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Acoustic Flight Test of the Piper Lance

December 1986

Final Report

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16. Abstract

Research is being conducted by the Federal Aviation Administration and other members of the International Civil Aviation Organization (ICAO) toward refinement of current noise regulation of propeller-driven small airplanes. These studies are examining the prospect of substituting a takeoff procedure of equal stringency for the level flyover certification test presently required. It was initially assumed that equivalency could be established between the takeoff and level flyover procedures via adjustment equations involving propeller helical-tip Mach number and noise propagation distance to account for differences in airspeed and altitude respectively. However, as test result became available, it was found that the propeller helical-tip Mach number adjustment equation did not adequately account for the measured noise level differences between the takeoff and level flyover procedures. After applying the adjustment equations, the takeoff noise levels were 3 to 4 decibels higher than the level flyover noise levels. This effect is believed to result from unsteady propeller blade loading when the aircraft is in a pitch-up position during a takeoff/climbout as opposed to level flight. The test aircraft was a Piper Cherokee Lance (PA-32R-300) equipped with a two-blade constant speed propeller.

The objectives required a series of flights ranging from level flyover to a takeoff/climbout performed at Vx (speed for best angle climb). Noise level versus propeller inflow angle was addressed by a series-to-series variation of aircraft speed at constant power and RPM. Since airspeed is a component of the helical tip Mach number (M_H), and given the generally strong influence of M_H on noise levels, additional series of overflights were necessary to empirically relate M_H to the noise levels actually produced by the Lance. The M_H issue was addressed through a series-to-series variation of propeller RPM at constant power and airspeed.

Summary of Findings:

(1) The empirically-derived constant (K_M) in the off-reference helical-tip mach number M_H correction, $K_M \log_{10}$ (test M_H/reference M_H), was found to be 225 for total aircraft noise (propeller and exhaust) and 250 for propeller-only noise. The generally accepted default valve for K_M is 150. In effect, the noise level produced by the test aircraft was more sensitive to propeller RPM than other similar aircraft.

(2) The flight test revealed a valve, on average, of 0.6 dBA per degree of propeller-inflow angle between a level flyover and a Vy takeoff.

(3) At high RPM, the maximum ground-level noise was emitted when the aircraft was 20° from vertical prior to the overhead position. At low RPM, the point of maximum noise emission relative to the microphone was when the aircraft was overhead.

(4) Harmonic rolloff rate (dB per harmonic) as a function of M_H was found to be 27 $\log_{10}$ ($1/M_H$).

(5) At the primary microphone site, the difference in noise level between a 4 ft. elevated microphone and a ground-plane (earth baffle) microphone ranged from 1.2 dBA to 2.8 dBA with an average of 2.0 dBA. At a secondary microphone location, the difference ranged from 1.8 dBA to 3.0 dBA with an average of 2.5 dBA.

(6) Based on narrowband frequency spectroscopy, the propeller noise was found to dominate the total aircraft noise at high RPM. Exhaust noise dominated at low RPM.

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Symbols and Acronyms

AGL	above ground level
AL	A-weighted sound level (dB re 20 micronewtons/meter squared
ALM	maximum a-weighted sound level
ARP	Aerospace Recommended Practice
BRP	brake release point
C	speed of sound in air (feet per second)
dB	decibel
dBA	A-weighted sound level
D_{50}	takeoff distance required to clear a 50 ft. obstacle
D_p	propeller diameter
EDST	Eastern Daylight Savings Time
F	temperature in degrees Fahrenheit
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
H_R	reference altitude (AGL, feet)
H_T	actual test altitude (AGL, feet)
Hz	Hertz
ICAO	International Civil Aviation Organization
K_M	helical tip mach number correction constant
K_p	engine power correction constant
KIAS	indicated airspeed in knots
LFO	level flyover
M_{HK}	advancing helical tip mach number
M_H	helical tip mach number
M_{HR}	reference helical tip mach number
M_{HT}	actual test helical tip mach number
M_R	rotational tip mach number
M_T	translational tip mach number
MPH	miles per hour
NOAA	National Oceanic and Atmospheric Administration
OASPL	overall sound pressure level
P_R	reference engine power
P_T	actual test engine power
RH	relative humidity
RPM	revolutions per minute
SAE	Society of Automotive Engineers
SHP	shaft horsepower
T_F	temperature in degrees Fahrenheit
TAS	true airspeed
TO	takeoff
TSC	Transportation Systems Center
V_R	propeller tip tangential velocity
V_T	propeller tip translational velocity
V_X	airspeed of best angle of climb
V_y	airspeed of best rate of climb
α	atmospheric absorption in dB/1000 ft. at 500 Hz
ϕ	propeller disk inflow angle

1.0 Introduction

1.1 Background - Aircraft noise regulations were initiated in the United States by the Federal Aviation Administration (FAA) in 1969 this the issuance of Federal Aviation Regulation (FAR) Part 36 - Noise Standards: Aircraft Type Certification. Part 36 has been amended several times to reflect improved technical knowledge and experience gained during the implementation of the noise certification process. Part 36 has also been amended to add new categories of aircraft to the scope of the regulation. Amendment 36-4 (December 31, 1974) marked the first efforts to regulate via the Part 36 process the noise levels produced by propeller-driven small aircraft in the United States.

Research is being conducted by the FAA and other members of the International Civil Aviation Organization (ICAO) toward the refinement of the current regulation of propeller-driven small airplanes. These studies are examining the prospect of substituting a takeoff procedure of equal stringency for the level flyover certification test required by Amendment 36-4.

The proposed takeoff test procedure calls for noise measurement at 8200 feet (2500 m) from brake-release-point (BRP) of an aircraft in a takeoff/climbout procedure performed at that aircraft's best rate-of-climb air speed. The existing level flyover test procedure calls for an aircraft flyover at 1000 feet above ground level (AGL). The noise metric of interest in both test procedures is the maximum A-weighted sound pressure level in decibels using slow detector response. The proposed FAA noise procedure is described in a "Notice of Proposed Rulemaking" in the Federal Register (Vol 51; No 134; 7/14/86).

It was initially assumed that equivalency could be established between the takeoff and level flyover procedures via adjustment equations involving propeller helical-tip Mach number and noise propagation distance to account for differences in air speed and altitude respectively. However, as test results became available, it was found that the propeller helical-tip Mach number adjustment equation did not adequately account for the measured noise level differences between the takeoff and level flyover procedures. After applying the adjustment equations, the takeoff noise levels were 3 to 4 decibels higher than the level flyover noise levels. This effect, referred to by investigators (ref 1) as the "residual factor" is believed to result from unsteady propeller blade loading. One source of such unsteady loading is the result of the airstream entering the propeller disk at an angle other than ninety degrees. Under such conditions, a given blade is advancing into the wind (increased loading) during half of a revolution, and retreating with the wind (reduced loading) during the other half. The resulting differential blade loadings are periodic and are believed to raise the noise level of the propeller fundamental and harmonics by several decibels when measured below the aircraft along the flight track. The incoming airstream angle, referred to as the "propeller inflow angle" or the "propeller disk angle-of-attack," is a function of the attitude of the aircraft relative to the airstream. Variations in aircraft pitch attitude are expected when the aircraft is in a pitch-up position during a takeoff/climbout as opposed to level flight.

This report presents the initial findings of a flight test designed to examine the relationship between propeller inflow angle and the resulting noise levels as measured by noise certification procedures proposed for propeller-driven small aircraft.

1.2 Objectives

1.2.1 The primary objective of the study was to examine, via flight testing, the relationship between propeller inflow angle and ground-based aircraft noise levels. Variation of propeller inflow angle was achieved by flying the aircraft at different airspeeds. A range of nearly 9 degrees in propeller inflow angle was achieved between a maximum angle climbout at Vx and a level flyover.

1.2.2 The second objective was to generate a data base of flight noise levels and trends to compare with the full-scale wind tunnel/propeller tests conducted late in 1984. The wind tunnel tests, designed to address the same issues as the flight test, examined variables under controlled conditions over a wider range than possible during a flight test. The wind tunnel tests were conducted at the German-Dutch Wind-Tunnel under the auspices of the FAA and the Federal Republic of Germany.

1.2.3 The final objective was to establish base-line noise levels for the chosen aircraft relative to the proposed takeoff noise certification procedure.

2.0 Experimental Procedure

2.1 Test Aircraft: The test aircraft was a Piper Cherokee Lance (PA-32R-300), a single engine monoplane with retractable landing gear. The power plant was a 300 hp Lycoming IO-540-K1G5 flat-six normally aspirated engine. The aircraft was equipped with a Hartzell two-blade metal constant speed propeller 80 inches in diameter. The maximum rate of climb, D_{50}, and Vy for the Lance are 1000 ft/min, 2240 ft., and 92 knots, respectively (standard day at sea level).

2.2 Location: The test was conducted on September 25, 1984 at the Washington Dulles International Airport. The acoustic instrumentation was deployed in the overrun area of runway 30. The microphones and aircraft flight track were aligned with the extended runway centerline. The actual runway centerline, approach lights, and middle marker functioned as visual cues for the pilot.

2.3 Test Plan: The objectives required a series of flights ranging from level flyover to a takeoff/climbout performed at Vx (speed for best angle of climb). The test series were designed around the proposed FAA takeoff noise certification procedure. Briefly, the proposed procedure calls for sound level measurement four (4) feet above the ground at a distance of 8200 feet from brake release point (BRP) of an aircraft performing a maximum continuous power takeoff at an airspeed of Vy (92 knots for the Lance). Given the performance figures for the Lance, the reference altitude for the Lance at the 8200 foot distance from BRP was calculated to be 694 feet above ground level (AGL).

Noise level versus propeller inflow angle was addressed by a series-to-series variation of aircraft speed at constant power and RPM. Since air speed is a component of the propeller helical tip Mach number (M_H), and given the generally strong influence of M_H on noise levels, additional series of overflights were necessary to empirically relate M_H to the noise levels actually produced by the Lance. The M_H issue was addressed through a series-to-series variation of propeller RPM at constant power and air speed.

Table 1 presents the 17 scheduled test series (A-Q) with target air speed, engine power and RPM. Series B represents the reference takeoff using the proposed noise certification procedure. Each series was scheduled for a minimum of four replications (events). The two exceptions were series B and D which were scheduled for six replications.

2.4 <u>Flight Procedure</u>: The test aircraft was flown continuously in a racetrack pattern with the measurement leg along the centerline of runway 30. Given the large number of test events (72 planned; 79 actually performed) the takeoff tests used a simulated procedure. Upon entering the measurement leg of the racetrack pattern, the aircraft was flown at a constant altitude until intercepting the pre-calculated reference flight path (marked by a marker positioned along the runway). At that point, with the required RPM set the pilot applied the prescribed power, rotated, and climbed at an angle which sustained the target indicated air speed. A radio mark was transmitted to the aircraft by a ground observer when the aircraft crossed over the 8200 ft measurement point. The flight crew noted the cockpit altimeter at the radio mark and either adjusted the

TABLE 1. TEST PROCEDURES

EVENT	MODE	KIAS	RPM	POWER
A	TO	80	2700	100%
B	TO	91	2700	100%
C	TO	120	2700	100%
D	LFO	-	2700	100%
E	TO	80	2700	75%
F	TO	91	2700	75%
G	TO	120	2700	75%
H	LFO	-	2700	75%
I	TO	91	2500	55%
J	TO	120	2500	55%
K	TO	91	2600	75%
L	LFO	-	2600	75%
M	TO	91	2400	75%
N	LFO	-	2400	75%
O	TO	91	2200	75%
P	TO	91	2300	55%
Q	TO	91	2100	55%

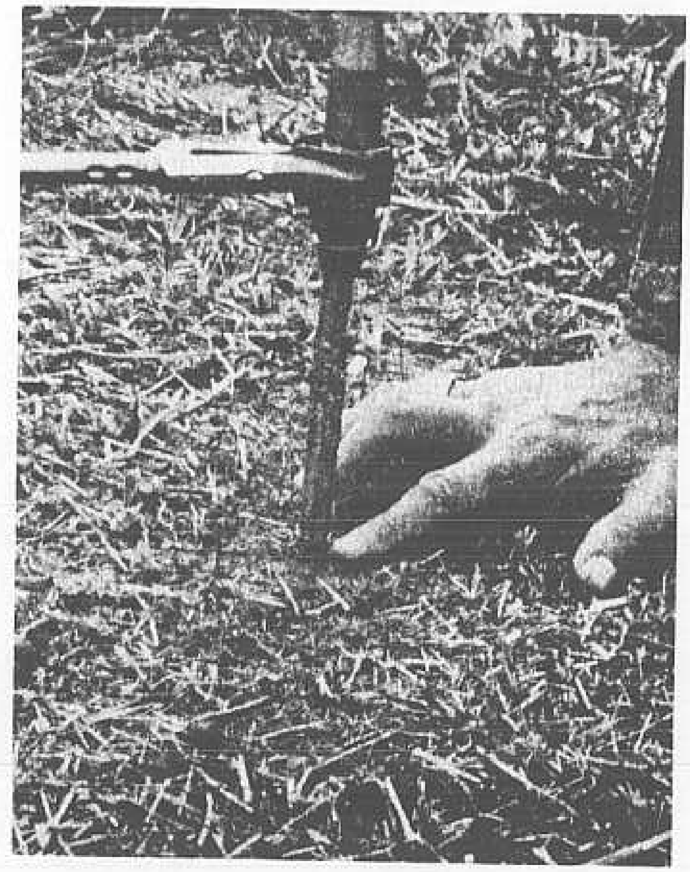
initial rotation altitude, or advanced or delayed rotation on subsequent events in an effort to intercept the reference altitude for all events.

2.5 Instrumentation

2.5.1 Acoustic: Two microphones sites were used throughout the test. The reference microphone location, 8200 feet from BRP, is referred to as the primary site. A secondary microphone site was located 6200 feet from BRP. Both sites were located on the flight track. Noise levels were recorded at ground level and at 4 ft elevation at each of the sites. A Nagra two-channel direct mode magnetic tape recorder was used to record the analog signal from a given microphone. The first channel recorded the full acoustic signal while the second channel recorded and preserved the high frequency component of the overall signal via a pre-emphasis technique–thus effectively increasing the dynamic range of the tape recorder. IRIG-B time code was recorded on the cue (third) channel of each recorder. All time-based measurements were synchronized to a base time-code generator. The four foot microphones were 1/2 inch grazing incidence type mounted with the sensing diaphragm coplaner with the plane formed by the flight path and flight track. The ground mounted microphones were 1/2 inch normal incidence type mounted inverted with the diaphragm positioned 7mm above the ground surface. The ground microphone was mounted immediately beneath the elevated microphone. The ground surface beneath the microphones was cleared to bare earth and lightly tamped as necessary to achieve a flat surface. Grass was mowed close-cut in a 30 ft circle around each microphone site. Photos 1 and 2 illustrate the microphone arrangement used in the test.

Figure 1 Microphone Installation

Figure 2 Ground Microphone



2.5.2 Aircraft altitude: The altitude of the aircraft over a given microphone was determined (independent of the cockpit altimeter) by the photoscaling technique described in the Society of Automotive Engineers report AIR-902 (ref 2). This technique involves photographing an aircraft when directly overhead and proportionally scaling the resulting image with the known dimensions of the aircraft. The photographic system is calibrated by photographing a test object of known size and distance.

2.5.3 Cockpit: The aircraft had a 3-man flight crew: pilot, observer, and video-camera operator. The observer maintained radio communication with the ground command post, and logged the indicated air speed, altitude, RPM, and manifold pressure for each event when given a radio mark over the primary microphone site. The observer also estimated the rotation advance/delay needed to intercept the reference altitude (694 feet at the primary microphone site) and cued the pilot accordingly. On selected runs, the observer measured the propeller RPM with a hand-held view-through tachometer. Relieved of many ancillary duties, the pilot was able to concentrate on the precision flying required and maintain contact with the Dulles tower. As an experiment, the video operator taped the cockpit instruments to augment the data collected by the observer.

2.5.4 Meteorology: Meteorological data were collected both at the test site and at the FAA Noise Monitoring Laboratory (located near the terminal approximately 3 miles from the test area). Temperature, wind speed, and wind direction were continuously recorded at the test site. Relative humidity was recorded at the test site on a 30-minute schedule via an Assmann psychrometer. Winds aloft were measured at the test site by NOAA personnel through the release of pibals, also on a 30-minute schedule. Barometric pressure was recorded at the Noise Monitoring Laboratory.

2.5.5 Acoustic Data Reduction System: The analog magnetic tape recordings were analyzed at the Department of Transportation, Transportation Systems Center in Cambridge, Massachusetts. The recordings were entered into GenRad 1921 Real Time Analyzer set to provide 27, one-third-octave-band (22Hz-11.2KHz) sound pressure levels for each 1/8-second integration period throughout the length of the recorded event. The data were digitized and stored on magnetic disk memory for further processing. Adjustments were made to the stored digitized data to account for deviations from flat frequency response in the measuring and reproduction systems. The spectral data were further adjusted by sloping the spectrum shape at a rate of -3dB per one-third-octave for those bands above 1.25 KHz where the signal to noise ratio was less than 3dB. A-weighted noise indexes calculated with "Slow" dynamic detector response were obtained by further processing the stored 1/8-second data. Four consecutive 1/8-second spectral data records were energy averaged to provide consecutive 1/2-second spectral data records over the length of the stored digitized data. These 1/2-second records were re-averaged using a sliding window 4-sample weighted logarithmic averaging technique to simulate "Slow" exponential sound level meter characteristics.

2.5.6 Data Correction: The reduced A-weighted (as measured) values were adjusted for deviation from the reference altitude by algebraically adding the increment 22 $\log_{10}(H_T/H_R)$ where H_T is the actual aircraft altitude over the microphone, and H_R is the reference altitude (694 ft for the Lance). The as-measured dBA values were also adjusted from test day to reference meteorological conditions (77°F; 70%RH) by algebraically adding the increment $(\alpha - 0.7)\ H_T/1000$ where (α) is the rate of absorption in dB per 1000 feet for test day conditions at 500 Hz as specified in SAE ARP 866A, "Standard Values of Atmospheric Absorption as a Function of Temperature and Humidity for use in Evaluating Aircraft Flyover Noise."

3.0 Data Analysis

3.1 Test Day Operations: The test was conducted between the hours of 0845 and 1500 EDST. Testing was continuous with the exception of a 30-minute rest break at 1040 and a one-hour fuel stop at 1230. On average, the time to complete a circuit around the racetrack pattern was four minutes. The test aircraft (N75196) was rented locally with one of the aircraft's co-owners functioning as the pilot for the test. The test aircraft was flown from the Woodbridge, Virginia Airport to Dulles Airport on the morning of the test.

The estimated fully fueled gross weight was 3280 pounds. The aircraft is certificated at a maximum takeoff weight of 3600 pounds. Total flight time and fuel burn (including 15 minutes flight time to/from the Woodbridge Airport) was 6.5 hours and 95 gallons respectively. The RPM measured with the view-thru-tachometer was typically one to three percent higher than the approximate RPM set in the cockpit. The "view-thru" readings are used in the analyses of the report.

3.2 Test Day Weather: A summary of the meteorological measurements is presented in Appendix A. Ground level temperature ranged from 68°F to 85°F. The aircraft consistently had a headwind component throughout the test. Given the range of meteorological measurements and the lack of observed anomalous conditions, it is unlikely that meteorological conditions exerted an adverse influence on accomplishing the flight test objectives.

3.3 As Measured Acoustic Data: The acoustic data reduction report from the Transportation Systems Center (TSC) is presented in Appendix A.

The measured data are uncorrected for off-reference temperature, humidity and aircraft position relative to the reference flight track. In addition to values of maximum A-weighted sound pressure levels (ALM), the TSC report also presents unweighted, or overall, sound pressure levels (OASPL) and related noise descriptors and statistics.

3.4 Corrected Acoustics Data: Table 2 presents a summary of the maximum A-weighted noise levels corrected for off-reference altitude and atmospheric absorption per the equations described in Section 2.5.6.

Table 2 Flight Operations and ALM Noise Levels
(averaged values for a given series)

SERIES	TYPE	POWER	TAS	RPM	PRIMARY (GND)	PRIMARY (4 ft)	SECONDARY (GND)	SECONDARY (4 ft)
A	TO	100%	82	2780	91.9	89.6	91.1	88.4
B	TO	100%	95	2780	91.4	89.0	90.6	88.0
C	TO	100%	123	2780	90.5	88.1	90.0	87.3
D	LFO	100%	167	2780	89.8	87.6	89.7	87.2
E	TO	75%	82	2780	90.5	88.0	89.7	87.2
F	TO	75%	96	2780	89.9	87.4	89.8	87.1
G	TO	75%	124	2780	89.2	87.3	89.5	87.1
H	LFO	75%	152	2780	88.7	86.8	89.1	86.8
I	TO	55%	95	2570	80.8	78.9	80.8	78.1
J	TO	55%	123	2570	80.5	78.4	80.9	78.4
K	TO	75%	97	2640	84.4	82.3	84.2	82.0
L	LFO	75%	153	2630	82.8	81.6	82.9	80.7
M	TO	75%	97	2440	79.1	77.5	79.2	76.8
N	LFO	75%	150	2460	78.6	77.0	78.9	76.5
O	TO	75%	97	2240	77.7	75.7	78.2	75.7
P	TO	55%	94	2320	76.3	74.4	76.2	74.0
Q	TO	55%	95	2140	74.3	72.6	74.1	71.4

NOTE: ALM values are altitude corrected to 694 feet and corrected for atmospheric absorption.

3.5 Flyover Time History: Test series B represents the reference takeoff under conditions of the proposed takeoff noise certification procedure. Appendix B contains listings of uncorrected sound pressure levels for one-half second intervals throughout the flyover for each of the six series B events. Figure 3 is a plot of the one-half second data from event B9 showing the rise and fall of noise levels as a function of time and aircraft position relative to the microphone site (primary site; ground plane microphone). Note that the maximum level occurs before the aircraft reaches the microphone site. Note also the change in difference between OASPL and AL as a function of aircraft position, as well as a substantial difference between the ground and four foot microphones, especially at lower emission angles. These observations are addressed in following sections.

3.6 Helical Tip Mach Number: Noise levels generated by a propeller are a strong function of Helical tip Mach number (M_H) as evidenced by the proposed default correction for off-reference RPM test specifications: $(K_m)\ \log_{10}(M_{HR}/M_{HT})$ where K_m is an empirically determined constant ($K_m = 150$), M_{HR} and M_{HT} are the reference and test helical tip Mach numbers, respectively. M_H is the vector sum of two components: (1) the ratio of the tangential velocity of the propeller tip in the plane of the propeller to the speed of sound, and (2) the ratio of the translational velocity of the propeller tip (i.e., the airspeed of the aircraft) to the speed of sound.

$$M_H = (V_R{}^2 + V_T{}^2)^{1/2}/C \qquad \text{eq. 1}$$

or $$M_H = (M_R{}^2 + M_T{}^2)^{1/2} \qquad \text{eq. 2}$$

where: V_R is the tip tangential velocity

Figure 3a

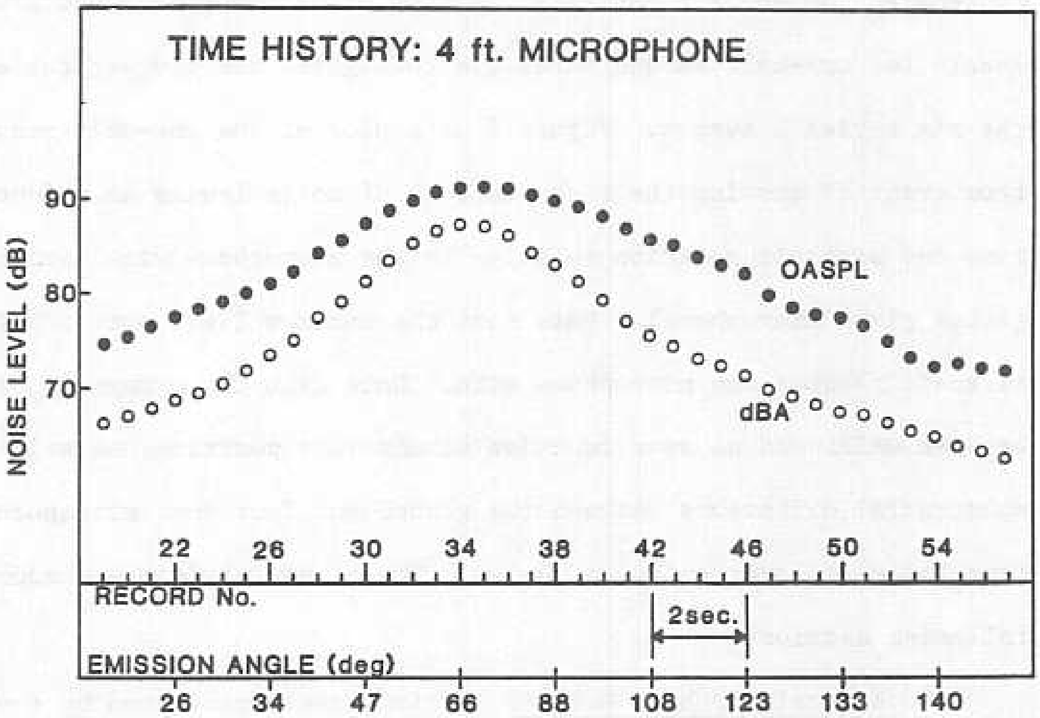
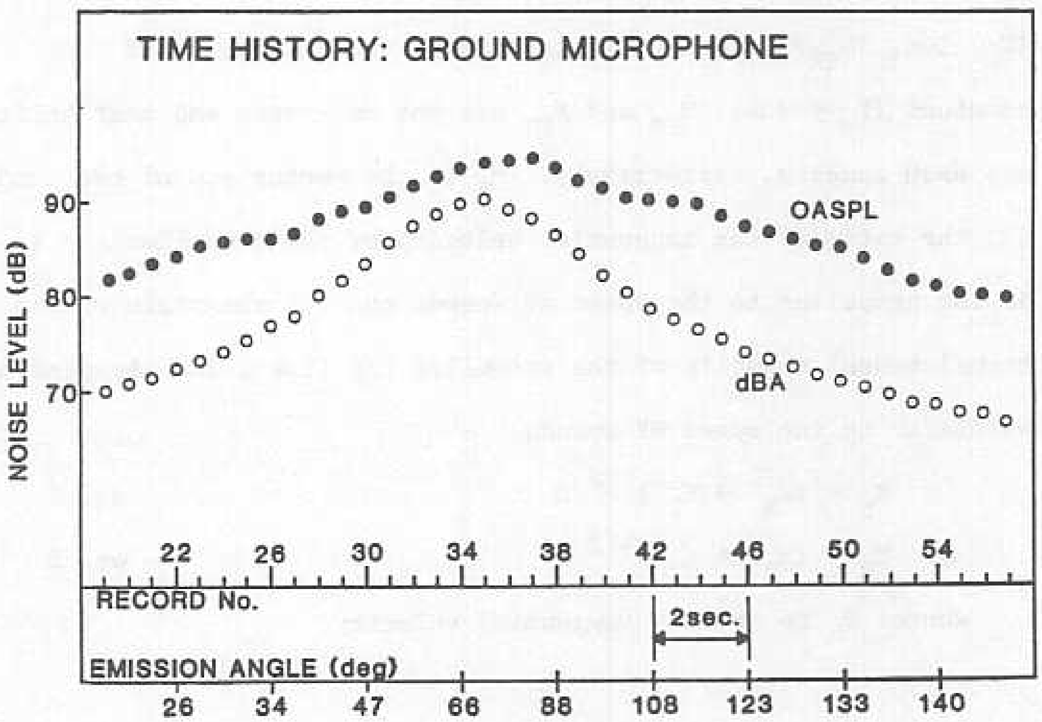


Figure 3b



(EVENT B9-see data listing in APP. B)

V_T is the tip translational velocity

M_R is the rotational tip Mach number

M_T is the translational tip Mach number

C is the speed of sound

V_R is the product of the propeller disk circumference and propeller RPM:

$$V_R = (D_P)(RPM)/229.18 \qquad \text{eq. 3}$$

V_T is the aircraft airspeed converted to feet per second:

$$V_T = (KIAS)(1.688) \qquad \text{eq. 4}$$

C, the speed of sound in feet per second, is a function of air temperature as follows:

$$C = (49.02)(T_F + 459.67)^{1/2} \qquad \text{eq. 5}$$

where T_F is air temperature in degrees Farenheit

KIAS is indicated air speed in knots per hour

RPM is revolutions per minute

Dp is propeller diameter in inches

The test aircraft has a 80 inch propeller, Vy of 92 knots and a 2700 RPM engine. At the standard day temperature of 59°F, the reference M_H for the Lance was 0.856. The reference M_R and M_T values are 0.844 and

0.139 respectively. Series averaged M_H values are presented in Table 3. Table 3 also includes other calculated values discussed in following sections of this report.

Table 3 Auxiliary Data

SERIES	MODE/RPM/POWER/TAS	[1] M_H	[2] INFLOW ANGLE (DEGREES)	[3] SHP	[4] EMISSION ANGLE (DEGREES)	[5] GROUND MINUS ELEVATED MICROPHONES (ALM)	[6] EXHAUST CONTRI-BUTION TO ALM	[6] PROP ONLY PRIMARY GROUND	[6] PROP ONLY PRIMARY 4 FT.	[6] PROP ONLY SECONDARY GROUND	[6] PROP ONLY SECONDARY 4 FT.	[7] M_{HK}	[8] HARMONIC ROLLOFF dB PER HARMONIC
A	TO/2780/96%/82	0.873	4.3°	287	70°	2.5	0.2	91.7	89.4	90.9	88.2	0.882	1.5
B	TO/2780/96%/95	0.875	1.2°	287	68°	2.5	0.3	91.1	88.7	90.3	87.7	0.878	1.4
C	TO/2780/96%/123	0.882	-2.2°	287	66°	2.5	0.3	90.2	87.8	89.7	87.0	0.875	1.5
D	LFO/2780/96%/167	0.896	-4.4°	287	67°	2.3	0.4	89.4	87.2	89.3	86.8	0.877	1.3
E	TO/2780/77%/82	0.868	4.0°	231	69°	2.5	0.2	90.3	87.8	89.5	87.0	0.876	1.4
F	TO/2780/77%/96	0.870	0.9°	231	69°	2.6	0.3	89.6	87.1	89.5	86.8	0.872	1.4
G	TO/2780/77%124	0.876	-2.2°	231	72°	2.2	0.3	88.9	87.0	89.2	86.8	0.870	1.3
H	LFO/2780/77%/152	0.886	-3.9°	231	72°	2.1	0.3	88.4	86.5	88.8	86.5	0.871	1.3
I	TO/2570/55%/95	0.804	1.2°	165	72°	2.3	1.0	79.8	77.9	79.8	77.1	0.806	2.3
J	TO/2570/55%/123	0.812	-2.2°	165	71°	2.2	1.8	78.7	76.6	79.1	76.6	0.805	2.6
K	TO/2640/77%/97	0.824	0.6°	231	76°	2.2	0.9	83.5	81.4	83.3	81.1	0.826	1.7
L	LFO/2630/77%/153	0.837	-3.8°	231	75°	1.8	1.0	81.8	80.6	81.9	79.7	0.822	1.6
M	TO/2440/77%/97	0.762	0.6°	231	83°	2.0	1.6	77.5	75.9	77.6	75.2	0.764	3.0
N	LFO/2460/77%/150	0.785	-3.6°	231	80°	2.0	1.7	77.2	75.5	77.2	74.8	0.772	3.0
O	TO/2240/77%/97	0.700	1.5°	231	92°	2.2	3.9	73.8	71.8	74.3	71.8	0.703	4.2
P	TO/2320/55%/94	0.723	1.9°	165	84°	2.0	2.6	73.7	71.8	73.6	71.4	0.727	3.4
Q	TO/2140/55%/95	0.669	1.9°	165	88°	2.2	3.6	70.7	69.0	70.5	67.8	0.673	4.7

[1] see section 3.6
[2] see section 3.7
[3] see section 3.8
[4] see section 3.9
[5] see section 3.11
[6] see section 3.12
[7] see section 3.13
[8] see section 3.10

Inflow angle was varied during the test by a series-to-series variation in airspeed (Section 2.3). Prior to performing the inflow angle analysis, the noise data must be normalized to a reference M_H. The M_H correction equation constant, Km, was empirically determined by a series-to-series variation of RPM at constant power and constant airspeed. Figure 4 illustrates for each microphone noise levels (ALM) as a function of M_H. The calculated Km constants for the line segments in Figure 4 are presented in Table 4. It is evident that engines exhaust noise may be affecting the noise level/M_H relationship at lower RPM values. The exhaust noise issue is addressed later in Section 3.12.

Figure 4a

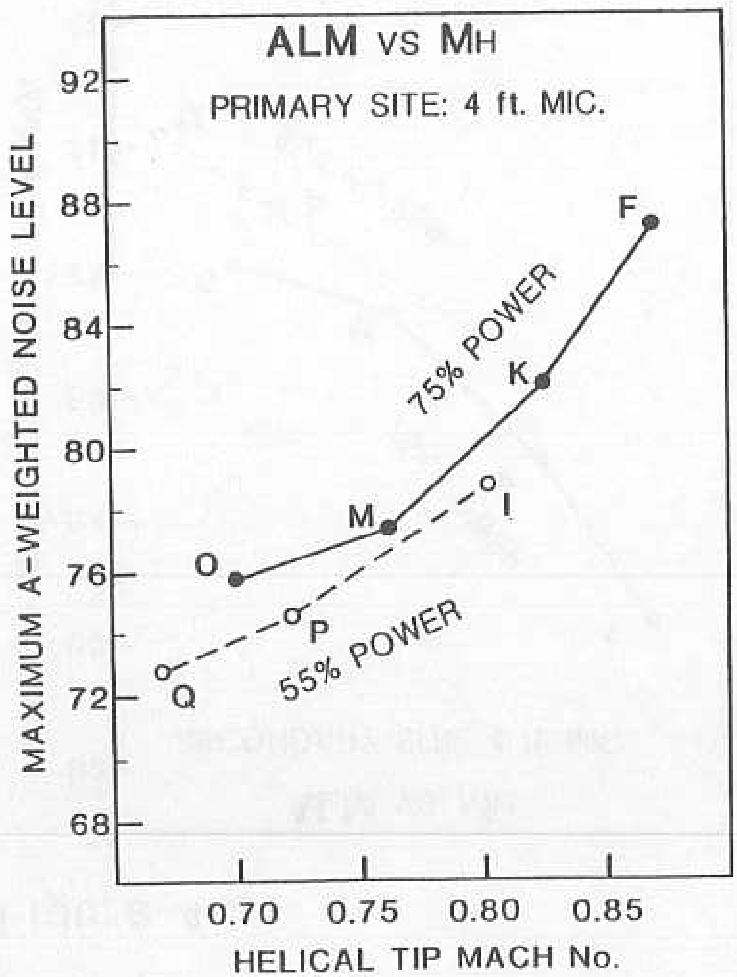


Figure 4b

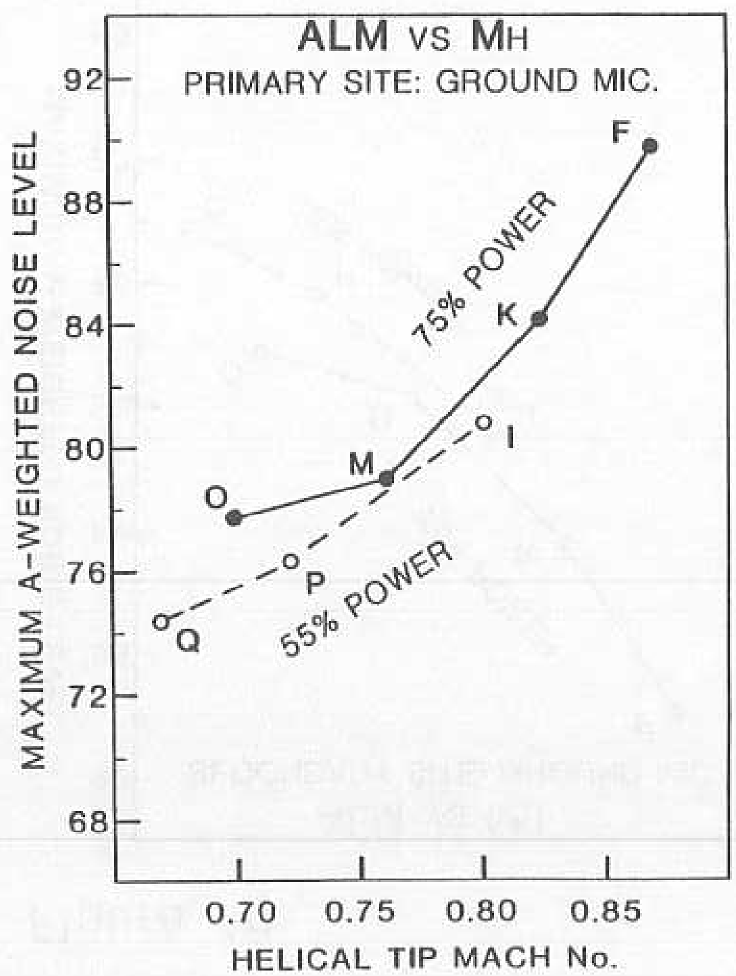


Figure 4c

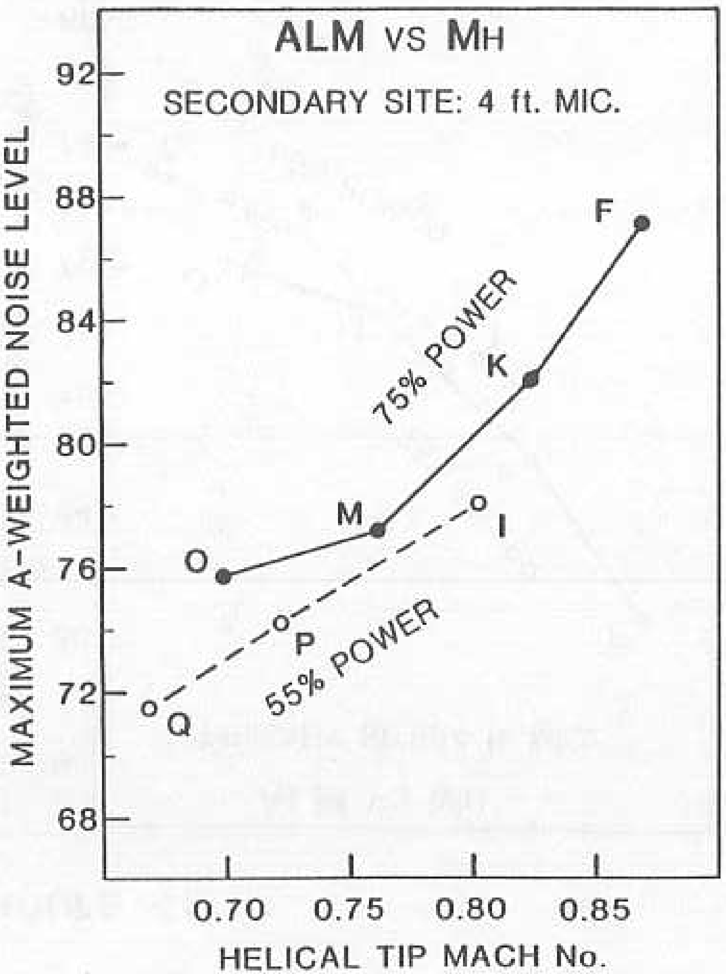


Figure 4d

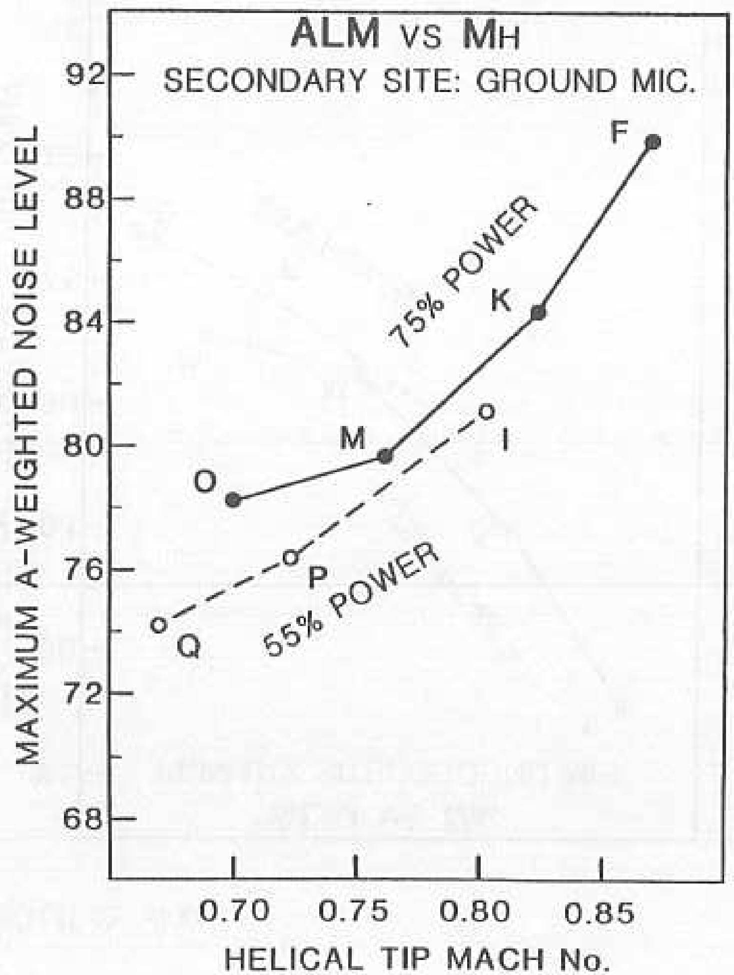


Table 4 M_H Correction Equation Constant "K_M"
(Empirically derived from flight test data-ref. Figure 4)

Segment	F (77% power; 96 TAS; 2780 RPM) to K (77% power; 97 TAS; 2640 RPM	
	@primary site; ground microphone	K_M = 231
	@primary site; 4 ft microphone	K_M = 218
	@secondary site; ground microphone	K_M = 235
	@secondary site; 4 ft microphone	K_M = 216
Segment	K (77% power; 97 TAS; 2640 RPM) to M (77% power; 97 TAS; 2440 RPM	
	@primary site; ground microphone	K_M = 156
	@primary site; 4 ft microphone	K_M = 140
	@secondary site; ground microphone	K_M = 150
	@secondary site; 4 ft microphone	K_M = 152
Segment	M (77% power; 97 TAS; 2440 RPM) to O (77% power; 97 TAS; 2240 RPM)	
	@primary site; ground microphone	K_M = 48
	@primary site; 4 ft microphone	K_M = 36
	@secondary site; ground microphone	K_M = 30
	@secondary site; 4 ft microphone	K_M = 26
Segment	I (55% power; 95 TAS; 2570 RPM) to P (55% power; 94 TAS; 2320 RPM)	
	@primary site; ground microphone	K_M = 100
	@primary site; 4 ft microphone	K_M = 98
	@secondary site; ground microphone	K_M = 100
	@secondary site; 4 ft microphone	K_M = 90
Segment	P (55% power; 94 TAS; 2320 RPM) to O (55% power; 95 TAS; 2140 RPM)	
	@primary site; ground microphone	K_M = 53
	@primary site; 4 ft microphone	K_M = 58
	@secondary site; ground microphone	K_M = 77
	@secondary site; 4 ft microphone	K_M = 63

3.7 Propeller Inflow Angle: A comparison between noise levels from the (B) takeoff and (D) level flyover series is presented in Table 5. The difference or "residual" in noise levels represents the unaccounted difference after the level flyover events are normalized via M_H correction to account for the difference in airspeed between the two series. The residual difference is thought to result from the change in propeller inflow angle between the takeoff and level flyover series.

Propeller inflow angle is a function of the lift coefficient in flight, which is a function of aircraft weight, airspeed, air density, and wing surface area. Based on performance information from the Piper Aircraft Company relating lift coefficient to wing angle of attack (and consequently to propeller inflow angle given the offset of the propeller axis from the wing chord), values of propeller inflow angle were calculated using series averages and are presented in Table 3.

