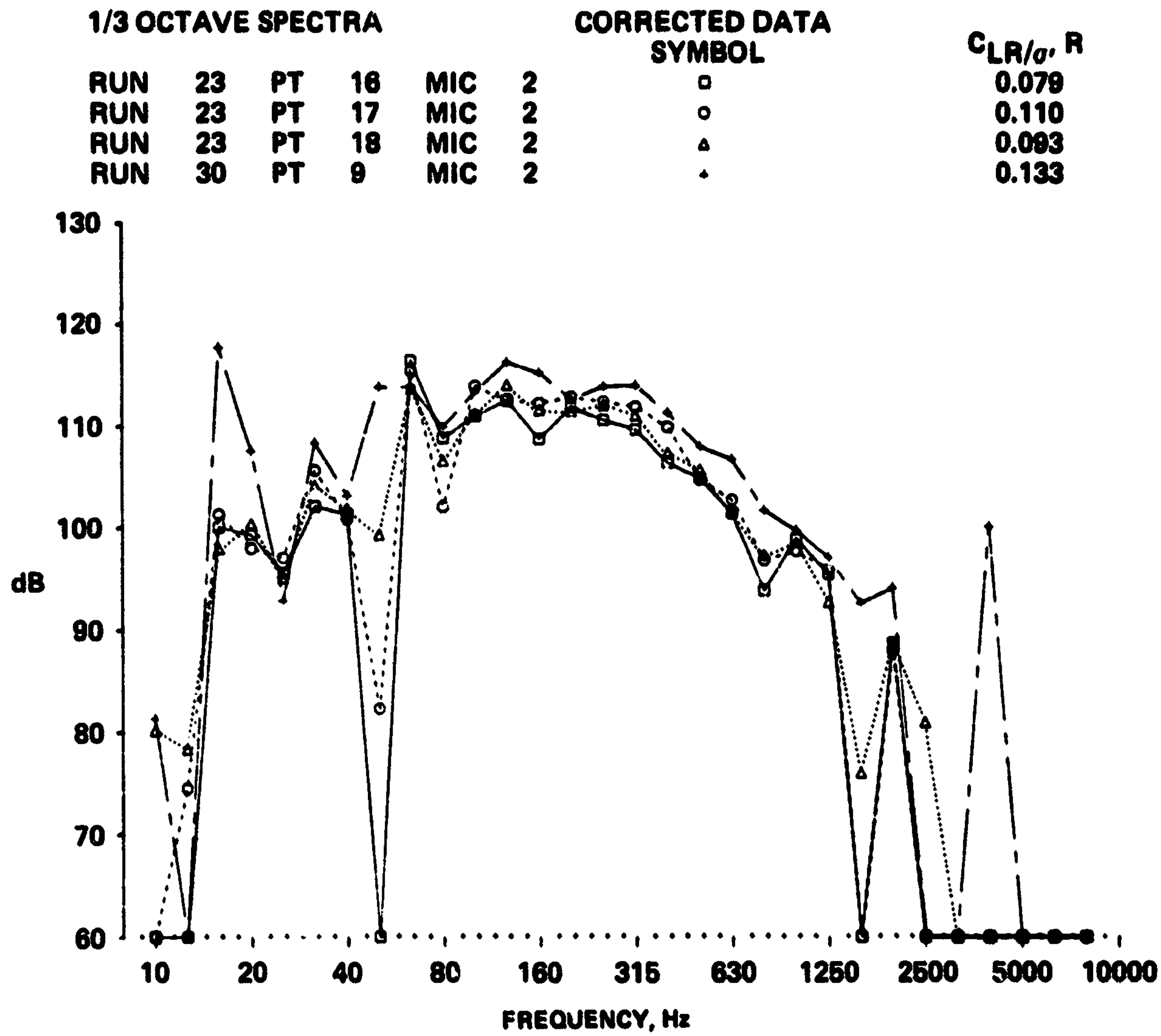


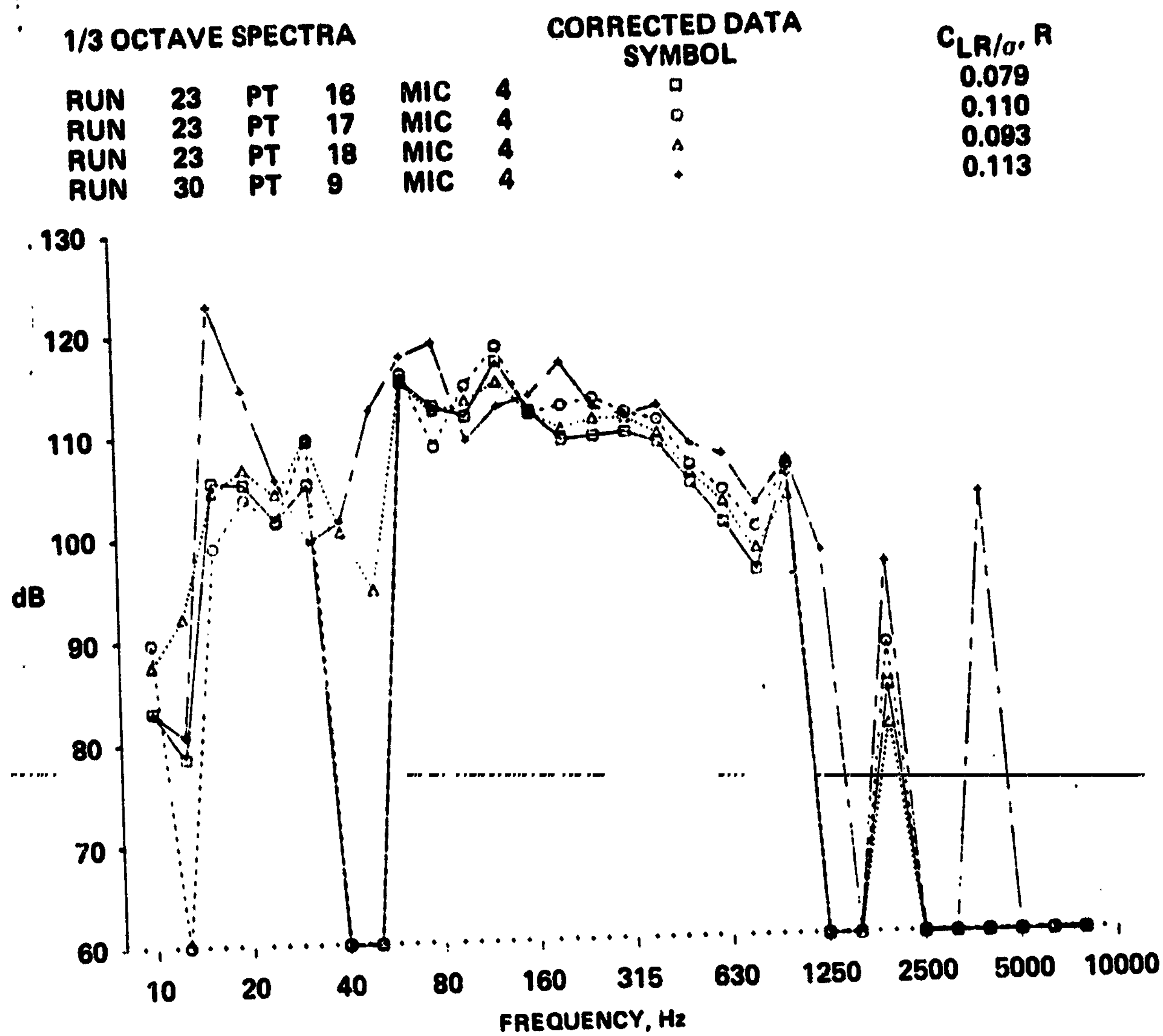
(c) Under the rotor, microphone 7.

Figure 15.- Concluded.



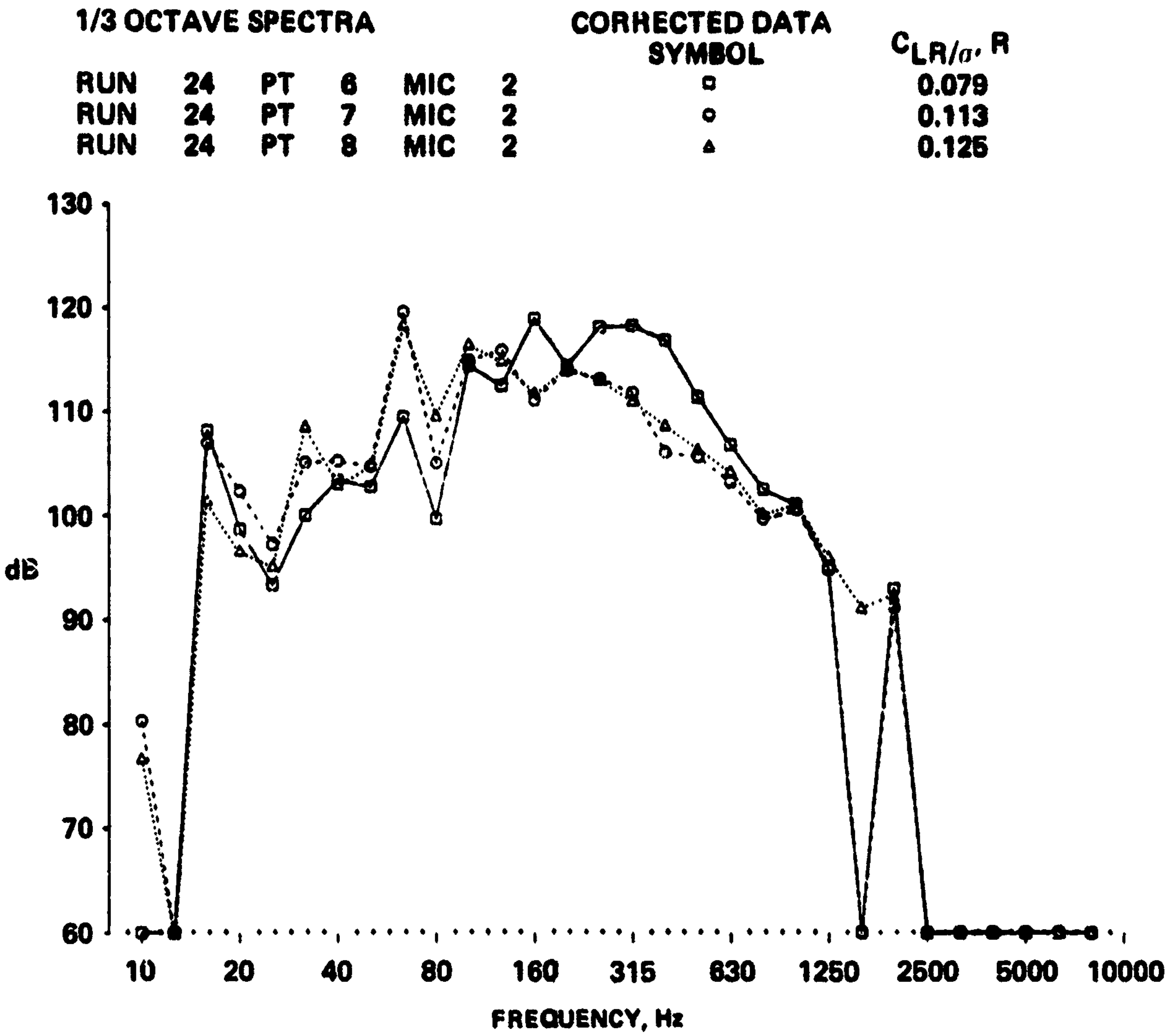
(a) In front of the rotor, microphone 2.

Figure 16.- One-third octave spectra as a function of isolated rotor lift coefficient, velocity = 142 knots, α = 2.5°.



