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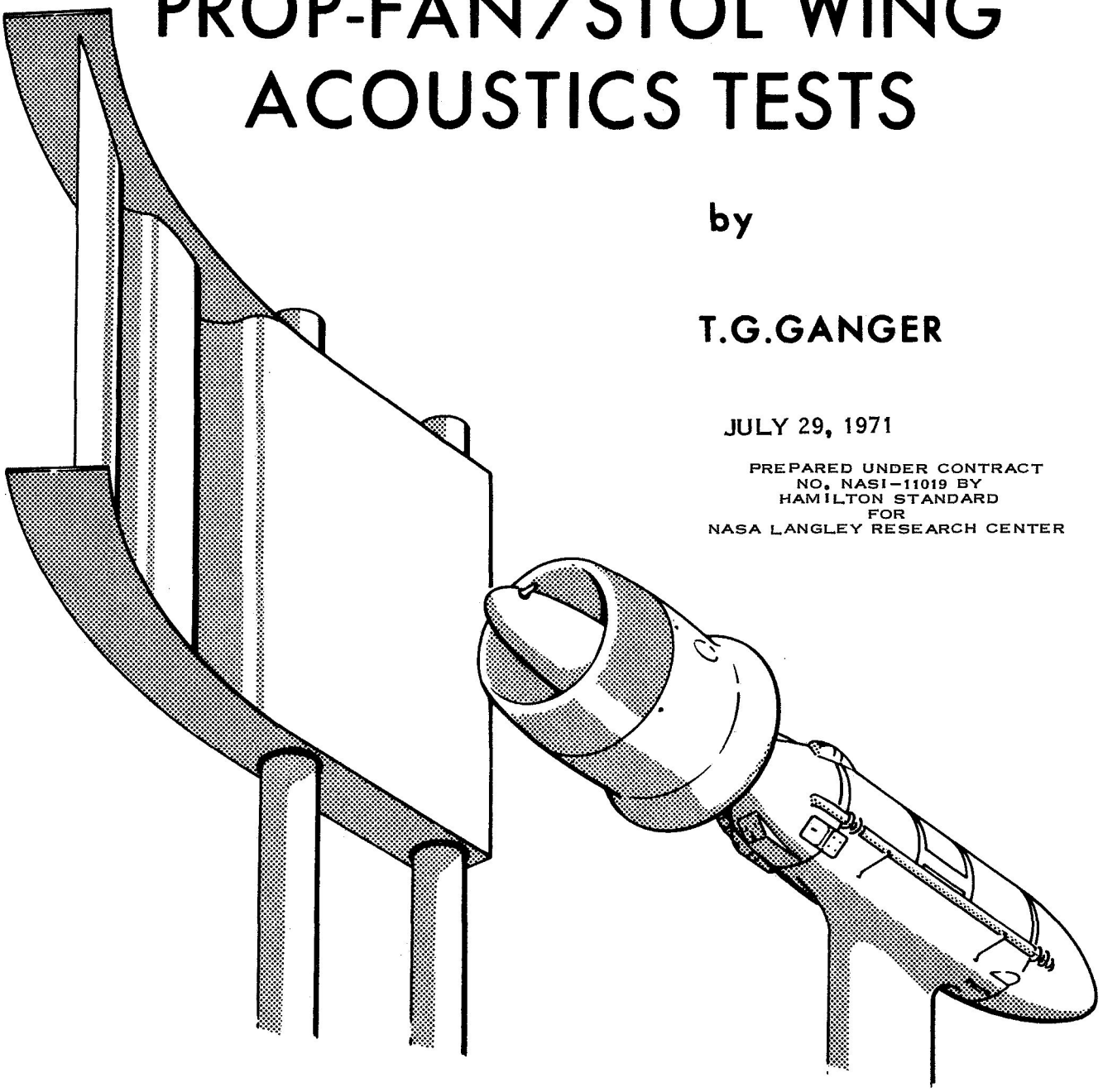
RESULTS OF PROP-FAN/STOL WING ACOUSTICS TESTS

by

T.G.GANGER

JULY 29, 1971

PREPARED UNDER CONTRACT
NO. NASI-11019 BY
HAMILTON STANDARD
FOR
NASA LANGLEY RESEARCH CENTER



ACKNOWLEDGEMENT:
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ABSTRACT

This report summarizes the results of a test conducted to determine the noise characteristics of a STOL wing with externally blown flaps in the vicinity of an aircraft propulsor. The STOL wing used for these tests was a 0.43 scale model with 60° and 0° flap capabilities; however, this wing system was not an optimum configuration, nor was it representative of all STOL wing/flap systems. The propulsor used was a low tip speed, high bypass ratio, low pressure ratio, variable pitch Prop-Fan Model. Far field noise data and directional character were determined for a 60° and 0° flap configuration. In addition, the noise character of the 21 inch diameter Prop-Fan Model without the STOL wing was evaluated.

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INTRODUCTION

In order to develop information related to the noise characteristics of a model STOL wing with externally blown flaps in the vicinity of an aircraft propulsor, a noise test has been conducted on a Prop-Fan/STOL Wing model at NASA Langley, Hampton, Virginia. The effect of the STOL wing and externally blown flaps on the level and directional character of the noise produced within the fan shroud, and the level and directional character of the noise generated by scrubbing and interaction of the high velocity jet wake from the propulsor with the STOL wing and flaps is discussed in detail.

The model tested consisted of a 0.43 scale STOL wing with flaps set at 60° and 0° mounted aft of a 21 inch diameter, 12 bladed Prop-Fan model with 22 swirl recovery vanes. The Prop-Fan model was originally designed for wind tunnel performance testing and incorporated no noise reduction features except for the use of 22 recovery vanes to suppress the tone level at the blade passing frequency. In this program an existing Prop-Fan test facility was used which precluded optimization of the Prop-Fan/STOL wing system.

The noise tests, which were conducted under controlled free field conditions, included measurements of far field and directional characteristics of the Prop-Fan/STOL Wing model for the 60° flap (setting which would be used during landing of a STOL aircraft), 0° flap (flap retracted flush with the wing surface), and no wing configuration, at various combinations of power (from 72 to 208 HP) and fan tip speeds (from 600 to 800 ft/sec).

CONCLUSIONS

Based on the results of the Prop-Fan/STOL Wing noise test the following is evident:

1. Maximum perceived noise and overall sound pressure propagates at an angle of 40° to 70° from the Prop-Fan exit.

2. In the scale of the model tested, the maximum 10 foot flyover noise varies approximately 6.5 dB per doubling of shaft power for both overall SPL and PNL for all wing and flap configurations tested.

3. The interaction of the Prop-Fan jet wake with the STOL Wing produced scrubbing noise even with the flaps fully retracted. This is shown by an increase in the low frequency (112 to 449 Hz) noise by as much as 12 dB with the flaps set at 0°. In addition, extending the flaps to 60° increased the level of low frequency noise by as much as 20 dB.

4. The STOL Wing with extended flaps increases the measured Prop-Fan 10 foot flyover noise by an average of 3.5 PNdB while the retracted flaps increased the 10 foot flyover noise by an average of 2.8 PNdB.

5. The installation of the STOL wing and flaps causes a change in the Prop-Fan tone noise level and directivity.

RECOMMENDATIONS

It is recommended that further tests be conducted to determine the effect on noise due to (1) location of the Prop-Fan relative to the wing, (2) direction of fan flow relative to the wing and (3) flap setting.

DESCRIPTION OF TEST

TEST ITEM

The test item consisted of a 0.43 scale STOL wing model with 60° and 0° externally blown flaps as shown on Figures 1 and 2, mounted above and aft of a 21 inch diameter, 12 bladed, manually adjustable pitch, shrouded Prop-Fan model with 22 fixed pitch recovery vanes. The Prop-Fan rotor, which is shown in Figure 3, was an existing wind tunnel model which was designed for 950 ft/sec tip speed, 400 HP, 0.20 free stream Mach Number and a rotor pressure ratio of 1.110. The recovery vanes were designed to be tested at static conditions at 700 ft/sec tip speed, 222 HP condition. The Prop-Fan shroud was a bellmouth type designed for unseparated inflow during static conditions. The only noise control measure incorporated into the system was the use of 22 stators to promote decay of rotor/stator interaction tone noise. These were located such that the distance between the trailing edge of the rotor blades and the leading edge of the stators was equal to two blade chords at the mean radius. Figure 4 shows the Prop-Fan/STOL Wing installation.

TEST FACILITY

The tests were conducted on a level grass covered field adjacent to Building 1212 at Langley Research Center, Hampton, Virginia. During the test program the Prop-Fan was driven by an electrically powered Propeller Test Rig (PTR) normally used for aerodynamic testing in the United Aircraft Wind Tunnel. It should be noted that the installation was such that the Prop-Fan inlet air was drawn over the PTR which is opposite from the installation of Reference 1, which provided a cleaner inflow for Prop-Fan noise evaluation. The axis of rotation was approximately 11.5 feet above the ground and the test area was free from obstructions within 100 feet of the test item. Six far field microphones were located 10 feet from the Prop-Fan, 11.5 feet off the ground, at 22.5 degree intervals. In addition, one microphone was located on a boom capable of traversing continuously from 0-150° on a 10 foot arc as shown in Figure 5. The traversing speed was held in most cases to approximately 0.5° per second.

INSTRUMENTATION

The following equipment was used for the program:

A. Data Acquisition

1. Eight Bruel and Kjaer type 4133 microphones with flat response to 40 KHz at normal incidence.

2. Eight Bruel and Kjaer type 2614 cathode followers.

3. Three Bruel and Kjaer type UA0052 nose cone wind screens.

4. Two Bruel and Kjaer model 140 four channel signal conditioners.

5. Hewlett Packard model 15117A microphone calibrator providing a 1 KHz signal at 94, 104, 114, or 124 dB ±0.3 dB.

6. CEC model VR3300, one inch, 14 channel, direct record tape recorder with a flat response to 40 KHz at 15 inches per second.

B. Data Reduction

1. General Radio type 1921 one-third octave band real time analyzer.

2. Spectral Dynamics type 101 frequency analyzer with stationary and tracking filter capabilities.

TEST PROCEDURE

Prior to testing, the microphone and power supplies were allowed to warm up to ensure stability. The microphones were then calibrated using the Hewlett Packard calibrator. This calibration procedure was repeated prior to, and following, each set of tests to determine any calibration shifts that may occur during testing.

To ensure minimum interference from background noise and excessive wind velocities, testing was restricted to the hours between 7 PM and 9 AM. Furthermore, total background noise measurements (ambient and electrical noise) were made at the gain settings used during the test.

Data was recorded for approximately four minutes for each of the appropriate microphone locations in addition to the continuous sweep microphone which traversed approximately 120° at a nominal 0.5 degree/sec for the test conditions of Table 1.

DISCUSSION

INTRODUCTION

In reducing the test data from this program, particular attention was given to determining the effect of the STOL wing and flaps on the internally generated Prop-Fan noise level and directional character as well as the character of noise generated by the jet wake interacting with the wing and flaps. Based on these objectives, the sweep microphone was analyzed with 1/3 octave band filters every 10° of angular travel using a four second averaging time (which minimizes statistical error without obscuring the directional character of the source). This data is tabulated in Appendix A. In addition, selected data were analyzed with a 40 Hz constant bandwidth filter to allow discrimination between tone and broad band noise.

Appendix B contains a discussion of the data accuracy with necessary corrections based on data acquisition/reduction frequency response, microphone frequency response, and total background noise. A summary of test conditions for this program is shown in Table 1 while Table 2 gives the ambient conditions during the test.

PERFORMANCE TEST DATA

Prop-Fan thrust (T) and shaft horsepower (SHP) were determined based on the performance information obtained in Reference 1. This data is shown on Figures 6 and 7. It should be noted, however, that no corrections were made to the performance data for the difference in Prop-Fan orientation between this test program and that of Reference 1.

ACOUSTIC TEST DATA

Based on the one-third octave band data of Appendix A, the overall sound pressure level (OASPL) on a 10 foot radius was determined for each test condition. The directional character of this data for the "flaps extended," "flaps retracted," and "no wing" configuration for each combination of blade angle and tip speed is shown on Figures 8 through 10. In like manner, the perceived noise level (PNL) as measured on a line 10 feet from, and parallel to, the Prop-Fan axis of rotation (i.e. a 10 foot flyover), is shown on Figures 11 through 13. From these curves it can be seen that both the maximum OASPL and PNL occur 40° to 70° from the Prop-Fan exit for the wing with flaps extended, retracted,and for the no wing configuration. This directional character was further verified by the results of the Prop-Fan model tests described in Reference 1.

These curves also show a significant effect of the wing and flaps on the internally generated Prop-Fan noise as a function of angular location. In general both the OASPL and PNL, which are primarily controlled by the mid-to-high frequency tone and broad band noise produced by the Prop-Fan, are a maximum with the flaps extended. This increase in the measured noise

can be attributed to both an increase in the internally generated acoustic power of the Prop-Fan and reflection of internally generated noise from the STOL wing.

From these data the maximum OASPL on a 10 foot flyover was calculated for each test condition. The results, as shown on Figure 14, follow a trend curve:

$$OASPL_{(MAX)} = 61.6 + 22.7 \log SHP \pm 2.5 \text{ dB}$$

over the horsepower range shown which corresponds to a 6.8 dB increase in $OASPL_{(MAX)}$ per doubling of horsepower. Similarly, Figure 15 shows the maximum PNL on a 10 foot flyover following a trend curve:

$$PNL_{(MAX)} = 78.4 + 21 \log SHP \pm 2 \text{ dB}$$

over the horsepower range shown which corresponds to a 6.3 dB increase per doubling of horsepower.

Both the flap interaction and wing interaction noise (i.e. the difference between the flap extended noise level and no wing noise level and between the flaps retracted noise level and no wing noise level) is shown in Figure 16 for each combination of blade angle and tip speed for the 10 foot-60° microphone location, which generally proved to be the location of maximum noise level. Another view of interaction noise can be obtained by summing the one third octave bands from 125 to 400 Hz for each test configuration as a function of angular position. This is shown in Figures 17 through 19 for each blade angle and tip speed.

Again, selecting the maximum noise location (10 foot-60° microphone location), the effect of the STOL wing and flaps on the entire frequency spectrum is shown in one-third octave bands in Figures 20 through 25. These curves clearly show the low frequency noise below 1 KHz generated by the STOL wing and flap as well as their effect on the Prop-Fan tone noise. It should be noted that the change in tone level due to the STOL wing/flap configuration may be caused by a directivity shift as well as reflection and reinforcement from the wing itself. This can be observed in the erratic directivity pattern of Figure 26 for the fundamental of blade passing frequency.

Narrow band analyses of the 45° blade angle, 683 ft/sec test case as shown on Figures 27 through 29, clearly show the tone content of the noise spectrum due to rotor blade loading (rotor field) and to fluctuating lift on the stators due to wakes from the rotor (rotor/stator interaction). The relatively high fundamental tone, as compared to the data of Reference 1 which showed suppression of the fundamental tone due to the stator count selection can be attributed to the presence of the PTR immediately upstream of the Prop-Fan inlet which prevented the desired uniform inflow conditions. Higher order harmonics, which tend to decrease in level, are clearly evident past the tenth overtone in each case shown.

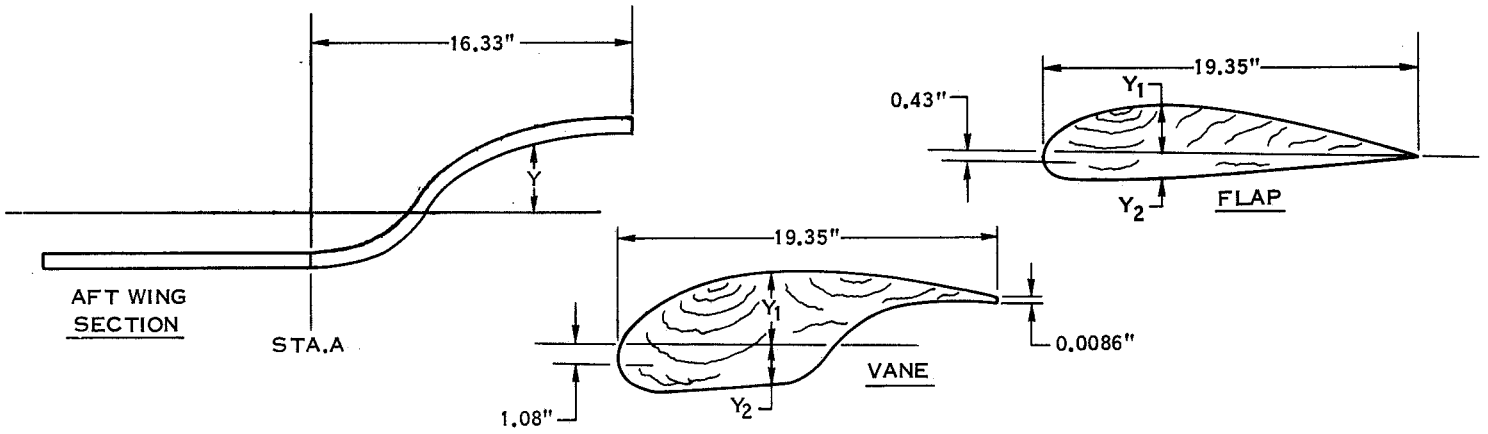
Further limited analysis of these curves show not only an increase in the low frequency noise floor (interaction noise) due to the presence of the STOL wing and flaps, but also an increase in the broad band noise by as much as 10 dB from 1.5K to 4 KHz and from 9K to 12 KHz.

Comparison of the one-third octave band curve with the narrow band curve, as shown in Figure 30 for the 45° blade angle, 683 ft/sec tip speed test condition with flaps extended show the fundamental of blade passing frequency and the first two overtones dominating the noise levels in the respective one-third octave band while the broad band noise floor contributes heavily elsewhere. Therefore, suppression of these tones, which are located in the area of greatest PNL weighting, will significantly aid in reducing perceived noise. This curve also demonstrates the consistency between the two types of analyses.

In order to determine the effect of the Prop-Fan installation (i.e. locating the PTR upstream of the fan) on the overall noise, the test data for the Prop-Fan without the wing was compared to the data of Reference 1 for four similar test cases. The results, as shown on Figures 31 and 32, indicate fair agreement between the two test programs. In general, however, the overall noise is higher for these latest tests, especially at the locations of maximum noise (40°-70° from Prop-Fan exit).

ACKNOWLEDGMENT

The author wishes to thank Dominic Maglieri, Harry Morgan, and Bob Pegg of NASA Langley Research Center for their invaluable contributions in making this test program possible, supplying the STOL wing model, and assisting in the measurement program.



AFT WING COORDINATES

STATION PAST STA.A (IN)	Y (IN)
0	−2.82
1.28	−2.80
2.35	−2.67
3.43	−2.37
4.50	−1.81
5.58	−0.65
6.66	0.99
7.73	1.85
8.81	2.45
9.88	2.88
10.96	3.23
12.03	3.44
13.11	3.57
14.18	3.63
15.26	3.61
16.33	3.66

VANE COORDINATES

VANE STATION (IN)	Y_1 (IN)	Y_2 (IN)
0	—	−1.08
1.08	0.99	−2.24
2.15	1.85	−2.37
3.23	2.45	−2.32
4.30	2.88	−2.24
5.38	3.23	−2.15
6.45	3.44	−2.02
7.53	3.57	−1.94
8.60	3.59	−1.72
9.68	3.61	−1.20
10.75	3.66	0
11.83	3.57	1.16
12.90	3.44	1.72
13.98	3.35	2.02
15.05	3.23	2.15
16.13	3.01	2.37
17.20	2.84	2.41
18.28	2.58	2.37
19.35	2.37	2.28

FLAP COORDINATES

FLAP STATION (IN)	Y_1 (IN)	Y_2 (IN)
0	—	−0.43
1.08	1.16	1.42
2.15	1.72	1.51
3.23	2.02	1.38
4.30	2.15	1.30
5.38	2.37	11.20
6.45	2.41	1.12
7.53	2.37	1.08
8.60	2.28	0.95
9.68	2.15	0.86
10.75	1.98	0.77
11.83	1.72	0.65
12.90	1.51	0.56
13.98	1.20	0.47
15.05	0.99	0.43
16.13	0.65	0.30
17.20	0.43	0.22
18.28	0.22	0.13
19.35	0.09	0.04

FIGURE 1. EXTERNALLY BLOWN FLAP

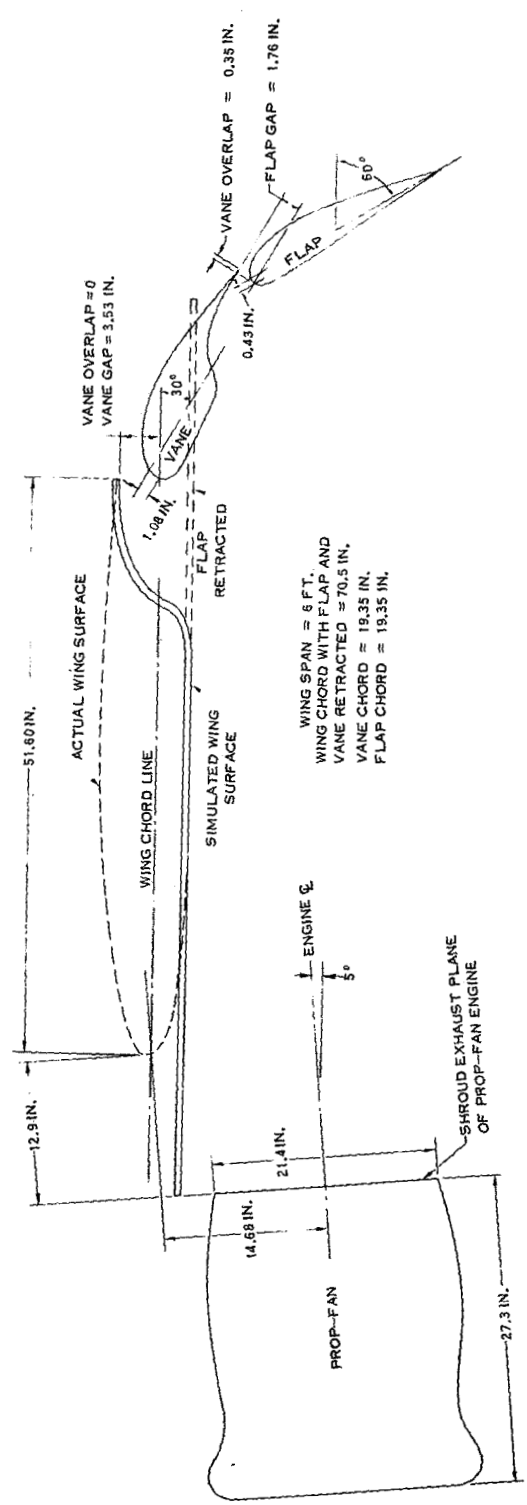


FIGURE 2. SIMULATED WING FOR STOL WING NOISE TESTS

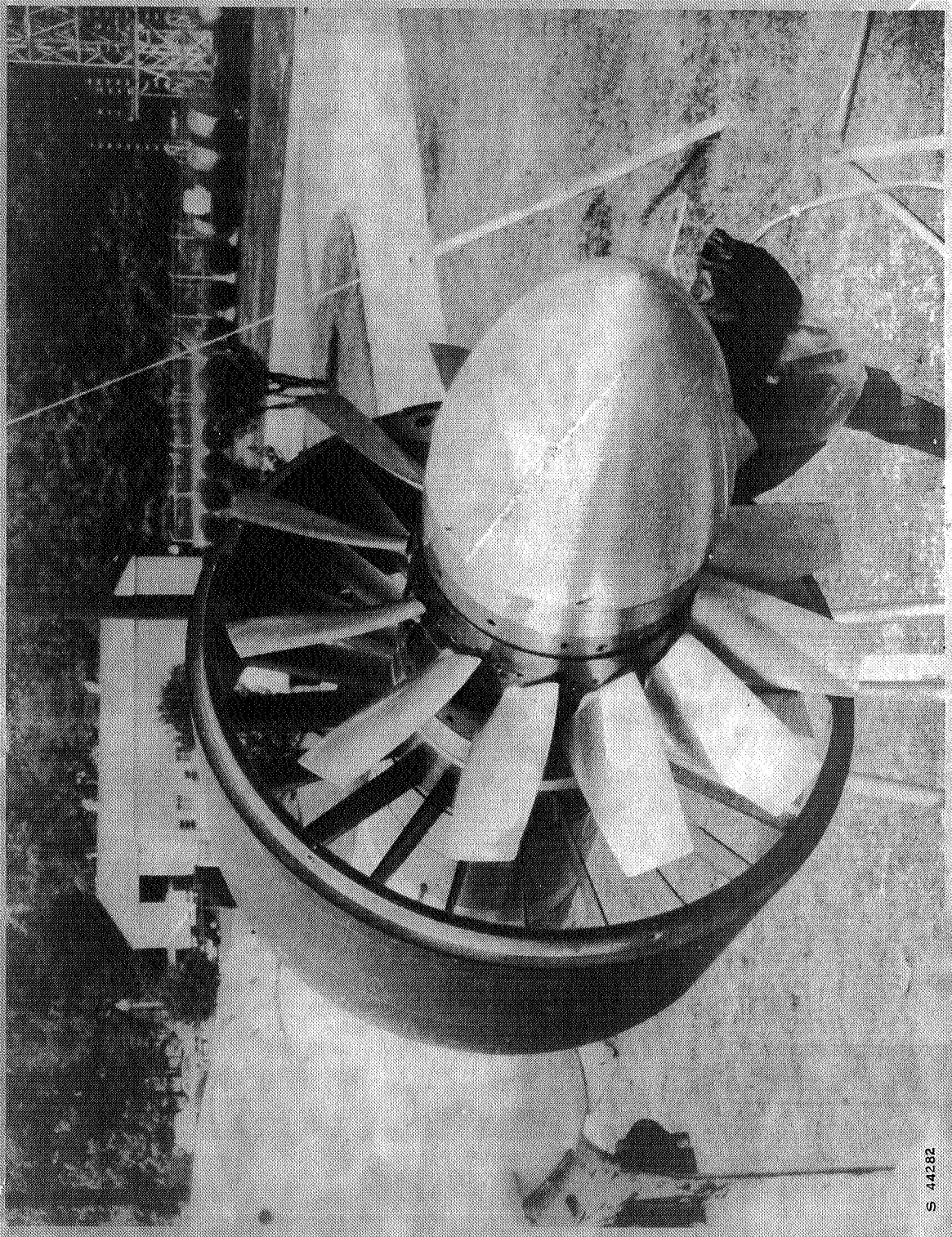


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FIGURE 3. PROP-FAN ROTOR

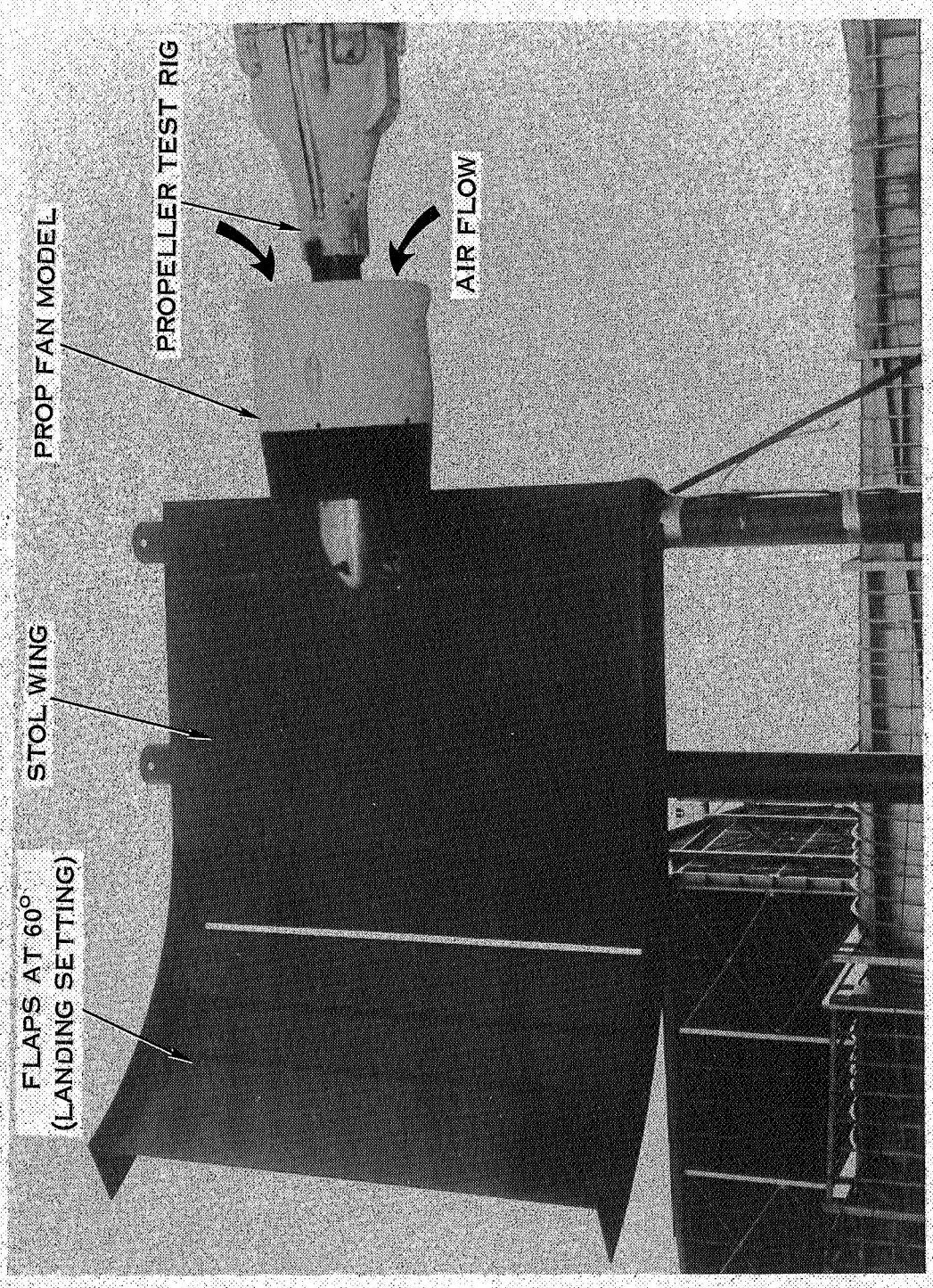
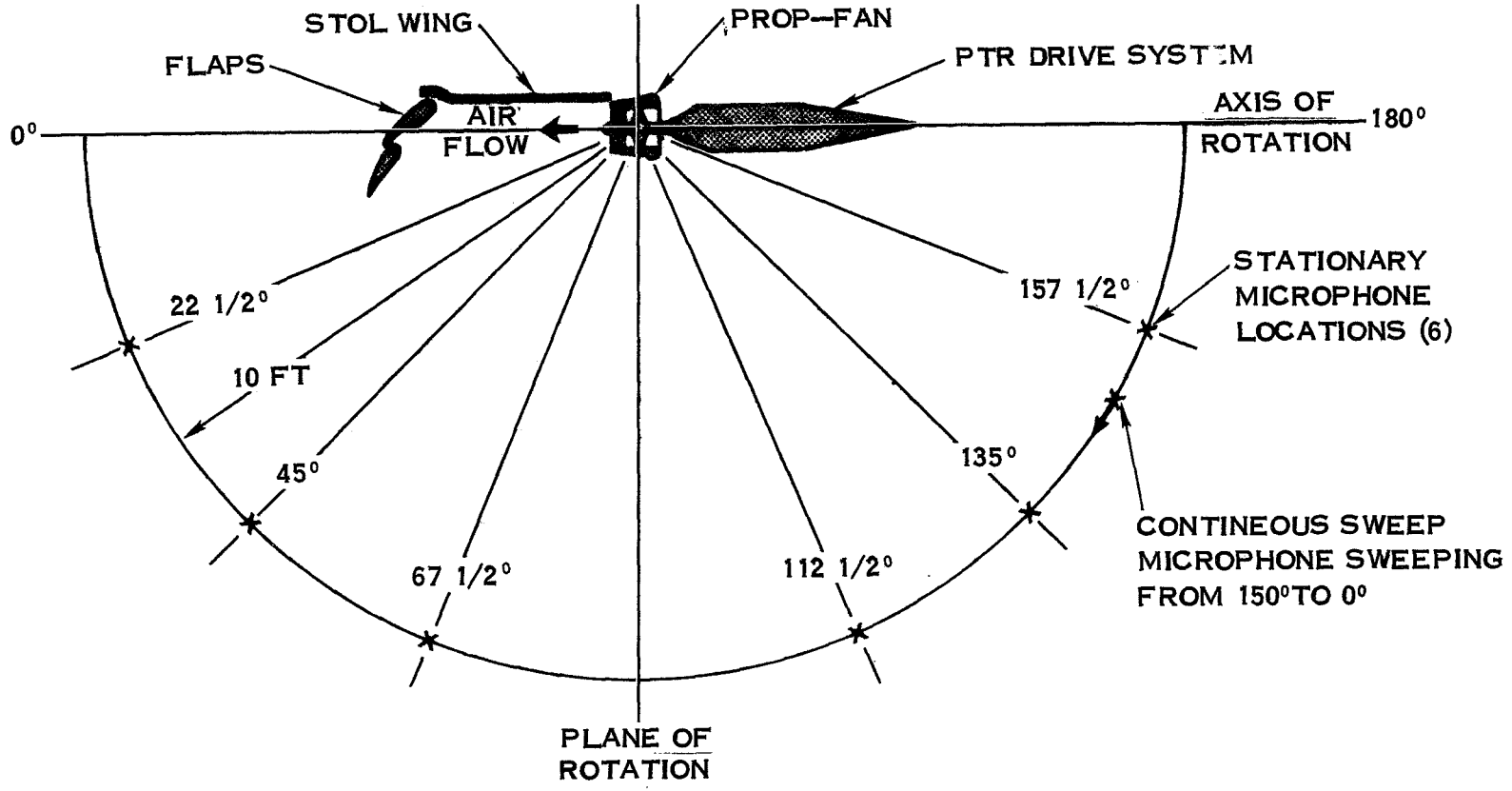