ALM values, in groups of constant power and RPM, and M_H normalized within each group to the 92 knot series (series B, F, K, L, M), are plotted against propeller inflow angle in Figure 5. It is evident from Figure 5 that a consistent relationship exists between propeller inflow angle and ALM over a range of RPM and power settings. Table 6 presents values of ALM per degree propeller inflow angle for the primary series of interest (Vy takeoff and level flyover series). On average, a value of 0.6 ALM per degree propeller inflow angle was found.

Table 5 Residual Factors

	Takeoff B series ALM	Level Flyover D series ALM	Level Flyover M_H Adj. of D series	Residual Factors
Primary Site (Ground)	91.4	89.8	-2.4	4.0
Primary Site (4 ft)	89.0	87.6	-2.2	3.6
Secondary Site (Ground)	90.6	89.7	-2.4	3.3
Secondary Site (4 ft)	88.0	87.2	-2.2	3.0

Table 6 ALM/degree propeller inflow angle
(refer to Figure 5)

Line Segment	Primary Site Ground Mic.	Primary Site 4 ft. Mic.	Secondary Site Ground Mic.	Secondary Site 4 ft. Mic.
B to D	0.73	0.68	0.63	0.62
F to H	0.62	0.52	0.54	0.45
K to L	0.59	0.38	0.54	0.51
M to N	0.54	0.55	0.55	0.55

Figure 5a

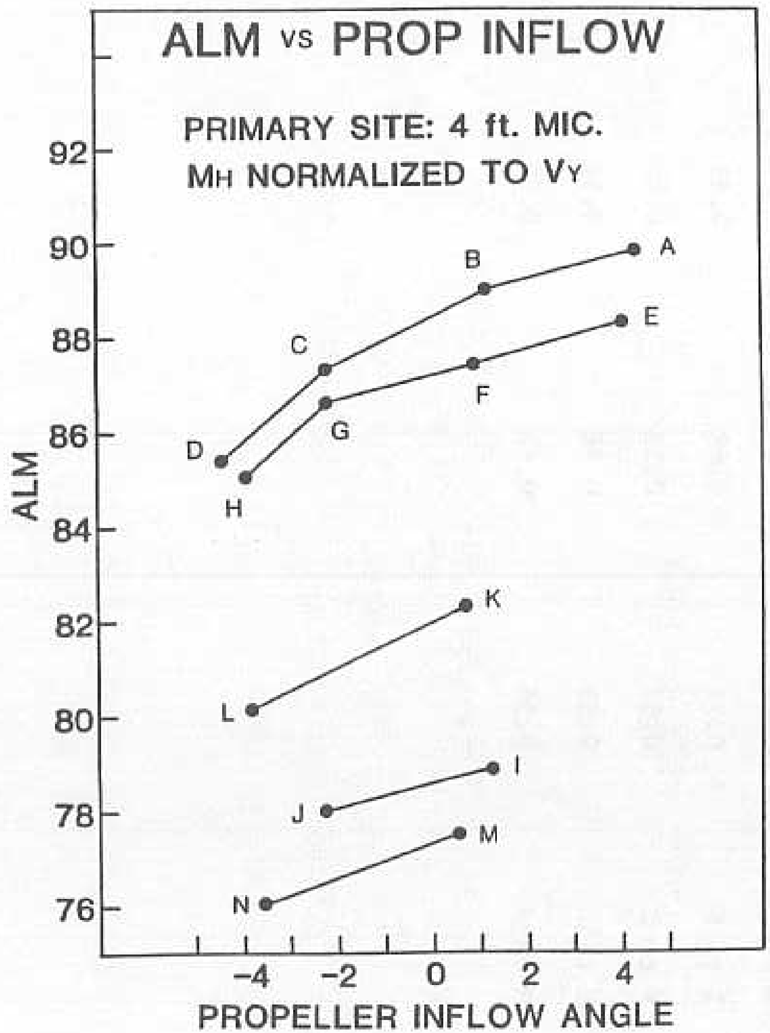


Figure 5b

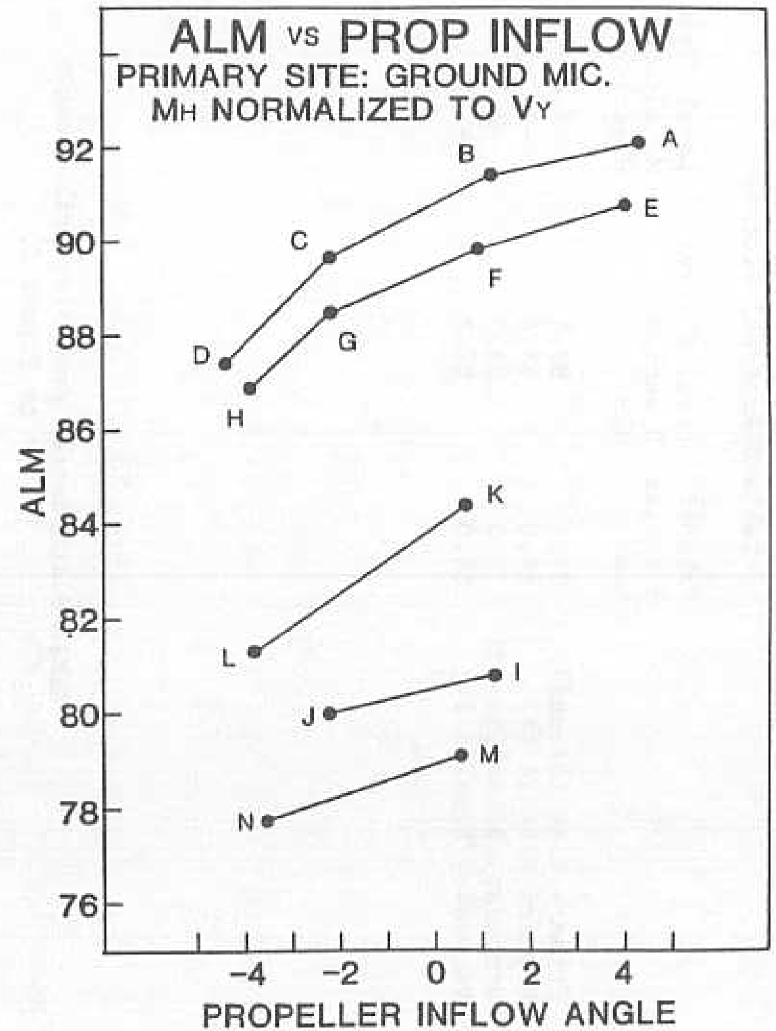


Figure 5c

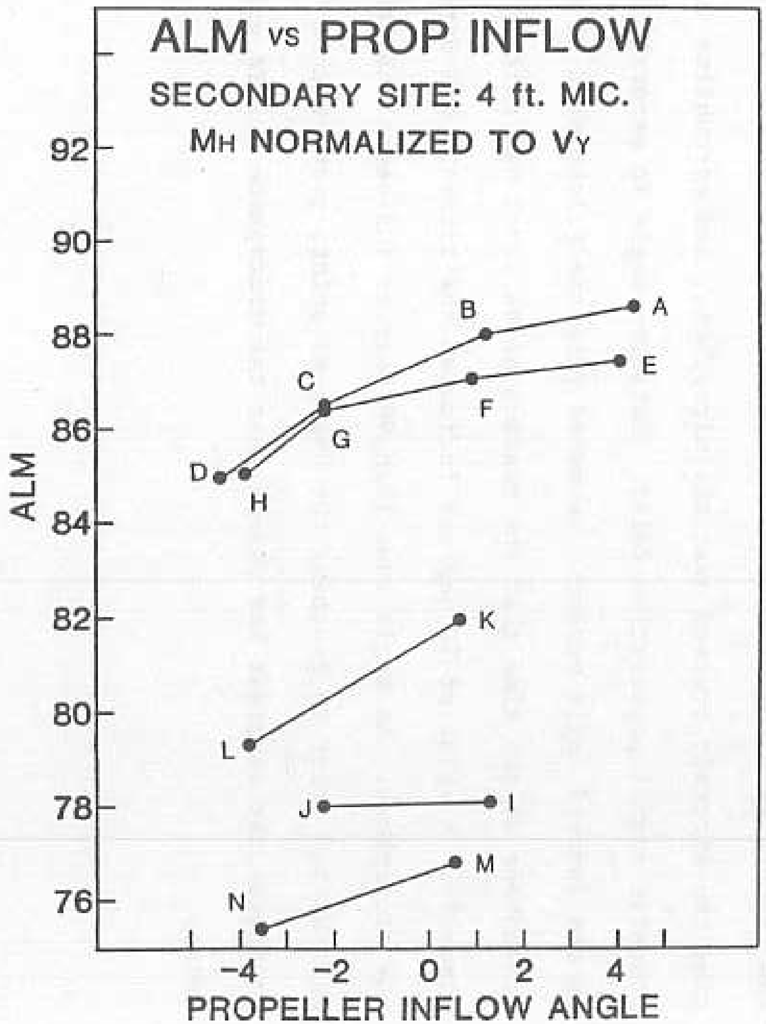
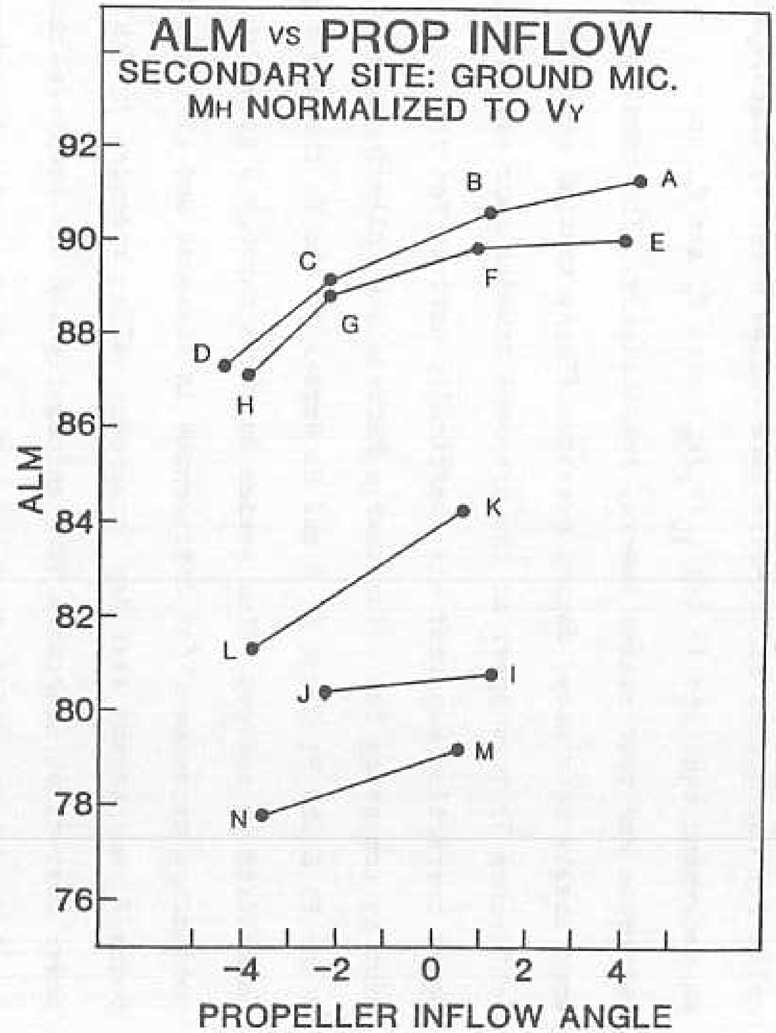


Figure 5d



3.8 Power Correction: The proposed FAA noise certification test calls for correction of off-reference engine power by algebraically adding an increment equal to 17 log $_{10}(P_R/P_T)$ were P_R and P_T are reference and test engine powers, respectively. The constant, 17, was empirically determined during previous flight testing performed by the FAA (reference 3) in support of the proposed takeoff test procedure. The power correction constant was empirically derived for the Lance flight test by comparing the noise levels between the following groups of series: A and E; B and F; C and G; D and H. Series in the E through H group were normalized to corresponding series in the A through D group via the M_H correction to account for differences in airspeed and air temperature. Using M_H and actual test day horsepower values recorded in Table 3, the power correction constants were calculated and are presented in Table 7.

3.9 Emission Angle Analysis: The specific angle of maximum acoustic emission, the location of the aircraft at ALM relative to the microphone, was calculated using measurements of altitude, time of ALM occurance, and time the aircraft crossed over the microphone, and accounting for the acoustic signal propagation delay. Emission angle in general is defined as the forward angle measured downward from the flight path to the microphone at the time that the maximum noise level was emitted by the aircraft. A value of 90 degrees indicates the aircraft was directly over the microphone. An angle less than 90 degrees indicates that the noise was emitted prior to reaching the overhead point; greater than 90 degrees indicates the aircraft has passed over the microphone before emitting the noise.

Table 7 Power Correction Constants "K_p"
(Empirically Derived from Flight Test

Series	Primary Site Ground mic.	Primary Site 4 ft. mic.	Secondary Site Ground mic.	Secondary Site 4 ft. mic.
A and E	10.5	8.4	6.7	7.6
B and F	11.4	10.7	5.8	5.1
C and G	2.1	6.8	-4.3	-2.4
D and H	-2.2	-0.7	-6.6	-5.1

Averaged values of maximum angle of emission for each series are presented in Table 3. Values for each event are listed in Table A-3 of Appendix A. By inspection, there is a discernable trend between RPM and angle of maximum emission. The angle is typically 70 degrees at the high RPM series. As RPM settings are reduced, the angle increases toward roughly an overhead position.

3.10 Narrowband Spectral Analysis: Figures 6a and 6b are flat-weighted and A-weighted narrowband frequency spectra, respectively, of the maximum acoustic signal level from event B9 (primary site; ground microphone). Components immediately identifiable in the spectra are the fundamental and harmonic tones of the propeller, engine exhaust, and half-order tones from the exhaust. Note that the harmonic tones of the propeller and exhaust are periodically combined as a single tone. These combined tones occur at propeller harmonic numbers 3, 6, 9,..., and engine exhaust harmonic numbers 2, 4, 6,...,. Note also that the harmonic tones in the frequency range of 200 to 1000 Hertz dominate the total A-weighted sound pressure level for the event B9 full power, high RPM spectrum depicted. Propeller tones clearly dominate the exhaust tones throughout the entire spectrum.

Appendix C presents flat-weighted and A-weighted narrowband spectra at the approximate time of maximum sound pressure level for each of the 17 series conducted during the Lance flight test. Of particular note is the influence of RPM on the mid- and higher harmonics as evidenced in the comparison of spectra from 2780 RPM series versus spectra from series conducted in the RPM range of 2100 to 2500. Note also the relative contribution of engine exhaust noise throughout the 17 series. Engine exhaust noise is discussed further in Section 3.12.

Figure 6a EXAMPLE NARROWBAND SPECTRA

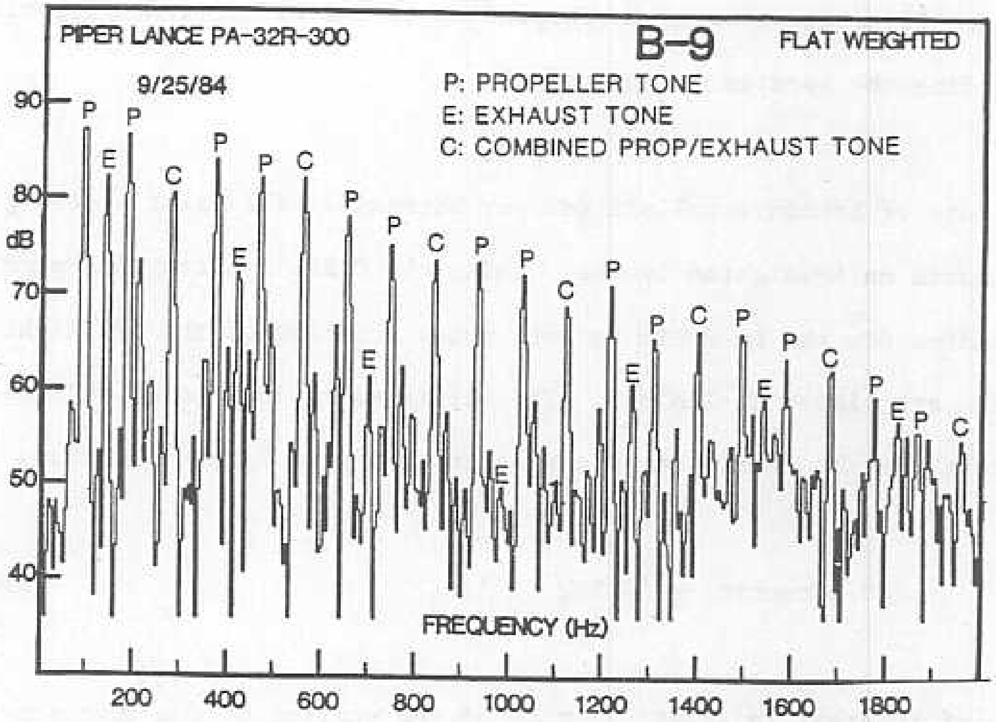
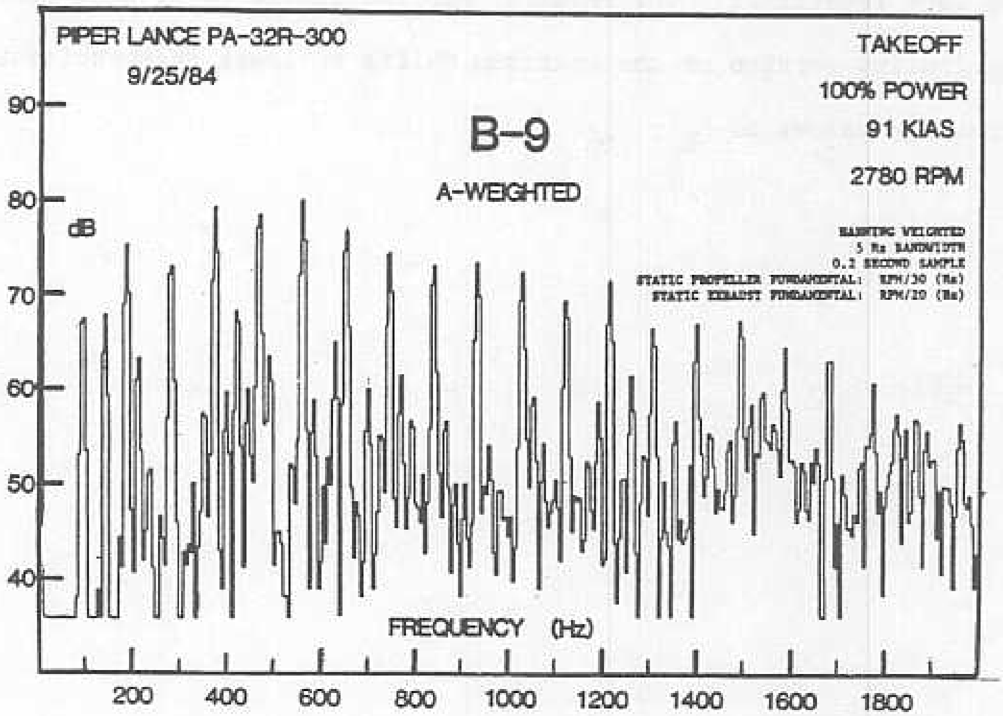


Figure 6b



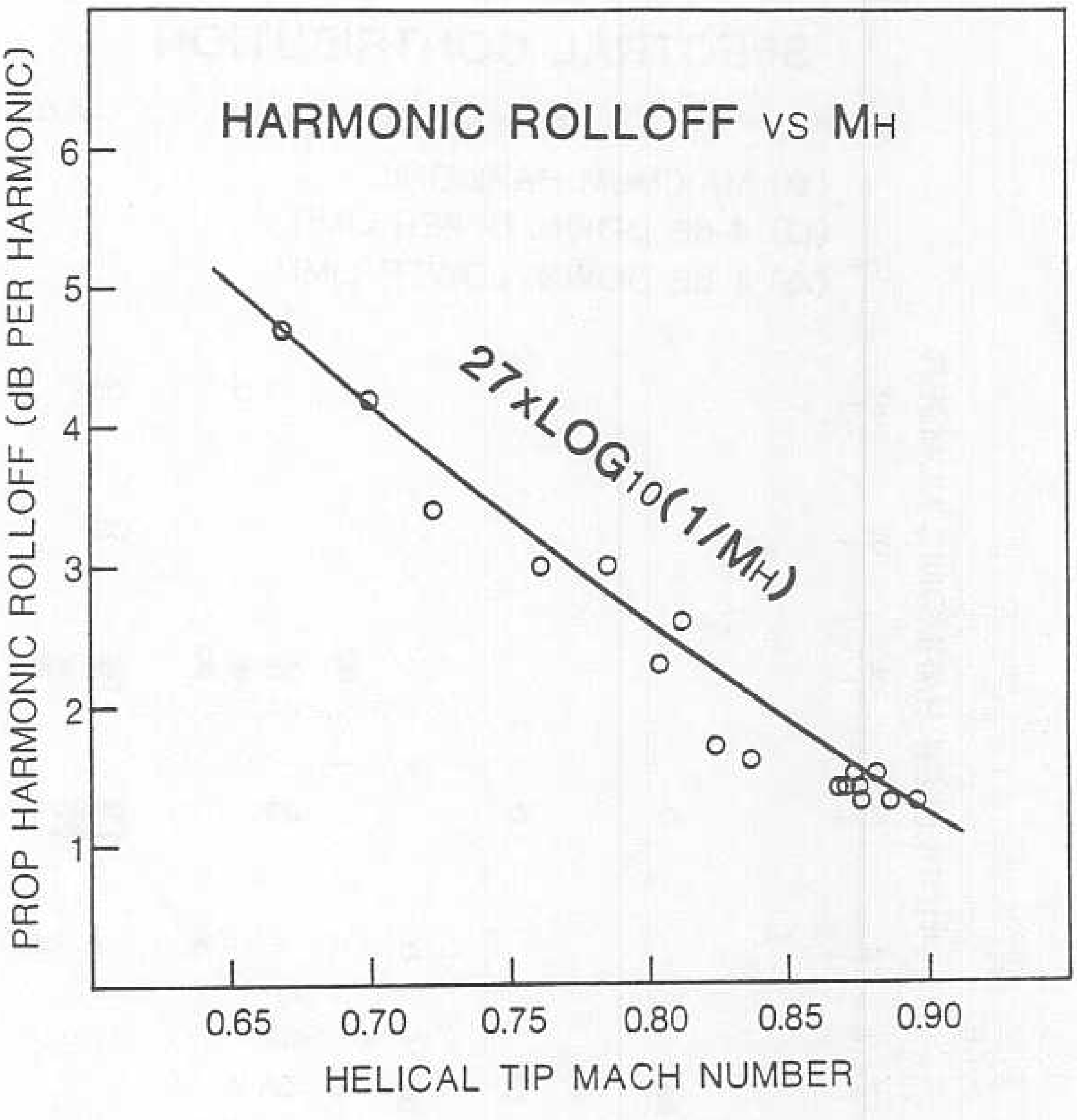
Time histories of narrowband spectra from ground and four foot microphones (primary site) for event B9 are presented in Appendix D. Each spectrum is a one-half second average corresponding to the listed time histories preceding the spectra in Appendix D.

The rate of harmonic rolloff (dB per harmonic) will exert a strong influence on A-weighted levels. Using the OASPL spectra in Appendix C, estimates for the harmonic rolloff rates for each of the 17 flight test series are listed in Table 3. The estimated rolloff rates, plotted against test M_H in Figure 7, can be approximated by the equation:

$$(\text{dB/harmonic}) = 27 \log_{10}(1/M_H) \qquad \text{eq. 6}$$

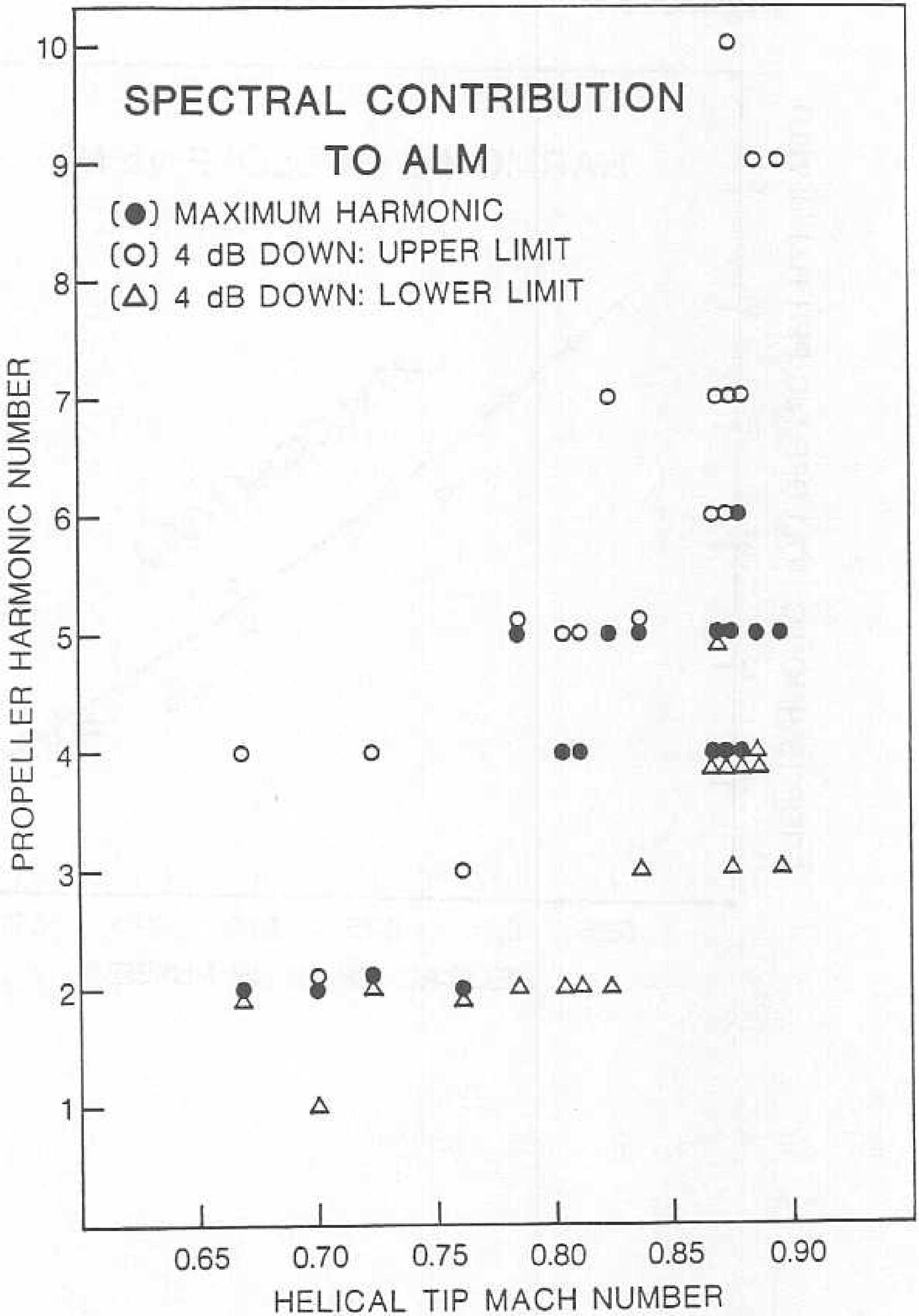
Also of interest is identification of the portion of the spectrum which significantly contributes to ALM. Using the A-weighted spectra in Appendix C, the dominant harmonics and the harmonics within plus or minus 4 dB were identified. The results, plotted in Figure 8, show that the contributing portion of the spectrum shifts to lower frequencies for decreasing values of M_H.

Figure 7



HARMONIC ROLLOFF VS MH
27xLOG10(1/MH)
PROP HARMONIC ROLLOFF (dB PER HARMONIC)
1
2
3
4
5
6
0.65
0.70
0.75
0.80
0.85
0.90
HELICAL TIP MACH NUMBER

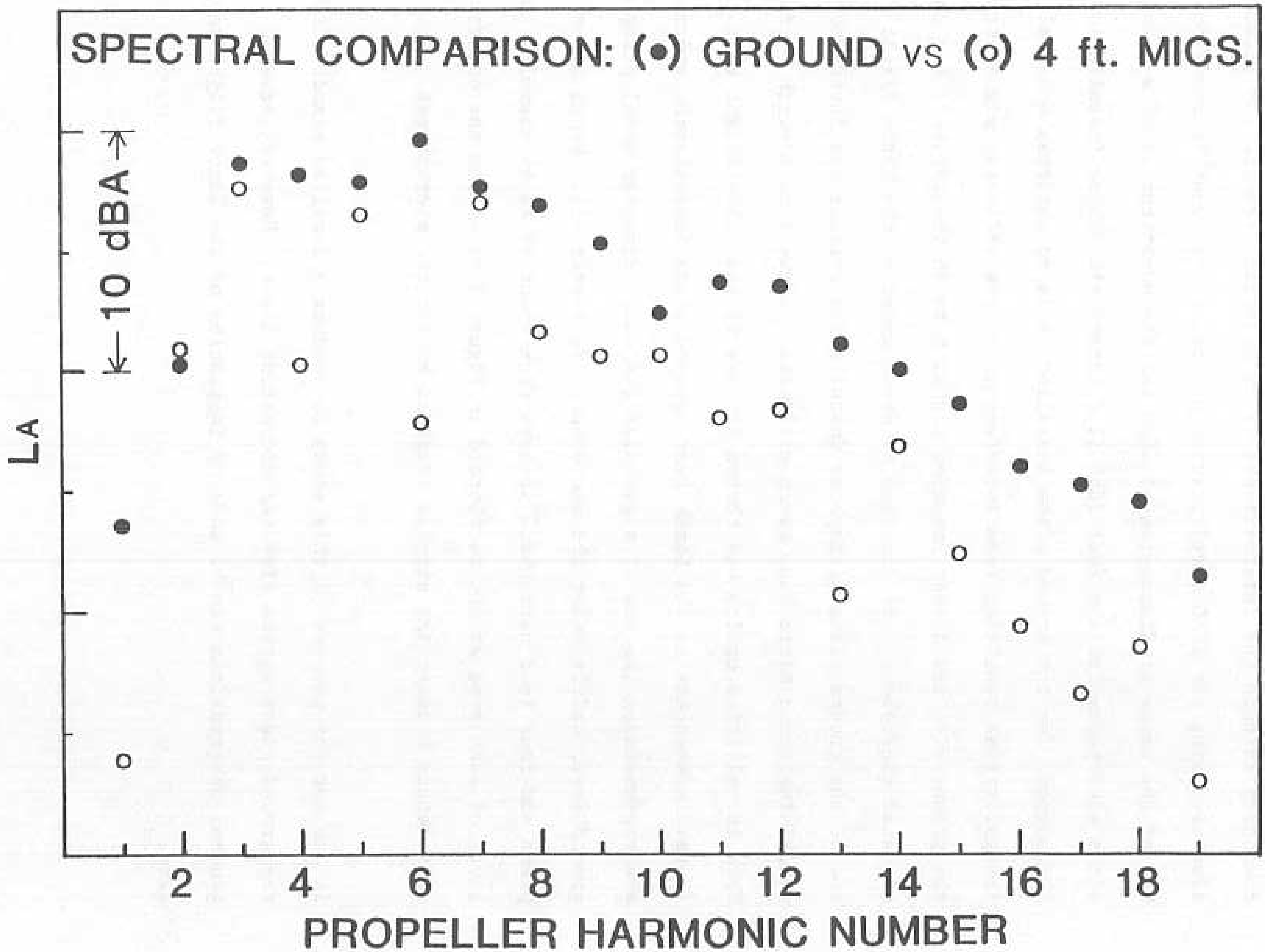
Figure 8


SPECTRAL CONTRIBUTION
TO ALM
(●) MAXIMUM HARMONIC
(○) 4 dB DOWN: UPPER LIMIT
(△) 4 dB DOWN: LOWER LIMIT
PROPELLER HARMONIC NUMBER
1
2
3
4
5
6
7
8
9
10
0.65
0.70
0.75
0.80
0.85
0.90
HELICAL TIP MACH NUMBER

3.11 Ground Plane Microphone: Concurrent with development of the proposed FAA noise certification procedure, the international aviation community through the International Civil Aviation Organization (ICAO) was also reviewing the ICAO certification procedure for possible revision. One of the areas of discussion at ICAO was the substitution of a ground plane microphone for the four foot (1.2 meter) microphone installation. The purpose for the ground plane installation is to suppress spectral irregularities resulting from interference of the reflected signal from the ground with the direct incoming signal between the aircraft and the elevated microphone. At the time of development of the Lance flight test, one of the ground plane microphone installation options was inversion of a normal incidence microphone seven millimeters above a bare earth surface. This installation option was chosen for use in the Lance flight test. (Note: subsequent to the Lance test, ground plane installation proponents are recommending the use of a circular 0.4 meter diameter metal plate as a ground level baffle under the microphone (reference 4)). Using ground plane and four foot narrowband spectra from event B9 as an example, the level of each tone at ALM is plotted in Figure 9 revealing the spectral differences between the signals received by the two microphones.

It was not the purpose of this study to conduct a detailed examination of the ground plane versus elevated microphone issue. However, several general observations can be made by inspection of the Lance flight test data.

Figure 9


SPECTRAL COMPARISON: (•) GROUND vs (o) 4 ft. MICS.
10 dBA
LA
2
4
6
8
10
12
14
16
18
PROPELLER HARMONIC NUMBER

The difference in ALM between ground plane and four foot measurements is included in Table 3. The average difference throughout the entire flight test was as follows:

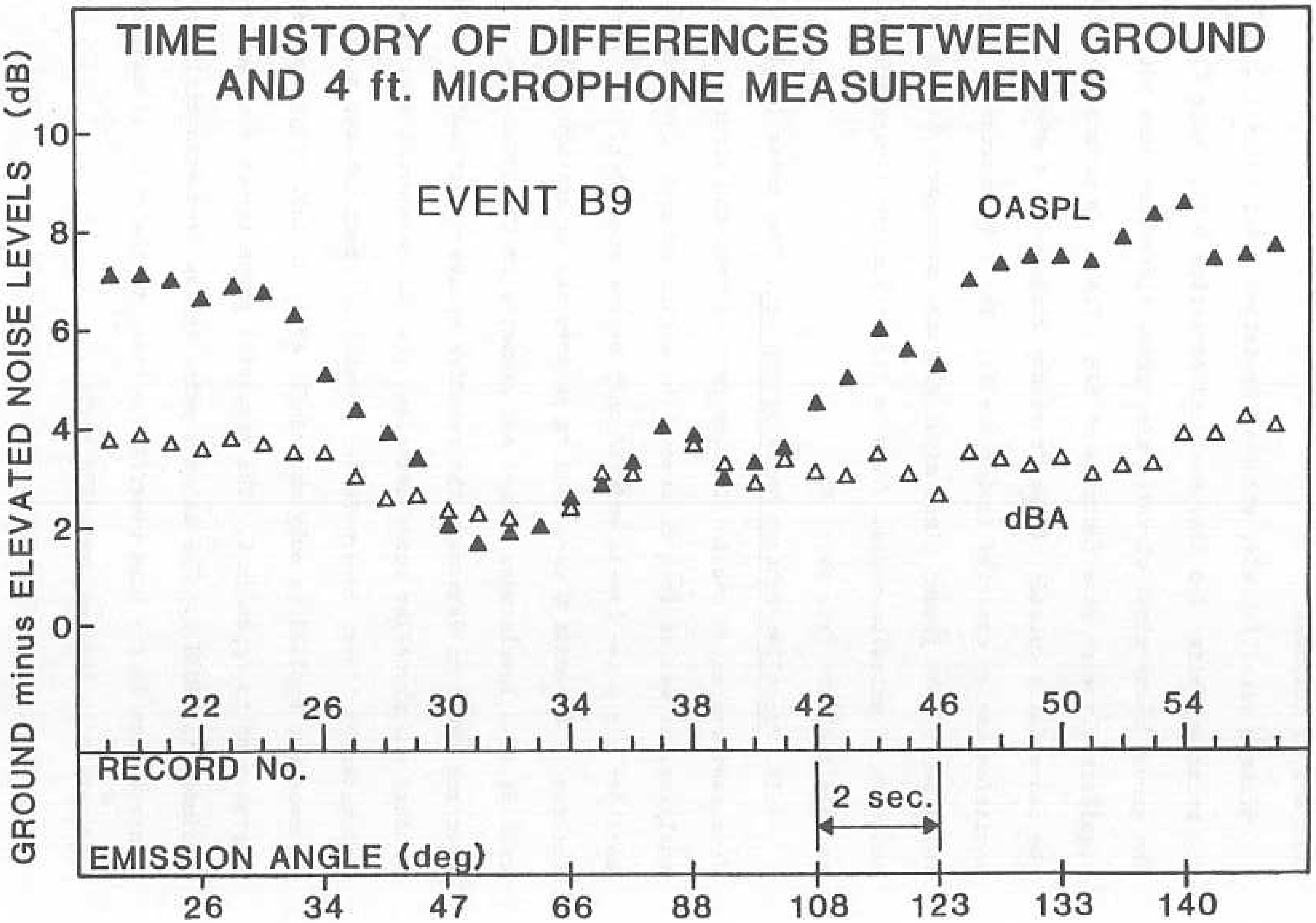
primary site: 2.0 dBA; standard deviation 0.41; range 1.2 to 2.8

secondary site: 2.5 dBA; standard deviation 0.26; range 1.8 to 3.0

The ground plane minus elevated microphone difference does not significantly vary as a function of RPM. The blade passage frequency of the Lance falls outside of the frequency range where a significant variation can be expected (reference 5). There is however, a significant variation of the ground plane minus elevated microphone levels as a function of emission angle. This is illustrated in Figure 10 using as an example the data from event B9.

3.12 Propeller/Exhaust Noise Separation: The noise levels previously discussed represent the total noise emitted from the aircraft. In some analyses, it was desired to remove the engine exhaust noise component and consider the noise levels emitted only by the propeller. The narrowband spectra in Appendix C were used to perform the separation. Individual exhaust tone levels were summed and compared to the total measured spectrum level to determine the relative exhaust contribution. Where the exhaust and propeller tones coincide, the hidden exhaust tone was estimated by linear interpolation between adjacent exhaust tones. This process was applied to only the single event in each flight series represented in Appendix C. The resulting propeller-only noise levels are included in Table 3. The exhaust noise varies from essentially no contribution in the high power/RPM series, to the point of exhaust noise domination in the low power/RPM series.

Figure 10



TIME HISTORY OF DIFFERENCES BETWEEN GROUND
AND 4 ft. MICROPHONE MEASUREMENTS
EVENT B9
OASPL
dBA
GROUND minus ELEVATED NOISE LEVELS (dB)
10
8
6
4
2
0
22
26
30
34
38
42
46
50
54
RECORD No.
2 sec.
EMISSION ANGLE (deg)
26
34
47
66
88
108
123
133
140

It is instructive to re-analyze the noise level/M_H relationship (Section 3.6) using the propeller only data. The resulting Figure 11 shows improved linearity in the lower RPM (M_H) region. The K_M constants for each of the propeller-only line segments are presented in Table 8. It is evident that the removal of exhaust noise will not affect the analysis performed in Section 2.7.2 on propeller inflow angle.