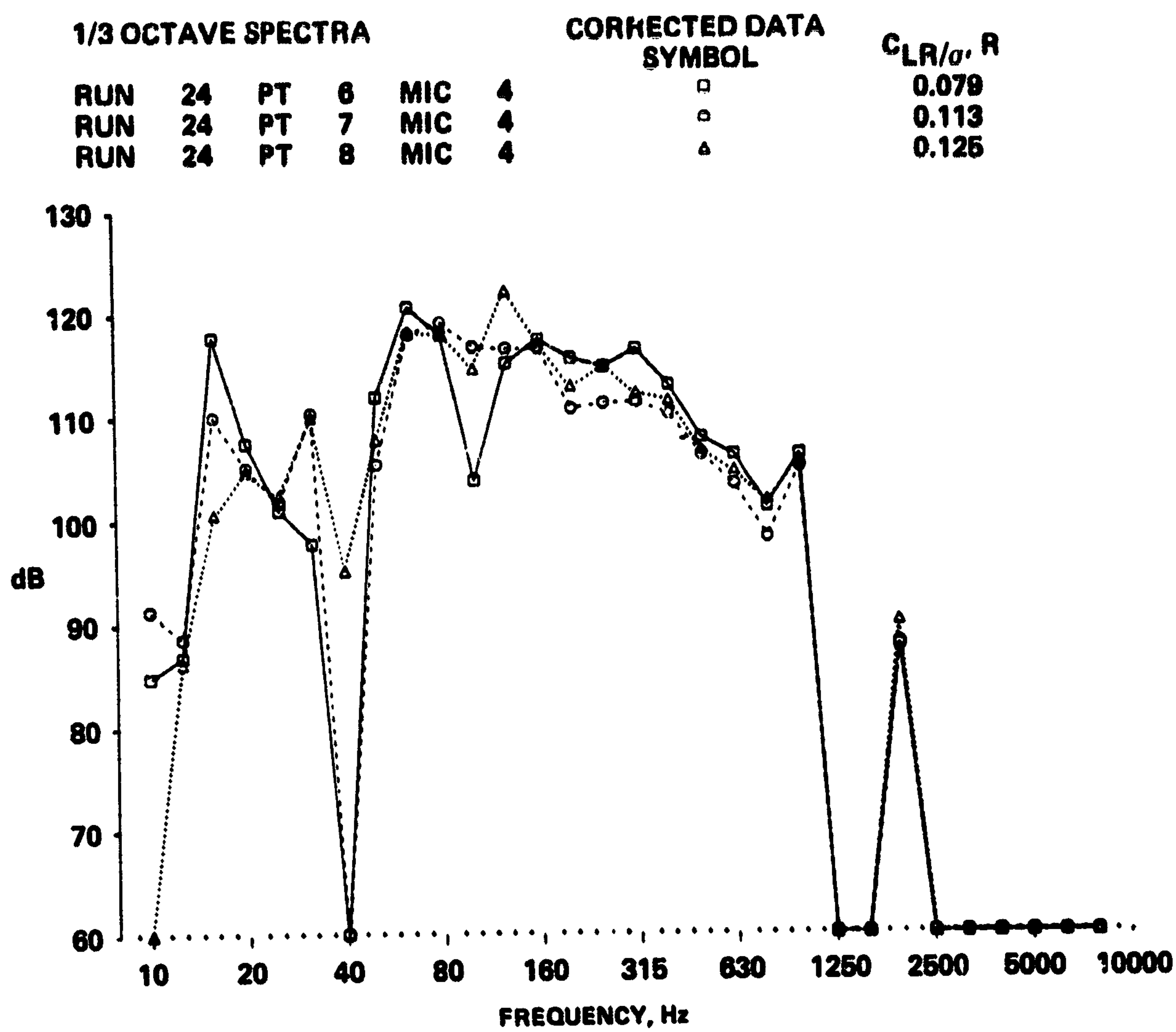
(b) Under the rotor, microphone 4.

Figure 16.- Concluded.



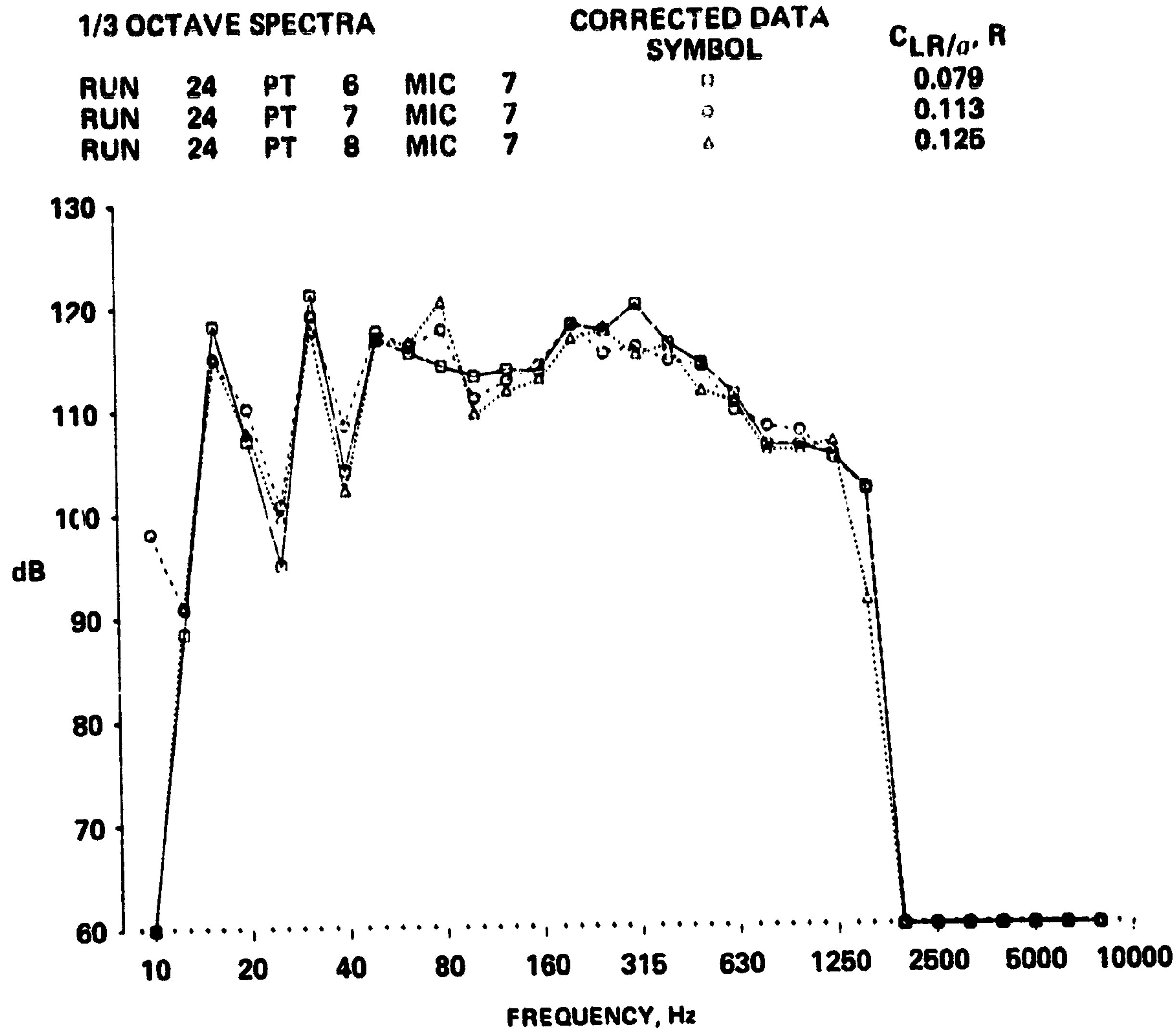
(a) In front of the rotor, microphone 2.

Figure 17.- One-third octave spectra as a function of isolated rotor lift coefficient, velocity = 142 knots, α = 5.0°.



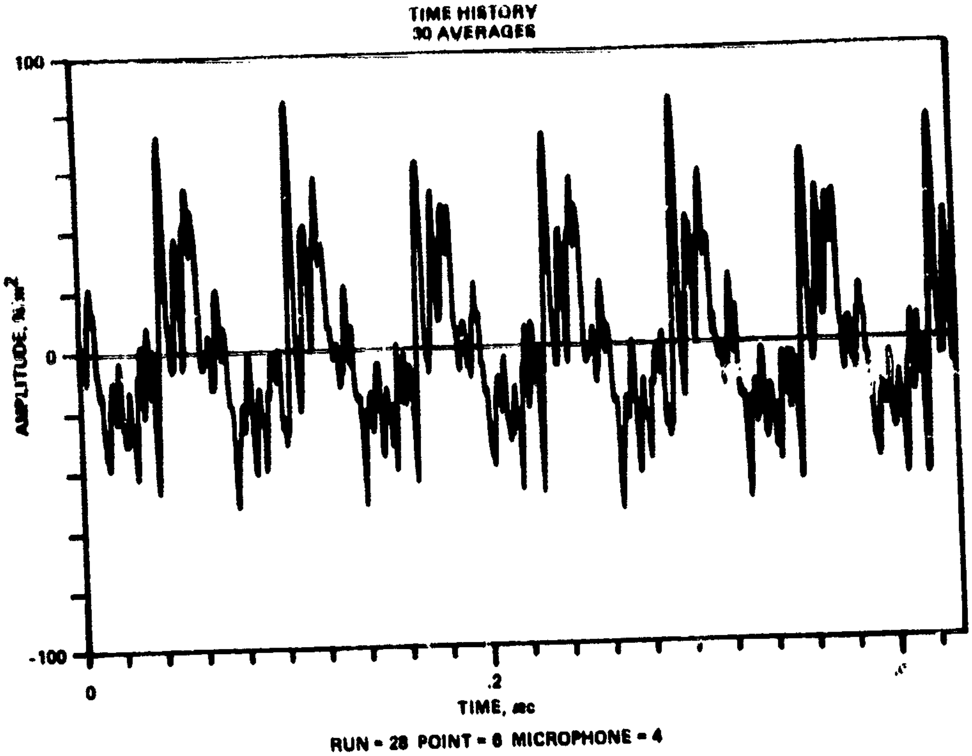
(b) Under the rotor, microphone 4.

Figure 17.- Continued.

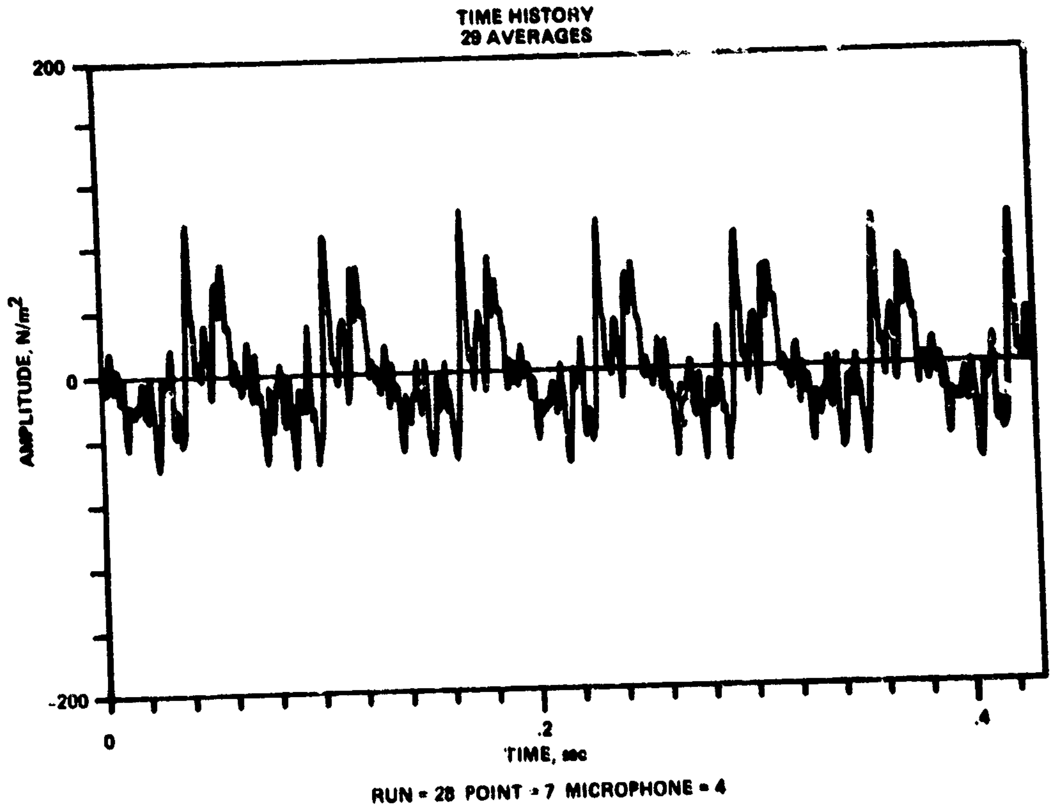


(c) Under the rotor, microphone 7.

Figure 17.- Concluded.