FIGURE 4. PROP-FAN/STOL WING INSTALLATION



NOTES

1. ALL MICROPHONES LOCATED AT HEIGHT OF AXIS OF ROTATION
2. DRAWING IS NOT TO SCALE

FIGURE 5 PROP-FAN/STOL WING NOISE TEST MICROPHONE LOCATIONS

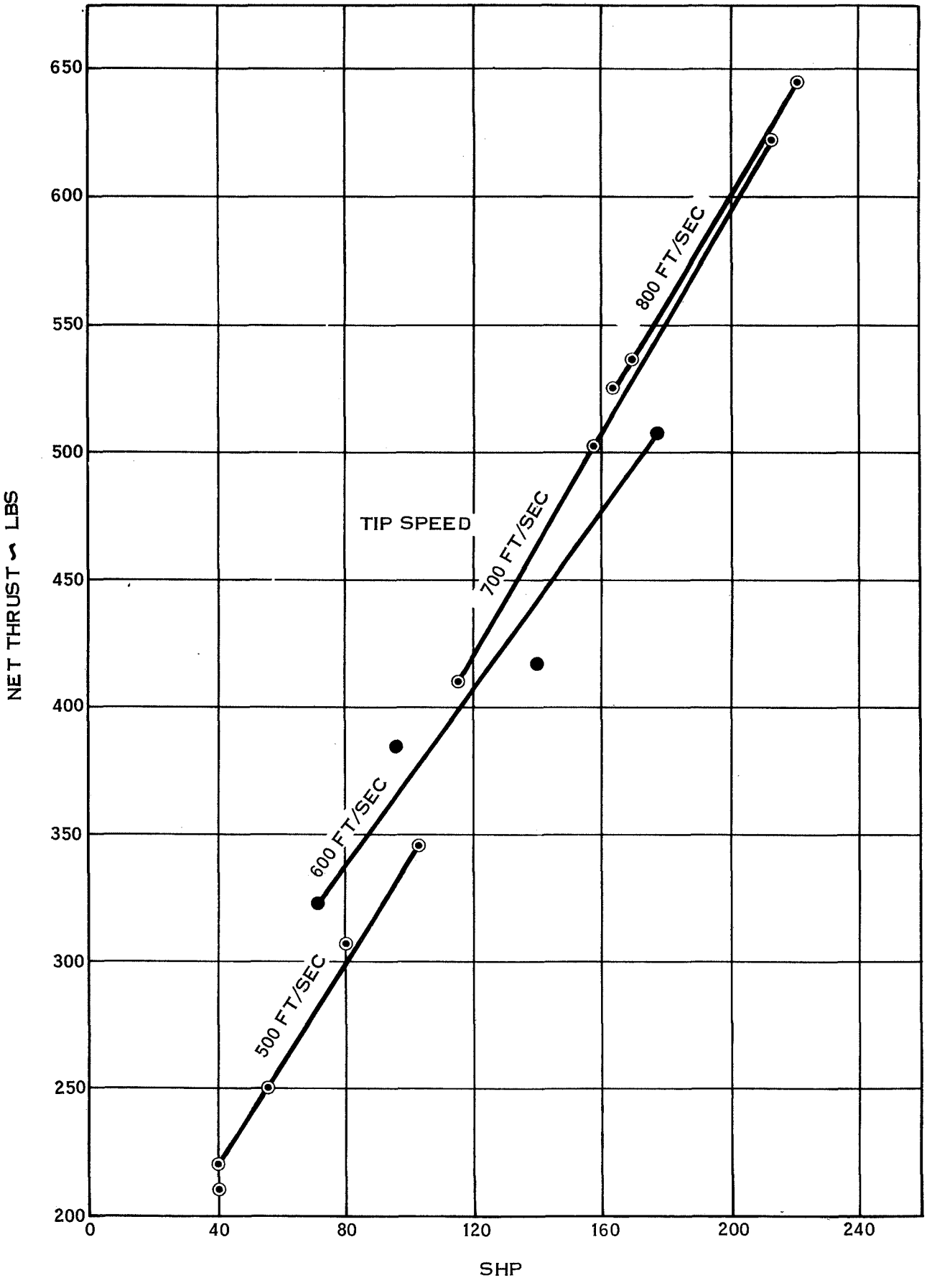


FIGURE 6 PROP—FAN PERFORMANCE

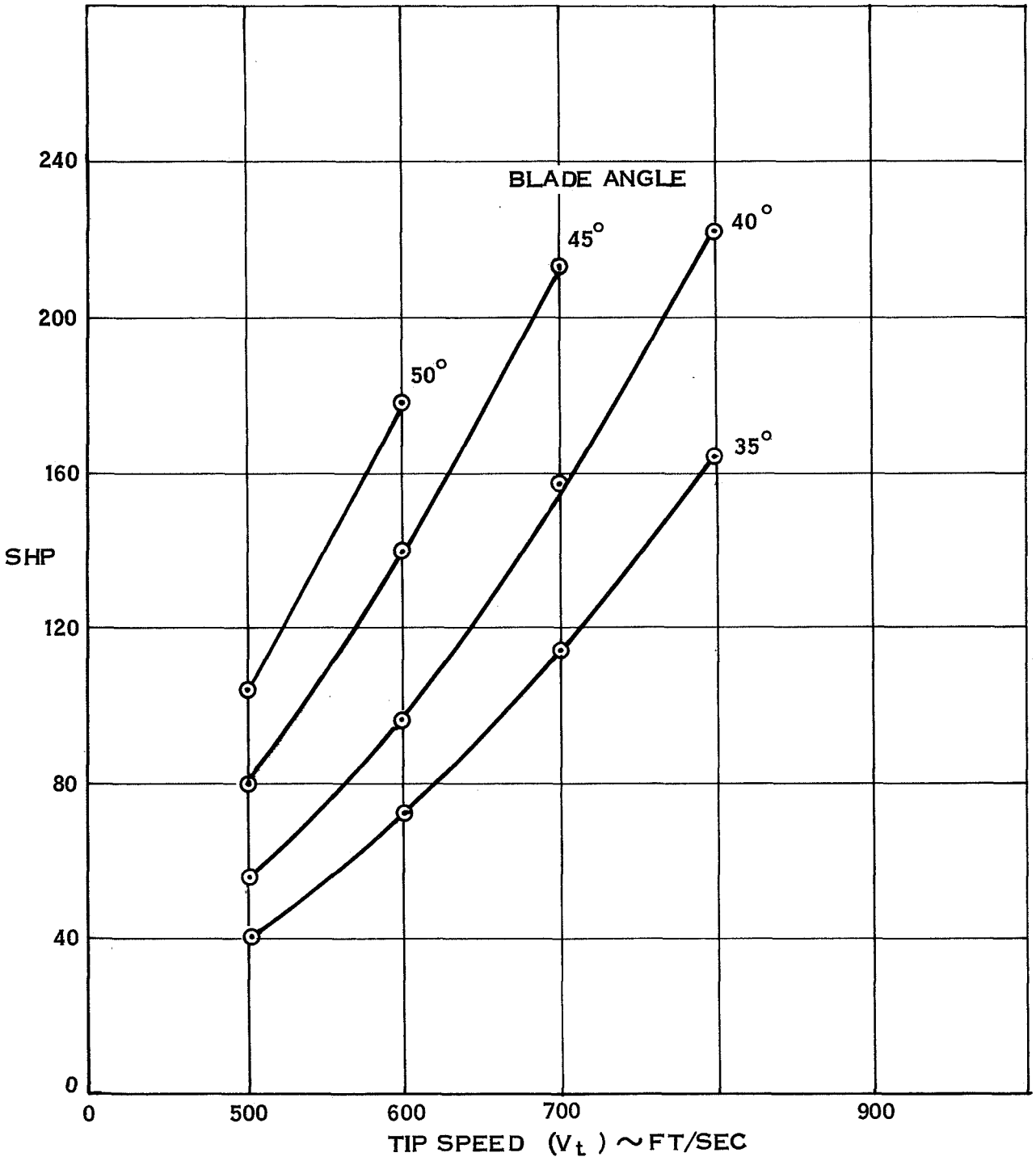
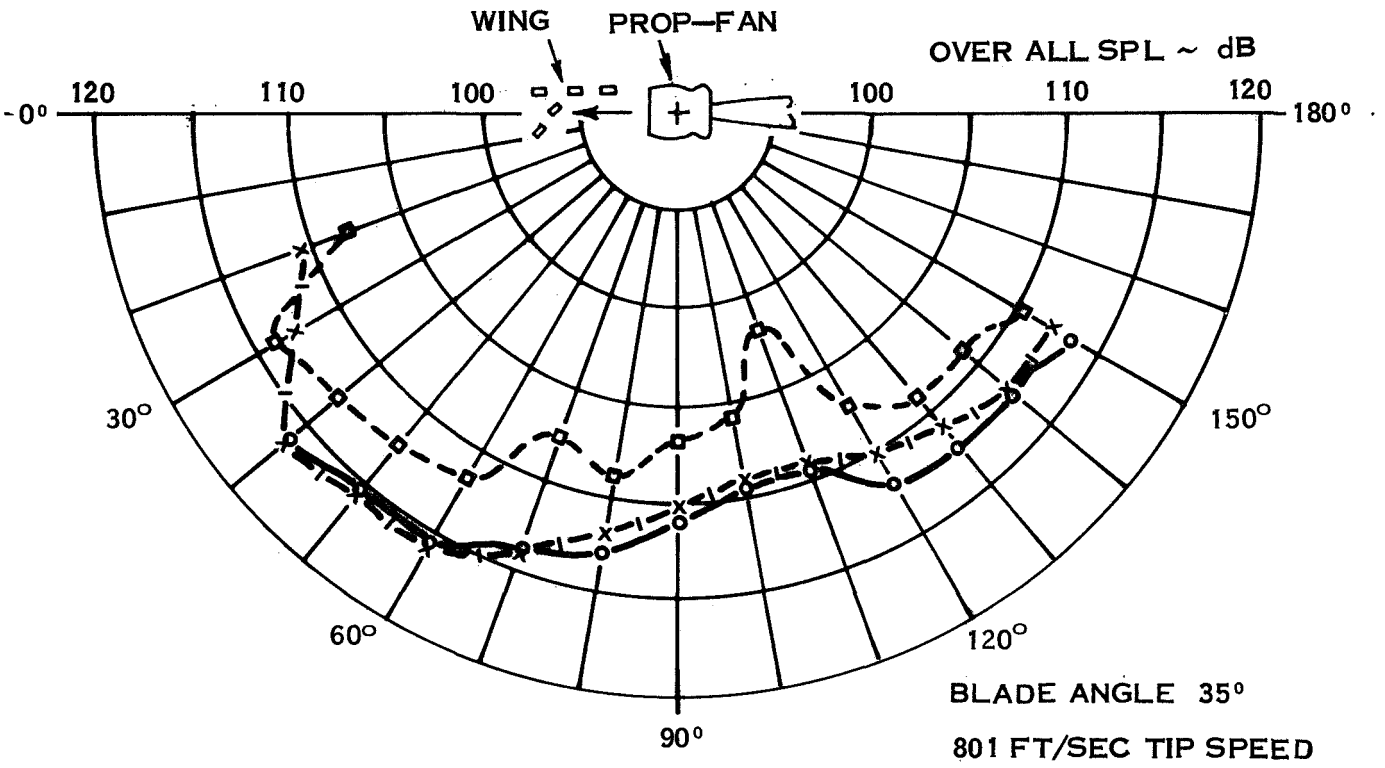


FIGURE 7 PROP-FAN PERFORMANCE



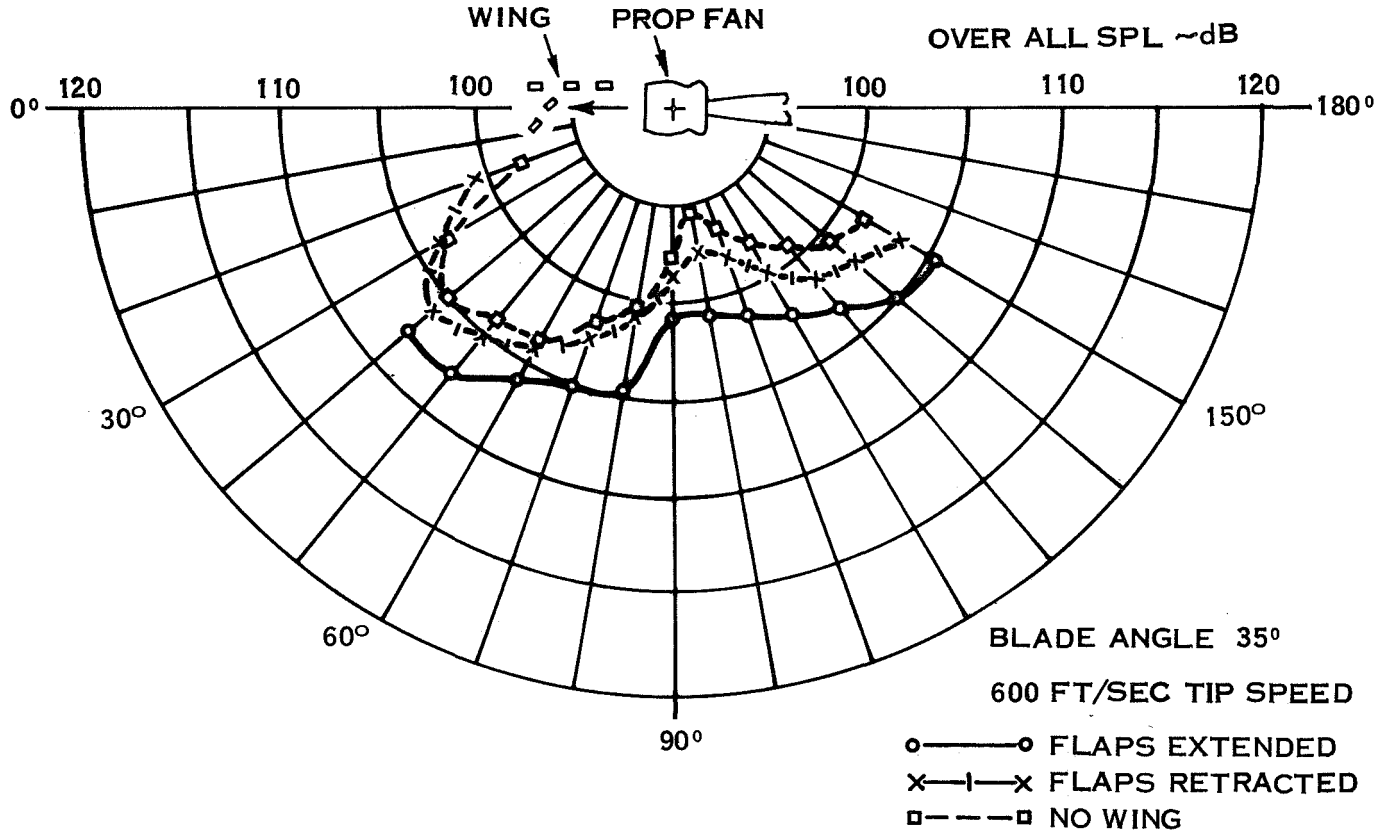
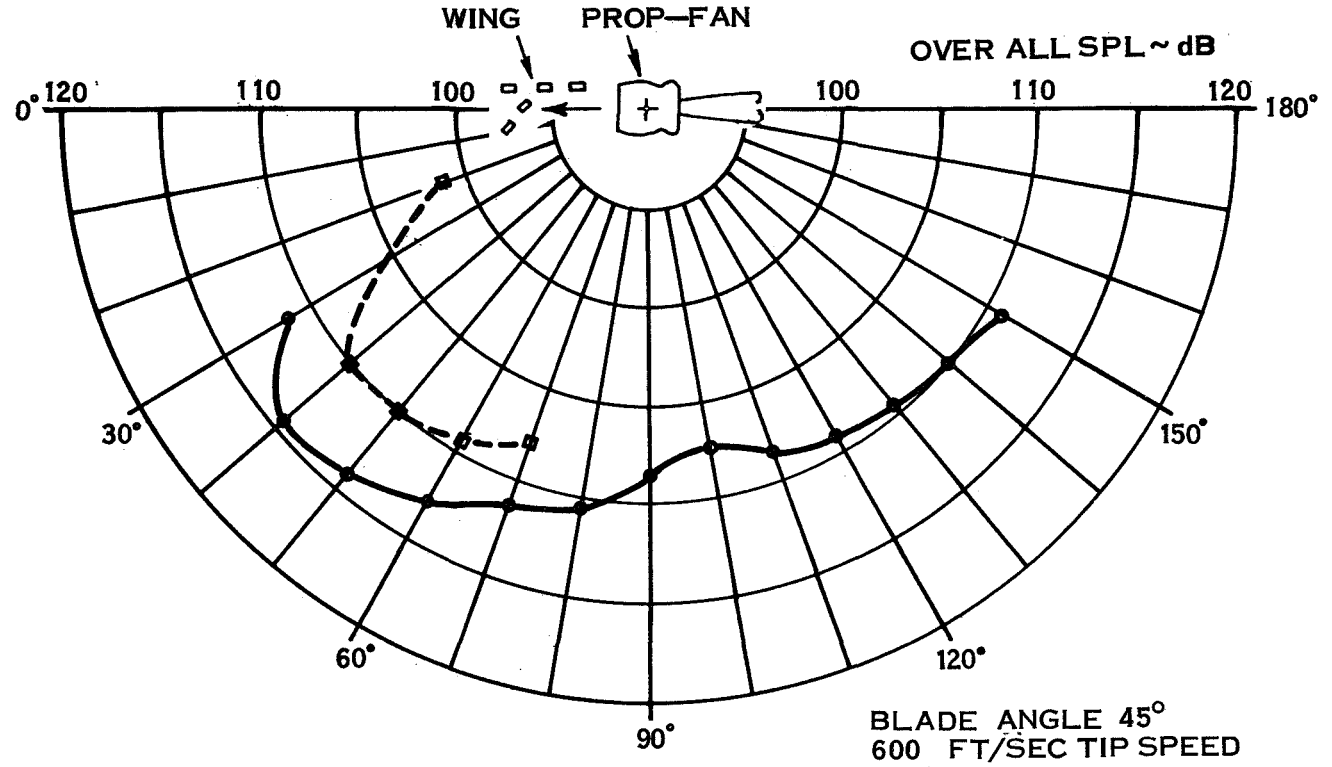


FIGURE 8 PROP–FAN/STOL WING NOISE



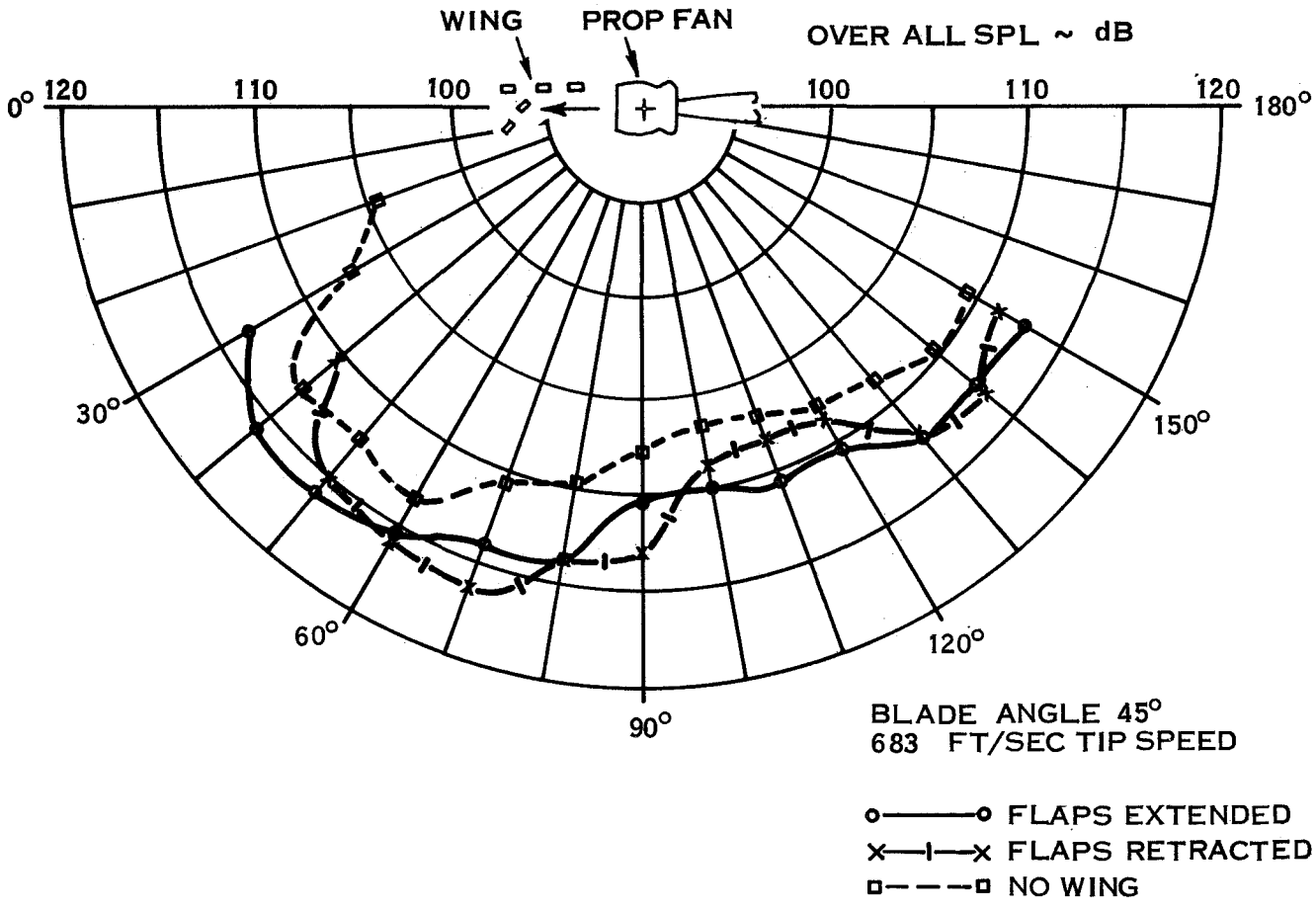


FIGURE 9 PROP—FAN/STOL WING NOISE

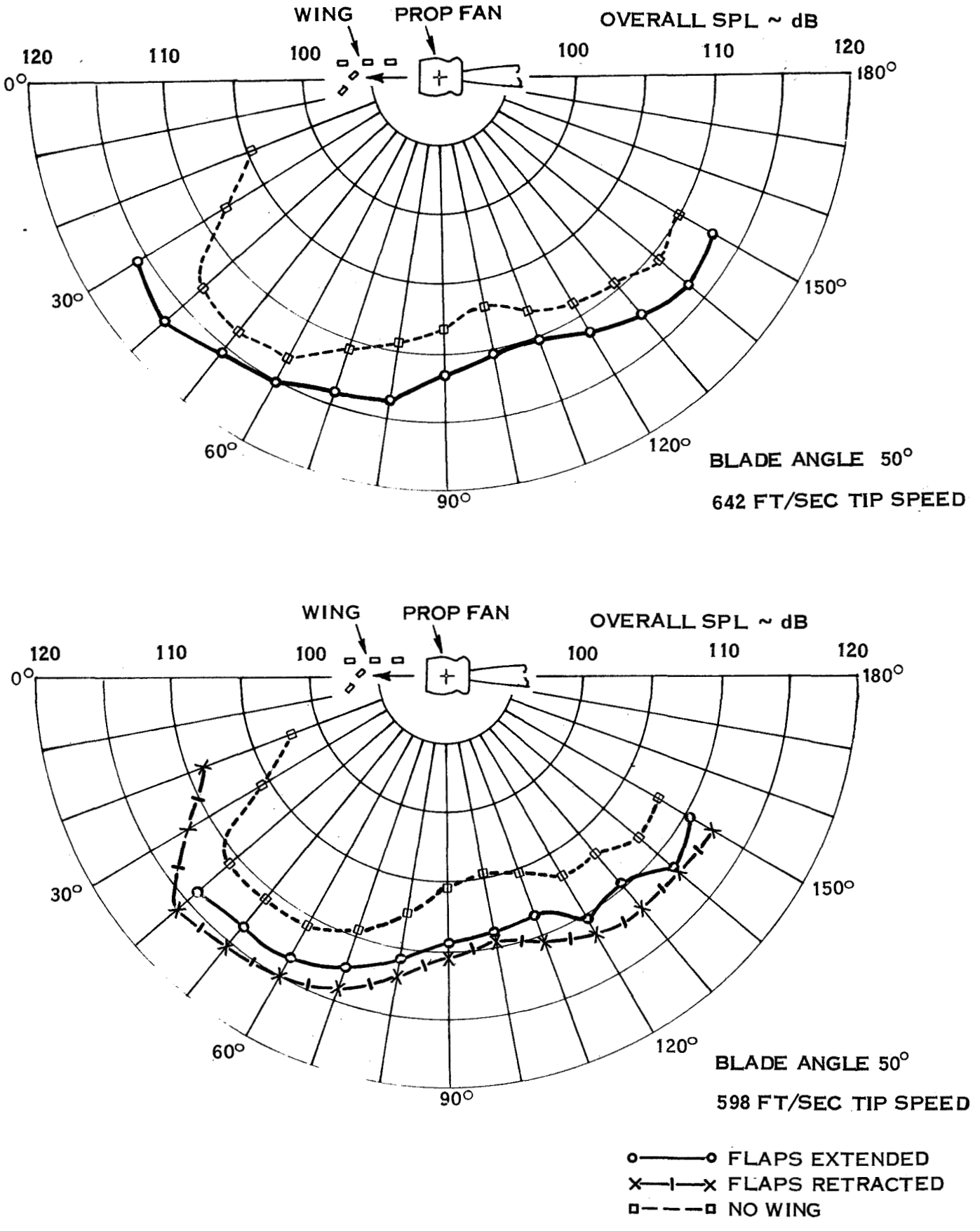
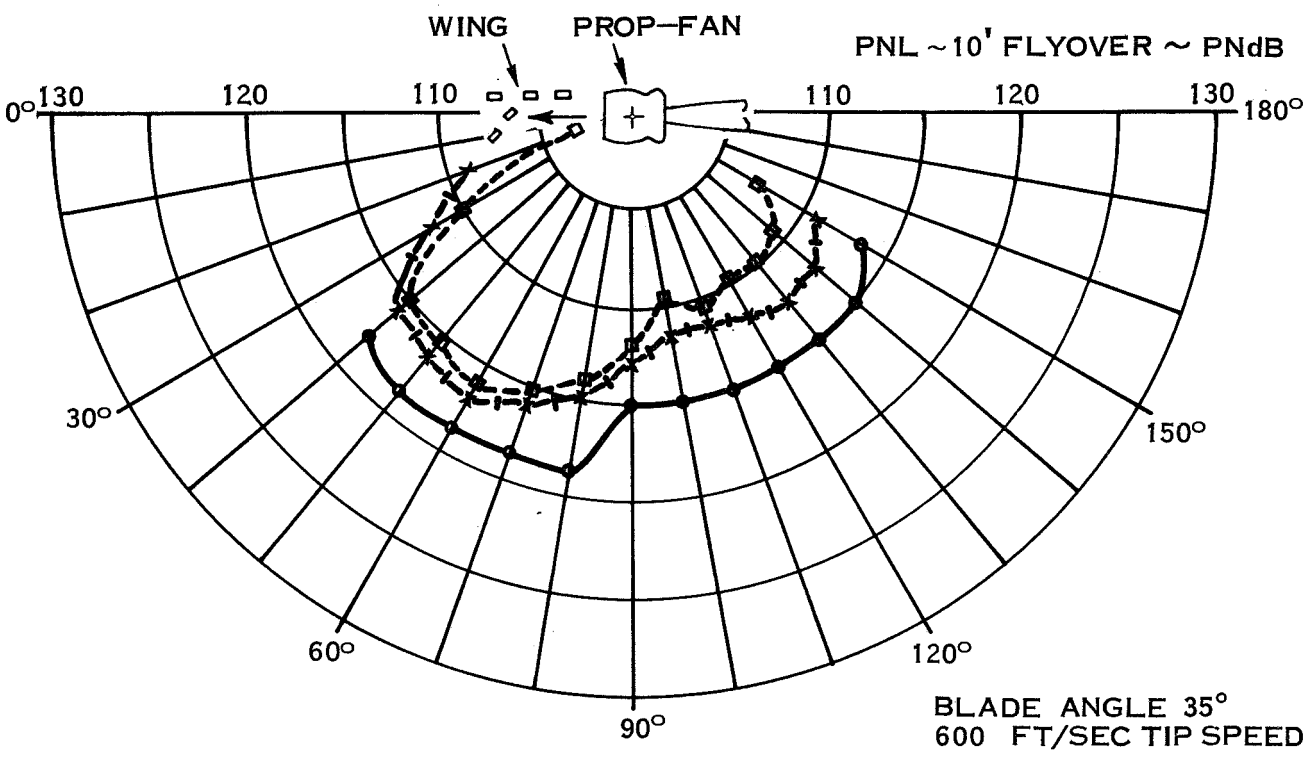