Figure 11a

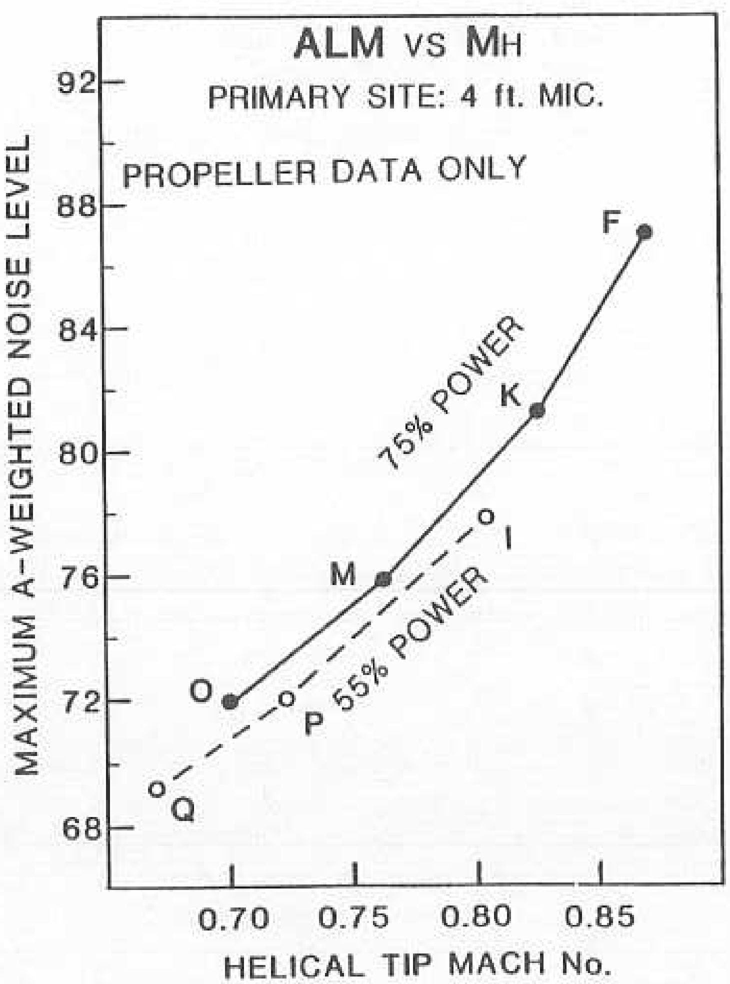


Figure 11b

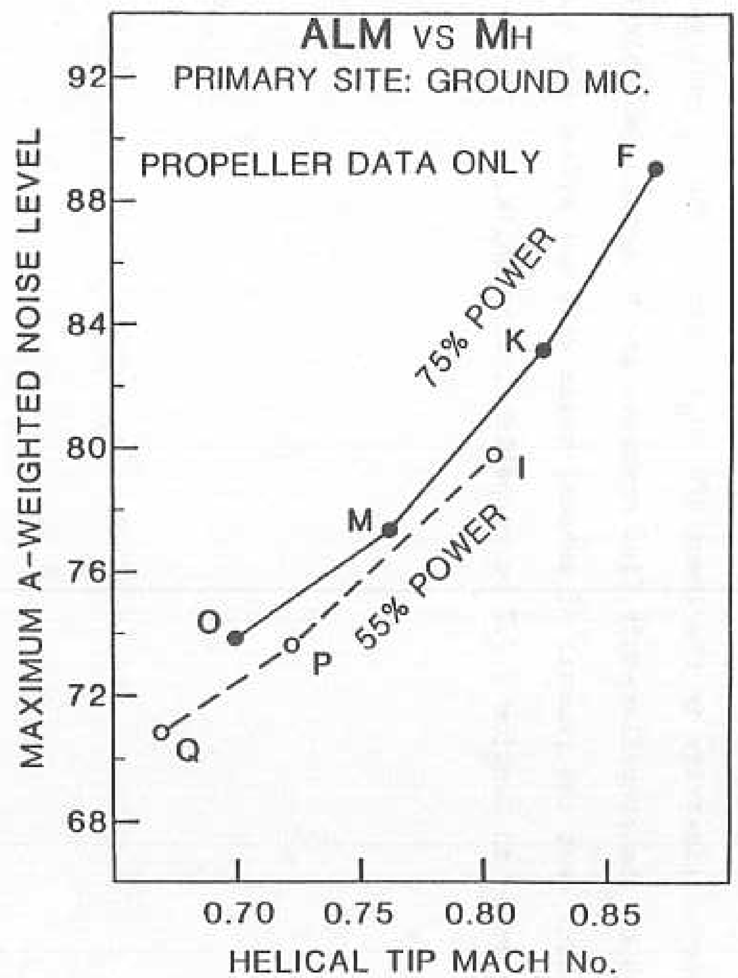


Figure 11c

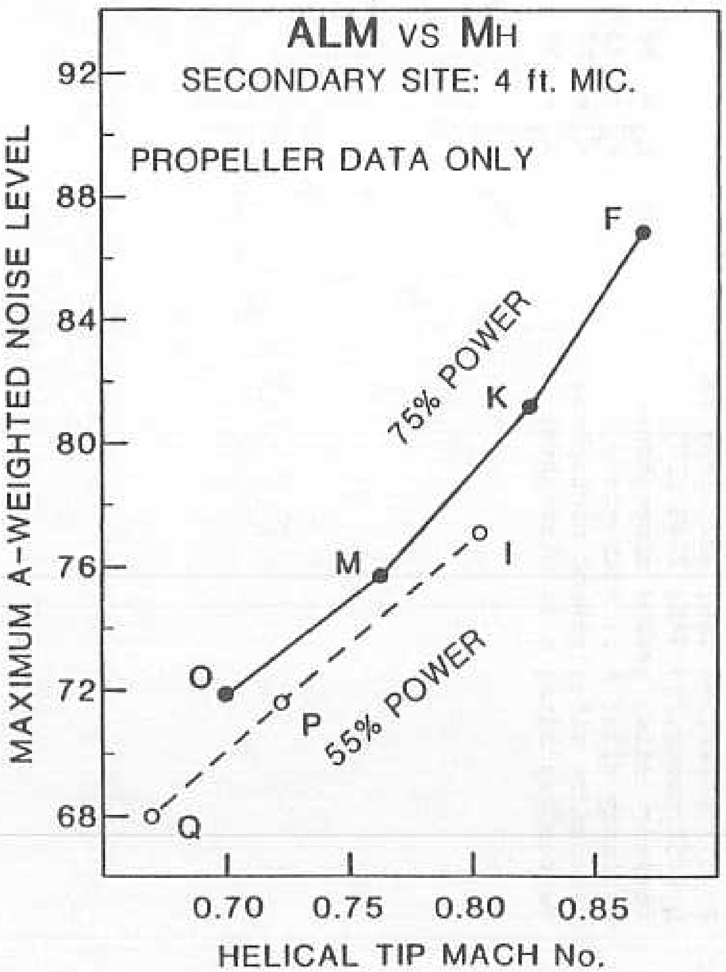


Figure 11d

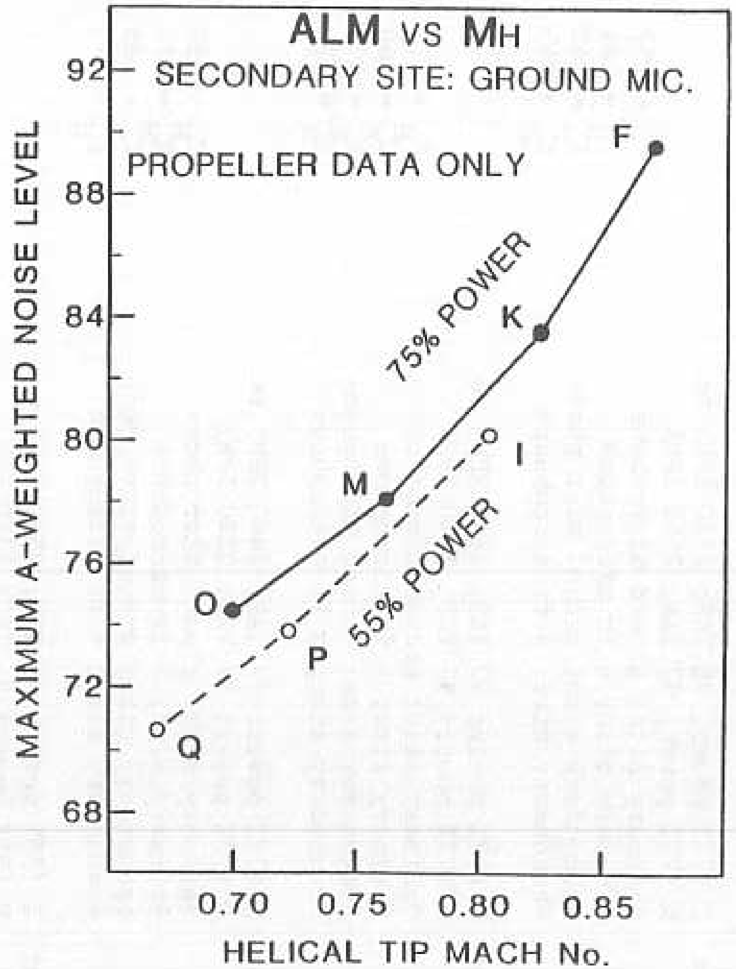


Table 8 M_H Correction Equation Constant "K_M" Using Propeller-Only Noise Data

Segment	F (77% power; 96 TAS; 2780 RPM) to K (77% power; 97 TAS; 2640 RPM)	
	@primary site; ground microphone	K_M = 257
	@primary site; 4 ft microphone	K_M = 244
	@secondary site; ground microphone	K_M = 262
	@secondary site; 4 ft microphone	K_M = 243
Segment	K (77% power; 97 TAS; 2640 RPM) to M (77% power; 97 TAS; 2440 RPM)	
	@primary site; ground microphone	K_M = 177
	@primary site; 4 ft microphone	K_M = 160
	@secondary site; ground microphone	K_M = 170
	@secondary site; 4 ft microphone	K_M = 173
Segment	M (77% power; 97 TAS; 2440 RPM) to O (77% power; 97 TAS; 2240 RPM)	
	@primary site; ground microphone	K_M = 98
	@primary site; 4 ft microphone	K_M = 110
	@secondary site; ground microphone	K_M = 88
	@secondary site; 4 ft microphone	K_M = 92
Segment	I (55% power; 95 TAS; 2570 RPM) to P (55% power; 94 TAS; 2320 RPM	
	@primary site; ground microphone	K_M = 134
	@primary site; 4 ft microphone	K_M = 132
	@secondary site; ground microphone	K_M = 134
	@secondary site, 4 ft microphone	K_M = 124
Segment	P (55% power, 94 TAS; 2320 RPM) to Q (55% power, 95 TAS; 2140 RPM)	
	@primary site; ground microphone	K_M = 88
	@primary site; 4 ft microphone	K_M = 83
	@secondary site; ground microphone	K_M = 107
	@secondary site; 4 ft microphone	K_M = 93

3.13 <u>Wind Tunnel Comparison</u>: The same model propeller was used in the full scale acoustic wind tunnel test performed at the German/Dutch Wind Tunnel. From results of the wind tunnel experiment, Dobrzynski (reference 6) proposes a revised M_H to account for the influence of propeller inflow angle on sound pressure levels. The proposed "advancing," or "local" helical tip Mach number, denoted as M_{HK}, is defined by the equation:

$$M_{HK} = M_H[1 + (2)(Vt/Vr)(\sin\emptyset)/(1 + Vt^2/Vr^2)]^{1/2} \qquad \text{eq. 7}$$

The M_{HK} equation is based on the observation (reference 7) that pressure waves originating from a blade at an orthogonal position advancing toward the microphone essentially govern the resulting noise levels. Calculated values of M_{HK} from the Lance flight test are presented in Table 3.

An analysis of propeller inflow angle using M_H was performed in Section 3.7.2. That analysis is repeated in this section using M_{HK}. As shown in Figure 12, use of M_{HK} to normalize the data does account for slightly more than half of the influence of inflow angle on noise levels.

Figure 12a

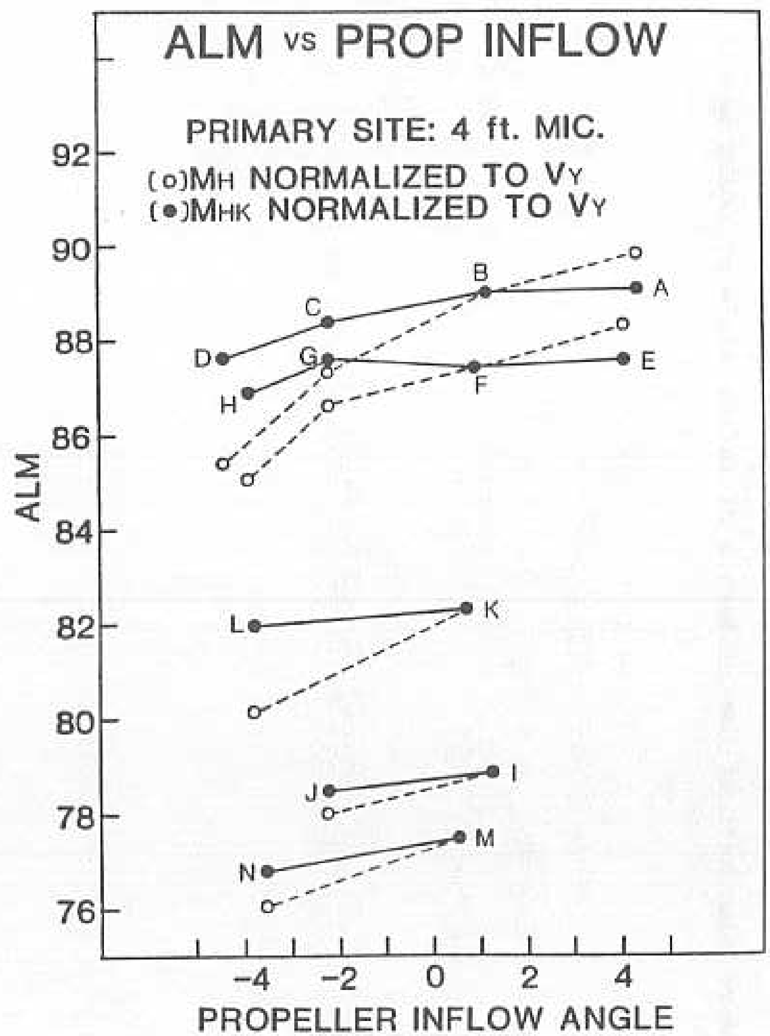


Figure 12b

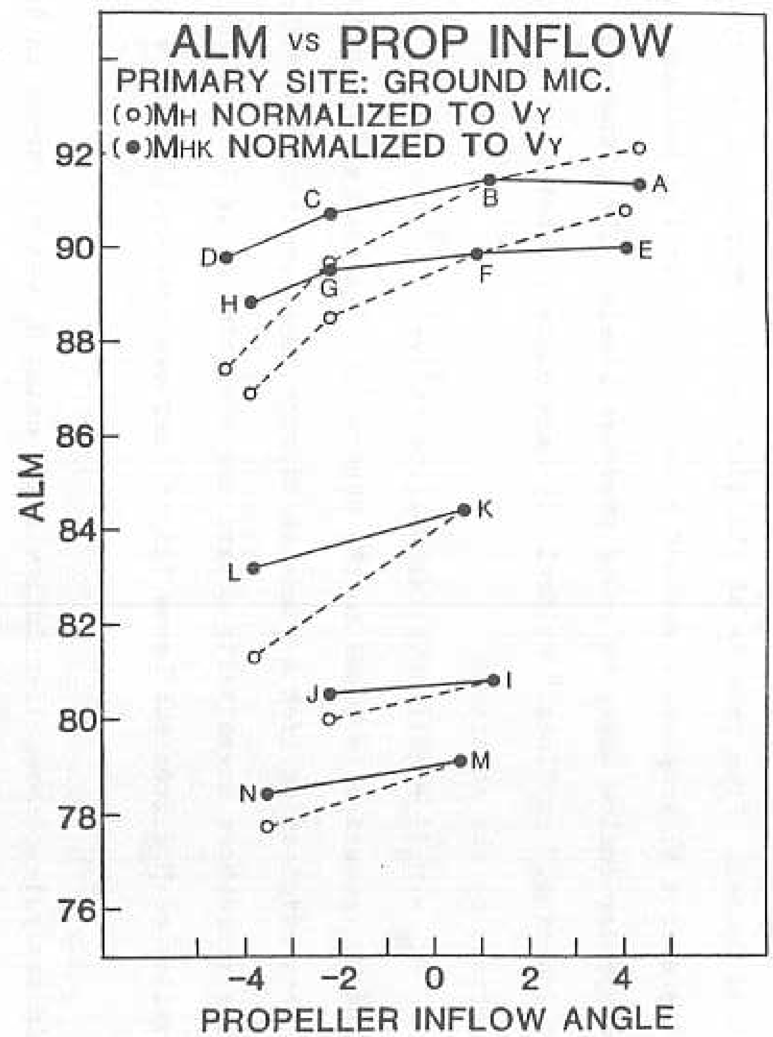


Figure 12c

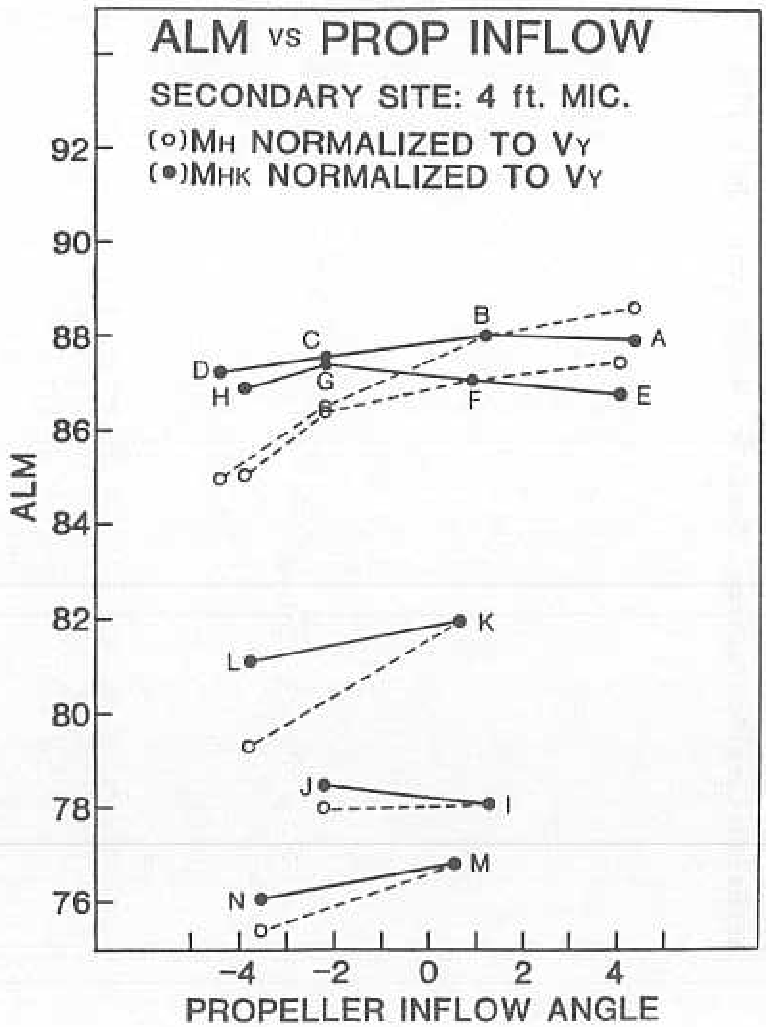
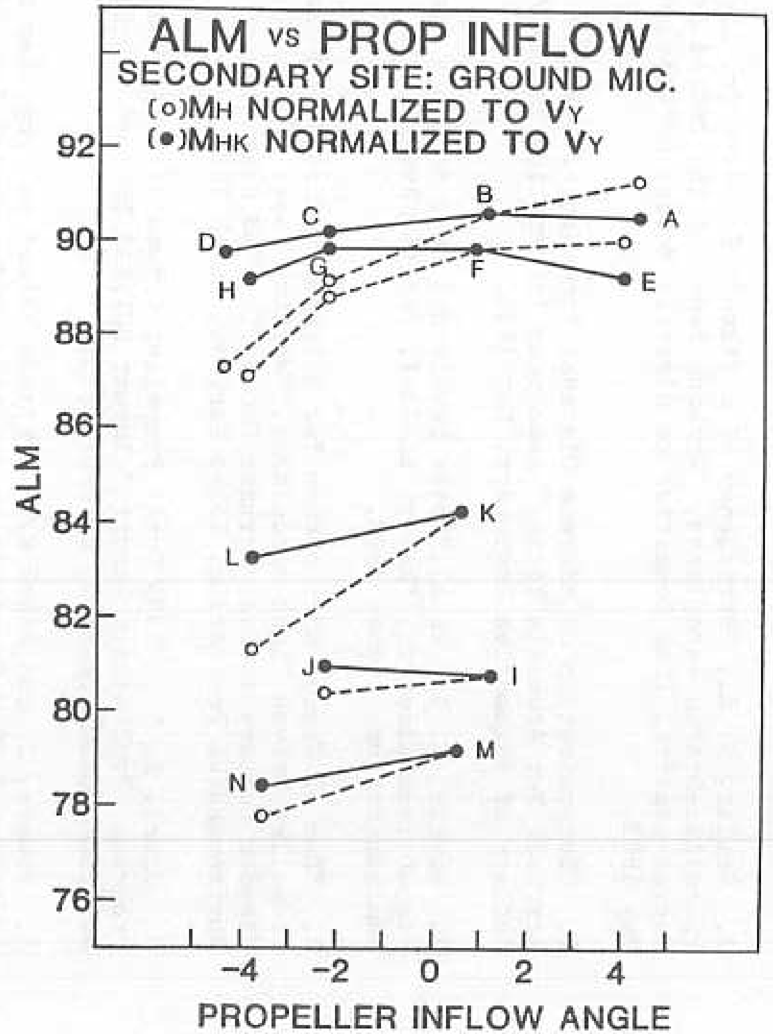


Figure 12d



4.0 References

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APPENDIX A

Table A-1: METEOROLOGICAL DATA

Table A-2: UNCORRECTED ACOUSTIC DATA

Table A-3: CORRECTED ACOUSTIC DATA

Table A-1a Test Day Temperature, Relative-Humidity and Barometric Pressure Measurements

TIME	SERIES	°F	RELATIVE HUMIDITY	BAROMETRIC PRESSURE
0830	-	68		
0845	A	68		
0900	A,B	69		29.74
0915	B	70		
0930	C	70		
0945	D	71	81%	
1000	D	72		29.76
1015	E	74		
1030	F	75	71%	
1045	-	76		
1100	G	76		29.75
1115	H	76	70%	
1130	H,I	77		
1145	I,J	78	64%	
1200	J,K	80		29.74
1215	K,M	81	57%	
1230	-	82		
1245	-	83		
1300	-	84		29.71
1315	-	85		
1330	O	85	68%	
1345	O	85		
1400	P	85	60%	29.69
1415	Q	85		
1430	N	84	48%	
1445	N,L	84		
1500	L	84	49%	29.67

Table A-1b Vertical Profiles of Test Day Wind Speed and Direction

	Wind Direction[1] (wrt Flight Track)				Wind Speed (MPH)			
	Surface	350 ft	700 ft	1000 ft	surface	350 ft	700 ft	1000 ft
0830	-20	40	30	30	1	1	12	15
0900	10	45	40	35	1	8	10	14
0930	50	50	40	35	1	8	9	12
1000	50	50	35	25	1	5	7	10
1030	90	35	30	15	2	3	4	7
1100	10	5	5	15	1	4	4	6
1145	-10	30	25	25	1	3	4	5
1230	-100	-55	-30	-10	3	2	2	3
1330	-40	-55	-60	-60	3	4	4	4
1400	-60	-45	-45	-40	5	8	8	8
1445	-90	-45	-45	-40	4	7	7	8

1: 0 degrees implies a headwind
(+) degrees implies a crosswind from the right
(-) degrees implies a crosswind from the left

Memorandum

U.S. Department
of Transportation

Research and
Special Programs
Administration

Date: December 4, 1984 Reply to Attn. of: DTS-48

Subject: INFORMATION: Propeller Noise Measurement Program
Letter report DTS-48-FA-555-LR3

From: E.J. Rickley E.J. Rickley

To: K. Jones, FAA/AEE-120

Noise level measurements were made by the TSC's Noise Measurement and Assessment Facility on September 25, 1984 at Dulles International Airport in support of an FAA Propeller Noise Test Program on a Piper (PA-32R-300) Cherokee Lance aircraft. Microphone systems were deployed at sites 6202 feet and 8202 feet from the brake release point, west of the extended centerline of runway 30. Data was recorded from both a four foot and flush mounted microphones at each site during takeoffs and level overflights under a variety of target test parameters as shown in table 1.

Recorded noise data were reduced at TSC. EPNL, SEL and ancillary indexes were calculated according to FAR-36 procedures, as specified for CTOL aircraft, using "As Measured" data, ie noise data uncorrected for temperature, humidity or aircraft deviations from reference flight tracks. To minimize data loss, the raw spectral data were adjusted by sloping off the spectrum shape at the rate of -3dB per 1/3 octave band for those frequencies (above 1.25 kHz) where the signal to noise ratio was less than 3dB.

This report contains "As Measured" Summary Noise Level Data for the four systems deployed. On-line-direct-read data from both four foot microphone systems and duplicate copies of all analog tapes from each microphone systems were previously supplied to personnel of the FAA Dulles Noise Laboratory.

No further processing of this data is planned.

Enclosure

cc: J.E. Densmore, FAA/AEE-100
J.O. Powers, FAA/AEE-3
E.W. Sellman, FAA/AEE-120
J.S. Newman, FAA/AEE-120

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TARGET TEST PARAMETERS

EVENT	MODE	KIAS	RPM	POWER
A	TO	80	2700	100%
B	TO	91	2700	100%
C	TO	120	2700	100%
D	LFO	-	2700	100%
E	TO	80	2700	75%
F	TO	91	2700	75%
G	TO	120	2700	75%
H	LFO	-	2700	75%
I	TO	91	2500	55%
J	TO	120	2500	55%
K	TO	91	2600	75%
L	LFO	-	2600	75%
M	TO	91	2400	75%
N	LFO	-	2400	75%
O	TO	91	2200	75%
P	TO	91	2300	55%
Q	TO	91	2100	55%

DEFINITIONS

A Brief synopsis of data column headings is presented.

EV	Event Number
SEL	Sound Exposure Level, the total sound energy measured within the period determined by the 10dB down duration of the A-weighted time history. Reference duration, 1-second.
ALm	A-weighted Sound Level (maximum)
SEL-ALm	Duration Correction Factor
K(A)	Constant used to obtain the Duration Correction for SEL, where:
	$K(A) = (SEL-ALm) \div (\text{Log } DUR(A))$
Q	Time History Shape Factor, where:
	$Q=(10^{0.1(SEL-ALm)}) \div (DUR(A))$
EPNL	Effective Perceived Noise Level
PNLm	Perceived Noise Level (maximum)
PNLTm	Tone Corrected Perceived Noise Level (maximum)
K(P)	Constant used to obtain the Duration Correction for EPNL, where:
	$K(P)=(EPNL-PNLTm + 10) \div (\text{Log } DUR(P))$
OASPLm	Overall Sound Pressure Level (maximum)
DUR(A)	The 10 dB down Duration Time for A-weighted time history
DUR(P)	The 10 dB down Duration Time for the PNLT time history
TC	Tone Correction Factor calculated at PNLTm
BAND	Frequency band number for largest TC factor
MAX NOY BANDS	3-1/3 octave bands exhibiting the largest Noy value in the PNLTm spectrum

Each set of data is headed by the site number, microphone location and test date. The target reference conditions is specified above each data subset.

APPENDIX A
(TABLE A2)
PRIMARY SITE
4 ft. MICROPHONE

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE - CENTER 8202 FT. from BRAKE RELEASE SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	DASPLm	DUR(A)	DUR(P)	TC	BAND	MAX.	NOY	BANDS
TAKEOFF -- (SEE TABLE NO.1)																	
A1	94.0	86.9	7.1	7.0	0.5	95.6	96.6	97.8	7.1	91.4	10.5	12.5	1.8	27	27	25	29
A2	93.6	87.3	6.3	6.6	0.5	95.3	96.9	98.1	6.6	91.6	9.0	12.5	1.9	27	27	25	23
A3	93.9	88.1	5.8	6.2	0.4	95.5	97.7	98.8	6.8	92.1	8.5	10.0	1.4	27	29	27	25
A4	93.7	88.0	5.7	6.5	0.5	95.6	97.8	99.0	6.6	92.1	7.5	10.0	1.1	27	27	29	28
A5	93.9	87.7	6.2	6.5	0.5	95.7	97.3	98.7	6.6	91.6	9.0	11.5	1.4	27	27	29	25
Avg.	93.8	87.6	6.2	6.6	0.5	95.5	97.3	98.5	6.7	91.8	8.9	11.3	1.5	-	-	-	-
Std Dv	0.2	0.5	0.6	0.3	0.0	0.1	0.5	0.5	0.2	0.3	1.1	1.3	0.3	-	-	-	-
90% CI	0.2	0.5	0.6	0.3	0.0	0.1	0.5	0.5	0.2	0.3	1.0	1.2	0.3	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
B6	93.2	87.8	5.4	6.4	0.5	94.9	97.4	98.8	6.6	91.9	7.0	8.5	1.4	27	29	27	25
B7	93.0	87.7	5.3	6.2	0.5	94.7	97.4	98.4	6.4	91.8	7.0	9.5	1.2	25	25	29	27
B8	92.8	87.4	5.4	6.4	0.5	94.7	97.1	98.4	6.6	91.5	7.0	9.0	1.2	27	27	29	28
B9	92.6	87.1	5.5	6.3	0.5	94.3	96.8	98.0	6.5	91.2	7.5	9.0	1.4	25	25	27	29
B10	92.9	87.5	5.4	6.4	0.5	94.7	97.2	98.5	6.7	91.6	7.0	8.5	1.5	27	25	27	29
B11	93.1	87.7	5.4	6.2	0.5	94.8	97.4	98.6	6.5	91.8	7.5	9.0	1.5	27	25	27	29
Avg.	93.0	87.5	5.4	6.3	0.5	94.7	97.2	98.5	6.6	91.6	7.2	8.9	1.4	-	-	-	-
Std Dv	0.2	0.3	0.1	0.1	0.0	0.2	0.2	0.2	0.1	0.2	0.3	0.4	0.1	-	-	-	-
90% CI	0.2	0.2	0.1	0.1	0.0	0.2	0.2	0.2	0.1	0.2	0.2	0.3	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
C12	90.4	84.9	5.5	6.3	0.5	92.3	95.1	96.4	6.2	89.4	7.5	9.0	1.3	25	25	28	29
C13	91.5	86.5	5.0	5.9	0.5	93.3	96.5	97.8	6.1	90.8	7.0	8.0	1.5	25	25	27	29
C14	91.0	85.7	5.3	6.0	0.5	92.5	95.1	95.9	6.6	90.1	7.5	10.0	1.4	25	25	27	29
C15	92.2	87.7	4.4	5.7	0.5	93.9	97.7	98.9	6.1	92.0	6.0	6.5	1.2	25	25	28	27
Avg.	91.3	86.2	5.1	6.0	0.5	93.0	96.1	97.3	6.2	90.6	7.0	8.4	1.3	-	-	-	-
Std Dv	0.7	1.2	0.5	0.3	0.0	0.7	1.3	1.4	0.2	1.1	0.7	1.5	0.1	-	-	-	-
90% CI	0.9	1.4	0.6	0.3	0.0	0.9	1.5	1.6	0.3	1.3	0.8	1.8	0.1	-	-	-	-
LEVEL FLY-BY -- (SEE TABLE NO.1)																	
D16	91.4	87.8	3.6	5.5	0.5	93.7	98.4	99.9	5.1	92.4	4.5	5.5	1.6	28	25	28	22
D17	91.1	87.4	3.7	5.6	0.5	93.1	97.8	99.2	5.2	91.8	4.5	5.5	1.7	20	25	28	22
D18	91.8	88.4	3.4	5.2	0.5	93.5	98.6	100.3	4.9	92.6	4.5	4.5	2.0	28	25	28	30
D19	91.4	87.7	3.6	5.6	0.5	93.5	98.2	99.9	5.1	92.3	4.5	5.0	1.7	28	25	28	22
D20	91.7	88.5	3.2	5.4	0.5	93.4	98.6	100.1	5.1	92.5	4.0	4.5	1.5	20	25	28	30
D21	91.5	88.0	3.5	5.3	0.5	93.5	98.6	100.2	5.0	92.4	4.5	4.5	1.7	20	25	28	22
Avg.	91.5	88.0	3.5	5.4	0.5	93.4	98.4	100.0	5.0	92.3	4.4	4.9	1.7	-	-	-	-
Std Dv	0.3	0.4	0.2	0.1	0.0	0.2	0.3	0.4	0.1	0.3	0.2	0.5	0.2	-	-	-	-
90% CI	0.2	0.3	0.1	0.1	0.0	0.2	0.3	0.3	0.1	0.2	0.2	0.4	0.1	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A
(TABLE A2)
PRIMARY SITE
4 ft. MICROPHONE

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE - CENTER 8202 FT. from BRAKE RELEASE   SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	DASPLm	DUR(A)	DUR(P)	TC	BAND	MAX.	NOY	BANDS
TAKEOFF -- (SEE TABLE NO.1)																	
E22	92.7	87.2	5.5	6.2	0.5	94.1	96.7	97.9	6.5	91.4	7.5	9.0	1.5	27	25	27	29
E23	92.3	86.7	5.6	6.4	0.5	93.7	96.1	97.2	6.5	90.7	7.5	10.0	1.1	27	29	27	28
E24	92.8	87.2	5.5	6.3	0.5	94.4	96.8	98.2	6.7	91.5	7.5	8.5	1.5	27	25	27	29
E25	91.9	86.0	5.9	6.4	0.5	93.5	95.5	96.9	6.6	90.4	8.5	10.0	1.9	27	25	27	29
E26	92.3	86.7	5.6	6.4	0.5	93.8	96.2	97.7	6.3	90.9	7.5	9.0	1.8	27	25	27	29
Avg.	92.4	86.8	5.6	6.3	0.5	93.9	96.3	97.6	6.5	91.0	7.7	9.3	1.6	-	-	-	-
Std Dv	0.3	0.5	0.2	0.1	0.0	0.4	0.5	0.5	0.1	0.5	0.4	0.7	0.3	-	-	-	-
90% CI	0.3	0.5	0.2	0.1	0.0	0.3	0.5	0.5	0.1	0.4	0.4	0.6	0.3	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
F27	92.0	86.9	5.0	6.2	0.5	93.5	96.5	97.7	6.3	91.1	6.5	8.5	1.2	25	25	29	27
F28	91.4	86.3	5.1	6.3	0.5	92.9	95.7	96.7	6.3	90.8	6.5	9.5	1.2	25	29	25	27
F29	91.3	85.9	5.4	6.2	0.5	92.9	95.8	97.0	6.2	90.4	7.5	9.0	1.2	25	25	29	27
F30	91.4	86.1	5.3	6.3	0.5	93.0	95.8	96.9	6.4	90.5	7.0	9.0	1.4	25	25	27	29
Avg.	91.5	86.3	5.2	6.2	0.5	93.1	95.9	97.1	6.3	90.7	6.9	9.0	1.2	-	-	-	-
Std Dv	0.3	0.4	0.2	0.1	0.0	0.3	0.4	0.4	0.1	0.3	0.5	0.4	0.1	-	-	-	-
90% CI	0.4	0.5	0.2	0.1	0.0	0.4	0.5	0.5	0.1	0.4	0.6	0.5	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
G31	90.3	85.7	4.6	5.9	0.5	92.2	95.9	97.2	5.9	90.1	6.0	7.0	1.4	28	25	28	22
G32	90.2	85.2	5.0	6.1	0.5	92.1	95.6	96.8	6.0	90.0	6.5	7.5	1.3	25	25	28	22
G33	90.6	85.7	4.9	6.0	0.5	92.5	96.0	97.4	5.8	90.4	6.5	7.5	1.4	25	25	28	22
G34	90.4	85.5	4.8	6.0	0.5	92.1	95.6	97.0	6.1	90.1	6.5	7.0	1.5	25	25	28	22
Avg.	90.4	85.5	4.8	6.0	0.5	92.2	95.8	97.1	5.9	90.2	6.4	7.2	1.4	-	-	-	-
Std Dv	0.2	0.2	0.2	0.1	0.0	0.2	0.2	0.2	0.1	0.2	0.2	0.3	0.1	-	-	-	-
90% CI	0.2	0.3	0.2	0.1	0.0	0.2	0.2	0.3	0.1	0.2	0.3	0.3	0.1	-	-	-	-
LEVEL FLY-BY -- (SEE TABLE NO.1)																	
H35	90.5	86.5	4.0	5.7	0.5	92.9	97.0	98.7	5.6	91.5	5.0	5.5	1.7	28	25	28	22
H36	90.8	87.2	3.6	5.5	0.5	92.5	97.3	98.7	5.4	91.6.	4.5	5.0	1.4	28	25	28	22
H37	90.6	86.9	3.6	5.6	0.5	92.7	97.2	98.9	5.2	91.6	4.5	5.5	1.6	28	25	28	22
H38	90.3	86.4	3.9	5.6	0.5	92.7	96.7	98.4	5.8	91.4	5.0	5.5	1.7	28	25	28	26
Avg.	90.6	86.8	3.8	5.6	0.5	92.7	97.1	98.7	5.5	91.5	4.7	5.4	1.6	-	-	-	-
Std Dv	0.2	0.4	0.2	0.1	0.0	0.2	0.3	0.2	0.2	0.1	0.3	0.2	0.1	-	-	-	-
90% CI	0.3	0.5	0.2	0.1	0.0	0.2	0.3	0.2	0.3	0.1	0.3	0.3	0.1	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A
(TABLE A2)
PRIMARY SITE
4 ft. MICROPHONE

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE - CENTER 8202 FT. from BRAKE RELEASE SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	OASPLm	DUR(A)	DUR(P)	TC	BAND	MAX.	NOY	BANDS
TAKEOFF -- (SEE TABLE NO.1)																	
I39	85.3	79.9	5.5	6.1	0.4	89.7	91.9	94.0	6.3	88.9	8.0	8.0	2.1	21	21	24	26
I40	85.3	79.7	5.6	6.4	0.5	89.8	91.9	93.9	6.3	88.9	7.5	8.5	2.0	21	21	24	26
I41	84.1	77.5	6.6	6.7	0.5	88.6	89.7	91.9	6.8	86.8	9.5	9.5	2.2	21	21	24	27
I42	84.1	77.6	6.5	6.6	0.5	88.5	89.9	92.0	6.6	86.7	9.5	10.0	2.1	21	21	24	27
I43	84.1	77.9	6.1	6.4	0.5	88.6	90.1	92.1	6.5	87.0	9.0	10.0	2.1	21	21	24	26
Avg.	84.6	78.5	6.0	6.4	0.5	89.0	90.7	92.8	6.5	87.7	8.7	9.2	2.1	-	-	-	-
Std Dv	0.7	1.2	0.5	0.3	0.0	0.6	1.1	1.1	0.2	1.1	0.9	0.9	0.1	-	-	-	-
90% CI	0.7	1.1	0.5	0.2	0.0	0.6	1.1	1.0	0.2	1.1	0.9	0.9	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
J44	82.4	76.1	6.3	6.6	0.5	86.7	88.3	90.5	6.4	85.2	9.0	9.5	2.2	21	21	24	27
J45	83.7	78.4	5.3	6.0	0.4	88.0	90.4	92.5	6.2	87.3	7.5	7.5	2.1	21	21	24	26
J46	83.1	77.7	5.4	6.0	0.4	87.5	90.1	92.2	6.0	86.9	8.0	7.5	2.2	21	21	24	27
J47	83.2	77.2	6.1	6.5	0.5	87.7	90.0	92.0	6.4	87.0	8.5	8.0	2.0	21	21	24	22
Avg.	83.1	77.4	5.8	6.3	0.5	87.5	89.7	91.8	6.2	86.6	8.2	8.1	2.1	-	-	-	-
Std Dv	0.5	1.0	0.5	0.3	0.0	0.5	0.9	0.9	0.2	1.0	0.6	0.9	0.1	-	-	-	-
90% CI	0.6	1.1	0.6	0.4	0.0	0.6	1.1	1.1	0.2	1.1	0.8	1.1	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
K48	86.9	80.7	6.2	6.3	0.4	90.3	91.7	93.3	6.6	87.9	9.5	11.5	1.6	21	27	21	24
K49	87.1	80.4	6.8	6.9	0.5	90.5	91.6	93.1	7.2	88.2	9.5	10.5	1.5	21	21	26	24
K50	87.3	81.4	5.9	6.4	0.5	90.3	92.3	93.9	6.4	88.6	8.5	10.0	1.6	21	24	27	21
K51	86.1	79.8	6.3	6.5	0.4	89.2	90.6	92.2	6.6	87.9	9.5	11.5	1.6	21	24	27	21
Avg.	86.9	80.6	6.3	6.5	0.5	90.1	91.6	93.1	6.7	88.1	9.2	10.9	1.6	-	-	-	-
Std Dv	0.5	0.7	0.3	0.3	0.0	0.6	0.7	0.7	0.4	0.3	0.5	0.7	0.0	-	-	-	-
90% CI	0.6	0.8	0.4	0.3	0.0	0.7	0.8	0.8	0.4	0.4	0.6	0.9	0.0	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
M52	83.9	77.1	6.8	6.8	0.5	89.1	90.2	91.7	7.1	87.5	10.0	11.0	1.5	21	21	22	24
M53	83.4	76.5	6.9	6.6	0.4	88.6	89.7	91.4	7.0	87.0	11.0	10.5	1.7	21	21	22	24
M54	83.6	76.5	7.1	6.9	0.5	88.7	89.6	91.5	7.2	87.2	10.5	10.0	1.9	21	21	22	24
M55	83.9	77.3	6.6	6.6	0.5	89.1	90.4	92.1	7.2	87.7	10.0	9.5	1.7	21	21	22	26
Avg.	83.7	76.8	6.9	6.8	0.5	88.9	90.0	91.7	7.1	87.4	10.4	10.2	1.7	-	-	-	-
Std Dv	0.3	0.4	0.2	0.2	0.0	0.3	0.4	0.3	0.1	0.3	0.5	0.6	0.2	-	-	-	-
90% CI	0.3	0.5	0.2	0.2	0.0	0.3	0.5	0.3	0.1	0.4	0.6	0.8	0.2	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED
FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A
(TABLE A2)
PRIMARY SITE
4 ft. MICROPHONE

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE - CENTER 8202 FT. from BRAKE RELEASE   SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	OASPLm	DUR(A)	DUR(P)	TC	BAND	MAX.	NOY	BANDS
TAKEOFF -- (SEE TABLE NO.1)																	
056		----------		NO DATA		----------											
057		----------		NO DATA		----------											
058		----------		NO DATA		----------											
059	83.2	77.2	6.0	6.3	0.	88.0	90.8	92.1	6.6	87.6	9.0	8.0	1.2	22	22	21	25
060	82.2	75.9	6.3	6.3	0.4	87.1	89.2	90.9	6.6	86.3	10.0	8.5	1.7	22	22	25	21
061	82.9	76.2	6.7	6.7	0.5	87.8	89.9	91.5	6.8	86.4	10.0	8.5	1.6	22	22	21	25
062	83.2	76.8	6.4	6.6	0.5	88.1	90.4	92.1	6.6	87.1	9.5	8.0	1.7	20	22	21	25
Avg.	82.9	76.5	6.4	6.5	0.5	87.7	90.1	91.6	6.7	86.8	9.6	8.2	1.6	-	-	-	-
Std Dv	0.5	0.6	0.3	0.2	0.0	0.5	0.7	0.6	0.1	0.6	0.5	0.3	0.2	-	-	-	-
90% CI	0.6	0.7	0.3	0.2	0.0	0.5	0.8	0.7	0.1	0.7	0.6	0.3	0.3	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
P63	82.5	76.8	5.7	6.3	0.5	87.9	91.0	92.3	6.3	88.2	8.0	7.5	1.7	21	21	25	22
P64	81.0	74.0	7.0	6.8	0.5	86.3	88.3	89.8	6.6	86.3	11.0	9.5	1.6	21	21	22	25
P65	80.7	74.0	6.7	6.5	0.4	85.7	87.7	89.3	6.5	85.2	10.5	10.0	1.6	21	21	25	22
P66	81.6	75.0	6.6	6.8	0.5	86.6	88.6	90.0	7.0	85.9	9.5	9.0	1.6	21	21	25	22
P67	82.0	75.6	6.4	6.7	0.5	87.6	89.9	91.2	6.8	87.9	9.0	8.5	1.7	21	21	22	25
Avg.	81.6	75.1	6.5	6.6	0.5	86.8	89.1	90.5	6.6	86.7	9.6	8.9	1.6	-	-	-	-
Std Dv	0.7	1.2	0.5	0.2	0.0	0.9	1.3	1.2	0.2	1.3	1.2	1.0	0.1	-	-	-	-
90% CI	0.7	1.1	0.5	0.2	0.0	0.8	1.3	1.2	0.2	1.2	1.1	0.9	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
Q68	79.7	73.4	6.4	6.2	0.4	84.4	87.4	88.6	6.3	85.5	10.5	8.0	1.2	20	20	22	21
Q69	79.3	72.2	7.1	6.0	0.3	84.0	85.9	88.5	6.3	83.9	15.0	7.5	2.6	20	20	22	21
Q70	80.7	74.2	6.5	6.1	0.4	85.4	87.3	89.5	5.8	85.2	11.5	10.0	2.2	20	20	22	25
Q71	79.7	72.6	7.1	6.6	0.4	84.7	86.4	88.6	6.5	84.5	12.0	8.5	2.4	20	20	22	21
Avg.	79.9	73.1	6.8	6.2	0.4	84.6	86.8	88.8	6.2	84.8	12.2	8.5	2.1	-	-	-	-
Std Dv	0.6	0.9	0.4	0.3	0.0	0.6	0.8	0.5	0.3	0.8	1.9	1.1	0.6	-	-	-	-
90% CI	0.7	1.0	0.5	0.3	0.0	0.7	0.9	0.6	0.4	0.9	2.3	1.3	0.7	-	-	-	-
LEVEL FLY-BY -- (SEE TABLE NO.1)																	
N72	82.5	77.0	5.5	6.5	0.5	87.3	90.5	92.5	5.9	87.1	7.0	6.5	2.0	21	21	22	24
N73	83.0	77.3	5.7	6.5	0.5	88.2	91.2	93.1	6.1	88.2	7.5	7.0	2.1	21	21	24	26
N74	83.3	77.9	5.4	6.2	0.5	88.3	91.6	93.6	5.8	88.4	7.5	6.5	1.9	21	21	24	22
N75	83.6	78.1	5.5	6.2	0.5	88.5	91.9	93.7	5.9	88.6	7.5	6.5	1.9	21	21	24	22
Avg.	83.1	77.6	5.5	6.4	0.5	88.1	91.3	93.2	5.9	88.1	7.4	6.6	2.0	-	-	-	-
Std Dv	0.4	0.5	0.1	0.2	0.0	0.5	0.6	0.6	0.1	0.7	0.2	0.2	0.1	-	-	-	-
90% CI	0.5	0.6	0.1	0.2	0.0	0.6	0.7	0.7	0.1	0.8	0.3	0.3	0.1	-	-	-	-
LEVEL FLY-BY -- (SEE TABLE NO.1)																	
L76	86.9	82.6	4.3	5.6	0.5	90.2	94.1	95.3	6.2	90.5	6.0	6.0	1.2	27	22	25	24
L77	87.2	83.0	4.2	5.7	0.5	90.2	94.0	95.3	6.1	90.3	5.5	6.5	1.3	27	22	27	25
L78	87.4	83.1	4.3	5.8	0.5	90.7	94.6	96.0	6.0	90.9	5.5	6.0	1.4	27	22	25	27
L79	86.6	82.3	4.4	5.6	0.5	90.3	93.9	95.2	6.2	90.4	6.0	6.5	1.3	27	22	21	27
Avg.	87.0	82.8	4.3	5.7	0.5	90.3	94.2	95.5	6.1	90.5	5.7	6.2	1.3	-	-	-	-
Std Dv	0.3	0.4	0.1	0.1	0.0	0.2	0.3	0.4	0.1	0.3	0.3	0.3	0.1	-	-	-	-
90% CI	0.4	0.5	0.1	0.1	0.0	0.3	0.4	0.4	0.1	0.3	0.3	0.3	0.1	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A
(TABLE A2)
PRIMARY SITE
GROUND MICROPHONE