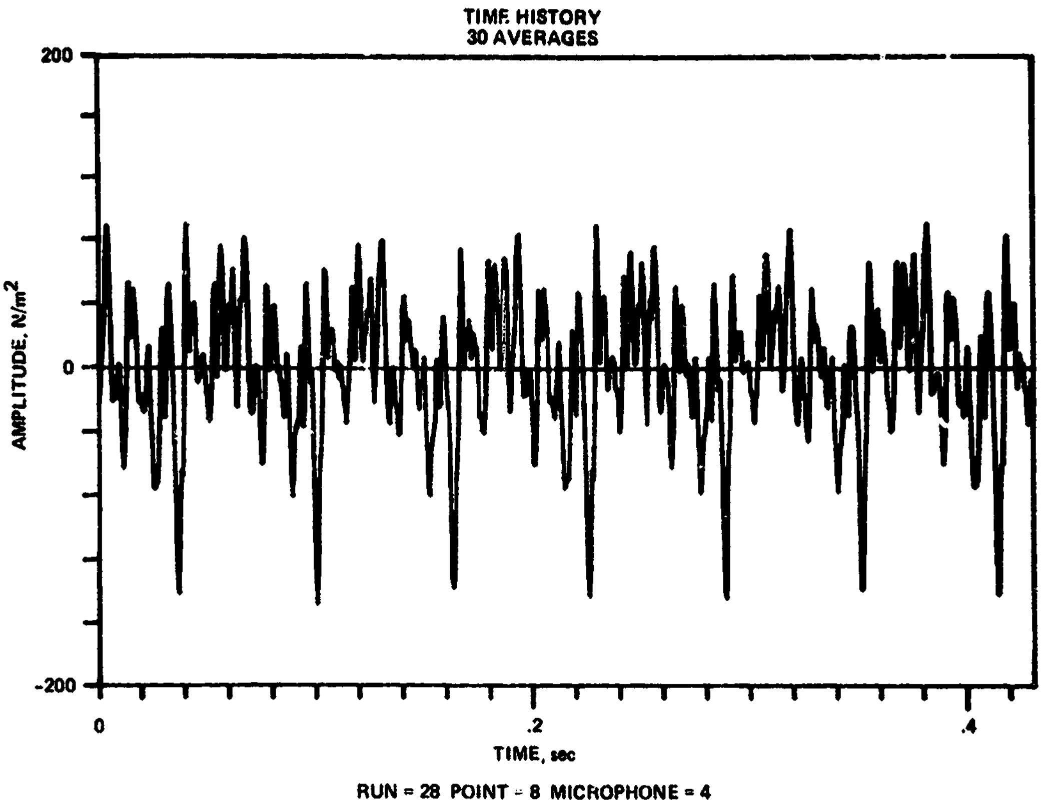


(a) $C_{LR/\sigma,R}$ = 0.082.



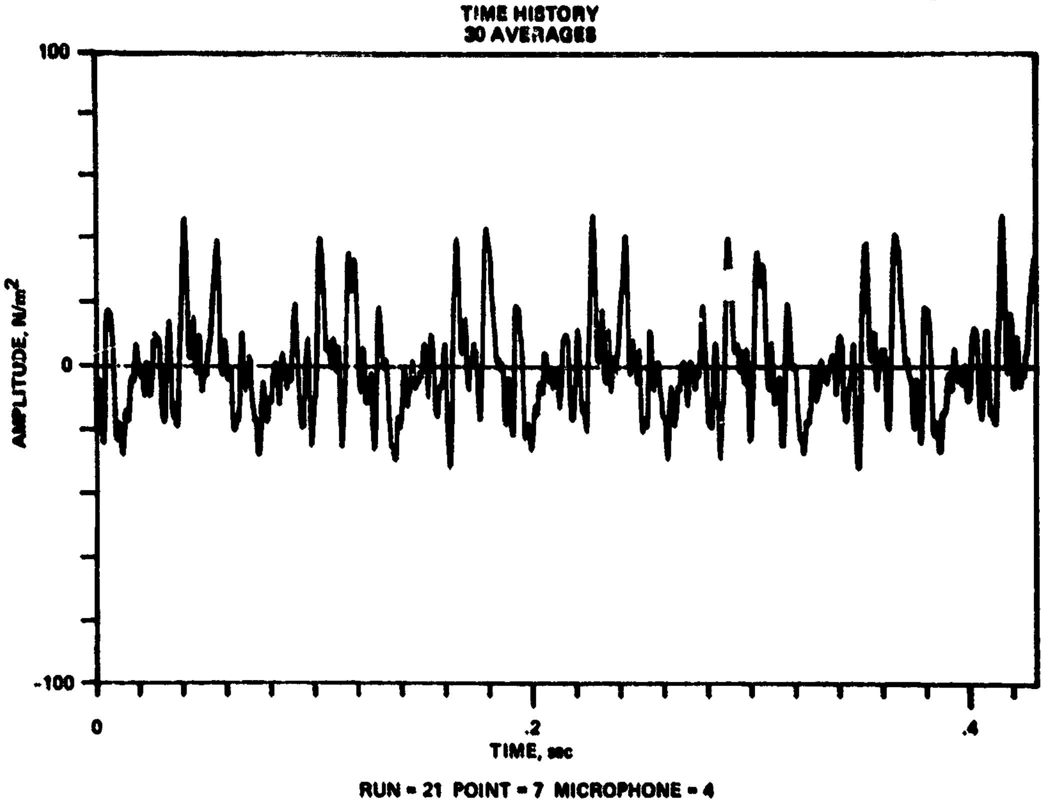
(b) $C_{LR/\sigma,R}$ = 0.109.

Figure 18.- Averaged time histories, velocity = 89 knots, α = 2.5°.

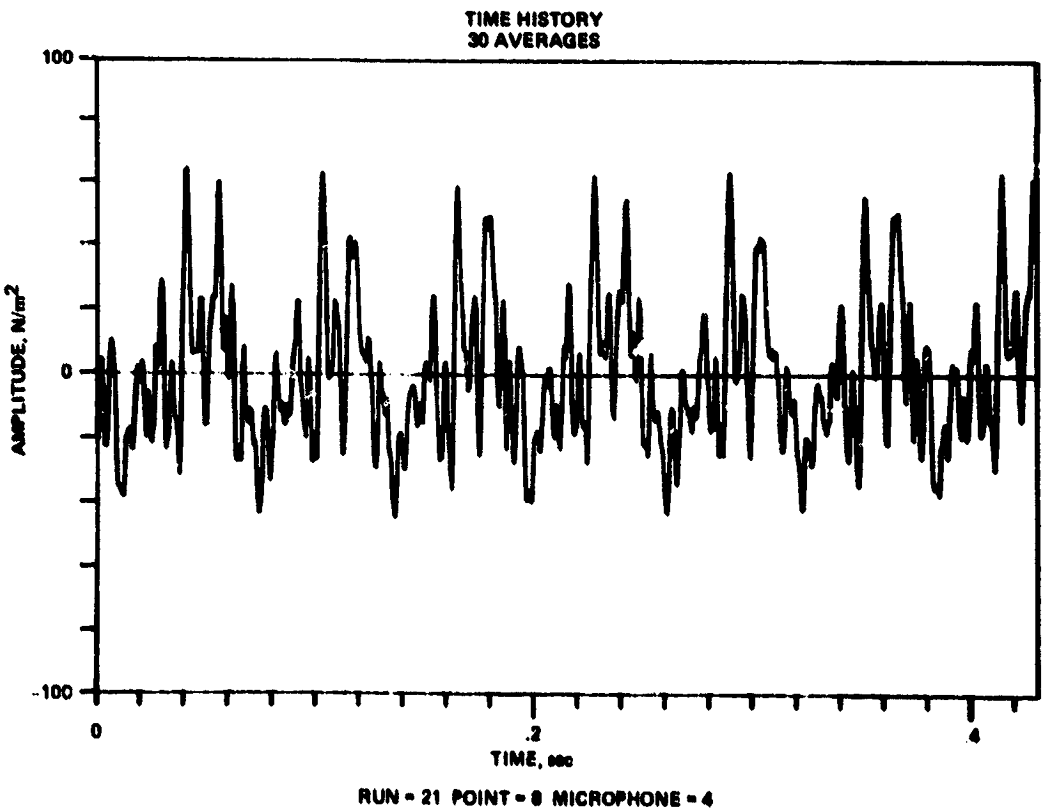


(c) $C_{LR/\sigma,R} = 0.150$.

Figure 18.- Concluded.



(a) $C_{LR/\sigma,R}$ = 0.072.



(b) $C_{LR/\sigma,R}$ = 0.093.

Figure 19.- Averaged time histories, velocity = 89 knots, α = 5.0°.

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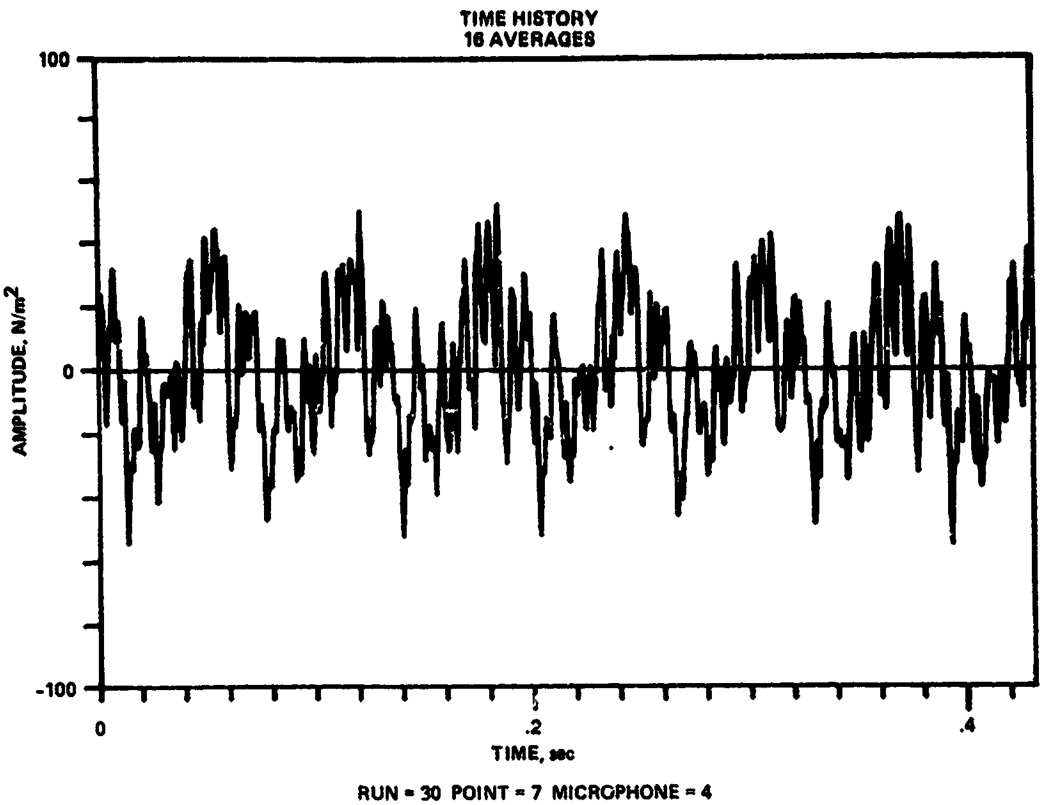
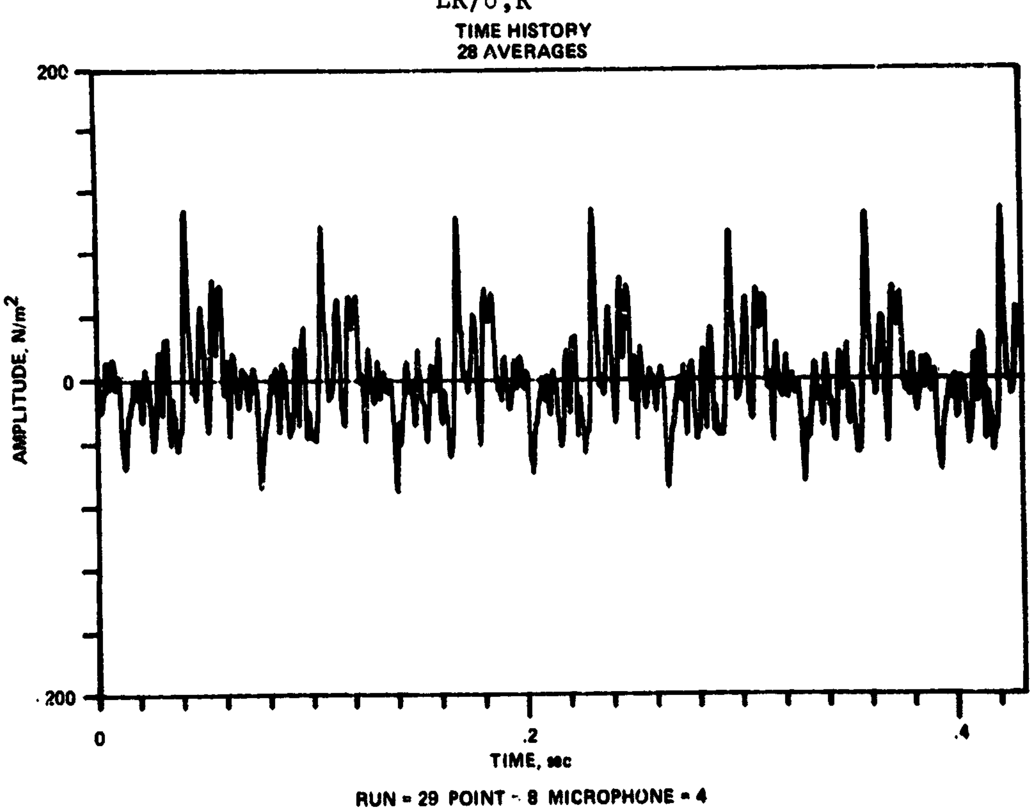


(c) $C_{LR/\sigma,R} = 0.104.$



(d) $C_{LR/\sigma,R} = 0.133.$

Figure 19.- Continued.