FIGURE 10 PROP-FAN/STOL WING NOISE



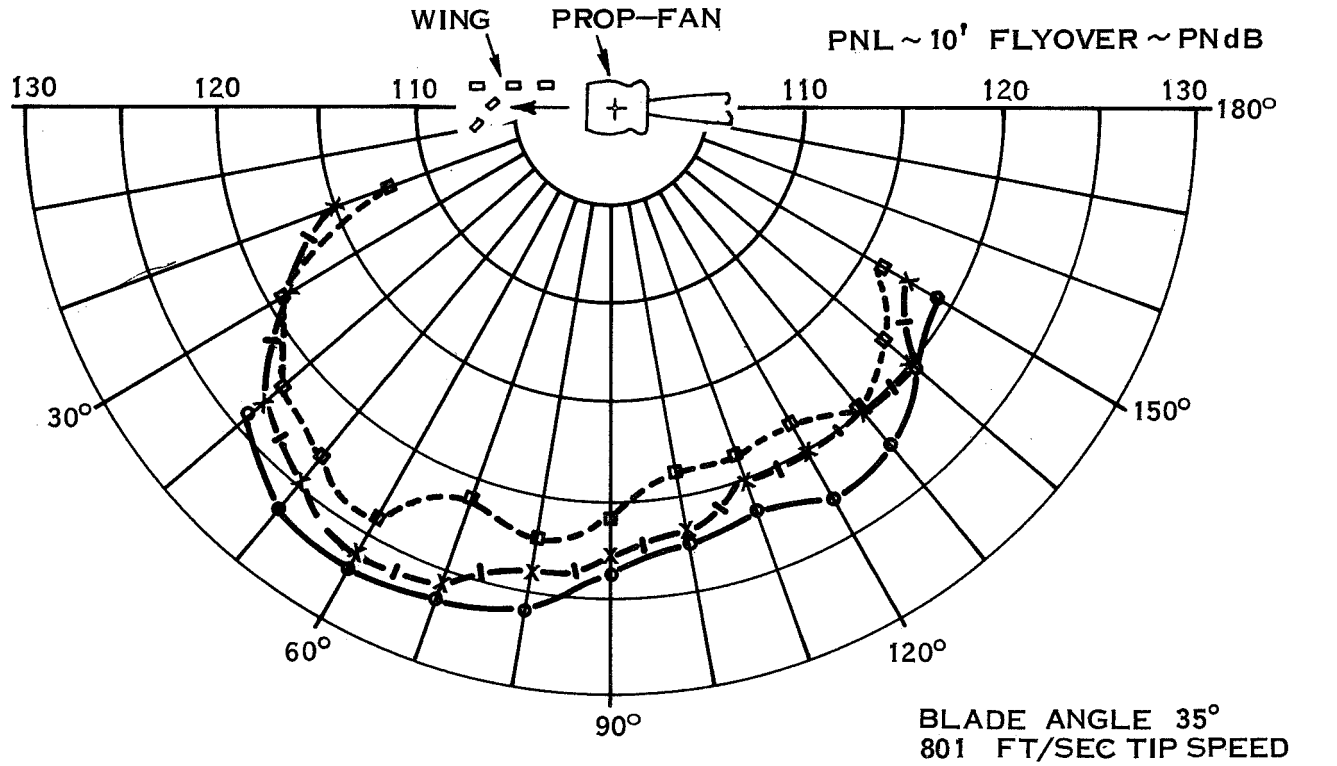
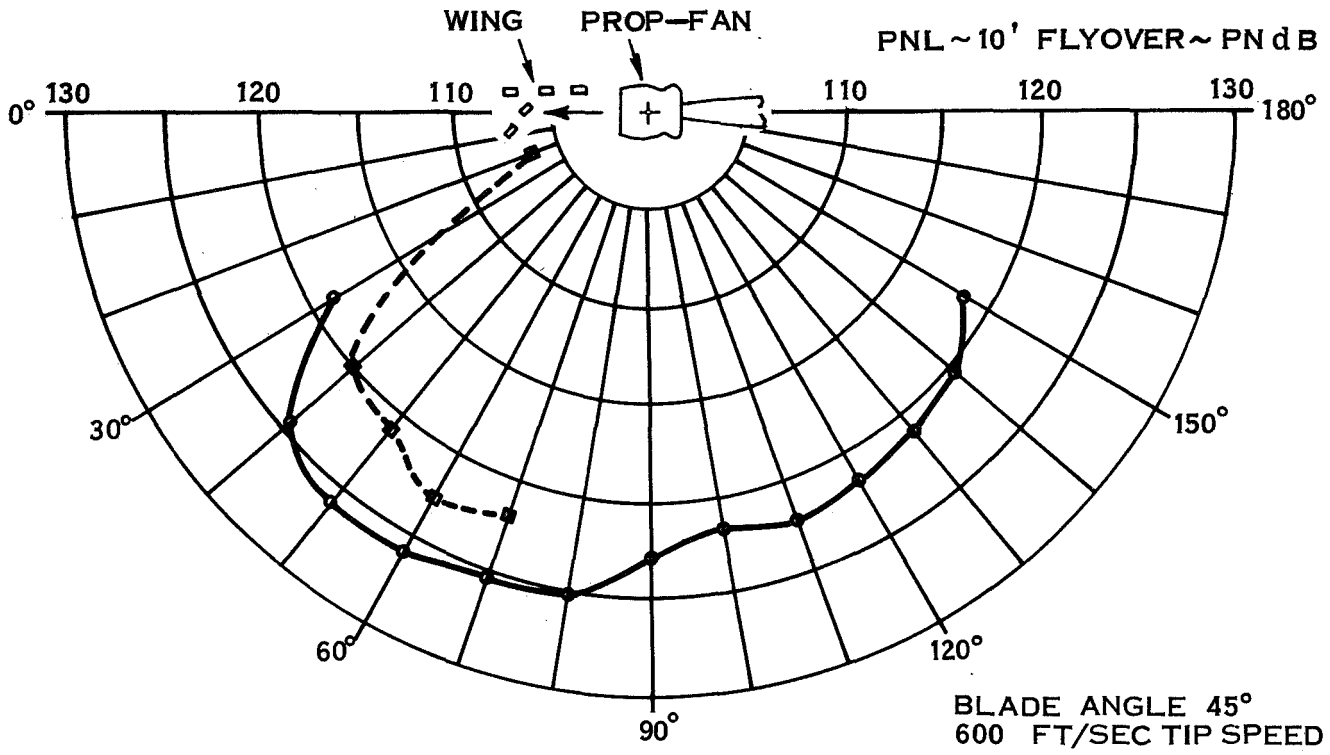


FIGURE 11. PROP–FAN/STOL WING NOISE
PNL ~ 10' FLYOVER



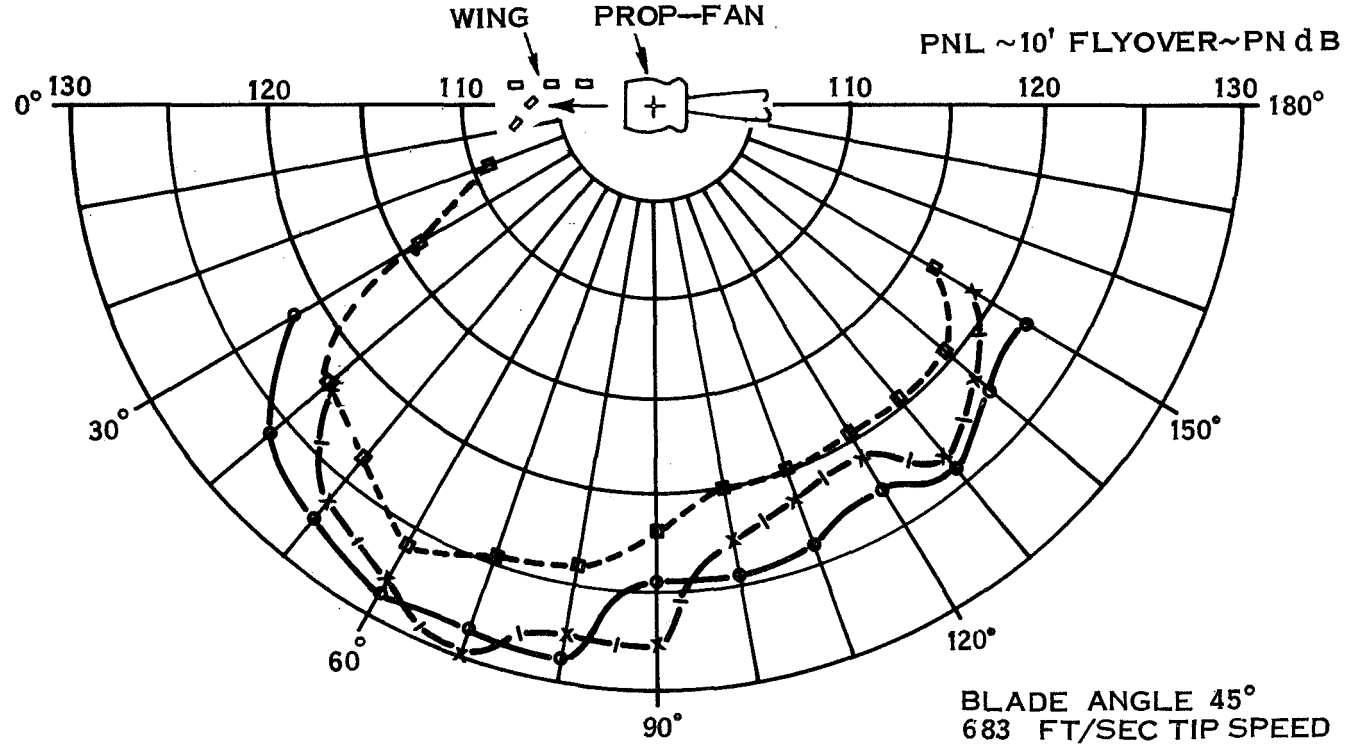


FIGURE 12 PROP–FAN/STOL WING NOISE
PNL ~10' FLYOVER

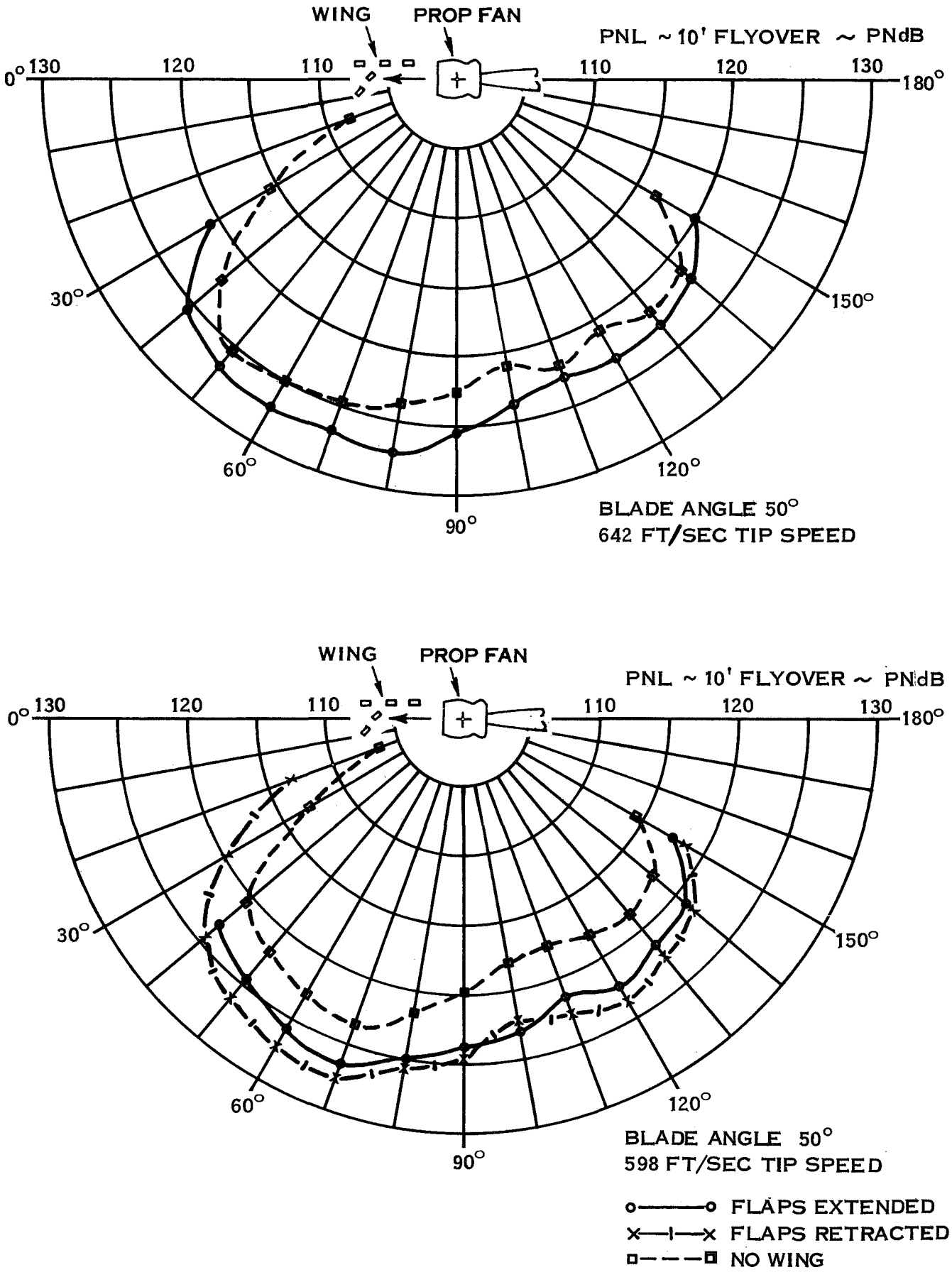


FIGURE 13 PROP-FAN/STOL WING NOISE
PNL ~ 10' FLYOVER

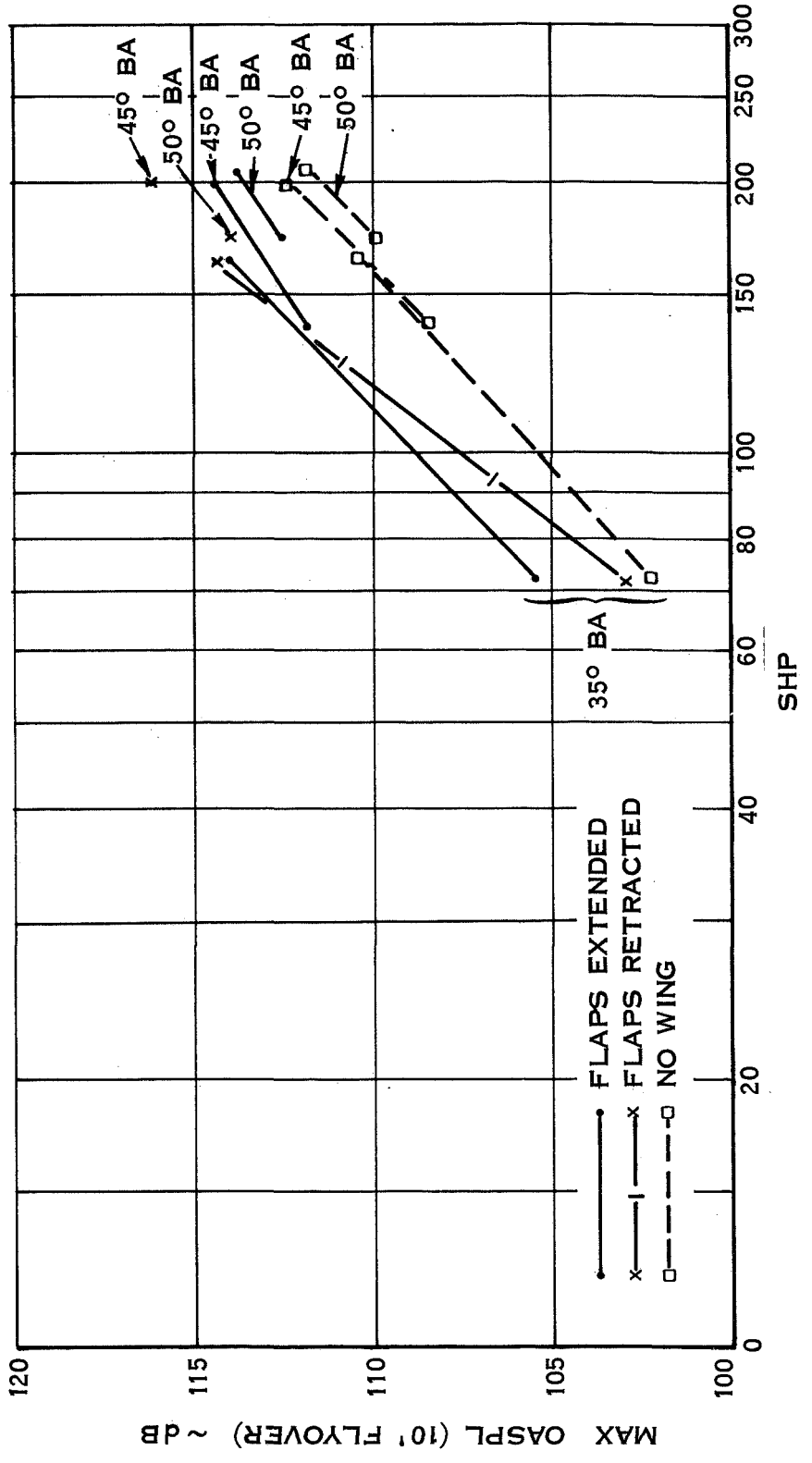


FIGURE 14 PROP-FAN/STOL WING OVERALL NOISE

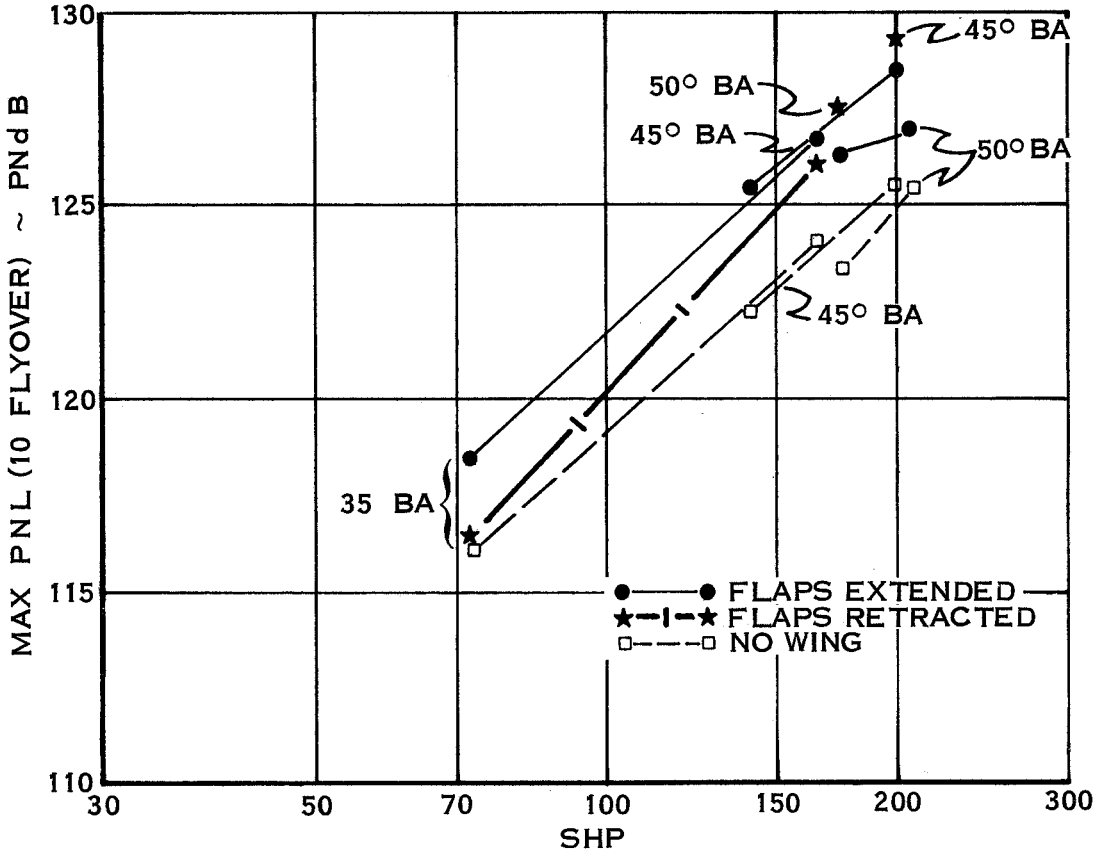


FIGURE 15. PROP–FAN/STOL WING PERCEIVED NOISE

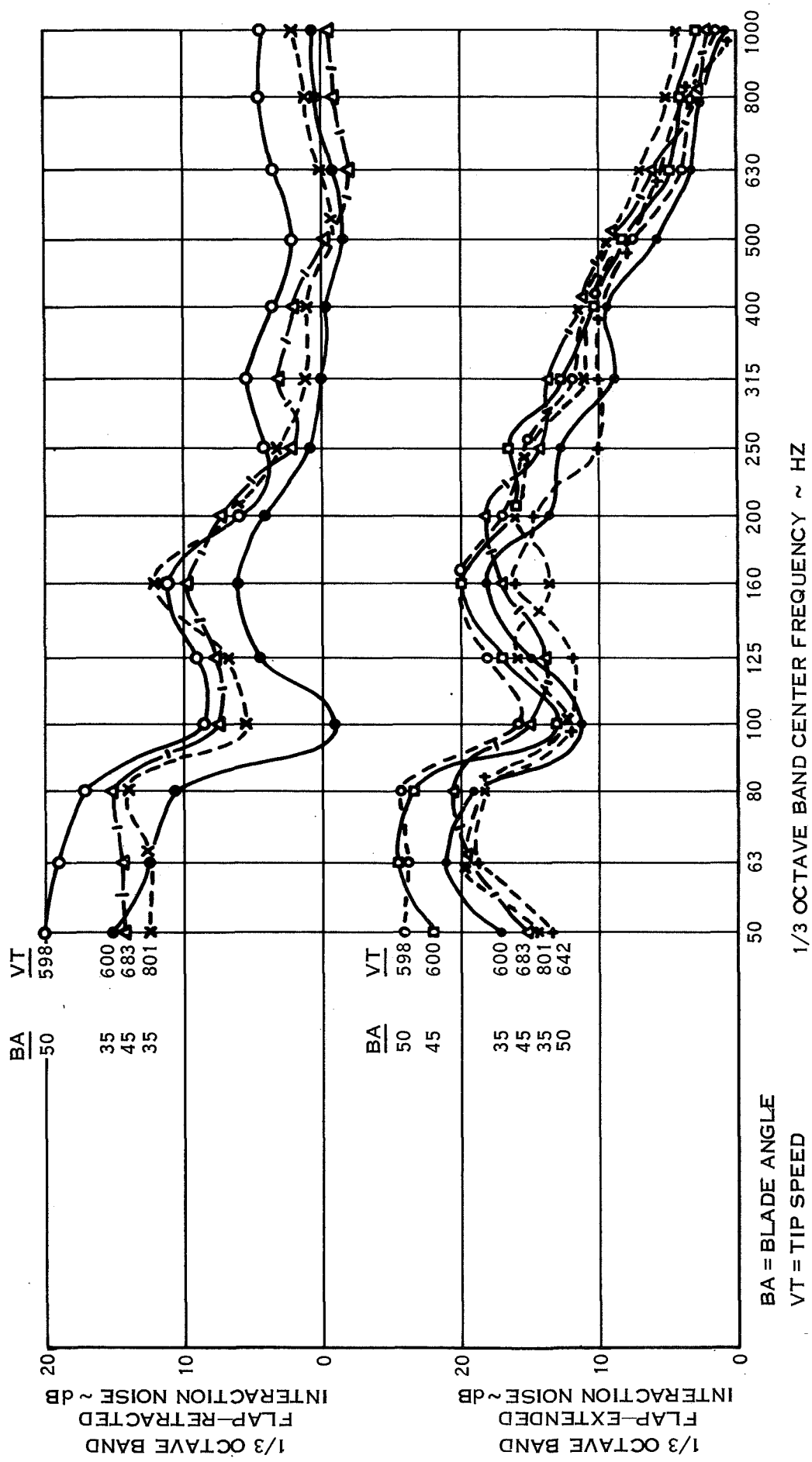
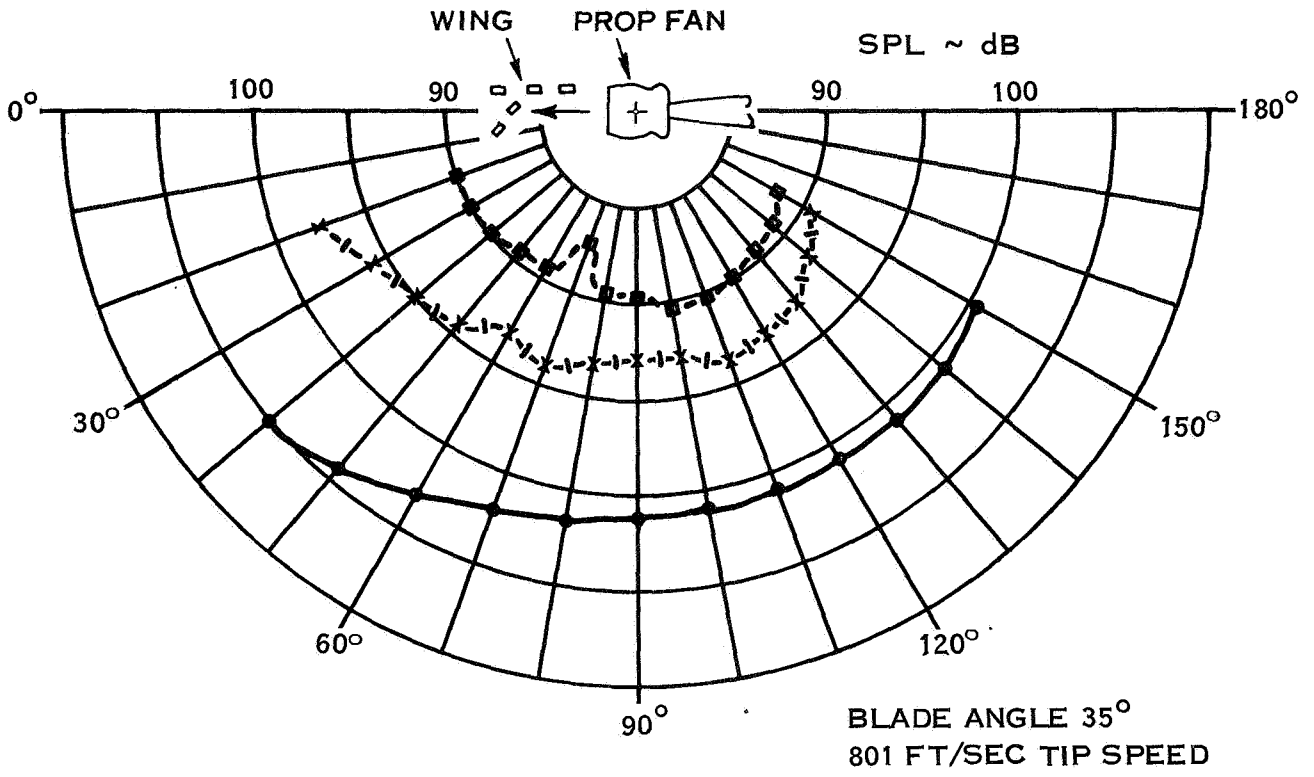


FIGURE 16 PROP-FAN/STOL WING INTERACTION NOISE (@10'-60° MICROPHONE LOCATION)



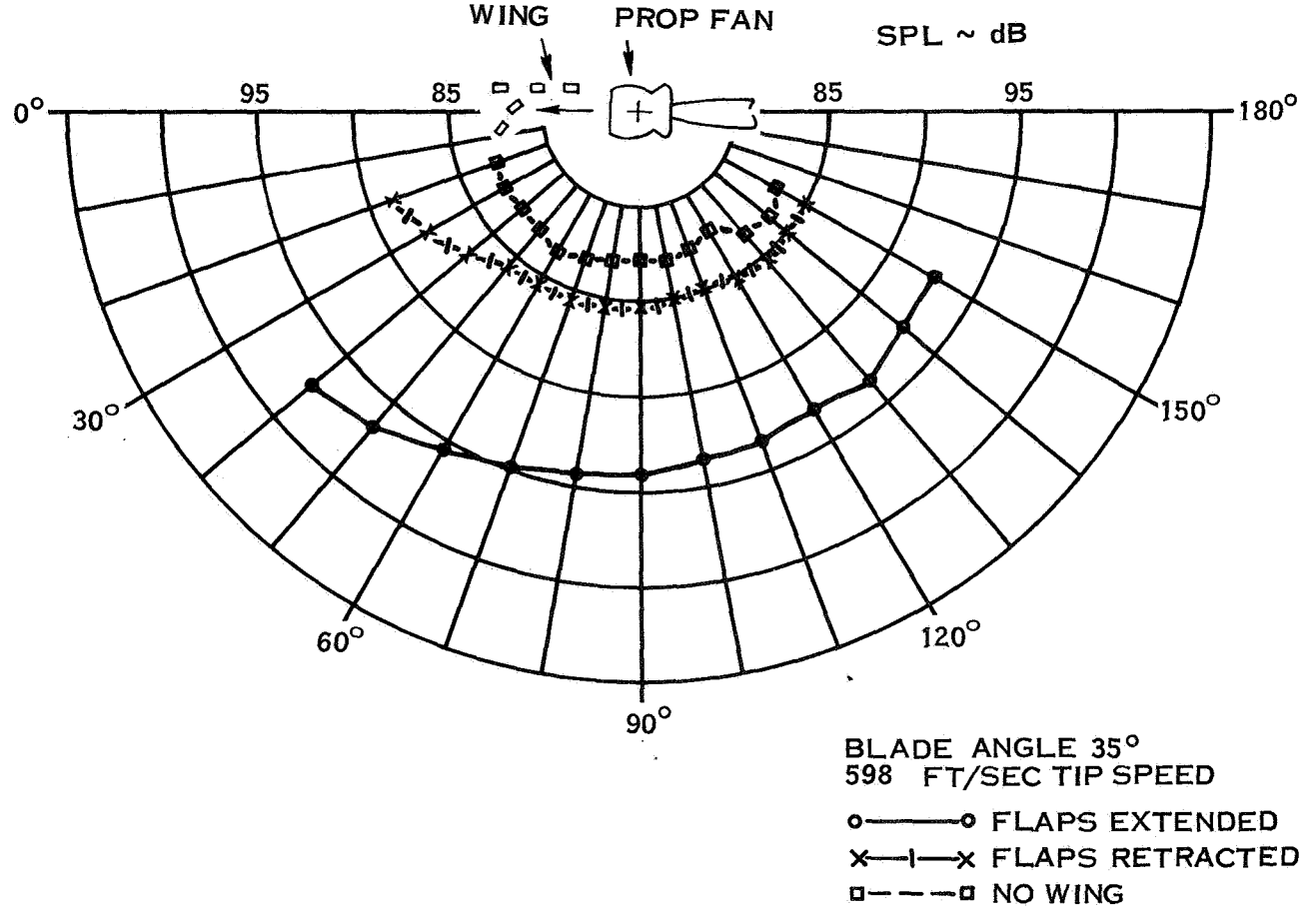


FIGURE 17 PROP–FAN STOL WING LOW FREQUENCY NOISE (112–449 HZ)