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE-CENTER (FLUSH) 8202 FT. from BRAKE RELEASE SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	OASPLm	DUR(A)	DUR(P)	TC	BAND	MAX. NOY BANDS		
TAKEOFF -- (SEE TABLE NO.1)																	
A1	96.8	89.7	7.1	6.9	0.5	98.9	99.9	101.2	6.9	94.7	10.5	13.0	1.4	20	26	27	23
A2	96.4	89.9	6.5	6.6	0.5	98.7	100.1	101.6	6.5	94.9	9.5	12.0	1.5	20	26	23	27
A3	96.2	90.2	6.0	6.4	0.5	98.5	100.2	101.8	6.5	94.9	8.5	10.5	1.6	20	27	26	29
A4	96.2	90.2	6.0	6.4	0.5	98.4	100.4	101.9	6.5	95.1	8.5	10.0	1.6	20	27	26	29
A5	96.3	89.5	6.7	6.7	0.5	98.4	99.8	101.1	6.7	94.5	10.0	12.5	1.3	20	27	26	23
Avg.	96.4	89.9	6.4	6.6	0.5	98.6	100.1	101.5	6.6	94.8	9.4	11.6	1.5	-	-	-	-
Std Dv	0.2	0.3	0.5	0.2	0.0	0.2	0.3	0.4	0.2	0.2	0.9	1.3	0.1	-	-	-	-
90% CI	0.2	0.3	0.5	0.2	0.0	0.2	0.2	0.4	0.2	0.2	0.9	1.2	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
B6	95.7	90.0	5.7	6.3	0.5	97.8	99.9	101.3	6.5	94.3	8.0	10.0	1.5	20	27	29	26
B7	95.7	90.1	5.7	6.3	0.5	98.0	100.3	101.7	6.4	94.7	8.0	9.5	1.4	20	26	27	23
B8	95.3	89.6	5.8	6.4	0.5	97.6	99.6	101.0	6.6	94.1	8.0	10.0	1.5	20	26	27	29
B9	95.3	89.6	5.7	6.5	0.5	97.7	99.9	101.2	6.5	94.4	7.5	10.0	1.5	20	26	27	28
B10	95.6	90.0	5.7	6.5	0.5	98.0	100.2	101.6	6.5	94.5	7.5	9.5	1.6	20	26	27	29
B11	95.9	90.4	5.5	6.3	0.5	98.2	100.4	101.9	6.5	94.9	7.5	9.5	1.5	20	26	29	27
Avg.	95.6	89.9	5.7	6.4	0.5	97.9	100.1	101.4	6.5	94.5	7.7	9.7	1.5	-	-	-	-
Std Dv	0.2	0.3	0.1	0.1	0.0	0.2	0.3	0.3	0.1	0.3	0.3	0.3	0.1	-	-	-	-
90% CI	0.2	0.3	0.1	0.1	0.0	0.2	0.3	0.3	0.1	0.2	0.2	0.2	0.1	-	-	-	-
TAKEOFF — (SEE TABLE NO.1)																	
C12	93.2	87.4	5.7	6.3	0.5	95.5	97.7	98.9	6.6	92.1	8.0	10.0	1.2	20	26	27	28
C13	94.3	89.0	5.3	6.2	0.5	96.7	99.1	100.3	6.5	93.5	7.0	9.5	1.2	20	26	27	28
C14	93.7	88.1	5.6	6.4	0.5	96.0	98.1	99.5	6.5	92.9	7.5	10.0	1.4	20	26	27	28
C15	94.6	89.8	4.8	5.9	0.5	96.9	100.0	101.1	6.4	94.2	6.5	8.0	1.1	20	27	26	28
Avg.	93.9	88.6	5.4	6.2	0.5	96.3	98.7	99.9	6.5	93.2	7.2	9.4	1.2	-	-	-	-
Std Dv	0.6	1.0	0.4	0.2	0.0	0.6	1.1	1.0	0.1	0.9	0.6	0.9	0.1	-	-	-	-
90% CI	0.7	1.2	0.5	0.3	0.0	0.7	1.2	1.1	0.1	1.0	0.8	1.1	0.2	-	-	-	-
LEVEL FLY-BY — (SEE TABLE NO.1)																	
D16	94.0	90.2	3.7	5.7	0.5	96.3	100.6	102.4	5.3	94.8	4.5	5.5	2.0	20	25	26	27
D17	93.4	89.6	3.8	5.5	0.5	95.6	99.7	101.4	5.4	94.0	5.0	6.0	1.7	20	27	25	26
D18	93.7	90.1	3.6	5.6	0.5	95.8	100.3	102.1	4.9	94.7	4.5	5.5	1.9	20	25	27	26
D19	94.0	90.4	3.6	5.2	0.5	96.0	100.5	102.3	5.4	94.8	5.0	5.0	2.1	20	25	26	27
D20	93.7	90.1	3.6	5.5	0.5	95.7	100.4	102.3	4.9	94.7	4.5	5.0	2.0	20	25	27	28
D21	93.8	90.3	3.5	5.4	0.5	95.9	100.5	102.4	5.0	94.8	4.5	5.0	2.0	20	25	26	27
Avg.	93.8	90.1	3.7	5.5	0.5	95.9	100.3	102.1	5.1	94.6	4.7	5.3	2.0	-	-	-	-
Std Dv	0.2	0.3	0.1	0.2	0.0	0.2	0.3	0.4	0.2	0.3	0.3	0.4	0.2	-	-	-	-
90% CI	0.2	0.2	0.1	0.1	0.0	0.2	0.3	0.3	0.2	0.3	0.2	0.3	0.1	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A
(TABLE A2)
PRIMARY SITE
GROUND MICROPHONE

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE-CENTER (FLUSH) 8202 FT. from BRAKE RELEASE SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	DASPLm	DUR(A)	DUR(P)	TC	BAND	MAX. NOY BANDS		
TAKEOFF -- (SEE TABLE NO.1)																	
E22	95.5	89.8	5.7	6.3	0.5	97.6	99.9	101.2	6.5	94.2	8.0	9.5	1.3	20	26	27	28
E23	95.1	89.3	5.8	6.4	0.5	97.2	99.2	100.4	6.6	93.8	8.0	10.5	1.3	20	26	27	28
E24	95.2	89.3	5.8	6.4	0.5	97.3	99.3	100.7	6.5	93.8	8.0	10.5	1.4	20	27	26	28
E25	94.7	88.5	6.2	6.5	0.5	96.9	98.5	99.8	6.7	93.1	9.0	11.5	1.4	20	26	27	29
E26	95.1	89.2	5.9	6.6	0.5	97.3	99.3	100.5	6.9	93.9	8.0	10.0	1.4	20	26	29	28
Avg.	95.1	89.2	5.9	6.4	0.5	97.3	99.2	100.5	6.6	93.8	8.2	10.4	1.4	-	-	-	-
Std Dv	0.3	0.5	0.2	0.1	0.0	0.2	0.5	0.5	0.2	0.4	0.4	0.7	0.1	-	-	-	-
90% CI	0.3	0.4	0.2	0.1	0.0	0.2	0.5	0.5	0.2	0.4	0.4	0.7	0.0	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
F27	94.3	88.9	5.5	6.3	0.5	96.5	99.0	100.4	6.2	93.4	7.5	9.5	1.4	20	27	28	26
F28	94.3	89.0	5.4	6.3	0.5	96.7	99.1	100.4	6.3	93.7	7.0	10.0	1.3	20	26	27	28
F29	94.0	88.4	5.6	6.4	0.5	96.2	98.3	99.7	6.5	93.1	7.5	10.0	1.4	20	27	26	28
F30	94.2	88.7	5.4	6.4	0.5	96.5	98.8	100.3	6.2	93.5	7.0	10.0	1.5	20	26	27	28
Avg.	94.2	88.7	5.5	6.4	0.5	96.5	98.8	100.2	6.3	93.4	7.2	9.9	1.4	-	-	-	-
Std Dv	0.2	0.2	0.1	0.1	0.0	0.2	0.3	0.3	0.1	0.3	0.3	0.2	0.1	-	-	-	-
90% CI	0.2	0.3	0.1	0.1	0.0	0.2	0.4	0.4	0.2	0.3	0.3	0.3	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
G31		-----------		NO DATA		-----------											
G32	92.4	87.3	5.1	6.2	0.5	94.6	97.2	98.5	6.5	91.9	6.5	8.5	1.6	20	25	26	27
G33	92.7	87.7	5.0	6.1	0.5	94.9	97.5	99.0	6.4	92.2	6.5	8.5	1.6	20	25	26	27
G34	92.5	87.5	5.0	6.2	0.5	94.7	97.2	98.6	6.6	92.1	6.5	8.5	1.7	20	25	27	26
Avg.	92.5	87.5	5.0	6.2	0.5	94.7	97.3	98.7	6.5	92.1	6.5	8.5	1.7	-	-	-	-
Std Dv	0.2	0.2	0.0	0.1	0.0	0.2	0.2	0.2	0.1	0.2	0.0	0.0	0.1	-	-	-	-
90% CI	0.3	0.3	0.1	0.1	0.0	0.3	0.3	0.4	0.2	0.3	0.0	0.0	0.1	-	-	-	-
LEVEL FLY-BY -- (SEE TABLE NO.1)																	
H35	92.8	89.0	3.8	5.8	0.5	95.0	99.0	100.4	5.9	93.6	4.5	6.0	1.4	20	26	27	28
H36	92.4	88.5	3.8	5.9	0.5	94.4	98.5	99.9	5.6	93.3	4.5	6.5	1.6	20	25	27	26
H37	92.6	88.7	3.8	5.5	0.5	94.6	98.6	100.1	5.8	93.4	5.0	6.0	1.5	20	25	27	26
H38	92.5	88.6	3.9	5.6	0.5	94.7	98.6	100.0	5.6	93.4	5.0	7.0	1.4	20	26	27	28
Avg.	92.6	88.7	3.8	5.7	0.5	94.7	98.7	100.1	5.7	93.4	4.7	6.4	1.5	-	-	-	-
Std Dv	0.2	0.2	0.1	0.2	0.0	0.2	0.2	0.2	0.1	0.1	0.3	0.5	0.1	-	-	-	-
90% CI	0.2	0.3	0.1	0.2	0.0	0.3	0.3	0.3	0.2	0.2	0.3	0.6	0.1	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A
(TABLE A2)
PRIMARY SITE
GROUND MICROPHON

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE-CENTER (FLUSH) 8202 FT. from BRAKE RELEASE   SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	OASPLm	DUR(A)	DUR(P)	TC	BAND	MAX. NOY BANDS		
TAKEOFF -- (SEE TABLE NO.1)																	
139	87.5	81.5	6.0	6.3	0.4	92.2	93.5	94.8	6.6	90.4	9.0	13.0	1.3	21	21	26	24
140	87.7	81.7	6.0	6.3	0.4	92.3	93.8	95.1	6.6	90.8	9.0	12.5	1.3	21	21	26	24
141	86.5	79.4	7.1	6.6	0.4	91.1	91.5	92.9	6.9	88.7	12.0	15.5	1.3	21	21	26	24
142	86.7	79.7	6.9	6.5	0.4	91.2	91.8	93.0	6.9	88.9	11.5	15.5	1.2	21	21	26	24
143	86.7	80.1	6.6	6.3	0.4	91.4	92.2	93.6	6.7	89.0	11.0	14.5	1.4	21	21	26	24
Avg.	87.0	80.5	6.5	6.4	0.4	91.6	92.6	93.9	6.7	89.6	10.5	14.2	1.3	-	-	-	-
Std Dv	0.5	1.1	0.5	0.1	0.0	0.6	1.0	1.0	0.2	0.9	1.4	1.4	0.1	-	-	-	-
90% CI	0.5	1.0	0.5	0.1	0.0	0.5	1.0	1.0	0.2	0.9	1.3	1.3	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
J44	84.5	78.3	6.2	6.9	0.5	-	90.1	91.4	-	87.4	8.0	-	1.4	21	21	26	23
J45	85.9	80.0	5.9	6.0	0.4	90.7	92.2	93.5	6.6	89.3	9.5	12.5	1.3	21	21	24	26
J46	85.6	79.7	6.0	6.0	0.4	90.1	92.0	93.3	6.2	88.9	10.0	12.5	1.3	21	21	26	24
J47	85.9	79.5	6.4	6.4	0.4	90.5	92.1	93.3	6.6	89.2	10.0	12.5	1.2	21	21	26	25
Avg.	85.5	79.4	6.1	6.3	0.4	90.4	91.6	92.9	6.5	88.7	9.4	12.5	1.3	-	-	-	-
Std Dv	0.7	0.8	0.2	0.4	0.1	0.3	1.0	1.0	0.2	0.9	0.9	0.0	0.1	-	-	-	-
90% CI	0.8	0.9	0.3	0.5	0.1	0.5	1.2	1.1	0.3	1.1	1.1	0.0	0.1	-	-	-	-
TAKEOFF — (SEE TABLE NO.1)																	
K48	89.4	82.8	6.6	6.5	0.4	92.7	94.1	94.6	6.9	90.4	10.5	15.0	0.5	21	26	27	23
K49	89.6	82.5	7.1	7.1	0.5	93.0	94.4	94.9	6.9	90.9	10.0	14.5	0.6	21	26	27	21
K50	89.4	83.0	6.5	6.5	0.4	93.0	94.4	95.0	6.8	90.6	10.0	15.0	0.6	21	26	24	27
K51	89.2	82.6	6.6	6.4	0.4	92.8	94.0	94.6	6.9	90.3	11.0	15.5	0.6	21	26	27	24
Avg.	89.4	82.7	6.7	6.6	0.5	92.9	94.2	94.8	6.9	90.6	10.4	15.0	0.6	-	-	-	-
Std Dv	0.1	0.2	0.3	0.3	0.0	0.1	0.2	0.2	0.0	0.3	0.5	0.4	0.0	-	-	-	-
90% CI	0.2	0.2	0.3	0.4	0.0	0.2	0.2	0.2	0.1	0.3	0.6	0.5	0.0	-	-	-	-
TAKEOFF — (SEE TABLE NO.1)																	
M52	86.2	78.8	7.4	6.9	0.5	91.5	92.4	93.7	7.3	90.0	12.0	11.5	1.4	21	21	22	24
M53	85.8	78.1	7.8	6.9	0.4	91.0	91.7	93.1	7.2	89.7	13.5	12.5	1.4	21	21	22	24
M54	85.9	78.0	7.9	7.0	0.5	91.3	91.8	93.1	7.3	89.8	13.5	13.5	1.2	21	21	22	24
M55	86.3	78.9	7.4	6.6	0.4	91.6	92.6	93.8	7.0	90.2	13.5	13.0	1.3	21	21	22	24
Avg.	86.0	78.4	7.6	6.8	0.4	91.4	92.1	93.4	7.2	89.9	13.1	12.6	1.3	-	-	-	-
Std Dv	0.2	0.4	0.2	0.2	0.0	0.3	0.4	0.4	0.1	0.2	0.7	0.9	0.1	-	-	-	-
90% CI	0.3	0.5	0.3	0.2	0.0	0.3	0.5	0.5	0.1	0.2	0.9	1.0	0.1	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A (TABLE A2) PRIMARY SITE GROUND MICROPHONE

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE-CENTER (FLUSH) 8202 FT. from BRAKE RELEASE SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	OASPLm	DUR(A)	DUR(P)	TC	BAND	MAX. NOY BANDS		
TAKEOFF -- (SEE TABLE NO.1)																	
056	85.4	78.3	7.2	6.8	0.5	91.8	92.5	93.6	7.3	90.9	11.5	13.0	1.6	21	21	24	22
057	85.1	76.8	8.3	7.2	0.5	91.3	91.4	92.6	7.4	89.6	14.0	15.0	1.7	21	21	24	25
058	85.3	76.9	8.3	6.8	0.4	91.4	91.0	92.3	7.2	88.8	16.5	18.5	1.5	21	21	22	24
059	86.1	79.1	7.0	6.5	0.4	92.3	93.6	94.5	6.9	91.5	12.0	13.5	1.5	21	21	24	22
060	84.8	77.5	7.3	6.6	0.4	90.9	91.5	92.5	7.5	90.1	12.5	13.5	1.0	22	22	19	21
061	85.5	78.3	7.2	6.8	0.5	91.8	92.6	93.6	7.3	91.0	11.5	13.5	1.4	21	21	24	22
062	86.0	79.0	7.0	6.5	0.4	92.2	93.3	94.4	7.0	91.4	12.0	13.0	1.4	21	21	24	22
Avg.	85.5	78.0	7.5	6.8	0.4	91.7	92.2	93.3	7.2	90.4	12.9	14.3	1.4	-	-	-	-
Std Dv	0.5	0.9	0.6	0.3	0.0	0.5	1.0	0.9	0.2	1.0	1.8	2.0	0.2	-	-	-	-
90% CI	0.4	0.7	0.4	0.2	0.0	0.4	0.7	0.7	0.2	0.7	1.3	1.5	0.2	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
P63	85.4	78.9	6.5	6.4	0.4	92.1	93.7	95.4	6.5	90.9	10.5	11.0	1.9	21	21	24	25
P64	83.6	75.8	7.9	6.9	0.4	90.1	90.5	92.2	6.8	88.3	14.0	14.5	2.0	21	21	24	25
P65	83.3	75.8	7.5	6.6	0.4	-	90.2	92.1	-	87.8	13.5	-	1.9	21	21	24	25
P66	84.2	76.7	7.5	6.7	0.4	90.8	91.2	93.0	6.7	88.6	13.0	14.0	2.0	21	21	25	22
P67	84.7	77.5	7.2	6.8	0.5	91.2	92.3	93.9	6.8	90.3	11.5	12.0	1.9	21	21	24	22
Avg.	84.2	76.9	7.3	6.7	0.4	91.1	91.6	93.3	6.7	89.2	12.5	12.9	1.9	-	-	-	-
Std Dv	0.8	1.3	0.5	0.2	0.0	0.8	1.4	1.4	0.2	1.4	1.5	1.7	0.1	-	-	-	-
90% CI	0.8	1.2	0.5	0.2	0.0	1.0	1.4	1.3	0.2	1.3	1.4	1.9	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
Q68	83.0	75.2	7.8	6.9	0.4	89.9	90.5	91.3	7.4	89.2	13.5	14.5	0.9	28	20	21	22
Q69	82.4	73.9	8.6	7.0	0.4	89.3	89.0	89.9	7.7	87.6	16.5	17.0	1.0	28	20	22	21
Q70	83.7	75.6	8.1	7.0	0.4	90.5	90.6	91.4	7.5	89.1	14.5	16.5	0.8	20	20	22	21
Q71	82.9	74.5	8.3	7.3	0.5	89.7	89.8	90.7	7.8	88.8	14.0	14.5	0.9	28	20	22	21
Avg.	83.0	74.8	8.2	7.0	0.5	89.8	90.0	90.8	7.6	88.7	14.6	15.6	0.9	-	-	-	-
Std Dv	0.5	0.8	0.3	0.2	0.0	0.5	0.8	0.7	0.2	0.8	1.3	1.3	0.1	-	-	-	-
90% CI	0.6	0.9	0.4	0.2	0.0	0.6	0.9	0.8	0.2	0.9	1.5	1.5	0.1	-	-	-	-
LEVEL FLY-BY --(SEE TABLE NO.1)																	
N72	85.2	78.9	6.3	6.3	0.4	90.0	92.3	93.3	6.6	89.7	10.0	10.5	1.0	21	21	24	22
N73	85.3	78.9	6.4	6.6	0.5	90.4	92.8	94.0	6.3	90.2	9.5	10.5	1.1	21	21	24	22
N74	85.6	79.4	6.2	6.3	0.4	90.6	93.2	94.2	6.3	90.5	9.5	10.5	1.0	21	21	24	26
N75	85.9	79.6	6.2	6.5	0.5	90.8	93.5	94.5	6.6	90.6	9.0	9.0	1.1	21	21	22	24
Avg.	85.5	79.2	6.3	6.4	0.4	90.5	93.0	94.0	6.4	90.2	9.5	10.1	1.0	-	-	-	-
Std Dv	0.3	0.4	0.1	0.1	0.0	0.3	0.5	0.5	0.2	0.4	0.4	0.7	0.1	-	-	-	-
90% CI	0.4	0.5	0.1	0.1	0.0	0.4	0.6	0.6	0.2	0.5	0.5	0.9	0.1	-	-	-	-
LEVEL FLY-BY -- (SEE TABLE NO.1)																	
L76	88.7	84.0	4.7	5.8	0.5	92.4	95.7	96.1	6.8	92.3	6.5	8.5	0.6	20	26	22	25
L77	88.9	84.2	4.7	5.8	0.5	92.6	95.7	96.1	6.7	92.3	6.5	9.0	0.8	20	22	26	23
L78	89.3	84.4	4.9	5.8	0.4	92.9	96.1	96.5	6.9	92.6	7.0	8.5	0.7	20	22	25	26
L79	88.7	83.9	4.8	5.7	0.4	92.4	95.7	96.2	6.7	92.3	7.0	8.5	0.5	20	26	23	22
Avg.	88.9	84.1	4.8	5.8	0.4	92.6	95.8	96.2	6.8	92.3	6.7	8.6	0.7	-	-	-	-
Std Dv	0.3	0.2	0.1	0.1	0.0	0.3	0.2	0.2	0.1	0.1	0.3	0.2	0.1	-	-	-	-
90% CI	0.3	0.3	0.1	0.1	0.0	0.3	0.2	0.2	0.1	0.2	0.3	0.3	0.2	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A
(TABLE A2)
SECONDARY SITE
4 ft. MICROPHONE

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE - 6202 FT. from BRAKE RELEASE

SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	OASPLm	DUR(A)	DUR(P)	TC	BAND	MAX. NOY BANDS		
TAKEOFF -- (SEE TABLE NO.1)																	
A1	94.6	89.4	5.1	6.3	0.5	97.0	100.1	101.9	5.7	93.9	6.5	8.0	1.8	27	27	25	23
A2	95.0	89.4	5.6	6.4	0.5	97.3	99.7	101.7	6.2	93.7	7.5	8.0	2.0	27	27	25	29
A3	94.9	89.9	5.0	6.1	0.5	97.2	100.6	102.3	5.6	94.5	6.5	7.5	1.7	27	27	25	23
A4	95.8	90.9	4.9	6.1	0.5	97.9	100.9	102.6	6.3	95.1	6.5	7.0	1.6	27	27	29	25
A5	94.2	88.9	5.3	6.3	0.5	96.4	99.2	100.7	6.1	93.3	7.0	8.5	1.5	27	27	23	25
Avg.	94.9	89.7	5.2	6.2	0.5	97.2	100.1	101.8	6.0	94.1	6.8	7.8	1.7	-	-	-	-
Std Dv	0.6	0.8	0.3	0.2	0.0	0.5	0.7	0.7	0.3	0.7	0.4	0.6	0.2	-	-	-	-
90% CI	0.6	0.7	0.3	0.1	0.0	0.5	0.7	0.7	0.3	0.7	0.4	0.5	0.2	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
B6	95.1	90.5	4.6	5.9	0.5	97.0	100.6	101.6	6.3	94.9	6.0	7.0	1.0	29	27	29	25
B7	94.2	89.3	4.9	6.1	0.5	96.7	99.9	101.8	5.6	93.9	6.5	7.5	1.9	27	27	25	29
B8	93.9	88.8	5.1	6.3	0.5	96.1	99.2	100.9	5.9	93.3	6.5	7.5	1.8	27	27	25	29
B9	94.2	89.2	5.0	6.1	0.5	96.4	99.4	101.3	5.8	93.4	6.5	7.5	1.9	27	27	29	25
B10	95.0	90.8	4.2	5.7	0.5	96.9	100.8	101.8	6.0	95.1	5.5	7.0	1.4	27	27	29	25
B11	94.7	90.4	4.3	5.8	0.5	96.6	100.4	101.5	6.0	94.6	5.5	7.0	1.1	20	27	29	25
Avg.	94.5	89.8	4.7	6.0	0.5	96.6	100.0	101.5	5.9	94.2	6.1	7.2	1.5	-	-	-	-
Std Dv	0.5	0.8	0.4	0.2	0.0	0.3	0.7	0.3	0.2	0.8	0.5	0.3	0.4	-	-	-	-
90% CI	0.4	0.7	0.3	0.2	0.0	0.3	0.5	0.3	0.2	0.6	0.4	0.2	0.3	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
C12	91.3	86.5	4.8	5.9	0.5	93.4	96.9	98.3	6.0	91.0	6.5	7.0	1.4	25	25	28	29
C13	92.9	88.9	4.0	5.8	0.5	95.0	99.2	100.6	5.7	93.4	5.0	6.0	1.4	27	25	27	29
C14	92.3	88.1	4.2	5.7	0.5	94.0	97.9	98.8	6.0	92.4	5.5	7.5	0.9	25	27	25	28
C15	93.6	90.1	3.5	5.4	0.5	95.7	100.5	101.8	5.6	94.4	4.5	5.0	1.3	27	25	27	29
Avg.	92.5	88.4	4.1	5.7	0.5	94.5	98.6	99.9	5.8	92.8	5.4	6.4	1.3	-	-	-	-
Std Dv	1.0	1.5	0.5	0.2	0.0	1.0	1.6	1.6	0.2	1.5	0.9	1.1	0.2	-	-	-	-
90% CI	1.1	1.8	0.6	0.2	0.0	1.2	1.9	1.9	0.2	1.7	1.0	1.3	0.3	-	-	-	-
LEVEL FLY-BY -- (SEE TABLE NO.1)																	
D16	91.3	87.4	3.9	5.7	0.5	93.7	98.5	100.1	5.2	92.2	5.0	5.0	1.6	20	25	28	22
D17	90.7	86.7	4.0	5.8	0.5	93.0	97.4	99.0	5.5	91.2	5.0	5.5	1.9	20	25	28	22
D18	91.2	87.5	3.7	5.3	0.5	93.6	98.4	100.0	5.1	92.2	5.0	5.0	1.5	20	25	28	22
D19	91.5	87.9	3.6	5.4	0.5	93.9	98.4	100.2	5.3	92.4	4.5	5.0	2.1	20	25	28	30
D20	91.0	87.1	3.9	5.6	0.5	93.4	98.1	99.6	5.4	91.8	5.0	5.0	1.9	20	25	28	22
D21	91.7	88.1	3.6	5.5	0.5	94.0	98.7	100.5	5.0	92.7	4.5	5.0	1.8	20	25	28	26
Avg.	91.2	87.4	3.8	5.5	0.5	93.6	98.3	99.9	5.3	92.1	4.8	5.1	1.8	-	-	-	-
Std Dv	0.4	0.5	0.2	0.2	0.0	0.4	0.5	0.5	0.2	0.5	0.3	0.2	0.2	-	-	-	-
90% CI	0.3	0.4	0.2	0.1	0.0	0.3	0.4	0.4	0.1	0.4	0.2	0.2	0.2	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED
FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A

(TABLE A2) SECONDARY SITE 4 ft. MICROPHONE

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE - 6202 FT. from BRAKE RELEASE

SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	DASPLm	DUR(A)	DUR(P)	TC	BAND	MAX. NOY BANDS		
TAKEOFF -- (SEE TABLE NO.1)																	
E22	94.2	89.6	4.6	6.2	0.5	96.3	99.8	101.3	6.1	94.3	5.5	6.5	1.5	27	27	25	29
E23	92.9	87.8	5.0	6.2	0.5	95.1	97.9	99.8	5.9	92.2	6.5	8.0	1.9	27	27	29	25
E24	94.3	89.7	4.6	5.9	0.5	96.2	99.6	101.3	5.9	94.0	6.0	7.0	1.7	27	27	25	29
E25	93.3	88.3	5.0	6.1	0.5	95.3	98.3	99.4	6.4	92.8	6.5	8.5	1.2	25	25	27	29
E26	94.0	89.4	4.6	5.9	0.5	95.7	99.7	100.7	5.8	94.1	6.0	7.5	1.0	25	25	29	28
Avg.	93.7	89.0	4.7	6.1	0.5	95.7	99.1	100.5	6.0	93.5	6.1	7.5	1.5	-	-	-	-
Std Dv	0.6	0.9	0.2	0.1	0.0	0.5	0.9	0.9	0.2	0.9	0.4	0.8	0.4	-	-	-	-
90% CI	0.6	0.8	0.2	0.1	0.0	0.5	0.8	0.8	0.2	0.9	0.4	0.8	0.4	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
F27	93.4	88.9	4.5	6.1	0.5	95.4	99.0	100.5	5.8	93.5	5.5	7.0	1.5	27	27	25	29
F28	92.9	88.8	4.1	5.8	0.5	95.0	99.1	100.3	5.8	93.6	5.0	6.5	1.2	27	25	27	29
F29	92.8	88.4	4.4	5.9	0.5	94.7	98.4	99.5	5.9	92.9	5.5	7.5	1.1	27	27	29	25
F30	92.6	88.3	4.3	5.8	0.5	94.8	98.3	100.1	5.8	92.7	5.5	6.5	1.7	27	27	25	29
Avg.	92.9	88.6	4.3	5.9	0.5	95.0	98.7	100.1	5.8	93.2	5.4	6.9	1.4	-	-	-	-
Std Dv	0.3	0.3	0.2	0.1	0.0	0.3	0.4	0.4	0.1	0.4	0.2	0.5	0.3	-	-	-	-
90% CI	0.4	0.4	0.2	0.1	0.0	0.4	0.5	0.5	0.1	0.5	0.3	0.6	0.3	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
G31	90.9	86.5	4.5	6.0	0.5	93.0	96.6	97.8	6.1	90.8	5.5	7.0	1.4	25	25	28	27
G32	91.4	87.4	4.0	5.7	0.5	93.5	97.6	99.0	5.5	91.7	5.0	6.5	1.4	25	25	28	27
G33	91.0	86.5	4.5	5.7	0.5	92.8	96.5	97.7	5.8	90.8	6.0	7.5	1.2	25	25	28	27
G34	90.7	86.3	4.3	5.9	0.5	93.0	96.8	98.0	5.9	91.0	5.5	7.0	1.6	25	25	28	22
Avg.	91.0	86.7	4.3	5.8	0.5	93.1	96.9	98.1	5.8	91.1	5.5	7.0	1.4	-	-	-	-
Std Dv	0.3	0.5	0.2	0.1	0.0	0.3	0.5	0.6	0.2	0.4	0.4	0.4	0.2	-	-	-	-
90% CI	0.3	0.6	0.3	0.2	0.0	0.4	0.6	0.7	0.3	0.5	0.5	0.5	0.2	-	-	-	-
LEVEL FLY-BY — (SEE TABLE NO.1)																	
H35	90.5	86.7	3.8	5.5	0.5	93.0	97.1	98.7	5.5	91.2	5.0	6.0	1.6	28	25	28	26
H36	90.7	87.1	3.6	5.2	0.5	93.0	97.5	99.1	5.3	91.6	5.0	5.5	1.5	28	25	28	26
H37	90.5	86.6	3.9	5.6	0.5	93.0	97.1	98.8	5.7	91:3	5.0	5.5	1.7	28	25	28	22
H38	90.3	86.3	3.9	5.6	0.5	92.9	97.0	98.7	5.5	91.1	5.0	6.0	1.7	28	25	28	22
Avg.	90.5	86.7	3.8	5.5	0.5	93.0	97.2	98.8	5.5	91.3	5.0	5.7	1.6	-	-	-	-
Std Dv	0.2	0.3	0.1	0.2	0.0	0.0	0.2	0.2	0.2	0.2	0.0	0.3	0.1	-	-	-	-
90% CI	0.2	0.4	0.2	0.2	0.0	0.0	0.3	0.2	0.2	0.2	0.0	0.3	0.1	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A
(TABLE A2)
SECONDARY SITE
4 ft. MICROPHONE

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE - 6202 FT. from BRAKE RELEASE

SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	OASPLm	DUR(A)	DUR(P)	TC	BAND	MAX. NOY BANDS		
TAKEOFF -- (SEE TABLE NO.1)																	
I39	85.4	79.9	5.5	6.3	0.5	90.1	92.3	94.1	6.6	88.9	7.5	8.0	1.8	21	21	26	24
I40	85.4	79.8	5.7	6.5	0.5	90.1	92.1	94.0	6.6	88.8	7.5	8.5	1.9	21	21	24	26
I41	84.1	77.1	7.0	7.0	0.5	89.2	89.7	91.6	7.4	86.6	10.0	10.5	2.0	21	21	24	27
I42	84.7	78.5	6.2	6.5	0.5	89.9	91.0	93.1	6.8	87.7	9.0	10.0	2.1	21	21	24	26
I43	84.4	78.6	5.8	6.4	0.5	89.4	91.1	93.0	6.7	87.8	8.0	9.0	1.9	21	21	24	26
Avg.	84.8	78.8	6.0	6.5	0.5	89.7	91.3	93.2	6.8	88.0	8.4	9.2	1.9	-	-	-	-
Std Dv	0.6	1.1	0.6	0.3	0.0	0.4	1.0	1.0	0.3	0.9	1.1	1.0	0.1	-	-	-	-
90% CI	0.6	1.1	0.6	0.3	0.0	0.4	1.0	1.0	0.3	0.9	1.0	1.0	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
J44	82.7	76.9	5.8	6.0	0.4	87.5	89.1	91.1	6.6	85.8	9.5	9.5	2.1	21	21	24	27
J45	84.0	78.5	5.5	6.3	0.5	88.7	91.3	93.2	6.3	87.9	7.5	7.5	1.9	21	21	24	27
J46	83.5	77.9	5.6	6.2	0.5	88.4	90.3	92.2	6.6	86.9	8.0	8.5	2.1	21	21	24	27
J47	83.7	78.8	4.9	5.8	0.4	88.5	91.3	93.3	6.2	87.9	7.0	7.0	2.0	21	21	24	27
Avg.	83.5	78.0	5.5	6.1	0.4	88.3	90.5	92.4	6.4	87.1	8.0	8.1	2.0	-	-	-	-
Std Dv	0.5	0.8	0.4	0.2	0.0	0.5	1.0	1.0	0.2	1.0	1.1	1.1	0.1	-	-	-	-
90% CI	0.6	1.0	0.5	0.3	0.0	0.6	1.2	1.2	0.2	1.2	1.3	1.3	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
K48	88.4	82.6	5.8	6.3	0.4	92.0	94.0	95.3	6.6	90.3	8.5	10.5	1.3	27	27	21	23
K49	89.2	84.1	5.1	6.0	0.5	92.9	95.7	97.1	6.3	91.7	7.0	8.0	1.4	21	24	21	27
K50	88.7	83.1	5.5	6.1	0.4	92.1	94.7	95.9	6.5	90.8	8.0	9.0	1.2	21	21	24	27
K51	88.9	83.4	5.6	6.2	0.4	92.5	94.8	96.1	6.7	90.9	8.0	9.0	1.2	21	21	27	24
Avg.	88.8	83.3	5.5	6.1	0.5	92.4	94.8	96.1	6.5	90.9	7.9	9.1	1.3	-	-	-	-
Std Dv	0.3	0.6	0.3	0.1	0.0	0.4	0.7	0.8	0.2	0.6	0.6	1.0	0.1	-	-	-	-
90% CI	0.4	0.7	0.4	0.1	0.0	0.4	0.8	0.9	0.2	0.7	0.7	1.2	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
M52	85.3	79.3	6.0	6.5	0.5	90.8	93.1	94.8	6.5	89.6	8.5	8.5	1.7	21	21	22	24
M53	84.8	79.2	5.6	6.1	0.4	90.1	92.6	94.3	6.4	89.2	8.0	8.0	1.7	21	21	22	26
M54	84.1	77.5	6.6	6.8	0.5	89.8	91.5	93.2	6.7	88.4	9.5	9.5	2.0	21	21	22	26
M55	85.1	78.6	6.6	6.7	0.5	90.6	92.4	94.1	6.9	89.0	9.5	9.0	1.8	21	21	22	26
Avg.	84.8	78.7	6.2	6.5	0.5	90.3	92.4	94.1	6.6	89.1	8.9	8.7	1.8	-	-	-	-
Std Dv	0.5	0.8	0.5	0.3	0.0	0.5	0.6	0.6	0.2	0.5	0.7	0.6	0.1	-	-	-	-
90% CI	0.6	1.0	0.6	0.3	0.0	0.5	0.8	0.7	0.2	0.6	0.9	0.8	0.2	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A
(TABLE A2)
SECONDARY SITE
4 ft. MICROPHONE

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE - 6202 FT. from BRAKE RELEASE SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	OASPLm	DUR(A)	DUR(P)	TC	BAND	MAX. NOY BANDS		
TAKEOFF -- (SEE TABLE NO.1)																	
056	83.4	76.1	7.3	6.7	0.4	87.9	89.4	90.7	6.8	85.4	12.0	11.5	1.3	27	22	21	25
057	83.7	76.4	7.4	6.9	0.5	88.5	89.9	91.3	6.8	86.3	11.5	11.5	1.4	27	21	22	25
058	83.7	76.3	7.5	6.7	0.4	88.2	89.1	90.8	6.8	85.4	13.0	12.5	1.8	20	22	25	21
059	84.9	79.2	5.8	6.4	0.5	90.0	93.1	94.0	7.1	89.6	8.0	7.0	0.9	25	21	22	25
060	83.6	77.0	6.6	6.1	0.4	88.5	90.7	92.4	6.6	87.4	12.0	8.5	1.7	22	22	21	25
061	84.3	77.7	6.5	6.5	0.5	89.2	91.5	93.1	6.7	88.1	10.0	8.5	1.6	22	22	21	25
062	84.3	78.1	6.1	6.3	0.4	88.7	91.2	92.5	6.4	86.9	9.5	9.5	1.3	25	21	25	22
Avg.	84.0	77.3	6.7	6.5	0.4	88.7	90.7	92.1	6.7	87.0	10.9	9.9	1.4	-	-	-	-
Std Dv	0.5	1.1	0.7	0.3	0.0	0.7	1.4	1.2	0.2	1.5	1.7	2.0	0.3	-	-	-	-
90% CI	0.4	0.8	0.5	0.2	0.0	0.5	1.0	0.9	0.2	1.1	1.3	1.5	0.2	-	-	-	-
TAKEOFF — (SEE TABLE NO.1)																	
P63	82.4	77.1	5.3	6.1	0.5	88.1	91.0	92.6	6.5	88.6	7.5	7.0	1.6	27	21	22	25
P64	81.3	74.8	6.5	6.6	0.5	87.2	89.5	91.1	6.6	87.2	9.5	8.5	1.8	21	21	22	25
P65	81.2	73.6	7.5	7.0	0.5	87.0	88.5	89.9	6.8	86.2	12.0	11.0	1.4	21	21	22	25
P66	81.8	75.6	6.2	6.5	0.5	87.3	89.5	91.0	6.7	86.4	9.0	8.5	1.4	21	21	22	25
P67	82.3	76.0	6.4	6.7	0.5	88.2	90.6	92.1	6.5	88.3	9.0	8.5	1.6	21	21	22	25
Avg.	81.8	75.4	6.4	6.6	0.5	87.6	89.8	91.3	6.6	87.3	9.4	8.7	1.6	-	-	-	-
Std Dv	0.6	1.3	0.8	0.3	0.0	0.5	1.0	1.0	0.1	1.1	1.6	1.4	0.1	-	-	-	-
90% CI	0.6	1.2	0.8	0.3	0.0	0.5	1.0	1.0	0.1	1.0	1.6	1.4	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
868	80.1	72.5	7.6	6.7	0.4	85.5	86.8	89.2	6.6	84.6	13.5	9.0	2.4	20	20	22	21
869	80.0	72.4	7.7	6.6	0.4	85.5	86.7	89.2	6.4	84.5	14.5	9.5	2.5	20	20	22	21
870	81.0	73.9	7.0	6.6	0.4	86.4	88.0	90.1	6.7	85.4	11.5	8.5	2.1	20	20	22	21
871	80.2	72.5	7.7	6.5	0.4	85.5	86.9	88.9	6.6	84.6	15.5	10.0	2.4	20	20	22	21
Avg.	80.3	72.8	7.5	6.6	0.4	85.7	87.1	89.4	6.6	84.8	13.7	9.2	2.4	-	-	-	-
Std Dv	0.4	0.7	0.3	0.1	0.0	0.4	0.6	0.5	0.1	0.4	1.7	0.6	0.2	-	-	-	-
90% CI	0.5	0.9	0.4	0.1	0.0	0.5	0.7	0.6	0.2	0.5	2.0	0.8	0.2	-	-	-	-
LEVEL FLY-BY — (SEE TABLE NO.1)																	
N72	82.5	75.9	6.6	6.7	0.5	87.6	90.1	92.0	6.4	86.8	9.5	7.5	2.0	21	21	24	22
N73	82.8	76.5	6.3	6.6	0.5	87.8	90.6	92.4	6.4	87.6	9.0	7.0	1.8	21	21	22	26
N74	83.0	77.0	6.0	6.6	0.5	88.1	91.1	92.9	6.2	87.9	8.0	7.0	1.8	21	21	22	24
N75	83.2	77.4	5.8	6.4	0.5	88.2	91.6	93.4	6.0	88.0	8.0	6.5	1.8	21	21	22	24
Avg.	82.9	76.7	6.1	6.6	0.5	87.9	90.9	92.7	6.2	87.6	8.6	7.0	1.8	-	-	-	-
Std Dv	0.3	0.6	0.4	0.1	0.0	0.3	0.6	0.6	0.2	0.5	0.7	0.4	0.1	-	-	-	-
90% CI	0.3	0.8	0.4	0.2	0.0	0.3	0.7	0.7	0.2	0.6	0.9	0.5	0.1	-	-	-	-
LEVEL FLY-BY —(SEE TABLE NO.1)																	
L76	86.7	82.1	4.6	5.7	0.4	90.4	93.9	95.0	6.6	90.2	6.5	6.5	1.1	27	22	25	21
L77	87.2	82.7	4.4	5.5	0.4	90.4	94.1	95.2	6.3	90.1	6.5	6.5	1.1	21	24	21	27
L78	86.9	82.2	4.7	5.8	0.5	90.6	93.9	95.3	6.6	90.4	6.5	6.5	1.6	27	22	25	27
L79	86.2	81.1	5.1	6.1	0.5	90.0	93.2	94.2	6.8	89.4	7.0	7.0	1.1	21	21	24	22
Avg.	86.7	82.0	4.7	5.7	0.4	90.3	93.8	94.9	6.6	90.0	6.6	6.6	1.2	-	-	-	-
Std Dv	0.4	0.7	0.3	0.3	0.0	0.3	0.4	0.5	0.2	0.4	0.2	0.2	0.3	-	-	-	-
90% CI	0.5	0.8	0.3	0.3	0.0	0.3	0.5	0.6	0.2	0.5	0.3	0.3	0.3	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED