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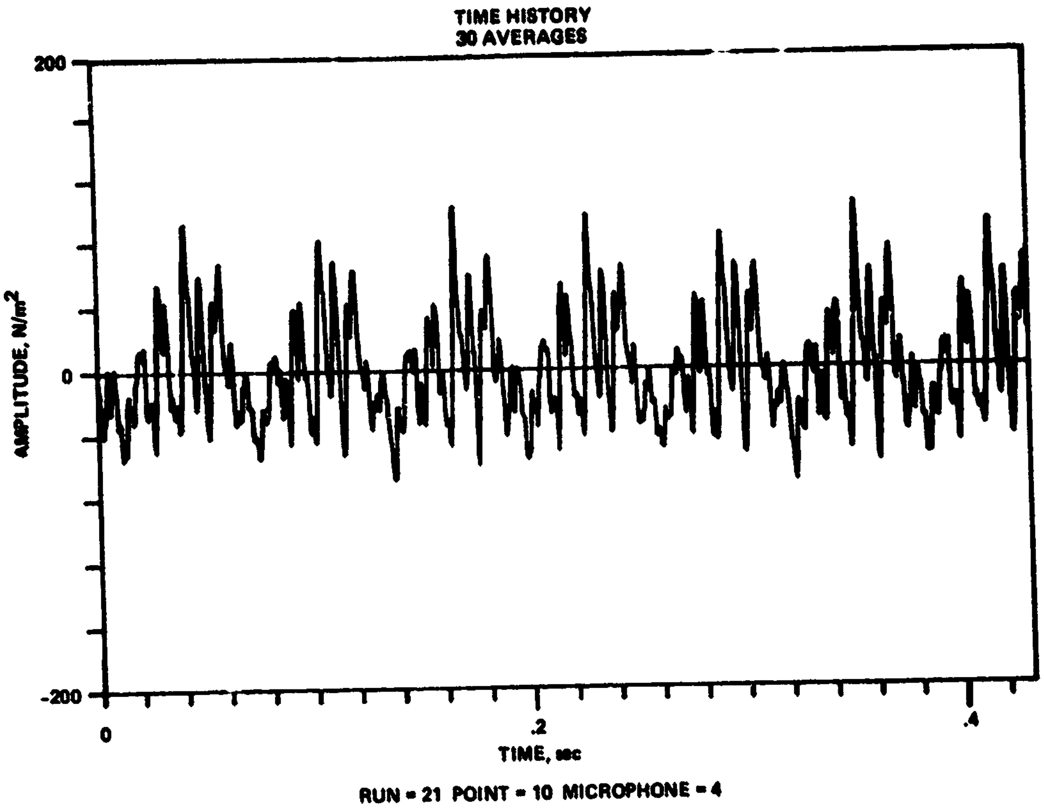
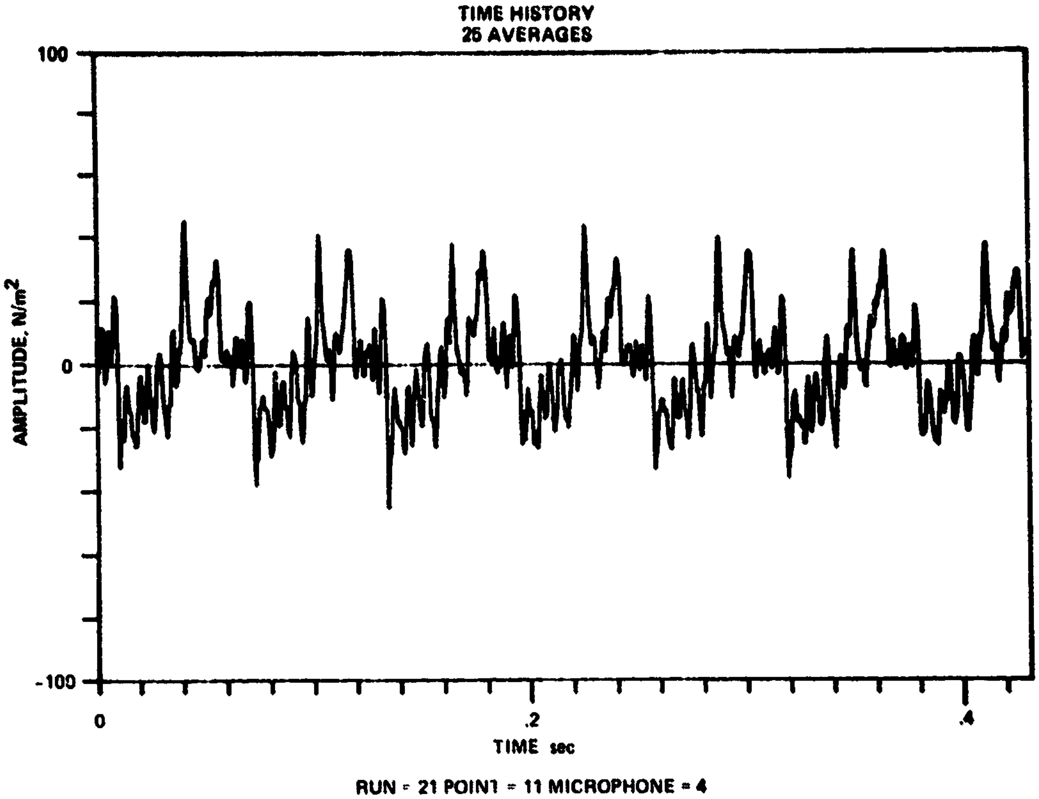
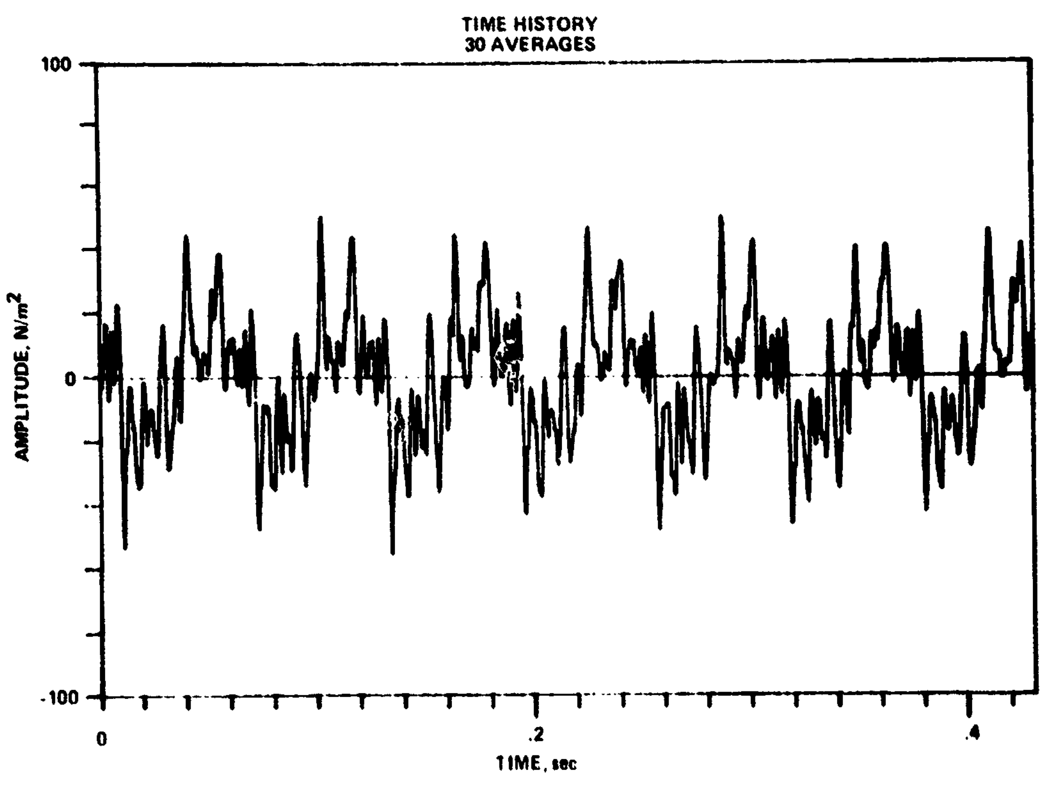


(e) $C_{LR/\sigma,R}$ = 0.139.

Figure 19.- Concluded.



(a) $C_{LR/\sigma,R}$ = 0.074.



(b) $C_{LR/\sigma,R}$ = 0.090.

Figure 20.- Averaged time histories, velocity = 89 knots, α = 7.5°.