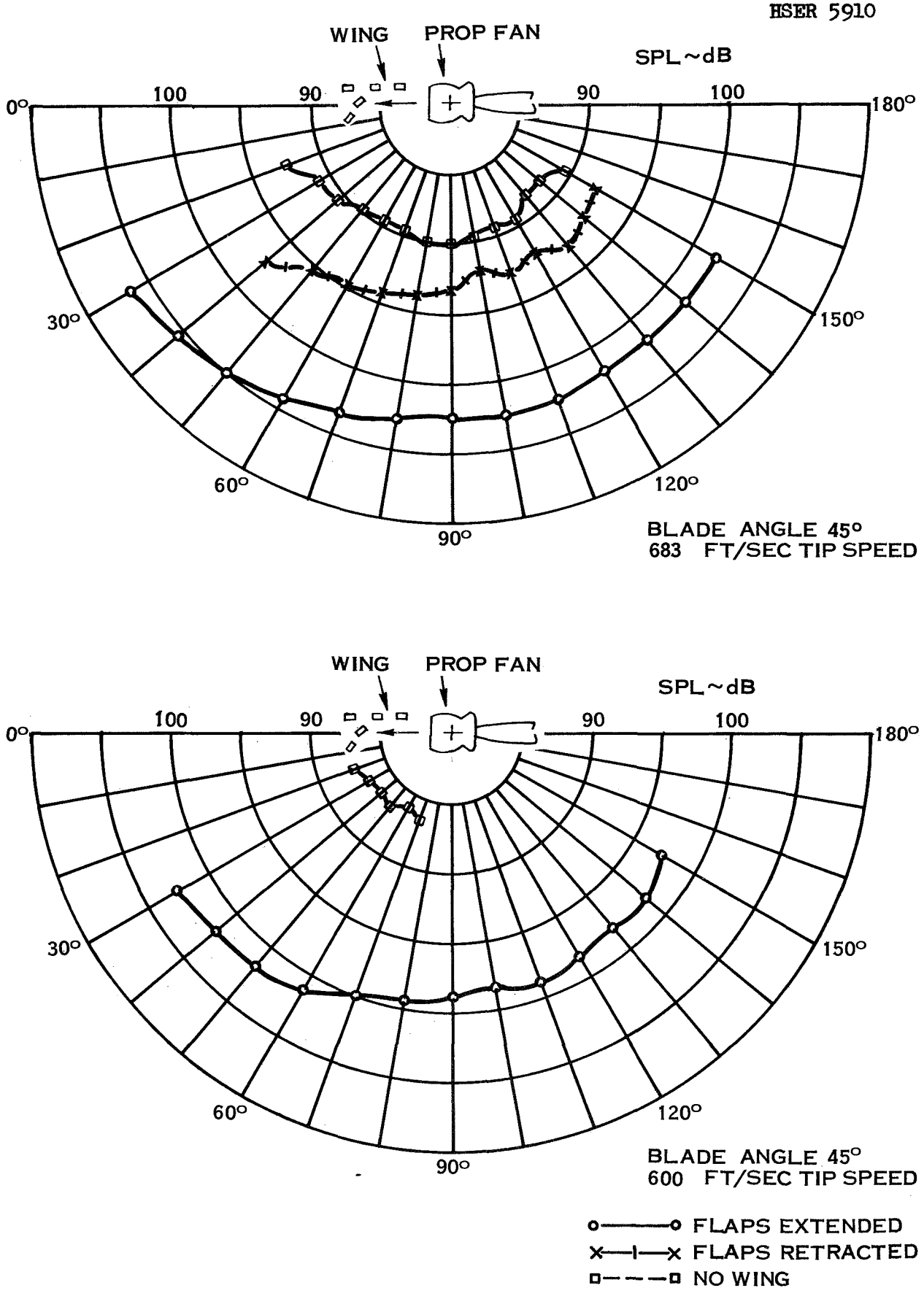
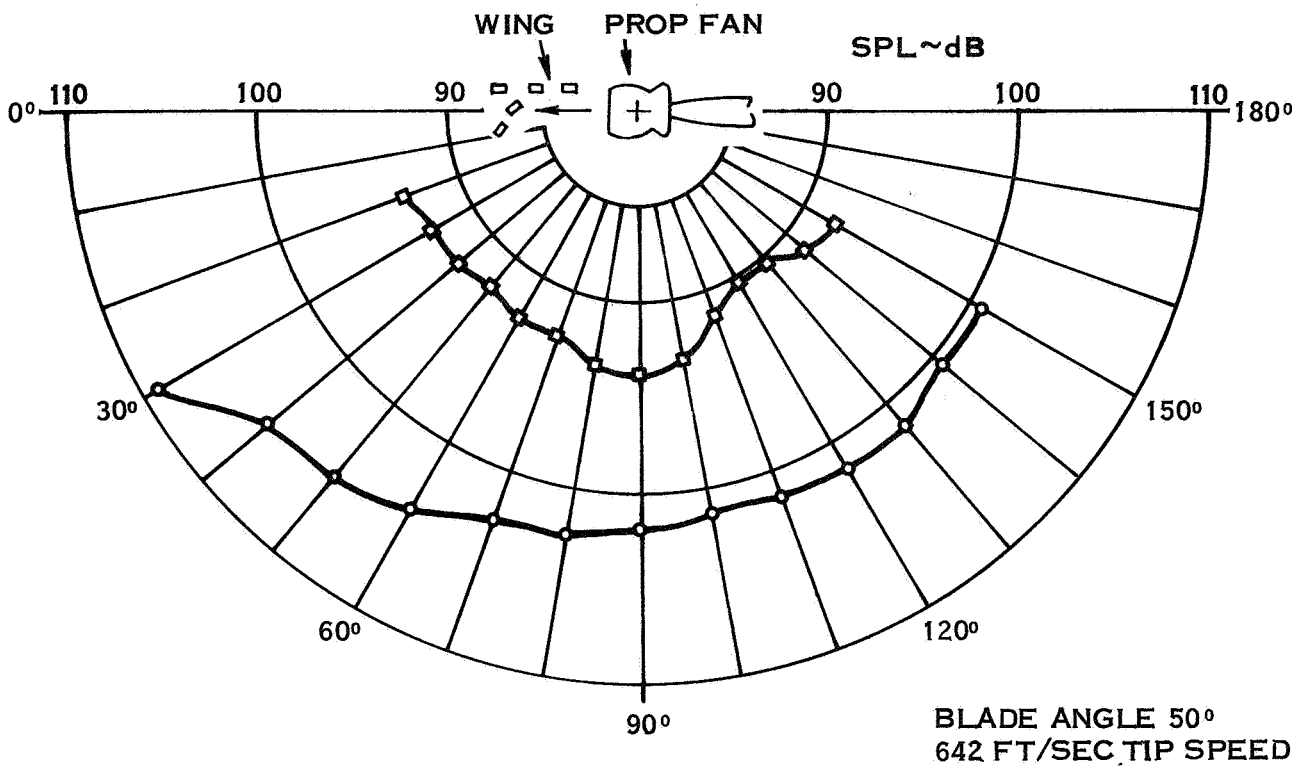


FIGURE 18 PROP–FAN STOL WING LOW FREQUENCY NOISE (112–449 HZ)



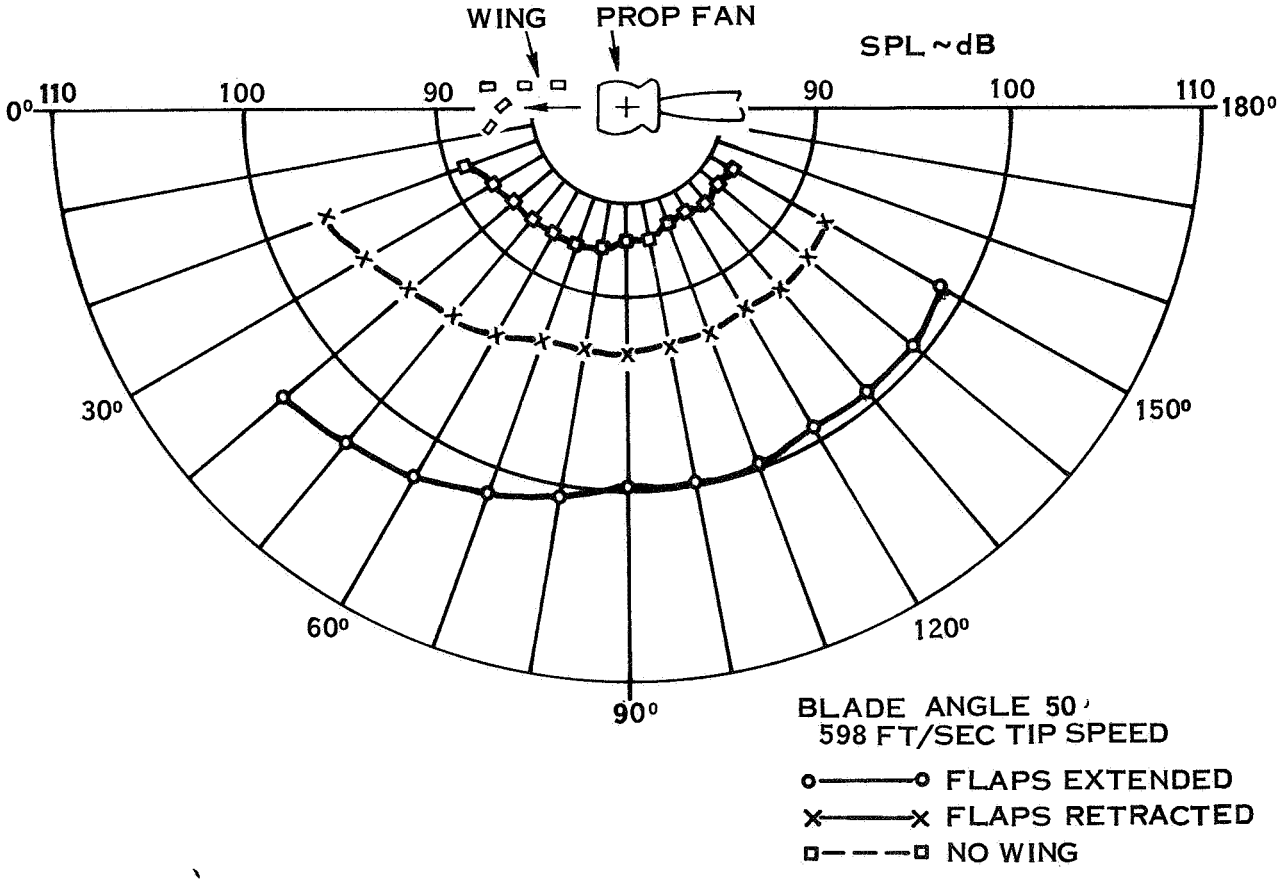
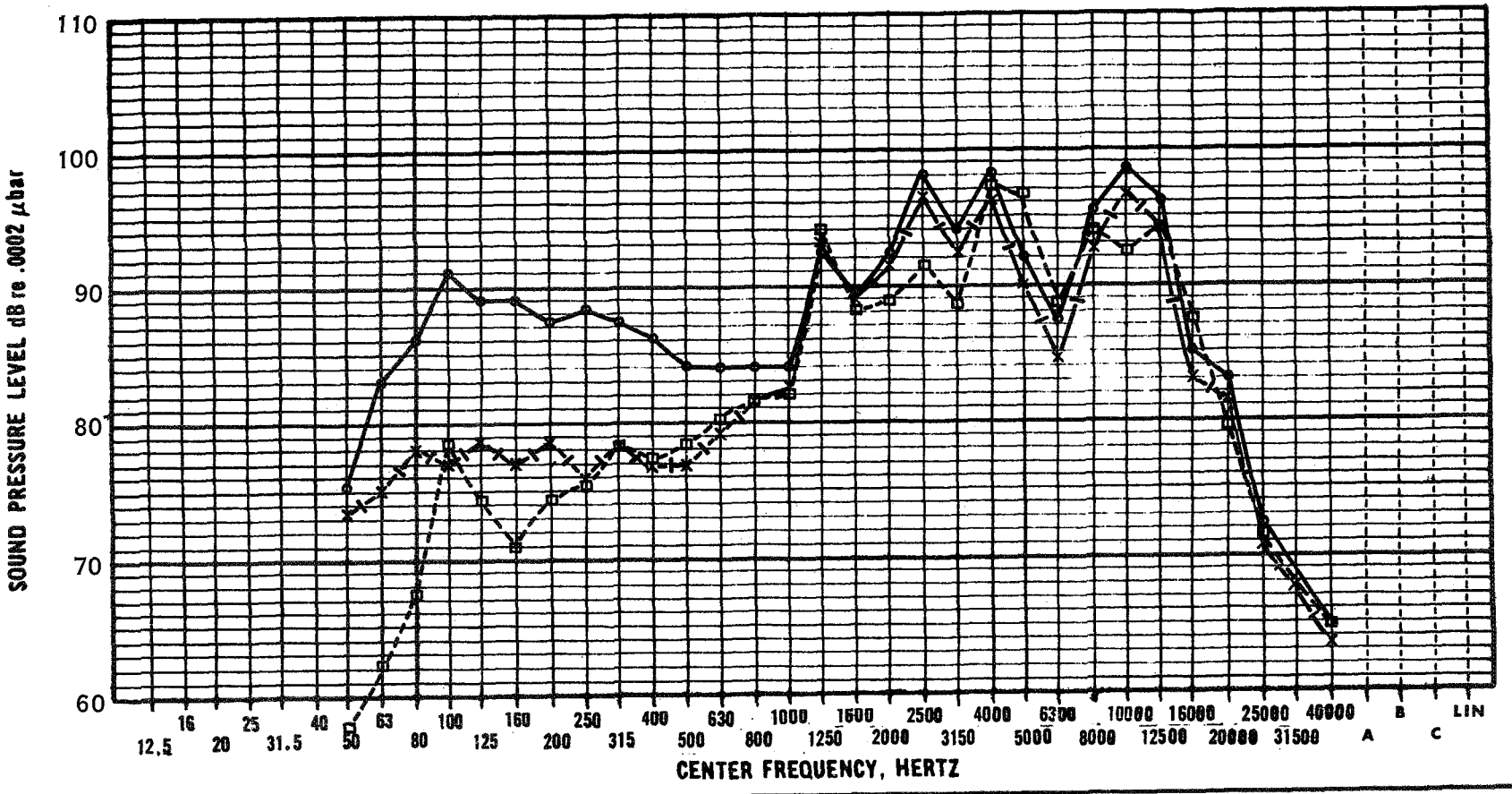


FIGURE 19 PROP–FAN STOL WING LOW FREQUENCY NOISE (112–449 HZ)



Hamilton Standard — DIVISION OF UNITED AIRCRAFT CORP. — ONE THIRD OCTAVE BAND ANALYSIS

TITLE: PROP – FAN/STOL WING NOISE
35° BA 600 ft/SEC Vt

Test Date _____ Run No. _____

Mic Location 10'–60° Reel No. _____

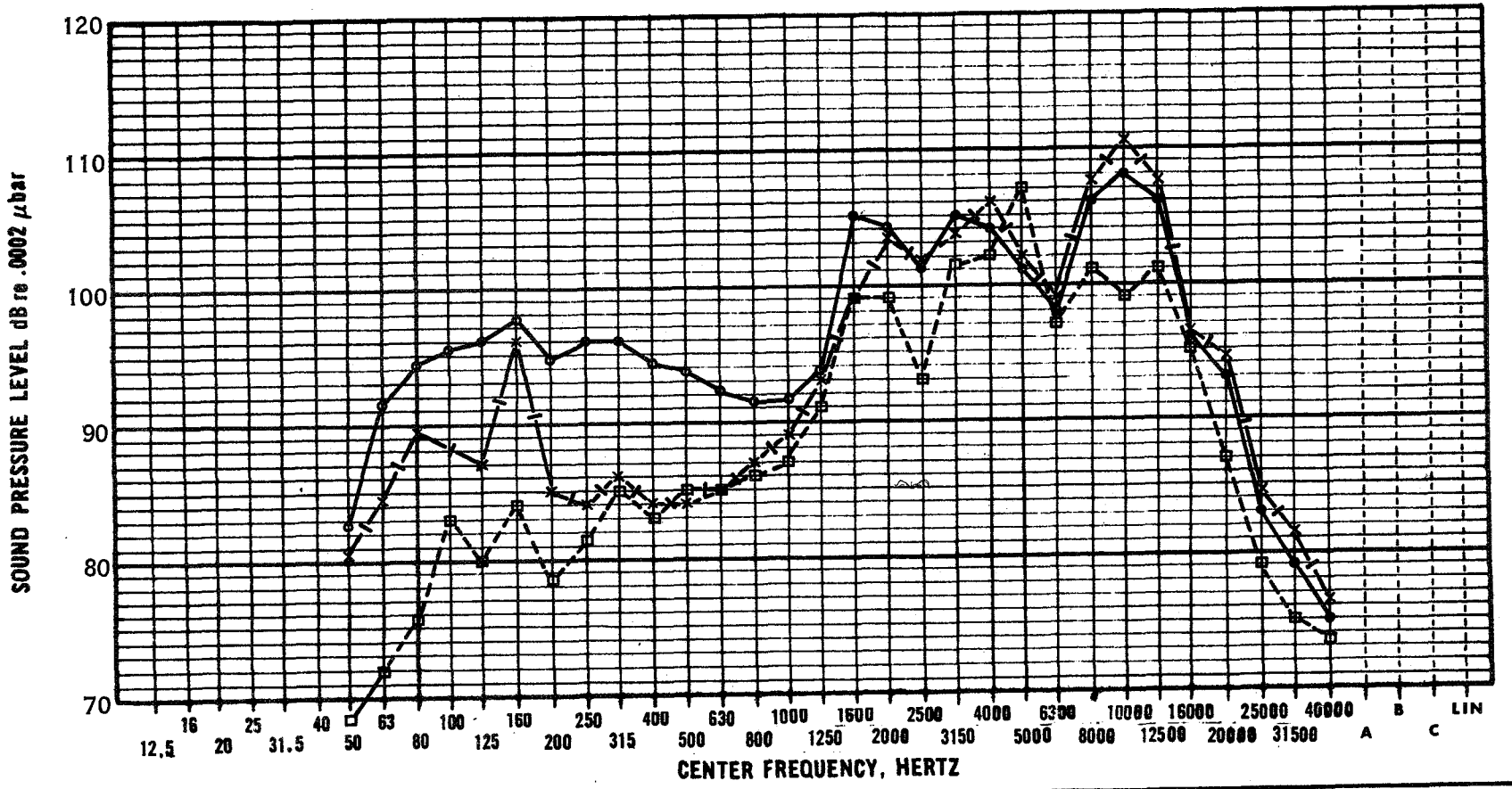
Analysed By _____ Identification No. _____

Analysis Method _____ Sheet ____ of ____

Comments, Sketches, Etc.

o———o FLAPS EXTENDED
x—|—x FLAPS RETRACTED
□– – –□ NO WING

FIGURE 20



Hamilton Standard — DIVISION OF UNITED AIRCRAFT CORP. — UA®

ONE THIRD OCTAVE BAND ANALYSIS

TITLE: PROP-FAN / STOL WING NOISE
35° BA 801 ft/SEC Vt

Test Date _____ Run No. _____

Mic Location 10'-60° Reel No. _____

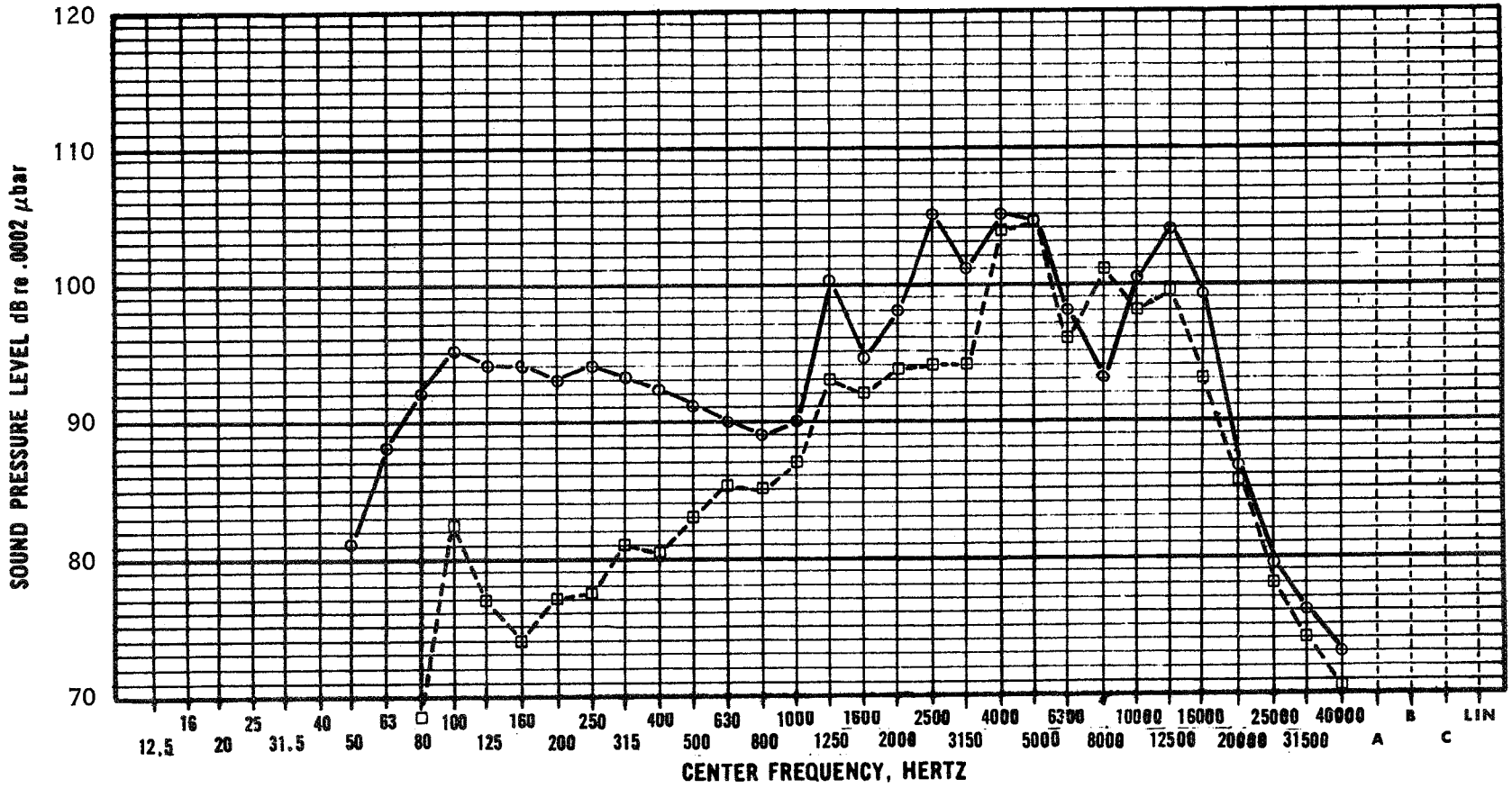
Analysed By _____ Identification No. _____

Analysis Method _____ Sheet ___ of ___

Comments, Sketches, Etc.

o——o FLAPS EXTENDED
x—|—x FLAPS RETRACTED
□- - -□ NO WING

FIGURE 21



Hamilton Standard — DIVISION OF UNITED AIRCRAFT CORP. — ONE THIRD OCTAVE BAND ANALYSIS

TITLE: PROP–FAN/STOL WING NOISE
45 DEG BA 600 FT/SEC VT

Test Date _____ Run No. _____

Mic Location 10'–60° Reel No. _____

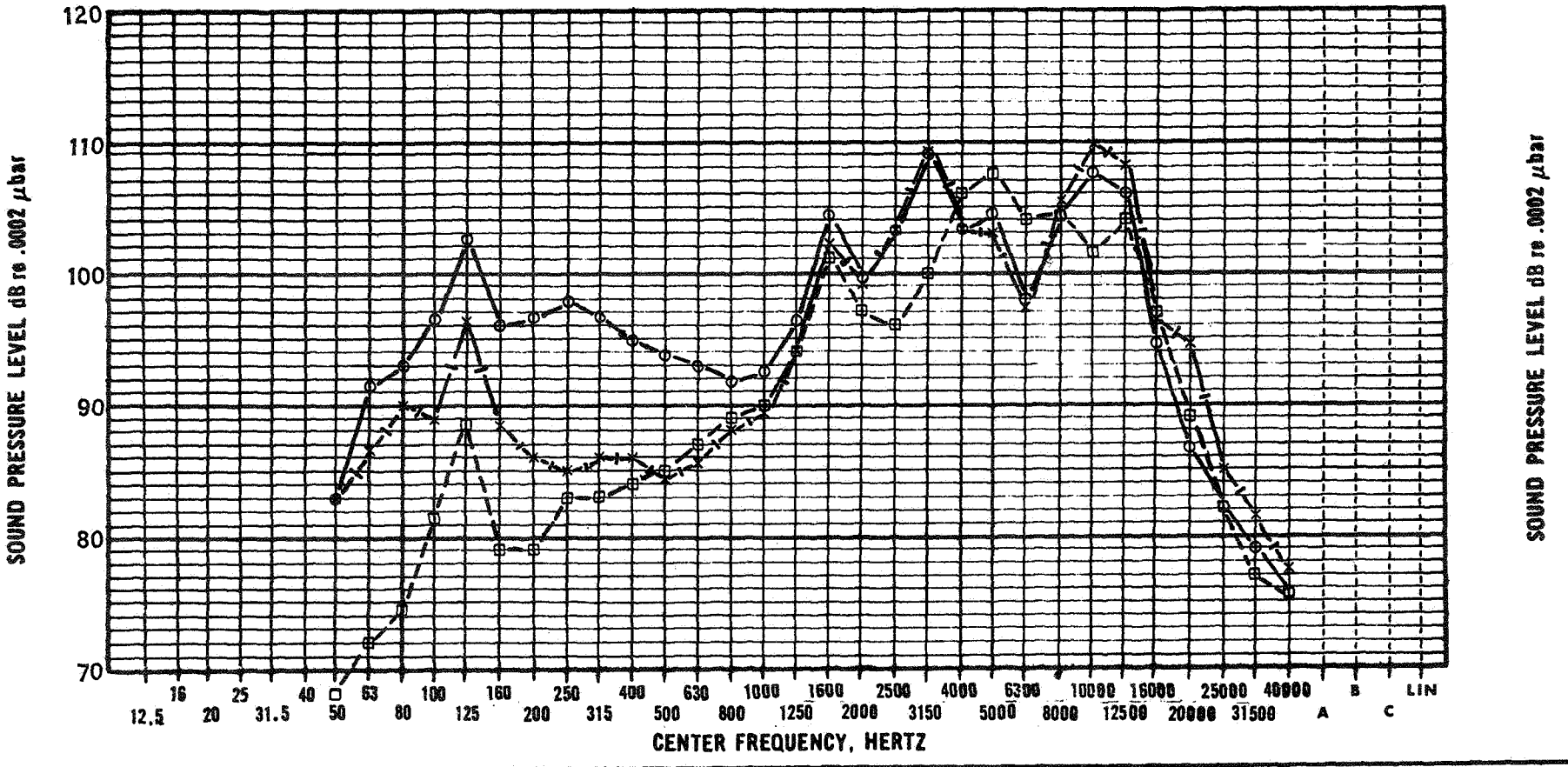
Analysed By _____ Identification No. _____

Analysis Method _____ Sheet ____ of ____

Comments, Sketches, Etc.

- o——o FLAPS EXTENDED
- x—|—x FLAPS RETRACTED
- □— — —□ NO WING

FIGURE 22



Hamilton Standard — DIVISION OF UNITED AIRCRAFT CORP. — UA

ONE THIRD OCTAVE BAND ANALYSIS

TITLE PROP-FAN/STOL WING NOISE
45 DEG BA 683 FT/SEC VT

Test Date _____ Run No. _____

Mic Location 10'–60° Reel No. _____

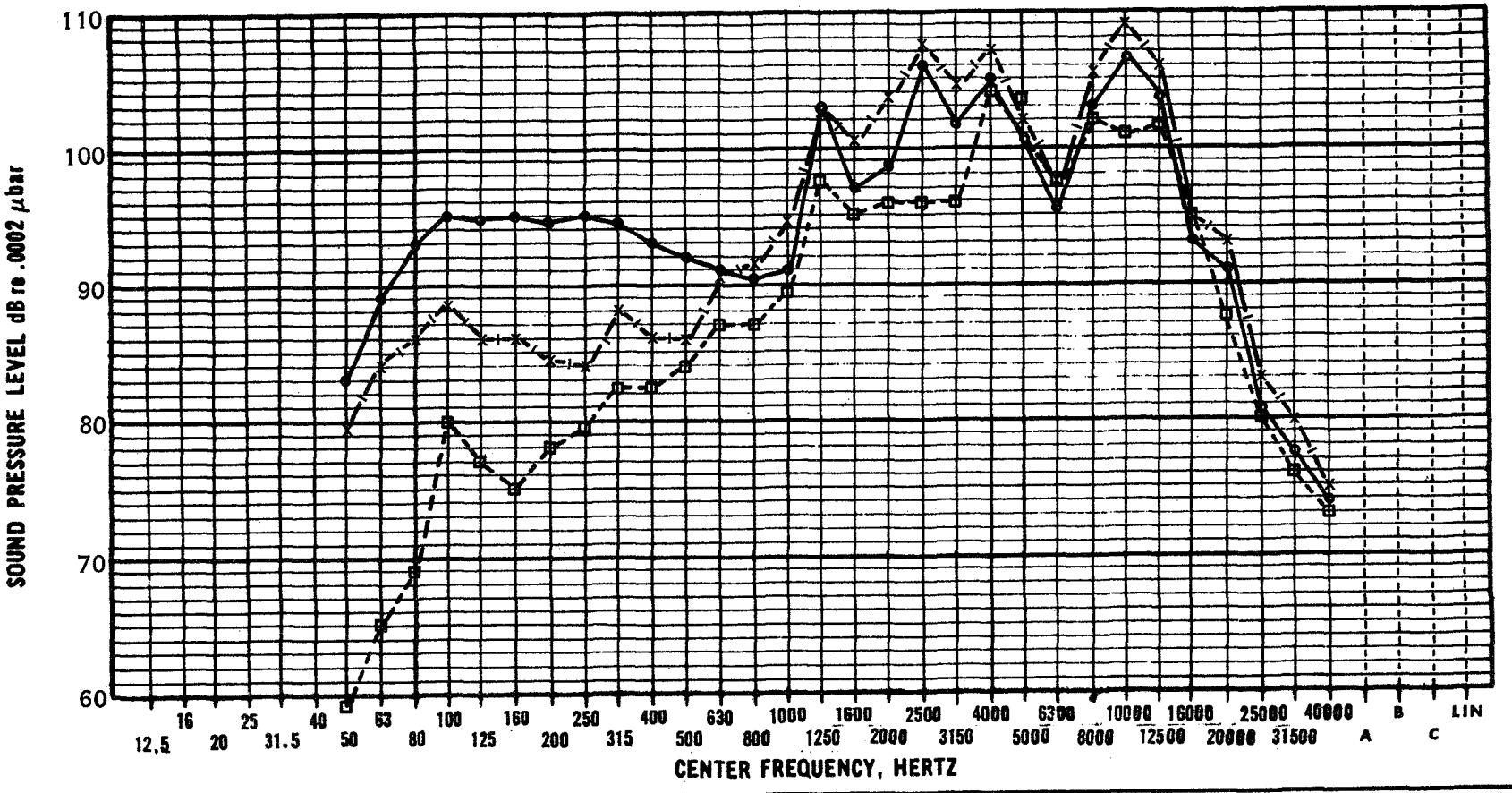
Analysed By _____ Identification No. _____

Analysis Method _____ Sheet ____ of ____

Comments, Sketches, Etc.