APPENDIX A (TABLE A2) SECONDARY SITE GROUND MICROPHON

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE - 6202 FT. from BRAKE RELEASE SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	OASPLm	DUR(A)	DUR(P)	TC	BAND	MAX. NOY BANDS		
TAKEOFF -- (SEE TABLE NO.1)																	
A1	97.[illegible]	92.0	5.1	6.3	0.5	99.3	101.9	103.1	6.4	96.9	6.5	9.0	1.3	20	28	25	27
A2	97.7	92.1	5.6	6.4	0.5	99.6	101.7	103.0	6.8	96.7	7.5	9.3	1.3	20	28	29	26
A3	97.5	92.6	5.0	6.1	0.5	99.7	102.4	103.7	6.5	97.5	6.5	8.5	1.4	20	25	28	27
A4	98.3	93.4	5.0	6.1	0.5	100.5	103.1	104.4	6.6	[illegible]	6.5	8.5	1.4	20	28	27	29
A5	97.3	91.9	5.3	6.3	0.5	99.[illegible]	101.9	103.0	6.6	96.6	7.0	9.5	1.2	20	26	28	27
Avg.	97.6	92.4	5.2	6.2	0.5	99.7	102.2	103.5	6.6	97.2	6.8	9.0	1.3	-	-	-	-
Std Dv	0.5	0.6	0.3	0.1	0.0	0.5	0.5	0.6	0.1	0.6	0.4	0.5	0.1	-	-	-	-
90% CI	0.4	0.6	0.2	0.1	0.0	0.4	0.5	0.6	0.1	0.6	0.4	0.5	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
B6	97.6	92.8	4.8	6.1	0.5	99.3	102.9	104.1	6.5	97.7	6.0	7.5	1.3	20	23	26	27
B7	96.8	92.0	4.8	6.2	0.5	99.0	101.8	103.2	6.2	96.9	6.0	8.5	1.3	20	28	26	25
B8	96.8	91.6	5.1	6.3	0.5	99.0	101.7	103.1	6.4	96.5	5.5	8.5	1.3	20	28	26	25
B9	96.8	91.6	5.2	6.2	0.5	99.0	101.5	102.9	6.4	96.5	7.0	9.0	1.3	20	27	23	28
B10	97.7	93.4	4.3	5.8	0.5	100.2	103.6	104.9	6.2	98.5	5.5	7.0	1.4	20	26	27	23
B11	97.8	93.3	4.5	5.7	0.5	100.3	103.7	105.0	6.2	98.2	6.0	7.0	1.5	20	26	23	29
Avg.	97.2	92.5	4.8	6.0	0.5	99.5	102.5	103.9	6.3	97.4	6.2	7.9	1.4	-	-	-	-
Std Dv	0.5	0.8	0.4	0.2	0.0	0.6	1.0	1.0	0.1	0.9	0.5	0.9	0.1	-	-	-	-
90% CI	0.4	0.7	0.3	0.2	0.0	0.5	0.8	0.8	0.1	0.7	0.4	0.7	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
C12	94.1	89.[illegible]	4.8	5.9	0.5	96.3	99.1	100.4	6.4	93.8	6.5	8.5	1.3	20	27	26	28
C13	95.7	91.7	3.9	5.6	0.5	97.9	101.5	102.9	5.7	96.1	5.0	7.0	1.6	20	25	23	26
C14	95.1	90.6	4.4	5.7	0.5	97.5	100.9	102.1	6.1	95.7	6.0	7.5	1.2	20	26	23	27
C15	96.2	92.7	3.5	5.3	0.5	98.3	102.6	104.0	5.5	97.2	4.5	6.0	1.3	20	25	27	29
Avg.	95.3	91.1	4.2	5.6	0.5	97.5	101.0	102.4	5.9	95.7	5.5	7.2	1.4	-	-	-	-
Std Dv	0.9	1.5	0.5	0.2	0.0	0.8	1.5	1.5	0.4	1.4	0.9	1.0	0.2	-	-	-	-
90% CI	1.1	1.7	0.7	0.2	0.0	1.0	1.8	1.8	0.5	1.7	1.1	1.2	0.2	-	-	-	-
LEVEL FLY-BY -- (SEE TABLE NO.1)																	
D16	93.9	90.1	3.8	5.8	0.5	96.1	100.3	102.3	5.1	94.8	4.5	5.5	2.0	20	25	26	29
D17	93.5	89.6	3.9	5.6	0.5	95.6	99.6	101.4	5.4	93.9	5.0	6.0	1.8	20	26	25	27
D18	93.7	90.0	3.6	5.2	0.5	95.7	100.3	102.2	4.7	94.5	5.0	5.5	1.9	20	25	28	29
D19	93.8	90.1	3.7	5.2	0.5	95.9	100.1	102.0	5.3	94.6	5.0	5.5	1.9	20	27	25	26
D20	93.5	89.7	3.8	5.4	0.5	95.5	99.9	101.7	5.2	94.2	5.0	5.5	1.8	20	25	27	29
D21	94.1	90.5	3.6	5.5	0.5	96.1	100.8	102.6	5.1	95.1	4.5	5.0	2.0	20	25	27	26
Avg.	93.7	90.0	3.7	5.5	0.5	95.8	100.2	102.0	5.1	94.5	4.8	5.5	1.9	-	-	-	-
Std Dv	0.3	0.3	0.1	0.2	0.0	0.3	0.4	0.4	0.2	0.4	0.3	0.3	0.1	-	-	-	-
90% CI	0.2	0.3	0.1	0.2	0.0	0.2	0.3	0.4	0.2	0.3	0.2	0.3	0.1	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A
(TABLE A2)
SECONDARY SITE
GROUND MICROPHONE

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE - 6202 FT. from BRAKE RELEASE SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	OASPLm	DUR(A)	DUR(P)	TC	BAND	MAX. NOY BANDS		
TAKEOFF -- (SEE TABLE NO.1)																	
E22	97.0	92.4	4.5	6.1	0.5	98.9	102.0	103.2	6.4	96.8	5.5	8.0	1.1	20	27	28	25
E23	95.6	90.2	5.3	6.3	0.5	97.7	100.0	101.1	6.6	94.9	7.0	10.0	1.2	20	28	26	25
E24	96.6	91.9	4.7	6.1	0.5	98.7	101.8	102.9	6.4	96.8	6.0	8.5	1.1	20	27	26	23
E25	96.2	91.1	5.1	6.2	0.5	98.5	101.0	102.3	6.6	95.8	6.5	8.5	1.3	20	27	26	28
E26	96.7	92.0	4.7	6.0	0.5	99.9	102.1	103.4	6.2	96.7	6.0	8.0	1.3	20	27	26	28
Avg.	96.4	91.5	4.9	6.1	0.5	98.6	101.4	102.6	6.4	96.2	6.2	8.6	1.2	-	-	-	-
Std Dv	0.6	0.9	0.3	0.1	0.0	0.5	0.9	0.9	0.2	0.8	0.6	0.8	0.1	-	-	-	-
90% CI	0.5	0.8	0.3	0.1	0.0	0.5	0.8	0.9	0.2	0.8	0.5	0.8	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
F27	96.0	91.5	4.5	6.1	0.5	98.1	101.4	102.7	6.0	96.1	5.5	8.0	1.3	20	27	26	28
F28	95.6	91.4	4.2	6.0	0.5	97.7	101.1	102.5	6.0	96.1	5.0	7.5	1.4	20	26	25	28
F29	95.6	91.2	4.4	5.9	0.5	98.0	101.3	102.6	6.2	96.1	5.5	7.5	1.3	20	26	23	27
F30	95.5	91.3	4.2	5.7	0.5	97.3	100.9	102.2	5.7	95.7	5.5	8.0	1.3	20	26	29	25
Avg.	95.7	91.4	4.3	5.9	0.5	97.8	101.2	102.5	6.0	96.0	5.4	7.7	1.3	-	-	-	-
Std Dv	0.2	0.1	0.2	0.2	0.0	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.0	-	-	-	-
90% CI	0.3	0.2	0.2	0.2	0.0	0.4	0.3	0.3	0.2	0.2	0.3	0.3	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
G31	93.5	89.0	4.5	6.1	0.5	95.5	98.5	100.0	6.1	93.1	5.5	8.0	1.6	20	25	28	26
G32	93.5	89.2	4.2	5.7	0.5	95.7	98.9	100.5	5.9	93.4	5.5	7.5	1.7	20	25	28	26
G33	93.6	89.1	4.5	5.8	0.5	96.0	99.0	100.2	6.3	93.7	6.0	8.5	1.2	20	26	23	28
G34	93.5	89.2	4.3	5.8	0.5	95.7	98.9	100.2	6.3	93.6	5.5	7.5	1.4	20	27	26	29
Avg.	93.5	89.1	4.4	5.8	0.5	95.7	98.8	100.2	6.2	93.4	5.6	7.9	1.5	-	-	-	-
Std Dv	0.1	0.1	0.1	0.2	0.0	0.2	0.2	0.2	0.2	0.3	0.2	0.5	0.2	-	-	-	-
90% CI	0.1	0.1	0.2	0.2	0.0	0.2	0.2	0.2	0.2	0.3	0.3	0.6	0.3	-	-	-	-
LEVEL FLY-BY -- (SEE TABLE NO.1)																	
H35	93.1	89.2	3.9	5.6	0.5	95.1	99.1	100.5	6.0	93.8	5.0	6.0	1.4	20	26	23	29
H36	92.7	89.0	3.7	5.3	0.5	94.7	98.9	100.5	5.4	93.4	5.0	6.0	1.6	20	25	27	28
H37	92.9	89.0	4.0	5.7	0.5	95.1	98.9	100.3	5.9	93.6	5.0	6.5	1.7	20	25	26	28
H38	92.8	88.8	3.9	5.7	0.5	94.6	98.8	99.9	5.8	93.4	5.0	6.5	1.1	20	27	26	25
Avg.	92.9	89.0	3.9	5.6	0.5	94.9	98.9	100.3	5.8	93.5	5.0	6.2	1.4	-	-	-	-
Std Dv	0.2	0.2	0.1	0.2	0.0	0.3	0.1	0.3	0.3	0.2	0.0	0.3	0.3	-	-	-	-
90% CI	0.2	0.2	0.1	0.2	0.0	0.3	0.2	0.3	0.3	0.2	0.0	0.3	0.3	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A
(TABLE A2)
SECONDARY SITE
GROUND MICROPHON

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE - 6202 FT. from BRAKE RELEASE FEB. 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	OASPLm	DUR(A)	DUR(P)	TC	BAND	MAX. NOY BANDS		
TAKEOFF -- (SEE TABLE NO.1)																	
I39	88.1	82.4	5.7	6.2	0.4	92.7	94.8	95.9	6.5	91.5	8.5	11.5	1.1	21	21	26	23
I40	89.7	84.3	5.4	6.0	0.4	94.2	96.1	97.2	6.4	91.7	8.0	12.5	1.1	21	21	26	29
I41	86.9	79.8	7.1	6.8	0.5	91.5	92.2	93.3	6.9	89.6	11.0	15.0	1.0	21	21	22	25
I42	87.5	81.1	6.4	6.4	0.4	92.2	93.2	94.4	6.7	89.9	10.0	14.0	1.2	21	21	24	26
I43	87.1	81.1	6.0	6.3	0.4	92.0	93.4	94.5	6.4	90.0	9.0	14.5	1.1.	21	21	24	26
Avg.	87.9	81.7	6.1	6.3	0.4	92.5	94.0	95.1	6.6	90.5	9.3	13.5	1.1	-	-	-	-
Std Dv	1.1	1.7	0.7	0.3	0.0	1.0	1.5	1.5	0.2	1.0	1.2	1.5	0.1	-	-	-	-
90% CI	1.1	1.6	0.6	0.3	0.0	1.0	1.4	1.4	0.2	0.9	1.1	1.4	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
J44	85.4	79.4	6.0	6.1	0.4	90.0	91.1	92.5	6.6	87.7	9.5	14.0	1.4	21	21	24	26
J45	86.7	81.0	5.7	6.3	0.5	91.4	93.4	94.6	6.7	90.3	8.0	10.5	1.1	21	21	26	23
J46	86.1	80.1	6.0	6.3	0.4	90.9	92.2	93.3	6.8	88.7	9.0	13.0	1.1	21	21	24	23
J47	86.3	81.4	4.9	5.7	0.4	91.0	93.2	94.4	6.3	89.6	7.0	11.0	1.3	21	21	24	26
Avg.	86.1	80.5	5.6	6.1	0.4	90.8	92.5	93.7	6.6	89.1	8.4	12.1	1.2	-	-	-	-
Std Dv	0.5	0.9	0.5	0.3	0.0	0.6	1.0	1.0	0.2	1.1	1.1	1.7	0.1	-	-	-	-
90% CI	0.6	1.0	0.6	0.3	0.0	0.7	1.2	1.1	0.2	1.3	1.3	1.9	0.2	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
K48	90.9	85.2	5.7	6.2	0.4	94.6	97.0	97.5	6.5	93.1	8.5	12.5	0.4	23	26	23	27
K49	91.6	86.2	5.4	6.1	0.5	95.0	97.6	98.2	6.3	93.7	7.5	12.0	0.6	21	26	24	23
K50	90.9	85.1	5.8	6.4	0.5	94.7	97.2	97.7	6.5	93.5	8.0	12.5	0.4	21	26	23	27
K51	91.4	85.9	5.5	6.1	0.4	95.0	97.8	98.2	6.6	93.8	8.0	11.0	0.3	36	26	23	27
Avg.	91.2	85.6	5.6	6.2	0.5	94.8	97.4	97.9	6.5	93.5	8.0	12.0	0.4	-	-	-	-
Std Dv	0.3	0.5	0.2	0.1	0.0	0.2	0.3	0.4	0.1	0.3	0.4	0.7	0.1	-	-	-	-
90% CI	0.4	0.6	0.2	0.2	0.0	0.3	0.4	0.4	0.1	0.4	0.5	0.8	0.1	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
M52	87.9	81.5	6.4	6.5	0.5	93.3	95.3	96.7	6.8	92.2	9.5	9.5	1.4	21	21	22	24
M53	87.4	81.7	5.7	6.0	0.4	92.6	95.0	96.2	6.4	92.1	9.0	10.0	1.2	21	21	22	24
M54	86.9	79.9	7.0	6.7	0.5	92.4	93.7	95.0	7.1	91.2	11.0	11.0	1.4	21	21	24	22
M55	87.9	81.0	6.9	6.6	0.4	93.2	94.6	95.8	7.1	92.2	11.0	11.0	1.1	21	21	22	24
Avg.	87.5	81.0	6.5	6.5	0.4	92.9	94.7	95.9	6.8	91.9	10.1	10.4	1.3	-	-	-	-
Std Dv	0.5	0.8	0.6	0.3	0.0	0.4	0.7	0.7	0.3	0.5	1.0	0.7	0.1	-	-	-	-
90% CI	0.5	0.9	0.7	0.4	0.0	0.5	0.8	0.8	0.4	0.6	1.2	0.9	0.1	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED
FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

APPENDIX A
(TABLE A2)
SECONDARY SITE
GROUND MICROPHO

PIPER (PA-32R-300) CHEROKEE LANCE

SUMMARY NOISE LEVEL DATA

AS MEASURED *

CENTERLINE - 6202 FT.from BRAKE RELEASE SEPT 25,1984

EV	SEL	ALm	SEL-ALm	K(A)	Q	EPNL	PNLm	PNLTm	K(P)	OASPLm	DUR(A)	DUR(P)	TC	BAND	MAX. NOY BANDS		
TAKEOFF -- (SEE TABLE NO.1)																	
056	86.3	78.6	7.7	6.9	0.5	92.4	92.9	94.0	7.3	90.2	13.0	14.0	1.0	21	21	22	25
057	86.7	79.1	7.6	7.1	0.5	92.8	93.3	94.7	7.3	91.5	12.0	13.0	1.6	21	21	25	22
058	86.6	78.6	8.0	7.1	0.5	92.5	92.5	93.9	7.3	89.0	13.5	15.0	1.4	21	21	25	22
059	88.0	82.1	5.9	6.3	0.5	94.3	96.5	97.5	6.8	93.6	8.5	10.0	1.0	21	21	22	24
060	86.5	79.3	7.2	6.5	0.4	92.7	93.4	94.3	7.2	91.3	12.5	14.5	0.9	21	21	22	25
061	87.2	80.1	7.1	6.8	0.5	93.4	94.5	95.5	7.3	92.3	11.0	12.0	1.4	21	21	22	24
062	87.2	80.7	6.6	6.6	0.5	93.6	95.3	96.2	7.0	92.1	10.0	11.5	1.5	21	21	25	22
Avg.	86.9	79.8	7.1	6.8	0.5	93.1	94.0	95.2	7.2	91.4	11.5	12.9	1.3	-	-	-	-
Std Dv	0.6	1.3	0.7	0.3	0.0	0.7	1.4	1.3	0.2	1.5	1.8	1.8	0.3	-	-	-	-
90% CI	0.4	0.9	0.5	0.2	0.0	0.5	1.1	1.0	0.2	1.1	1.3	1.3	0.2	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
P63	85.3	79.3	6.0	6.1	0.4	92.0	94.1	95.5	6.3	91.8	9.5	10.5	1.4	21	21	22	24
P64	64.2	77.0	7.2	6.7	0.4	90.9	92.0	93.6	6.6	89.4	12.0	12.5	1.8	21	21	22	24
P65	84.0	75.9	8.1	7.1	0.5	90.6	90.7	92.1	7.2	88.1	14.0	15.0	1.4	21	21	22	24
P66	84.7	77.7	7.0	6.5	0.4	91.3	92.3	93.9	6.6	89.2	12.0	13.0	1.7	21	21	25	24
P67	85.2	78.1	7.1	6.6	0.4	92.0	93.2	94.7	6.6	90.7	12.0	12.5	1.7	21	21	24	22
Avg.	84.7	77.6	7.1	6.6	0.4	91.3	92.5	94.0	6.7	89.8	11.9	12.7	1.6	-	-	-	-
Std Dv	0.6	1.3	0.8	0.3	0.0	0.6	1.3	1.3	0.3	1.4	1.6	1.6	0.2	-	-	-	-
90% CI	0.6	1.2	0.7	0.3	0.0	0.6	1.2	1.2	0.3	1.3	1.5	1.5	0.2	-	-	-	-
TAKEOFF -- (SEE TABLE NO.1)																	
Q68	83.5	75.0	8.5	7.2	0.5	-	90.4	91.4	-	88.4	15.0	-	1.0	20	20	21	22
Q69	83.4	75.2	8.2	7.1	0.5	90.6	90.6	91.7	7.6	88.4	14.5	15.0	1.1	20	20	21	23
Q70	84.3	76.5	7.8	7.0	0.5	91.4	91.8	92.8	7.6	89.8	13.0	13.5	0.9	20	20	21	22
Q71	83.6	75.3	8.3	6.9	0.4	-	90.6	91.7	-	88.7	15.5	-	1.4	21	21	20	22
Avg.	83.7	75.5	8.2	7.1	0.5	91.0	90.9	91.9	7.6	88.8	14.5	14.2	1.1	-	-	-	-
Std Dv	0.4	0.7	0.3	0.1	0.0	0.5	0.6	0.6	0.0	0.7	1.1	1.1	0.2	-	-	-	-
90% CI	0.5	0.8	0.4	0.1	0.0	2.4	0.7	0.7	0.2	0.8	1.3	4.7	0.2	-	-	-	-
LEVEL FLY-BY -- (SEE TABLE NO.1)																	
N72	85.2	78.2	7.0	6.7	0.5	90.2	92.2	93.3	6.6	89.1	11.0	11.5	1.1	21	21	22	24
N73	85.6	79.1	6.4	6.4	0.4	90.6	93.3	94.3	6.3	90.3	10.0	10.5	1.0	21	21	22	24
N74	85.6	79.3	6.3	6.5	0.5	90.6	93.3	94.2	6.3	90.3	9.5	10.5	1.0	21	21	22	24
N75	85.9	79.7	6.1	6.4	0.5	91.0	93.8	94.7	6.3	90.5	9.0	10.0	1.0	21	21	22	24
Avg.	85.6	79.1	6.5	6.5	0.5	90.6	93.1	94.1	6.3	90.0	9.9	10.6	1.0	-	-	-	-
Std Dv	0.3	0.6	0.4	0.1	0.0	0.3	0.7	0.6	0.1	0.7	0.9	0.6	0.0	-	-	-	-
90% CI	0.3	0.8	0.4	0.2	0.0	0.4	0.8	0.7	0.2	0.8	1.0	0.7	0.1	-	-	-	-
LEVEL FLY-BY -- (SEE TABLE NO.1)																	
L76	89.0	84.4	4.6	5.7	0.4	92.8	96.3	96.9	6.6	92.3	6.5	8.0	0.9	20	22	23	25
L77	89.3	84.6	4.7	5.8	0.5	93.0	96.3	96.8	6.7	92.2	6.5	8.5	0.5	21	24	26	21
L78	89.2	84.4	4.8	5.9	0.5	92.9	96.2	96.4	6.8	92.1	6.5	9.0	0.2	36	26	23	25
L79	88.6	83.4	5.3	6.0	0.4	92.5	95.4	95.6	6.9	91.5	7.5	10.0	0.2	21	26	23	21
Avg.	89.0	84.2	4.9	5.9	0.5	92.8	96.1	96.4	6.7	92.0	6.7	8.9	0.5	-	-	-	-
Std Dv	0.3	0.6	0.3	0.2	0.0	0.2	0.4	0.6	0.1	0.4	0.5	0.9	0.3	-	-	-	-
90% CI	0.3	0.7	0.3	0.2	0.0	0.2	0.5	0.7	0.2	0.4	0.6	1.0	0.4	-	-	-	-

* - NOISE INDEXES CALCULATED USING MEASURED DATA UNCORRECTED FOR TEMPERATURE,HUMIDITY,OR AIRCRAFT DEVIATION FROM REF FLIGHT TRACK

Table A-3 "As Measured" ALM[1] and Corresponding Emission Angle[2] for Each Event

EVENT	PRIMARY 4 ft.	PRIMARY GROUND	SECONDARY 4 ft.	SECONDARY GROUND	EMISSION ANGLE AT ALM
A1	89.3	92.1	88.1	90.7	73°
A2	89.4	92.0	88.3	91.0	67°
A3	89.9	92.0	88.1	90.8	70°
A4	89.5	91.7	88.9	91.4	70°
A5	89.8	91.6	88.5	91.5	70°
B6	89.3	91.5	87.9	90.2	66°
B7	89.1	91.5	87.8	90.5	68°
B8	89.0	91.2	87.9	90.7	69°
B9	88.9	91.4	88.4	90.8	66°
B10	88.7	91.2	88.2	90.8	68°
B11	88.9	91.6	87.8	90.7	68°
C12	88.0	90.6	87.4	90.2	68°
C13	87.9	90.4	87.4	90.2	67°
C14	88.4	90.8	87.2	89.7	63°
C15	88.0	90.1	87.0	89.6	65°
D16	87.1	89.5	86.8	89.5	64°
D17	88.4	90.6	87.3	90.2	72°
D18	87.7	89.4	87.0	89.6	73°
D19	87.2	89.9	87.6	89.8	–
D20	87.9	89.5	87.1	89.7	67°
D21	87.3	89.6	87.1	89.5	61°
E22	88.0	90.6	87.1	89.9	67°
E23	88.3	90.8	87.2	89.6	71°
E24	88.4	90.5	87.5	89.7	70°
E25	87.7	90.2	87.0	89.8	70°
E26	87.7	90.2	87.1	89.7	66°
F27	87.9	89.9	87.4	90.0	69°
F28	87.1	89.8	86.6	89.2	67°
F29	87.2	89.6	86.9	89.7	71°
F30	87.4	90.0	87.4	90.4	68°
G31	87.7	–	87.7	90.2	68°
G32	87.1	89.2	87.6	89.4	72°
G33	87.3	89.3	86.5	89.1	75°
G34	87.1	89.1	86.6	89.5	72°
H35	86.3	88.8	86.7	89.2	74°
H36	87.4	88.7	87.1	89.0	66°
H37	86.9	88.7	86.7	89.1	72°
H38	86.4	86.6	86.5	89.0	74°
I39	79.4	81.0	78.0	80.5	73°
I40	78.7	80.7	77.8	–	70°
I41	79.0	80.8	77.7	80.4	71°
I42	78.4	80.5	78.5	81.1	75°
I43	78.8	81.0	78.6	81.1	73°
J44	78.6	80.8	78.5	81.0	–
J45	78.7	80.3	77.7	80.2	78°

1. Uncorrected for off-reference altitude, temperature and relative humidity

2. Specific angle of maximum acoustic emission (see section 3.9)

Table A-3 "As Measured" ALM[1] and Corresponding Emission Angle[2] for Each Event (cont'd)

EVENT	PRIMARY 4 ft.	PRIMARY GROUND	SECONDARY 4 ft.	SECONDARY GROUND	EMISSION ANGLE AT ALM
J46	78.7	80.7	79.2	81.4	64°
J47	77.7	80.0	78.3	80.9	70°
K48	82.6	84.7	81.9	84.5	77°
K49	82.1	84.2	82.7	84.8	70°
K50	83.0	84.6	81.6	83.6	80°
K51	81.4	84.2	81.6	84.2	75°
M52	77.9	79.6	77.1	79.3	85°
M53	77.5	79.1	77.9	80.4	77°
M54	77.3	78.8	75.8	78.2	85°
M55	77.3	78.9	76.4	78.8	84°
O56	-	78.1	76.0	78.6	-
O57	-	77.4	75.2	77.9	-
O58	-	78.1	76.8	79.1	-
O59	75.9	77.8	74.8	77.7	82°
O60	76.4	78.0	75.4	77.6	92°
O61	75.3	77.4	75.4	77.8	97°
O62	75.5	77.7	76.1	78.7	95°
P63	74.2	76.2	73.8	76.0	82°
P64	74.3	76.1	73.6	75.8	84°
P65	75.5	77.3	74.2	76.5	76°
P66	74.7	76.4	75.3	77.4	87°
P67	73.4	75.3	73.4	75.5	89°
Q68	72.6	74.4	71.4	73.9	93°
Q69	72.4	74.1	71.4	74.2	84°
Q70	73.2	74.6	71.6	74.2	84°
Q71	72.2	74.2	71.3	74.1	90°
N72	77.9	79.8	76.8	79.1	68°
N73	77.0	78.6	76.4	79.0	86°
N74	77.3	78.8	76.4	78.7	80°
N75	76.9	78.4	76.5	78.8	85°
L76	81.6	83.0	80.9	83.2	73°
L77	82.1	83.3	81.6	83.6	78°
L78	81.6	82.4	80.6	82.8	71°
L79	81.0	82.6	79.7	82.0	77°

1. Uncorrected for off-reference altitude, temperature and relative humidity

2. Specific angle of maximum acoustic emission (see section 3.9)

APPENDIX B

Table B-1: TIME HISTORY LISTINGS OF B SERIES

NOTE: Definitions for Table B-1

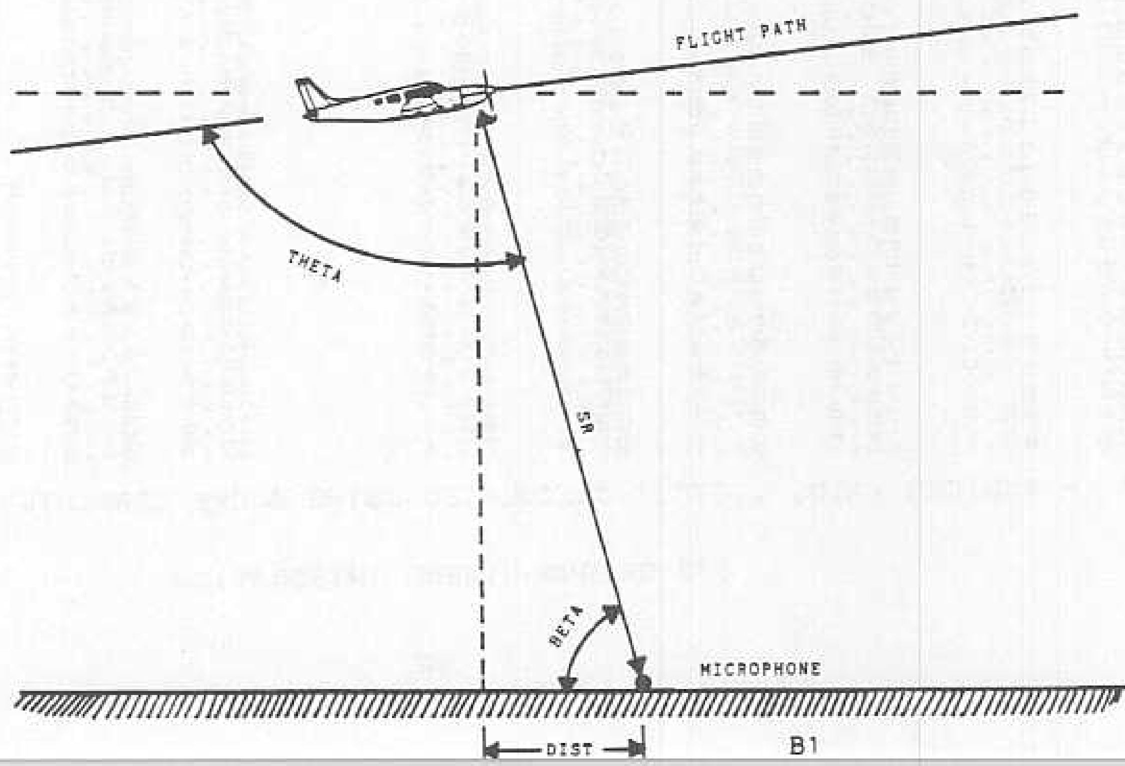
SR: slant distance between microphone and aircraft

THETA: angle formed by flight path and slant range vector

BETA: angle formed by ground and slant range vector

DIST: horizontal distance from microphone to aircraft

(angles and distances are at time of acoustic emission)



PIPER PA-32R-300 (LANCE)

NOISE LEVEL TIME HISTORY DATA

AS MEASURED *

EVENT: B6 7mm INVERTED MICROPHONE SITE 1G

TAKEOFF -- GROUND SPEED 95.6 KTS.

APPENDIX B

TABLE B-1

PRIMARY SITE

GROUND MIC.

REC.	L(A)	L(D)	OASPL	PNL	PNLT	THETA	BETA	SR	DIST
1	56.9	64.9	70.2	68.9	71.4	165.9	8.7	3287.3	-3249.4
2	57.6	65.7	71.0	70.3	72.9	165.5	9.1	3196.1	-3155.7
3	58.9	66.9	72.0	71.6	74.2	165.0	9.6	3105.1	-3062.0
4	59.5	67.6	72.7	72.4	75.1	164.6	10.0	3014.3	-2968.4
5	60.5	68.7	73.9	73.4	76.1	164.1	10.5	2923.8	-2874.8
6	61.4	69.6	74.7	74.3	76.9	163.6	11.0	2833.5	-2781.2
7	62.7	70.4	75.3	75.8	78.4	163.0	11.6	2743.5	-2687.6
8	63.8	71.6	76.5	77.2	79.7	162.4	12.2	2653.9	-2594.[illegible]
9	64.6	72.2	77.0	78.2	80.8	161.8	12.8	2564.5	-2500.7
10	64.7	72.3	77.1	78.2	80.9	161.1	13.5	2475.6	-2407.3
11	65.2	72.7	77.5	78.6	81.1	160.4	14.2	2387.1	-2314.0
12	65.5	73.2	78.2	78.9	81.6	159.6	15.0	2299.1	-2220.7
13	65.7	73.5	78.6	79.2	81.8	158.8	15.8	2211.6	-2127.6
14	67.0	74.7	79.6	80.6	83.1	157.8	16.8	2124.7	-2034.5
15	68.1	75.4	80.2	81.6	84.1	156.8	17.8	2038.5	-1941.5
16	68.5	75.9	80.7	82.0	84.5	155.8	18.8	1953.1	-1848.6
17	69.0	76.4	81.3	82.7	85.4	154.6	20.0	1868.5	-1755.8
18	69.7	77.1	82.0	83.6	86.3	153.3	21.3	1784.9	-1663.2
19	70.4	77.8	82.6	84.3	86.9	151.9	22.7	1702.4	-1570.7
20	71.6	78.7	83.4	85.2	87.8	150.4	24.2	1621.2	-1478.4
21	72.4	79.4	83.8	85.8	88.5	148.7	25.9	1541.5	-1386.4
22	73.3	79.9	84.1	86.6	89.1	146.8	27.8	1463.5	-1294.5
23	73.8	80.3	84.1	87.1	89.6	144.7	29.9	1387.5	-1203.0
24	75.1	81.5	85.0	88.3	90.7	142.4	32.2	1313.7	-1111.8
25	76.5	82.8	86.4	89.5	92.1	139.8	34.8	1242.7	-1021.0
26	78.3	84.1	87.2	90.5	93.1	137.0	37.6	1174.8	-930.6
27	80.8	86.1	88.8	92.5	95.1	133.8	40.8	1110.5	-840.7
28	82.7	87.7	89.7	94.4	96.6	130.3	44.3	1050.4	-751.4
29	84.6	89.1	90.4	95.6	97.0	126.4	48.2	995.2	-662.9
30	86.8	90.8	91.4	97.2	98.2	122.1	52.5	945.6	-575.1
31	88.5	92.3	92.6	99.0	100.7	117.4	57.2	902.4	-488.3
32	89.7	93.2	93.6	99.6	101.3	112.3	62.3	866.1	-402.4
33	90.5	93.9	94.4	100.3	101.8	106.9	67.7	837.5	-317.7
34	90.1	93.8	94.7	100.2	101.5	101.2	73.4	817.1	-234.1
35	89.3	93.0	94.3	99.6	100.6	95.5	79.1	805.1	-151.7
36	87.7	92.0	94.0	98.7	99.5	89.6	85.0	801.4	-70.5
37	85.8	90.8	93.4	97.5	98.2	83.9	89.3	806.0	9.6
38	84.2	89.5	92.4	96.2	96.5	78.4	83.8	818.2	88.5
39	82.7	88.3	91.4	95.0	95.1	73.1	78.5	837.4	166.4
40	81.1	87.0	90.5	93.5	93.5	68.2	73.6	863.0	243.4
41	79.6	85.8	89.8	92.4	92.6	63.7	69.1	894.3	319.6
42	78.1	84.6	89.4	91.2	91.6	59.5	64.9	930.4	395.1
43	76.8	83.5	88.6	90.1	91.2	55.6	61.0	970.8	470.0
44	75.9	82.8	88.4	89.3	90.5	52.2	57.6	1014.8	544.4
45	74.9	81.9	87.5	88.6	89.7	49.0	54.4	1062.0	618.3
46	74.4	81.3	86.9	88.0	89.1	46.1	51.5	1111.9	691.9
47	73.1	80.6	86.7	87.0	87.9	43.5	48.9	1164.1	765.1
48	72.5	79.9	86.0	86.3	87.1	41.1	46.5	1218.2	838.0
49	72.0	79.3	85.4	85.6	86.6	39.0	44.4	1274.1	910.7
50	71.6	78.9	84.7	85.1	86.2	37.0	42.4	1331.5	983.1
51	70.6	77.7	83.4	83.9	85.0	35.2	40.6	1390.2	1055.4
52	69.9	76.8	82.4	83.2	84.6	33.6	39.0	1450.0	1127.6
53	69.4	76.3	82.0	82.7	84.3	32.0	37.4	1510.7	1199.5
54	68.9	75.9	81.8	82.1	83.6	30.6	36.0	1572.4	1271.4
55	68.1	75.2	81.1	81.4	83.1	29.4	34.8	1634.8	1343.1

* - INDICES (A,D, ..ETC.) CALCULATED USING SLOPE CORRECTED DATA.

1/2 SECOND LINEAR INTEGRATION

PIPER PA-32R-300 (LANCE)

NOISE LEVEL TIME HISTORY DATA

AS MEASURED *

APPENDIX B
TABLE B-1
PRIMARY SITE GROUND MIC.

EVENT: B7 — 7mm INVERTED MICROPHONE SITE 1G

TAKEOFF -- GROUND SPEED 95.5 KTS.

REC.	L(A)	L(D)	OASPL	PNL	PNLT	THETA	BETA	SR	DIST
7	57.6	65.5	70.5	69.4	71.9	167.3	6.8	3596.1	-3570.9
8	58.8	67.0	72.3	71.5	74.2	167.0	7.1	3504.3	-3477.2
9	59.5	67.4	72.7	71.9	74.7	166.6	7.5	3412.6	-3383.5
10	59.8	67.7	72.6	72.7	75.2	166.2	7.9	3321.1	-3289.9
11	60.6	68.3	73.2	73.8	76.5	165.8	8.3	3229.7	-3196.2
12	61.2	69.0	73.8	74.2	77.0	165.4	8.7	3138.5	-3102.6
13	61.5	69.5	74.5	74.7	77.4	165.0	9.1	3047.6	-3009.1
14	61.9	69.8	75.0	75.3	78.0	164.5	9.6	2956.9	-2915.5
15	62.8	70.7	75.9	76.1	79.0	164.0	10.1	2866.4	-2822.0
16	63.5	71.5	76.8	76.8	79.6	163.5	10.6	2776.2	-2728.5
17	64.3	72.1	77.3	77.5	80.3	162.9	11.2	2686.2	-2635.1
18	64.7	72.6	78.0	78.3	81.0	162.3	11.8	2596.7	-2541.7
19	65.3	73.4	78.9	79.0	81.8	161.6	12.5	2507.4	-2448.4
20	66.0	73.8	79.2	79.8	82.5	160.9	13.2	2418.6	-2355.1
21	67.0	74.9	80.1	80.8	83.6	160.2	13.9	2330.3	-2261.9
22	67.5	75.5	80.8	81.6	84.4	159.4	14.7	2242.4	-2168.8
23	68.4	76.0	81.2	82.5	85.3	158.5	15.6	2155.1	-2075.7
24	68.8	76.5	81.8	83.2	86.0	157.6	16.5	2068.4	-1982.7
25	69.5	77.3	82.5	84.0	86.8	156.5	17.6	1982.4	-1889.9
26	70.7	78.3	83.4	84.7	87.5	155.4	18.7	1897.3	-1797.1
27	71.3	78.5	83.4	85.1	87.9	154.2	19.9	1813.0	-1704.5
28	72.1	79.3	83.8	85.6	88.3	152.8	21.3	1729.8	-1612.0
29	72.6	79.9	84.5	86.2	89.0	151.4	22.7	1647.8	-1519.7
30	73.4	80.6	85.2	87.2	90.0	149.7	24.4	1567.2	-1427.6
31	74.2	81.4	86.0	88.0	90.8	147.9	26.2	1488.1	-1335.7
32	75.3	82.4	86.8	88.7	91.5	146.0	28.1	1410.9	-1244.1
33	76.6	83.0	86.9	89.2	91.9	143.8	30.3	1335.8	-1152.8
34	78.0	83.8	87.1	90.0	92.6	141.3	32.8	1263.2	-1061.9
35	79.4	84.9	87.7	91.2	93.6	138.6	35.5	1193.6	-971.3
36	80.6	85.8	88.1	92.2	94.4	135.5	38.6	1127.3	-881.3
37	81.9	86.8	88.8	93.2	95.3	132.1	42.0	1064.9	-791.8
38	84.4	88.9	90.3	95.5	97.4	128.4	45.7	1007.2	-702.9
39	86.5	90.4	91.2	97.0	98.0	124.2	49.9	954.8	-614.9
40	88.2	91.9	92.3	98.4	99.8	119.6	54.5	908.4	-527.7
41	89.7	93.3	93.6	99.5	101.4	114.6	59.5	868.9	-441.4
42	90.5	94.0	94.6	100.3	102.0	109.3	64.8	836.8	-356.2
43	90.3	93.9	94.7	100.4	101.9	103.7	70.4	812.8	-272.2
44	89.8	93.7	95.0	100.3	101.5	97.8	76.3	797.3	-189.4
45	87.9	92.3	94.4	99.0	100.1	91.9	82.2	790.2	-107.8
46	86.4	91.3	93.8	98.3	99.1	86.1	88.0	791.6	-27.4
47	84.4	89.7	92.2	96.6	97.1	80.4	86.3	801.0	51.8
48	82.1	87.9	91.0	94.7	95.1	75.0	80.9	817.8	130.0
49	80.4	86.6	90.3	93.1	93.4	69.8	75.7	841.3	207.2
50	78.7	85.3	90.1	91.7	91.9	65.1	71.0	870.8	283.6
51	77.7	84.6	89.9	91.4	91.7	60.7	66.6	905.4	359.2
52	76.5	83.7	89.3	90.4	90.8	56.7	62.6	944.6	434.2
53	75.3	82.5	88.2	89.1	89.7	53.1	59.0	987.6	508.7
54	74.1	81.5	87.4	88.1	88.7	49.8	55.7	1034.0	582.6
55	73.5	80.8	86.8	87.4	88.3	46.8	52.7	1083.2	656.2
56	72.7	80.1	86.1	86.5	87.5	44.1	50.0	1134.8	729.4
57	71.8	79.1	85.3	85.6	86.7	41.6	47.5	1188.6	802.3
58	71.1	78.4	84.7	84.8	85.9	39.4	45.3	1244.1	875.0
59	70.3	77.4	83.2	83.7	85.2	37.4	43.3	1301.2	947.4
60	69.9	76.6	82.2	83.0	84.6	35.5	41.4	1359.6	1019.7

* - INDICES (A,D, ..ETC.) CALCULATED USING SLOPE CORRECTED DATA.

1/2 SECOND LINEAR INTEGRATION

PIPER PA-32R-300 (LANCE)

NOISE LEVEL TIME HISTORY DATA

AS MEASURED *

EVENT: B8 7mm INVERTED MICROPHONE SITE 1G

TAKEOFF -- GROUND SPEED 93.9 KTS.

APPENDIX B
TABLE B-1
PRIMARY SITE
GROUND MIC.

REC.	L(A)	L(D)	OASPL	PNL	PNLT	THETA	BETA	SR	DIST
8	58.3	66.9	72.4	70.9	73.5	166.1	8.6	3397.2	-3359
9	60.2	68.4	73.6	73.0	75.8	165.8	8.9	3307.7	-3267
10	62.3	70.0	74.5	75.1	77.7	165.4	9.3	3218.5	-3175
11	62.4	70.3	75.2	75.5	78.2	164.9	9.8	3129.4	-3084
12	61.4	69.5	74.6	74.4	77.1	164.5	10.2	3040.6	-2992
13	61.3	69.3	74.5	74.1	76.9	164.0	10.7	2951.9	-2900
14	62.2	69.8	74.8	75.3	78.0	163.5	11.2	2863.6	-2809
15	63.0	70.7	75.6	76.3	79.0	163.0	11.7	2775.5	-2717
16	62.5	70.4	75.6	75.3	78.1	162.4	12.3	2687.7	-2625
17	63.4	71.1	76.2	76.7	79.4	161.8	12.9	2600.2	-2534
18	64.1	71.8	77.0	77.3	80.0	161.1	13.6	2513.2	-2442
19	65.0	72.8	78.0	78.3	81.0	160.4	14.3	2426.5	-2351
20	65.6	73.3	78.4	79.0	81.7	159.7	15.0	2340.3	-2260
21	66.3	73.8	78.8	79.6	82.3	158.8	15.9	2254.5	-2168
22	66.7	74.3	79.4	80.1	82.6	158.0	16.7	2169.4	-2077
23	67.7	75.4	80.5	81.4	84.0	157.0	17.7	2084.8	-1986
24	68.9	76.3	81.3	82.7	85.3	156.0	18.7	2001.0	-1895
25	69.5	77.0	81.9	83.6	86.2	154.9	19.8	1917.9	-1804
26	70.1	77.8	82.7	83.9	86.6	153.7	21.0	1835.8	-1713
27	71.0	78.3	83.0	84.6	87.2	152.4	22.3	1754.7	-1623
28	71.6	78.7	83.1	85.2	87.8	150.9	23.8	1674.7	-1532
29	72.6	79.3	83.5	85.9	88.5	149.4	25.3	1596.0	-1442
30	73.1	79.7	83.7	86.5	88.9	147.6	27.1	1518.9	-1352.
31	73.9	80.5	84.3	87.2	89.7	145.7	29.0	1443.5	-1262.
32	75.2	81.5	85.1	88.1	90.7	143.6	31.1	1370.2	-1173
33	76.8	83.0	86.3	89.6	92.0	141.2	33.5	1299.2	-1083
34	78.4	84.1	87.1	90.4	92.9	138.6	36.1	1230.9	-995
35	80.5	85.8	88.4	92.4	94.8	135.7	39.0	1165.8	-906.
36	82.2	87.2	89.3	93.7	95.9	132.5	42.2	1104.3	-818.
37	84.5	89.0	90.4	95.5	97.1	129.0	45.7	1047.0	-731
38	86.6	90.5	91.3	97.2	98.4	125.1	49.6	994.5	-644.
39	88.1	91.8	92.4	98.5	100.3	120.8	53.9	947.6	-559.
40	89.3	92.8	93.2	99.1	100.8	116.2	58.5	906.8	-474.
41	89.9	93.4	94.0	99.7	101.2	111.2	63.5	872.8	-390.
42	89.8	93.5	94.4	100.0	101.3	106.0	68.7	846.2	-307.
43	88.9	92.7	94.2	99.3	100.4	100.5	74.2	827.3	-225.
44	87.3	91.8	93.9	98.4	99.5	94.9	79.8	816.5	-144.
45	86.0	90.9	93.5	97.8	98.7	89.3	85.4	813.6	-64
46	84.0	89.3	92.1	96.2	96.6	83.7	89.0	818.4	13.
47	82.2	88.0	91.2	94.7	95.2	78.4	83.7	830.5	91.
48	80.8	86.9	90.6	93.4	94.0	73.3	78.6	849.4	168.
49	78.8	85.3	89.7	91.7	91.8	68.5	73.8	874.3	243.
50	77.6	84.5	89.7	91.2	91.5	64.1	69.4	904.6	318.
51	76.3	83.5	89.1	90.3	90.7	60.0	65.3	939.6	393.
52	75.5	83.0	88.8	89.9	90.3	56.2	61.5	978.7	466.
53	74.5	82.0	88.1	89.0	89.5	52.8	58.1	1021.5	540
54	73.7	81.3	87.3	87.9	88.6	49.7	55.0	1067.3	612.
55	72.9	80.4	86.6	87.1	87.8	46.8	52.1	1115.7	685.
56	72.6	79.9	86.0	86.3	87.2	44.2	49.5	1166.5	757.
57	71.7	79.2	85.5	85.7	86.5	41.9	47.2	1219.2	829.
58	70.7	78.3	84.7	84.6	85.5	39.7	45.0	1273.7	900.
59	70.0	77.3	83.3	83.3	84.6	37.7	43.0	1329.7	972.
60	69.7	76.6	82.2	82.9	84.3	35.9	41.2	1386.9	1043.