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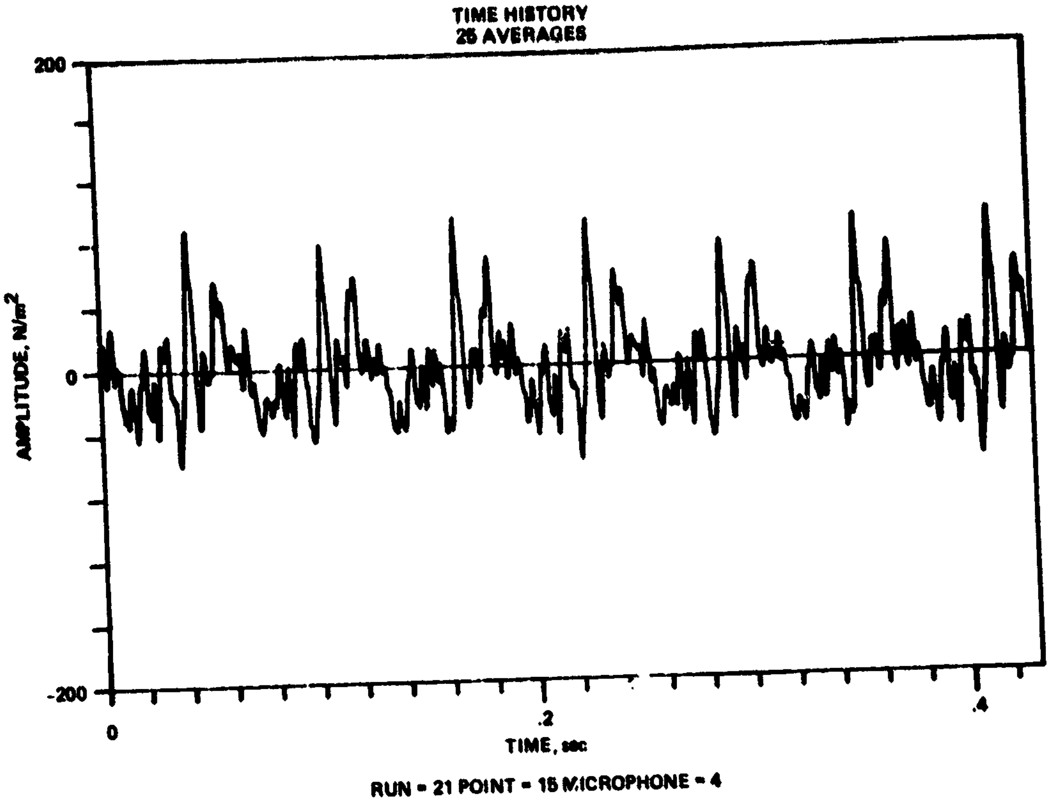
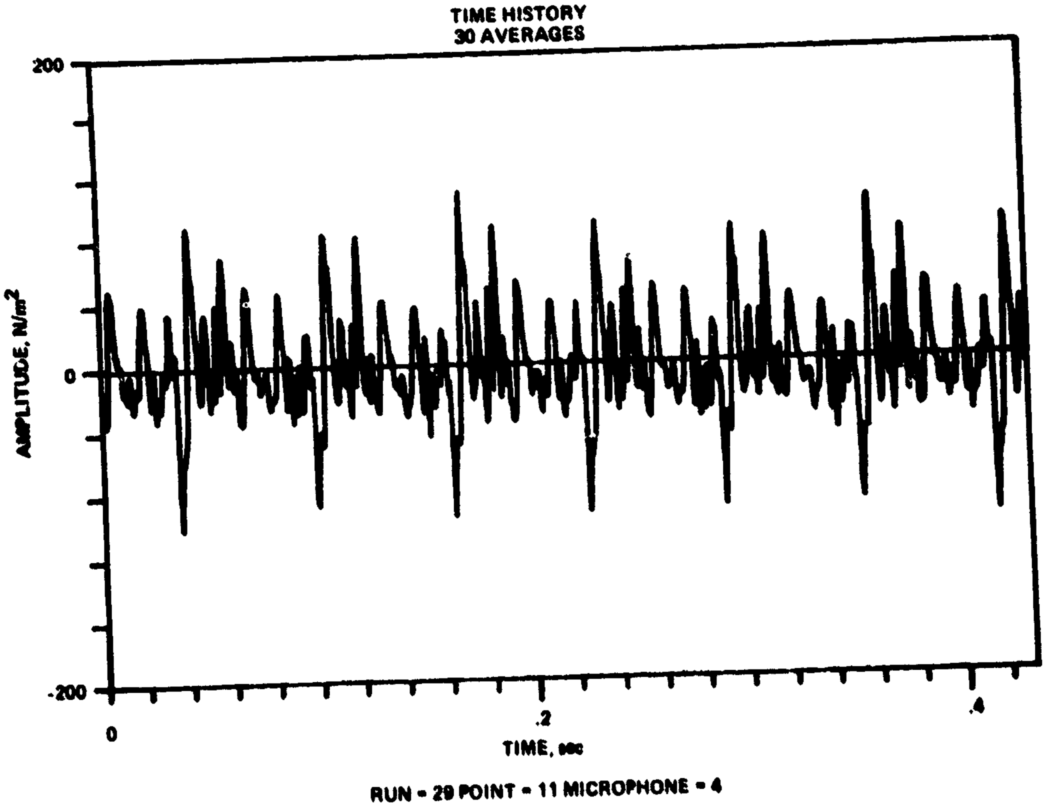


(c) $C_{LR/\sigma,R}$ = 0.141.



(d) $C_{LR/\sigma,R}$ = 0.162.

Figure 20.- Concluded.

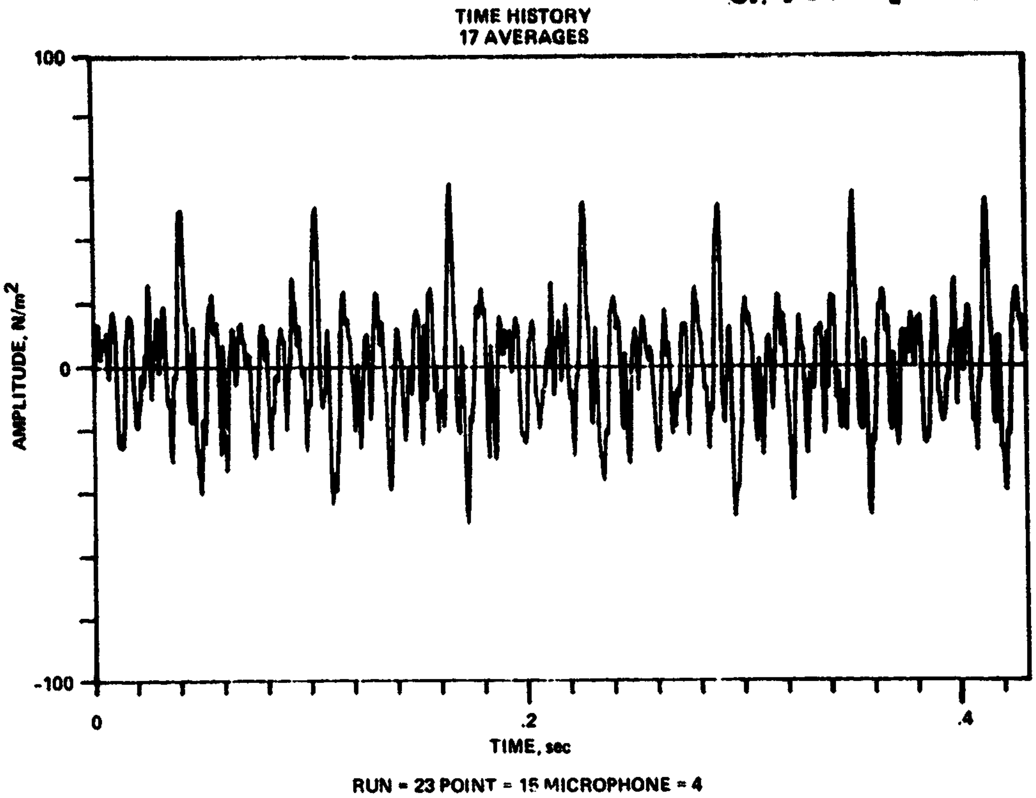
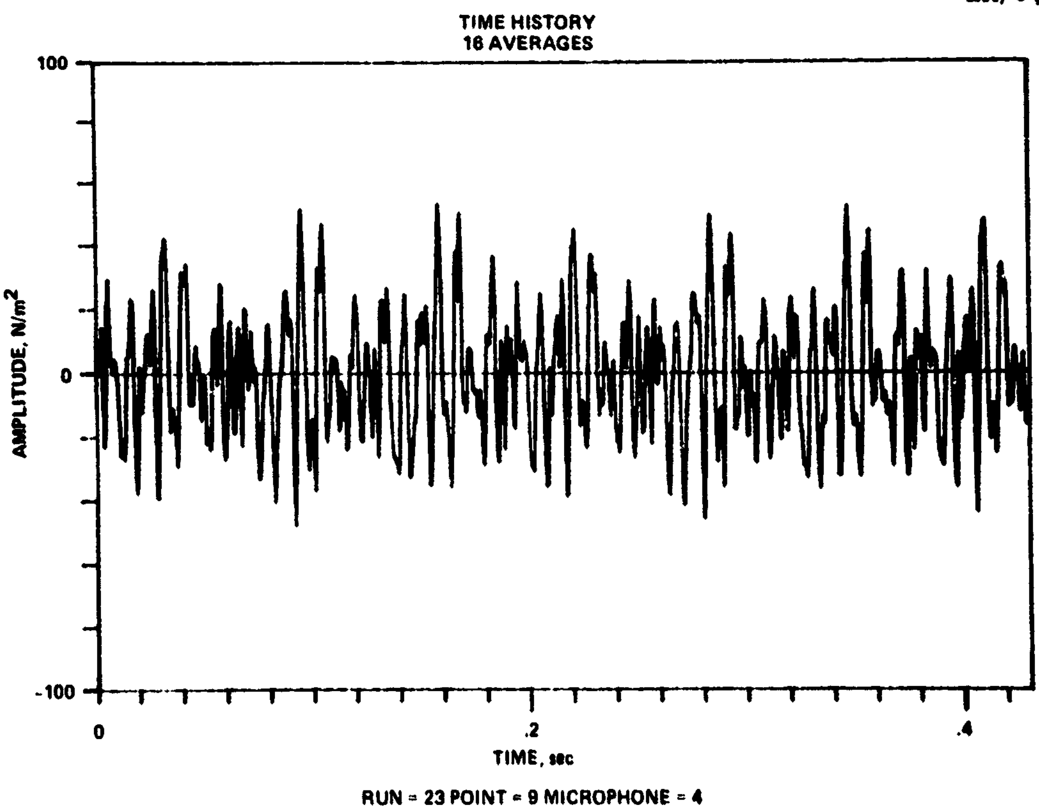
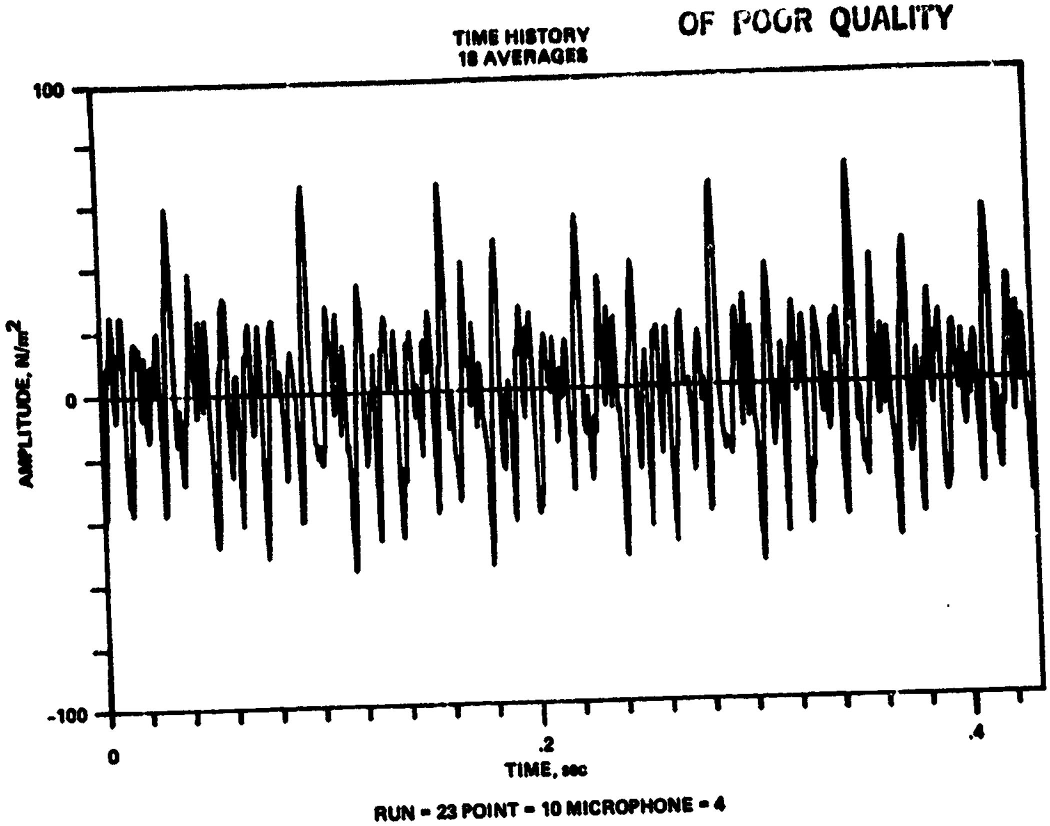


Figure 21.- Averaged time histories, velocity = 106 knots, α = 2.5°, $C_{LR/\sigma,R}$ = 0.085.