- o——o FLAPS EXTENDED
- x—|—x FLAPS RETRACTED
- □– – –□ NO WING

FIGURE 23



Hamilton Standard — DIVISION OF UNITED AIRCRAFT CORP. — ONE THIRD OCTAVE BAND ANALYSIS

TITLE PROP–FAN/STOL WING NOISE
50° BA 598 ft/SEC Vt

Test Date _____ Run No. _____

Mic Location 10'–60° Reel No. _____

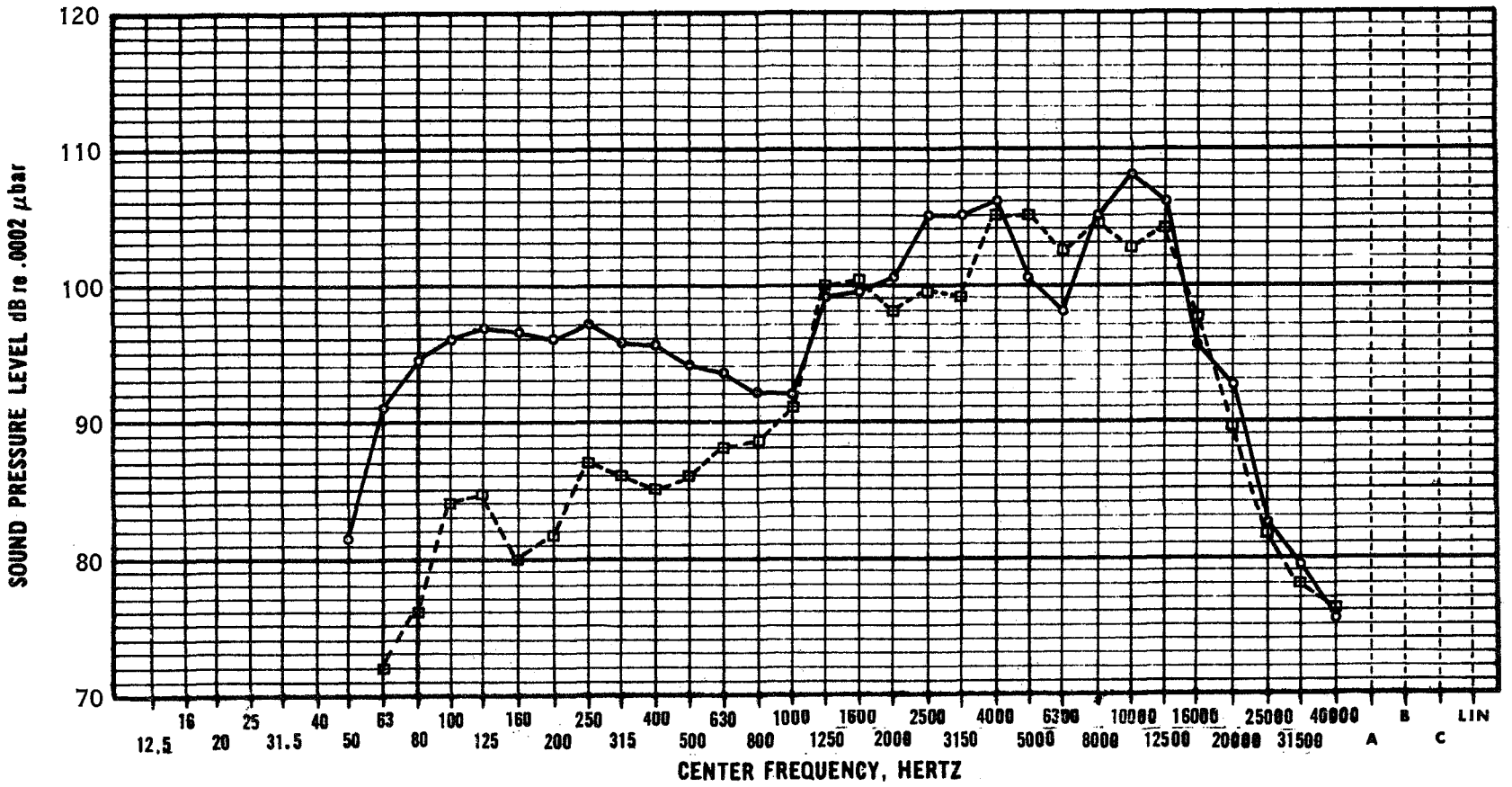
Analysed By _____ Identification No. _____

Analysis Method _____ Sheet ____ of ____

Comments, Sketches, Etc.

o——o FLAPS EXTENDED
×—|—× FLAPS RETRACTED
□– – –□ NO WING

FIGURE 24



Hamilton Standard — DIVISION OF UNITED AIRCRAFT CORP. — UA®

ONE THIRD OCTAVE BAND ANALYSIS

TITLE PROP – FAN / STOL WING NOISE
50° BA 642 ft/ SEC Vt

Test Date _____ Run No. _____

Mic Location 10' – 60° Reel No. _____

Analysed By _____ Identification No. _____

Analysis Method _____ Sheet ____ of ____

Comments, Sketches, Etc.

o——o FLAPS EXTENDED
×—|—× FLAPS RETRACTED
□— — —□ NO WING

FIGURE 25

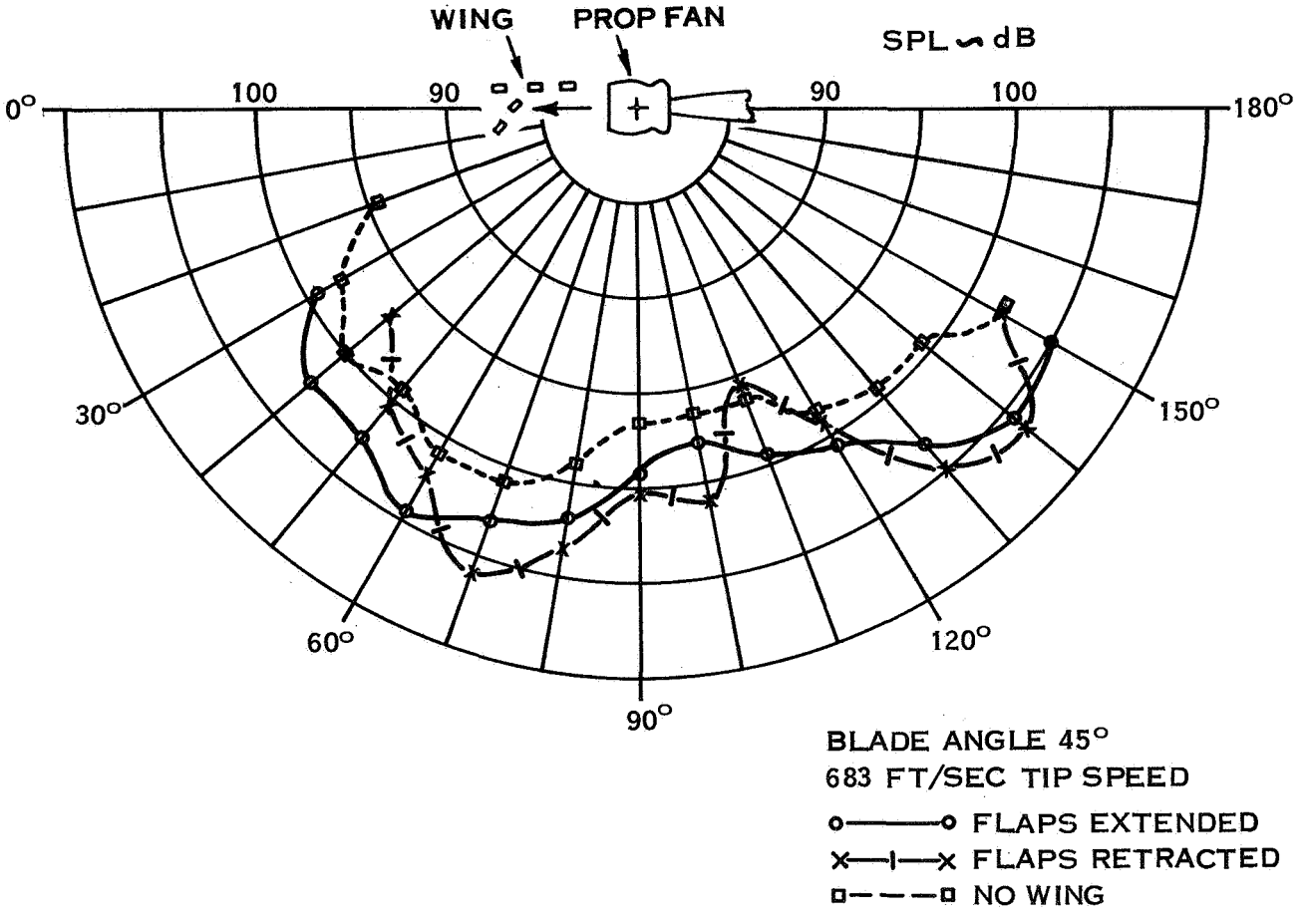
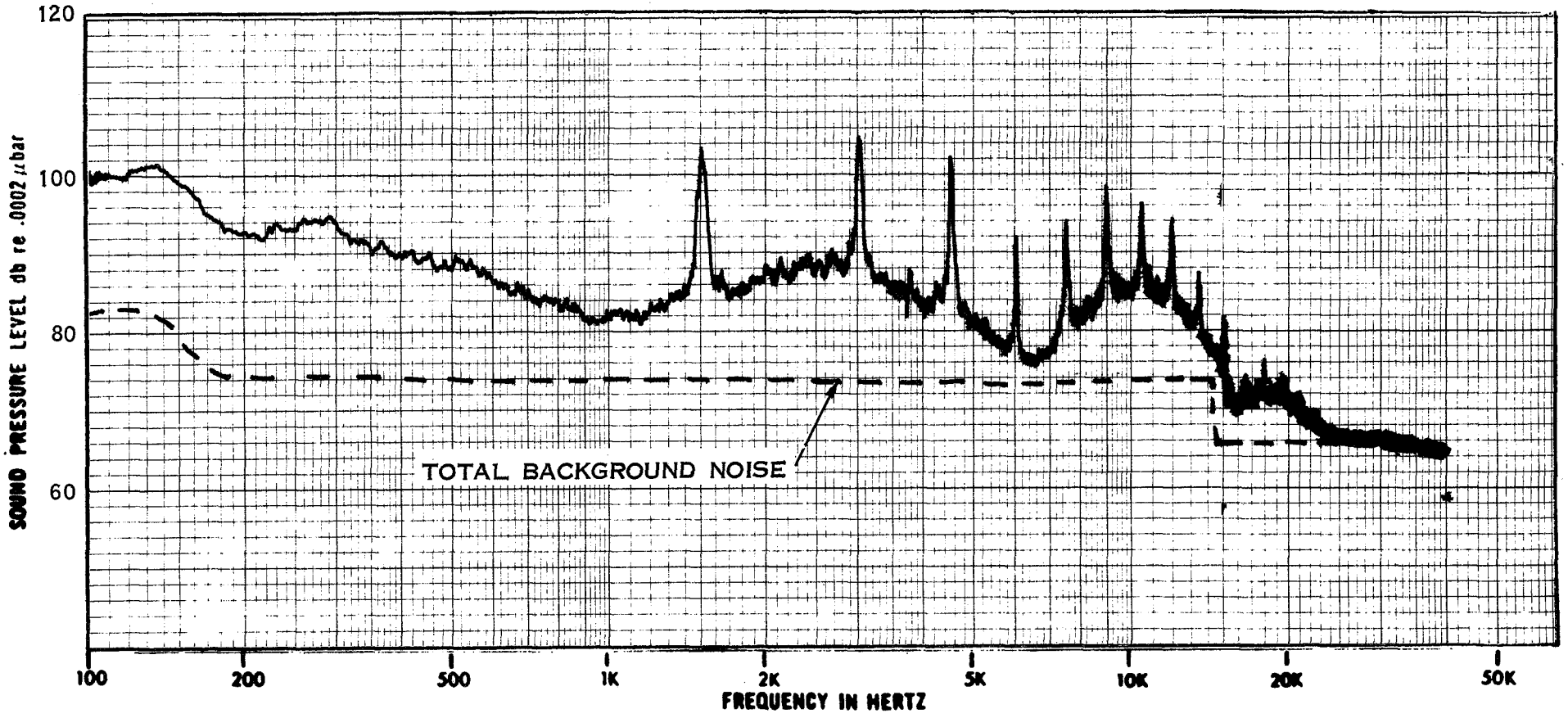


FIGURE 26 PROP–FAN/STOL WING NOISE FUNDAMENTAL OF BLADE PASSING FREQUENCY



Hamilton Standard — DIVISION OF UNITED AIRCRAFT CORP. — SPECTRUM ANALYSIS

TITLE: PROP–FAN/STOL WING NOISE

ANALYSIS EQUIPMENT: 40 Hz CONSTANT BANDWIDTH FILTER~0.5 SEC AVERAGING TIME

Sheet ___ of ___ Date _____ Analyzed by _____

Comments, Sketches, Etc.

FLAPS EXTENDED

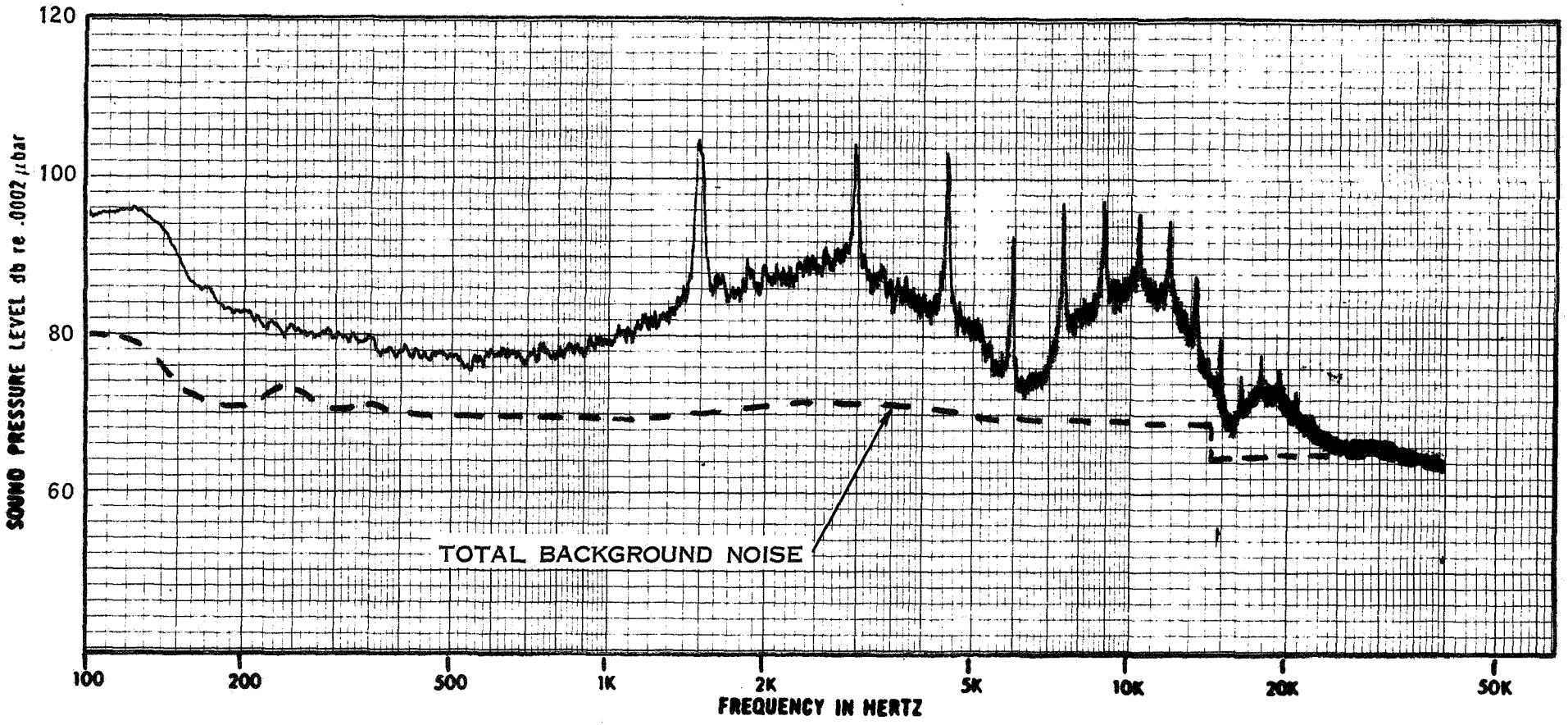
BLADE ANGLE: 45°

TIP SPEED: 683 FT/SEC

MICROPHONE LOCATION: 10' – 60°

HSF-1678 3/68*

Figure 27



Hamilton Standard — DIVISION OF UNITED AIRCRAFT CORP. — SPECTRUM ANALYSIS

TITLE: PROP–FAN/STOL WING NOISE

ANALYSIS EQUIPMENT: 40 Hz CONSTANT BANDWIDTH FILTER~0.5 SEC AVERAGING TIME

Sheet ___ of ___ Date _____ Analyzed by _____

Comments, Sketches, Etc.

FLAPS RETRACTED

BLADE ANGLE 45°

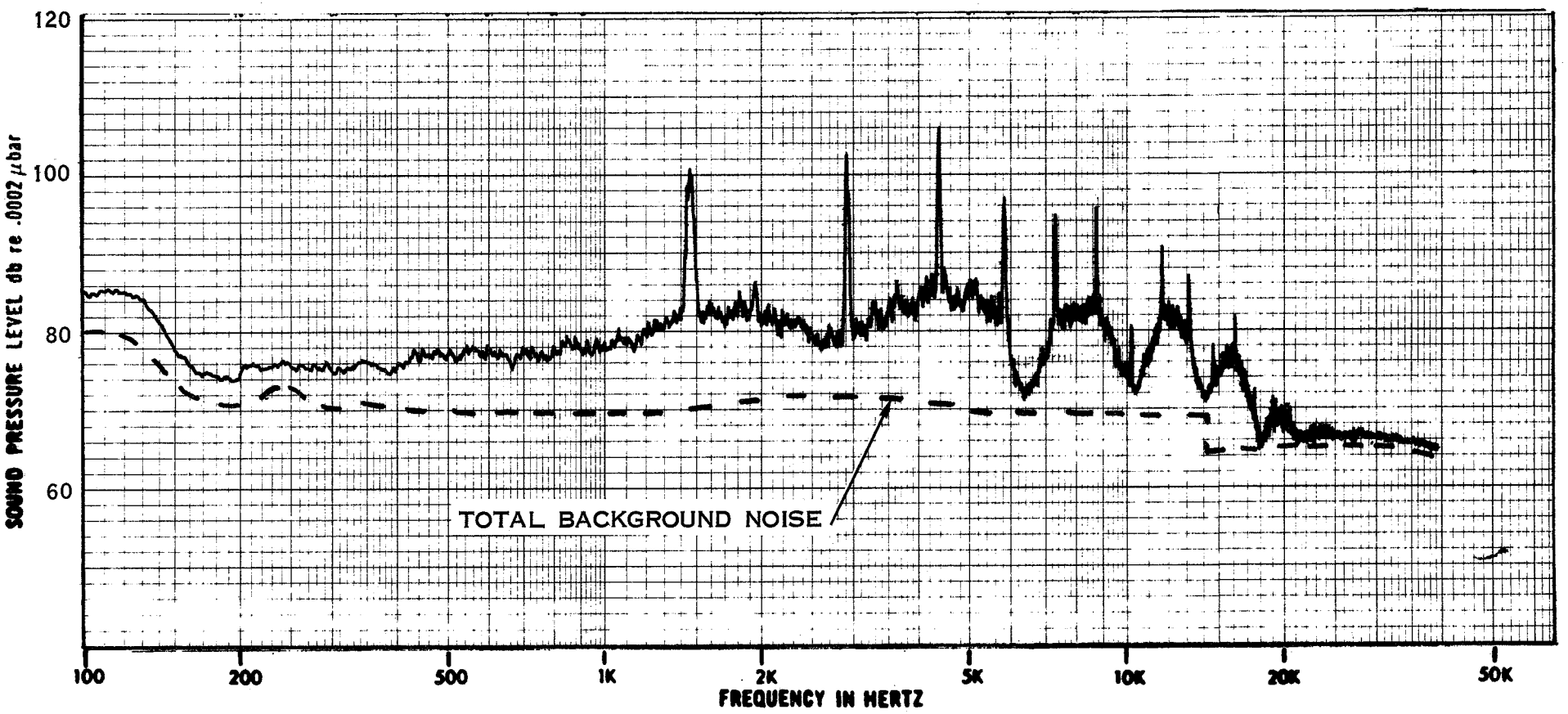
TIP SPEED 683 FT/SEC

MICROPHONE LOCATION 10' – 60°

HSF-1678 3/68*

Figure 28

HSER 5910



Hamilton Standard — DIVISION OF UNITED AIRCRAFT CORP. — UA — SPECTRUM ANALYSIS

TITLE: PROP–FAN/STOL WING NOISE

ANALYSIS EQUIPMENT: 40 H_Z CONSTANT BANDWIDTH FILTER~0.5 SEC AVERAGING TIME

Sheet ___ of ___ Date _____ Analyzed by _____

Comments, Sketches, Etc.

NO WING

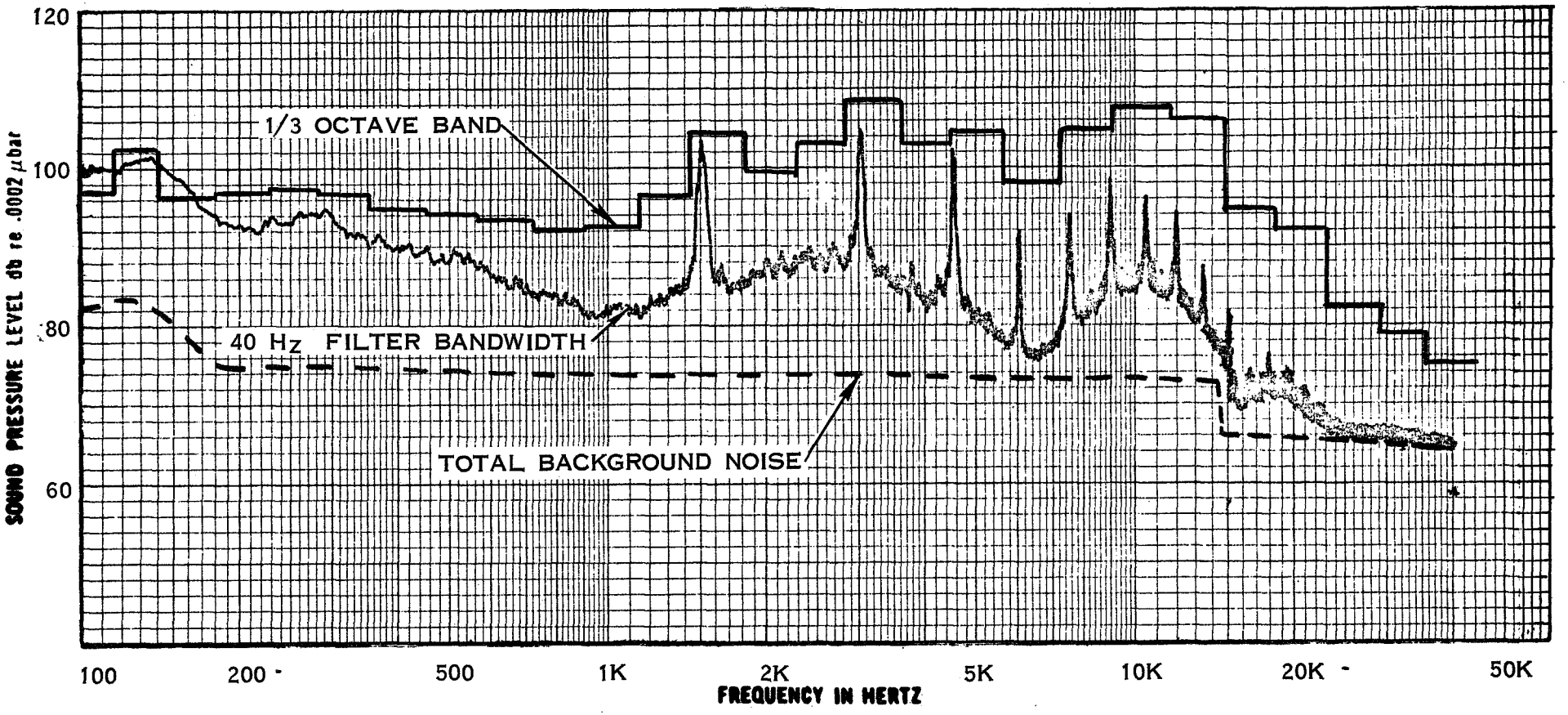
BLADE ANGLE 45°

TIP SPEED 683 FT/SEC

MICROPHONE LOCATION 10' – 60°

HSF-1678 3/68*

Figure 29



Hamilton Standard — DIVISION OF UNITED AIRCRAFT CORP. • SPECTRUM ANALYSIS

TITLE: PROP-FAN/STOL WING NOISE

COMPARISON OF 1/3 OCTAVE AND NARROW BAND ANALYSES

ANALYSIS EQUIPMENT: 1/3 OCTAVE BAND AND 40 H_Z CONSTANT BANDWIDTH

Sheet ___ of ___ Date _____ Analyzed by _____

Comments, Sketches, Etc.