* - INDICES (A,D, ..ETC.) CALCULATED USING SLOPE CORRECTED DATA.

1/2 SECOND LINEAR INTEGRATION

-:-FER PA-32R-300 (LANCE)

NOISE LEVEL TIME HISTORY DATA

AS MEASURED *

APPENDIX B
TABLE B-1
PRIMARY SITE
GROUND MIC.

EVENT: B9

/mm INVERTED MICROPHONE SITE 1G
TAKEOFF -- GROUND SPEED 95.4 KTS.

REC.	L(A)	L(D)	DASPL	PNL	PNLT	THETA	BETA	SR	DIST
1	60.5	68.1	72.9	73.3	75.4	165.9	7.9	3404.9	-3372.6
2	60.6	68.4	73.2	73.5	75.8	165.5	8.3	3313.7	-3279.1
3	61.2	69.1	73.9	74.5	76.9	165.1	8.7	3222.8	-3185.6
4	61.7	69.7	74.7	74.7	77.5	164.6	9.2	3132.0	-3092.2
5	61.9	69.8	74.9	74.9	77.6	164.2	9.6	3041.5	-2998.8
6	62.9	70.7	75.8	76.0	78.8	163.7	10.1	2951.3	-2905.4
7	63.6	71.7	76.9	76.9	79.8	163.2	10.6	2861.3	-2812.0
8	64.3	72.2	77.4	77.6	80.4	162.6	11.2	2771.6	-2718.7
9	64.8	72.8	78.0	77.9	80.7	162.0	11.8	2682.2	-2625.5
10	65.4	73.4	78.8	79.0	81.8	161.4	12.4	2593.2	-2532.3
11	65.8	73.8	79.2	79.6	82.3	160.7	13.1	2504.6	-2439.1
12	66.1	74.0	79.3	79.8	82.5	159.9	13.9	2416.5	-2346.0
13	66.8	74.5	79.8	80.5	83.2	159.1	14.7	2328.8	-2253.0
14	67.7	75.3	80.4	81.6	84.4	158.3	15.5	2241.7	-2160.1
15	67.8	75.5	80.6	81.9	84.6	157.4	16.4	2155.2	-2067.3
16	68.7	75.9	81.0	82.7	85.5	156.4	17.4	2069.4	-1974.5
17	69.0	76.2	81.1	82.6	85.4	155.3	18.5	1984.4	-1881.9
18	69.0	76.5	81.6	82.9	85.6	154.1	19.7	1900.3	-1789.4
19	70.1	77.2	81.9	83.5	86.3	152.9	20.9	1817.1	-1697.0
20	71.0	78.1	82.6	84.3	86.9	151.5	22.3	1735.1	-1604.8
21	71.6	78.7	83.5	85.3	88.0	149.9	23.9	1654.4	-1512.8
22	72.4	79.5	84.2	86.3	89.0	148.2	25.6	1575.1	-1421.0
23	73.3	80.5	85.3	87.2	90.0	146.4	27.4	1497.6	-1329.4
24	74.2	81.4	85.9	87.8	90.5	144.3	29.5	1422.1	-1238.1
25	75.4	82.1	86.2	88.3	91.0	142.1	31.7	1348.8	-1147.2
26	77.0	82.9	86.1	89.2	91.8	139.6	34.2	1278.1	-1056.6
27	78.0	83.8	86.7	90.2	92.6	136.8	37.0	1210.6	-966.4
28	80.2	85.6	88.2	92.0	94.4	133.7	40.1	1146.5	-876.8
29	81.8	86.8	89.1	93.3	95.7	130.3	43.5	1086.6	-787.7
30	83.6	88.1	89.6	94.7	96.6	126.5	47.3	1031.4	-699.4
31	85.8	89.9	90.6	96.6	97.8	122.4	51.4	981.5	-611.7
32	87.5	91.2	91.8	97.8	99.3	117.8	56.0	937.7	-525.0
33	88.8	92.4	92.8	98.6	100.4	113.0	60.8	900.6	-439.2
34	89.9	93.4	93.7	99.7	101.4	107.8	66.0	870.9	-354.4
35	90.3	93.8	94.2	100.2	101.7	102.4	71.4	848.9	-270.8
36	89.3	93.0	94.4	99.5	100.9	96.8	77.0	835.1	-188.3
37	88.3	92.6	94.6	99.6	100.7	91.2	82.6	829.3	-107.0
38	86.7	91.4	93.7	98.4	99.2	85.6	88.2	831.5	-26.8
39	84.7	89.8	92.3	96.6	97.2	80.2	86.4	841.3	52.3
40	82.3	88.3	91.5	95.1	95.7	75.1	81.3	858.1	130.4
41	80.4	86.7	90.5	93.1	93.1	70.2	76.4	881.3	207.6
42	78.8	85.6	90.3	92.1	92.2	65.6	71.8	910.3	284.0
43	77.7	84.9	90.2	91.7	91.7	61.4	67.6	944.2	359.6
44	76.6	84.1	89.9	91.0	91.2	57.5	63.7	982.6	434.6
45	75.6	82.9	88.7	89.5	90.1	54.0	60.2	1024.7	509.1
46	74.1	81.5	87.4	88.1	88.7	50.8	57.0	1070.2	583.2
47	73.4	80.8	86.9	87.3	88.1	47.8	54.0	1118.5	656.8
48	72.7	80.0	86.1	86.6	87.5	45.2	51.4	1169.2	730.0
49	71.8	79.3	85.4	85.7	86.8	42.7	48.9	1222.1	803.0
50	71.1	78.8	85.2	85.2	86.3	40.5	46.7	1276.8	875.7
51	70.5	77.8	84.2	84.3	85.3	38.5	44.7	1333.0	948.2
52	69.9	76.8	82.9	82.7	84.1	36.6	42.8	1390.7	1020.4
53	68.9	75.9	81.7	82.2	83.9	34.9	41.1	1449.6	1092.5
54	68.8	75.4	81.1	81.3	83.0	33.3	39.5	1509.5	1164.5
55	67.9	74.7	80.4	80.5	82.2	31.9	38.1	1570.4	1236.3
56	67.8	74.4	80.1	80.2	82.0	30.5	36.7	1632.1	1308.0
57	66.9	74.0	79.9	79.9	81.7	29.3	35.5	1694.5	1379.6
58	66.5	73.3	79.0	79.5	81.4	28.1	34.3	1757.6	1451.1
59	65.5	72.4	78.3	78.4	80.3	27.1	33.3	1821.2	1522.5
60	64.6	71.2	77.0	76.8	78.5	26.1	32.3	1885.4	1593.9
61	64.1	70.8	76.6	76.0	77.6	25.2	31.4	1950.1	1665.2
62	63.7	70.0	75.2	75.4	77.2	24.3	30.5	2015.1	1736.4

* - INDICES (A,D, ..ETC.) CALCULATED USING SLOPE CORRECTED DATA.

1/2 SECOND LINEAR INTEGRATION

PIPER PA-32R-300 (LANCE)
NOISE LEVEL TIME HISTORY DATA
AS MEASURED *

APPENDIX B
TABLE B-1
PRIMARY SITE
4 ft. MIC.

EVENT: B9 1.2m MICROPHONE SITE 1
TAKEOFF -- GROUND SPEED 95.4 KTS.

REC.	L(A)	L(D)	OASPL	PNL	PNLT	THETA	BETA	SR	DIST
1	60.3	65.8	69.9	71.2	73.3	166.0	7.8	3404.2	-3372.5
2	60.4	66.1	70.2	71.6	73.7	165.6	8.2	3313.1	-3279.0
3	60.6	66.5	70.6	72.2	74.4	165.2	8.6	3222.1	-3185.5
4	61.0	67.0	71.4	72.5	74.9	164.7	9.1	3131.3	-3092.1
5	60.8	67.0	71.5	72.5	74.9	164.3	9.5	3040.7	-2998.6
6	61.7	68.0	72.5	73.6	76.1	163.8	10.0	2950.4	-2905.3
7	61.9	68.3	73.0	73.9	76.5	163.2	10.6	2860.4	-2811.9
8	62.5	68.9	73.7	75.0	77.5	162.7	11.1	2770.7	-2718.6
9	62.8	69.3	74.4	75.5	78.2	162.1	11.7	2681.3	-2625.3
10	63.0	69.7	74.9	76.1	78.7	161.4	12.4	2592.2	-2532.1
11	63.0	69.8	75.2	76.3	79.0	160.8	13.0	2503.6	-2439.0
12	62.9	69.7	75.0	76.2	78.9	160.0	13.8	2415.4	-2345.9
13	63.5	70.1	75.2	77.0	79.7	159.2	14.6	2327.7	-2252.9
14	64.0	70.6	75.8	77.5	80.3	158.4	15.4	2240.5	-2159.9
15	63.8	70.4	75.5	77.4	80.2	157.5	16.3	2153.9	-2067.1
16	64.5	70.8	75.6	77.8	80.6	156.5	17.3	2068.0	-1974.3
17	64.6	70.6	75.0	77.2	80.0	155.4	18.4	1982.9	-1881.7
18	64.9	71.1	75.2	77.6	80.3	154.2	19.6	1898.7	-1789.2
19	66.4	71.9	74.8	77.7	80.3	153.0	20.8	1815.5	-1696.8
20	67.2	72.7	75.5	78.7	81.4	151.6	22.2	1733.4	-1604.6
21	68.0	73.7	76.6	79.7	82.4	150.0	23.8	1652.5	-1512.5
22	68.9	74.9	77.6	81.1	83.7	148.4	25.4	1573.2	-1420.7
23	69.6	75.7	78.5	81.9	84.6	146.5	27.3	1495.5	-1329.1
24	70.6	76.7	79.2	83.3	85.7	144.5	29.3	1419.8	-1237.8
25	72.0	77.9	80.0	84.2	86.2	142.2	31.6	1346.4	-1146.8
26	73.6	79.2	81.1	85.1	86.5	139.7	34.1	1275.6	-1056.2
27	75.1	80.4	82.4	86.6	88.0	136.9	36.9	1207.9	-966.1
28	77.7	82.5	84.4	88.6	90.5	133.8	40.0	1143.7	-876.4
29	79.2	84.0	85.8	90.5	91.7	130.4	43.4	1083.6	-787.3
30	81.4	86.1	87.6	91.3	93.4	126.6	47.2	1028.1	-698.9
31	83.6	87.9	89.0	94.4	96.7	122.5	51.3	978.1	-611.3
32	85.4	89.4	90.0	95.9	98.2	118.0	55.8	934.2	-524.5
33	86.9	90.5	90.9	96.9	98.5	113.1	60.7	896.9	-438.7
34	87.6	90.9	91.3	97.3	98.3	107.9	65.9	867.1	-353.9
35	87.3	90.6	91.4	97.2	97.7	102.5	71.3	845.0	-270.3
36	86.3	90.0	91.2	96.4	96.8	96.9	76.9	831.1	-187.8
37	84.4	88.8	90.7	95.2	95.8	91.2	82.6	825.3	-106.4
38	83.1	88.0	90.0	94.3	95.4	85.6	88.2	827.6	-26.3
39	81.5	86.8	89.4	93.3	94.9	80.2	86.4	837.4	52.8
40	79.5	85.4	88.3	91.7	93.2	75.0	81.2	854.3	130.9
41	77.1	83.6	87.0	89.8	90.6	70.1	76.3	877.6	208.1
42	75.7	82.4	85.9	88.9	89.7	65.5	71.7	906.7	284.5
43	74.7	81.6	85.3	88.0	89.1	61.3	67.5	940.8	360.1
44	73.2	80.2	84.0	86.7	87.8	57.4	63.6	979.3	435.1
45	72.6	79.3	83.2	85.8	87.4	53.9	60.1	1021.5	509.6
46	71.5	78.4	82.2	84.5	86.2	50.6	56.8	1067.1	583.6
47	70.0	76.4	80.0	82.4	83.9	47.7	53.9	1115.5	657.2
48	69.4	75.4	78.8	81.2	82.6	45.0	51.2	1166.4	730.4
49	68.6	74.6	78.0	80.6	82.0	42.6	48.8	1219.4	803.4
50	67.8	73.8	77.8	79.7	81.0	40.4	46.6	1274.1	876.1
51	67.5	73.2	76.9	79.5	80.9	38.3	44.5	1330.5	948.5
52	66.6	71.9	75.1	78.1	79.6	36.5	42.7	1388.3	1020.8
53	65.7	70.8	73.4	77.1	78.5	34.8	41.0	1447.2	1092.9
54	65.0	69.8	72.6	76.1	77.7	33.2	39.4	1507.2	1164.8
55	64.1	69.4	73.0	75.4	76.4	31.7	37.9	1568.2	1236.6
56	63.6	68.8	72.6	74.7	75.9	30.4	36.6	1629.9	1308.3
57	62.9	68.2	72.2	73.9	74.8	29.2	35.4	1692.4	1379.9
58	62.2	67.4	71.2	73.3	74.5	28.0	34.2	1755.6	1451.4
59	61.0	66.3	70.5	71.9	73.0	27.0	33.2	1819.3	1522.8
60	60.7	65.7	69.7	71.3	72.3	26.0	32.2	1883.5	1594.2
61	60.4	65.3	69.3	71.0	71.9	25.1	31.3	1948.2	1665.4
62	59.9	64.9	68.3	70.9	72.4	24.2	30.4	2013.3	1736.6

* - INDICES (A,D, ..ETC.) CALCULATED USING SLOPE CORRECTED DATA.

1/2 SECOND LINEAR INTEGRATTION

PIPER PA-32R-300 (LANCE)

NOISE LEVEL TIME HISTORY DATA

AS MEASURED *

EVENT: B10 7mm INVERTED MICROPHONE SITE 1G

TAKEOFF -- GROUND SPEED 93.4 KTS.

APPENDIX B
TABLE B-1
PRIMARY SITE
GROUND MIC.

REC.	L(A)	L(D)	OASPL	PNL	PNLT	THETA	BETA	SR	DIST
1	56.2	63.9	69.0	67.9	70.1	166.5	6.1	3315.9	-3296.9
2	57.0	64.8	70.0	69.0	71.5	166.1	6.5	3226.5	-3205.6
3	58.3	66.3	71.5	70.7	73.1	165.7	6.9	3137.2	-3114.3
4	59.5	67.6	72.9	72.3	74.9	165.2	7.4	3048.1	-3023.0
5	60.5	68.7	74.0	73.4	76.2	164.8	7.8	2959.2	-2931.8
6	61.2	69.5	74.7	74.1	76.6	164.3	8.3	2870.6	-2840.6
7	62.1	70.0	75.0	75.1	77.4	163.8	8.8	2782.2	-2749.4
8	63.1	70.6	75.5	76.2	78.9	163.2	9.4	2694.1	-2658.3
9	64.3	71.8	76.8	77.5	80.4	162.7	9.9	2606.3	-2567.2
10	65.4	72.7	77.5	78.6	81.2	162.0	10.6	2518.8	-2476.2
11	65.5	73.1	78.1	78.8	81.3	161.4	11.2	2431.7	-2385.2
12	65.4	73.2	78.4	78.8	81.4	160.7	11.9	2345.0	-2294.3
13	65.5	73.6	79.0	79.2	81.7	159.9	12.7	2258.7	-2203.4
14	66.3	74.1	79.4	79.9	82.6	159.1	13.5	2173.0	-2112.6
15	67.3	74.8	79.8	80.8	83.3	158.2	14.4	2087.8	-2021.9
16	68.2	75.6	80.6	81.7	84.3	157.2	15.4	2003.2	-1931.3
17	68.9	76.3	81.4	82.5	85.3	156.1	16.5	1919.4	-1840.7
18	69.6	77.1	82.3	83.6	86.3	155.0	17.6	1836.4	-1750.3
19	70.5	77.9	82.9	84.5	87.2	153.7	18.9	1754.3	-1660.0
20	71.6	78.8	83.7	85.7	88.5	152.4	20.2	1673.3	-1569.9
21	72.3	79.4	84.2	86.2	88.8	150.8	21.8	1593.5	-1480.0
22	73.2	80.0	84.4	86.5	89.2	149.2	23.4	1515.1	-1390.2
23	73.8	80.4	84.4	86.8	89.4	147.3	25.3	1438.3	-1300.6
24	74.8	81.1	85.0	87.4	89.9	145.3	27.3	1363.4	-1211.4
25	75.9	82.2	85.8	88.6	91.2	143.0	29.6	1290.7	-1122.4
26	77.3	83.2	86.3	89.7	92.2	140.5	32.1	1220.5	-1033.8
27	78.6	84.3	87.1	90.6	93.0	137.7	34.9	1153.2	-945.6
28	80.6	85.9	88.3	92.3	94.6	134.5	38.1	1089.5	-857.8
29	82.4	87.1	89.0	93.4	95.6	131.1	41.5	1029.7	-770.7
30	84.3	88.7	90.1	95.3	97.2	127.2	45.4	974.6	-684.2
31	86.6	90.7	91.4	97.5	98.7	122.9	49.7	924.9	-598.4
32	88.3	92.0	92.5	98.6	99.7	118.2	54.4	881.4	-513.5
33	89.8	93.3	93.7	99.6	101.4	113.2	59.4	844.6	-429.5
34	90.5	93.9	94.5	100.3	102.0	107.8	64.8	815.3	-346.6
35	90.2	93.8	94.7	100.5	101.9	102.1	70.5	794.1	-264.9
36	89.3	93.2	94.6	100.0	101.2	96.2	76.4	781.1	-184.2
37	87.9	92.3	94.3	99.1	100.2	90.4	82.2	776.5	-104.8
38	86.4	91.5	94.2	98.3	99.1	84.5	88.1	780.0	-26.5
39	84.4	89.8	92.6	96.6	97.1	78.9	86.3	791.2	50.8
40	82.5	88.4	91.6	95.0	95.1	73.6	81.0	809.5	127.1
41	80.8	87.1	90.9	93.6	93.6	68.6	76.0	834.2	202.4
42	78.8	85.3	89.7	92.0	92.4	63.9	71.3	864.6	277.0
43	77.5	84.3	89.5	91.0	91.5	59.6	67.0	899.8	350.9
44	76.6	84.0	89.9	91.0	91.4	55.8	63.2	939.3	424.2
45	75.7	83.1	89.1	90.0	90.7	52.2	59.6	982.5	497.0
46	74.5	81.7	87.5	88.3	89.3	49.0	56.4	1028.8	569.3
47	73.9	81.1	87.0	87.6	88.5	46.1	53.5	1077.8	641.3
48	72.7	80.0	86.0	86.4	87.4	43.4	50.8	1129.1	712.9
49	72.4	79.5	85.5	85.9	87.0	41.0	48.4	1182.4	784.3
50	71.5	78.6	84.5	84.9	86.2	38.9	46.3	1237.4	855.4
51	70.7	77.7	83.3	84.0	85.3	36.9	44.3	1293.9	926.4
52	70.1	77.0	82.5	83.6	85.3	35.1	42.5	1351.6	997.1
53	69.5	76.2	81.7	82.9	84.7	33.4	40.8	1410.5	1067.7
54	68.8	75.7	81.4	82.1	83.9	31.9	39.3	1470.3	1138.2
55	68.3	74.9	80.5	81.2	83.1	30.5	37.9	1531.0	1208.5
56	67.7	74.4	80.0	80.5	82.3	29.2	36.6	1592.5	1278.7
57	66.9	73.4	78.9	79.4	81.2	28.0	35.4	1654.6	1348.9
58	66.3	72.5	77.8	78.4	80.2	26.9	34.3	1717.3	1418.9
59	65.4	71.5	76.6	77.0	78.7	25.9	33.3	1780.5	1488.9

* - INDICES (A,D, ..ETC.) CALCULATED USING SLOPE CORRECTED DATA.

1/2 SECOND LINEAR INTEGRATION

PIPER PA-32R-300 (LANCE)
NOISE LEVEL TIME HISTORY DATA
AS MEASURED *

EVENT: B11 7mm INVERTED MICROPHONE SITE 1G
TAKEOFF -- GROUND SPEED 93.4 KTS.

REC.	L(A)	L(D)	DASPL	PNL	PNLT	THETA	BETA	SR	DIST
1	57.0	64.9	70.0	69.2	70.9	168.4	4.3	3856.2	-3845.2
2	57.6	65.5	70.4	69.6	71.9	168.1	4.6	3765.9	-3753.8
3	57.4	65.4	70.7	69.6	71.4	167.8	4.9	3675.8	-3662.4
4	58.2	66.3	71.5	70.7	72.2	167.5	5.2	3585.8	-3571.0
5	57.9	66.2	71.7	70.3	71.5	167.2	5.5	3496.0	-3479.6
6	59.0	66.9	72.0	71.4	73.3	166.8	5.9	3406.2	-3388.3
7	59.8	67.8	73.1	72.2	74.5	166.5	6.2	3316.6	-3297.0
8	59.9	67.9	73.1	72.4	74.7	166.1	6.6	3227.2	-3205.7
9	60.7	68.5	73.5	73.6	75.9	165.7	7.0	3138.0	-3114.4
10	61.5	69.3	74.3	74.5	76.6	165.2	7.5	3048.9	-3023.1
11	62.1	69.8	74.8	75.1	77.3	164.8	7.9	2960.1	-2931.9
12	62.0	69.6	74.7	75.0	77.5	164.3	8.4	2871.5	-2840.7
13	62.0	70.0	75.4	75.2	77.4	163.8	8.9	2783.1	-2749.5
14	63.1	71.2	76.7	76.8	78.7	163.3	9.4	2695.0	-2658.4
15	64.0	72.2	77.6	77.9	79.7	162.7	10.0	2607.2	-2567.3
16	64.3	72.6	78.2	78.3	80.0	162.0	10.7	2519.7	-2476.3
17	65.1	73.2	78.6	78.8	80.7	161.4	11.3	2432.6	-2385.3
18	66.5	74.2	79.4	80.0	82.3	160.7	12.0	2345.9	-2294.4
19	66.9	74.5	79.7	80.4	82.7	159.9	12.8	2259.7	-2203.5
20	67.8	75.3	80.2	81.5	83.6	159.1	13.6	2174.0	-2112.7
21	68.1	75.5	80.5	81.7	84.0	158.2	14.5	2088.8	-2022.0
22	68.6	76.1	81.0	82.2	84.9	157.2	15.5	2004.3	-1931.4
23	69.1	76.7	81.9	83.2	86.0	156.1	16.6	1920.5	-1840.9
24	70.1	77.6	82.6	84.4	87.1	155.0	17.7	1837.5	-1750.5
25	71.4	78.6	83.4	85.2	87.9	153.7	19.0	1755.4	-1660.2
26	72.3	79.4	84.0	85.8	88.5	152.4	20.3	1674.4	-1570.1
27	72.7	79.5	83.9	85.9	88.6	150.9	21.8	1594.6	-1480.1
28	73.5	80.1	84.3	86.5	89.1	149.2	23.5	1516.2	-1390.3
29	74.3	80.9	84.9	87.3	90.0	147.3	25.4	1439.4	-1300.8
30	75.5	82.0	86.1	88.5	91.1	145.3	27.4	1364.5	-1211.5
31	76.9	83.2	86.7	89.3	91.9	143.0	29.7	1291.8	-1122.5
32	78.1	83.9	86.9	90.1	92.6	140.5	32.2	1221.6	-1033.9
33	79.5	85.2	87.9	91.6	94.0	137.7	35.0	1154.3	-945.7
34	81.0	86.1	88.2	92.6	94.6	134.6	38.1	1090.5	-858.0
35	82.7	87.4	89.2	94.0	95.9	131.1	41.6	1030.7	-770.8
36	85.1	89.5	90.7	96.4	97.9	127.2	45.5	975.6	-684.3
37	87.5	91.4	91.8	98.0	99.1	123.0	49.7	925.8	-598.5
38	89.1	92.7	93.1	99.2	100.7	118.3	54.4	882.1	-513.6
39	90.3	93.8	94.1	100.0	101.8	113.2	59.5	845.3	-429.6
40	91.0	94.3	94.8	100.7	102.4	107.8	64.9	815.9	-346.7
41	90.4	94.0	94.9	100.6	101.9	102.2	70.5	794.5	-264.9
42	89.4	93.3	95.0	100.1	101.2	96.3	76.4	781.4	-184.3
43	87.7	92.4	94.8	99.4	100.4	90.5	82.2	776.7	-104.8
44	86.1	91.2	93.8	98.2	98.9	84.6	88.1	780.1	-26.5
45	84.1	89.6	92.4	96.5	97.1	79.0	86.3	791.1	50.8
46	81.6	87.8	91.2	94.6	94.9	73.7	81.0	809.3	127.1
47	79.7	86.2	90.4	92.7	92.7	68.6	75.9	833.9	202.5
48	78.0	85.0	90.2	91.8	92.0	64.0	71.3	864.1	277.1
49	77.2	84.3	89.9	91.1	91.5	59.7	67.0	899.3	351.0
50	76.6	83.7	89.3	90.5	90.9	55.8	63.1	938.7	424.3
51	75.1	82.6	88.6	89.4	90.0	52.3	59.6	981.8	497.1
52	74.4	82.0	88.1	88.7	89.6	49.1	56.4	1028.1	569.4
53	73.2	80.9	87.3	87.7	88.4	46.1	53.4	1077.0	641.4
54	72.4	80.0	86.3	86.6	87.5	43.5	50.8	1128.2	713.1
55	71.8	79.3	85.6	85.8	86.7	41.1	48.4	1181.5	784.4
56	71.0	78.4	84.6	84.6	85.7	38.9	46.2	1236.4	855.6
57	70.5	77.2	82.8	83.5	84.9	36.9	44.2	1292.9	926.5
58	69.5	76.3	82.0	82.7	84.2	35.1	42.4	1350.6	997.3
59	69.2	75.8	81.6	81.9	83.5	33.4	40.7	1409.4	1067.9
60	68.5	75.4	81.4	81.3	83.0	31.9	39.2	1469.2	1138.3

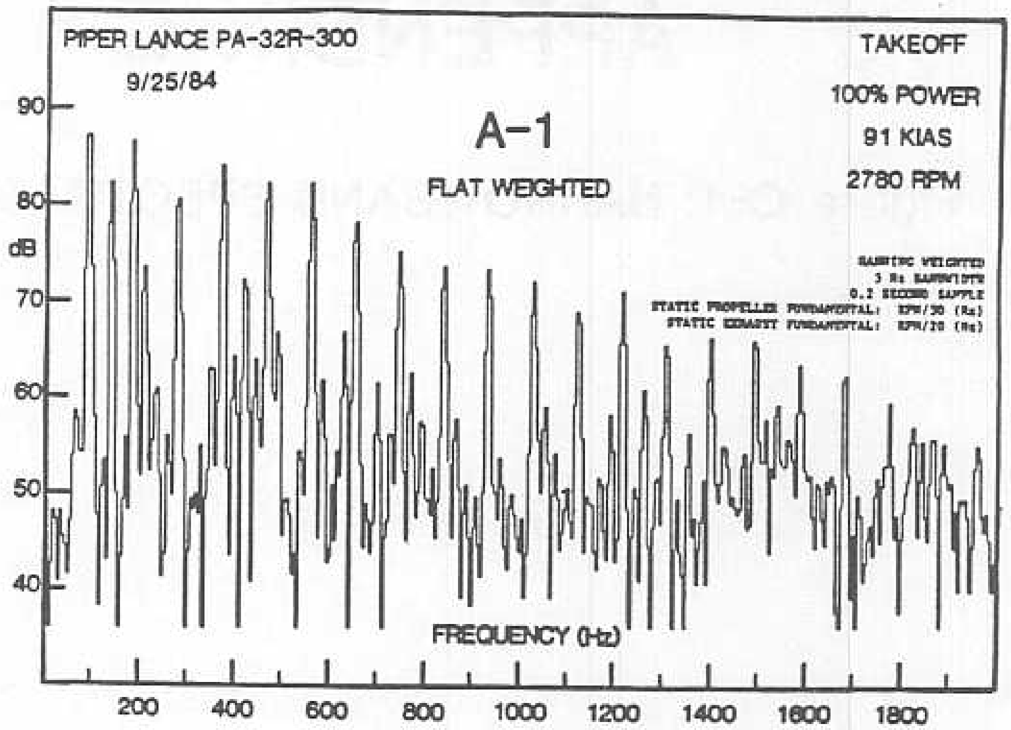
* - INDICES (A,D, ..ETC.) CALCULATED USING SLOPE CORRECTED DATA.

1/2 SECOND LINEAR INTEGRATION

APPENDIX C

Figure C-1: NARROWBAND SPECTRA AT ALM

Figure C-1


PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
100% POWER
91 KIAS
2780 RPM
A-1
FLAT WEIGHTED
HANNING WEIGHTED
3 Hz BANDWIDTH
0.2 SECOND SAMPLE
STATIC PROPELLER FUNDAMENTAL: RPM/30 (Hz)
STATIC EXHAUST FUNDAMENTAL: RPM/20 (Hz)
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

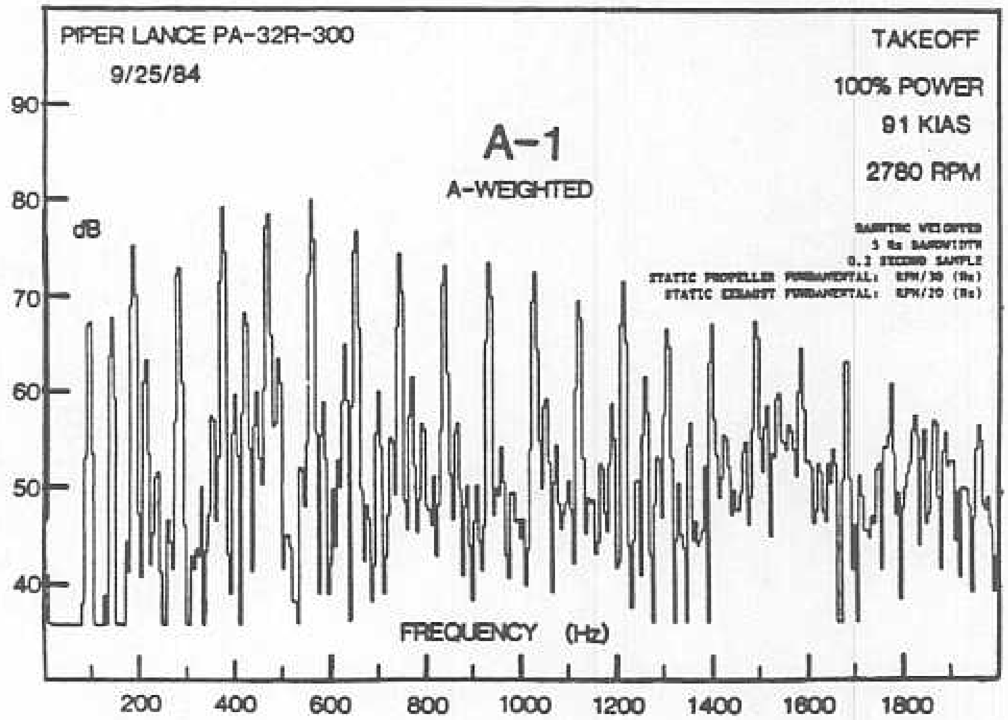
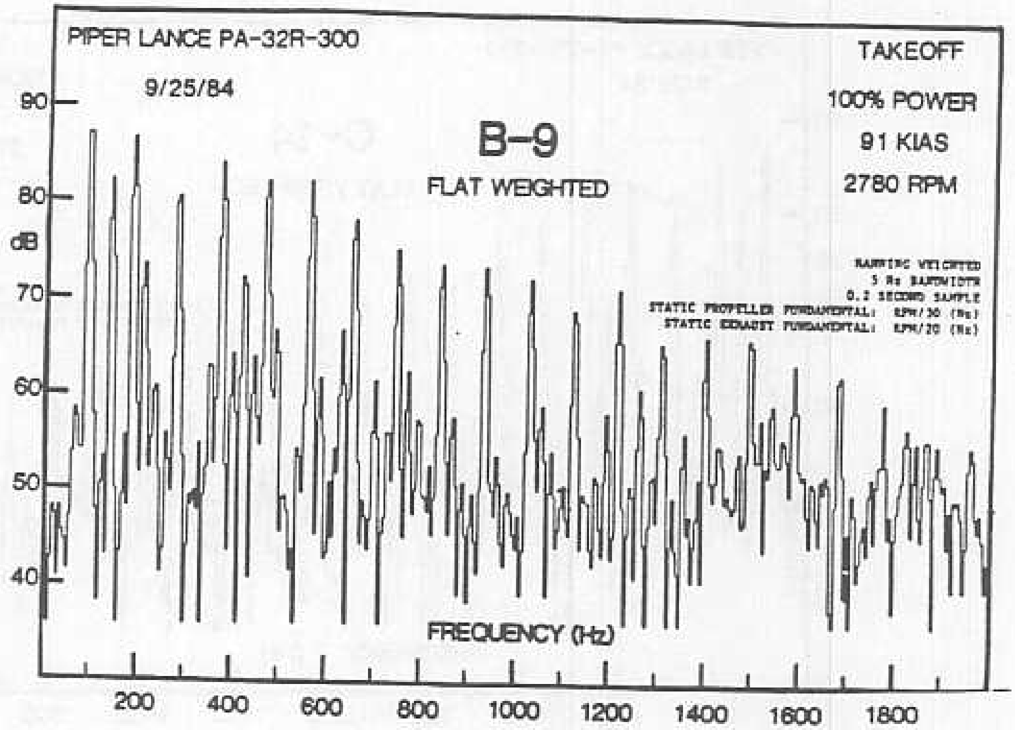

PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
100% POWER
91 KIAS
2780 RPM
A-1
A-WEIGHTED
HANNING WEIGHTED
3 Hz BANDWIDTH
0.2 SECOND SAMPLE
STATIC PROPELLER FUNDAMENTAL: RPM/30 (Hz)
STATIC EXHAUST FUNDAMENTAL: RPM/20 (Hz)
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1


PIPER LANCE PA-32R-300
9/25/84
B-9
FLAT WEIGHTED
TAKEOFF
100% POWER
91 KIAS
2780 RPM
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

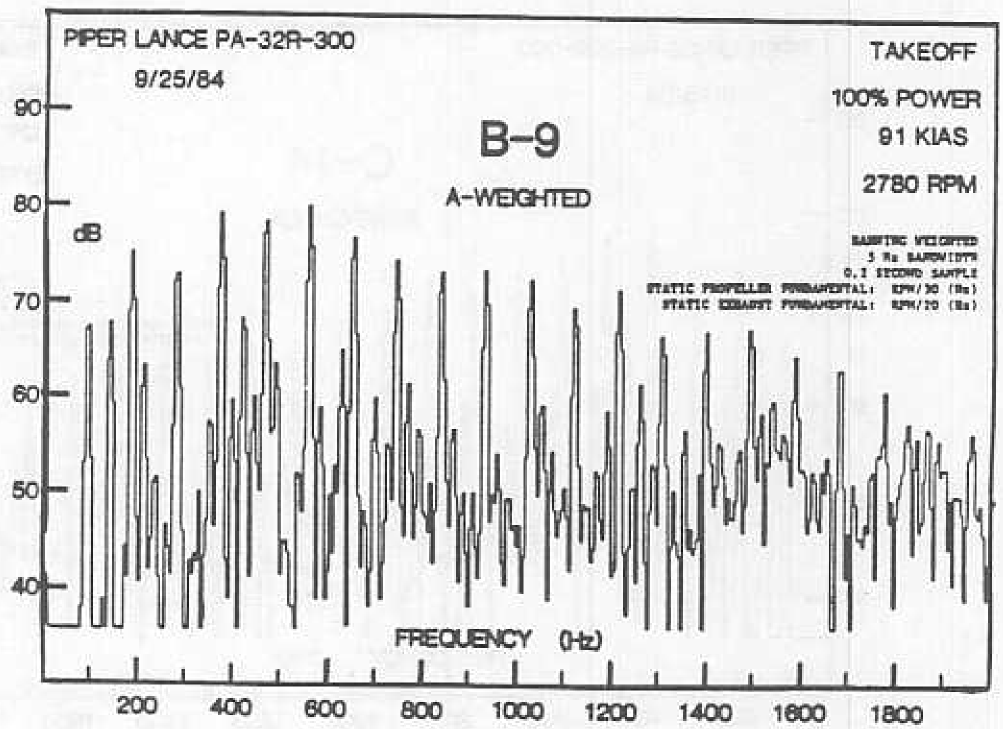
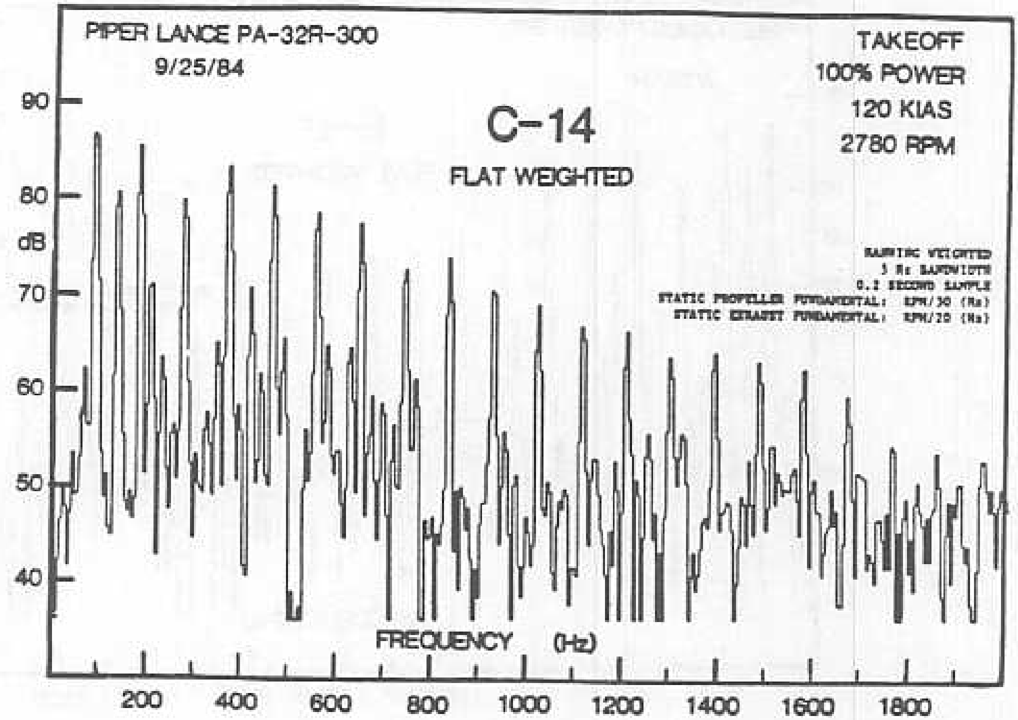

PIPER LANCE PA-32R-300
9/25/84
B-9
A-WEIGHTED
TAKEOFF
100% POWER
91 KIAS
2780 RPM
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1


PIPER LANCE PA-32R-300
9/25/84
C-14
FLAT WEIGHTED
TAKEOFF
100% POWER
120 KIAS
2780 RPM
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

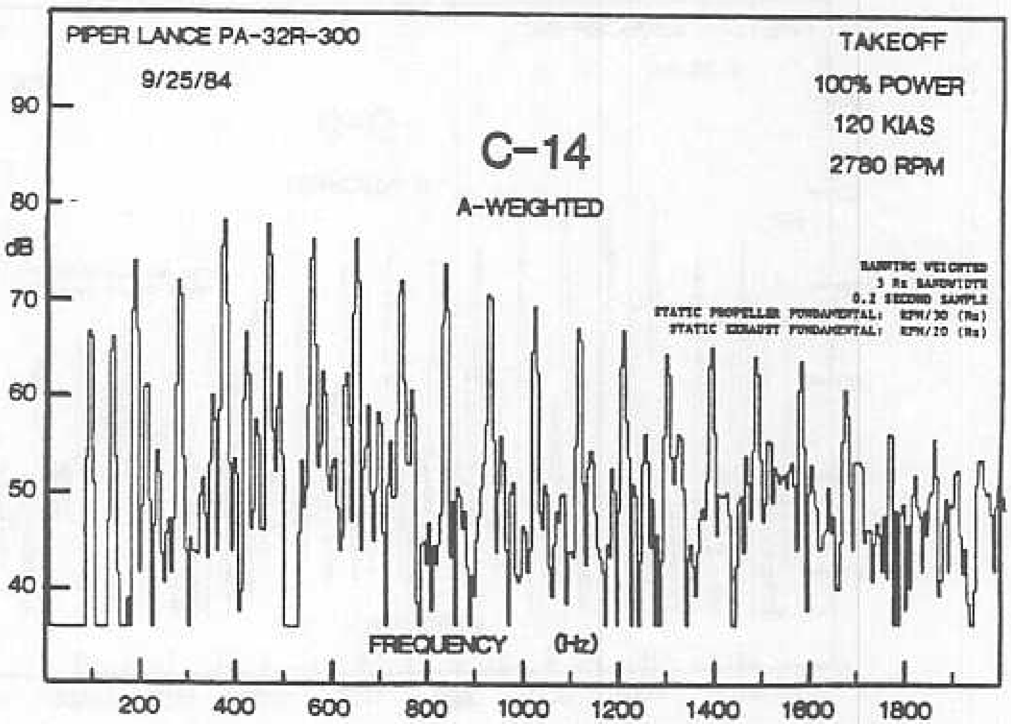
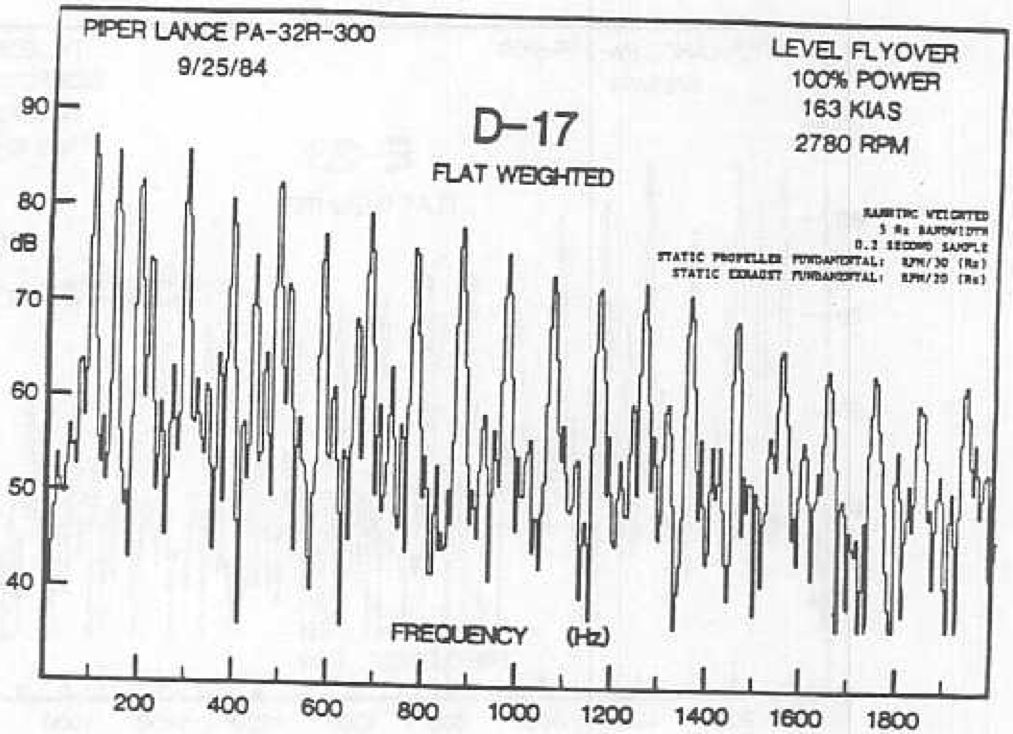
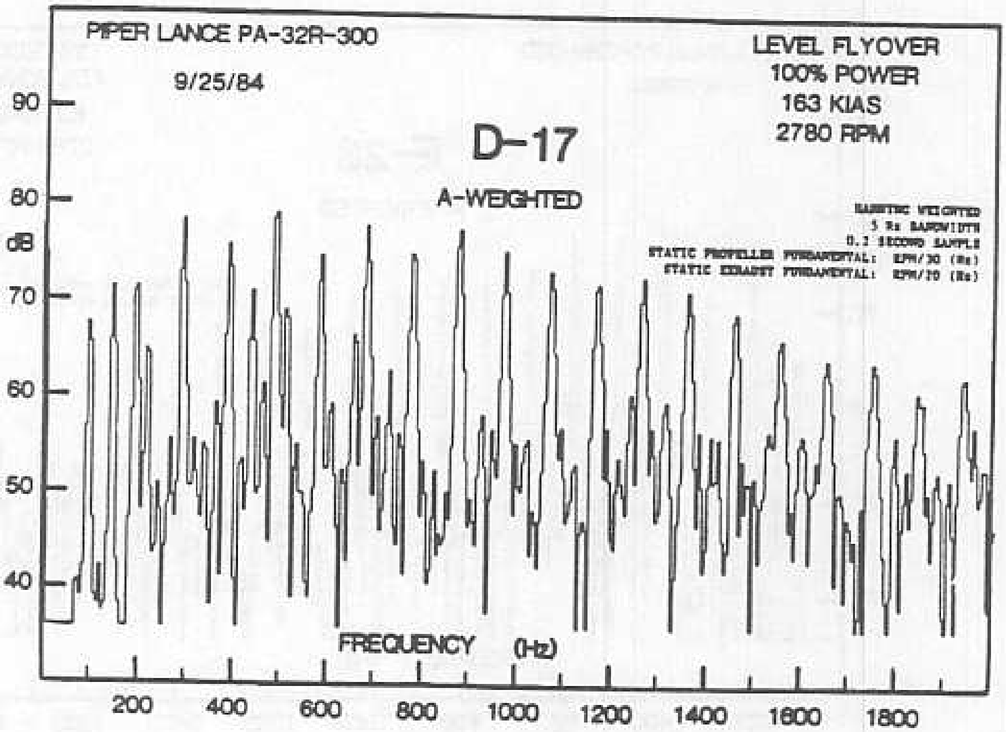