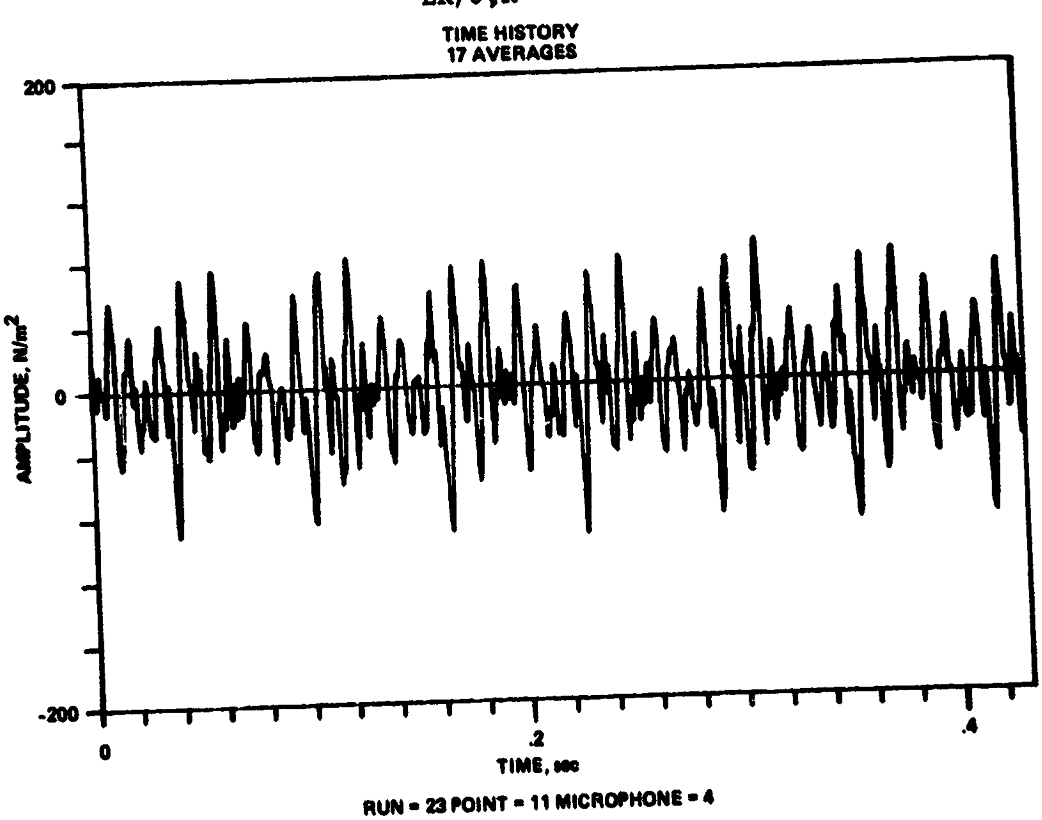


(a) $C_{LR/\sigma,R}$ = 0.114.

Figure 22.- Averaged time histories, velocity = 106 knots, α = 5.0°.

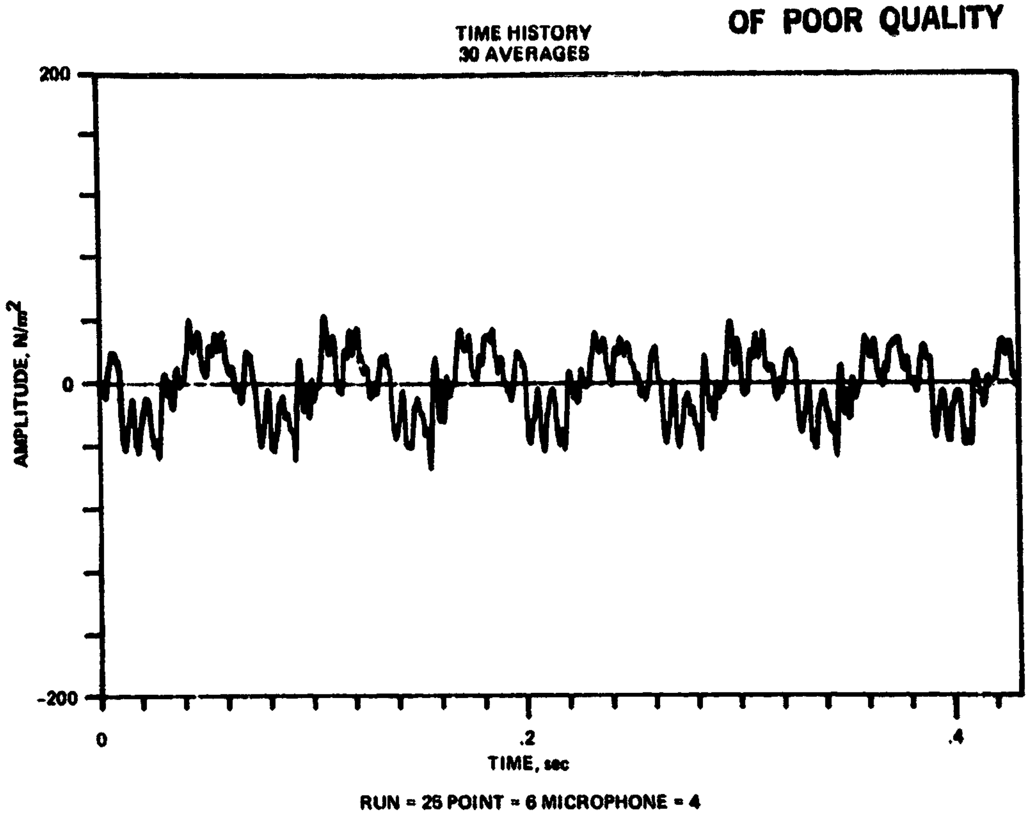


(b) $C_{LR/\sigma,R} = 0.135.$

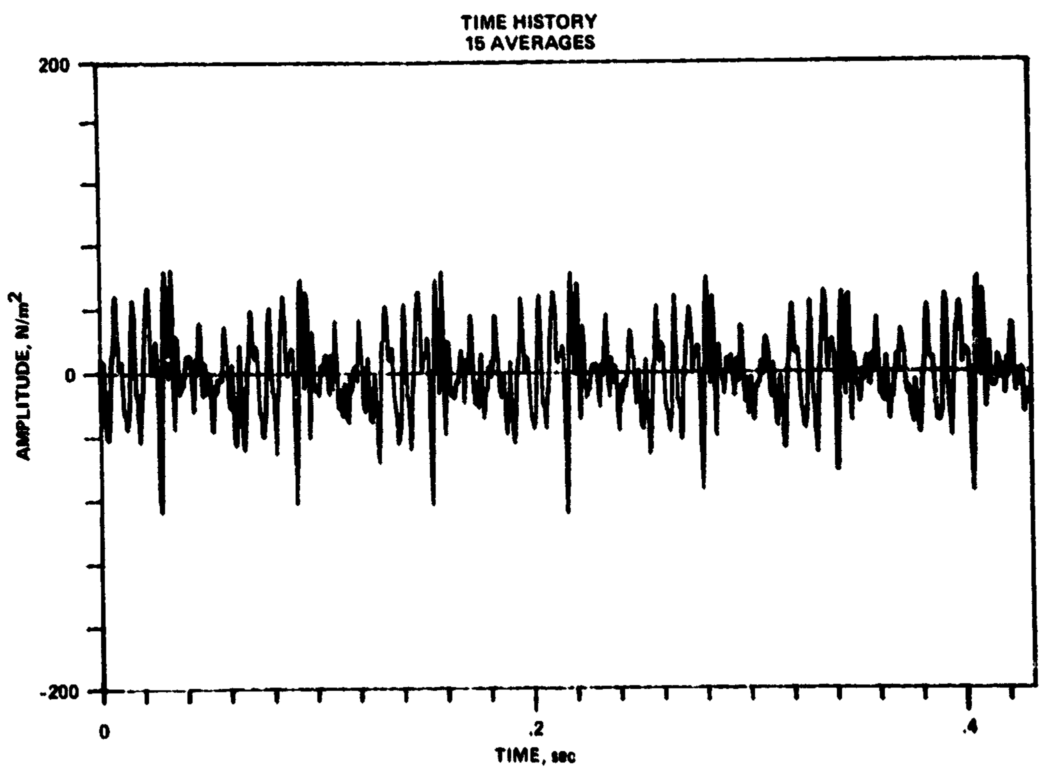


(c) $C_{LR/\sigma,R} = 0.145$

Figure 22.- Concluded.



(a) $C_{LR/\sigma,R} = 0.066$.



(b) $C_{LR/\sigma,R} = 0.093$.

Figure 23.- Averaged time histories, velocity = 106 knots, $\alpha = 7.5°$.

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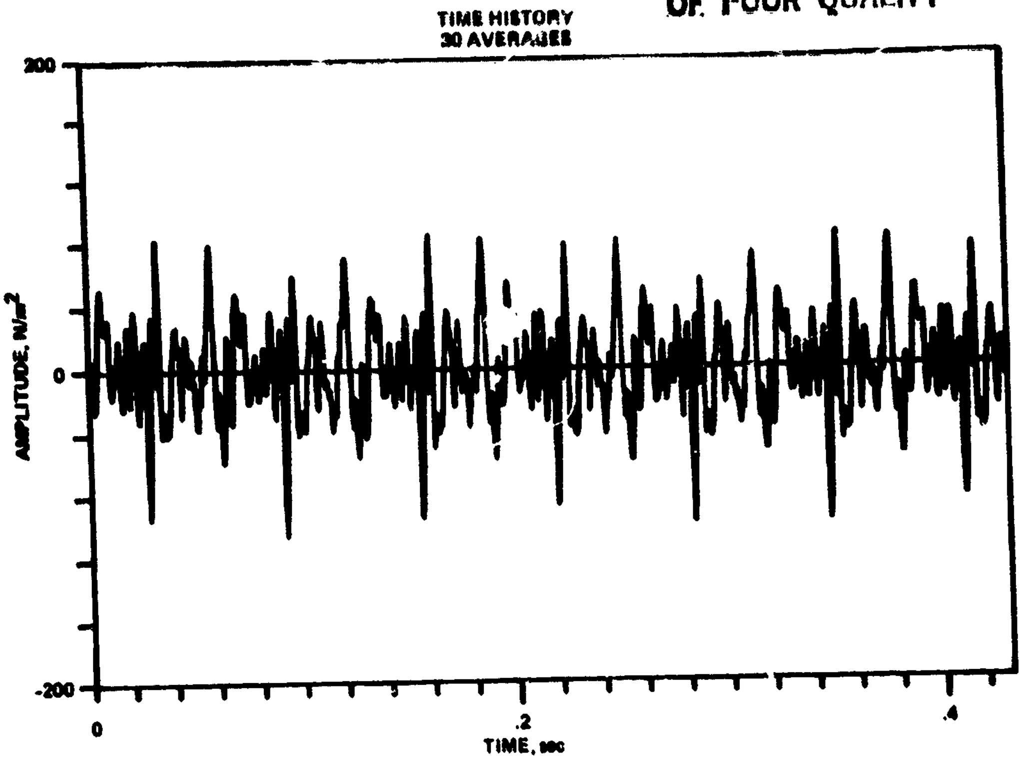
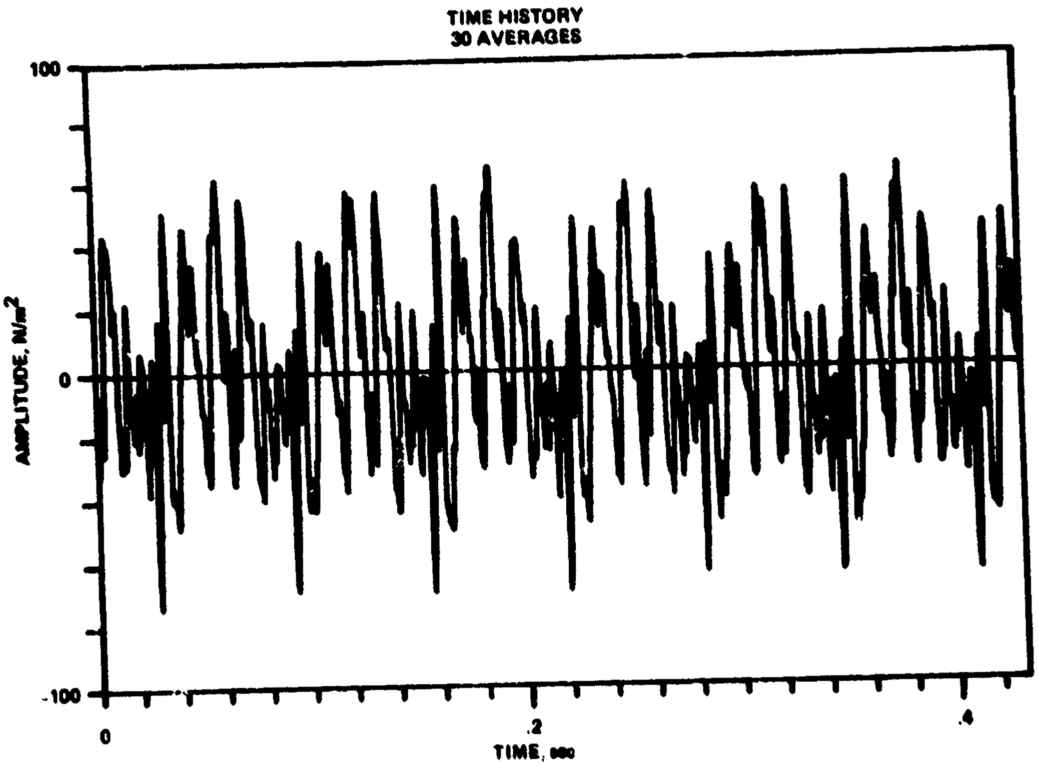


RUN = 25 POINT = 7 MICROPHONE = 4

(c) $C_{LR/\sigma,R} = 0.106$.