FLAPS EXTENDED

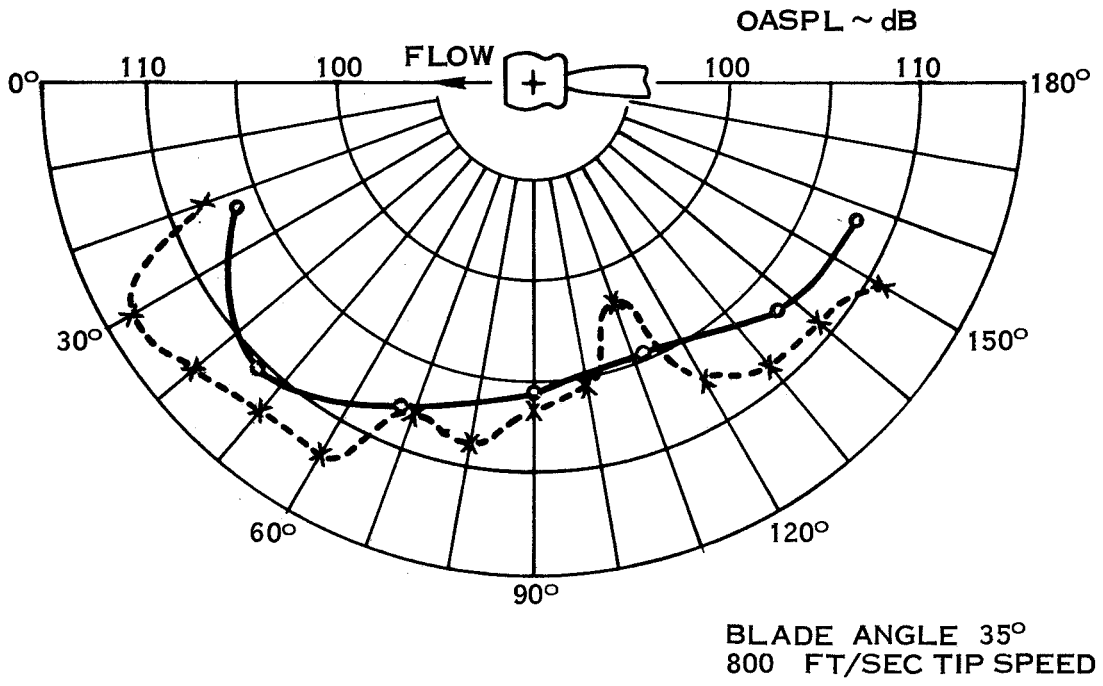
BLADE ANGLE 45°

TIP SPEED 683 FT/SEC

MICROPHONE LOCATION 10' – 60°

HSF-1678 3/68*

Figure 30



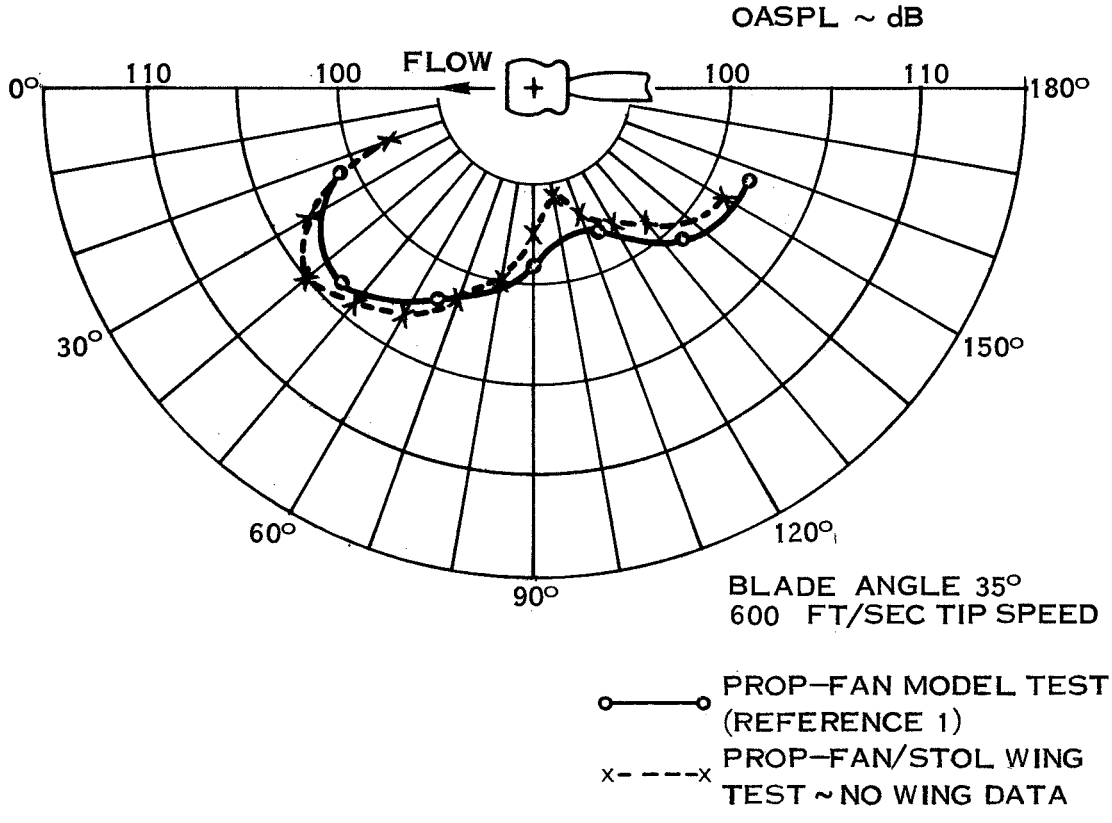


FIGURE 31. PROP-FAN NOISE COMPARISON CURVE

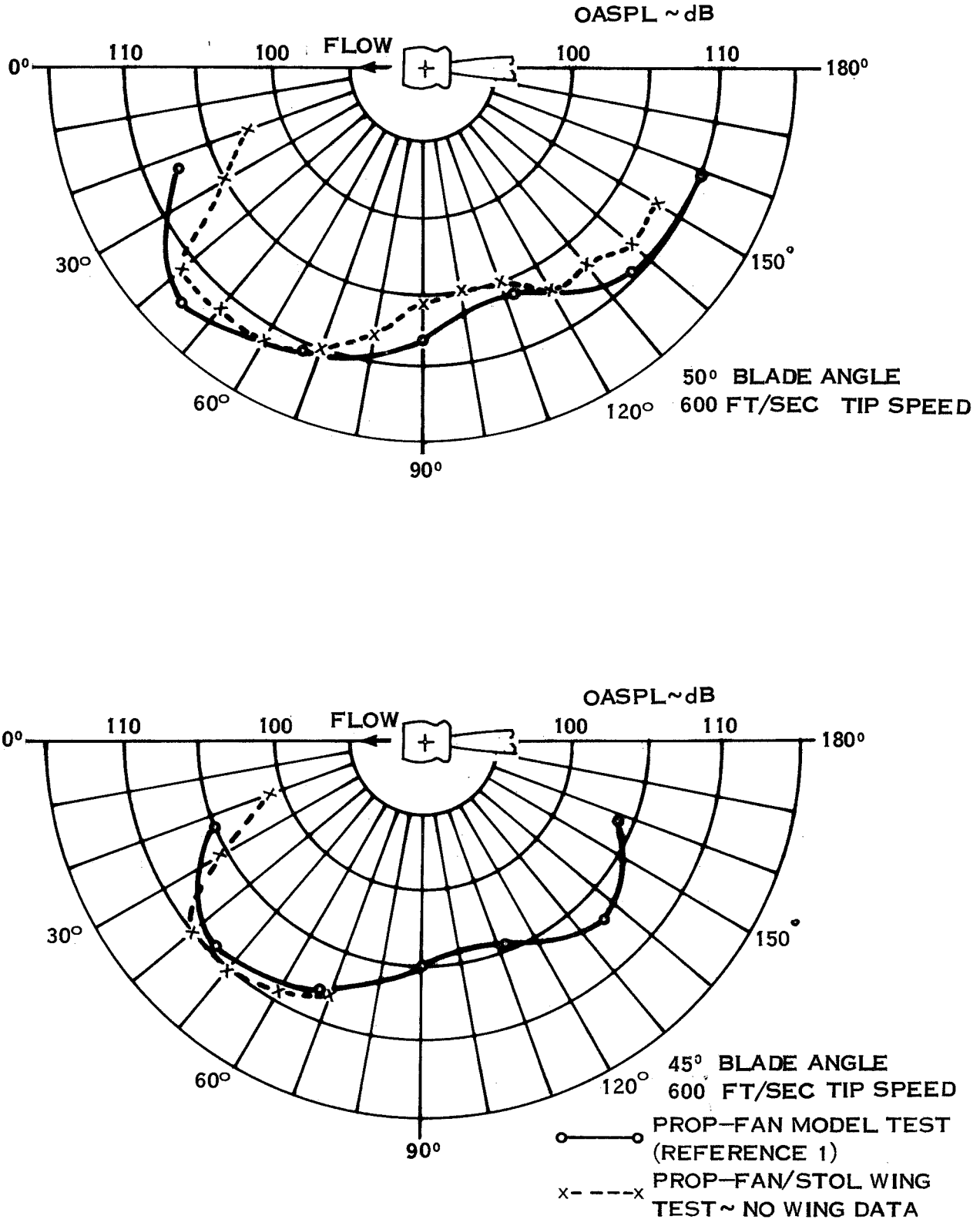


FIGURE 32. PROP-FAN NOISE COMPARISON CURVE

TABLE 1

PROP-FAN/STOL WING TEST CONDITIONS

Blade Angle (Deg)	Tip Speed (Ft/Sec)	STOL Wing Configuration
35	594	Flaps Extended
35	801	
45	600	
45	683	
50	598	
50	642	
35	598	Flaps Retracted
35	804	
45	685	
50	593	
35	600	No Wing
35	801	
45	598	
45	683	
50	599	
50	641	

TABLE 2

PROP-FAN/STOL WING NOISE TEST
AMBIENT CONDITIONS

Test	Temp (°F)	Relative Humidity (%)	Barometric Pressure (In Hg)	Wind Velocity (KTS)
Flaps Extended	19	50	30.10	5-10
Flaps Retracted	19	50	30.10	5-7
No Wing	30	35	30.20	5

APPENDIX A

ONE-THIRD OCTAVE BAND DATA

INTRODUCTION

This section contains the one-third octave band data for the sweep microphone, analyzed every 10° with a four second averaging time. The data is not continuous to zero degrees due to overloading of the microphone system caused by impingement of the Prop-Fan jet wake on the microphone. It should be noted that the data below 100 Hz is not considered completely reliable since this is the lower limit of the recording system frequency response (See Appendix B). In addition, data at frequencies above 15 KHz are influenced by total system background noise as shown in Figures 27 through 29. A detailed discussion of system and data accuracy is given in Appendix B.

TABLE 1A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- FLAPS EXTENDED
BLADE ANGLE- 35.0
TIP SPEED-594.0

		AZIMUTH ANGLE (DEG)															
		150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
	50	67.2	68.5	69.0	69.0	70.7	72.0	72.5	74.2	74.7	75.5	77.5	77.5				
	63	75.5	76.2	76.7	77.0	78.5	80.2	79.5	81.7	83.0	83.2	83.0	84.2				
	80	81.2	82.0	82.5	83.0	84.2	86.7	86.7	87.0	86.5	86.0	86.2	87.5				
	100	87.0	86.7	88.2	88.7	88.5	90.0	89.5	91.5	91.0	91.0	90.0	90.7				
	125	85.2	86.2	88.0	87.5	88.2	88.0	88.5	89.0	89.2	89.0	90.2	90.0				
	160	86.2	86.5	87.2	87.0	87.5	88.0	88.2	86.7	88.2	89.2	88.7	89.7				
	200	87.0	87.0	86.7	85.7	85.7	85.7	85.5	86.2	86.7	87.5	89.0	90.0				
	250	85.5	84.5	83.7	83.5	84.0	84.2	85.7	86.0	86.7	88.2	89.7	90.0				
	315	83.0	83.5	84.0	84.5	84.0	84.2	85.5	86.5	86.2	87.5	89.2	89.7				
F	400	80.7	81.5	82.2	81.7	82.5	83.0	83.0	84.7	85.0	86.7	87.2	88.2				
R	500	80.5	80.5	80.2	80.7	82.2	83.2	83.2	84.5	84.0	84.2	85.5	86.0				
E	630	80.7	79.7	80.2	81.2	81.0	81.5	82.5	83.2	83.5	84.0	84.7	85.7				
Q	800	81.5	81.2	81.5	81.0	81.5	81.5	82.0	83.5	83.2	84.0	84.2	84.0				
U	1000	83.0	82.0	81.5	80.2	80.2	80.5	80.7	84.0	83.2	84.0	84.5	85.2				
E	1250	96.2	96.0	92.0	91.2	89.7	90.0	90.0	96.5	93.0	94.2	96.2	94.7				
N	1600	87.7	87.2	85.7	84.5	84.5	84.0	84.7	89.5	88.0	89.2	89.2	87.7				
C	2000	88.7	89.0	88.0	86.7	85.7	85.7	87.0	90.5	91.0	92.2	92.5	91.0				
Y	2500	101.0	99.7	97.0	96.0	95.7	94.7	94.2	98.0	98.5	98.2	99.7	101.5				
	3150	91.7	90.5	89.7	88.5	87.7	87.5	88.2	92.2	92.7	93.7	94.2	95.0				
H	4000	94.5	94.2	93.0	92.0	91.2	90.0	91.5	95.7	96.0	97.7	98.7	98.7				
Z	5000	88.2	89.0	88.2	88.5	86.0	85.7	85.5	89.0	89.7	92.2	93.2	92.5				
	6300	83.2	83.0	82.7	81.7	80.2	80.5	80.7	84.5	85.2	87.5	87.7	87.7				
	8000	93.7	93.2	92.2	91.0	88.5	87.0	87.7	91.7	93.0	95.2	96.0	96.5				
	10000	97.0	96.7	95.7	94.5	92.0	90.0	90.7	94.5	96.2	98.2	100.0	100.2				
	12500	94.5	94.0	92.7	92.0	90.2	87.0	87.7	91.7	93.5	96.0	98.0	98.5				
	16000	83.2	83.2	82.5	81.5	79.7	78.0	78.0	82.0	83.0	85.0	87.7	88.0				
	20000	82.5	81.5	81.2	79.7	78.0	74.7	74.0	78.0	79.2	83.0	84.5	85.5				
	25000	70.2	70.2	69.5	68.2	66.2	64.7	64.5	68.5	69.2	72.2	74.7	75.2				
	31500	68.7	68.7	68.0	67.2	65.5	63.5	62.2	65.0	66.0	69.0	71.0	71.5				
	40000	65.0	66.2	65.5	64.7	63.5	62.0	60.5	62.0	62.2	64.5	66.0	66.2				
	DB(L)	105.5	105.0	103.2	102.2	101.2	100.7	100.7	104.7	105.0	106.0	107.7	107.7				
PNL	10FT FLYOVER	113.6	115.0	114.8	115.0	115.2	115.0	115.2	118.5	118.4	118.5	118.4	117.7				

TABLE 2A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- FLAPS EXTENDED
BLADE ANGLE- 35.0
TIP SPEED-801.0

		AZIMUTH ANGLE (DEG)															
		150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
	50	77.0	77.0	78.2	78.0	79.0	80.0	82.5	82.5	82.2	82.7	83.7	85.2				
	63	85.0	85.5	86.2	87.5	87.7	90.2	90.2	92.5	90.5	91.5	92.2	92.5				
	80	90.5	90.0	90.7	92.5	92.7	95.0	94.5	95.5	94.7	94.2	95.5	96.2				
	100	94.5	94.0	95.0	96.2	96.2	96.0	95.5	96.0	95.5	95.5	95.2	97.0				
	125	92.5	94.0	94.7	95.2	94.7	94.7	95.0	95.0	95.2	96.0	97.2	97.5				
	160	97.2	97.2	98.2	99.5	98.7	97.0	96.0	96.5	97.5	97.5	97.5	97.5				
	200	94.0	94.5	94.0	93.7	94.0	94.0	93.2	94.0	94.2	94.5	96.2	97.5				
	250	93.2	92.2	92.2	92.2	92.5	92.5	93.5	94.5	94.7	96.0	97.0	98.0				
	315	92.2	92.0	92.5	92.5	92.5	92.5	93.2	94.0	94.5	96.0	97.2	98.2				
F	400	89.0	89.0	90.2	89.5	91.0	91.0	91.0	91.5	93.0	94.2	95.5	96.5				
R	500	87.7	88.5	88.7	88.7	90.7	91.2	91.7	92.5	92.5	93.7	95.0	95.7				
E	630	87.5	88.2	88.0	88.7	89.2	91.0	91.2	91.7	92.2	92.2	93.0	93.7				
Q	800	88.0	88.2	88.2	87.7	88.7	89.2	89.2	90.7	91.0	91.2	91.2	92.0				
U	1000	88.7	88.2	88.2	88.0	87.7	88.0	88.5	89.2	90.2	91.5	92.5	92.5				
E	1250	90.0	89.7	90.2	89.2	88.7	88.7	89.7	91.7	92.5	93.5	93.7	93.5				
N	1600	103.7	103.5	105.0	102.2	97.7	98.2	98.5	100.2	101.5	105.0	103.0	102.0				
C	2000	102.5	101.7	104.0	101.0	97.0	98.0	98.7	100.2	102.5	104.2	103.0	102.0				
Y	2500	96.2	95.2	95.5	95.2	94.0	95.5	96.7	100.0	101.0	101.0	100.2	101.0				
	3150	103.0	101.5	101.7	101.0	99.0	99.0	100.5	103.0	104.0	105.2	106.2	105.0				
H	4000	100.7	99.5	100.5	98.7	97.2	97.5	99.2	101.2	102.2	104.0	104.7	103.2				
Z	5000	99.5	97.2	97.0	97.5	94.5	95.5	98.5	99.0	101.0	101.7	101.7	101.2				
	6300	95.0	93.2	94.2	94.0	92.2	91.2	93.2	96.2	96.0	98.7	99.5	99.0				
	8000	102.2	101.2	101.7	101.7	99.2	98.2	100.0	103.0	105.0	106.0	105.0	106.5				
	10000	106.0	105.5	105.0	105.2	103.2	102.2	103.5	105.7	106.2	107.7	109.5	110.0				
	12500	103.5	103.0	103.0	102.7	100.7	100.0	101.5	103.0	104.2	105.7	107.0	108.0				
	16000	93.5	93.2	93.7	93.2	91.7	90.5	91.2	93.0	94.2	95.5	97.0	98.2				
	20000	92.7	92.5	92.7	92.2	90.7	88.7	88.5	89.7	90.5	93.0	94.2	95.7				
	25000	81.2	81.2	81.2	81.0	79.5	77.2	78.0	79.7	81.0	82.7	84.2	85.5				
	31500	79.5	80.0	79.7	79.5	78.5	76.0	75.5	76.0	78.0	79.5	81.5	82.7				
	40000	76.0	77.0	76.5	77.0	75.5	73.7	73.0	72.7	73.5	74.7	76.2	77.2				
	DB(L)	113.2	112.5	112.5	112.0	109.5	109.7	111.0	113.0	113.7	115.2	115.2	116.0				
PNL	10FT FLYOVER	119.3	120.4	122.4	122.8	121.8	122.3	123.7	125.6	126.2	126.7	126.2	124.1				

TABLE 3A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- FLAPS EXTENDED
BLADE ANGLE- 45.0
TIP SPEED-600.0

		AZIMUTH ANGLE (DEG)														
		150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
	50	74.5	75.5	76.7	77.2	77.5	77.0	78.5	79.2	80.2	81.2	81.7	84.0	96.2			
	63	81.5	82.5	84.0	83.0	84.5	84.7	86.0	87.2	88.2	88.0	88.2	89.2	99.5			
	80	87.0	88.2	88.5	88.7	89.5	89.7	92.0	92.2	92.0	91.7	92.2	92.2	98.0			
	100	91.2	93.2	92.7	92.7	93.7	93.7	94.7	95.7	95.7	95.0	94.0	94.0	97.2			
	125	89.5	90.7	90.5	91.7	93.0	91.0	92.2	93.5	93.2	94.0	94.0	94.5	96.2			
	160	90.0	91.7	91.2	93.0	92.7	93.0	93.2	93.0	92.5	93.7	94.2	95.0	95.2			
	200	92.2	92.5	91.7	91.7	91.5	90.2	90.5	91.2	92.0	93.0	94.0	94.0	94.7			
	250	90.2	89.5	89.7	89.0	90.2	89.7	90.7	91.2	92.5	94.0	93.7	95.0	95.2			
	315	89.7	90.0	90.2	90.0	90.0	90.2	90.2	91.5	92.5	93.5	94.5	94.0	95.5			
F	400	86.0	87.0	87.0	86.7	87.7	88.0	88.2	89.5	90.2	91.7	93.0	93.2	93.2			
R	500	85.0	86.0	85.0	86.0	88.0	87.7	88.7	89.7	89.7	90.7	91.0	92.2	91.5			
E	630	85.2	85.5	85.7	87.0	86.7	87.0	88.2	88.7	89.2	90.0	90.5	90.7	90.2			
Q	800	86.0	86.7	85.7	86.0	86.5	86.7	87.0	88.0	88.5	89.0	89.0	89.0	88.5			
U	1000	88.0	87.0	86.5	85.5	86.5	86.0	86.2	87.7	88.0	89.7	90.2	90.0	88.5			
E	1250	100.2	99.0	97.7	97.2	97.0	95.5	97.2	98.5	94.7	100.2	100.7	100.5	95.5			
N	1600	92.0	91.7	90.7	90.7	90.2	89.2	90.5	92.7	92.5	94.5	94.0	94.2	91.0			
C	2000	93.5	93.5	92.5	92.5	92.5	92.0	93.5	96.0	96.7	97.7	98.0	97.0	93.0			
Y	2500	105.7	104.5	103.0	102.0	101.2	100.7	101.5	103.5	103.0	105.0	106.0	108.0	104.0			
	3150	97.5	97.0	96.2	95.7	95.7	95.0	96.2	98.7	99.2	100.5	102.0	103.0	98.5			
H	4000	100.5	102.0	102.2	101.0	101.0	98.7	100.5	103.5	104.2	105.2	106.7	106.7	100.7			
Z	5000	99.2	98.2	98.5	98.2	97.2	97.2	98.7	99.7	103.2	104.2	105.0	104.5	100.5			
	6300	95.7	95.2	95.5	94.2	93.7	92.5	94.0	95.7	96.7	98.5	99.7	99.5	96.7			
	8000	90.0	89.7	90.0	89.7	89.2	88.2	89.0	91.7	91.5	93.2	94.7	95.0	93.0			
	10000	98.0	98.0	97.7	97.0	96.0	94.0	95.2	97.7	97.7	100.5	102.2	102.7	97.7			
	12500	102.7	102.5	102.2	101.5	100.5	97.5	98.5	101.0	101.7	104.0	106.0	106.7	100.0			
	16000	97.5	97.7	97.5	96.7	95.2	92.7	93.5	95.2	96.2	98.5	100.7	100.5	94.0			
	20000	84.5	85.2	84.7	83.7	82.5	80.0	80.7	83.0	84.0	86.5	87.2	88.5	83.0			
	25000	82.0	82.0	81.5	80.5	79.2	76.2	75.5	76.0	76.2	79.0	80.2	81.2	76.2			
	31500	77.0	77.2	76.7	75.5	74.7	72.2	72.5	73.2	74.0	76.0	76.7	77.0	74.0			
	40000	75.7	75.5	75.2	74.7	73.2	71.5	71.2	71.0	71.2	72.7	73.5	73.2	71.7			
	OB(L)	110.7	110.0	109.5	109.2	108.5	107.5	108.7	110.5	111.2	113.0	114.0	114.5	111.2			
PNL	10FT FLYOVER	118.6	120.2	120.9	121.2	121.8	121.2	122.4	124.5	124.7	125.3	125.4	124.2	118.8			

TABLE 4A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- FLAPS EXTENDED
BLADE ANGLE- 45.0
TIP SPEED-683.0

		AZIMUTH ANGLE (DEG)														
		150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
	50	78.0	77.7	78.2	78.5	79.7	79.5	81.5	82.2	82.5	82.5	82.7	85.7	99.2			
	63	86.0	87.0	85.5	85.2	87.7	88.2	90.2	92.0	91.0	91.5	91.2	93.0	104.0			
	80	89.7	91.0	91.0	91.5	92.5	93.0	94.2	93.7	94.7	95.0	94.0	94.7	104.5			
	100	94.9	95.0	95.7	95.5	96.7	96.5	97.0	96.7	96.7	96.7	96.0	98.0	101.7			
	125	94.2	98.0	99.0	98.7	96.2	96.2	98.5	101.2	101.2	102.5	102.7	104.0	103.0			
	160	94.6	95.0	95.2	95.5	96.2	97.0	95.5	96.2	96.2	96.2	97.0	97.5	99.2			
	200	95.9	94.7	95.2	95.0	95.2	93.5	94.0	94.7	95.7	96.7	97.0	98.5	98.5			
	250	93.8	93.7	93.0	93.2	93.0	94.2	94.5	95.5	96.5	97.7	98.2	99.2	99.0			
	315	92.5	93.2	93.5	93.5	93.0	93.2	93.7	94.5	95.5	96.7	98.0	98.2	98.2			
F	400	92.9	92.2	91.7	91.7	92.2	92.0	93.2	93.7	94.0	94.7	96.5	97.2	96.5			
R	500	89.0	89.2	89.5	89.7	92.0	92.2	93.2	93.2	93.5	94.2	95.7	96.7	95.7			
E	630	88.2	88.7	89.2	90.2	90.7	92.0	92.2	92.7	93.2	93.2	94.0	94.5	93.2			
Q	800	89.9	89.5	89.0	89.5	90.5	90.5	91.0	92.0	92.0	92.2	93.0	92.7	91.5			
U	1000	90.0	90.2	89.2	89.0	89.7	89.2	90.2	90.5	91.5	92.5	92.5	93.0	91.5			
E	1250	96.2	96.5	94.7	92.0	92.5	91.5	92.5	94.5	96.0	96.2	96.0	96.0	93.2			
N	1600	105.1	105.5	103.2	100.5	99.7	98.0	99.2	102.2	103.0	104.5	102.7	103.5	99.5			
C	2000	96.0	96.0	95.2	94.2	94.0	95.2	96.2	98.5	98.7	99.7	99.2	98.5	94.5			
Y	2500	100.0	98.2	98.5	96.7	96.5	97.2	98.5	102.0	102.5	103.0	103.0	102.0	98.2			
	3150	108.1	104.0	105.2	101.2	102.5	102.5	101.7	108.0	108.0	108.5	108.5	108.7	105.7			
H	4000	98.8	100.2	99.0	97.0	96.7	97.0	97.5	102.2	101.7	103.2	103.0	103.0	99.2			
Z	5000	98.3	101.0	99.0	96.2	96.5	96.5	96.0	102.2	100.2	104.5	103.2	103.0	99.2			
	6300	92.9	92.5	93.7	92.5	92.5	92.0	92.2	94.7	95.7	98.0	99.2	98.0	97.0			
	8000	101.2	101.5	101.0	100.2	99.7	99.5	99.0	102.0	102.7	105.0	106.0	105.7	100.2			
	10000	104.6	105.2	105.0	104.0	103.5	102.0	102.7	105.5	106.2	107.5	109.5	109.7	102.7			
	12500	102.5	102.2	102.0	100.5	100.0	99.5	99.7	102.5	103.5	106.0	107.2	107.2	99.2			
	16000	92.5	92.5	92.5	91.5	90.0	89.0	88.7	91.2	93.0	94.5	96.7	96.5	92.0			
	20000	92.4	92.7	92.2	92.2	89.7	87.7	87.2	88.5	89.5	92.0	94.0	94.5	85.5			
	25000	81.2	81.7	81.2	80.7	79.2	77.7	77.2	78.5	80.0	82.2	83.2	84.2	78.0			
	31500	81.9	81.2	81.0	80.2	79.0	76.7	75.7	76.5	77.2	79.2	80.5	80.7	76.0			
	40000	78.8	79.5	79.0	78.5	77.0	75.0	73.5	73.7	73.7	75.2	76.0	76.7	74.0			
	DB(L)	112.9	112.5	112.5	110.5	111.0	110.2	110.5	114.0	114.2	115.5	116.2	116.2	113.5			
PNL	10FT FLYOVER	121.8	122.1	123.9	122.4	123.7	124.1	124.2	128.4	128.1	128.4	127.4	126.0	121.4			

TABLE 5A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- FLAPS EXTENDED
BLADE ANGLE- 50.0
TIP SPEED-598.0

		AZIMUTH ANGLE (DEG)															
		150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
	50	75.0	76.5	77.5	77.0	78.2	78.7	80.5	82.2	82.2	83.0	83.7	84.0				
	63	82.5	83.5	84.0	84.7	85.7	86.2	87.2	88.7	89.2	89.2	89.7	90.0				
	80	87.7	88.7	89.2	90.5	90.7	91.2	91.5	92.5	93.2	93.0	94.2	93.5				
	100	92.7	94.5	93.2	93.7	94.5	96.7	95.5	95.7	96.0	95.2	95.7	96.0				
	125	91.5	91.7	93.2	93.0	93.7	94.2	93.2	94.5	95.0	94.7	95.2	95.5				
	160	91.2	93.0	92.5	93.0	94.0	93.7	93.7	94.0	94.5	95.0	95.2	95.2				
	200	93.0	93.7	92.5	92.2	92.7	92.5	92.2	92.2	93.0	94.5	95.2	96.5				
	250	91.2	90.5	90.2	90.5	91.0	91.0	92.2	92.5	93.5	95.2	95.5	96.5				
	315	90.5	90.7	91.2	92.0	91.2	90.7	91.7	92.7	93.7	94.5	95.5	96.2				
F	400	88.0	88.5	88.5	88.0	88.7	89.7	89.7	91.2	91.7	93.2	94.5	95.5				
R	500	86.7	86.7	86.7	87.5	89.2	89.2	90.7	92.0	91.0	91.7	93.2	94.5				
E	630	86.7	87.0	87.2	88.0	88.2	89.2	90.0	91.0	90.2	91.0	92.5	92.7				
Q	800	87.7	88.0	87.5	87.5	87.5	88.0	88.5	89.2	90.2	90.5	90.7	90.7				
U	1000	89.2	89.7	88.5	87.7	87.7	87.7	88.5	89.2	90.7	91.2	91.0	91.7				
E	1250	97.7	102.0	99.2	98.0	95.7	98.0	97.5	97.0	102.0	103.0	98.2	98.7				
N	1600	93.0	94.7	92.7	92.7	91.2	92.0	92.7	94.5	96.2	96.5	95.2	95.5				
C	2000	95.7	96.5	95.5	95.2	94.0	95.0	96.2	98.2	99.0	98.7	99.0	98.5				
Y	2500	103.0	104.5	103.0	102.5	100.2	102.7	103.0	103.0	106.5	105.7	105.2	105.0				
	3150	97.5	98.2	97.2	97.0	95.5	96.5	97.5	99.7	101.0	101.5	102.5	104.0				
H	4000	98.5	99.7	99.2	101.0	97.0	98.0	100.5	103.2	105.2	105.0	104.5	103.5				
Z	5000	95.0	96.0	95.2	95.0	94.5	94.2	95.7	97.2	99.0	100.2	100.0	101.0				
	6300	90.2	91.2	91.7	90.5	89.2	89.7	91.0	92.7	93.7	95.5	95.5	96.0				
	8000	100.0	100.5	100.0	99.7	98.2	97.0	97.5	100.5	101.5	103.0	103.7	103.0				
	10000	103.7	104.2	103.5	103.0	101.7	100.2	101.5	103.5	104.5	106.7	108.0	107.7				
	12500	101.5	102.2	101.5	101.0	99.2	98.2	98.2	100.7	102.0	103.7	105.5	105.2				
	16000	91.7	92.2	92.0	91.2	89.2	88.5	88.7	89.7	91.5	93.2	95.2	94.5				
	20000	92.2	92.2	91.2	91.2	88.5	87.2	86.0	87.2	87.7	91.0	92.0	92.2				
	25000	81.0	81.0	80.5	79.5	77.7	76.2	76.2	77.7	78.7	80.7	81.5	82.0				
	31500	80.7	80.7	80.2	79.7	77.2	75.7	74.7	75.2	75.7	77.5	78.0	79.0				
	40000	78.0	78.0	77.2	76.7	75.0	73.5	72.2	72.0	72.7	73.7	74.2	74.2				
	DB(L)	110.2	111.5	109.7	110.2	108.5	109.0	109.5	111.0	112.7	113.7	113.5	114.0				
PNL	10FT FLYOVER	117.4	120.9	121.3	122.2	121.3	123.0	123.8	125.0	126.4	125.9	124.6	123.1				

TABLE 6A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- FLAPS EXTENDED
BLADE ANGLE- 50.0
TIP SPEED-642.0

		AZIMUTH ANGLE (DEG)														
		150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
	50	75.7	77.5	77.7	79.0	78.7	80.2	81.2	81.2	82.5	83.0	85.5	85.5	104.5			
	63	83.5	86.0	86.2	86.7	88.5	88.7	89.7	90.0	89.7	91.0	92.5	92.7	108.2			
	80	90.0	90.7	90.7	92.5	93.0	92.7	94.2	94.7	93.5	94.5	94.7	94.5	108.0			
	100	93.7	94.7	95.5	95.5	96.2	96.2	96.5	96.5	96.0	95.7	97.0	96.7	107.5			
	125	93.7	94.5	95.0	95.2	95.0	94.0	95.5	95.5	96.0	96.7	97.2	98.7	105.7			
	160	93.5	94.2	95.2	95.2	95.5	95.2	95.5	95.5	96.0	96.5	97.5	97.2	102.5			
	200	94.0	93.7	94.5	94.7	94.0	93.7	93.5	94.0	94.7	96.0	96.7	98.0	99.5			
	250	93.2	92.7	92.7	92.5	93.0	94.0	94.0	94.5	95.7	97.2	98.5	98.0	98.7			
	315	92.2	92.0	92.7	93.2	92.5	92.5	93.2	94.2	94.5	95.7	97.2	98.2	98.7			
F	400	89.5	89.2	90.7	90.0	91.5	91.5	91.7	92.5	93.2	95.5	96.0	97.0	96.0			
R	500	88.2	88.7	89.0	90.2	91.0	92.5	92.2	92.7	93.0	94.0	95.5	96.2	94.7			
E	630	88.0	89.2	90.7	90.0	90.5	92.0	92.2	92.2	93.2	93.5	94.0	94.2	92.7			
Q	800	89.5	89.7	89.2	89.0	89.7	90.5	90.2	91.7	91.7	92.0	93.0	92.2	90.5			
U	1000	90.0	91.0	90.2	89.2	89.2	89.2	90.2	90.7	91.2	92.2	93.0	93.0	90.5			
E	1250	99.2	103.7	100.7	98.2	93.7	95.7	95.2	98.0	99.2	99.0	98.5	101.0	95.5			
N	1600	98.7	103.0	100.2	98.0	94.5	96.0	95.2	98.7	99.5	99.5	99.2	101.0	94.7			
C	2000	96.5	97.5	96.5	95.5	95.0	96.0	97.2	99.2	99.5	100.2	101.0	99.5	94.2			
Y	2500	104.0	103.5	102.0	101.2	99.2	100.7	102.7	105.2	105.5	105.0	106.0	106.0	102.2			
	3150	103.7	103.5	102.2	101.5	99.2	100.5	103.0	105.2	104.7	105.0	107.0	107.2	103.5			
H	4000	101.0	102.5	102.0	100.0	100.0	100.2	102.0	103.5	103.5	106.0	106.0	105.2	100.5			
Z	5000	96.2	96.0	96.2	95.5	95.2	95.2	96.2	98.2	99.0	100.5	100.7	101.0	96.2			
	6300	94.0	93.5	93.7	93.5	93.2	92.5	94.0	95.0	96.5	98.0	99.0	99.7	95.0			
	8000	102.2	101.5	101.5	101.0	100.0	99.5	100.2	104.0	104.7	105.0	105.2	106.0	98.7			
	10000	106.0	105.2	105.0	104.5	102.7	102.5	103.0	105.5	106.5	108.2	109.2	109.5	100.5			
	12500	104.0	103.0	102.5	102.0	100.5	100.5	100.5	103.0	104.5	106.0	107.5	107.5	98.0			
	16000	94.2	93.0	93.0	92.5	90.7	89.7	91.0	92.2	93.5	95.5	96.7	97.0	90.5			
	20000	94.5	92.7	93.2	92.2	90.2	88.2	88.0	89.5	90.0	92.7	93.7	94.7	84.5			
	25000	83.0	82.2	82.0	81.2	79.0	78.0	77.7	79.2	80.5	82.5	83.7	84.0	77.0			
	31500	83.5	82.0	81.7	80.7	78.5	77.0	75.7	76.5	77.7	79.5	80.5	80.5	74.7			
	40000	80.2	79.2	78.7	78.0	76.0	74.5	73.7	73.5	74.0	75.2	76.5	76.5	73.0			
	DB(L)	113.0	113.5	112.5	111.2	110.2	110.5	111.5	113.7	114.0	115.0	115.5	116.5	115.5			
PNL	10FT FLYOVER	119.6	122.1	122.7	123.0	122.6	123.5	125.2	127.0	126.7	127.0	126.8	125.5	120.6			