PIPER LANCE PA-32R-300
9/25/84
C-14
A-WEIGHTED
TAKEOFF
100% POWER
120 KIAS
2780 RPM
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1

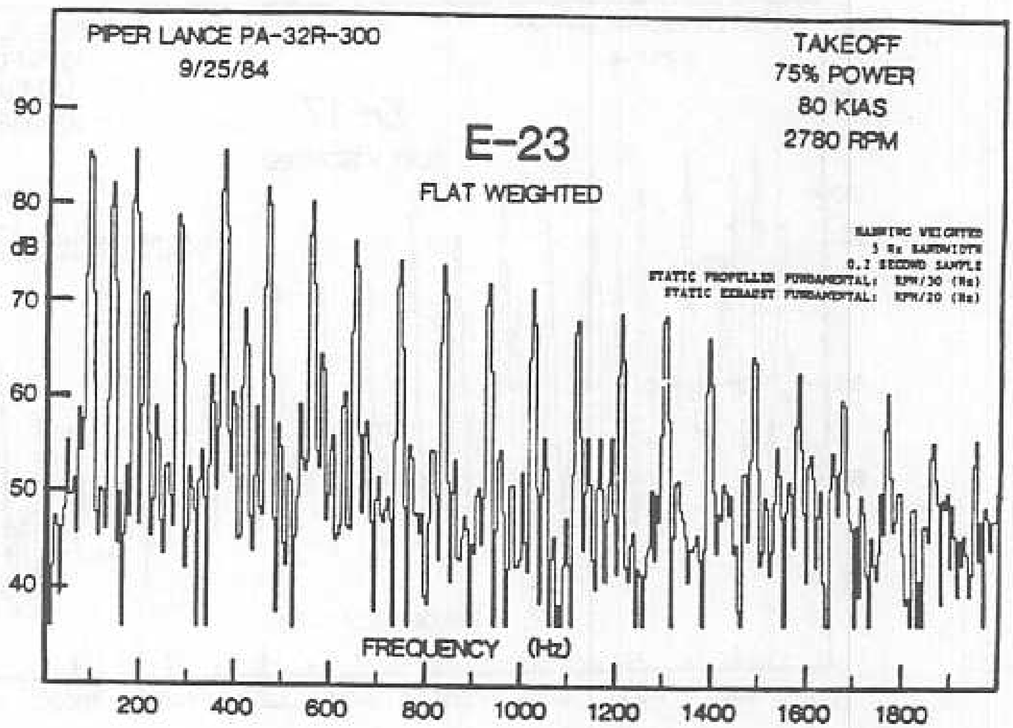


PIPER LANCE PA-32R-300
9/25/84
LEVEL FLYOVER
100% POWER
163 KIAS
2780 RPM
D-17
FLAT WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800



PIPER LANCE PA-32R-300
9/25/84
LEVEL FLYOVER
100% POWER
163 KIAS
2780 RPM
D-17
A-WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1


PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
75% POWER
80 KIAS
2780 RPM
E-23
FLAT WEIGHTED
5 Hz BANDWIDTH
0.2 SECOND SAMPLE
STATIC PROPELLER FUNDAMENTAL: RPM/30 (Hz)
STATIC EXHAUST FUNDAMENTAL: RPM/20 (Hz)
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

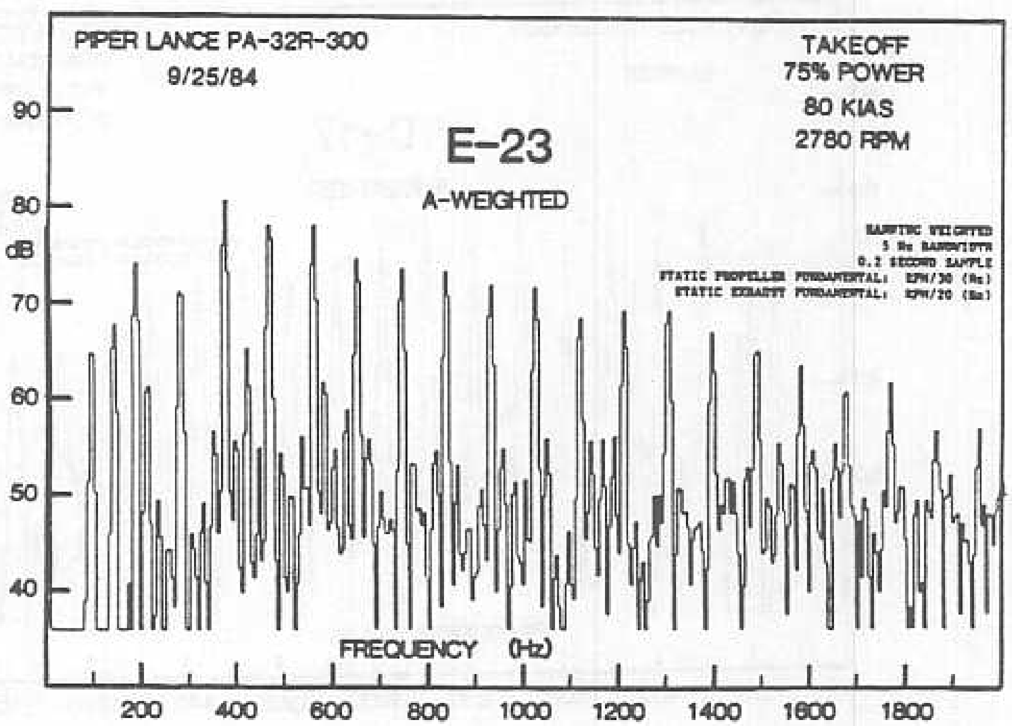
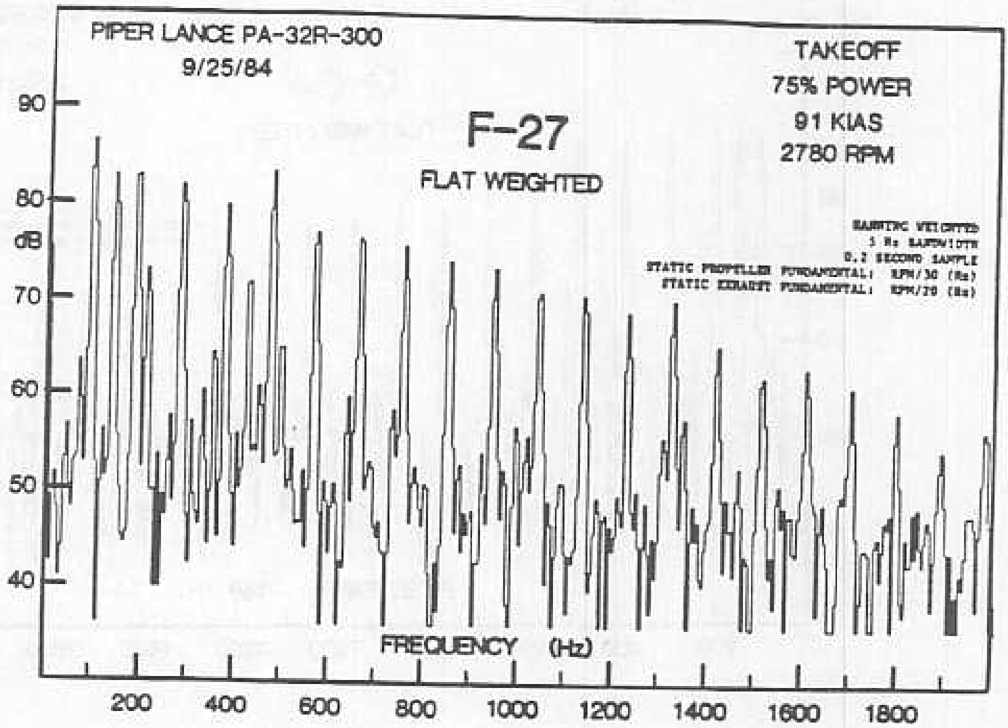

PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
75% POWER
80 KIAS
2780 RPM
E-23
A-WEIGHTED
5 Hz BANDWIDTH
0.2 SECOND SAMPLE
STATIC PROPELLER FUNDAMENTAL: RPM/30 (Hz)
STATIC EXHAUST FUNDAMENTAL: RPM/20 (Hz)
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1


PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
75% POWER
91 KIAS
2780 RPM
F-27
FLAT WEIGHTED
90
80
dB
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

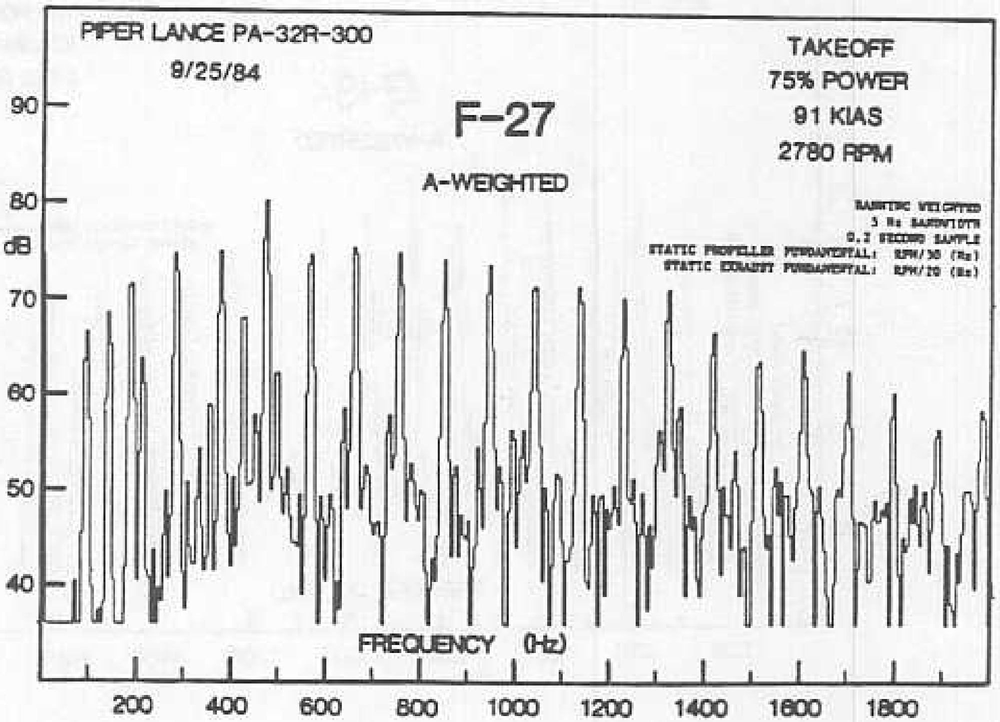
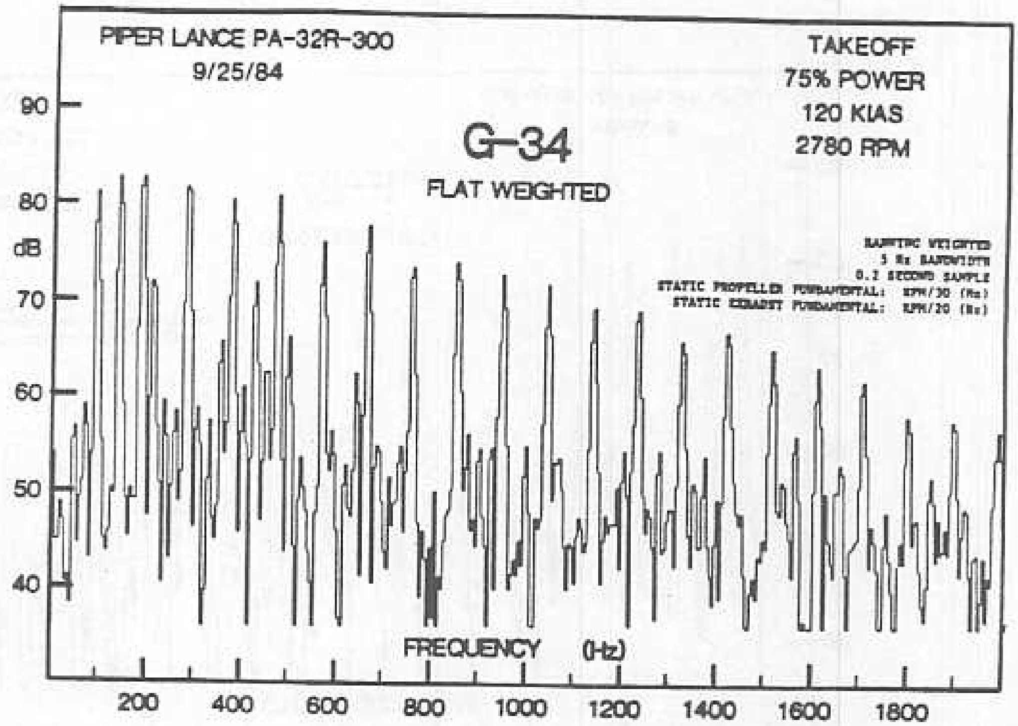
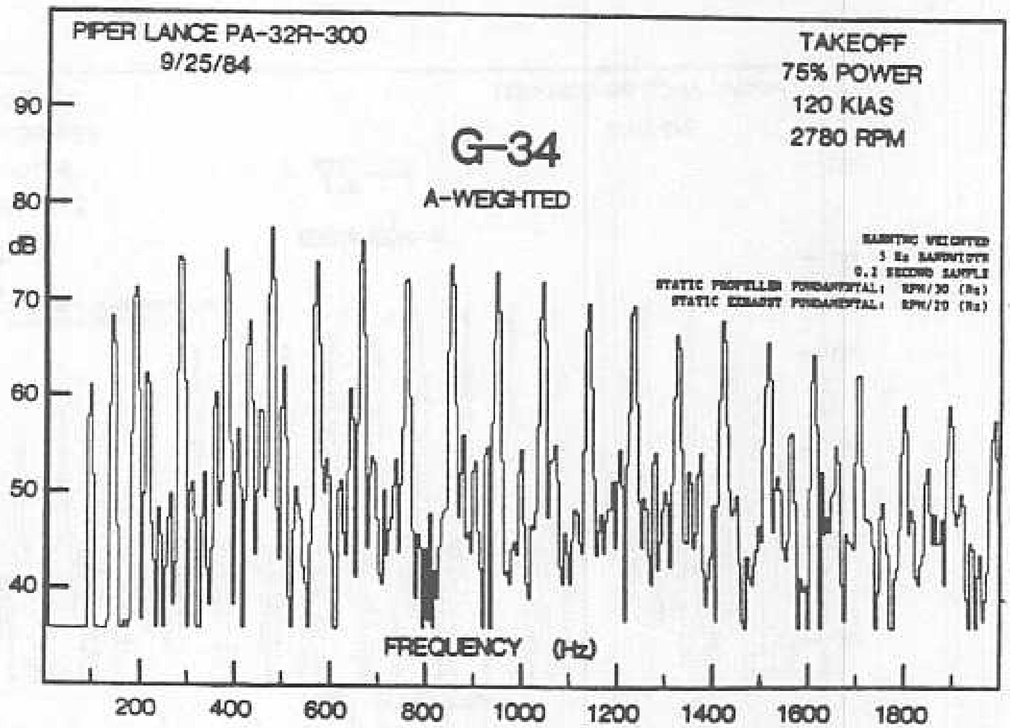

PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
75% POWER
91 KIAS
2780 RPM
F-27
A-WEIGHTED
90
80
dB
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1

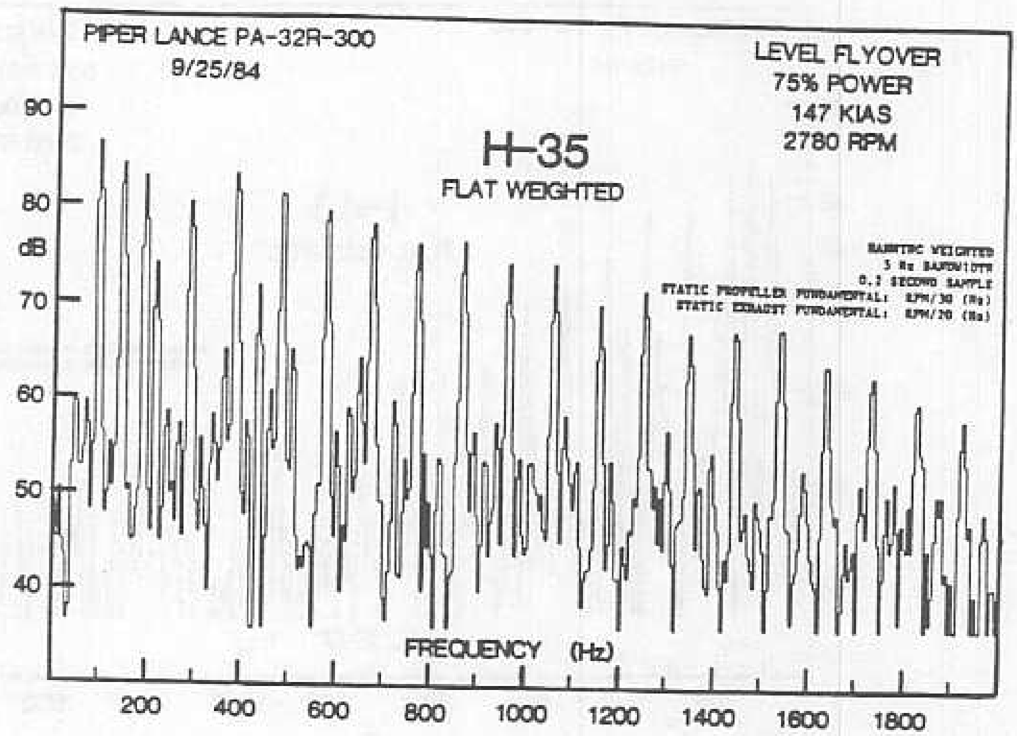


PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
75% POWER
120 KIAS
2780 RPM
G-34
FLAT WEIGHTED
HANNING WEIGHTED
5 Hz BANDWIDTH
0.2 SECOND SAMPLE
STATIC PROPELLER FUNDAMENTAL: RPM/30 (Hz)
STATIC EXHAUST FUNDAMENTAL: RPM/20 (Hz)
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800



PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
75% POWER
120 KIAS
2780 RPM
G-34
A-WEIGHTED
HANNING WEIGHTED
5 Hz BANDWIDTH
0.2 SECOND SAMPLE
STATIC PROPELLER FUNDAMENTAL: RPM/30 (Hz)
STATIC EXHAUST FUNDAMENTAL: RPM/20 (Hz)
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1


PIPER LANCE PA-32R-300
9/25/84
LEVEL FLYOVER
75% POWER
147 KIAS
2780 RPM
H-35
FLAT WEIGHTED
90
80
dB
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

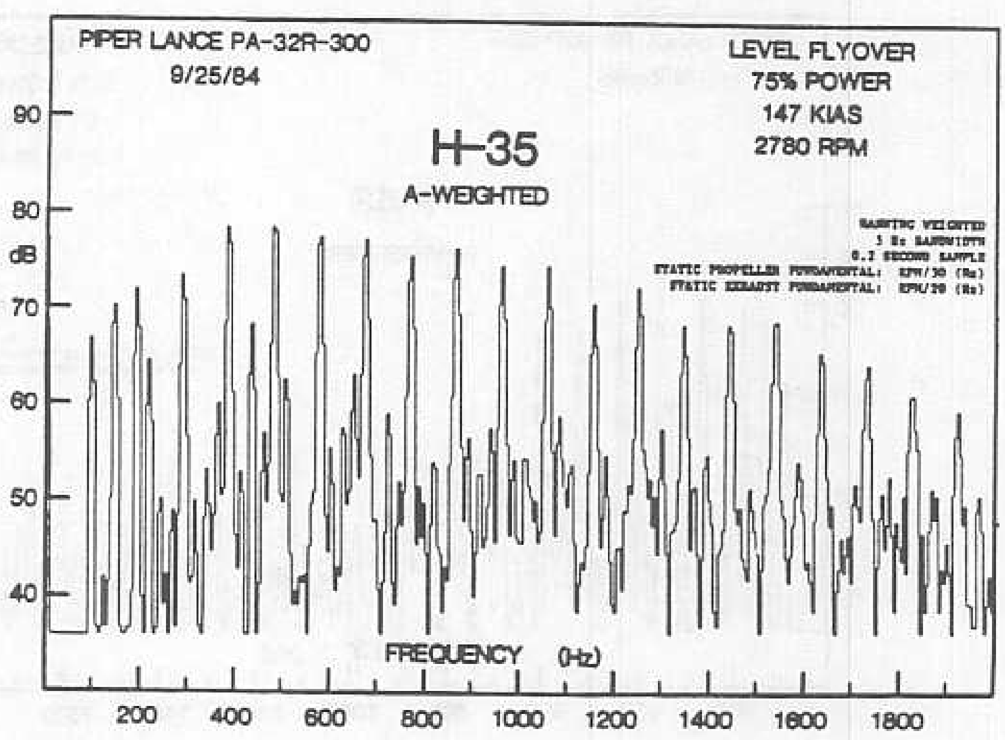
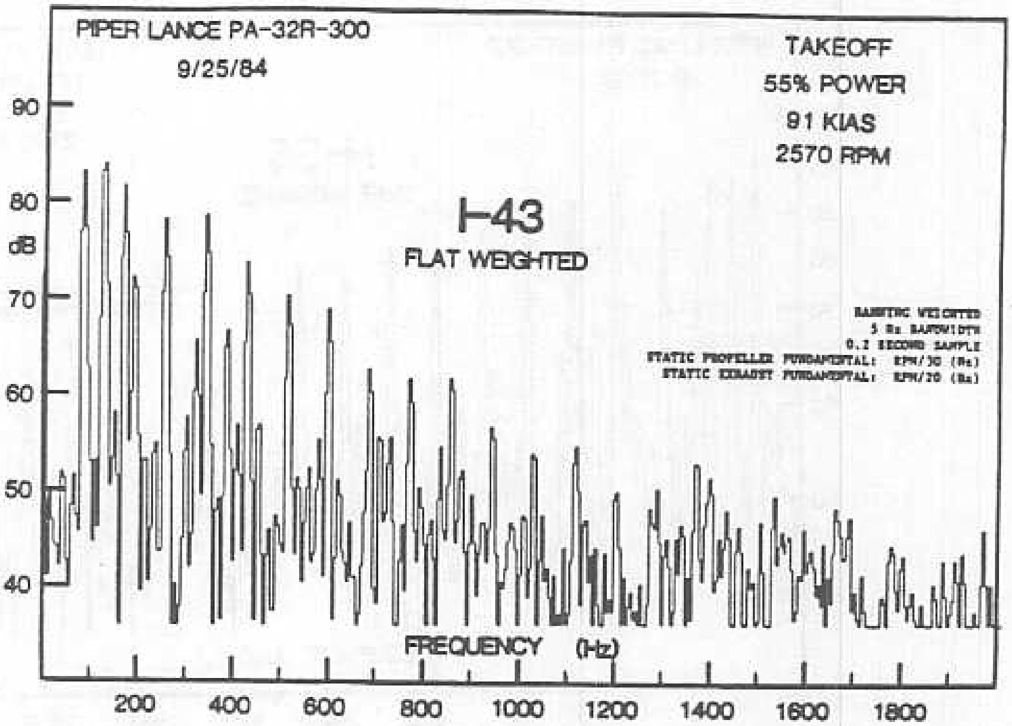
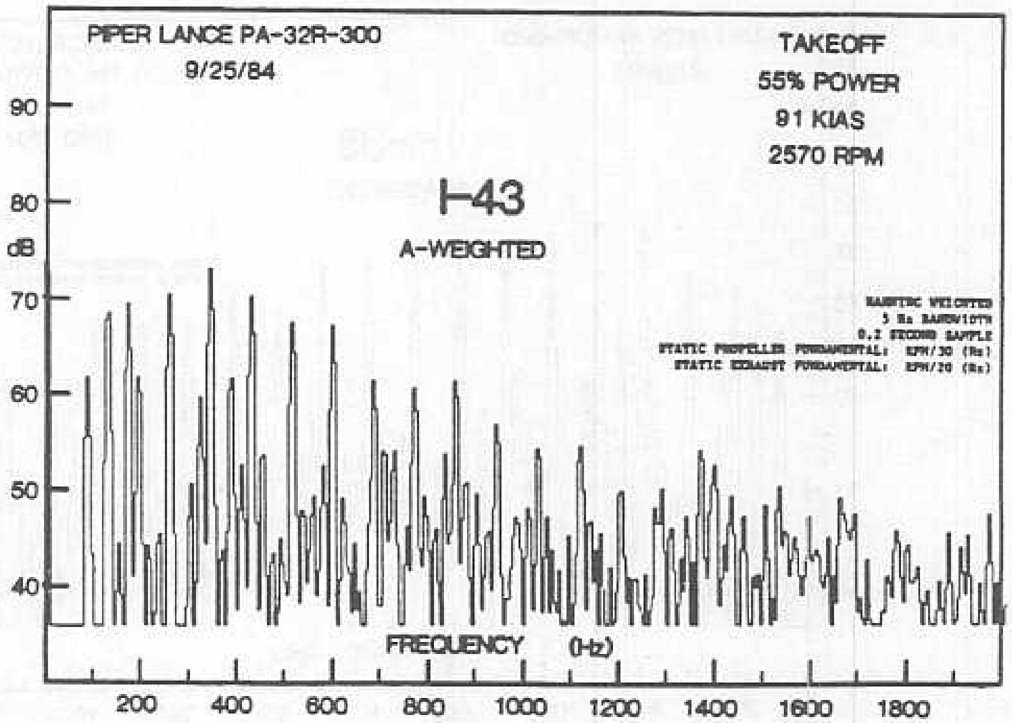

PIPER LANCE PA-32R-300
9/25/84
LEVEL FLYOVER
75% POWER
147 KIAS
2780 RPM
H-35
A-WEIGHTED
90
80
dB
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1

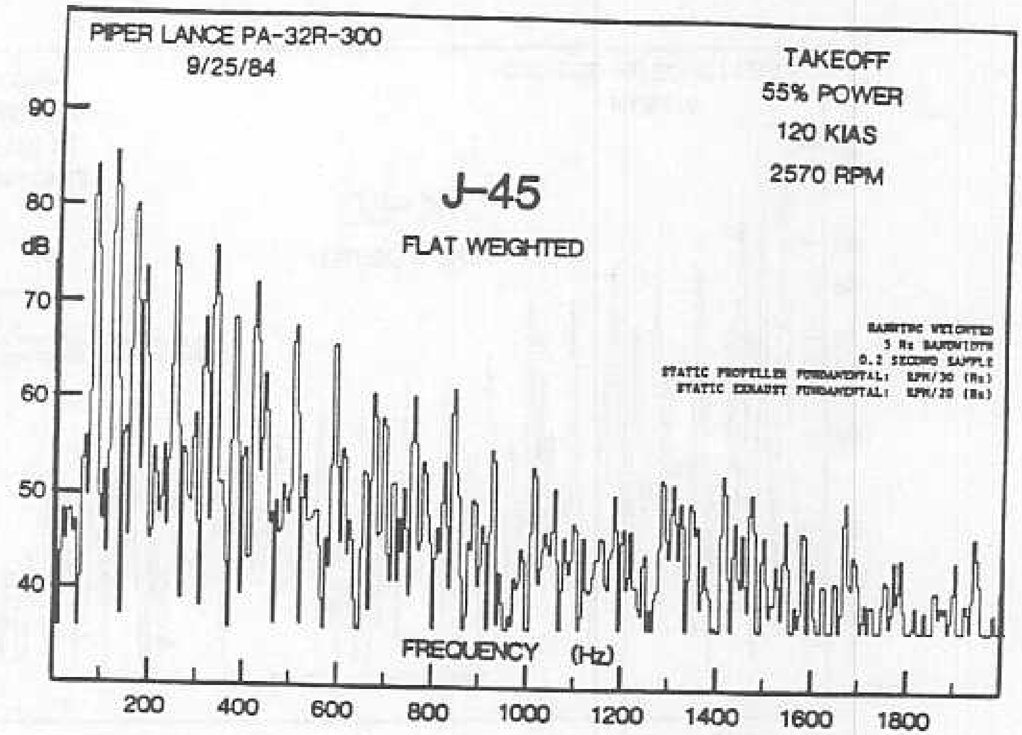


PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
55% POWER
91 KIAS
2570 RPM
I-43
FLAT WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800



PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
55% POWER
91 KIAS
2570 RPM
I-43
A-WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1


PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
55% POWER
120 KIAS
2570 RPM
J-45
FLAT WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

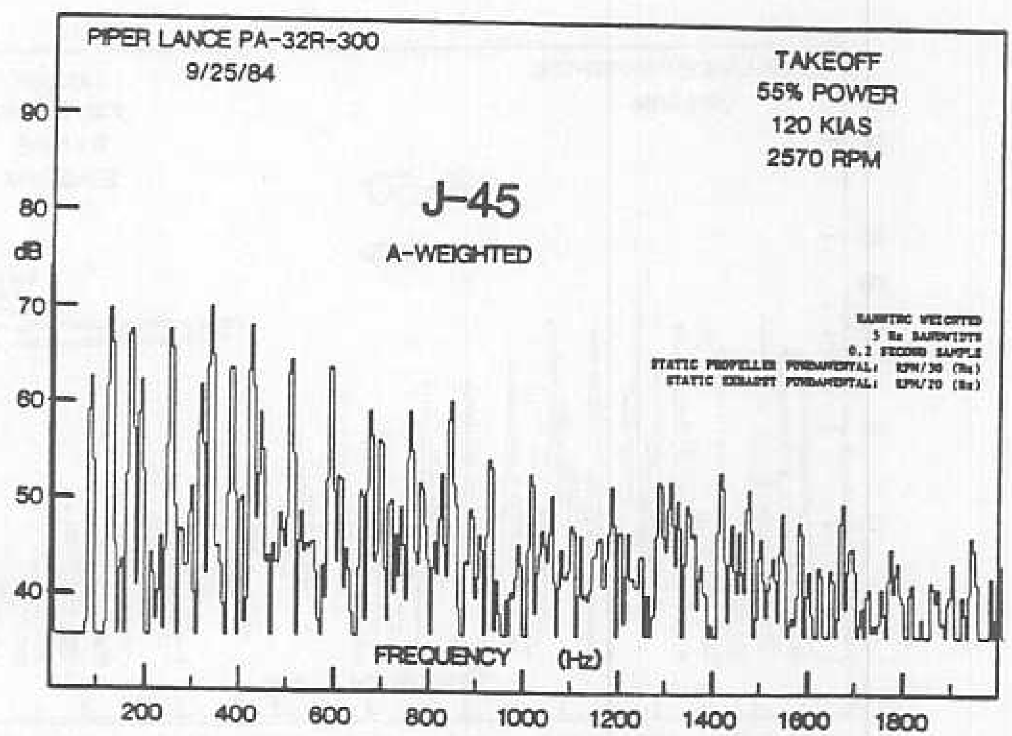
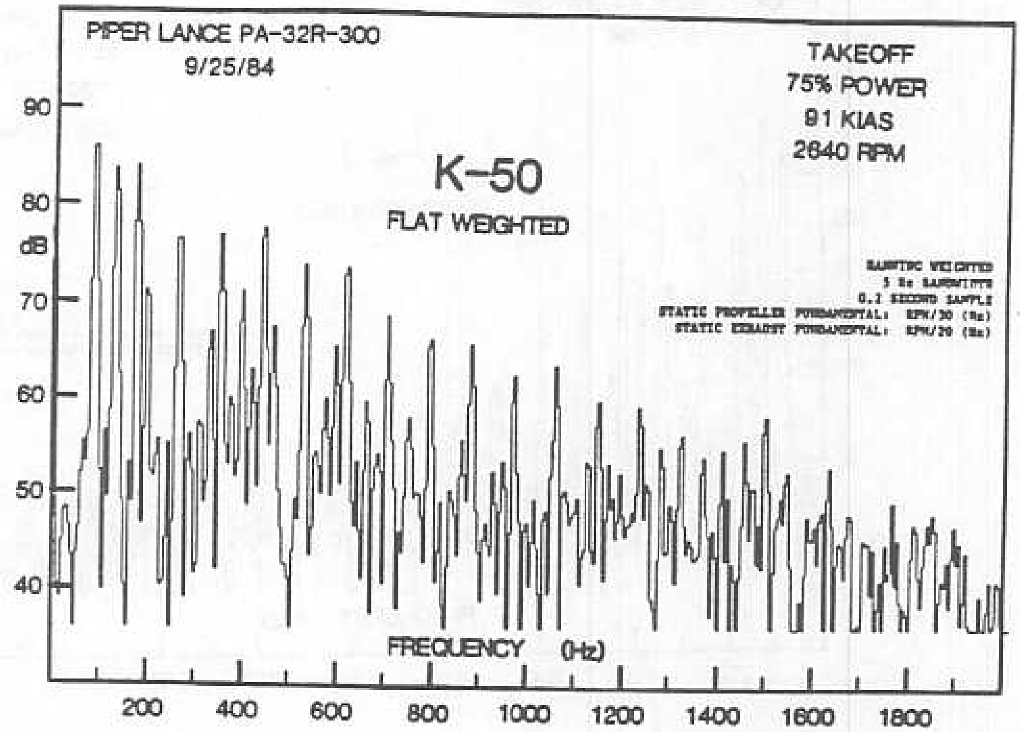

PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
55% POWER
120 KIAS
2570 RPM
J-45
A-WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1


PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
75% POWER
91 KIAS
2640 RPM
K-50
FLAT WEIGHTED
90
80
dB
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

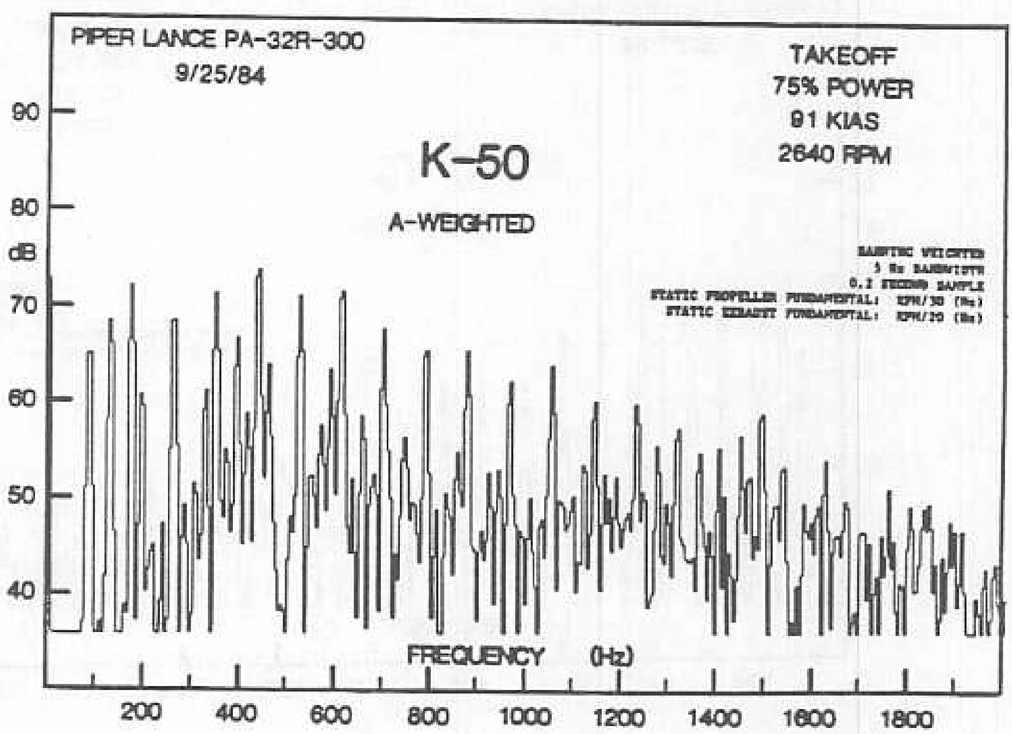
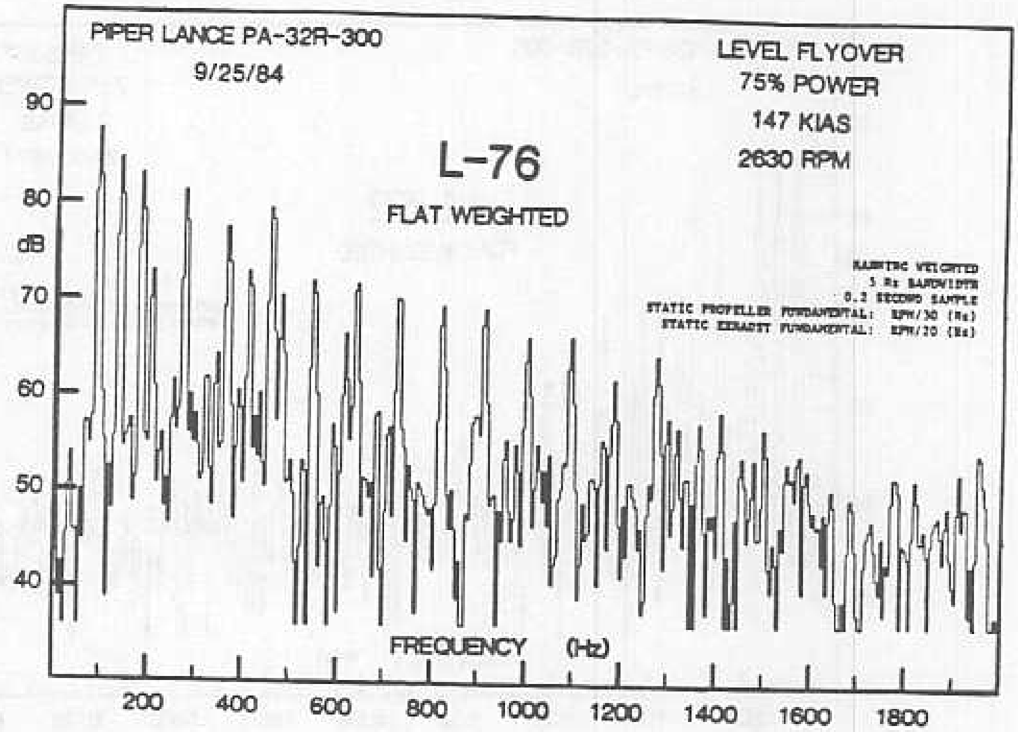
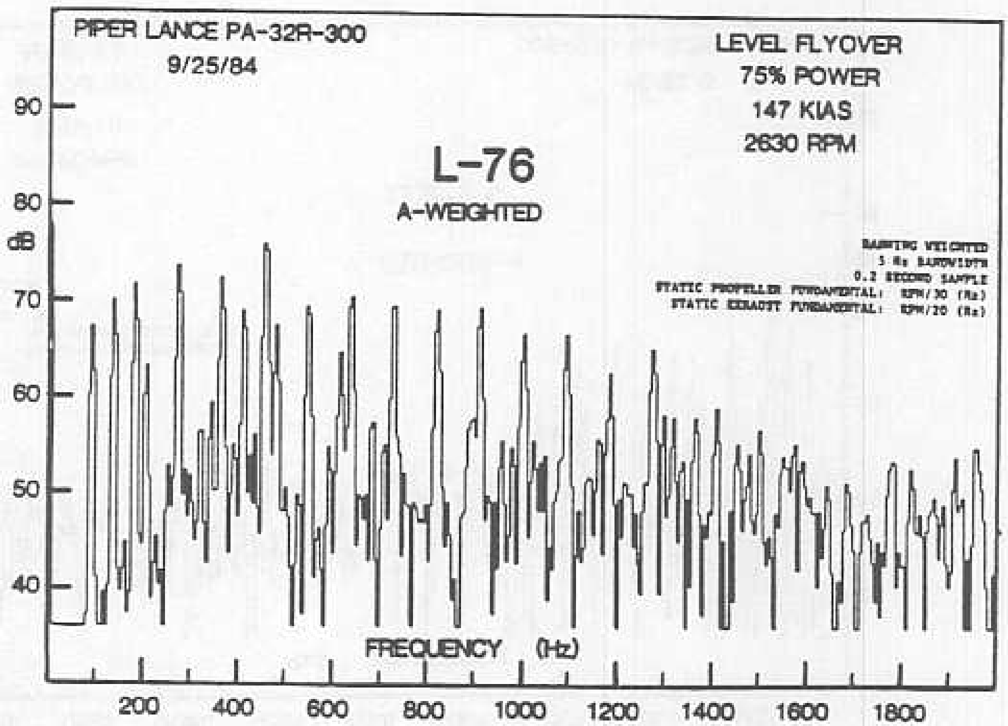

PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
75% POWER
91 KIAS
2640 RPM
K-50
A-WEIGHTED
90
80
dB
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1