RUN = 25 POINT = 8 MICROPHONE = 4

(d) $C_{LR/\sigma,R} = 0.116$.

Figure 23.- Continued.

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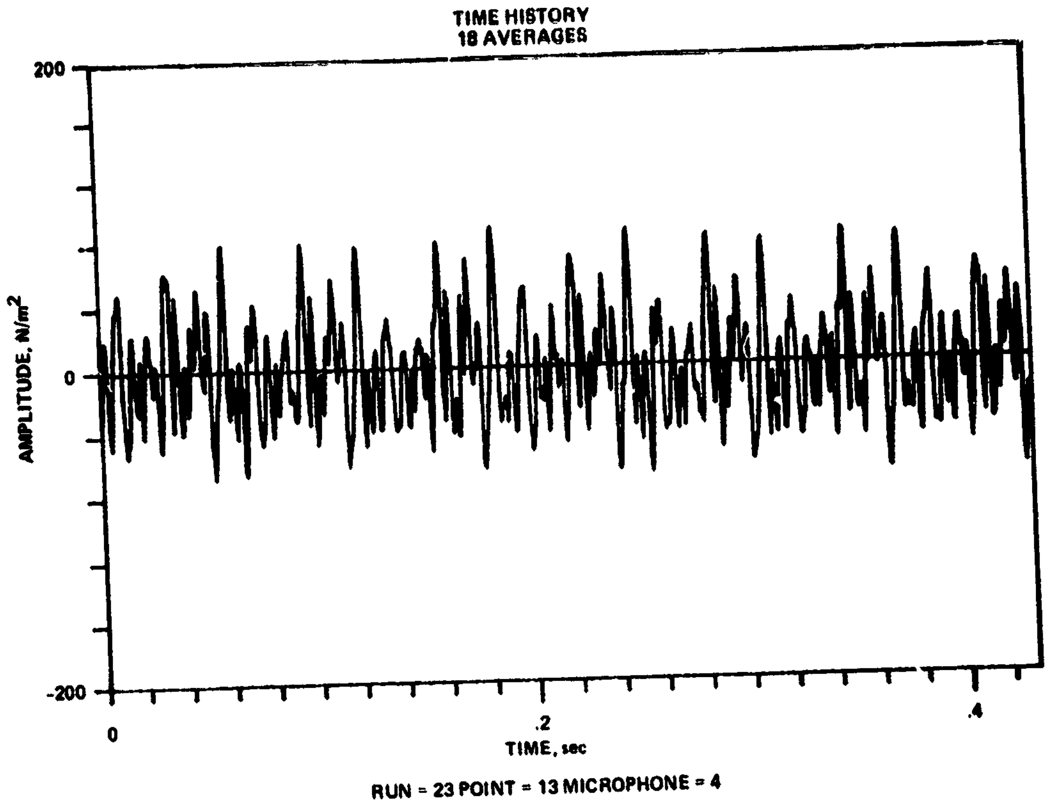
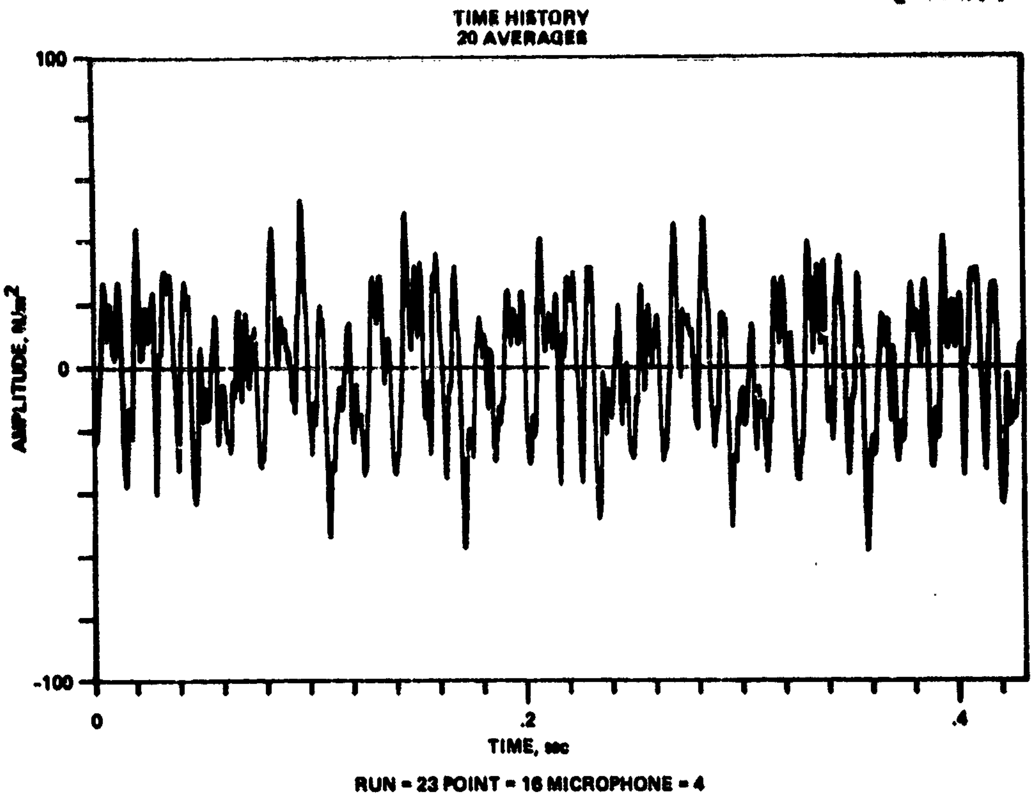
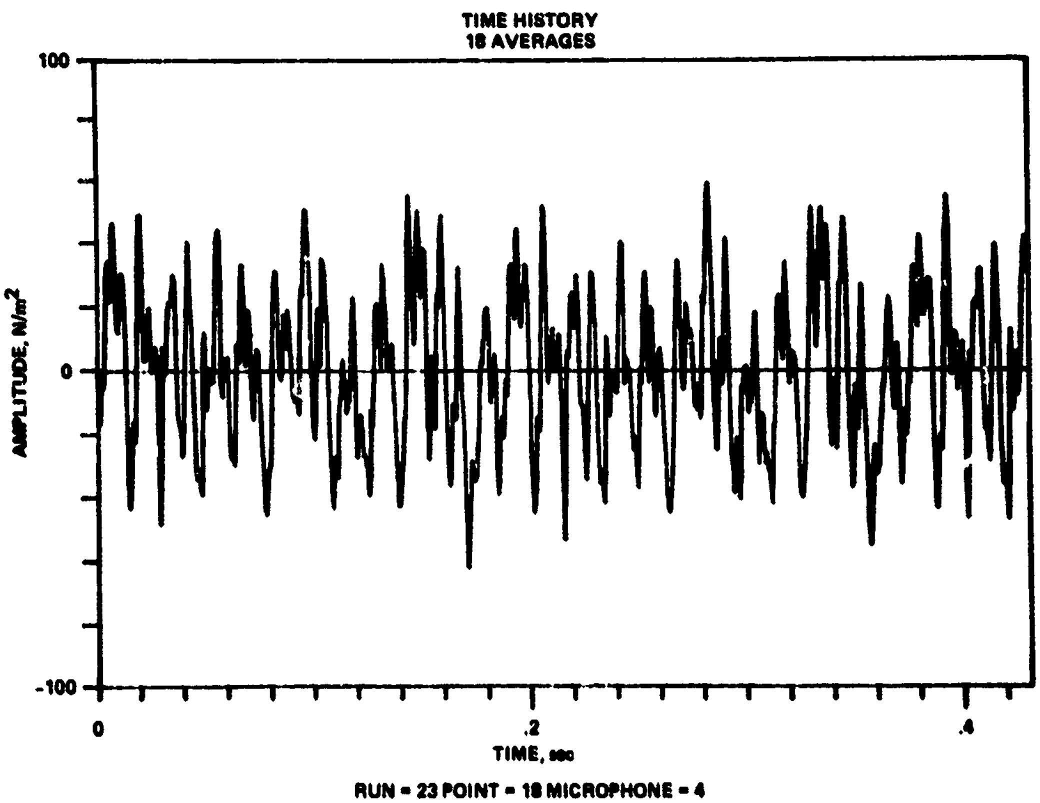


(e) $C_{LR/\sigma,R} = 0.131.$

Figure 23.- Concluded.

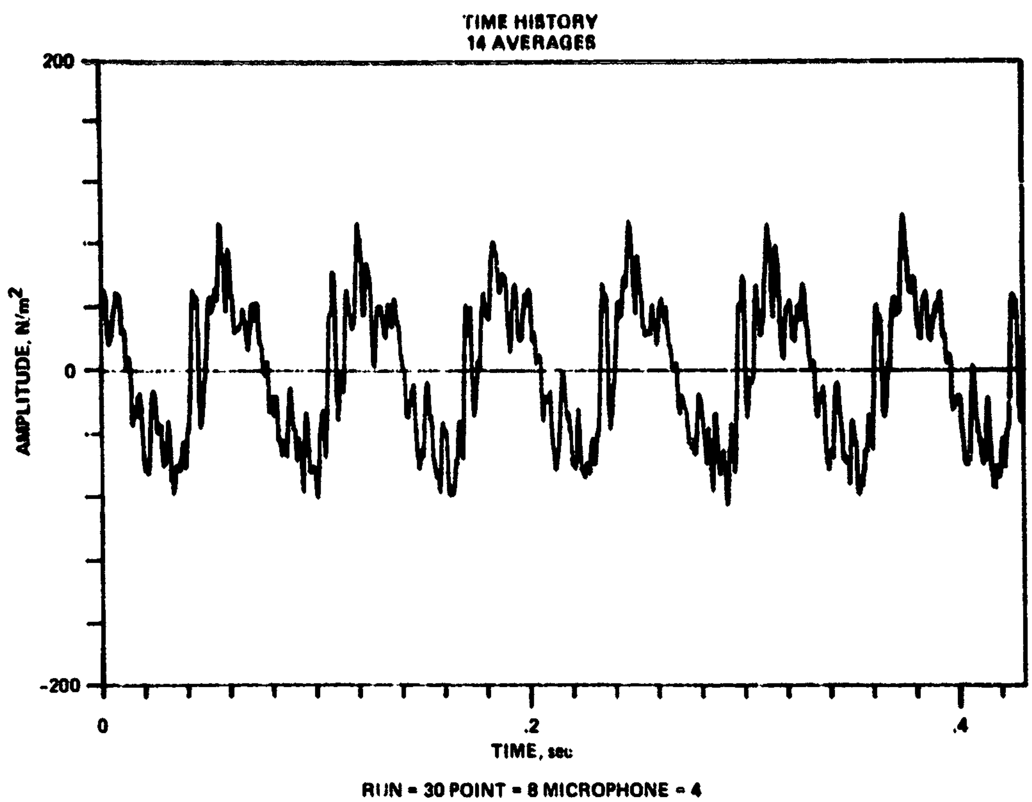


(a) $C_{LR/\sigma,R}$ = 0.079.



(b) $C_{LR/\sigma,R}$ = 0.093.

Figure 24.- Averaged time histories, velocity = 142 knots, α = 2.5°.



(c) $C_{LR/\sigma,R} = 0.110.$

Figure 24.- Concluded.