TABLE 7A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- FLAPS RETRACTED
BLADE ANGLE- 35.0
TIP SPEED-598.0

		AZIMUTH ANGLE (DEG)														
		150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
	50	62.2	62.0	64.2	63.5	64.0	67.0	66.7	69.2	72.0	73.7	72.2	71.7	72.0	77.2		
	63	65.7	66.7	68.5	69.5	70.5	71.2	72.5	73.2	73.7	75.2	75.5	75.5	76.7	79.5		
	80	70.7	71.0	73.2	74.0	75.0	75.7	76.5	77.7	77.0	78.0	77.0	77.5	78.7	79.5		
	100	81.0	84.0	83.7	83.0	82.5	84.0	85.5	84.2	81.0	77.5	78.5	78.2	79.5	83.0		
	125	78.0	80.2	80.7	80.5	80.2	81.0	82.0	80.7	79.5	78.7	79.2	80.5	81.0	82.7		
	160	75.2	75.7	76.5	76.7	75.5	75.7	76.2	76.2	75.7	77.2	77.7	79.2	81.0	82.2		
	200	79.7	77.2	77.2	76.5	77.2	75.2	74.5	76.5	79.2	78.5	79.0	79.7	80.2	81.2		
	250	76.7	75.2	75.0	74.5	75.0	74.2	75.0	76.5	76.7	76.0	77.5	78.5	79.0	79.7		
	315	77.0	77.5	79.2	78.7	77.2	79.0	79.0	77.7	78.7	78.5	78.0	78.0	80.2	80.2		
F	400	75.2	74.0	74.7	74.5	73.7	74.2	74.2	76.0	76.5	76.7	76.5	77.7	77.7	77.5		
R	500	76.2	75.0	75.5	75.2	75.2	74.7	74.0	76.0	76.7	76.7	77.2	77.7	78.5	79.2		
E	630	77.0	77.5	77.7	77.5	76.2	76.5	77.0	78.5	78.5	79.5	78.7	79.2	78.7	79.2		
Q	800	79.5	79.0	78.7	78.7	77.5	78.5	78.5	80.0	81.0	81.7	81.5	81.7	80.5	80.7		
U	1000	81.2	79.7	79.2	78.7	78.0	78.5	78.2	80.2	81.0	82.5	83.2	83.2	82.0	80.0		
E	1250	96.5	93.5	91.5	91.0	87.5	88.7	88.2	89.5	91.7	93.2	94.0	95.7	93.0	88.5		
N	1600	86.7	86.0	85.2	84.2	83.2	83.7	83.7	86.5	87.7	88.7	87.7	87.5	86.0	81.7		
C	2000	88.2	87.5	87.2	86.0	85.2	85.5	86.7	89.5	90.7	91.5	91.5	90.5	87.5	83.0		
Y	2500	98.7	97.2	95.5	93.7	91.7	92.0	93.0	94.0	96.5	96.5	98.7	100.5	97.5	96.5		
	3150	90.0	88.7	88.5	87.2	86.0	85.7	87.0	90.0	92.0	92.5	92.7	94.0	91.0	88.2		
H	4000	92.2	92.7	92.0	90.0	89.0	88.0	89.5	93.5	94.0	97.0	96.5	97.5	95.2	92.0		
Z	5000	86.7	86.5	85.5	84.7	83.2	83.5	84.2	87.0	88.0	90.0	90.7	91.5	89.7	98.0		
	6300	82.0	81.0	80.5	79.0	79.2	78.7	79.7	81.5	82.5	84.5	86.0	85.7	86.0	94.0		
	8000	92.5	90.7	89.7	88.5	86.0	85.0	86.7	90.0	91.0	92.7	93.2	95.7	93.5	98.0		
	10000	95.0	94.5	93.7	92.2	89.2	88.0	89.2	92.5	94.2	96.5	98.2	98.7	97.5	101.0		
	12500	92.7	91.7	90.7	90.0	87.0	85.0	86.5	90.0	91.5	94.0	96.0	97.5	93.2	98.0		
	16000	82.5	81.0	80.2	79.2	77.0	75.0	75.5	79.0	80.2	83.0	85.0	86.0	82.2	80.0		
	20000	81.5	80.0	79.0	78.0	75.5	72.5	73.2	76.7	78.0	81.0	82.7	83.7	79.5	72.5		
	25000	69.5	68.0	67.5	66.7	64.0	62.5	63.2	66.2	67.7	71.0	72.2	73.2	69.5	66.0		
	31500	68.0	67.2	66.7	65.7	63.7	61.7	61.5	63.7	64.7	68.2	69.5	70.2	66.5	63.2		
	40000	65.5	65.0	64.7	64.0	61.7	60.7	59.2	60.5	61.2	63.7	64.7	65.5	63.2	61.5		
	DB(L)	103.5	102.2	101.5	99.7	98.2	97.7	98.7	101.0	102.5	104.0	105.2	106.0	103.5	100.7		
PNL 10FT FLYOVER		111.2	112.3	112.6	112.3	111.4	111.9	112.9	114.7	115.8	116.4	116.0	115.8	111.3	108.8		

TABLE 8A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- FLAPS RETRACTED
BLADE ANGLE- 35.0
TIP SPEED-804.0

FREQUENCY (HZ)	AZIMUTH ANGLE (DEG) 150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
50	72.0	71.0	76.0	75.0	76.0	75.0	76.2	78.0	81.0	80.5	80.2	84.2	83.0	85.7		
63	76.2	77.7	79.5	80.0	80.7	81.5	81.0	83.0	84.0	84.5	86.5	87.5	88.0	89.7		
80	82.0	82.7	84.0	85.0	87.0	87.7	88.5	87.5	89.7	89.5	89.5	90.5	90.7	91.5		
100	85.2	85.7	86.7	88.2	88.2	89.2	88.5	89.2	89.2	88.2	89.7	89.5	90.5	92.5		
125	83.5	84.5	87.5	89.2	90.2	89.2	88.7	88.7	89.0	87.2	88.7	89.5	90.5	92.7		
160	88.0	90.2	95.0	99.0	100.5	100.0	98.5	98.5	98.0	95.7	94.2	93.7	94.2	95.0		
200	82.7	83.7	83.7	83.7	83.7	82.5	82.0	83.2	84.7	85.0	85.7	86.5	87.7	88.7		
250	82.7	82.0	82.2	81.7	81.2	81.2	82.7	83.2	84.2	83.7	84.5	85.7	87.0	88.2		
315	84.7	86.0	87.2	85.7	85.5	85.0	86.2	86.0	87.7	86.2	87.0	87.0	88.2	89.2		
F 400	81.7	82.0	82.0	81.2	82.7	82.2	82.7	83.0	83.0	84.0	85.0	85.5	85.5	86.0		
R 500	80.7	81.0	82.2	82.2	82.7	81.5	82.5	83.5	83.5	83.7	84.7	84.5	85.5	86.0		
E 630	84.2	85.2	84.2	83.5	83.0	83.7	84.0	83.7	85.5	85.2	85.0	85.5	85.7	85.7		
Q 800	86.0	86.0	84.7	84.2	84.7	85.0	84.5	85.2	86.2	87.2	87.5	87.0	86.5	88.0		
U 1000	87.0	86.7	86.0	85.2	85.5	85.0	85.7	86.5	88.0	89.2	90.2	90.0	88.5	88.2		
E 1250	89.2	89.5	88.2	88.0	87.7	88.0	89.0	91.0	92.2	93.0	92.5	92.2	90.2	88.5		
N 1600	101.0	101.0	98.5	96.0	97.0	95.2	96.5	96.0	99.7	99.5	98.2	99.2	99.0	96.2		
C 2000	104.5	105.0	102.7	99.2	100.2	99.0	100.0	99.5	103.5	103.5	101.7	103.5	102.5	99.7		
Y 2500	96.2	95.5	95.5	94.0	94.2	95.5	98.0	100.5	101.7	101.5	100.5	100.0	96.7	95.0		
3150	100.2	100.0	98.7	97.0	97.0	98.7	99.7	101.0	103.2	104.2	104.0	103.2	101.7	101.2		
H 4000	102.2	103.0	100.5	98.5	98.0	100.5	101.0	102.0	105.0	106.2	106.0	104.5	103.5	103.5		
Z 5000	96.5	96.2	94.5	94.7	94.0	97.0	96.0	97.0	99.5	101.5	100.0	103.0	100.2	97.5		
6300	93.2	93.5	92.2	92.0	92.0	92.5	93.5	94.0	97.7	99.0	98.0	98.5	96.7	95.2		
8000	101.7	102.0	101.0	100.2	99.2	99.2	100.7	102.5	104.7	107.0	105.7	107.0	103.0	100.0		
10000	105.7	106.0	105.2	104.5	103.0	102.7	104.0	106.0	108.2	110.2	110.0	111.7	106.0	102.7		
12500	103.5	103.7	102.2	102.5	100.5	100.2	101.2	103.5	105.0	107.0	107.5	108.5	102.7	99.2		
16000	94.2	94.0	93.7	94.0	91.2	90.7	91.5	92.7	94.2	96.0	98.0	99.0	93.7	92.7		
20000	93.7	93.7	93.0	93.2	90.5	88.7	89.5	91.0	91.5	94.5	95.5	97.5	90.2	84.7		
25000	82.0	82.0	81.0	81.5	79.0	78.0	79.0	80.2	82.0	84.2	85.5	86.2	81.0	78.2		
31500	81.2	81.0	80.7	80.5	77.7	76.7	76.7	77.7	78.7	81.5	82.7	83.5	78.7	75.0		
40000	77.7	78.2	77.5	77.7	76.0	74.0	73.7	73.7	74.0	76.2	77.5	78.0	74.5	73.5		
OB(L)	112.0	112.2	111.0	110.2	109.2	109.5	110.5	112.0	114.0	115.5	115.2	116.2	112.5	110.5		
PNL 10FT FLYOVER	117.7	120.4	120.3	119.9	120.4	122.1	122.9	123.8	125.9	126.2	124.7	122.9	119.2	115.2		

TABLE 9A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- FLAPS RETRACTED
BLADE ANGLE- 45.0
TIP SPEED-685.0

FREQUENCY (HZ)	AZIMUTH ANGLE (DEG) 150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
50	71.2	76.2	74.0	77.2	78.5	74.7	78.5	79.0	81.7	83.0	83.7	83.2				
63	76.0	79.5	81.0	81.2	81.5	81.5	83.7	84.2	85.7	86.5	86.7	87.5				
80	80.7	83.7	85.0	85.7	87.0	86.0	87.7	89.5	89.0	89.5	90.2	91.0				
100	85.0	86.7	88.0	87.5	88.7	88.0	89.0	88.7	89.0	89.2	89.7	92.2				
125	91.7	95.2	95.5	89.0	89.2	94.0	97.5	98.0	97.2	96.7	96.7	96.2				
160	84.7	86.0	86.7	86.0	86.7	85.5	86.0	86.5	87.2	88.7	89.7	91.5				
200	83.7	84.5	84.0	83.0	83.2	81.0	83.2	85.7	86.5	86.2	86.7	88.7				
250	85.7	84.7	84.0	82.5	83.2	82.2	85.7	86.5	85.5	84.7	85.7	87.7				
315	82.7	83.2	83.0	83.0	83.7	82.7	84.0	84.2	85.0	85.7	86.0	87.2				
400	84.5	82.7	85.5	83.7	83.7	85.0	85.7	84.2	85.0	85.7	86.7	86.5				
500	81.5	83.0	82.5	82.5	81.7	81.2	83.0	83.5	84.2	84.5	85.0	86.0				
630	85.0	86.5	84.2	84.0	85.5	84.0	84.7	85.5	86.2	85.5	85.7	86.0				
800	87.2	86.5	86.0	85.7	86.0	84.5	86.7	87.7	87.2	88.2	88.0	87.0				
1000	88.2	88.0	87.2	86.2	86.5	85.5	87.5	89.0	90.2	89.5	89.5	89.0				
1250	93.0	96.0	94.5	90.5	89.7	92.0	92.7	95.0	97.0	94.5	93.7	91.7				
1600	101.7	106.5	104.7	99.2	95.2	101.0	100.2	103.7	106.0	102.2	100.5	97.0				
2000	96.2	96.0	95.0	94.5	95.5	95.5	98.2	99.2	100.0	99.5	98.5	95.0				
2500	98.2	98.2	97.7	96.2	97.0	97.7	101.7	103.0	103.7	103.0	101.7	98.5				
3150	104.7	104.5	105.5	100.2	100.2	101.2	107.5	106.7	110.2	109.2	108.5	105.2				
4000	99.2	100.2	99.2	96.2	97.0	97.0	103.0	102.0	104.2	103.0	102.2	98.5				
5000	99.0	100.7	100.0	95.5	96.5	95.7	104.0	101.0	104.7	103.2	102.5	97.2				
6300	94.5	93.5	95.0	93.0	91.5	91.5	95.5	96.2	99.0	98.0	97.5	95.5				
8000	101.2	102.2	101.7	99.5	98.7	98.0	101.7	103.0	106.5	106.0	106.5	100.2				
10000	104.5	106.2	105.7	102.7	101.7	101.5	104.7	106.5	109.2	110.2	109.7	103.0				
12500	103.2	103.5	102.7	100.0	99.5	99.2	103.0	104.7	107.0	108.0	108.0	101.2				
16000	93.7	94.0	93.2	90.2	89.7	87.7	91.5	93.0	96.0	97.0	97.0	92.2				
20000	94.0	94.2	93.5	89.7	88.7	86.5	89.7	90.7	93.5	94.5	95.7	88.0				
25000	83.0	83.0	82.5	79.2	78.0	76.5	79.5	80.7	84.0	84.5	85.0	79.2				
31500	83.7	83.5	82.0	79.0	78.2	76.0	77.5	78.0	80.5	81.7	82.5	77.5				
40000	81.0	81.5	80.2	77.2	76.2	73.2	74.7	74.7	76.2	77.5	77.7	75.0				
DB(L)	111.2	113.0	112.5	108.7	108.7	109.0	113.5	114.0	116.5	116.0	115.2	110.2				
PNL 10FT FLYOVER	118.9	121.6	123.4	120.5	121.2	122.3	127.3	127.1	129.4	127.8	126.1	121.4				

TABLE 10A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- FLAPS RETRACTED
BLADE ANGLE- 50.0
TIP SPEED-593.0

FREQUENCY (HZ)	AZIMUTH ANGLE (DEG) 150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
50	70.5	71.0	70.7	72.7	74.2	72.7	76.7	76.0	78.2	79.7	80.7	79.2	79.7	82.5		
63	75.0	76.7	77.7	77.5	79.0	79.5	80.7	81.5	81.5	84.0	83.7	84.0	85.0	87.5		
80	79.5	80.7	81.7	82.0	84.2	84.7	85.7	86.7	86.5	86.5	87.0	86.7	88.7	89.7		
100	87.5	89.7	90.5	89.0	90.2	89.5	90.7	89.7	88.0	88.5	89.2	89.2	89.7	91.2		
125	84.2	85.0	86.2	85.2	86.0	86.0	86.2	86.0	85.0	86.2	87.7	88.0	89.2	90.7		
160	83.5	83.5	85.0	84.0	84.7	84.7	85.0	85.2	85.0	86.2	86.7	87.2	89.0	90.7		
200	83.5	83.0	83.0	83.0	83.2	82.7	81.0	82.5	83.5	84.5	84.7	85.7	87.0	88.7		
250	83.2	82.7	82.5	82.5	83.0	82.2	83.5	84.0	83.5	83.7	84.5	84.7	86.5	87.2		
315	86.0	86.0	86.2	86.2	86.2	87.2	87.2	86.5	87.5	88.0	88.0	87.2	87.5	88.7		
400	85.0	85.2	84.0	83.7	83.7	83.2	83.7	84.7	85.7	86.2	86.5	87.7	87.5	87.0		
500	86.0	85.7	85.0	85.0	84.5	84.2	83.7	84.2	85.5	86.2	87.5	88.2	87.2	88.0		
630	88.0	89.5	88.7	87.5	85.7	87.5	88.2	87.7	89.2	90.5	89.5	89.7	89.5	88.7		
800	91.5	91.0	89.7	88.2	87.7	88.5	88.7	89.5	91.2	91.5	92.2	92.2	91.7	90.7		
1000	93.7	93.0	92.5	90.7	90.7	90.2	90.5	92.2	92.5	94.5	94.0	93.5	92.2	89.7		
1250	99.7	100.5	99.5	99.0	98.2	96.2	97.2	99.5	101.7	102.7	100.5	100.7	99.2	95.0		
1600	97.0	97.5	96.7	96.0	96.0	95.7	96.0	98.5	100.2	100.5	100.0	97.7	96.0	93.0		
2000	99.5	100.0	98.7	98.7	99.0	98.7	99.7	102.2	103.2	103.5	103.2	102.0	98.7	96.0		
2500	104.0	105.2	104.7	105.2	102.7	102.2	102.5	105.0	107.5	107.5	107.5	107.5	105.7	101.5		
3150	101.0	100.0	100.0	99.2	99.0	98.7	100.0	102.2	103.5	104.5	106.2	107.2	103.0	100.2		
4000	101.2	101.7	103.0	102.0	100.0	99.0	103.5	103.5	107.2	107.0	107.0	106.0	103.2	100.5		
5000	97.5	97.5	97.2	97.0	96.0	95.7	96.2	99.2	101.5	102.0	101.2	102.7	98.5	96.7		
6300	92.0	92.5	91.7	92.5	91.5	90.7	91.5	93.7	95.0	97.5	97.0	97.5	94.7	94.0		
8000	102.0	101.7	101.5	101.0	100.0	98.5	99.2	102.0	103.2	105.5	105.5	106.2	100.7	97.2		
10000	105.7	105.5	104.5	104.7	103.5	101.7	102.2	105.2	107.0	109.2	109.5	109.5	103.7	99.5		
12500	103.7	103.7	102.5	102.5	101.0	99.2	99.7	103.2	104.5	106.0	107.2	107.5	101.5	97.7		
16000	94.7	94.0	93.2	93.0	91.2	89.7	89.0	91.5	92.7	94.7	96.0	96.2	91.7	91.0		
20000	94.7	94.5	93.2	92.5	91.2	88.7	88.0	89.5	90.7	93.0	94.0	94.2	88.5	83.7		
25000	84.0	83.0	82.2	81.7	79.7	78.0	77.5	79.5	81.2	82.7	83.5	84.0	80.0	78.0		
31500	83.5	83.0	82.2	81.0	79.5	76.7	76.0	77.0	78.0	80.0	81.0	81.5	78.0	75.0		
40000	80.5	80.2	79.0	78.0	76.5	74.2	73.5	73.2	74.2	75.2	76.2	76.7	75.0	73.5		
DB(L)	112.2	112.0	112.0	111.7	110.5	109.5	110.5	112.2	114.2	115.0	115.5	116.0	112.0	109.0		
PNL 10FT FLYOVER	118.6	121.4	122.5	123.6	122.8	122.6	124.4	125.5	127.5	127.2	126.1	124.7	119.9	113.6		

TABLE 11A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- NO WING
BLADE ANGLE- 35.0
TIP SPEED-600.0

FREQUENCY	AZIMUTH ANGLE (DEG) 150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
50	58.5	59.0	58.5	58.2	58.7	58.5	58.5	59.0	58.5	58.7	59.2	59.2	60.5	69.7		
63	62.0	62.0	62.0	61.2	62.0	62.2	62.5	62.7	62.0	62.2	62.5	63.0	64.0	70.5		
80	66.7	65.7	66.0	65.7	65.7	66.0	66.2	66.5	66.5	67.2	66.2	67.0	68.5	71.5		
100	81.5	81.5	79.2	75.0	75.0	78.7	81.0	80.7	79.7	78.7	75.7	74.2	74.7	75.0		
125	75.7	75.7	74.0	70.2	70.7	73.7	75.0	75.2	75.0	74.2	73.2	73.0	73.5	73.2		
160	71.0	70.7	71.7	71.0	71.0	70.7	71.0	71.5	70.7	71.2	70.7	71.7	72.7	73.2		
200	75.7	76.0	72.7	71.0	76.5	76.0	73.5	73.7	75.0	74.2	75.0	75.0	73.5	73.5		
250	74.5	74.5	73.7	73.2	74.7	75.5	74.5	75.2	75.5	75.5	75.5	74.7	75.7	74.7		
315	76.2	79.2	80.2	79.0	77.5	77.5	77.5	77.2	77.5	78.2	77.5	77.7	78.0	78.5		
F 400	77.0	76.0	75.0	74.7	75.0	75.0	76.5	76.7	76.5	77.2	76.2	76.5	76.0	75.5		
R 500	78.0	75.5	75.5	75.7	76.2	75.5	76.2	77.7	78.2	78.5	78.0	78.5	78.0	76.2		
E 630	79.5	78.7	79.2	79.0	78.2	77.0	78.5	79.7	80.0	80.5	80.7	80.2	78.7	77.2		
Q 800	80.7	80.7	80.5	78.7	78.0	78.7	79.2	80.2	80.5	81.2	81.0	81.0	79.7	77.5		
U 1000	81.2	80.5	79.0	78.0	77.7	78.5	79.7	81.0	81.2	82.2	83.0	82.7	81.2	77.5		
E 1250	93.2	90.0	86.7	86.0	86.5	87.5	90.5	92.2	91.0	93.7	92.5	93.2	92.0	88.2		
N 1600	85.5	85.0	83.7	83.0	82.0	82.5	84.5	86.0	86.5	88.0	87.0	86.7	85.2	81.0		
C 2000	84.2	84.7	84.0	82.7	82.5	81.7	83.7	86.0	87.5	88.7	89.0	87.7	85.2	81.2		
Y 2500	88.7	88.7	88.2	86.2	86.7	85.7	86.0	89.0	88.7	91.2	91.2	95.5	91.7	88.5		
3150	85.2	84.0	84.0	82.7	82.0	81.0	82.0	85.2	86.5	88.5	88.0	89.2	86.0	82.0		
H 4000	92.2	92.0	91.2	89.7	90.0	87.7	91.2	93.2	95.2	97.0	97.5	99.0	95.5	91.0		
Z 5000	92.2	91.5	90.5	89.5	88.2	86.5	89.5	91.5	93.5	96.7	97.0	97.5	96.0	90.5		
6300	84.7	84.5	83.2	82.7	81.0	79.5	81.2	84.2	86.5	88.5	89.2	90.2	89.0	84.5		
8000	93.5	92.5	91.5	89.5	87.7	85.5	86.5	91.5	92.7	94.0	95.0	95.5	95.2	88.5		
10000	90.7	90.0	89.2	87.5	85.2	83.7	84.5	88.5	90.7	92.5	93.5	93.5	93.5	88.0		
12500	93.5	92.0	91.0	90.0	88.0	85.0	86.0	90.0	91.5	94.0	95.2	96.7	94.5	87.0		
16000	89.2	87.0	85.5	84.5	82.5	79.0	79.2	83.5	85.2	87.2	89.5	90.7	87.0	81.0		
20000	81.0	79.0	77.7	76.7	74.2	71.2	71.2	75.2	77.0	79.5	82.0	83.0	79.7	73.0		
25000	73.0	72.0	70.7	69.5	67.2	64.2	64.0	67.2	68.7	71.7	73.7	75.2	71.5	65.0		
31500	68.5	67.5	67.0	65.0	63.5	61.2	61.0	63.2	65.0	67.5	69.5	70.2	67.0	63.0		
40000	65.7	65.0	63.7	63.0	62.0	60.0	60.0	61.5	63.0	65.0	66.7	67.5	64.5	61.0		
DB(L)	101.2	100.5	99.0	98.0	96.5	95.5	97.7	100.2	101.5	103.5	104.0	105.0	103.2	98.5		
PNL 10FT FLYOVER	107.8	109.6	110.2	109.9	110.5	109.4	112.0	114.0	115.0	116.1	115.3	114.9	110.2	102.7		

TABLE 12A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- NO WING
BLADE ANGLE- 35.0
TIP SPEED-801.0

FREQUENCY	AZIMUTH ANGLE (DEG) 150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
50	68.2	67.7	69.0	68.5	68.2	68.2	68.0	68.7	67.7	68.0	67.7	69.0	69.0	69.2		
63	71.7	72.0	72.7	71.5	71.5	70.7	71.7	72.0	71.7	71.7	71.7	72.5	72.0	74.0		
80	75.0	75.5	75.2	75.2	74.7	74.7	74.2	75.7	75.0	75.5	75.0	75.5	75.7	77.5		
100	82.7	82.7	82.5	82.5	82.7	82.5	82.5	82.5	82.0	82.7	82.5	82.7	83.0	83.2		
125	81.7	81.0	82.0	84.2	84.7	83.7	81.5	79.5	78.0	80.2	79.7	81.2	81.7	81.7		
160	88.7	87.5	90.2	92.2	93.2	91.7	88.0	83.5	81.2	84.0	85.2	86.0	85.0	83.7		
200	75.7	76.2	76.5	76.7	77.2	77.5	77.7	78.0	76.0	78.5	79.5	79.5	79.2	80.2		
250	79.7	80.2	80.7	80.5	80.7	81.2	81.2	81.7	78.5	81.2	81.2	82.0	82.5	82.5		
315	84.0	86.0	86.0	84.7	85.7	85.7	85.0	85.2	83.0	85.0	85.2	85.0	85.0	85.0		
F 400	81.0	81.2	81.2	82.2	82.7	83.2	82.7	83.5	80.2	83.0	82.7	82.5	82.2	81.5		
R 500	79.7	81.5	82.7	83.7	83.2	82.7	83.7	84.7	81.0	84.7	84.0	83.5	83.5	83.0		
E 630	84.5	86.2	85.5	85.0	84.0	84.5	85.2	85.0	82.7	85.2	85.7	85.5	85.0	84.5		
Q 800	87.7	87.2	85.2	84.2	84.7	84.5	85.0	85.5	82.7	86.0	86.2	86.7	86.7	84.7		
U 1000	87.7	85.7	85.5	84.5	85.5	84.7	85.5	86.7	83.7	87.0	88.0	88.7	89.0	86.2		
E 1250	88.2	87.7	87.2	86.7	87.2	87.7	88.0	89.7	86.5	91.0	91.0	90.7	90.2	88.7		
N 1600	101.5	99.5	100.0	96.2	98.2	96.0	94.0	99.2	93.2	99.0	98.2	99.2	100.0	97.5		
C 2000	100.7	98.7	99.2	96.2	97.5	95.5	93.5	98.5	93.2	98.7	98.5	99.2	100.0	96.7		
Y 2500	88.7	88.2	87.7	88.0	87.5	88.2	90.0	92.7	89.7	93.2	93.5	93.2	93.5	89.2		
3150	99.7	95.5	96.0	96.7	95.0	95.5	95.5	99.0	97.5	101.0	101.0	103.5	102.5	95.7		
H 4000	99.5	96.2	96.7	96.5	95.5	95.5	96.5	100.0	98.5	102.2	101.7	103.5	102.7	96.0		
Z 5000	102.0	103.0	103.2	98.2	98.0	98.0	101.5	102.0	103.0	107.0	106.2	106.5	106.5	101.5		
6300	94.5	95.0	95.2	93.2	92.0	90.7	92.5	96.2	94.5	97.0	99.2	99.5	99.5	94.2		
8000	100.0	99.2	99.0	98.2	97.5	95.5	97.5	100.7	98.5	101.2	104.5	104.0	105.2	100.2		
10000	97.7	97.0	96.5	96.0	94.5	93.2	94.5	97.5	95.2	99.0	102.2	102.0	103.0	99.0		
12500	102.0	101.0	100.0	99.5	98.5	96.7	97.5	100.0	97.5	101.0	103.7	105.0	106.0	98.5		
16000	96.5	96.0	96.0	94.7	93.5	91.0	91.5	93.5	92.0	95.2	97.0	99.2	100.0	92.7		
20000	88.5	88.2	87.5	87.7	85.5	83.7	83.5	86.0	84.2	87.0	89.7	91.0	93.0	85.5		
25000	82.0	81.7	81.7	81.0	79.5	77.7	76.5	78.5	75.0	79.2	82.5	84.0	85.2	78.2		
31500	77.7	78.0	77.7	76.7	76.0	74.0	73.5	74.7	72.7	75.7	78.2	79.5	80.5	75.0		
40000	75.0	75.5	75.0	74.7	73.5	71.5	72.5	73.0	70.7	74.0	76.2	77.2	77.5	72.7		
DB(L)	110.5	109.0	109.2	107.5	102.0	106.0	107.0	109.2	107.7	111.5	112.2	112.7	113.7	108.0		
PNL 10FT FLYOVER	116.3	118.3	120.1	118.2	118.8	118.8	120.8	122.3	121.1	124.2	123.0	122.0	119.8	112.0		

TABLE 13A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- NO WING
BLADE ANGLE- 45.0
TIP SPEED-598.0