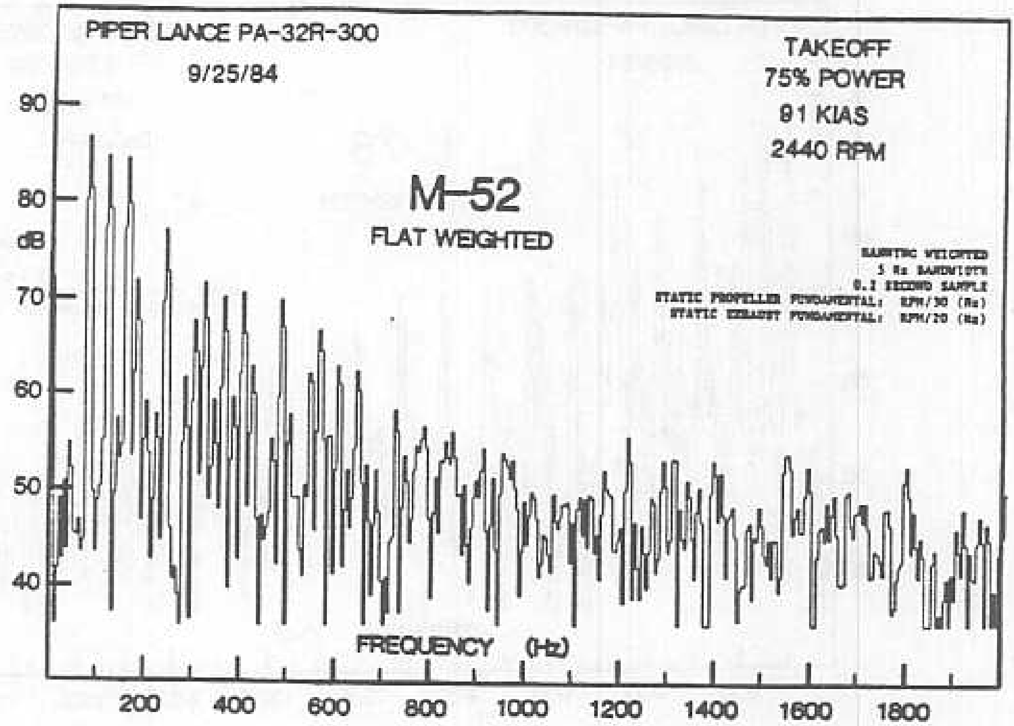


PIPER LANCE PA-32R-300
9/25/84
LEVEL FLYOVER
75% POWER
147 KIAS
2630 RPM
L-76
FLAT WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

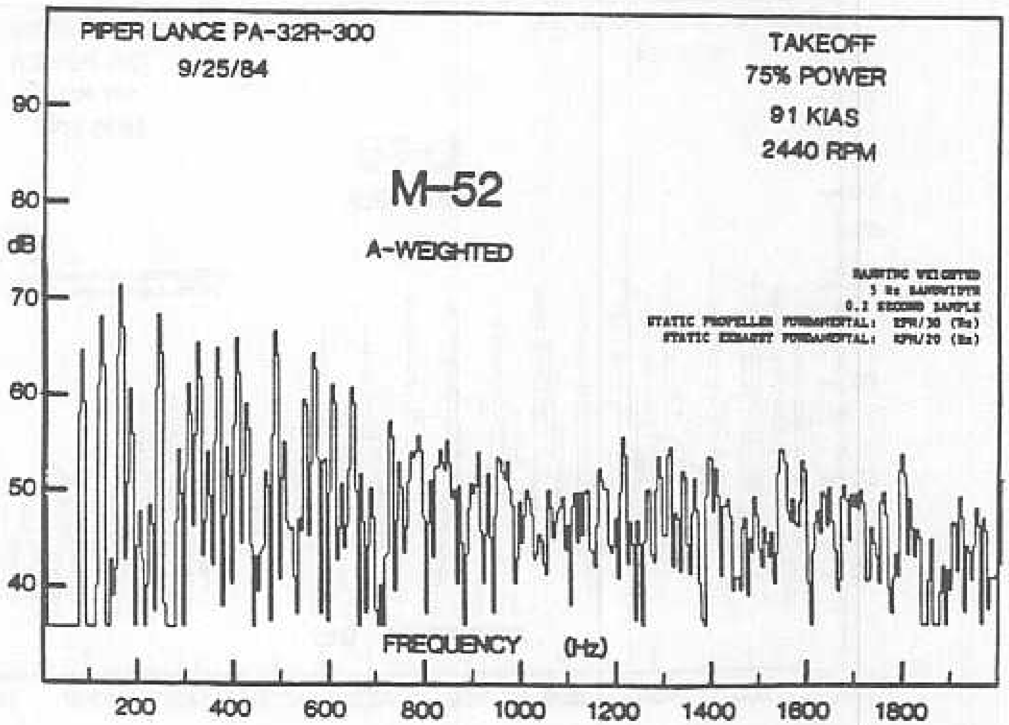


PIPER LANCE PA-32R-300
9/25/84
LEVEL FLYOVER
75% POWER
147 KIAS
2630 RPM
L-76
A-WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1

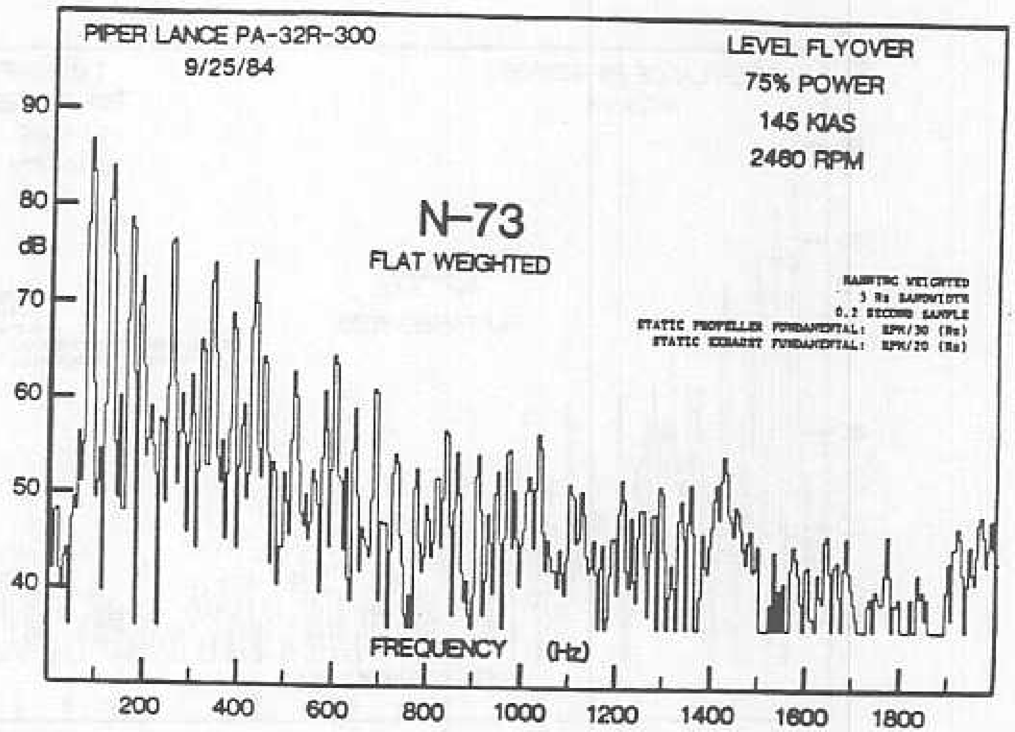


PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
75% POWER
91 KIAS
2440 RPM
M-52
FLAT WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800



PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
75% POWER
91 KIAS
2440 RPM
M-52
A-WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1


PIPER LANCE PA-32R-300
9/25/84
LEVEL FLYOVER
75% POWER
145 KIAS
2460 RPM
N-73
FLAT WEIGHTED
3 Hz BANDWIDTH
0.2 SECOND SAMPLE
STATIC PROPELLER FUNDAMENTAL: RPM/30 (Hz)
STATIC EXHAUST FUNDAMENTAL: RPM/20 (Hz)
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

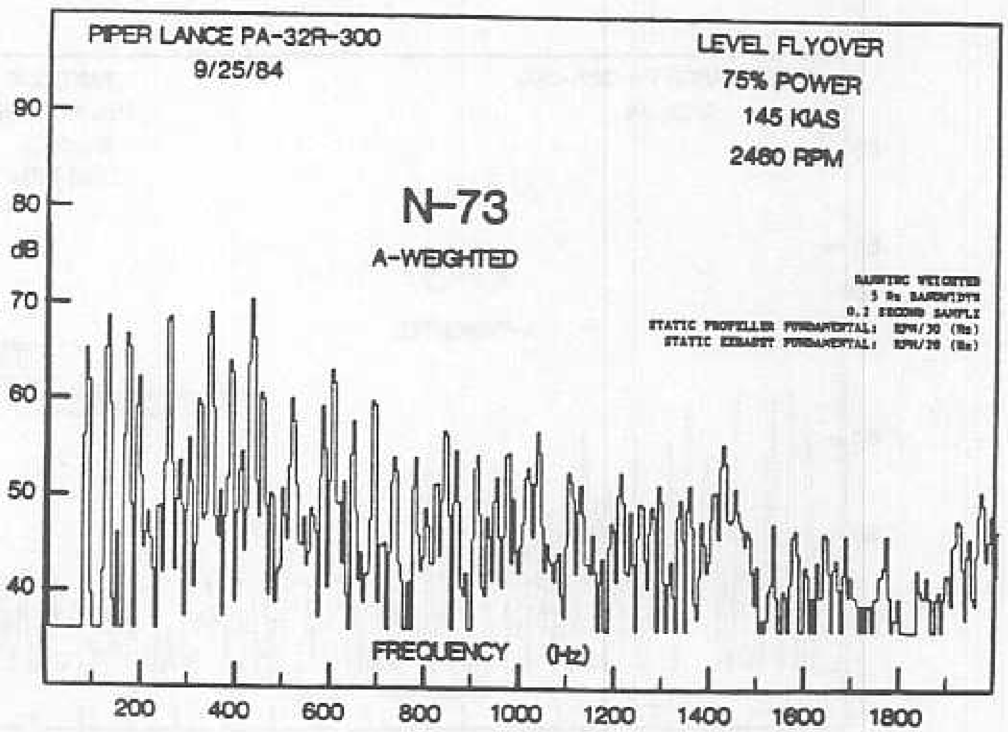
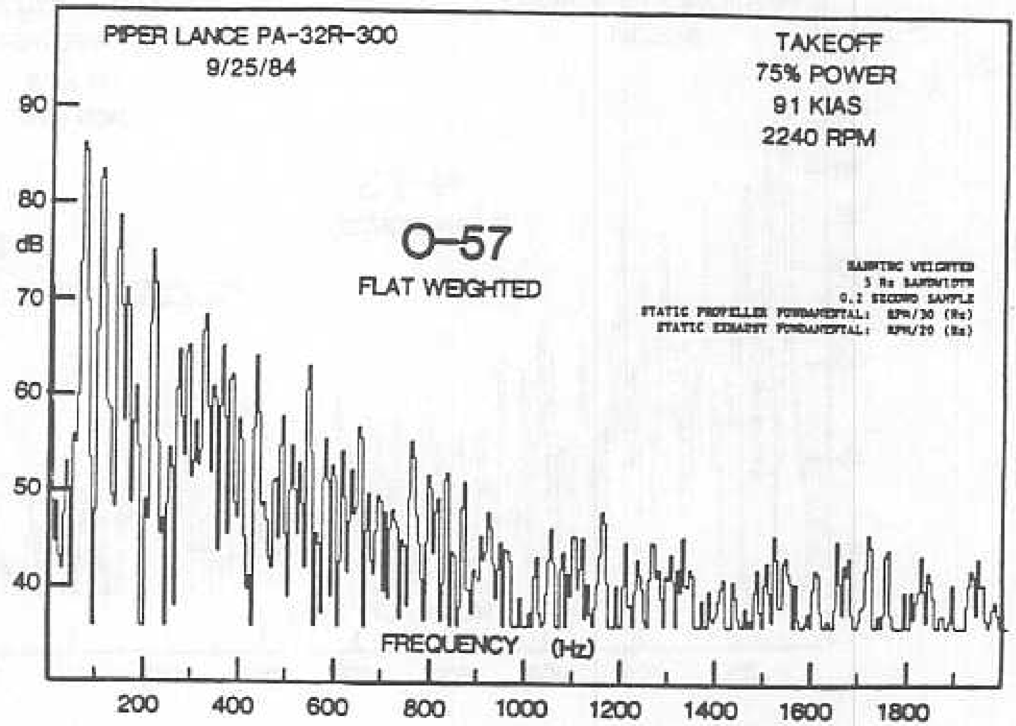

PIPER LANCE PA-32R-300
9/25/84
LEVEL FLYOVER
75% POWER
145 KIAS
2460 RPM
N-73
A-WEIGHTED
3 Hz BANDWIDTH
0.2 SECOND SAMPLE
STATIC PROPELLER FUNDAMENTAL: RPM/30 (Hz)
STATIC EXHAUST FUNDAMENTAL: RPM/20 (Hz)
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1


PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
75% POWER
91 KIAS
2240 RPM
O-57
FLAT WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

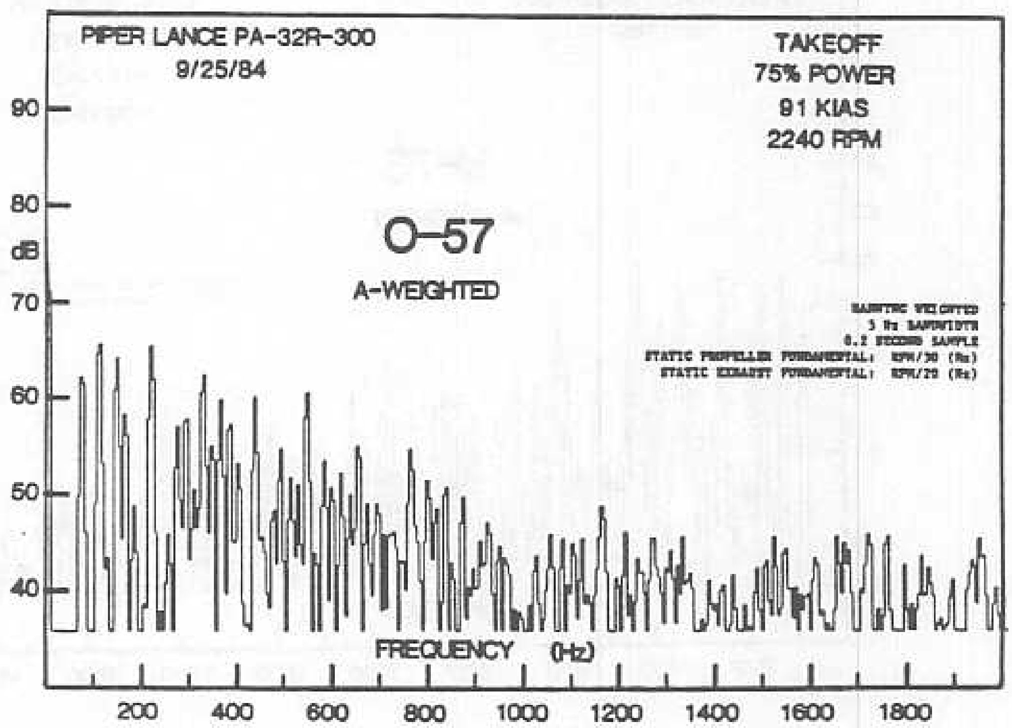
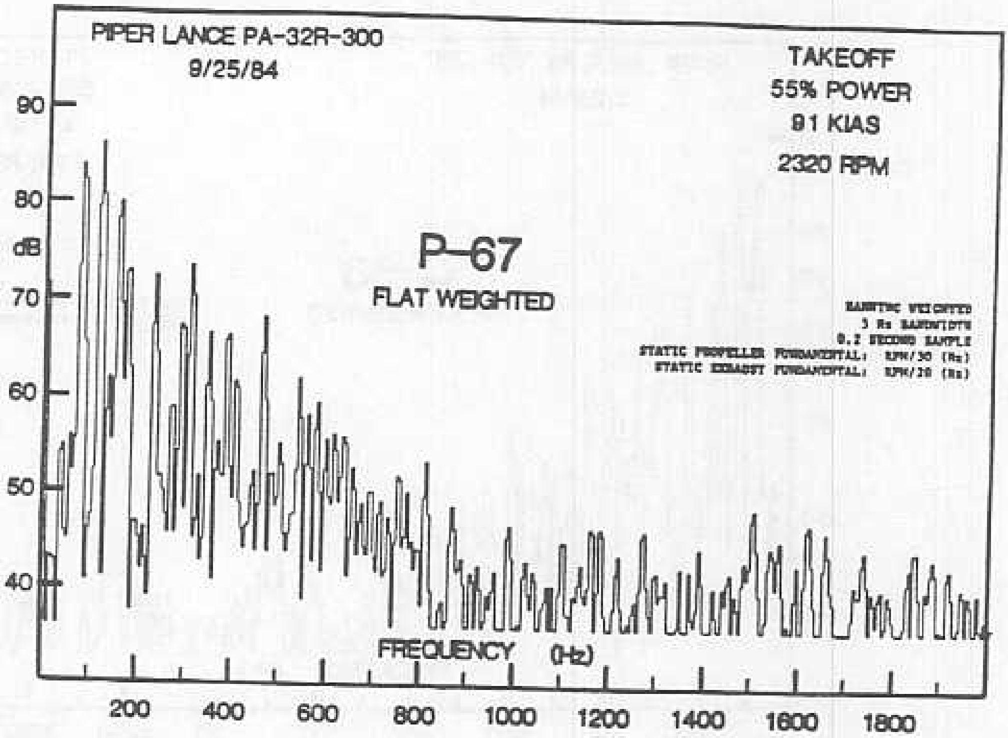

PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
75% POWER
91 KIAS
2240 RPM
O-57
A-WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1


PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
55% POWER
91 KIAS
2320 RPM
P-67
FLAT WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

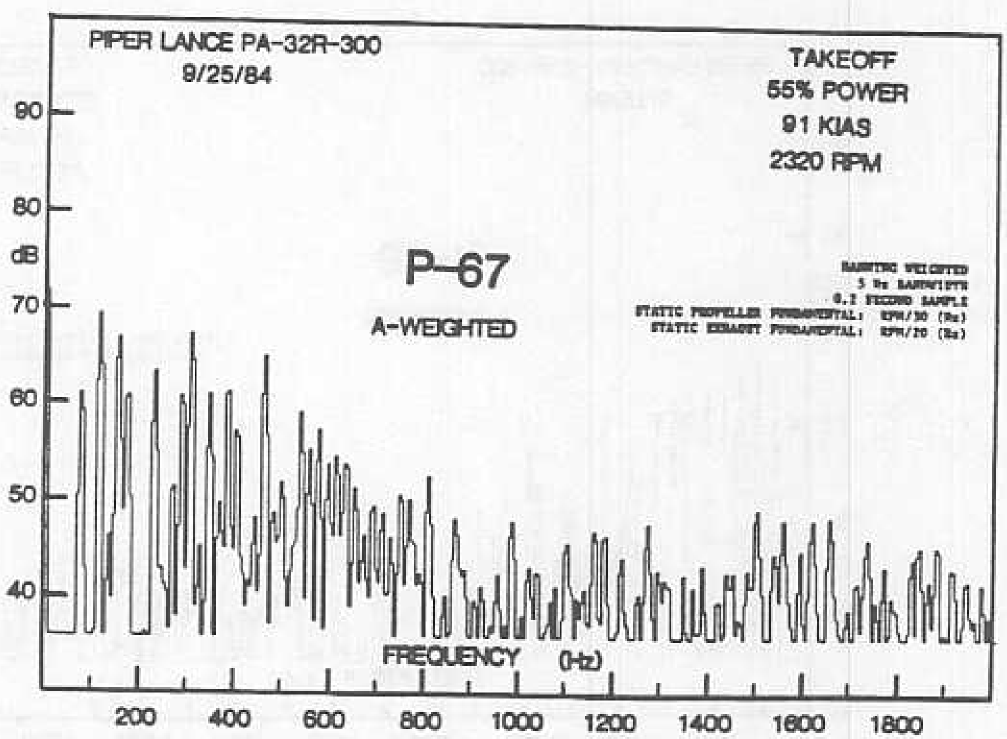
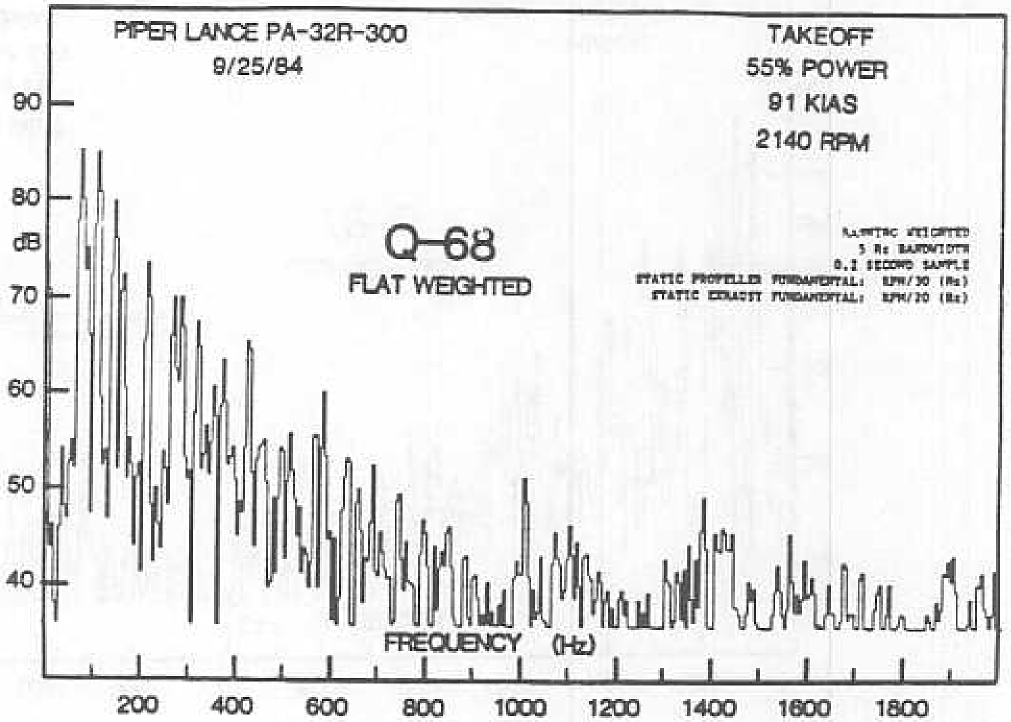
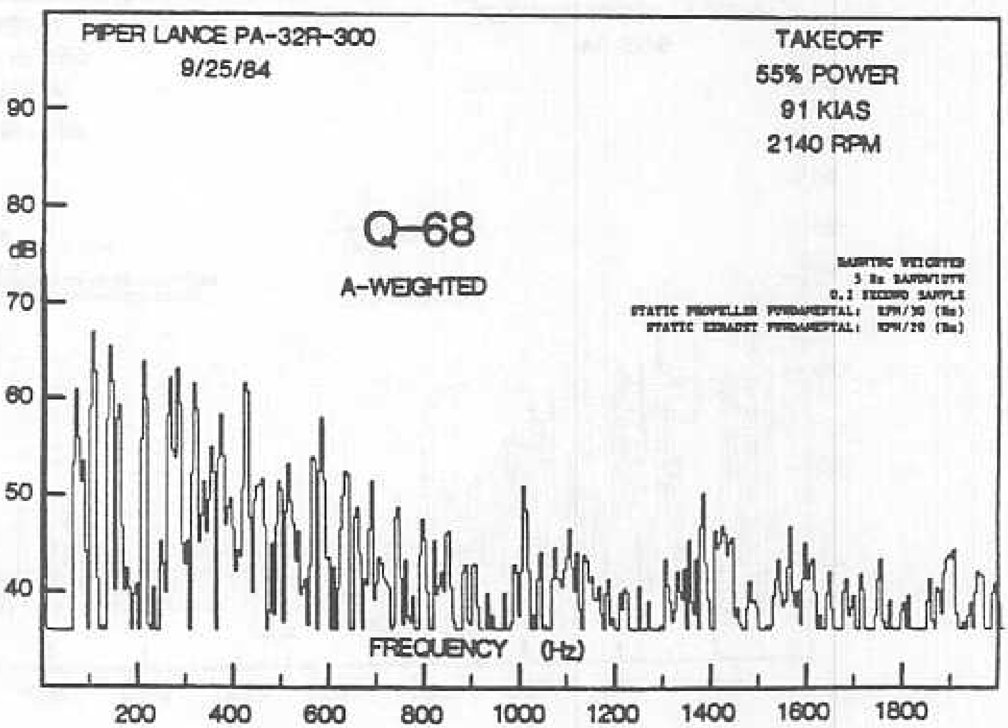

PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
55% POWER
91 KIAS
2320 RPM
P-67
A-WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

Figure C-1


PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
55% POWER
91 KIAS
2140 RPM
Q-68
FLAT WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800


PIPER LANCE PA-32R-300
9/25/84
TAKEOFF
55% POWER
91 KIAS
2140 RPM
Q-68
A-WEIGHTED
dB
90
80
70
60
50
40
FREQUENCY (Hz)
200
400
600
800
1000
1200
1400
1600
1800

APPENDIX D

Figure D-1: EVENT B9 NARROWBAND TIME HISTORY
(GROUND MICROPHONE)

Figure D-2: EVENT B9 NARROWBAND TIME HISTORY
(4 ft. MICROPHONE)

Figure D-1: NARROWBAND TIME HISTORY: GROUND MIC.

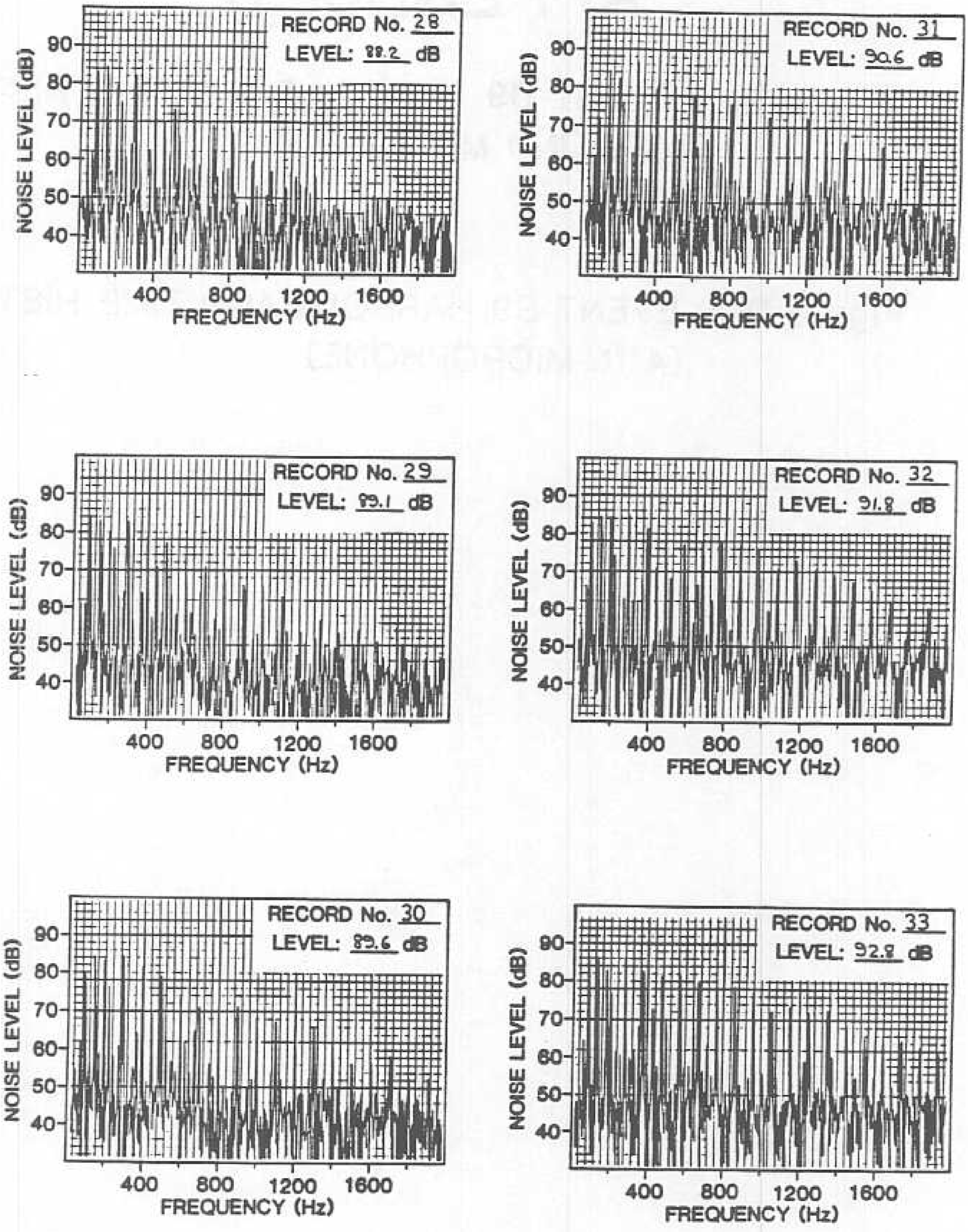


Figure D-1: NARROWBAND TIME HISTORY: GROUND MIC.

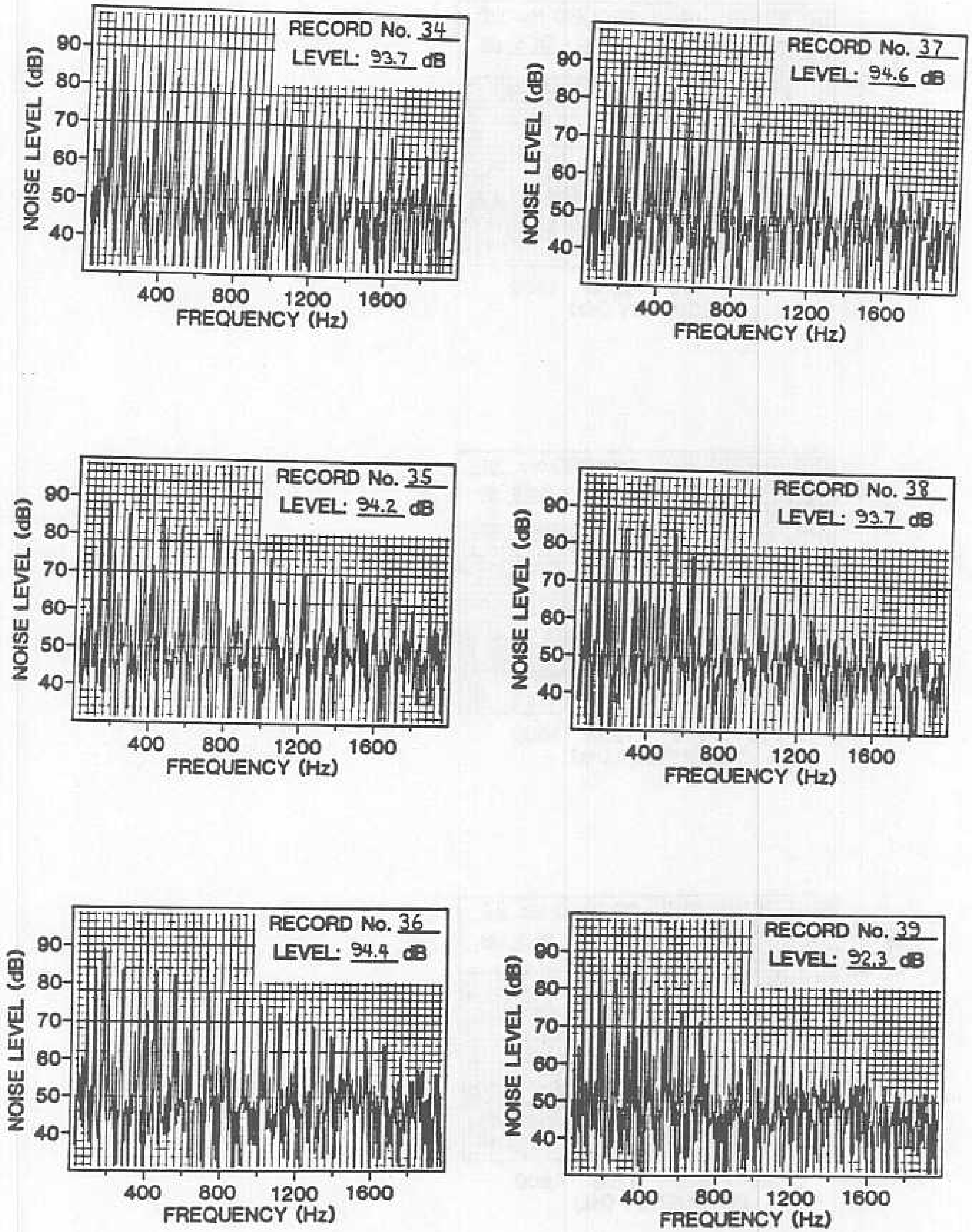
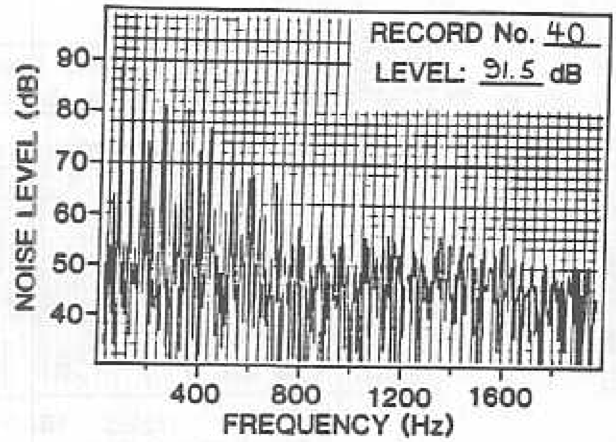
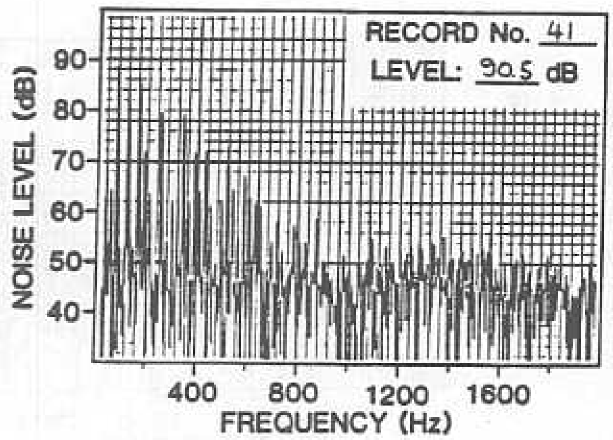


Figure D-1: NARROWBAND TIME HISTORY: GROUND MIC.





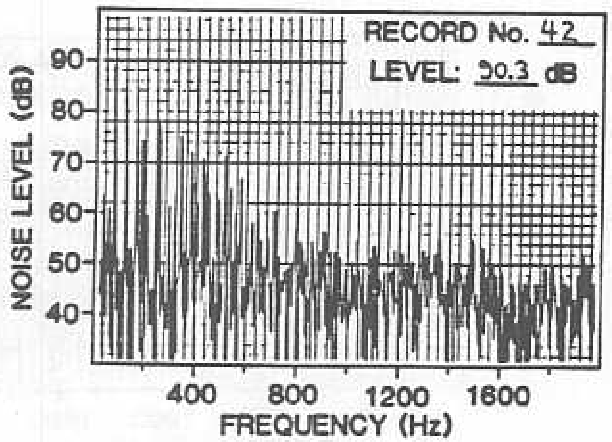


Figure D-2: NARROWBAND TIME HISTORY: 4 ft. MIC.

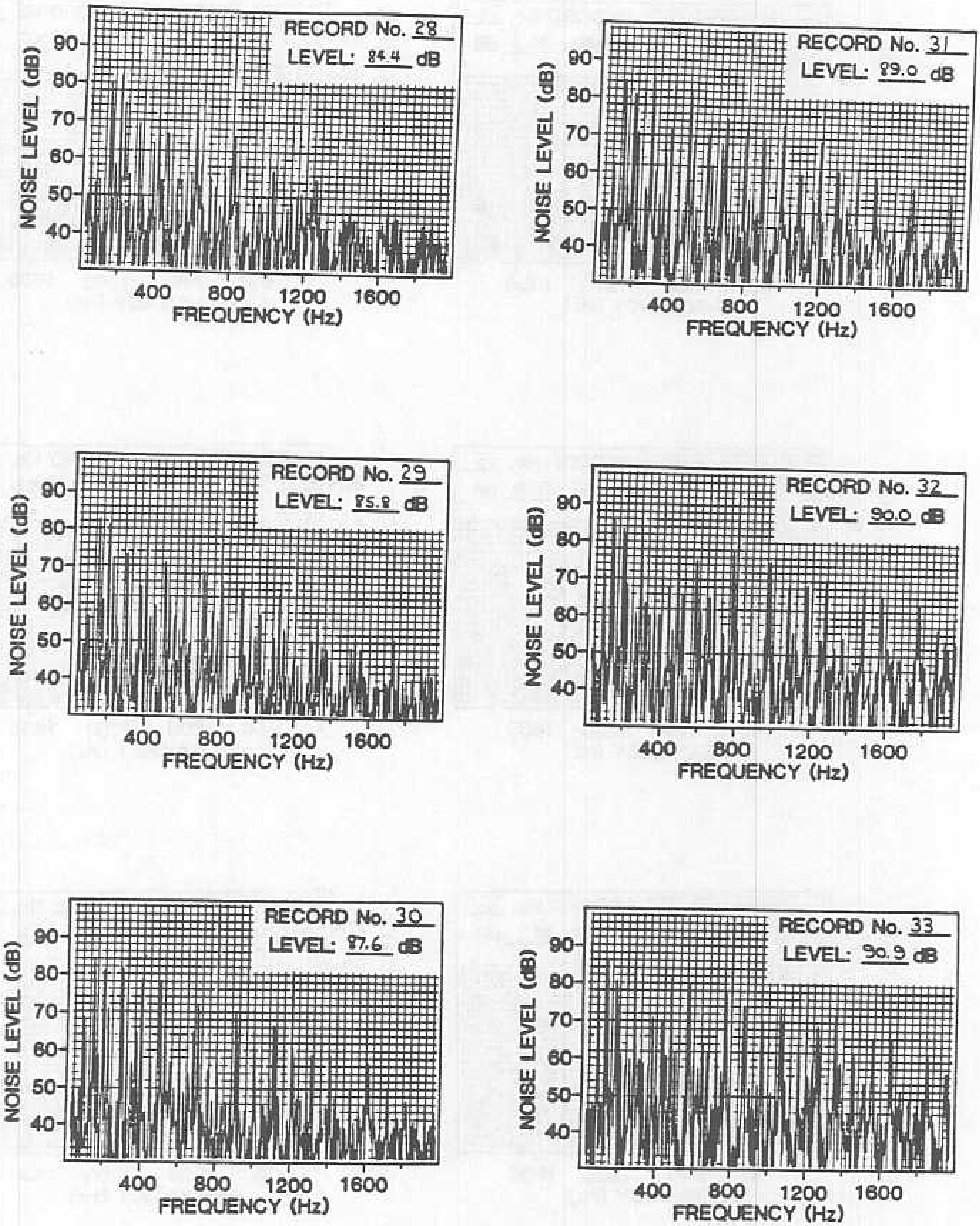
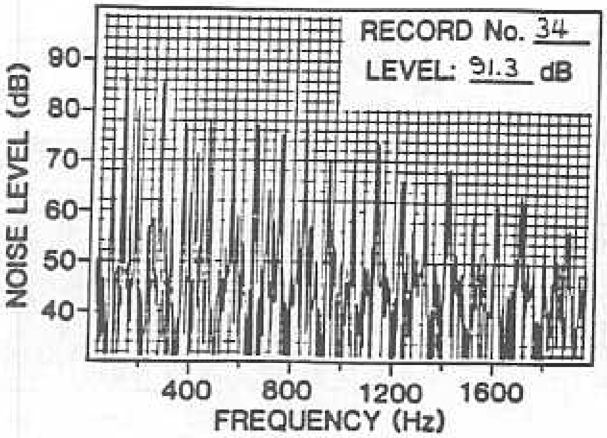
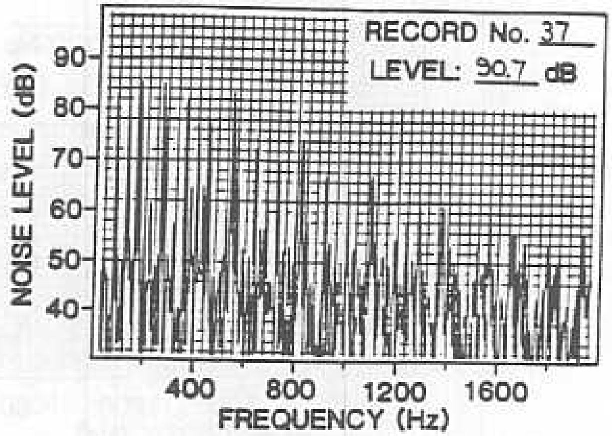
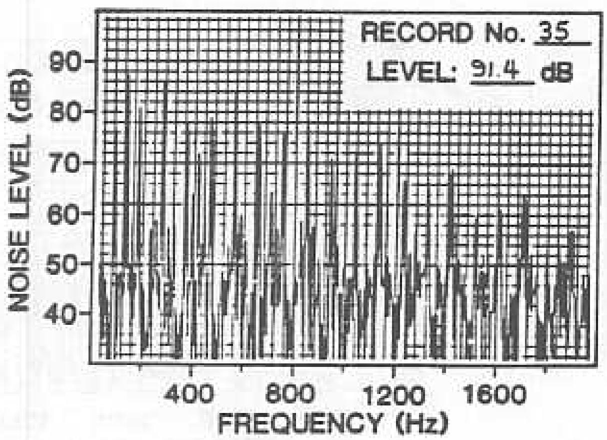
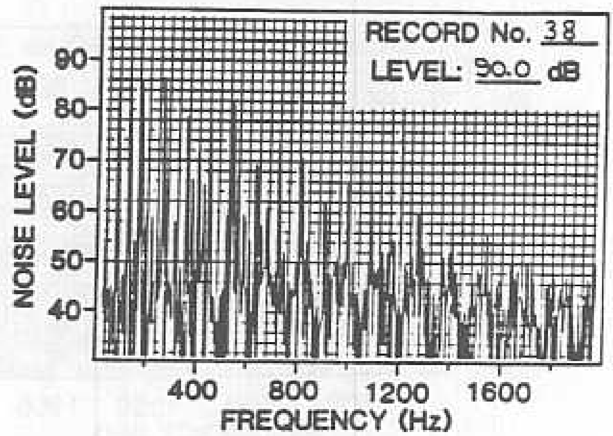


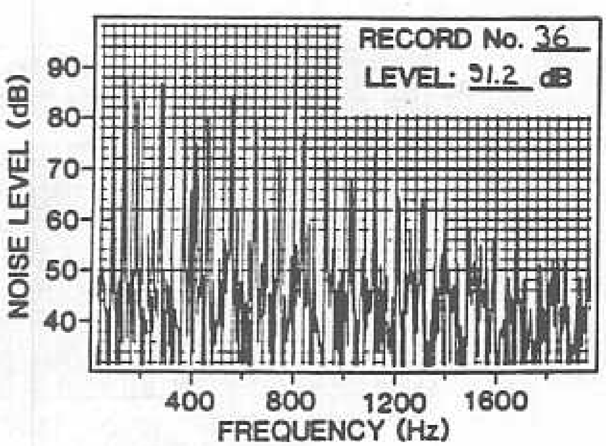
Figure D-2: NARROWBAND TIME HISTORY: 4 ft. MIC.











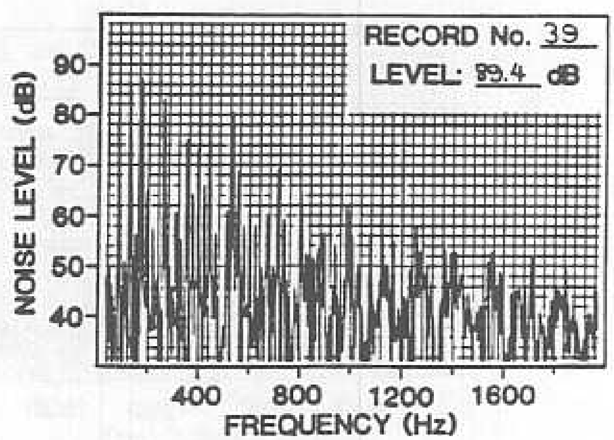


Figure D-2: NARROWBAND TIME HISTORY: 4 ft. MIC.