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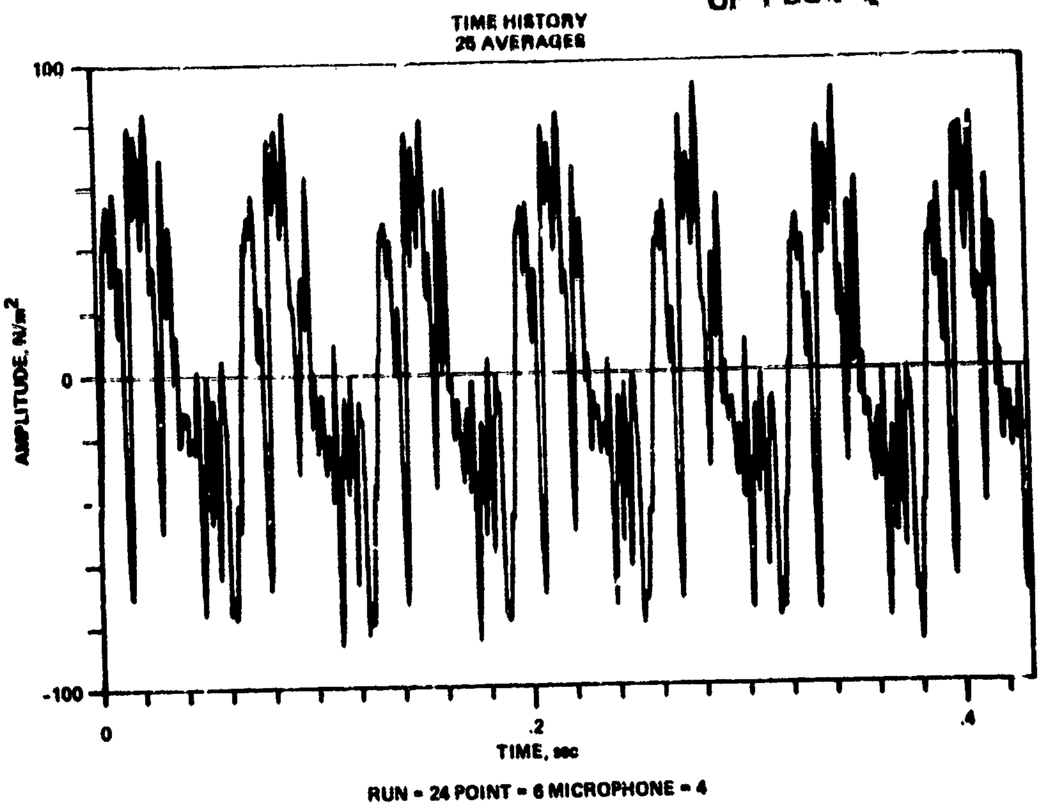
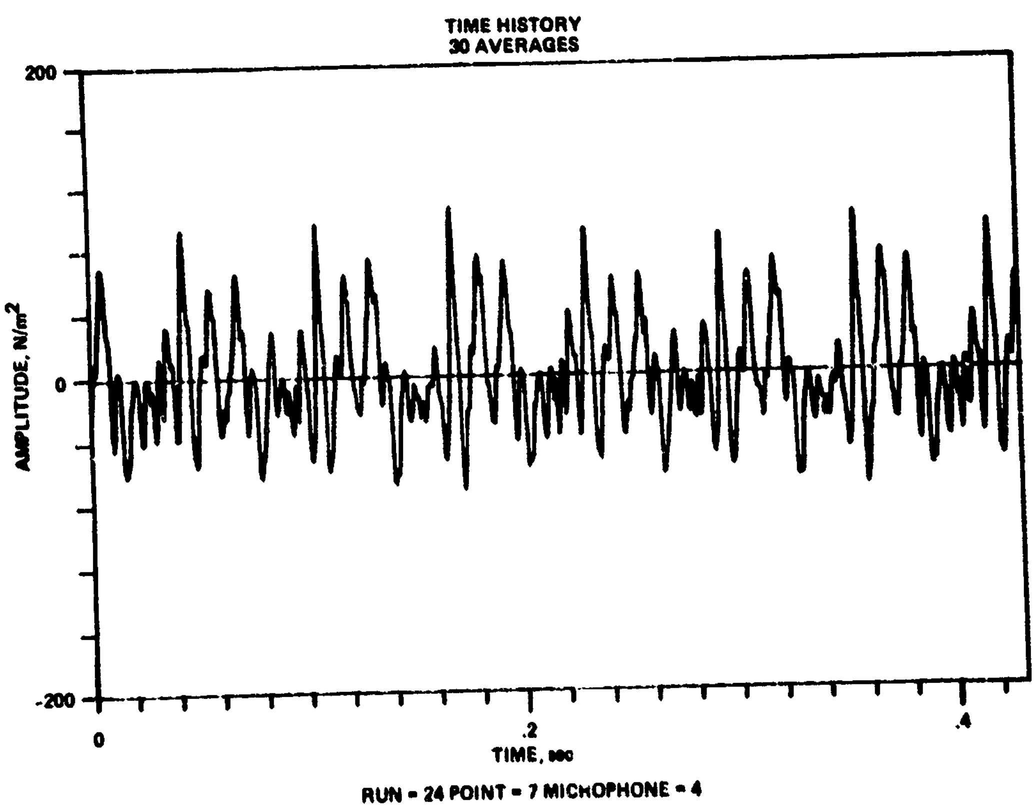


(a) $C_{LR/\sigma,R} = 0.079.$



(b) $C_{LR/\sigma,R} = 0.113.$

Figure 25.- Averaged time histories, velocity = 142 knots, $\alpha = 5.0°$.

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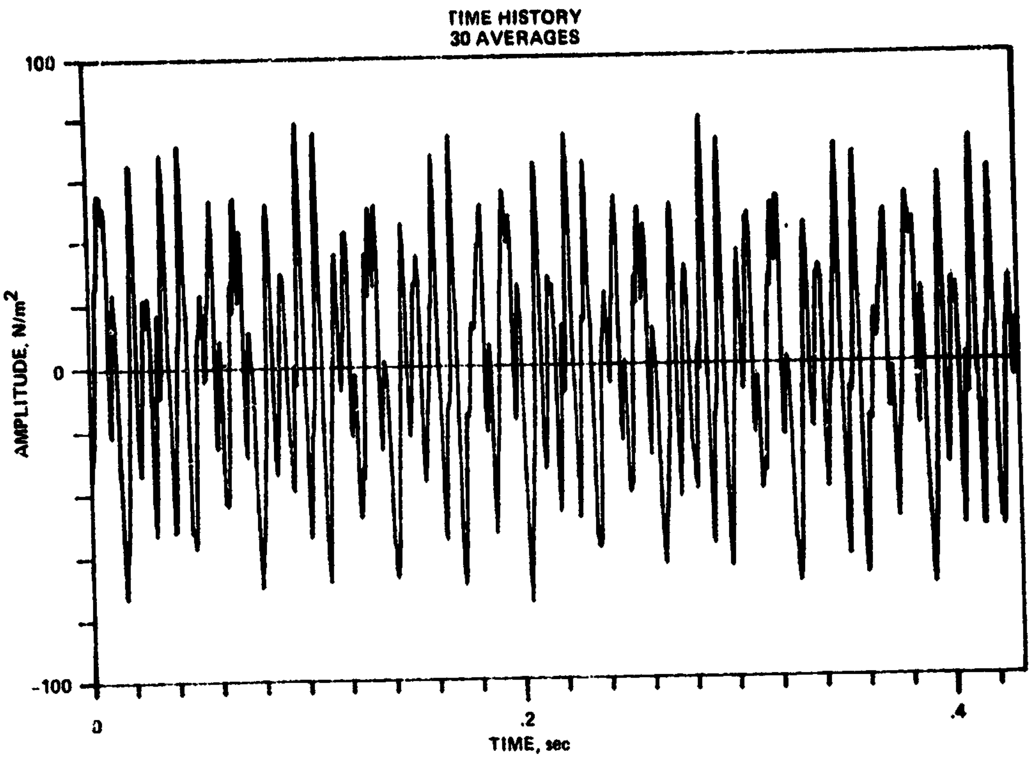
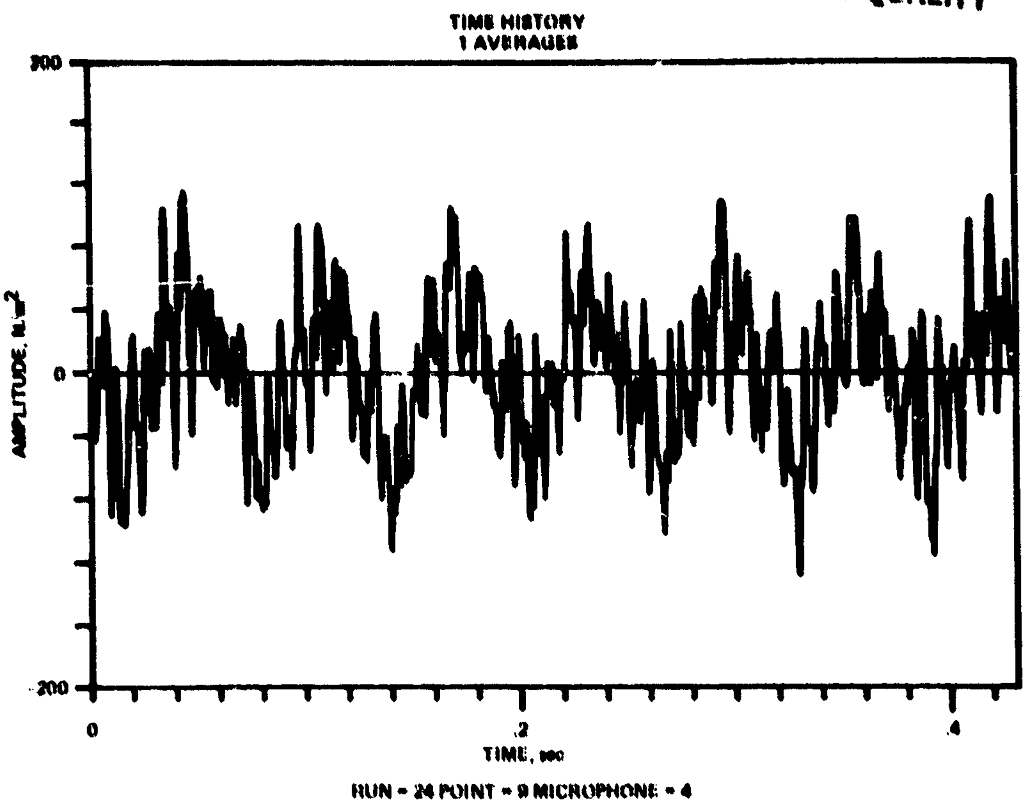
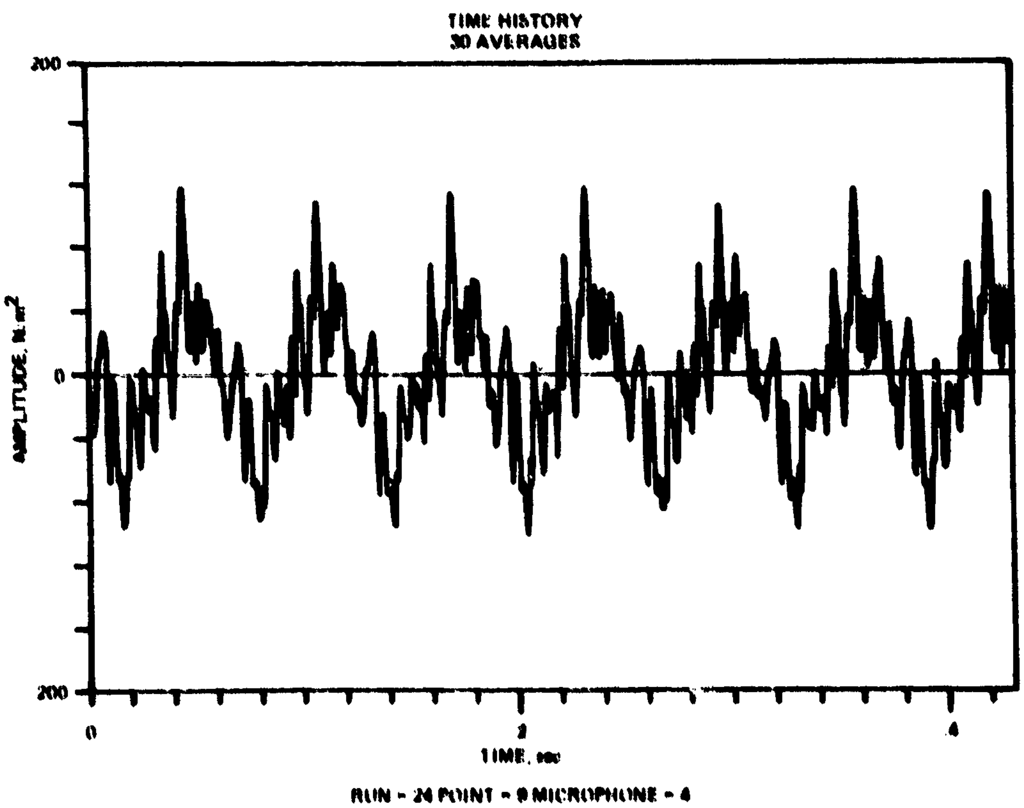


(c) $C_{LR/\sigma,R} = 0.125$.

Figure 25.- Continued.



(a) - $C_{LR/\sigma,R}$ = 0.090.



(b) $C_{LR/\sigma,R}$ = 0.90.

Figure 26.- Averaged time histories, velocity = 142 knots, α = 7.5°.