FREQUENCY	AZIMUTH ANGLE (DEG) 150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	59.5	59.2	60.0	60.7	65.2	78.2		
63	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.7	63.7	64.2	65.0	68.0	79.7		
80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.2	68.2	68.2	69.5	72.2	79.7		
100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	82.5	82.5	81.0	80.2	79.2	80.5		
125	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.2	76.7	77.2	77.0	77.2	78.5		
160	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	74.5	74.0	75.2	75.0	76.7	79.0		
200	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.0	76.7	78.0	77.0	77.7	79.0		
250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.5	77.5	79.0	78.7	78.7	79.5		
315	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.0	80.7	81.2	81.0	81.0	81.2		
F 400	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	81.0	80.2	80.2	80.7	80.7	79.0		
R 500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.7	83.0	83.0	82.5	82.0	80.5		
E 630	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.0	85.2	84.7	83.7	83.2	82.7		
Q 800	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	85.0	85.0	85.5	85.5	84.0	81.5		
U 1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	86.0	87.0	87.5	87.0	85.2	81.5		
E 1250	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.2	94.2	98.0	95.7	95.2	87.5		
N 1600	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.0	92.2	92.0	90.5	88.5	84.2		
C 2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.5	93.5	94.5	92.2	89.2	85.7		
Y 2500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	95.2	94.2	96.7	97.7	95.7	91.0		
3150	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93.0	94.0	94.7	95.7	91.2	87.7		
H 4000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	102.2	104.2	102.7	104.5	97.0	94.5		
Z 5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	101.2	104.5	103.0	102.5	98.0	93.5		
6300	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	93.2	95.7	96.5	95.7	92.0	89.2		
8000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	98.5	100.7	101.2	101.7	97.5	92.0		
10000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.2	98.0	99.7	100.2	95.2	92.2		
12500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	97.5	99.5	102.0	101.7	95.7	91.5		
16000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	91.2	93.2	95.2	95.0	89.7	84.7		
20000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.0	85.5	87.2	88.0	81.7	76.0		
25000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	75.5	78.0	80.2	80.5	74.2	69.2		
31500	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.0	73.7	75.0	75.7	70.2	66.2		
40000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.5	70.5	72.5	72.5	68.2	65.0		
	← DATA TAPE VOICE CHANNEL UNINTELLIGIBLE →															
DB(L)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	108.0	109.7	110.0	110.0	105.7	101.2		
PNL 10FT FLYOVER	18.0	20.2	21.8	22.9	23.6	24.0	24.1	24.0	121.4	122.3	120.7	120.0	112.6	106.4		

TABLE 14A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- NO WING
BLADE ANGLE- 45.0
TIP SPEED-683.0

		AZIMUTH ANGLE (DEG)														
		150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
	50	67.7	67.7	67.2	67.5	68.2	67.2	68.2	67.0	68.2	67.7	68.0	69.5	71.7	83.7		
	63	71.2	71.2	71.2	71.0	70.7	71.2	72.0	72.0	71.7	71.7	72.0	72.2	75.0	85.5		
	80	74.5	74.7	73.5	74.2	74.5	73.7	74.5	74.7	75.0	74.5	75.0	75.7	78.2	85.7		
	100	81.0	81.0	80.7	80.5	81.2	79.5	81.7	81.5	81.5	81.5	81.5	81.7	80.7	85.5		
	125	89.5	90.0	86.0	87.7	92.0	93.5	93.7	92.2	91.2	88.5	88.2	89.2	90.0	89.0		
	160	77.2	77.0	77.5	78.0	78.0	78.2	79.2	79.2	79.0	79.2	79.2	80.2	81.2	84.0		
	200	76.7	76.0	77.0	77.0	76.7	78.0	78.5	78.5	78.7	79.0	80.2	80.5	81.7	84.0		
	250	81.0	81.0	81.7	81.2	83.5	83.2	83.7	84.0	83.5	83.2	82.7	83.0	83.5	84.7		
	315	82.2	82.0	82.0	82.2	82.5	82.5	83.0	83.2	83.2	83.0	83.5	84.0	84.7	85.5		
F	400	86.5	83.7	83.2	86.0	83.7	84.7	86.0	84.5	84.0	84.0	84.0	85.2	85.0	85.0		
R	500	81.5	84.7	85.5	85.0	84.2	83.2	84.5	85.0	84.2	85.2	85.5	84.5	84.2	83.5		
E	630	88.0	89.5	88.2	87.2	86.2	87.2	87.5	87.0	87.2	87.2	87.2	86.7	85.7	84.5		
Q	800	90.5	88.7	87.2	87.0	87.2	87.2	87.0	88.2	88.2	88.7	88.7	88.2	86.2	84.5		
U	1000	90.0	89.0	88.7	87.2	87.2	86.5	88.0	88.2	88.7	90.2	90.2	89.7	88.0	85.0		
E	1250	93.2	92.2	92.0	91.2	90.0	90.2	90.7	92.2	93.5	93.7	93.2	93.0	91.0	87.0		
N	1600	102.0	99.5	99.5	98.7	96.2	96.2	96.7	99.0	101.0	101.0	99.5	100.0	98.0	94.5		
C	2000	93.0	92.2	92.2	91.7	91.0	92.2	93.2	95.2	95.5	97.0	96.7	96.0	92.0	89.0		
Y	2500	92.0	91.0	91.5	90.5	89.2	91.0	92.2	94.2	94.7	96.0	95.5	95.5	92.7	90.5		
	3150	99.0	96.5	96.7	96.0	94.5	97.7	98.0	98.2	99.0	100.2	100.5	102.2	98.2	96.0		
H	4000	99.7	101.7	99.7	98.0	98.5	97.0	99.2	102.7	103.5	106.0	103.7	103.2	97.0	93.5		
Z	5000	101.5	103.5	101.0	99.5	99.7	98.2	100.7	104.2	105.0	107.7	105.5	106.0	99.2	95.5		
	6300	95.5	96.7	96.7	97.5	95.2	95.0	95.7	99.2	103.0	103.7	102.0	102.2	96.2	94.2		
	8000	100.5	101.2	100.7	100.2	99.2	98.2	99.0	101.0	101.7	105.0	105.2	105.5	99.2	94.2		
	10000	97.2	98.5	97.7	97.5	95.7	95.2	96.2	98.5	100.0	101.5	103.7	103.0	97.5	95.0		
	12500	101.2	101.0	100.5	100.0	99.0	97.7	98.2	100.0	101.5	103.7	105.2	104.7	98.2	93.5		
	16000	97.5	96.5	96.7	96.0	94.2	92.2	92.0	93.2	95.2	97.2	99.0	99.0	91.5	88.0		
	20000	89.7	88.7	88.7	88.7	86.0	84.2	84.0	85.0	86.5	89.0	90.5	90.7	83.5	79.5		
	25000	84.0	82.7	83.5	82.7	80.5	78.0	77.5	77.7	78.5	81.7	82.7	83.2	76.7	73.0		
	31500	81.0	79.7	79.7	79.0	77.0	74.5	74.2	74.7	75.0	77.2	78.5	78.0	73.7	71.7		
	40000	78.5	78.5	77.7	77.5	75.0	73.5	72.5	73.2	74.0	75.5	76.7	76.2	73.2	71.0		
	DB(L)	109.5	110.0	108.5	108.2	107.2	107.0	108.0	110.2	111.2	113.5	112.7	113.0	107.5	104.7		
PNL	10FT FLYOVER	116.2	119.2	119.3	119.4	119.7	119.8	121.4	123.8	124.3	125.6	123.2	122.0	114.6	109.1		

TABLE 15A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- NO WING
BLADE ANGLE- 50.0
TIP SPEED-599.0

		AZIMUTH ANGLE (DEG)														
		150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
	50	59.2	58.2	58.5	58.7	59.5	58.5	58.5	59.0	59.5	59.5	60.2	61.2	66.5	80.0		
	63	63.0	62.7	63.0	62.7	63.7	63.2	62.5	63.7	63.5	64.7	64.5	66.5	69.5	82.7		
	80	66.7	67.0	66.5	67.2	67.7	67.7	67.5	68.5	68.0	68.7	69.7	70.5	74.0	82.2		
	100	81.5	81.0	79.5	75.5	74.2	78.0	80.5	81.5	82.0	80.2	78.2	77.0	78.0	82.7		
	125	77.2	76.7	75.5	73.7	73.0	75.0	77.0	78.5	78.0	77.2	76.2	75.7	77.5	81.0		
	160	72.7	73.7	74.0	74.7	73.7	74.5	74.5	75.0	75.5	75.0	76.2	77.0	77.5	80.7		
	200	77.7	77.0	75.0	74.2	78.0	78.0	77.5	78.0	78.2	77.7	78.0	78.5	79.2	80.0		
	250	78.0	78.0	78.0	77.5	78.7	79.2	79.5	79.2	79.2	79.7	79.7	81.0	81.0	81.0		
	315	81.2	81.7	83.0	81.7	81.2	82.0	81.5	82.0	82.5	82.5	82.2	82.0	82.5	82.5		
F	400	81.2	80.2	80.0	81.7	81.2	81.5	81.0	82.2	82.5	82.5	82.2	82.2	81.7	81.7		
R	500	81.0	82.0	83.5	84.0	83.2	82.0	83.0	84.0	84.7	84.2	84.5	84.2	83.5	81.7		
E	630	85.0	87.2	87.0	86.0	84.5	85.2	85.5	86.2	86.0	87.0	85.7	86.0	85.0	83.0		
Q	800	88.7	88.0	87.0	85.7	85.5	86.0	85.5	87.0	87.0	87.2	87.7	87.5	85.7	83.7		
U	1000	89.2	88.0	87.0	86.0	86.2	86.0	87.0	88.2	88.2	89.5	89.5	89.0	87.2	82.5		
F	1250	98.7	98.7	99.0	94.5	97.2	97.0	96.5	97.2	99.7	97.7	95.0	94.0	93.0	88.7		
N	1600	92.5	92.5	92.5	91.7	91.5	91.2	92.0	93.0	94.0	94.7	94.2	92.7	90.5	86.5		
C	2000	92.7	93.0	92.5	92.2	91.5	91.2	92.5	94.2	94.7	95.7	95.2	94.5	91.0	87.5		
Y	2500	95.0	96.5	95.0	93.2	93.0	93.0	92.5	95.7	96.0	96.0	96.2	97.0	94.7	92.5		
	3150	93.5	93.0	93.0	92.2	91.0	90.5	91.5	94.2	95.2	95.7	96.7	97.2	92.7	89.5		
H	4000	98.5	101.2	100.0	98.2	96.0	96.5	99.5	101.0	104.2	104.2	104.5	104.7	97.2	93.2		
Z	5000	99.0	98.7	98.5	98.7	96.5	96.5	98.0	99.7	103.7	103.5	103.7	103.0	98.2	94.5		
	6300	93.2	93.0	92.5	92.2	90.5	90.0	91.0	93.5	95.2	97.5	97.7	97.5	93.2	90.7		
	8000	99.0	98.7	99.0	98.7	97.5	96.6	96.5	100.5	100.7	102.2	102.7	103.2	97.5	92.5		
	10000	96.5	96.0	96.0	95.7	94.5	92.6	94.0	96.2	98.0	101.0	101.0	101.5	96.0	92.5		
	12500	99.7	99.5	99.0	98.7	97.0	95.2	96.5	98.2	99.0	101.7	103.0	103.0	96.2	91.0		
	16000	95.5	95.0	95.0	94.5	91.0	91.0	90.0	91.5	92.5	95.0	96.7	96.7	90.0	85.5		
	20000	88.5	87.2	87.5	86.5	85.0	83.0	82.5	83.7	84.2	87.5	88.2	88.7	82.2	77.2		
	25000	82.2	81.7	82.0	80.5	78.2	76.5	75.0	76.2	76.7	80.2	81.5	81.5	75.0	70.5		
	31500	78.5	78.0	77.5	76.5	75.0	72.3	71.0	72.0	73.7	76.0	77.2	77.2	71.2	67.7		
	40000	75.7	75.7	75.0	74.2	72.0	70.0	69.0	70.0	71.2	73.0	74.0	74.5	69.7	66.5		
	DB(L)	107.7	108.2	107.0	106.7	105.0	104.7	105.5	107.7	110.0	111.0	111.0	111.0	105.7	102.2		
PNL	10FT FLYOVER	114.1	117.7	118.5	118.2	117.5	118.0	119.9	121.5	123.4	123.0	122.1	120.6	113.0	106.6		

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TABLE 16A

PROP-FAN MODEL/STOL WING NOISE DATA

CONFIGURATION- NO WING
BLADE ANGLE- 50.0
TIP SPEED-641.0

		AZIMUTH ANGLE (DEG)														
		150	140	130	120	110	100	90	80	70	60	50	40	30	20	10	0
	50	68.2	68.2	68.0	68.7	67.7	68.7	68.0	67.7	68.0	68.0	68.7	69.2	70.7	83.2		
	63	71.7	71.5	71.2	71.7	72.0	71.7	71.5	72.0	72.7	72.0	72.2	72.5	74.0	85.0		
	80	75.5	74.5	75.5	75.5	75.5	75.5	75.0	75.0	75.7	76.0	75.7	77.0	77.7	84.7		
	100	83.7	83.7	83.2	83.0	83.7	84.5	84.2	84.0	83.7	84.0	83.5	83.7	84.7	86.2		
	125	87.0	88.2	85.0	83.7	87.7	90.2	90.5	89.2	87.5	84.5	84.0	86.0	87.2	87.5		
	160	78.2	78.7	79.0	79.2	79.0	79.2	79.0	79.7	79.5	80.0	80.5	81.0	82.2	84.2		
	200	78.0	76.5	76.7	77.5	77.7	78.5	79.0	80.2	80.2	81.5	81.5	81.5	82.0	83.0		
	250	84.5	80.5	80.0	80.0	82.0	84.0	84.5	86.0	86.5	87.0	86.0	86.0	85.7	85.2		
	315	86.0	85.2	85.5	86.0	85.5	86.2	87.0	86.7	85.7	86.0	86.0	86.5	86.2	86.2		
F	400	83.7	81.7	82.7	84.0	83.2	83.7	85.0	84.7	84.0	85.0	84.0	84.0	84.2	84.0		
R	500	83.0	85.2	86.2	86.0	84.2	84.7	85.5	85.5	85.5	86.0	86.0	86.0	85.0	83.2		
E	630	88.2	89.0	88.5	86.7	86.0	87.2	88.0	87.0	87.0	88.0	88.5	87.5	86.0	85.0		
Q	800	90.2	89.5	87.5	86.2	87.5	87.0	87.5	88.5	88.7	88.5	89.0	89.5	87.0	84.7		
U	1000	91.0	89.0	88.7	87.5	87.7	87.0	88.5	89.0	89.5	91.0	91.0	90.0	88.7	84.2		
E	1250	95.2	95.2	95.0	95.2	92.7	91.5	96.5	93.2	97.5	100.0	97.0	99.5	93.0	90.7		
N	1600	95.7	95.2	95.7	96.0	93.7	93.0	97.5	95.2	98.5	100.5	97.5	99.0	94.0	91.5		
C	2000	94.5	93.5	93.5	92.7	92.2	93.0	94.5	96.2	97.2	98.0	98.0	96.5	93.5	89.5		
Y	2500	96.0	94.5	94.2	93.2	91.2	91.5	92.5	96.0	97.5	99.5	100.0	97.5	95.5	92.2		
	3150	96.7	95.5	95.7	94.2	93.7	92.7	94.0	97.0	97.5	99.0	101.5	99.5	96.5	92.2		
H	4000	101.0	106.2	104.5	101.0	102.5	100.0	101.5	103.0	104.7	105.0	108.0	106.5	100.5	95.2		
Z	5000	100.2	100.5	100.0	99.2	98.2	98.0	99.0	101.2	104.0	105.0	105.0	105.5	99.0	95.5		
	6300	96.7	95.5	96.2	95.7	95.2	95.5	96.0	97.0	100.0	102.5	102.0	101.5	96.5	93.5		
	8000	102.0	101.7	101.2	100.7	99.0	97.7	99.5	101.5	103.0	104.5	105.5	105.5	99.5	94.0		
	10000	98.5	97.5	97.7	97.0	95.7	94.5	96.0	98.5	100.5	102.5	103.5	103.5	97.5	94.5		
	12500	102.2	101.5	101.2	100.5	99.5	97.5	99.0	100.5	102.0	104.0	105.5	105.5	98.5	93.5		
	16000	98.2	97.2	97.0	96.0	94.5	92.0	93.0	94.0	96.5	97.5	99.5	99.5	92.5	87.2		
	20000	91.0	89.7	89.5	89.0	86.0	84.2	84.0	86.0	87.0	89.5	91.5	91.5	85.0	79.2		
	25000	84.7	83.7	83.7	82.5	80.5	77.7	78.0	78.7	80.0	82.0	83.5	83.5	77.0	73.0		
	31500	81.2	80.0	80.2	79.0	72.5	74.7	74.5	75.5	76.0	78.0	79.0	79.5	74.5	71.5		
	40000	79.0	78.0	77.5	76.0	70.5	72.7	73.0	73.2	75.0	76.0	77.0	77.0	73.5	70.5		
	DB(L)	109.7	110.5	109.5	109.0	108.0	107.0	108.5	109.5	111.0	113.0	113.5	113.0	108.0	104.5		
PNL	10FT FLYOVER	116.5	121.1	121.6	120.6	121.6	120.7	122.3	123.5	124.7	124.9	125.4	122.3	115.8	108.6		

APPENDIX B

DATA ACCURACY CONSIDERATIONS

INTRODUCTION

The Prop-Fan/STOL Wing test data is unique in that the test item is a simple aerodynamic configuration, the test environment is close to ideal, and a range of operating conditions were tested. In order to make the data from this program useful to other acoustic investigators, an analysis of the accuracy of the data presented has been conducted. This analysis which is summarized below includes evaluation of: (1) measurement and analysis system frequency response, (2) averaging time during data reduction, and (3) influence of total background noise on the test data.

SYSTEM FREQUENCY RESPONSE

Prior to testing, the CEC VR3300 tape recorder frequency response was determined by recording oscillator signals at various frequencies from 100 to 40 KHz at a constant input voltage and playing back on the Hamilton Standard data reduction system. Since both the narrow band and one-third octave band analyzers used for data reduction were limited to 20 KHz, the test data was played back at one-half the tape speed used during recording to allow analysis to 40 KHz. Consequently, the frequency characteristics were determined at 7 1/2 ips. Figure 1B shows the frequency response. Since the microphone of interest required a nose cone windscreen to reduce wind noise in the Prop-Fan wake, it is therefore necessary to consider the microphone/windscreen response at zero degree incidence. This response, as shown on Figure 2B, falls off rapidly from 15K to 20 KHz. Past 20 KHz the response is unpredictable due to standing waves between the nose cone housing and the microphone diaphragm. It should be noted that the data presented has not been corrected for this variation in frequency response.

DATA REDUCTION AVERAGING TIME

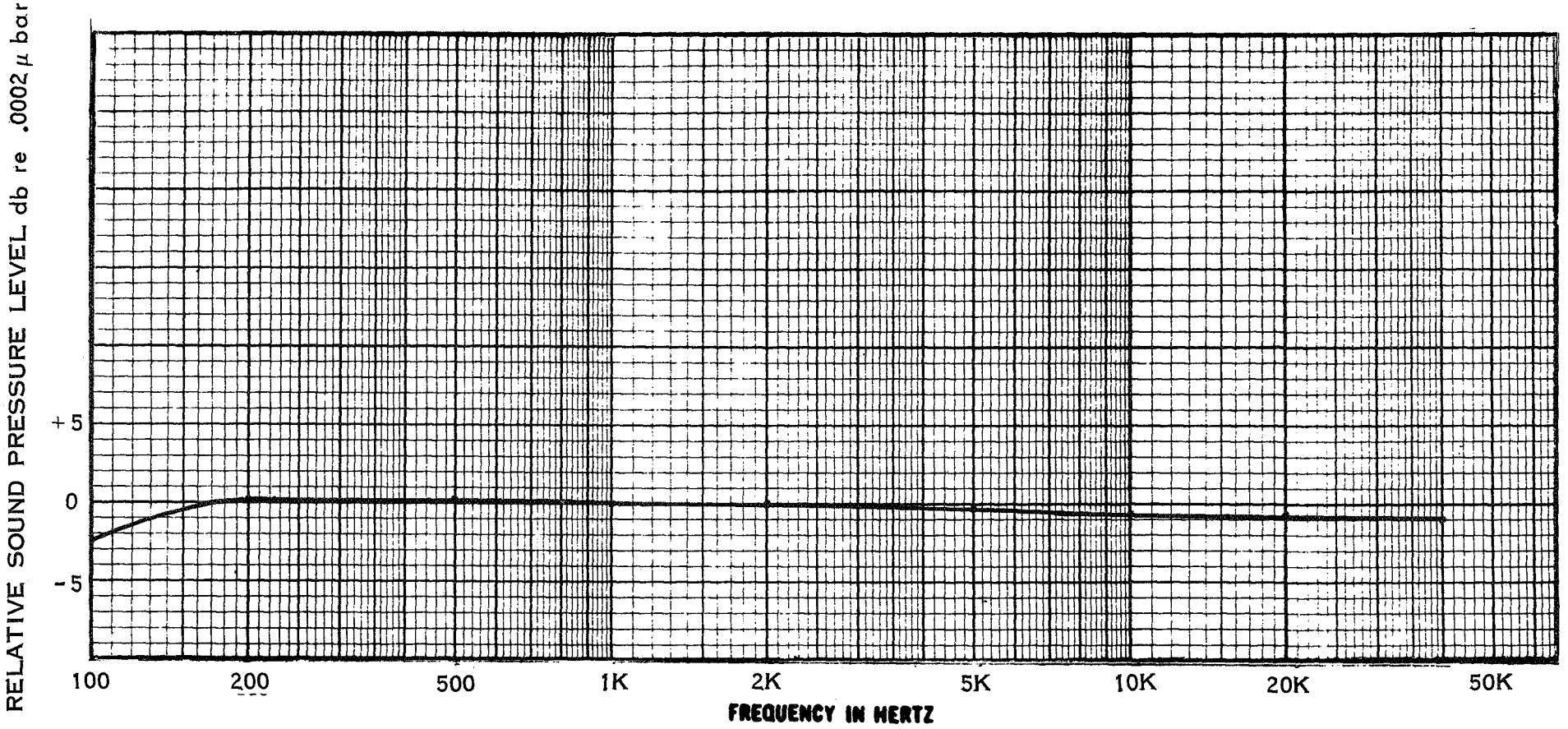
In analyzing the sweep data, which was recorded from a microphone traversing at approximately 0.5 degree per second, it was necessary to select an averaging time which would minimize the statistical error without sacrificing the directional character of the data.

For the data reduction using one-third octave filters, an averaging time of four seconds was selected to facilitate data reduction while minimizing statistical error. In order to determine this error, a single four-minute stationary data point was analyzed continuously using a four-second averaging time. The results, as shown on Figure 3B, indicate the spread of data to be 3 dB or less in all but one of the one-third octaves considered. In like manner, an averaging time of 0.5 second was chosen for the narrow band (40 Hz constant bandwidth filter) analysis.

TOTAL BACKGROUND NOISE

Prior to each set of tests, background noise measurements were made at various input gain settings of the tape recorder signal conditioners, for each microphone. These recordings, when played back through the data

reduction system, include ambient acoustic noise as well as the electrical noise of the recording system, playback system, and analyzer system. These total background noise levels are shown on each of the narrow band curves of Figures 27 through 29.



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TITLE CEC VR3300 FREQUENCY RESPONSE

ANALYSIS EQUIPMENT

Sheet ___ of ___ Date ___ Analyzed by ___

Comments, Sketches, Etc.

HSF-1678 3/68*

Figure 1B

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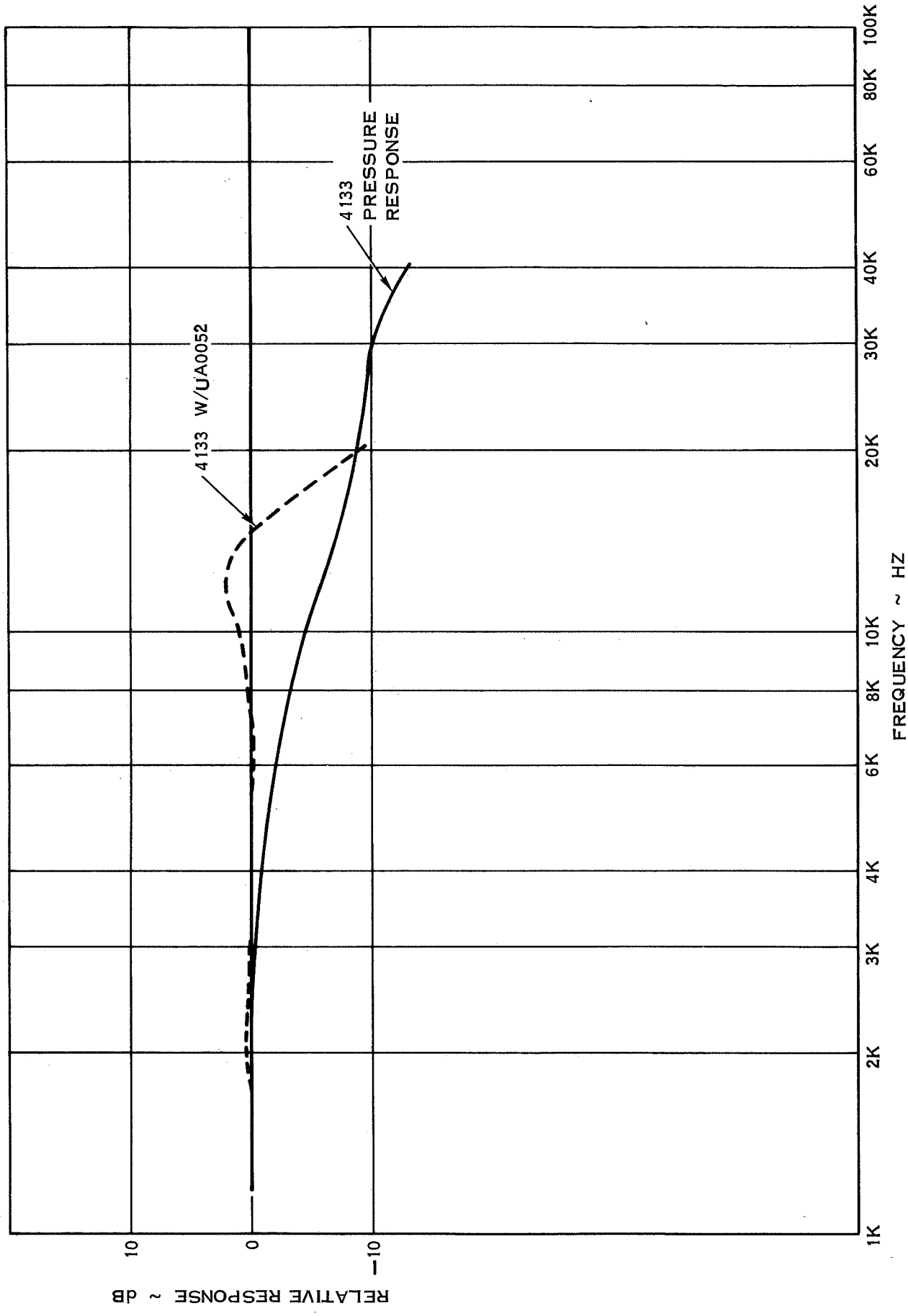

FIGURE 2B. MICROPHONE/WIND SCREEN FREQUENCY RESPONSE

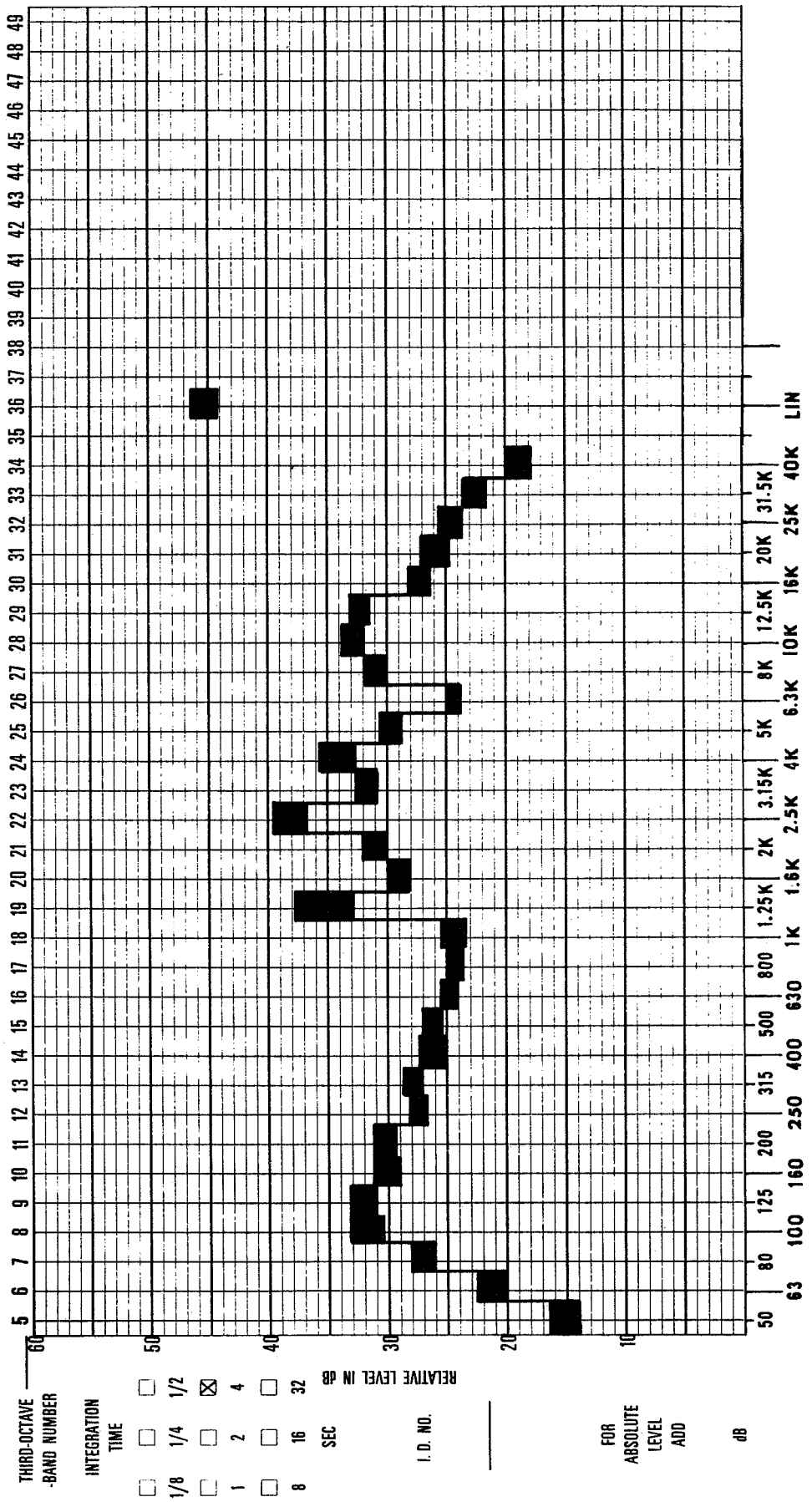

FIGURE 3B PROP-FAN/STOL WING NOISE VARIANCE

APPENDIX C

REFERENCES

REFERENCES

1. Metzger, F. B. and Ganger, T. G., "Results of Initial Prop-Fan Model Acoustic Testing," Volume I Hamilton Standard, NASA CR111842, December, 1970.